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RCRA FACILITY INVESTIGATION WORK PLAN

Heritage Environmental Services
Lemont, Illinois
U.S.E.P.A. Identification No. ILD085349264
DLPC 0311620007

Prepared for:

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October 29, 1993

HR/E Job No. 6119

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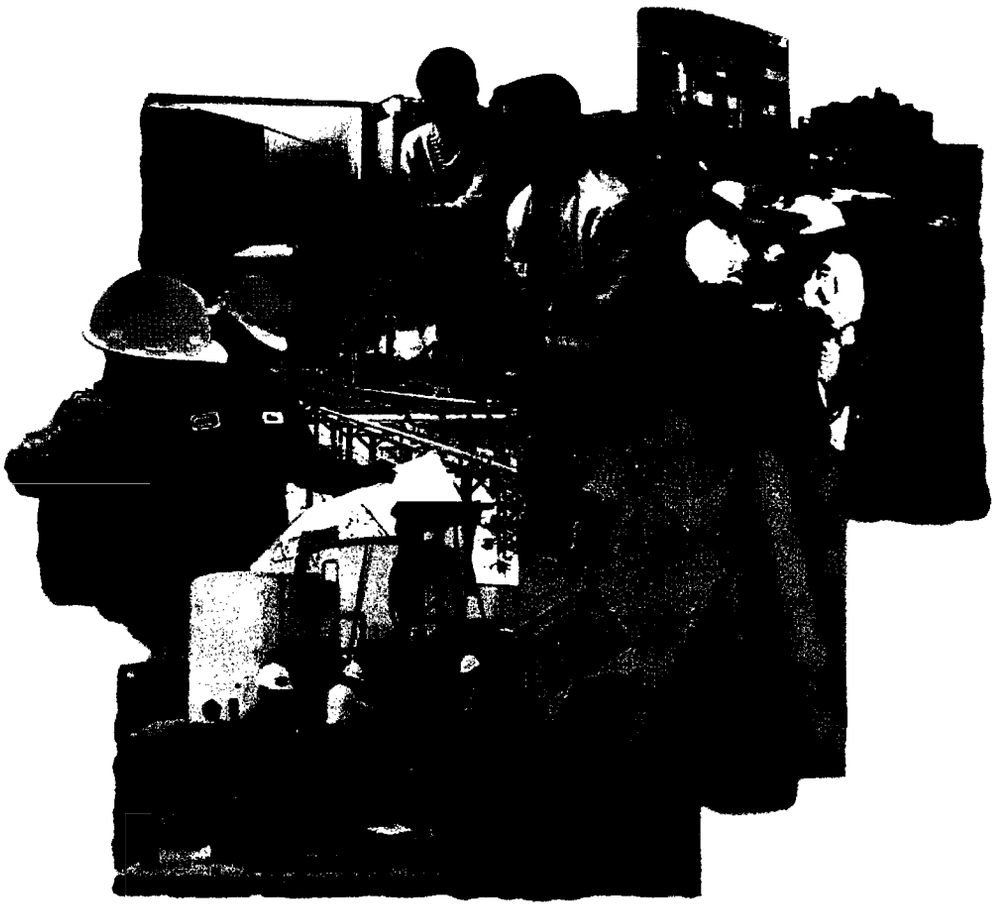

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TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 GENERAL FACILITY INFORMATION 1
- 2.1 Facility Background 1
  - 2.1.1 Facility Description 1
  - 2.1.2 Facility History 1
  - 2.1.3 SWMUs 3
  - 2.1.4 Geology And Hydrology At Site 6
  - 2.1.5 Site Features 7
  - 2.1.6 Topographical Maps 8
  - 2.1.7 History of Releases at the Site 9

3.0 NATURE AND EXTENT OF CONTAMINATION 1
- 3.1 Phase I Activities 2

4.0 PROJECT MANAGEMENT PLANS 1
- 4.1 Project Management Plan 2
- 4.2 Field Sampling Plan 2
- 4.3 Quality Assurance Project Plan (QAPjP) 3
- 4.4 Data Management Plan 3
- 4.5 Health and Safety Plan 4

5.0 IMPLEMENTATION OF RFI 1

6.0 REPORTS 1

7.0 INTERIM MEASURES 1

8.0 SCHEDULE 1

Appendix I Figures
- Figure 1 Site Location
- Figure 2 Existing Facility

Appendix II Tables
- Table 1 Solid Waste Management Units
- Table 2 Preliminary Schedule for Implementation of RFI

Appendix III List of Materials Permitted for Storage and/or Treatment

Appendix IV Release Incident Reports

Appendix V ESCA Report

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Appendix VI	IWS Well List
Attachment 1	Quality Assurance Project Plan
Attachment 2	Data Management Plan
Attachment 3	Health and Safety Plan
Attachment 4	Phase I RFI Project Management Plan

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1.0 INTRODUCTION

Heritage Environmental Services, Inc. (HERITAGE) owns and operates a commercial and industrial waste storage and treatment facility in Lemont Township, unincorporated Cook County, Illinois. HERITAGE also engages in the cleaning of industrial and marine storage vessels at this facility. As part of the requirements under the facility's RCRA permit, the facility has been requested by the Illinois Environmental Protection Agency's (IEPA) Division of Land Pollution Control (DLPC) to conduct a RCRA Facility Investigation (RFI) and as necessary to implement a Corrective Action Plan (CAP). The purpose of the RFI is to determine whether releases of hazardous wastes and hazardous constituents have occurred from any of the solid waste management units (SWMUs) identified during the IEPA's RCRA Facility Assessment (RFA) as listed in Table 1, and the nature and extent of these releases. Based upon the results of the RFI, a CAP will be developed and implemented by HERITAGE as necessary to protect the human health and the environment from all releases of hazardous wastes and hazardous constituents, listed in Appendix H of 35 IAC Part 721.

This work plan describes procedures for performing an evaluation of potential releases at the SWMUs as identified in Table 1 at the HERITAGE - Lemont facility. Table 1 also presents the environmental element of concern at each of the SWMUs as identified in the permit.

This RFI Work Plan describes the location and characteristic of each SWMU; discusses the integrity of the secondary containment where of concern, the specific sampling requirements at each SWMU where required; the rationale for collection of samples, test parameters; and

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summarizes quality assurance/quality control (QA/QC) requirements for the investigation. In support of the RFI Work Plan the following documents have been prepared and are included as Attachments to the RFI Work Plan. These documents include the Health and Safety Plan (HASP) and the Quality Assurance Project Plan (QAPjP).

The RFI will be conducted in three phases;

- Phase I is to provide information on the characteristics and integrity of each SWMU and to conduct the necessary field activities to evaluate the potential for a release to occur to the soil or air from these SWMUs.

- Phase II may be required if the IEPA's DLPC determines that it is necessary to define the extent of any release identified as having occurred or is occurring to the soils and air from any SWMU or if the results are inconclusive.

- Phase III will be required if the IEPA's DLPC determines that hazardous wastes or constituents have potentially migrated to the groundwater. The purpose of the Phase III efforts are to define the extent of the release and its migration on and off-site within the groundwater.

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2.0 GENERAL FACILITY INFORMATION

2.1 Facility Background

2.1.1 Facility Description

The HERITAGE facility is located on the north bank of the Chicago Sanitary and Ship Canal, Mile 301.2 in Lemont Township, Cook County, Illinois. The HERITAGE facility is a commercial industrial waste storage and treatment facility (SIC 9969) which also engages in the cleaning of industrial and marine storage vessels. The location of the facility is shown in Figure 1 and a plan of the existing operating area of the facility is presented in Figure 2.

The operating portion of the facility occupies approximately 8.7 acres of the 17.2 acres of property leased from the Metropolitan Water Reclamation District of Greater Chicago. As a result of its activities, HERITAGE has located on-site a variety of hazardous materials and wastes which may include ignitable, corrosive, reactive and toxic substances. A listing of the materials accepted at the HERITAGE facility are presented in Appendix III.

2.1.2 Facility History

The property occupied by HERITAGE is owned by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) (formerly Metropolitan Sanitary District of Greater Chicago) and leased to HERITAGE. Prior to

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December 1992, the Lemont Industrial District leased the property from the MWRDGC and in turn subleased the 17.2 acres to HERITAGE. Based upon records from the Lemont Industrial District, Inc., the property was leased to Marine Fleeting Company which repaired and maintained fleeting and storage of barges and boats from May 1965 to April 1966. From July 1971 to May 1979, Certified Cleaning Services leased the property for the same purpose as Marine Fleeting. In late 1980 Petrochem subleased the property from the Lemont Industrial District. At this time, the property was undeveloped. With occupancy of the site by Petrochem, the office/maintenance shop building and parking areas were constructed. Petrochem was primarily involved in the cleaning of industrial marine vessels. In 1981, the tank farm was constructed. During the time period from 1981 to 1987, Petrochem provided maintenance and cleaning services and stored and disposed of oily waste, hazardous waste fuels and fuels/oils at and from its tank farm facility. It also provided brokering services for other wastes generated in responding to emergency spills.

In 1987 Petrochem constructed an aerosol can crushing unit which was located to the southwest of the tank farm in the area which is presently south of the Van Trailer Storage Area. The facility in 1987 consisted of the office/maintenance shop, the tank farm, truck transfer area, container storage area, the aerosol crushing unit and the barge unloading area. All waste materials brought in to the facility were stored and processed in the appropriate manner within these areas.

In September 1988 the aerosol can crushing unit burned and was destroyed. This incident and the actions undertaken are described in the substance release report provided in the Part B Application Permit, Section L-Z, Attachment L-1.

In 1988 Petrochem was acquired by Heritage Environmental Services, Inc. and merged with Process Engineering Group to form Heritage Remediation/Engineering, Inc. (HR/E). At this time the operations involving the storage and handling of wastes at the Lemont facility were incorporated into HERITAGE, separating this element from HR/E. Presently HERITAGE - Lemont consists of the facilities as shown in Figure 2.

2.1.3 SWMUs

In accordance with condition B.1 of Section III, the following SWMUs, shown in Figure 2, were identified to be addressed in the RFI.

- Truck Transfer Area

  The truck transfer area is located as shown in Figure 2. All materials transported to the site are received in this area for acceptance prior to their being processed at the facility. Bulk organic-based materials are sampled and tested to ensure the material is within the permitted criteria for acceptance at the facility. Upon acceptance, the material is off-loaded at the liquid transfer station located along the north side of the tank farm and the south side of the truck transfer area.

- Outdoor Container Storage Area

  The outdoor container storage area is located at the west end of the tank farm. This area is utilized to store containers which will be staged with other compatible material, and transported to other facilities for final management.

- Van Container Storage Area

  The van container storage area is located to the south of the tank farm as shown in Figure 2. This area is used to temporarily hold and store containerized waste materials for further processing at the facility, materials resulting from industrial and governmental emergency response actions and the storage of materials in quantity to be transported to other facilities for final management.

- Roll-off Box Storage Area

  The roll-off box storage area is located at the southeast corner of the tank farm area. This area is utilized to store roll-off containers of non-hazardous tank bottoms, emergency response debris, strained/filtered solids and debris, and "RCRA-empty" crushed drums.

- Drum Crushing Unit

  The drum crushing unit is located at the southwest corner of the container storage and processing building. This unit is utilized to compact "RCRA-empty" drums.

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- Barge Cleaning Transfer Point

  The barge cleaning transfer point is the location along the west side of the barge slip at which all connections to hosing for pumping materials from the barges are located.

- Old Aerosol Can Crushing Unit

  This area was located south of the existing van trailer area and was utilized to empty and collect the contents of aerosol cans with the empty container being crushed and disposed as a "RCRA-empty" container. In 1988 this unit was destroyed by a fire. This area is now a bituminous paved area for the movement of vehicles into and out of the container storage and processing building and the van trailer storage area, see Figure 3.

- Underground Sanitary Waste Holding Tank

  This unit consists of a 10,000 gallon sanitary waste holding tank and a 2,000 gallon overflow tank. These tanks are located to the west of the offices at the northwest corner of the office building. Sanitary wastes from the facility are accumulated within these tanks. The tanks are periodically pumped of their contents and transported to the Lemont Wastewater Treatment Plant for disposal.

- Drainage Ditch and Tile Leading to Chicago Sanitary and Ship Canal

  The drainage ditch is located to the west of the office building and traverses the site from north to south. The drainage pattern is shown

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in Figure 7. At this time flow in the ditch occurs during rain events draining the site and is also the conveyance for water seepage from the Des Plaines River south dike during periods of high water. The seepage primarily occurs along the bank area adjacent to and north of the office parking area. In order to minimize the impact of this non-site surface water at the facility, it is HERITAGE's intent to either construct an asphalt lined swale or to install a culvert in place of the ditch as it exists along the upper portion of the site. At the discharge end of the ditch HERITAGE has constructed a weir and a control gate by which flow to the Chicago Sanitary and Ship Canal can be stopped in the event that a release occurs at the facility which might migrate via this route.

2.1.4 Geology And Hydrology At Site

In general, bedrock has been encountered at the site at an elevation of 587 feet. As seen in the contour map provided in Section B-2 of the permit the entire site elevation is essentially the top of bedrock.

The Chicago Sanitary and Ship Canal water level is normally 578 feet above sea level while the Des Plaines River is generally at an elevation of 586 feet above sea level. Based upon these water levels and the top of the bedrock, subsurface flow would essentially traverse the site from the Des Plaines River to the north to the Chicago Sanitary and Ship Canal to the south. These waterways and the steep gradient between them, one percent slope, essentially

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preclude the potential migration of contaminants in any direction other than the Chicago Sanitary and Ship Canal, of which there is no evidence of this occurring.

2.1.5 Site Features

As seen in Figure 1, the site is bounded to the north by the Des Plaines River and to the south by the Chicago Sanitary and Ship Canal. Located to the north of the Des Plaines River, is the Argonne National Laboratory Reservation. This area is typified by forest and wetland areas. To the south of the Chicago Sanitary and Ship Canal the area is typified by former quarry operations and KA Steel Chemical, Inc., a barge facility. Immediately to the east of the site is Egan Marine which engages in barge cleaning, chartering and towing. To the west of the facility are located several industrial type operations: INTAC Automotive Products; ABC Firewood and TRDA Wood Products; Lake and Rivers, Inc., a barge repair and equipment rental operation; and Tri Rivers Docks, a bulk barge transfer facility for dry materials.

Figure 8 shows the location of all wells within 1,500 feet of the site on record with the Illinois Water Survey. See Appendix VI for the IWS list. There are no wells on the list within 1,500 feet. These wells would not be impacted by the site since they are across the river ways.

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As a result of the undeveloped and light industrial nature of the surrounding area, releases which potentially could occur are limited to the population at the facility and generally, if airborne, to the population immediately to the east of the site. Because of the containment protection provided at each SWMU and the overall control of surface water runoff from the site by the control gate on the drainage ditch, most releases, should they occur, would be on the ground with the surrounding environment not considered to be susceptible to contaminant exposure.

2.1.6 Topographical Maps

The appropriate topographical maps are provided in Section B-1 of the Part B Permit and as appropriate to the performance of this RFI Work Plan are provided herein. In the permit application a topographical map of the site at a scale of one-inch equals 80 feet with contour intervals of 1 foot has been provided. This map shows the site and surrounding property for a distance of 100 feet. Since the topography of the site property boundaries ensure all surface water run-around occurs into the site and only discharges along the Chicago Sanitary and Ship Canal, HERITAGE believes that this map in conjunction with the 7½ minute topographical map of the area is adequate and should be considered as satisfaction of the topographical map requirements.

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2.1.7 History of Releases at the Site

In Section L, Attachment L-1, HERITAGE provided documentation of two releases at the site and response actions undertaken which occurred at the site prior to HERITAGE's ownership of the facility. In Appendix IV of the Work Plan is a list of releases which have been documented and the response actions undertaken since HERITAGE acquired the facility. As can be seen from review of this list the releases have been minor in nature and contained within the appropriate SWMU area.

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3.0 NATURE AND EXTENT OF CONTAMINATION

The location of the SWMUs as addressed within this RFI are shown in Figure 2. Specifics with respect to the construction, operation and the quantity as well as the types of wastes handled at the various SWMUs have been previously addressed in the Part B Permit. Furthermore, Material Safety Data Sheets are also available at the facility office for review.

At this time HERITAGE does not have any evidence that contamination to the environment has occurred at any of the SWMUs as a result of HERITAGE's and its predecessors' prompt attention to any and all releases at the site.

In the course of preparing this RFI the structural integrity of the following units were evaluated by ESCA Consultants, Inc.:

- Outdoor Container Storage Area
- Roll-off Storage Area
- Van Trailer Container Storage Area
- Truck Transfer Area
- Tank Farm

The results and findings of this evaluation are presented in Appendix V. This evaluation and review of past reported releases were utilized, consistent with the efforts as identified in Table 1 in the development of the Phase I activities of the RFI Work Plan.

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3.1 Phase I Activities

Based upon this review process, the following activities are proposed to be performed at the specific SWMUs in Phase I of the RFI:

- Truck Transfer Area

  As specified in the permit by the IEPA with the establishment that the integrity of the secondary containment system by ESCA is competent at this SWMU, further investigative studies in this area at this time are not proposed.

- Outdoor Container Storage Area

  As specified in the permit by the IEPA with the findings by ESCA, that while the overall condition of this SWMU is in good condition, the presence of several shrinkage cracks, which potentially penetrate the concrete slab, warrants additional investigative efforts at this area. HR/E proposes to advance five (5) borings at this SWMU. These borings will be located at and along the significant shrinkage cracks as identified by ESCA, see Figure 5. The specific locations and procedures are presented in the Phase I RFI Project Management Plan and its supportive documents.

- Van Trailer Container Storage Area

  As specified in the permit by the IEPA and the finding by ESCA that while the secondary containment system was in good condition, the presence of depressions in the asphalt from the trailer supports and a rebar in the pavement as well as a 2 inch diameter hole warrant additional investigation,

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see Figure 4. HR/E proposes to advance a total of five (5) soil borings within this SWMU area. As specified in the permit a sixth soil sample will be collected immediately adjacent to the west side of this SWMU, outside the area of the berm, which had been noted by the IEPA as deteriorated and which has already been repaired.

- Old Aerosol Can Crushing Unit

  As specified in the permit, soil sampling in the area of the old aerosol can crushing unit will be conducted by HR/E. Since this unit had been located in the area now covered by bituminous pavement between the van trailer storage area and the container storage and processing unit, HR/E proposes to advance two soil borings in the area of this former SWMU, see Figure 3.

- Roll-off Box Storage Area

  As specified in the permit by the IEPA and based upon the findings of ESCA that concrete at the SWMU is in fair condition with several cracks which penetrate the slab, HR/E proposes to advance four boring within this SWMU area at locations of significant cracks in the concrete floor, see Figure 6.

- Drum Crushing Unit

  As specified in the permit by the IEPA, the integrity of the secondary containment system at this SWMU will be evaluated. Based upon this evaluation should the integrity of the system be found lacking, soil sampling in the area of the failure will be conducted.

- Underground Sanitary Waste Holding Tanks

  In accordance with the permit specified by the IEPA the integrity of tanks should be determined and as necessary soil samples collected in the area. Since these tanks are of fiberglass construction and are directly connected to the sanitary sewers, conventional tightness tests are not feasible. Therefore, HR/E proposes to advance one soil boring in this area. This soil sample will be visually observed for evidence of contamination and will be analyzed for volatile organic constituents similar to the tank contents as required in the permit, see Figure 3.

- Barge Cleaning Transfer Point

  In accordance with the permit, as specified by the IEPA, a soil sample will be collected in the area of the transfer point from the barge to the land based facility, see Figure 3.

- Drainage Ditch and Tiles Leading To The Chicago Sanitary And Ship Canal

  As specified in the permit by the IEPA, soil samples will be collected along the length of the ditch as part of the Phase I RFI activities. HR/E proposes to collect soil samples at five locations throughout the length of the ditch. HERITAGE is currently involved in an evaluation of lining and other construction options along the ditch, see Figure 3.

- Other

  As a result of the extensive covering of the site by bituminous materials and the relative absence of soil cover separating these surfaces and the underlying

bedrock, HR/E anticipates that the soil samples collected in the various SWMU areas may exhibit chemical constituents found in this bituminous material. Therefore, HR/E proposes to advance three soil borings adjacent to and inside the northern edge of the office area parking lot, see Figure 3. These samples would be considered as background conditions for these areas in which bituminous materials are present as the overlying surface.

4.0 PROJECT MANAGEMENT PLANS

In the course of performing the RFI as defined within this Work Plan, HR/E has prepared the specific Project Management Plans by which the Phase I activities of the RFI will be conducted. HR/E will, as it is determined necessary prepare the documents by which the Phase II and/or Phase III activities will be conducted.

The documents to be prepared and submitted to the IEPA for approval shall consist of the following:

- Project Management Plan
- Field Sampling Plan
- Quality Assurance Project Plan
- Data Management Plan
- Health and Safety Plan

The Project Management Plan and the Field Sampling Plan shall be specific to each phase of the RFI, while the Quality Assurance Project Plan, Data Management Plan, and the Health and Safety Plan will be prepared as addendums to the previous phase of work performed during this RFI. As such, these plans have been prepared as attachments to this RFI Work Plan and have been prepared to address the overall direction of the RFI Work Plan and specifically to address the Phase I RFI activities.

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4.1 Project Management Plan

As each phase of the Work Plan is implemented, the Project Management Plan (PjMP) specific to the phase activities shall be prepared. The Phase I RFI PjMP has been prepared and is attached as part of this RFI Work Plan.

The PjMP outlines the specific objectives, the technical approach for achieving these objectives, personnel necessary to accomplish the technical approach, the schedule of activities, and the budget for accomplishing these efforts as outlined. The PjMP also provides the qualifications of the key personnel performing and/or directing the RFI and the overall approach for management of the RFI efforts.

4.2 Field Sampling Plan

The Field Sampling Plan (FSP) for each phase of work to be performed during the RFI will be prepared as an attachment to the PjMP. This plan will be prepared specific to the sampling efforts conducted during each phase of the RFI. The FSP for the Phase I activities of the RFI have been prepared and are included as an attachment to the Phase I RFI PjMP.

For each Phase of the RFI work the FSP will be prepared to contain the specific objectives of the sampling to be performed; the procedures and methods of the investigative activities to be conducted; specification of equipment necessary to perform the work; the analysis to be performed, the number of samples to be

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collected, the location of the samples, and the basis for these selections; and schedules for performance of the work.

In summary the FSP for each phase of the RFI will describe in detail how that specific phase will be implemented.

4.3 Quality Assurance Project Plan (QAPjP)

The QAPjP, which is provided as Attachment 1 has been prepared primarily to address the Phase I RFI activities. This QAPjP will, if necessary, be utilized and amended as necessary, specific to the activities which might be conducted, should Phase II or Phase III of the RFI Work Plan be required.

The QAPjP presents the organization, objectives, functional activities and specific Quality Assurance (QA) and Quality Control (QC) procedures associated with the performance of the RFI Work Plan. The QAPjP describes the specific protocols which will be followed for sampling, sample handling and storage, chain of custody, laboratory and field analysis and the procedures which will be followed to ensure the data collected is of known quality which would be usable, defensible and can be utilized for decision making.

4.4 Data Management Plan

The Data Management Plan has been prepared for the Phase I activities and is included as Attachment 2 to this RFI Work Plan. This Data Management Plan will

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be amended as necessary to reflect any changes in the plan which may be required during the performance of Phase II or Phase III of the RFI should they be required to be performed. The Data Management Plan will provide the basis by which the data will be collected and managed to maintain its uniqueness as well as the manner in which the data will be evaluated and presented to provide a concise and meaningful summation of the results of the RFI.

The Data Management Plan will also define the project progress reporting procedures and documents.

4.5 Health and Safety Plan

The Health and Safety Plan (HASP) for performing the RFI activities is provided as Attachment 3. This HASP will constitute the HASP for all phases of the RFI with minor modifications. These modifications will primarily be associated with the specific and unique site activity of the various Phases of the RFI Work Plan, such as groundwater sampling if required.

5.0 IMPLEMENTATION OF RFI

HR/E is prepared to implement the activities defined within this RFI Work Plan for the HERITAGE facility in Lemont, Illinois, upon approval of the Work Plan Documents by which all activities will be conducted.

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6.0 REPORTS

HR/E will prepare and submit quarterly progress reports to HERITAGE for submittal to the IEPA documenting the activities conducted. At the conclusion of the activities defined in the specific Phase of the RFI. HR/E will submit a final report summarizing the findings of the RFI activities conducted at the site for submittal to the IEPA. The specifics of these reports are defined in the Data Management Plan for the particular Phase of the RFI.

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7.0 INTERIM MEASURES

During the performance of the RFI, should HERITAGE identify the necessity to implement an interim measure for the purposes of preventing continuing releases and/or mitigating the results of releases and/or the migration of hazardous wastes or constituents, HERITAGE shall notify and confirm with the IEPA the necessity for implementing this measure. HERITAGE shall submit to the IEPA the objectives of the interim measure, the design of the measure, and a schedule for implementing the interim measures for approval of implementation of the interim measure.

At this time, depending upon the results of the RFI activities, it is HERITAGE's intention to implement the recommendations by ESCA in performing the necessary maintenance of the secondary containment systems. This will be accomplished in the Spring of 1994 since the sealers to be utilized must be placed within specific temperature ranges, generally greater than 40°F and less than 70°F. HERITAGE also envisions implementing the lining or other control measures for the ditch at this same time.

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8.0 SCHEDULE

HR/E is prepared to commit the necessary resources to implement the RFI Work Plan upon notification by HERITAGE. Figure 9, Appendix I presents a preliminary schedule for implementation of the RFI activities.

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APPENDIX I

FIGURES

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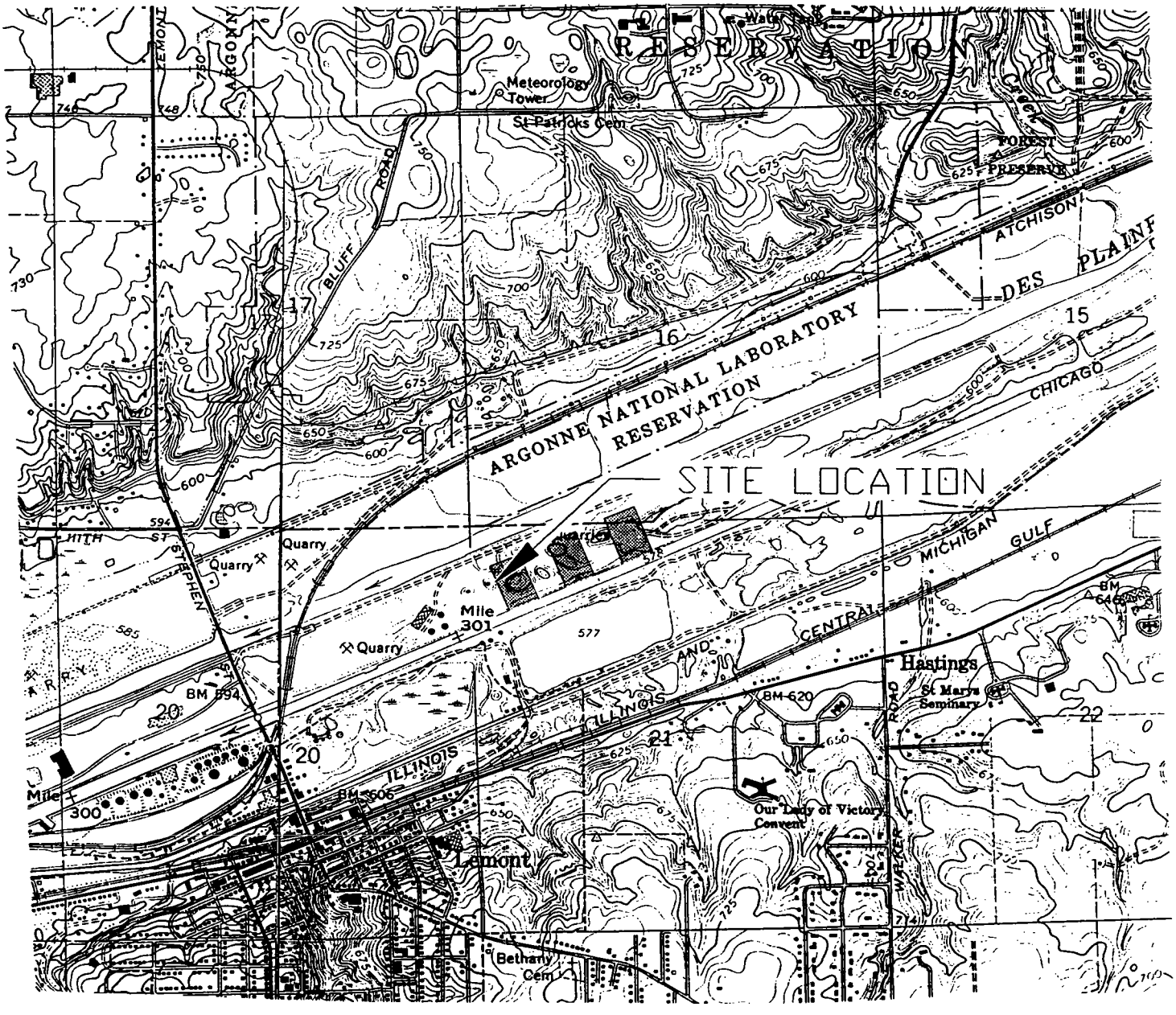

SAG BRIDGE AND ROMEOVILLE QUADRANGLES

Illinois 7.5 Minute Series

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HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

SITE LOCATION MAP

REVISIONS

HERITAGE

HERITAGE REMEDIATION/ENGINEERING, INC.

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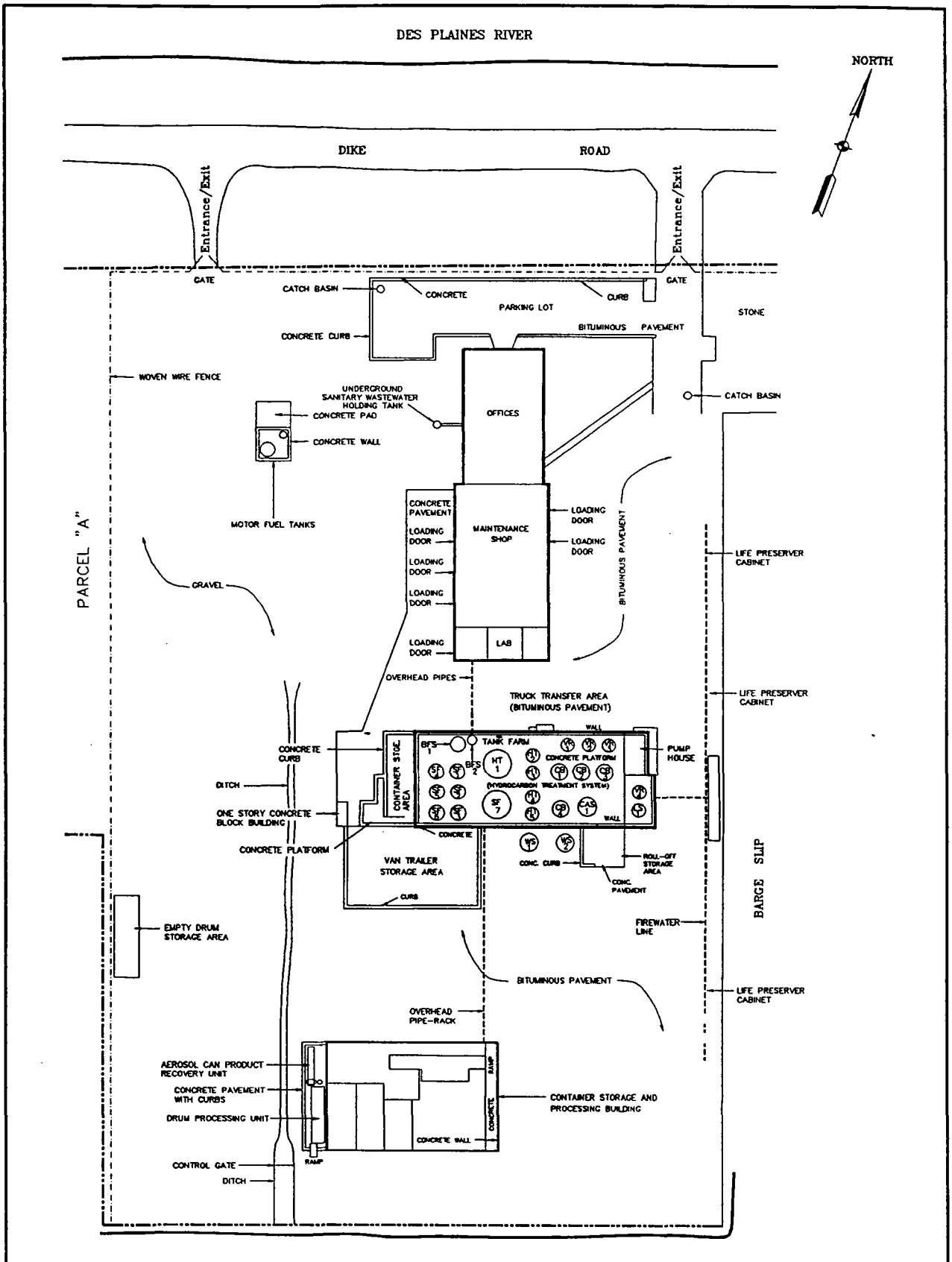
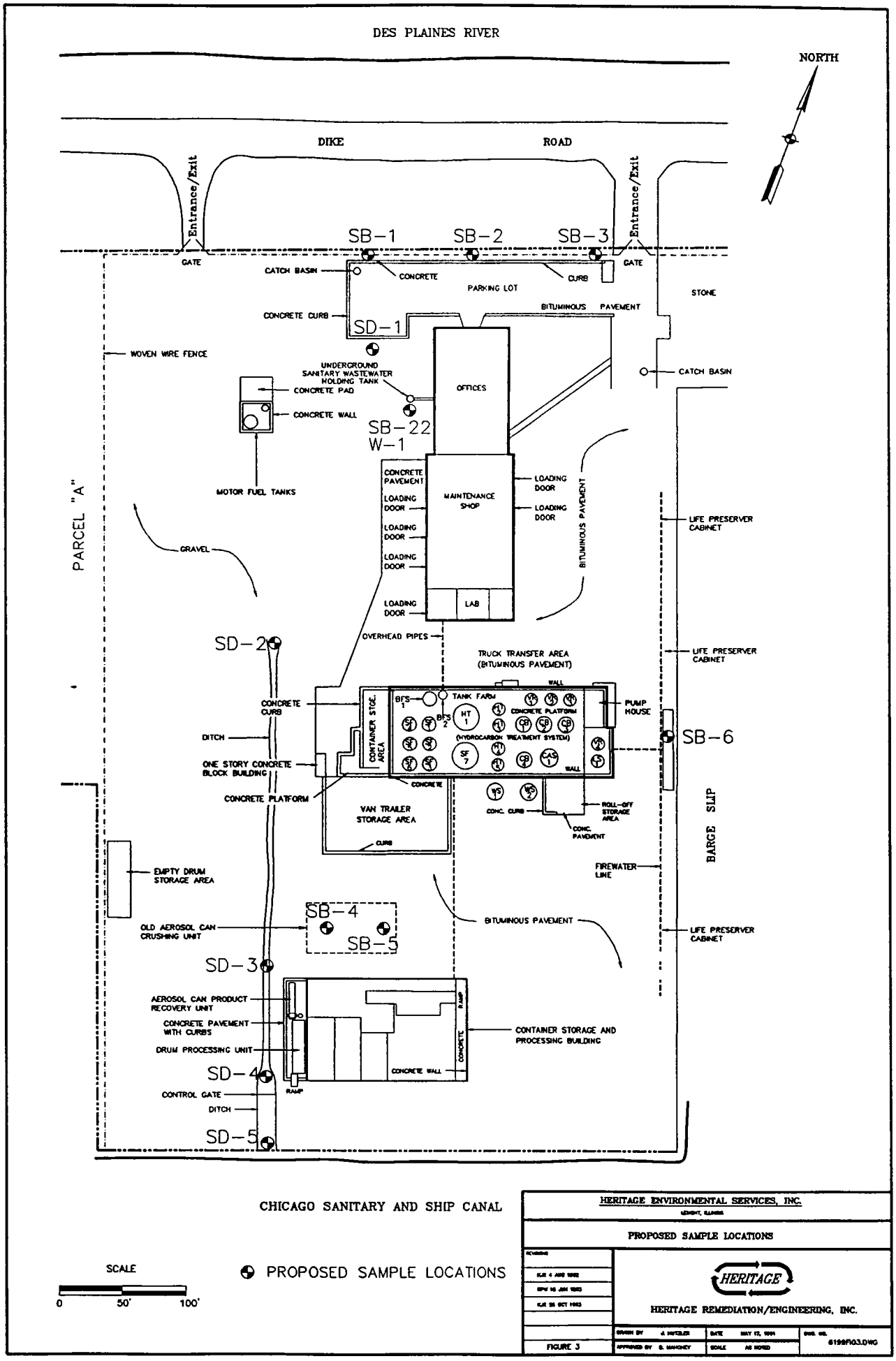


HERITAGE ENVIRONMENTAL SERVICES, INC.

EXISTING FACILITY

HERITAGE REMEDIATION/ENGINEERING, INC.

FIGURE 2


DES PLAINES RIVER
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SB-3
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PARKING LOT
STONE
BITUMINOUS PAVEMENT
CONCRETE CURB
SD-1
WOVEN WIRE FENCE
UNDERGROUND SANITARY WASTEWATER HOLDING TANK
CONCRETE PAD
CONCRETE WALL
SB-22
W-1
OFFICES
CATCH BASIN
MOTOR FUEL TANKS
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LIFE PRESERVER CABINET
PARCEL "A"
GRAVEL
OVERHEAD PIPES
SD-2
TRUCK TRANSFER AREA (BITUMINOUS PAVEMENT)
LIFE PRESERVER CABINET
WALL
CONCRETE CURB
BFS 1
BFS 2
TANK FARM
HT 1
CONCRETE PLATFORM
PUMP HOUSE
CONTAINER STOR. AREA
(HYDROCARBON TREATMENT SYSTEM)
SF 7
SB-6
DITCH
ONE STORY CONCRETE BLOCK BUILDING
CONCRETE
CONCRETE PLATFORM
VAN TRAILER STORAGE AREA
CURB
CONC. CURB
ROLL-OFF STORAGE AREA
CONC. PAVEMENT
BARGE SLIP
FIREWATER LINE
EMPTY DRUM STORAGE AREA
SB-4
SB-5
OLD AEROSOL CAN CRUSHING UNIT
BITUMINOUS PAVEMENT
LIFE PRESERVER CABINET
SD-3
AEROSOL CAN PRODUCT RECOVERY UNIT
CONCRETE PAVEMENT WITH CURBS
DRUM PROCESSING UNIT
RAMP
CONCRETE
CONCRETE WALL
CONTAINER STORAGE AND PROCESSING BUILDING
SD-4
CONTROL GATE
DITCH
SD-5
CHICAGO SANITARY AND SHIP CANAL
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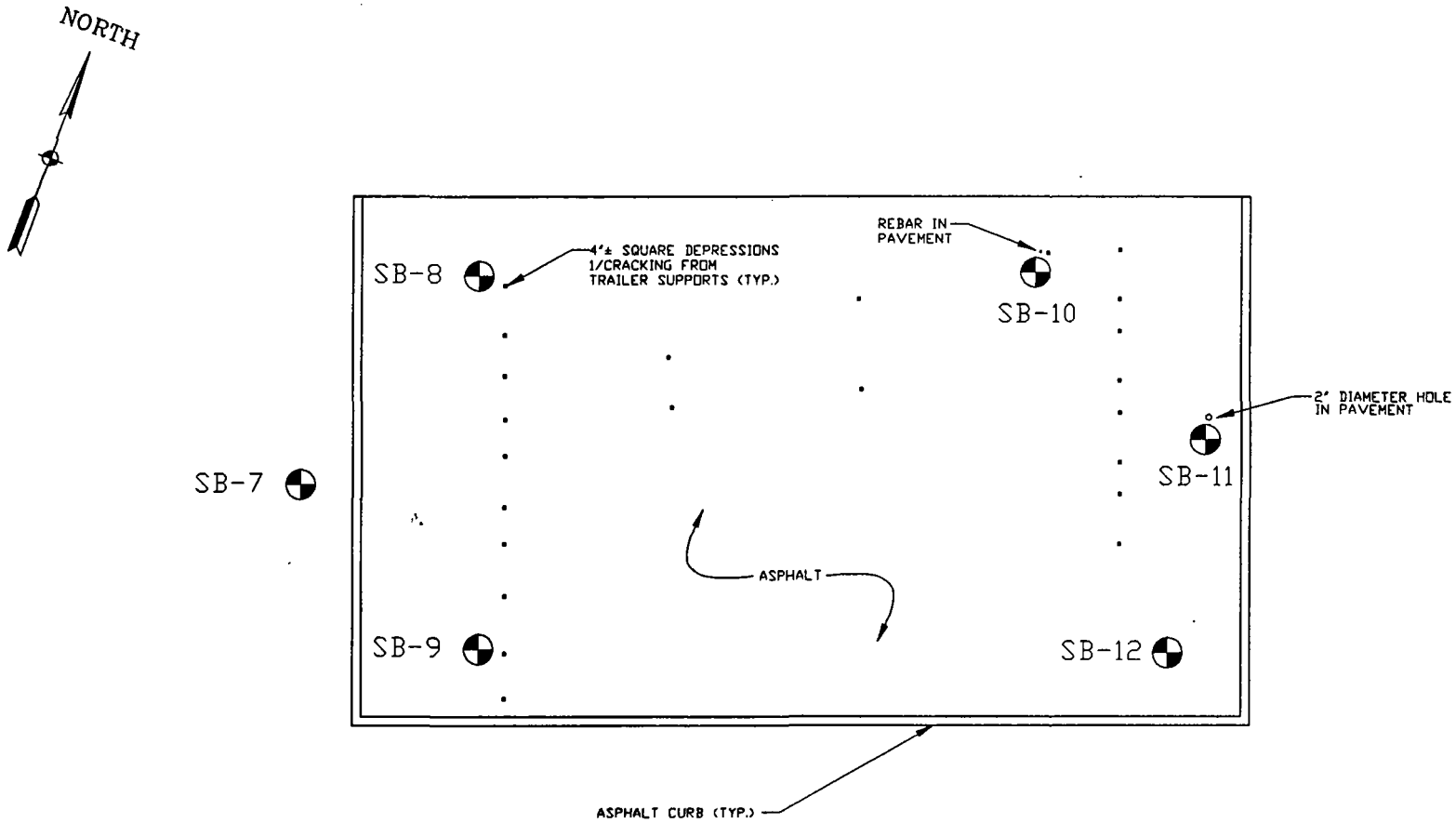
50'
100'
PROPOSED SAMPLE LOCATIONS
HERITAGE ENVIRONMENTAL SERVICES, INC.
PROPOSED SAMPLE LOCATIONS
HERITAGE
HERITAGE REMEDIATION/ENGINEERING, INC.
FIGURE 3
6199FIG3.DWG



⊕ - PROPOSED SOIL SAMPLE LOCATION

SCALE

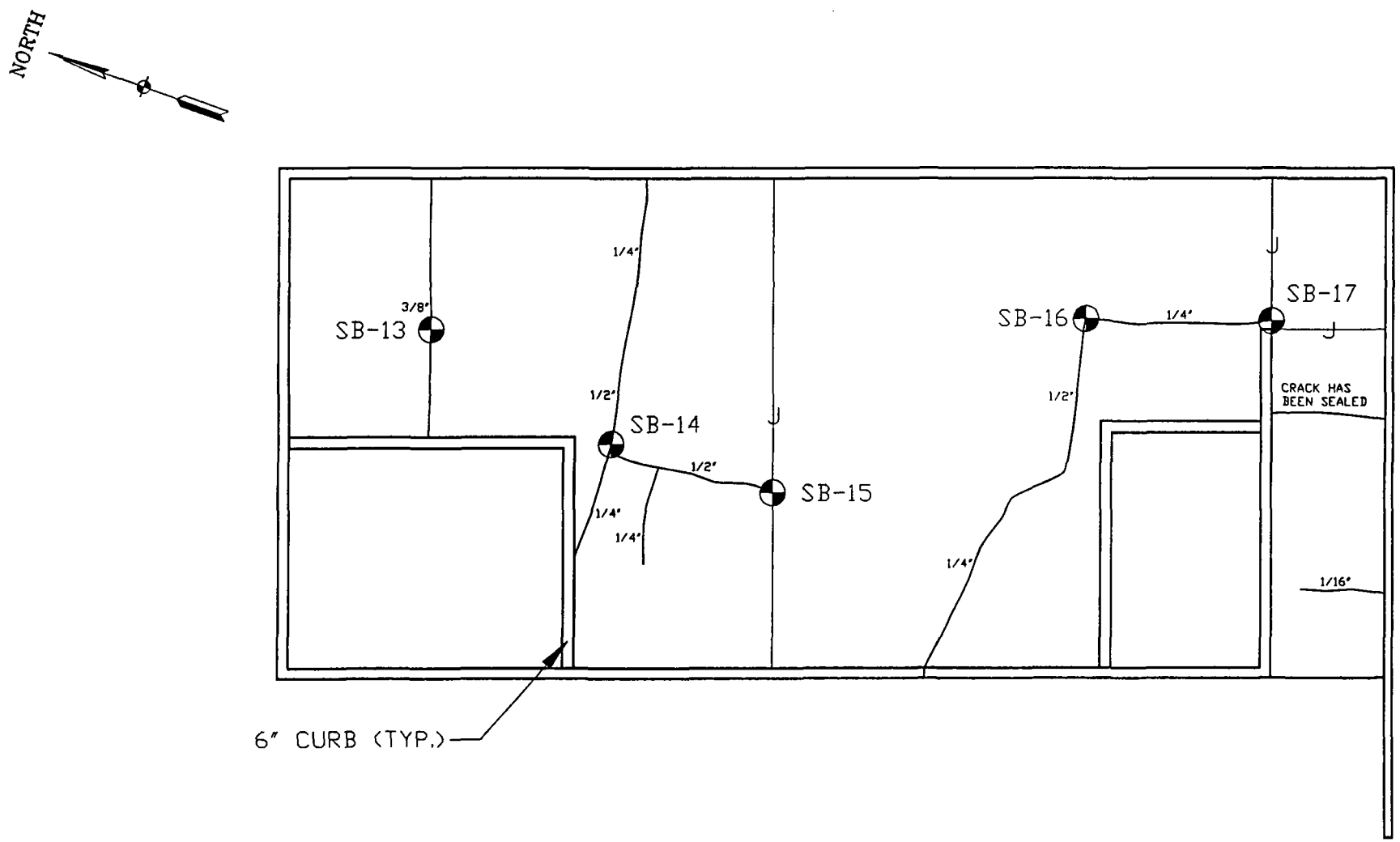
0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

VAN TRAILER FARM - PROPOSED SAMPLE LOCATIONS

REVISIONS			
	DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 4
	APPROVED BY	SCALE 1"=20'	JOB NO. 6119

HERITAGE REMEDIATION/ENGINEERING, INC.



- PROPOSED SOIL SAMPLE LOCATION

- DENOTES CONSTRUCTION JOINT

SCALE

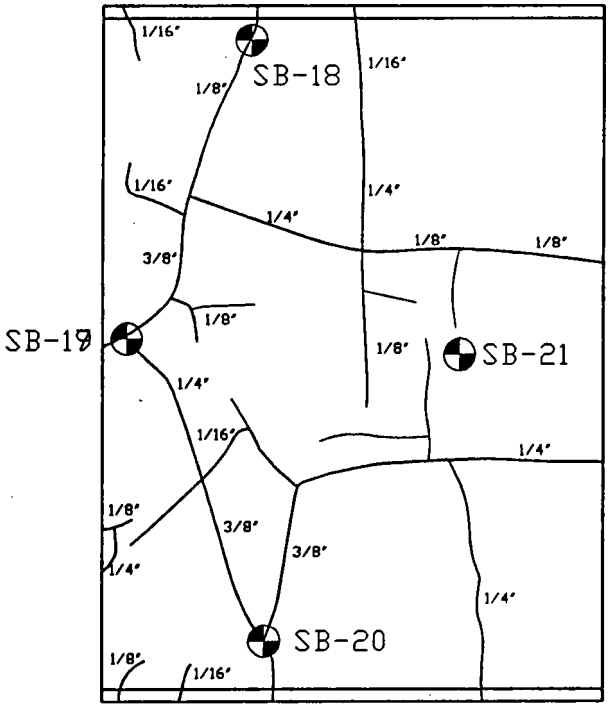
0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

OUTDOOR CONTAINER STORAGE AREA

REVISIONS			
	HERITAGE REMEDIATION/ENGINEERING, INC.		
	DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 5
	APPROVED BY	SCALE 1"=10'	JOB NO. 6119

NORTH



⊕ - PROPOSED SOIL SAMPLE LOCATION

SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

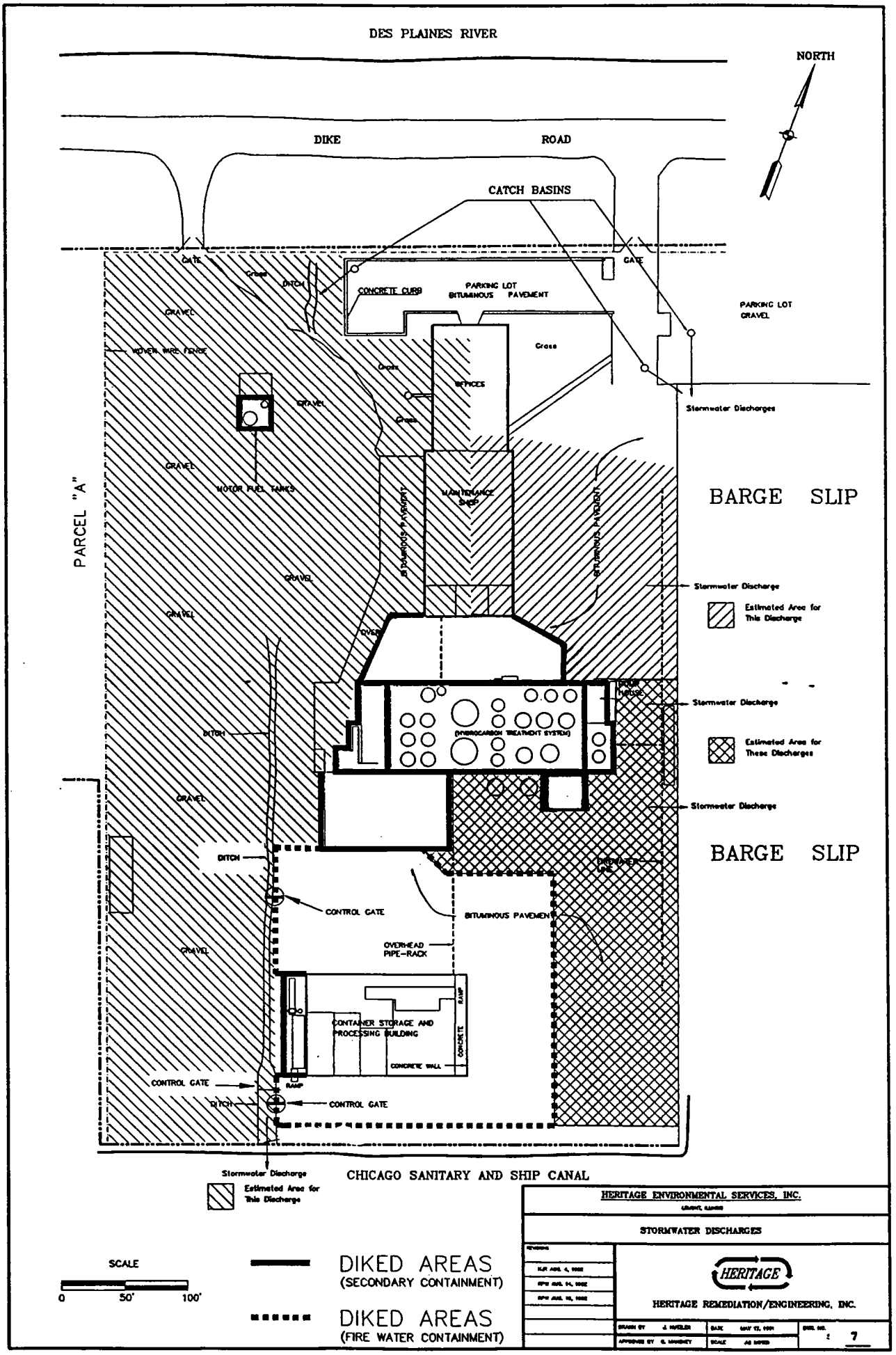
ROLL-OFF STORAGE AREA

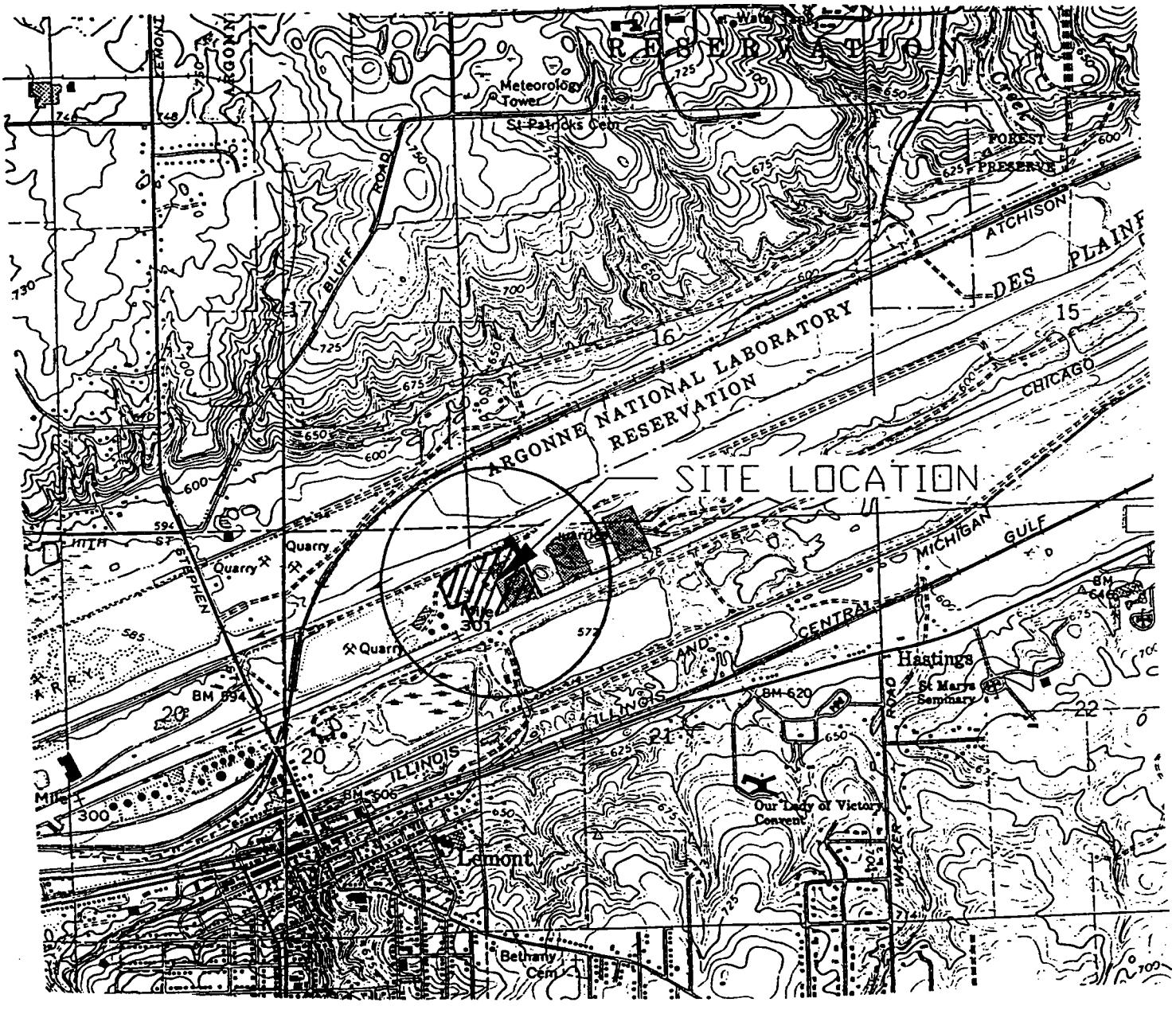
REVISIONS

HERITAGE

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 6
APPROVED BY	SCALE 1"=10'	JOB NO. 6119


DES PLAINES RIVER
NORTH
DIKE
ROAD
CATCH BASINS
GATE
GATE
Grass
DITCH
CONCRETE CURB
PARKING LOT
BITUMINOUS PAVEMENT
PARKING LOT
GRAVEL
GRAVEL
BARBED WIRE FENCE
Grass
Grass
OFFICES
GRAVEL
Grass
Stormwater Discharges
GRAVEL
MOTOR FUEL TANKS
PARCEL "A"
BITUMINOUS PAVEMENT
MAINTENANCE SHOP
BITUMINOUS PAVEMENT
BARGE SLIP
GRAVEL
Stormwater Discharge
Estimated Area for This Discharge
GRAVEL
COVER
DOOR HOUSE
Stormwater Discharge
(HYDROCARBON TREATMENT SYSTEM)
DITCH
Estimated Area for These Discharges
GRAVEL
Stormwater Discharge
BARGE SLIP
DITCH
DISCHARGE LINE
CONTROL GATE
BITUMINOUS PAVEMENT
GRAVEL
OVERHEAD PIPE-RACK
RAMP
CONTAINER STORAGE AND PROCESSING BUILDING
CONCRETE
CONCRETE WALL
CONTROL GATE
RAMP
DITCH
CONTROL GATE
Stormwater Discharge
Estimated Area for This Discharge
CHICAGO SANITARY AND SHIP CANAL
SCALE
0
50'
100'
DIKED AREAS
(SECONDARY CONTAINMENT)
DIKED AREAS
(FIRE WATER CONTAINMENT)
HERITAGE ENVIRONMENTAL SERVICES, INC.
STORMWATER DISCHARGES
HERITAGE
HERITAGE REMEDIATION/ENGINEERING, INC.
7



SAG BRIDGE AND ROMEOVILLE QUADRANGLES

Illinois 7.5 Minute Series

SCALE

2000' 0 1000' 2000'

NORTH

HERITAGE TREATMENT CENTER

LEMONT, ILLINOIS

SITE LOCATION MAP

REVISIONS

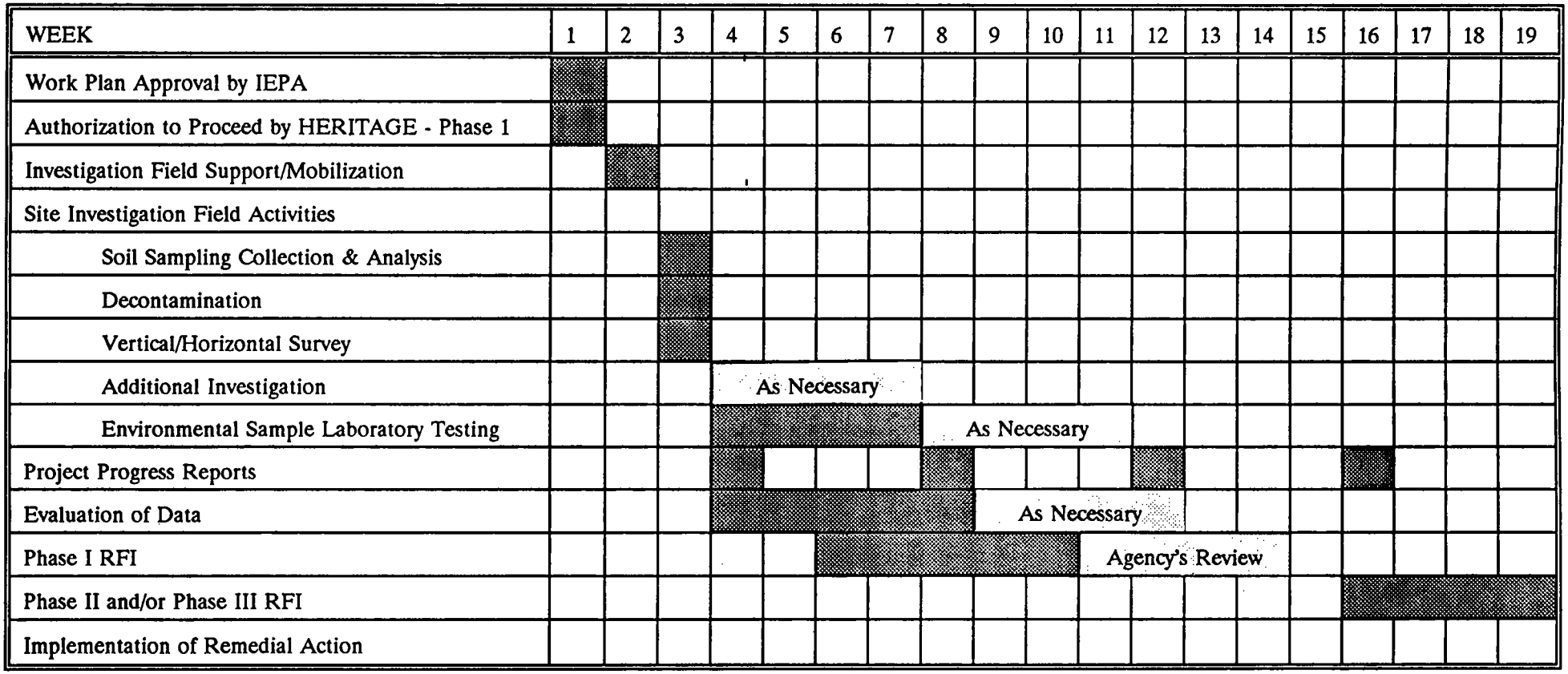
HERITAGE

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE 26 OCT 1993	FIGURE 8
APPROVED BY	SCALE AS SHOWN	JOB NO. 6199

FIGURE 9

PROJECT SCHEDULE



4070RM93.R1/6119

APPENDIX II

TABLES

Recycled Paper

TABLE 1

SOLID WASTE MANAGEMENT UNITS
Heritage Environmental Services, Inc.
Lemont, Illinois

Solid Waste Management Unit (SWMU)	Environmental Element of Concern
Truck Transfer Area	Secondary Containment System Integrity
Outdoor Container Storage Area	Secondary Containment System Integrity
Van Trailer Container Storage Area	Soil and Secondary Containment System Integrity
Old Aerosol Can Crushing Unit	Soil
Roll-off Box Storage Area	Secondary Containment System Integrity and Soil Sampling During Closure
Drum Crushing Unit	Secondary Containment Integrity and Soil Sampling During Closure
Underground Sanitary Waste Holding Tanks	Tank Integrity and SW846-8240 Run-On Contents
Barge Cleaning Transfer Point	Soil
Drainage Ditch and Tile Leading to Chicago	Soil Along Length of Ditch and Provisions for Lining of Ditch

Recycled Paper

APPENDIX III
LIST OF MATERIALS PERMITTED FOR STORAGE AND/OR TREATMENT

HERITAGE ENVIRONMENTAL SERVICES, INC.
LEMONT, IL

LIST OF MATERIALS PERMITTED FOR STORAGE AND/OR TREATMENT

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
CHARACTERISTICALLY HAZARDOUS MATERIALS (IGNITABLE, CORROSIVE, REACTIVE OR HEAVY METAL-BEARING):					
D001	SOLID & LIQUID IGNITABLE INDUSTRIAL WASTES	D1,D2,D3,T1	IGNITABILITY	1000	300
D002	SOLID & LIQUID CORROSIVE INDUSTRIAL WASTES (ACIDS & CAUSTICS)	D1,D2,D3,T1	CORROSIVITY	400	100
D003	SOLID & LIQUID REACTIVE INDUSTRIAL WASTES (CYANIDE/SULFIDE-BEARING, OXIDIZERS)	D1,D2,D3	REACTIVITY	10	1
D004	ARSENIC-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D005	BARIUM-CONTAINING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D006	CADMIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D007	CHROMIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D008	LEAD-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D009	MERCURY-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D010	SELENIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D011	SILVER-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D018	BENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D019	CARBON TETRACHLORIDE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D020	CHLORDANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D021	CHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D022	CHLOROFORM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D023	O-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D024	m-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D025	p-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D026	CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
D027	1,4-DICHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D028	1,2-DICHLOROETHANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D029	1,1-DICHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D030	2,4-DINITROTOLUENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D031	HEPTACHLOR (and its hydroxide)-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D032	HEXACHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D033	HEXACHLOROBUTADIENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D034	HEXACHLOROETHANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D035	METHYL ETHYL KETONE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D036	NITROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D037	PENTACHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D038	PYRIDINE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D039	TETRACHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D040	TRICHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D041	2,4,5-TRICHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D042	2,4,6-TRICHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D043	VINYL CHLORIDE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
HAZARDOUS WASTE FROM NON-SPECIFIC SOURCES: (Hazardous Constituents Included w/Materials Description)					
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE, AND CHLORINATED FLUOROCARBONS	D1,D2,D3,T1	TOXIC	1000	300
F002	SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,1,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE AND 1,1,2-TRICHLOROETHANE	D1,D2,D3,T1	TOXIC	1000	300

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
F003	SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYLCOHEXANONE, AND METHANOL	D1,D2,D3,T1	TOXIC, IGNITABLE	1000	300
F004	SPENT NON-HALOGENATED SOLVENTS: CRESOLS AND CRESYLIC ACID, AND NITROBENZENE	D1,D2,D3,T1	TOXIC	1000	300
F005	SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL AND 2-NITROPROPANE	D1,D2,D3,T1	TOXIC	1000	300
F006	WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS (Camium, Hexavalent Chromium, Nickel, Complexed Cyanides)	D1,D2,D3,T1	TOXIC	100	20
F007	SPENT CYANIDE PLATING BATH SOLUTIONS FROM ELECTROPLATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F008	PLATING BATH RESIDUES FROM ELECTROPLATING OPERATIONS WHERE CYANIDES ARE USED (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F009	SPENT STRIPPING AND CLEANING BATH CYANIDE SOLUTIONS FROM ELECTROPLATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F010	QUENCHING BATH CYANIDE RESIDUES FROM OIL BATHS FROM METAL HEAT TREATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F011	SPENT CYANIDE SOLUTIONS FROM SALT BATH POT CLEANING FROM METAL HEAT TREATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F012	QUENCHING WASTEWATER TREATMENT CYANIDE SLUDGES FROM METAL HEAT TREATING OPERATIONS (Cyanide Complexes)	D1,D2,D3,T1	TOXIC	100	20
F019	WASTEWATER TREATMENT SLUDGES FROM THE CHEMICAL CONVERSION COATING OF ALUMINUM (Hexavalent Chromium, Complexed Cyanides)	D1,D2,D3,T1	TOXIC	100	20
HAZARDOUS WASTES FROM SPECIFIC SOURCES: (Hazardous Constituents included w/Materials Description)					
K002	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME YELLOW AND ORANGE PIGMENTS (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5
K003	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF MOLYBDATE ORANGE PIGMENTS (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K004	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF ZINC YELLOW PIGMENTS (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K005	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5
K006	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS, ANHYDROUS AND HYDRATED (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K007	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF IRON BLUE PIGMENTS (Complexed Cyanides, Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K008	OVEN RESIDUE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K022	DISTILLATION BOTTOM TARS FROM THE PRODUCTION OF PHENOL/ACETONE FROM CUMENE (Phenol, Tars/Polycyclic Aromatic Hydrocarbons)	D1,D2,D3,T1	TOXIC	100	5
K023	DISTILLATION LIGHT ENDS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE (Phthalic Anydride, Maleic Anydride)	D1,D2,D3,T1	TOXIC	100	5
K024	DISTILLATION BOTTOMS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride, 1,4-Napthoquinone)	D1,D2,D3,T1	TOXIC	100	5
K025	DISTILLATION BOTTOMS FROM THE PRODUCTION OF NITROBENZENE BY THE NITRATION OF BENZENE (m-Dinitrobenzene, 2,4-Dinitrotoluene)	D1,D2,D3,T1	TOXIC	100	5
K029	WASTE FROM THE PRODUCT STEAM STRIPPER IN THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,2-Dichloroethane, 1,1,1-Trichloroethane, Vinyl Chloride, Vinylidene Chloride, Chloroform)	D1,D2,D3,T1	TOXIC	100	5
K032	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHLORDANE (Hexachloropentadiene)	D1,D2,D3,T1	TOXIC	100	5
K035	WASTEWATER TREATMENT SLUDGES GENERATED IN THE PRODUCTION OF CREOSOTE (Creosote, Chrysene, Naphthalene, Fluoranthene, Benzo(a)pyrene, Indeno (1,2,3-cd) pyrene, Benzo(a)anthracene, Dibenzo(a)anthracene, Acenapthalene)	D1,D2,D3,T1	TOXIC	100	5
K041	WASTEWATER TREATMENT SLUDGES FROM THE PRODUCTION OF TOXAPHENE (Toxaphene)	D1,D2,D3,T1	TOXIC	100	5
K046	WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING , FORMULATION AND LOADING OF LEAD-BASED INITIATING COMPOUNDS (Lead)	D1,D2,D3,T1	TOXIC	100	5

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K048	DISSOLVED AIR FLOATATION FLOAT FROM THE PETROLEUM REFINING INDUSTRY (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20
K049	SLOP OIL EMULSION SOLIDS FROM THE PETROLEUM REFINING INDUSTRY (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20
K050	HEAT EXCHANGER BUNDLE CLEANING SLUDGE FROM THE PETROLEUM REFINING INDUSTRY (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	20
K051	API SEPARATOR SLUDGE FROM THE PETROLEUM REFINING INDUSTRY (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20
K052	LEADED TANK BOTTOMS FROM THE PETROLEUM REFINING INDUSTRY	D1,D2,D3,T1	TOXIC	100	20
K060	AMMONIA STILL LIME SLUDGE FROM COKING OPERATIONS (Cyanide, Napthalene, Phenolic Compounds, Arsenic)	D1,D2,D3,T1	TOXIC	100	1
K061	EMISSION CONTROL DUST/SLUDGE FROM THE PRIMARY PRODUCTION OF STEEL IN ELECTRIC ARC FURNACES (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	1000	100
K062	SPENT PICKLE LIQUOR GENERATED BY STEEL FINISHING OPERATIONS WITHIN THE IRON AND STEEL INDUSTRY (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC, CORROSIVE	1000	100
K069	EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	100	1
K071	BRINE PURIFICATION MUDS FROM THE MERCURY CELL PROCESS IN CHLORINE PRODUCTION (Mercury)	D1,D2,D3,T1	TOXIC	100	1
K083	DISTILLATION BOTTOMS FROM ANILINE PRODUCTION (Aniline, diphenylamine, Nitrobenzene, Phenylenediamine)	D1,D2,D3,T1	TOXIC	100	1
K084	WASTEWATER TRMT. SLUDGES GENERATED DURING THE PRODUCTION OF VETERINARY PHARMACEUTICAL FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS	D1,D2,D3,T1	TOXIC	100	1
K086	SOLVENT, CAUSTIC OR WATER WASHES AND SLUDGES FROM CLEANING EQUIPMENT USED IN THE FORMULATION OF INK FROM PIGMENTS , DRIERS, SOAPS & STABILIZERS CONTAINING CHROMIUM & LEAD (Lead, Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	1
K087	DECANTER TANK TAR SLUDGE FROM COKING OPERATIONS (Phenol, Naphthalene)	D1,D2,D3,T1	TOXIC	100	1
K093	DISTILLATION LIGHT ENDS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride, Maleic Anhydride)	D1,D2,D3,T1	TOXIC	100	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K094	DISTILLATION BOTTOMS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride)	D1,D2,D3,T1	TOXIC	100	1
K095	DISTILLATION BOTTOMS FROM THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,1,2-Trichloroethane, 1,1,1,2-Tetrachloroethane, 1,1,2,2-Tetrachloroethane)	D1,D2,D3,T1	TOXIC	100	1
K096	HEAVY ENDS FROM THE HEAVY ENDS COLUMN FROM THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,2-Dichloroethane, 1,1,1-Trichloroethane, 1,1,2- Trichloroethane)	D1,D2,D3,T1	TOXIC	100	1
K099	UNTREATED WASTEWATER FROM THE PRODUCTION OF 2,4-D (2,4-Dichlorophenol, 2,4,6-Trichlorophenol)	D1,D2,D3,T1	TOXIC	100	1
K100	WASTE LEACHING SOLUTION FROM ACID LEACHING OF EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	100	1
K104	COMBINED WASTEWATER STREAMS GENERATED FROM NITROBENZENE/ANILINE PRODUCTION (Aniline, Benzene, Diphenylamine, Nitrobenzene, Phenylenediamine)	D1,D2,D3,T1	TOXIC	100	1
K106	WASTEWATER TREATMENT SLUDGES FROM THE MERCURY CELL PROCESS IN CHLORINE PRODUCTION (Mercury)	D1,D2,D3,T1	TOXIC	100	1
COMMERCIAL CHEMICAL PRODUCTS & CHEMICAL MFG. INTERMEDIATES (INCL. OFF-SPEC. MATERIALS): (DOT HAZARD CLASS INCLUDED IN MATERIALS DESCRIPTION*)					
P003	ACROLEIN (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P004	ALDRIN (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P005	ALLYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P008	4-AMINOPYRIDINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P009	AMMONIUM PICRATE (FLAMMABLE SOLID)	D1,D2,D3	REACTIVE	1	100 LBS.
P010	ARSENIC ACID (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P011	ARSENIC (V) OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P012	ARSENIC (VII) OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P013	BARIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P014	THIOPHENOL (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P015	BERYLLIUM DUST (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P021	CALCIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P022	CARBON DISULFIDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P023	CHLOROACETALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P024	P-CHLOROANILINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P028	BENZYL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P029	COPPER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P030	SOLUBLE CYANIDE SALTS, N.O.S. (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P031	CYANOGEN (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P033	CYANOGEN CHLORIDE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P037	DIELDRIN (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P039	DISULFOTON (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P040	0,0-DIETHYL-0-PRYAZINLY-PHOSPHOROTHIOATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P041	DIETHYL-P-NITROPHENYL PHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P042	EPINEPHRIN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P043	DIISPROPYLFLUOROPHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P048	2,4-DINITROPHENOL (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P050	ENDOSULFAN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P051	ENDRIN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P058	FLUOROACETIC ACID, SODIUM SALT (CORROSIVE MATERIAL)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P062	TETRAPHOSPHORIC ACID, HEXAETHYL ESTER (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P063	HYDROCYANIC ACID < 5% (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P064	METHYL ISOCYANATE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P067	2-METHYLAZIRIDINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P068	METHYL HYDRAZINE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P069	METHYACRYLONITRILE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P070	ALDICARB (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P071	METHYL PARATHION (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P072	ALPHA-NAPHTHYLTHIOUREA (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P074	NICKEL CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P075	NICOTINE & SALTS (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P076	NITRIC OXIDE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P077	P-NITROANILINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P078	NITROGEN OXIDES (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P081	SPIRITS OF NITROGLYCERINE < 10% (FLAMMABLE LIQUID)	D1,D2,D3	REACTIVE	1	100 LBS.
P082	N-NITROSODIMETHYLAMINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P087	OSMIUM TETRAOXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P089	PARATHION (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P092	PHENYLMERCURIC ACETATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P093	N-PHENYLTHIOUREA (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P094	PHORATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P095	PHOSGENE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P097	FAMPHUR (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P098	POTASSIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P099	POTASSIUM SILVER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P101	PROPANENITRILE (FLAMMABLE LIQUID)	D1,D2,D32	ACUTE TOXICITY	1	100 LBS.
P102	PROPARGYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P104	SILVER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P105	SODIUM AZIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P106	SODIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P107	STRONTIUM SULFIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P108	STRYCHNINE & SALTS (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P110	TETRAETHYL LEAD (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P111	TETRAETHYL PYROPHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P112	TETRANITROMETHANE (OXIDIZER)	D1,D2,D3	REACTIVE	1	100 LBS.
P113	THALLIC OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P114	THALLIUM SELENITE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P115	THALLIUM SULFATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P118	TRICHLOROMETHANETHIOL (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P119	AMMONIUM VANADATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P120	VANADIUM OXIDE (ORM-E)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P121	ZINC CYANIDE (POISON B	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P122	ZINC PHOSPHIDE >10% (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P123	TOXAPHENE (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
U001	ACETALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	1	100 LBS.
U002	ACETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	1
U003	ACETONITRILE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	10	1
U004	ACETOPHENONE (ORM-E)	D1,D2,D3	TOXIC	10	1
U005	0-ACETYLAMINOFLUORENE (POISON B)	D1,D2,D3	TOXIC	10	1
U006	ACETYL CHLORIDE (FLAMMABLE LIQUID OR GAS)	D1,D2,D3	CORROSIVE, REACTIVE, TOXIC	10	1
U007	ACRYLAMIDE (ORM-E)	D1,D2,D3	TOXIC	10	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U008	ACRYLIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	IGNITABLE	10	1
U009	ACRYLONITRILE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	10	1
U010	PORFIROMYCIN (ORM-E)	D1,D2,D3	TOXIC	10	1
U011	AMITROLE (POISON B)	D1,D2,D3	TOXIC	10	1
U012	ANILINE (POISON B)	D1,D2,D3	TOXIC	10	1
U014	AURAMINE (POISON B)	D1,D2,D3	TOXIC	10	1
U015	AZASERINE (POISON B)	D1,D2,D3	TOXIC	10	1
U017	BENZAL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U018	BENZ[A]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U019	BENZENE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U020	BENZENESULFONYL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U021	BENZIDINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U022	BENZOPYRENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U023	BENZOTRICHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U024	BIS(2-CHLOROETHOXY) METHANE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U025	DICHLOROETHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U027	BIS(2-CHLOROISOPROPYL) ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U028	BIS-(2-ETHYLHEXYL) PHTHALATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U030	BENZENE, 1-BROMO-4-PHENOXY (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U031	N-BUTYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	100	1
U032	CALCIUM CHROMATE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U034	CHLORAL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U035	CHLORAMBUCIL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U036	CHLORDANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U037	CHLOROBENZENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U038	ETHYL-4-4-DICHLOROBENZILATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U039	4-CHLORO-M-CRESOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U041	EPICHLOROHYDRIN (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U043	VINYL CHLORIDE (FLAMMABLE GAS)	D1,D2,D3	TOXIC	1	100 LBS.
U044	CHLOROFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U046	CHLOROMETHYL METHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U047	2-CHLORONAPHTHALENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U048	2-CHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U049	2-CHLORO-0-TOLUIDINE HYDROCHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U050	CHRYSENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U051	CREOSOTE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U052	CREOSOLS (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U053	CROTONALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U055	CUMENE (FLAMMABLE LIQUID, POISON B)	D1,D2,D3	IGNITABLE	1	100 LBS.
U056	CYCLOHEXANE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U057	CYCLOHEXANONE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U060	DDD (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U061	DDT (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U063	DIBENZ[A,H]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U064	DIBENZOPYRENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U067	ETHYLENE DIBROMIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U069	DIBUTYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U070	0-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U071	M-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U072	1,4-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U076	1,1-DICHLOROETHANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U077	ETHYLENE DICHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U078	1,1-DICHLOROETHYLENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U079	1,2-TRANS-DICHLOROETHYLENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U080	METHYLENE CHLORIDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U081	2,4-DICHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U082	2,6-DICHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U083	1,2-DICHLOROPROPANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U084	1,3-DICHLOROPROPENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U085	1,2:3,4-DIEPOXYBUTANE (CORROSIVE MATERIAL/FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U086	N,N-DIETHYLHYDRAZINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U087	0,0-DIETHYL-S-METHYL-DITHIOPHOSPHATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U088	DIETHYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U089	DIETHYLSTIBESTROL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U090	DIHYDROSAFROLE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U092	DIMETHYLAMINE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U093	DIMETHYLAMINOAZOBENZENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U094	7,12-DIMETHYLBENZ[A]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U096	DIMETHYLBENZYL HYDROPEROXIDE (ORGANIC PEROXIDE)	D1,D2,D3	REACTIVE	1	100 LBS.
U101	2,4-DIMETHYLPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U102	DIMETHYLPHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U103	DIMETHYL SULFATE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U105	2,4-DINITROTOLUENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U106	2,6-DINITROTOLUENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U107	DI-N-OCTYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U108	1,4-DIOXANE (FLAMMABLE LIQUIDS)	D1,D2,D3	TOXIC	1	100 LBS.
U112	ETHYL ACETATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U113	ETHYL ACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U117	ETHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U118	ETHYLMETHACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U120	FLUORANTHENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U121	TRICHLORO-MONOFLUORO-METHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U122	FORMALDEHYDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U123	FORMIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U124	FURAN (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U125	FURFURAL (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U127	HEXACHLOROBENZENE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U128	HEXACHLOROBUTADIENE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U129	LINDANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U130	HEXACHLOROCYCLOPENTADIENE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U131	HEXACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U133	HYDRAZINE (CORROSIVE MATERIAL)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U134	HYDROFLUORIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U135	HYDROGEN SULFIDE (FLAMMABLE GAS)	D1,D2,D3	TOXIC	1	100 LBS.
U136	CACODYLIC ACID (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U138	METHYL IODIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U140	ISOBUTYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	1OO	1
U151	MERCURY, METALLIC (ORM-B)	D1,D2,D3	TOXIC	100	1
U154	METHANOL (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	20
U157	3-METHYCHOLANTHRENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U158	4,4'-METHYLENE-BIS(-2-CHLOROANILINE) (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U159	METHYL ETHYL KETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	100	20
U160	METHYL ETHYL KETONE PEROXIDE (ORGANIC PEROXIDE)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.
U161	METHYL ISOBUTYL KETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	1
U162	METHYL METHACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U165	NAPHTHALENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U168	2-NAPHTHYLAMINE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U169	NITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U170	NITROPHENOLS (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U171	2-NITROPROPANE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U181	5-NITRO-O-TOLUIDINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U182	PARALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U183	PENTACHLOROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U185	PENTACHLORONITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U187	PHENACETIN (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U188	PHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U190	PHTHALIC ANHYDRIDE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U196	PYRIDINE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U197	P-BENZOQUINONE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U200	RESERPINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U201	RESORCINOL (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U202	SACCHARIN AND SALTS (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U203	SAFROLE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U204	SELENIOUS ACID (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U205	SELENIUM DISULFIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U207	1,2,4,5-TETRACHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U208	1,1,1,2-TETRACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U209	1,1,2,2-TETRACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U210	TETRACHLOROETHYLENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U211	CARBON TETRACHLORIDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U213	TETRAHYDROFURAN (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U214	THALLIUM ACETATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U215	THALLIUM CARBONATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U216	THALLIUM CHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U217	THALLIUM NITRATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U219	THIOUREA (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U220	TOLUENE (FLAMMABLE LIQUID)	D1,D2,D3,T1	TOXIC	100	20

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U221	TOLUENEDIAMINE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U222	O-TOLUIDINE HYDROCHLORIDE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U223	TOLUENEDIISOCYANATE (POISON B)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.
U225	BROMOFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U226	METHYLCHLOROFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U227	1,1,2-TRICHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U228	TRICHLOROETHYLENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U234	SYM-TRINITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U236	TRYPAN BLUE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U238	ETHYL CARBAMATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U239	XYLENE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	20
U240	2,4-D (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U246	CYANOGEN BROMIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U247	METHOXYCHLOR (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U249	ZINC PHOSPHIDE < 10% (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U328	O-TOLUIDINE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U353	P-TOLUIDINE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U359	ETHYLENE GLYCOL MONOETHYL ETHER (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	10	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.

DEFINITIONS OF HAZARDOUS CHARACTERISTICS AND HAZARD CLASSES:

RCRA (HAZARDOUS WASTE, 40CFR) DEFINITIONS:

IGNITABLE:	LIQUID MATERIALS W/FLASHPOINT < 140 DEGREES F; SOLIDS CAPABLE OF IGNITING AND VIGOUROUSLY BURNING THROUGH FRICTION, ABSORPTION OF MOISTURE OR SPONTANEOUS CHEMICAL CHANGE; AND OXIDIZERS UNDER DOT DEFINITIONS
CORROSIVE:	AQUEOUS SOLUTIONS OF MATERIALS W/ pH LESS THAN 2.0 OR GREATER THAN 12.5; OR LIQUIDS THAT CORRODES STEEL AT A RATE GREATER THAN 0.250 IN./YR.
REACTIVE:	MATERIALS THAT ARE UNSTABLE, REACTS VIOLENTLY W/WATER, FORMS POTENTIALLY EXPLOSIVE MIXTURES W/WATER, FORMS TOXIC GASES, VAPORS OR FUMES WHEN MIXED W/WATER; CYANIDE OR SULFIDE BEARING CAPABLE OF FORMING TOXIC GASES, VAPORS OR FUMES WHEN SUBJECT TO pH CONDITIONS BETWEEN 2 AND 12
EP TOXIC:	MATERIALS CAPABLE OF LEACHING HEAVY METALS AT CONCENTRATIONS GREATER THAN THOSE PRESCRIBED BY THE EPA WHEN SUBJECTED TO EXTRACTION PROCEDURE TESTING

DOT HAZARD CLASSES (49 CFR):

FLAMMABLE LIQUIDS:	MATERIALS W/FLASHPOINT < 100 DEGREES F
COMBUSTIBLE LIQUIDS:	MATERIALS W/ 100 DEGREES F < FLASHPOINT < 200 DEGREES F
FLAMMABLE SOLIDS:	MATERIALS POSING A FIRE HAZARD DUE TO FRICTION, HEAT EXPOSURE, OR BURNS VIGOROUSLY WHEN IGNITED, INCLUDES SPONTANEOUS COMBUSTIBLE OR WATER REACTIVE MATERIALS
OXIDIZERS:	CHLORATES, PERMANGANATES, INORGANIC PEROXIDES, OR NITRATES THAT YIELD OXYGEN READILY TO STIMULATE THE COMBUSTION OF ORGANIC MATTER
ORGANIC PEROXIDES:	
CORROSIVE MATERIALS:	LIQUID OR SOLID THAT CAUSES VISIBLE DESTRUCTION OR IRREVERSIBLE ALTERATIONS IN HUMAN SKIN TISSUE AT THE SITE OF CONTACT; OR HAS A SEVERE CORROSION RATE ON STEEL
POISON A:	POISONOUS GASES OR LIQUIDS IN VERY SMALL AMOUNTS THAT WHEN MIXED WITH AIR ARE DANGEROUS TO LIFE
POISON B:	LIQUID & SOLID SUBSTANCES KNOWN TO BE TOXIC VIA INHALATION, DIGESTION OR SKIN ABSORPTION
ORM-A:	MATERIALS W/ANESTHETIC, IRRITATING, NOXIOUS, TOXIC OR OTHER PROPERTIES CAUSING ANNOYANCE OR DISCOMFORT
ORM-B:	MATERIALS CAPABLE OF CAUSING SIGNIFICANT DAMAGE OR LEAKAGE DURING TRANSPORTATION (OR STORAGE)
ORM-E:	HAZARDOUS WASTES OR HAZARDOUS SUBSTANCES NOT INCLUDED IN ANY OTHER HAZARD CLASS

1 Storage Areas: D1=Drum Storage Building;
D2=Outdoor Drum Storage;
D3=Drum Storage - Trailer;
T1=Tank Farm

APPENDIX IV

RELEASE INCIDENT REPORTS

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HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

January 7, 1992

Mr. Bernard P. Killian, Director
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. PO Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL SITE #: 0311620007

Dear Mr. Killian:

Please find the enclosed incident report involving implementation of the site contingency plan. If you have any questions, please feel free to call me at (708)739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/kn

Attachment

cc: Lawrence Eastep - IEPA/SPFLD Permit Section
Doug Clay - IEPA/SPFLD Permit Section
Clarence Smith - IEPA/SPFLD Permit Section
Donna Czech - IEPA Maywood Field Operations
Mike Crafton - HTC, Indy

lkn206

Recycled Paper

CONTINGENCY PLAN IMPLEMENTATION REPORT

I. Owner/Facility Name: Heritage Environmental Services, Inc.
Canal Bank Road, N.E.
P.O. Box 337
Lemont, IL 60439

II. Date/Time of Incident: January 6, 1992
12:15 PM

III. Type Incident: Fire

IV. Type/Quantity Material: 20 pounds wood and plastic
10 pounds propane gas - product

V. Narrative:

At approximately 12:15 PM on January 6, 1992, a small fire occurred in a temporary enclosure adjacent to the new drum storage and processing building located at the south end of the plant. A small propane torpedo heater was being used to heat the enclosure for application of a chemical-resistant coating to the floor. While personnel assigned to the task were at lunch, a 2" x 4" support brace failed, causing the enclosure to collapse and knock over a 100# propane cylinder feeding the heater. The regulator on the cylinder broke causing propane to leak and flare and also igniting plastic and wood from the collapsed enclosure. The flames were seen immediately by personnel working in the tank farm approximately 200 feet north of the building, who immediately sounded the plant alarm. The personnel responded with a 20# dry chemical fire extinguisher, which extinguished the flames. The valve on the propane cylinder was closed off to prevent further leaking of propane. The Lemont Fire Department was dispatched at the time the alarm was sounded and arrived within 10 minutes, at which time the incident was under control.

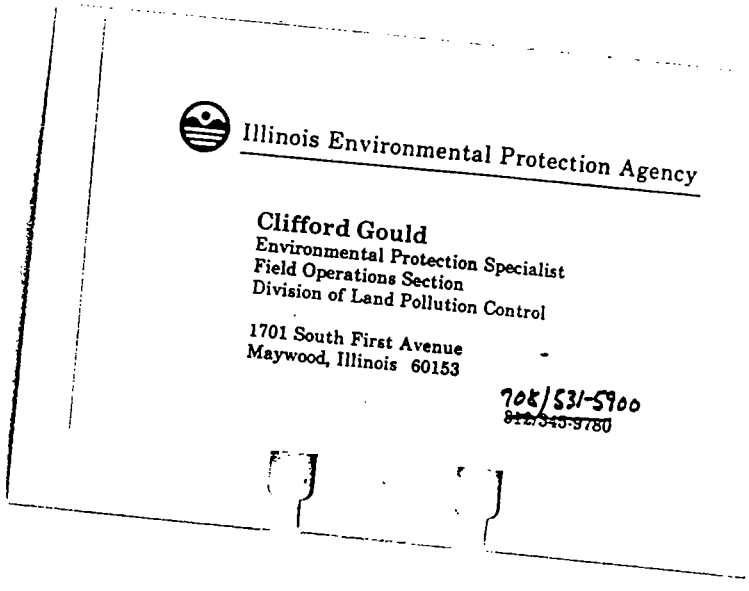
The total time of the fire was less than 5 minutes. No injuries and minimal property damage occurred. No waste materials were involved due to the fact that no waste handling activities have begun in this area to date. The debris from the fire, approximately 20 lbs of burnt wood and plastic, was cleaned up and disposed of as a non-hazardous debris. Less than 10 lbs. of propane was flared off and the small plume dispersed prior to leaving the facility boundary. At no time during the incident was there any potential off-site threat to human health or environment.

This report is being submitted in compliance with 35 IAC 725.156j. All information provided is certified to be accurate to the best of my knowledge.

SIGNED: Robert D. Garcia Jr.

DATE: 1-7-92

lkn206



Illinois Environmental Protection Agency

Clifford Gould
Environmental Protection Specialist
Field Operations Section
Division of Land Pollution Control

1701 South First Avenue
Maywood, Illinois 60153

708/531-5900
~~312/345-3780~~

HERITAGE

DATE: 1-6-92

SAFETY-O-GRAM

(PLEASE TYPE OR PRINT INFORMATION)

LOCATION: HTC-Lemont

EMPLOYEE: Greg Fithian / Don Ryan

DEPARTMENT: Drum Processing

SUPERVISOR: Paul Zajec

ACCIDENT CLASSIFICATION (UNAVOIDABLE, PHYSICAL CONDITIONS, OPERATING CONDITIONS, SAFETY DEVICES, PERSONAL CAUSES): Physical conditions

ACCIDENT STATEMENT: Fire occurred at new building; no injuries, minimal damage. Employees reacted quickly and responsibly to bring situation under control within minutes.

WHAT HAPPENED? Propane heater ignited plastic, wood & leaking propane from cylinder, causing a fire which peeled paint on new building structural steel.

WHY DID IT HAPPEN? A 2"x4" support brace snapped, causing temporary enclosure to collapse & knock over propane cylinder. Propane regulator broke, allowing propane to leak & flare from bottle; plastic & wood from enclosure ignited also. Alarm sounded & fire extinguished using 20lb. extinguisher within minutes.

WHAT CORRECTIVE ACTION IS RECOMMENDED? Remove temporary enclosure & eliminate unsupervised use of propane heater in such enclosures.

WHEN WILL CORRECTIVE ACTION BE COMPLETED? 1-10-92

R D Garcia 1-6-92
BUSINESS UNIT INVESTIGATOR DATE

R D Garcia 1-6-92
BUSINESS UNIT MANAGER DATE

ACCIDENT ANALYSIS

PLEASE TYPE OR PRINT

[X] SUPERVISOR [ ] LOCAL SAFETY SPECIALIST [ ] CORPORATE SAFETY LOCATION: HTC Lemont - Drum Processing Bldg

ACCIDENT #(Office Use): _____ [X] MALE [ ] FEMALE SOCIAL SECURITY NUMBER: _____

JOB TITLE: Utility Operator EMPLOYEE'S DEPARTMENT: Drum Dept.

TIME WITH THE COMPANY: 1yr. 2mos. TIME ON THE JOB: SAME SUPERVISOR: Paul Zajec

ACCIDENT CLASS: [ ] INJURY [ ] ILLNESS [X] PROPERTY DAMAGE [ ] NEAR MISS [ ] DEATH

DATE OF ACCIDENT: 1-6-92 TIME OF ACCIDENT: 12:15 pm DATE REPORTED TO SUPERVISOR: 1-6-92

CLASSIFICATION: [ ] MAJOR [ ] OFF WORK [ ] RESTRICTIVE WORK [ ] NO LOST WORK [ ] FIRST AID [X] PROPERTY DAMAGE ONLY

ACCIDENT TYPE: [ ] FALL [X] FIRE [ ] AUTO ACCIDENT [ ] IMPROPER LIFTING [ ] ELECTRICAL CONTACT [ ] OTHER _____

LIKELIHOOD OF RECURRENCE: [ ] FREQUENT [ ] OCCASIONAL [X] REMOTE

UNSAFE ACTS
(List 1=Primary,2=Secondary,3=Tertiary:Limit 3)

- [ ] UA01 Working on Moving Equipment or Pressurized or Energized Equipment
- [ ] UA02 Adjusting/Clearing James, Cleaning Machinery in Motion
- [ ] UA03 Improper Welding or Burning Procedure
- [ ] UA04 Failure to Use or Properly Use Personal Protective Equipment
- [ ] UA05 Failure to Barricade or Warn
- [ ] UA06 Horseplay, Distraction, Teasing
- [ ] UA07 Improper Use of Eqipment or Equipment Used in Unsafe Manner
- [ ] UA08 Improper Body Position
- [ ] UA09 Making Safety Devices Inoperable
- [ ] UA10 Haste/Short Cuts, Unsafe Speed
- [ ] UA11 Unsafe Stacking, Piling or Placing
- [ ] A12 Using Unsafe Eqipment
- [ ] A13 Improper Method
- [ ] UA14 Operating W/O Authority
- [ ] UA15 Failure to Secure Equipment
- [ ] UA16 Failure to Follow Process Instructions
- [ ] UA17 Other _____
- [X] UA18 None

UNSAFE CONDITIONS
(List 1=Primary,2=Secondary,3=Tertiary:Limit 3)

- [ ] UC10 Improper Maintenance
- [ ] UC15 Defective Fabrication or Installation
- [X] UC20 Poor Design or Layout
- [ ] UC25 Improper Material Storage
- [ ] UC30 Improperly or Inadequately Guarded
- [ ] UC45 inadequate Ventilation
- [ ] UC50 Poor Housekeeping
- [ ] UC55 Congested Area
- [ ] UC60 Slippery Floors or Walkways
- [ ] UC65 Inadequate Illumination
- [ ] UC70 Acts of Nature
- [X] UC80 Other Equipment failure
- [ ] UC85 None

SUPERVISORY RESPONSIBILITIES
(List 1-Primary,2=Secondary,3=Tertiary:Limit 3)

- [ ] SR10 No Instructions Given
- [ ] SR20 Incomplete Instructions
- [ ] SR30 Rules, Stds. or Instructions Not enforced
- [ ] SR40 Personal Safety Devices Not Provided on Job (Goggles, Safety Belts, Masks, Respirators, Etc.)
- [ ] SR50 Correct Tools or Equipment not Provided
- [ ] SR60 Inadequate Inspection of Equipment or Jobs
- [ ] SR65 Rules, Standard Lacking
- [ ] SR70 Improper Methods of Doing Work
- [ ] SR75 Poor Job Planning
- [ ] SR80 Too Much Rush
- [ ] SR85 Other _____
- [X] SR90 None

PERSONAL FACTORS
(List 1=Primary, 2=Secondary,3=Tertiary:Limit 3)

- [ ] PF10 Improper Clothing
- [ ] PF20 Disregard of Rule or Instruction
- [ ] PF40 Inattention
- [ ] PF50 Employee Physical Condition
- [ ] PF60 Action of Fellow Employee
- [ ] PF65 Personal Distractions
- [ ] PF70 Other: _____
- [X] PF80 None

LOSS SEVERITY POTENTIAL: [X] MAJOR [ ] SERIOUS [ ] MINOR

DESCRIBE POTENTIAL CONSEQUENCES: Potential destruction of new processing building

DESCRIPTION OF ACCIDENT: Temporary enclosure of wood & visqueen collapsed; when 2x4" support brace failed; plastic & wood were ignited by propane heater, propane bottle fell & regulator broke, causing bottle to flare.

DIAGNOSIS OF INJURY OR ILLNESS: NONE

DESCRIPTION OF TREATMENT: NA

TREATED BY: N/A PLACE OF TREATMENT: N/A

CORRECTIVE ACTION: Eliminate temporary enclosure; use propane heater only when personnel are present.

TYPE OF DISCIPLINARY ACTION TAKEN: [ ] VERBAL WARNING [ ] WRITTEN WARNING [ ] OTHER: NONE

BUSINESS UNIT SUPERVISOR: R.D. Garcia DATE: 1-6-92

BUSINESS UNIT MANAGER: R.D. Garcia DATE: 1-6-92

CORPORATE SAFETY DIRECTOR: _____ DATE: _____

APPENDIX B

HERITAGE

EMPLOYEE ACCIDENT REPORT

(PLEASE TYPE OR PRINT INFORMATION)

TO BE COMPLETED BY EMPLOYEE, BEFORE RETURNING TO WORK, AFTER AN ACCIDENT HAS OCCURRED

NAME: Greg Fithian / Don Ryan observed accident DATE: 1-6-92

EMPLOYEE #: 8102 ; 7312 JOB TITLE: Drum Handlers

DEPARTMENT: HTC Lemont

NUMBER OF DAYS AWAY FROM WORK: 0

WAS MEDICAL TREATMENT RECEIVED? N/A IF YES WHAT? —

FULLY DESCRIBE HOW ~~YOUR~~ ACCIDENT OR ILLNESS OCCURED (INDICATE PART OF BODY AFFECTED):

I, greg Fithian and DonRyan saw new building on fire. Apparently, a 2x4 stud broke in two knocking over propane tank that was being used to dry floor. Tank broke, fire occured

WAS THIS YOUR REGULAR JOB? N/A WHEN?

WERE YOU TRAINED FOR THIS JOB? N/A BY WHOM?

WERE YOU FOLLOWING INSTRUCTIONS/PROCEDURES? yes

WHAT ARE THESE PROCEDURES? Sounded Alarm, notified Supervisors, got fire extinguishers, put out the fire

DID YOU ACT IN A SAFE MANNER? yes

WERE ALL PHYSICAL AND ENVIRONMENTAL CONDITIONS SAFE? NO

WAS PROTECTIVE EQUIPMENT REQUIRED? NO

WHAT PROTECTIVE EQUIPMENT WERE YOU WEARING? gloves, safety glasses

WHAT SUGGESTIONS OR RECOMMENDATIONS DO YOU HAVE WHICH WILL PREVENT REOCCURRENCE OF THIS ACCIDENT? ANY OTHER COMMENTS?

have a ~~fire watch~~ fire watch, extinguishers present

Greg Fithian - Don Ryan 1-6-92

EMPLOYEE SIGNATURE DATE

BUSINESS UNIT SUPERVISOR DATE

R.D. Lucas 1-6-92

BUSINESS UNIT MANAGER DATE

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

March 9, 1992

Mr. Oran Robertson
Illinois Environmental Protection Agency
101 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E., P.O. BOX 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any further questions, please contact me, at your convenience, at (708)739-1151.

Sincerely,

Robert D. Garcia, Jr.

Robert D. Garcia
Plant Manager

RDG/kn

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Mike Crafton - Heritage, Indianapolis

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HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. P.O. BOX 337
LEMONT, IL 60439
(708)739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party:	Heritage Environmental Services Canal Bank Road, N.E. P.O. Box 337 IEPA GEN.#031162007 Lemont,IL 60439 USEPA ID# ILD085349264 (708)739-1151 Contact: Robert Garcia, Plant Manager
Type of Incident:	Spill
Time/Date of Release:	10:30 a.m. 3/4/93
Duration of Release:	5 minutes
Quantity of Release:	50 gallons

II. TYPE OF MATERIAL: Blending Hazardous Waste Fuel

Ingredient	Amount	%	CAS #	CERCLA(RQ-LBS)
Toluene	4.0 Gal	20%	108-88-3	1000 lbs.
Xylene	4.0 Gal	20%	1330-20-7	1000 lbs.
Fuel Oil	2.0 Gal	10%	-	100 lbs.(D001)
Methanol	2.0 Gal	10%	67-56-1	5000 lbs.
Gasoline	1.0 Gal	5%	-	100 lbs.(D001)
Styrene	1.0 Gal	5%	100-42-5	1000 lbs.
Water	2.0 Gal	10%	-	-

Health Effects: Contact may irritate or burn tissue (eyes, skin, mucous membrane) May cause dizziness, irritation if inhaled.

DOT Description: RQ, Waste Flammable Liquid, N.O.S. (Toluene, Xylene)

Hazard Codes: UN1993

EPA Hazardous Waste Codes: F001-F005-D001,D018,D035

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	TIME	INCIDENT
IL E.M.A.	800/782-7860	Toni Watkins	1:30	93-0535

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 10:30 a.m. on Thursday, March 4, 1993, a spill of 50 gallons of hazardous waste fuel occurred from the process tank of the drum processing unit. Material was being circulated between the process tank and a storage tank when the unit was shut down for minor maintenance. The spill resulted because the valve from the storage tank to the process tank was left open inadvertently, allowing material to gravity-feed from the storage tank to the process tank, overfilling the process tank into secondary containment. The valve was shut immediately by an operator and the material pumped into the storage tank. Absorbent pads were used to wipe down the residue and were repackaged for off-site incineration. The total incident and response time was approximately 5 hours. At no time was there any potential off-site threat to human health or the environment.

V. CERTIFICATION:

This report is submitted in compliance with 35 IAC 724.296. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D. Garcia Jr.

DATE: 3-9-93

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

March 9, 1992

Mr. Oran Robertson
Illinois E.M.A.
110 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. PO Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL SITE #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA Release Report. Please review this report and should you have any questions, please feel free to contact me at (708)739-1151.

Sincerely,

Robert D. Garcia Jr.

Robert D. Garcia
Plant Manager

RDG/kn

Attachment

cc: Lawrence Eastep - IEPA/SPFLD Permit Section
Cliff Gould - IEPA Maywood Field Operations
Mike Crafton - HTC, Indy

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HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. PO BOX 337
LEMONT, IL 60439
708/739-1151

SARA/CERCLA HAZARDOUS SUBSTANCE RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party: Heritage Environmental Services
Canal Bank Road, N.E.
P.O. Box 337 IEPA GEN. #0311620007
Lemont, IL 60439 USEPA ID #ILD085349264
708/739-1151
Contact: Bob Garcia, Plant Manager

Type of Incident: Spill

Time/Date of Release: 2:00 P.M. 3/4/92

Duration of Release: 1.0 Hour

Quantity Released: 55 gallons

II. TYPE OF MATERIAL: Waste Alkaline Liquid, n.o.s.

Ingredient	Amount	%	CAS #	CERCLA (RQ-LBS)
Sodium hydroxide Liquid	500 lbs	100%	1310-73-2	100 lbs.

Health Effects: Corrosive to skin tissue; strong irritant to tissue (eyes, skin, mucous membranes).

DOT Description: RQ,Waste Alkaline Liquid, n.o.s.(contains sodium hydroxide)

Hazard Class: NA1719

EPA Hazardous Waste Code: D002.

III. NOTIFICATION:

AGENCY	TELEPHONE #	CONTACT	TIME	INCIDENT #
Illinois E.M.A.	800-782-7860	John Warren	3:30pm	920-595
National Response Center	800-424-8802	Chief Jones	3:45pm	109-208
Illinois EPA-Maywood Office	708-531-5900	Donna Czech	4:00pm	

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 2:00pm on March 4, 1992, a drum containing 55 gallons of waste alkaline liquid (containing sodium hydroxide) was spilled while being transported from the drum receiving area to the drum storage area. The liquid spilled on the edge of the asphalt containment pad, with approximately half of the material spilling onto the ground. The liquid was immediately contained using absorbent clay, at which time the material was diluted with water. Approximately 150 gallons of the water/caustic mixture was pumped immediately into a storage tank for off-site treatment. The soil which was contaminated was then dug up and drummed for off-site treatment. Ten 55-gallon drums of contaminated soil was collected. The total time of the incident and response was approximately 1 hour. No injuries occurred and at no time was there any potential off-site threat to human health or environment.

V. CERTIFICATION;

This report is being submitted in compliance with 40CFR Part 355.40 and 40CFR 264.56. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D. Garcia, Jr.

DATE: 3-9-92

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

April 6, 1993

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any further questions, please contact me at your convenience, at (708)739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/sh

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Mike Crafton - Heritage Indianapolis

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party: Heritage Environmental Services, Inc.
Canal Bank Road, N.E.
P.O. Box 337 IEPA GEN. #0311620007
Lemont, IL 60439 USEPA ID #ILD085349264
708/739-1151
Contact: Bob Garcia, Plant Manager

Type of Incident: Spill

Time/Date of Release: 8:30 a.m. 4/06/93

Duration of Release: 5 Minutes

Quantity Released: 50 gallons

II. TYPE OF MATERIAL: Blending Hazardous Waste Fuel

Ingredient	Amount	%	CAS #	CERCLA(RQ-LBS)
Toluene	12.5	25	108-88-3	1000 lbs.
Xylene	12.5	25	1330-20-7	1000 lbs.
Fuel Oil	5.0	10	-	100 lbs.
Methanol	5.0	10	67-56-1	5000 lbs.
Gasoline	2.5	5	-	100 lbs.
Styrene	2.5	5	100-42-5	1000 lbs.
Water	10.0	20	-	-

Health Effects: Contact may irritate or burn tissue (eye, skin, mucous membrane) May cause dizziness, irritation if inhaled.

DOT Description: RQ, Waste Flammable Liquid, N.O.S. (Toluene, Xylene)

Hazard Class: UN1993

EPA Hazardous Waste Code: F001-F005, D001, D018, D035

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	TIME	INCIDENT
IL E.M.A.	800/782-7860	Toni Watkins	10:00 a.m.	93-0831
Nat.'l Resp. Ctr.	800/424-8802	Petty Officer Beshoar	9:55 a.m.	165-927

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 8:30 A.M. on Tuesday, April 6, 1993, a spill of 50 gallons of hazardous waste fuel occurred from the process tank of the drum processing unit. Material was being circulated between the process tank and a storage tank when the high level alarm on the process tank was reached. The operator reacted by shutting down the pump from the storage tank and attempted to shut the valve on the line from the storage tank. The handle on the valve was knocked off in the confusion and was placed back on the valve in the incorrect position, leaving the valve in the open position. Material from the storage tank gravity-fed into the processing tank, causing the overflow into secondary containment. The valve was then placed in the correct position, stopping the flow of waste. The material was pumped up immediately and the residue wiped up using absorbent pads, which were then packaged for off-site incineration. The total incident and response time was approximately 4 hours. At no time was there any potential off-site threat to human health or the environment.

V. CERTIFICATION:

This report is submitted in compliance with 40 CFR Part 302.6 and 35 IAC 724.296. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D. Garcia

DATE: 4-6-93

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

August 6, 1992

Mr. Oran Robertson
Illinois E.M.A.
110 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL Site #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any questions, please contact me, at your convenience, at (708)739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/kn

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Mike Crafton - Heritage, Indianapolis

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. P.O. BOX 337
LEMONT, IL 60439
708/739-1151

SARA/CERCLA HAZARDOUS SUBSTANCE RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party: Heritage Environmental Services
Canal Bank Road, N.E.
P.O. Box 337 IEPA GEN. #0311620007
Lemont, IL 60439 USEPA ID #ILD085349264
708/739-1151
Contact: Bob Garcia, Plant Manager

Type of Incident: Spill

Time/Date of Release: 2:00 P.M. 8/5/92

Duration of Release: 30 minutes

Quantity Released: 3 gallons

II. TYPE OF MATERIAL: Blended Hazardous Waste Fuel

Ingredient	Amount	%	CAS #	CERCLA (RQ-LBS)
Toluene	0.6 gal	20%	108-88-3	1000 lbs.
Xylene	0.6 gal	20%	1330-20-7	1000 lbs.
Fuel Oil	0.3 gal	10%	-	100 lbs. (D001)
Methanol	0.3 gal	10%	67-56-1	5000 lbs.
Gasoline	0.15 gal	5%	-	100 lbs. (D001)
Styrene	0.15 gal	5%	100-42-5	1000 lbs.
Water	0.30 gal	10%	-	-

Health Effects: Contact may irritate or burn tissue (eyes,skin,mucous membrane)
May cause dizziness, irritation if inhaled.

DOT Description: RQ,Waste Flammable Liquid, n.o.s. (toluene,xylene)

Hazard Class: UN1993

EPA Hazardous Waste Codes: F001-F005-D001,D018,D035

III. NOTIFICATION:

Agency	Telephone	Contact	Time	Incident
Illinois E.M.A.	800-782-7860	Hugo Sullan	2:45 pm	922-141

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 2:00 pm on Wednesday, August 5, 1992, an employee began loading a supplemental fuel tanker. As the material was being transferred from a storage tank to a tanker, a valve on the trailer, being partially open, began to spray liquid on the ground, inside of the unloading containment area. A second employee near the tanker immediately reacted to shut the valve and prevent a further spill. While shutting the valve, the second employee was splashed in the eyes with the material. He immediately flushed his eyes using an eye wash and showered using a safety shower. The employee was sent to Joliet Medical Center as a precautionary measure and was released.

Approximately 3 gallons of material was spilled, which was cleaned up immediately using 50 pounds of clay absorbent. The absorbent was then picked up and packaged for off-site incineration. The total incident and response time was approximately 30 minutes. At no time was there any potential off-site threat to human health or environment.

V. CERTIFICATION:

This report is being submitted in compliance with 35IAC 724.296. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D. Garcia

DATE: 8-6-92

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

August 7, 1992

Mr. Oran Robertson
Illinois E.M.A.
110 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL Site #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any questions, please contact me, at your convenience, at (708)739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/sh

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Mike Crafton - Heritage, Indianapolis

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HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. P.O. BOX 337
LEMONT, IL 60439
708/739-1151

SARA/CERCLA HAZARDOUS SUBSTANCE RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party: Heritage Environmental Services
Canal Bank Road, N.E.
P.O. Box 337 IEPA GEN. #0311620007
Lemont, IL 60439 USEPA ID #ILD085349264
708/739-1151
Contact: Bob Garcia, Plant Manager

Type of Incident: Spill

Time/Date of Release: 10:00 A.M. 8/7/92

Duration of Release: 1 hour

Quantity Released: 110 gallons

II. TYPE OF MATERIAL: Waste Alkaline Cleaner

Ingredient	Amount	%	CAS #	CERCLA (RQ-LBS)
Sodium Hydroxide	110	50%	1310-73-2	1000 lbs.
Water		50%	-0-	-0-

Health Effects: Corrosive to tissue in presence of moisture; strong irritant to tissue (eyes, mucous membranes, skin) by ingestion.

DOT Description: RQ,Waste Alkaline Liquid, n.o.s. (sodium hydroxide)

Hazard Class: NA1719

EPA Hazardous Waste Codes: D002

III. NOTIFICATION:

Agency	Telephone	Contact	Time	Incident
Illinois E.M.A.	800-782-7860	Kelly Kelley	10:45am	922-159

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 10:00 am on Friday, August 7, 1992, an employee loading drums of sodium hydroxide-based cleaner onto a van trailer inside of secondary containment, dropped two plastic 55-gallon drums, resulting in a spill of 110 gallons of the material onto the secondary containment pad. The spill resulted due to the plastic drums slipping from a forklift-mounted drum picker. The spill was immediately cleaned up, using water to spray down the containment pad.

Approximately, 110 gallons of the cleaner was spilled and with the 200 gallons of water used to clean up the containment pad, was pumped into a storage tank. The total time of the incident was approximately 1 hour, with no injuries.. At no time was there any potential of-site threat to human health or environment.

V. CERTIFICATION:

This report is being submitted in compliance with 35IAC 724.296. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D Garcia

DATE: 8-7-92

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

December 4, 1992

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage's facility release report, as reported to Chuck Brutlog on 12/1/92. Although this is not a CERCLA reportable spill, this report is being provided in accordance with our facility operating permit requirements. If you have any further questions, please contact me at (708)735-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/kn

Enc:

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party:	Heritage Environmental Services, Inc. Canal Bank Road, N.E. P.O. Box 337 IEPA GEN. #0311620007 Lemont, IL 60439 USEPA ID #ILD085349264 708/739-1151 Contact: Bob Garcia, Plant Manager
Type of Incident:	Spill
Time/Date of Release:	9:00 a.m. 12/1/92
Duration of Release:	2 Minutes
Quantity Released:	150 gallons

II. TYPE OF MATERIAL: Used Crankcase Oil

Ingredient	Amount	%	CAS #	CERCLA(RQ-LBS)
Used crankcase oil	150 Gal	100	64742-25-2	0

Health Effects: Irritant to eyes, skin and nasal passages; prolonged exposure may cause nausea.

DOT Description: Non-DOT hazardous, non-RCRA regulated waste liquid

Hazard Class: None

EPA Hazardous Waste Code: None

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	TIME	INCIDENT
Illinois E.M.A.	217/782-3637	Chuck Brutlog	1:15pm	NONE

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 9:00 A.M. on Tuesday, December 1, 1992, approximately 150 gallons of used crankcase oil was spilled inside the tank farm secondary containment when a transfer hose popped loose during the transfer process. The operator performing the activity immediately shut the valve on the transfer line, preventing any further release. The duration of the release was approximately 2 minutes. The spill resulted due to a camlock fitting vibrating loose from the transfer line.

The oil was immediately pumped into a waste storage tank and approximately 500 gallons of water was used to decontaminate the containment area. The duration of the clean up was approximately 8 hours. No potential off-site threat to human health or the environment existed during this incident, and no CERCLA reportable quantity was released.

V. CERTIFICATION:

This report is submitted in compliance with 35 IAC 724.296. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D. Garcia

DATE: 12-4-92

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

December 15, 1992

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any further questions, please contact me, at your convenience, at (708)735-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/kn

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Mike Crafton - Heritage Indianapolis

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HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party:	Heritage Environmental Services, Inc. Canal Bank Road, N.E. P.O. Box 337 IEPA GEN. #0311620007 Lemont, IL 60439 USEPA ID #ILD085349264 708/739-1151 Contact: Bob Garcia, Plant Manager
Type of Incident:	Spill
Time/Date of Release:	1:30 p.m. 12/14/92
Duration of Release:	2 Hours
Quantity Released:	30 gallons

II. TYPE OF MATERIAL: Blended Hazardous Waste Fuel

Ingredient	Amount	%	CAS #	CERCLA(RQ-LBS)
Toluene	6.0 Gal	20%	108-88-3	1000 lbs.
Xylene	6.0 Gal	20%	1330-20-7	1000 lbs.
Fuel Oil	3.0 Gal	10%	-	100 lbs. (D001)
Methanol	3.0 Gal	10%	67-56-1	5000 lbs.
Gasoline	1.5 Gal	5%	-	100 lbs. (D001)
Styrene	1.5 Gal	5%	100-42-5	1000 lbs.
Water	3.0 Gal	10%	-	-

Health Effects: Contact may irritate or burn tissue (eyes,skin,mucous membrane)
May cause dizziness, irritation if inhaled.

DOT Description: RQ,Waste Flammable Liquid, n.o.s. (toluene,xylene)

Hazard Class: UN1993

EPA Hazardous Waste Code: F001-F005-D001,D018,D035

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	TIME	INCIDENT
Illinois E.M.A.	800/782-7860	Hugo Sullan	1:15pm	92-3552

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 1:30 pm on Monday, December 14, 1992, material from the drum processing unit was released into the secondary containment when the nitrogen-purge system forced approximately 30 gallons of hazardous waste fuel through a faulty gasket and into the secondary containment. The leak was noticed immediately and the system shut down. The liquid was pumped up immediately into a storage tank and the residue cleaned up using absorbent pads, which were packaged for off-site incineration. The total time of the incident and response was approximately 2 hours. At no time was there any potential off-site threat to human health or environment.

V. CERTIFICATION:

This report is submitted in compliance with 35 IAC 724.296. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D. Garcia

DATE: 12-15-92

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

March 4, 1993

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage's facility release report, as reported to Kelly Kelly on 2/22/93. Although this is not a CERCLA reportable spill, this report is being provided in accordance with our facility operating permit requirements. If you have any further questions, please contact me at (708)739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/sh

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Mike Crafton - Heritage Indianapolis

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party:	Heritage Environmental Services, Inc. Canal Bank Road, N.E. P.O. Box 337 IEPA GEN. #0311620007 Lemont, IL 60439 USEPA ID #ILD085349264 708/739-1151 Contact: Bob Garcia, Plant Manager
Type of Incident:	Spill
Time/Date of Release:	8:30 a.m. 2/22/93
Duration of Release:	2 Minutes
Quantity Released:	50 gallons

II. TYPE OF MATERIAL: Used Oil and Water Mixture

Ingredient	Amount	%	CAS #	CERCLA(RQ-LBS)
Used oil/water	50 Gal	100	64742-25-2	0

Health Effects: Irritant to eyes, skin and nasal passages; prolonged exposure may cause nausea.

DOT Description: Non-DOT hazardous, non-RCRA regulated waste liquid

Hazard Class: None

EPA Hazardous Waste Code: None

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	TIME	INCIDENT
IL E.M.A.	217/782-3637	Kelly Kelly	9:45pm	93-0449

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 8:30 A.M. on Monday, February 22, 1993, approximately 50 gallons of used oil and water mixture was spilled from a storage tank while unloading a bulk tanker into the tank. The material overflowed the tank due to an incorrect tank gauge reading. The operator immediately shut down the transfer line, preventing any further release. The duration of the release was approximately 2 minutes.

The clean up response was begun immediately following the release. The duration of the clean up was approximately 12 hours, with approximately 500 gallons of oil/water/snow mixture generated and pumped into another storage tank. No potential off-site threat to human health or environment existed during this incident and no CERCLA reportable quantity was released.

V. CERTIFICATION:

This report is submitted in compliance with 35 IAC 724.296. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D. Garcia

DATE: 3-4-93

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

June 4, 1993

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

RE: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any further questions, please contact me at your convenience, at (708)739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/sh

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E. P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party: Heritage Environmental Services, Inc.
Canal Bank Road, N.E.
P.O. Box 337 IEPA GEN. #0311620007
Lemont, IL 60439 USEPA ID #ILD085349264
708/739-1151
Contact: Bob Garcia, Plant Manager

Type of Incident: Spill

Time/Date of Release: 11:00 a.m. 6/02/93

Duration of Release: 5 Minutes

Quantity Released: 50 gallons

II. TYPE OF MATERIAL: Blending Hazardous Waste Fuel

Ingredient	Amount	%	CAS #	CERCLA(RQ-LBS)
Toluene	12.5	25	108-88-3	1000 lbs.
Xylene	12.5	25	1330-20-7	1000 lbs.
Fuel Oil	5.0	10	-	100 lbs.
Methanol	5.0	10	67-56-1	5000 lbs.
Gasoline	2.5	5	-	100 lbs.
Styrene	2.5	5	100-42-5	1000 lbs.
Water	10.0	20	-	-

Health Effects: Contact may irritate or burn tissue (eye, skin, mucous membrane) May cause dizziness, irritation if inhaled.

DOT Description: RQ, Waste Flammable Liquid, N.O.S. (Toluene, Xylene)

Hazard Class: UN1993

EPA Hazardous Waste Code: F001-F005, D001, D018, D035

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	TIME	INCIDENT
IL E.M.A.	800/782-7860	Hugo Sullan	2:20 p.m.	93-1465
Nat.'l Resp. Ctr.	800/424-8802	Petty Officer Bennett	2:28 p.m.	177940

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 11:00 a.m. on Wednesday, June 2, 1993, a spill of approximately 50 gallons of hazardous waste fuel occurred during the unloading of a bulk tanker into a storage tank. While the operator was preparing to transfer material from the bulk tanker into the tank, a hose connecting the transfer pump and the piping system was removed while the valve was open, resulting in the spill. The operator immediately shut the valve and re-attached the hose to stop the flow of material. The material was contained in the secondary containment and immediately pumped into the storage tank. The secondary containment was then pressure washed to remove any residual material. Approximately 300 gals. of wash water was collected and treated. The total time of the incident and response was approximately 3 hours. At no time was there any potential off-site threat to human health or the environment.

V. CERTIFICATION:

This report is submitted in compliance with 40 CFR Part 302.6 and 35 IAC 724.296. All information provided is accurate to the best of my knowledge.

SIGNED: Robert D. Garcia

DATE: 6-4-93

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

July 7, 1993

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

Re: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD 085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any further questions, please contact me at your convenience, at (708) 739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/kn

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Rev. Glenn Bergmark - Lemont Environmental Advisory Commission

070793SARA/CERCLA

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HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E., P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party:	Heritage Environmental Services, Inc. Canal Bank Road, N.E. P.O. Box 337 IEPA GEN. #0311620007 Lemont, IL 60439 USEPA ID #ILD085349264 708/739-1151 Contact: Robert D. Garcia, Plant Manager
Type of Incident:	Spill
Time/Date of Release:	8:30 a.m. 7/2/93
Duration of Release:	6 Hours
Quantity Released:	35 Gallons

II. TYPE OF MATERIAL: Liquid Chromic Acid Solution

INGREDIENT	AMOUNT	%	CAS #	CERCLA(RQ-LBS)
Waste Chromic Acid Solution	35	100	7738-94-5	10

Health Effects: Contact may cause severe irritation of skin, eyes and mucous membranes; can cause dermatitis, broncho-asthma. A poison if ingested, inhaled or absorbed.

DOT Description: RQ, Waste Chromic Acid Solution

Hazard Class: Corrosive Material, UN1755

EPA Hazardous Waste Code: D002,D007

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	TIME	INCIDENT
IL E.M.A.	800/~~782~~-7860	John Warren	12:05p.m.	93-1807
Nat.'l Resp. Ctr.	800/424-8802	Petty Officer Pompilio	11:55a.m.	184-588

070793SARA/CERCLA

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 8:30 a.m. on Friday, July, 2, 1993, a spill of 35 gallons of waste chromic acid solution from a drum occurred when a worker was transporting the drum from the unloading area to drum storage. The drum was on a pallet, unsecured, and the pallet was being transported via forklift to the storage area. The drum was toppled as the worker drove the forklift over a bump and the spill occurred onto a graveled area. The spill was immediately contained and all free liquid pumped up within 30 minutes. Approximately 4000 pounds of contaminated soil and gravel were excavated and will be sent off-site for treatment. The total incident and response time was approximately 6 hours. At no time was there any potential off-site threat to human health or the environment.

V. CERTIFICATION:

This report is submitted in compliance with 40 CFR Part 302.6 and 35 IAC 724.296. All information provided is accurate top the best of my knowledge.

SIGNED: Robert D. Garcia, Jr

DATE: 7-7-93

070793SARA/CERCLA

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

July 19, 1993

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

Re: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD 085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any further questions, please contact me at your convenience, at (708) 739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/sh

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Rev. Glenn Bergmark - Lemont Environmental Advisory Commission

071993SARA/CERCLA

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E., P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party: Heritage Environmental Services, Inc.
Canal Bank Road, N.E.
P.O. Box 337 IEPA GEN. #0311620007
Lemont, IL 60439 USEPA ID #ILD085349264
708/739-1151
Contact: Robert D. Garcia, Plant Manager

Type of Incident: Spill

Time/Date of Release: 4:15 p.m. 7/15/93

Duration of Release: 2 Minutes

Quantity Released: 15 Gallons

II. TYPE OF MATERIAL: Blended Hazardous Waste Fuel

INGREDIENT	AMOUNT	%	CAS#	CERCLA(RQ-LBS)
TOLUENE	3.75	25	108-88-3	1000
XYLENE	3.75	25	1330-20-7	1000
FUEL OIL	1.5	10	-	100
METHANOL	1.5	10	67-56-1	5000
GASOLINE	.75	5	-	100
STYRENE	.75	5	100-42-5	1000

Health Effects: Contact may irritate or burn tissue, (eyes skin, mucous membrane) May cause dizziness, irritation in inhaled.
DOT Description: RQ, Waste Flammable Liquid, N.O.S. (Toluene, Xylene)
Hazard Class: UN1993
EPA Hazardous Waste Code: F001-F005, D001, D018, D035

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	DATE	TIME	INCIDENT
IL E.M.A.	800/~~782~~-7860	Hugo Sullan	7/16	10:50 a.m.	93-1903
Nat'l Resp. Ctr.	800/424-8802	Petty Officer Pompilio	7/16	10:45 a.m.	186-715

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 4:15 p.m. on Thursday, July 15, 1993 a spill of 15 gallons of flammable liquid waste fuel occurred following the transfer of a bulk tanker into a storage tank. The spill occurred when the operator disconnected the transfer hose from the truck without blowing down the lines and closing the valve to the tank. The operator immediately re-attached the hose to stop the flow of material. The material was contained in the secondary containment and immediately pumped into the storage tank. The secondary containment was pressure washed to remove any residual material and the wash water was collected for treatment. The total time of the incident and response was approximately 2 hours. At no time was there any potential off-site threat to human health or the environment.

V. CERTIFICATION:

This report is submitted in compliance with 40 CFR Part 302.6 and 35 IAC 724.296. All information provided is accurate top the best of my knowledge.

SIGNED: Robert D. Garcia

DATE: 7/19/93

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

July 22, 1993

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

Re: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD 085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any further questions, please contact me at your convenience, at (708) 739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/sh

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Rev. Glenn Bergmark - Lemont Environmental Advisory Commission

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E., P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party: Heritage Environmental Services, Inc.
Canal Bank Road, N.E.
P.O. Box 337 IEPA GEN. #0311620007
Lemont, IL 60439 USEPA ID #ILD085349264
708/739-1151
Contact: Robert D. Garcia, Plant Manager

Type of Incident: Spill

Time/Date of Release: 2:45 p.m. 7/21/93

Duration of Release: 5 Minutes

Quantity Released: 10 Gallons

II. TYPE OF MATERIAL: Waste Acid Liquid

INGREDIENT	AMOUNT	%	CAS#	CERCLA(RQ-LBS)
SULFURIC ACID	2.0	20	7664-93-9	1000
WATER	8.0	80	-	0

Health Effects: Contact may irritate or burn tissue, (eyes skin, mucous membrane) May cause dizziness, irritation in inhaled.
DOT Description: RQ, Waste Acid Liquid, N.O.S. (Sulfuric Acid, Water)
Hazard Class: NA1760
EPA Hazardous Waste Code: D002

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	DATE	TIME	INCIDENT
IL E.M.A.	800/782-7860	Hugo Sullan	7/22/93	8:45 a.m.	93-1961
Nat'l Resp. Ctr.	800/424-8802	Petty Officer Beshoar	7/22/93	8:40 a.m.	187-898

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 2:45 p.m. on Wednesday, July 21, 1993, a spill of 10 gallons of waste acid liquid occurred when material being composited into the drum reacted, causing material to overflow a 55 gallon plastic drum. The technician reacted immediately to contain the spill, which occurred in secondary containment, with absorbent pads. Approximately 8 gallons of free liquid was collected for treatment and 20 pounds of absorbent pads repackaged for off-site treatment. The containment area was washed off with 20 gallons of water, which was collected for treatment. The total time of the incident and response was approximately 2 hours. At no time was there any potential off-site threat to human health or the environment.

V. CERTIFICATION:

This report is submitted in compliance with 40 CFR Part 302.6 and 35 IAC 724.296. All information provided is accurate top the best of my knowledge.

SIGNED: _____

DATE: _____

HERITAGE ENVIRONMENTAL SERVICES, INC.

P.O. Box 337
Lemont, IL 60439
Phone: 708/739-1151
Fax: 708/739-9491

October 5, 1993

Mr. Oran Robertson
Illinois Environmental Protection Agency
110 East Adams
Springfield, IL 62706

Re: Heritage Environmental Services, Inc.
Canal Bank Road, N.E. P.O. Box 337
Lemont, IL 60439
USEPA ID #: ILD 085349264
IL State #: 0311620007

Dear Mr. Robertson:

Please find enclosed your copy of Heritage Environmental Services, Inc. SARA/CERCLA release report. Please review and should you have any further questions, please contact me at your convenience, at (708) 739-1151.

Sincerely,

Robert D. Garcia

Robert D. Garcia
Plant Manager

RDG/sh

Enc:

cc: Lawrence Eastep - IEPA/Springfield Permit Section
Cliff Gould - IEPA/Maywood Field Operations
Gary Lindgren - Heritage, Indianapolis
Rev. Glenn Bergmark - Lemont Environmental Advisory Commission

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
CANAL BANK ROAD, N.E., P.O. BOX 337
LEMONT, IL 60439
708/739-1151

FACILITY RELEASE REPORT

I. FACILITY LOCATION:

Responsible Party: Heritage Environmental Services, Inc.
Canal Bank Road, N.E.
P.O. Box 337 IEPA GEN. #0311620007
Lemont, IL 60439 USEPA ID #ILD085349264
708/739-1151
Contact: Robert D. Garcia, Plant Manager

Type of Incident: Spill

Time/Date of Release: 8:30 p.m. 9/28/93

Duration of Release: 30 Minutes

Quantity Released: 35 Gallons

II. TYPE OF MATERIAL: Blended Hazardous Waste Fuel

INGREDIENT	AMOUNT	%	CAS#	CERCLA(RQ-LBS)
TOLUENE	8.75	25	108-88-3	1000
XYLENE	8.75	25	1330-20-7	1000
FUEL OIL	3.5	10	-	100
METHANOL	3.5	10	67-56-1	5000
GASOLINE	1.75	5	-	100
STYRENE	1.75	5	100-42-5	1000

Health Effects: Contact may irritate or burn tissue, (eyes skin, mucous membrane) May cause dizziness, irritation in inhaled.
DOT Description: RQ, Waste Flammable Liquid, N.O.S. (Toluene, Xylene)
Hazard Class: UN1993
EPA Hazardous Waste Code: F001-F005, D001, D018, D035

III. NOTIFICATION:

AGENCY	TELEPHONE	CONTACT	DATE	TIME	INCIDENT
IL E.M.A.	800/782-7860	Chris	9/28	9.20 p.m.	93-2602
Nat'l Resp. Ctr.	800/424-8802	Mr. Long	9/28	9:15 a.m.	200-090

IV. INCIDENT DESCRIPTION/RESPONSE ACTION

At approximately 8:30 p.m. on Tuesday, September 28, 1993 a spill of 35 gallons of flammable liquid waste fuel was discovered by a plant operator. The spill resulted from a failure of the packing on a tank mixer. The material was contained in secondary containment and immediately pumped into a storage tank. The area was pressure-washed to remove any residual material and the wash water collected for off-site treatment. The total time of the incident and response was approximately 2 hours. At no time was there any potential off-site threat to human health or the environment.

V. CERTIFICATION:

This report is submitted in compliance with 40 CFR Part 302.6 and 35 IAC 724.296. All information provided is accurate top the best of my knowledge.

SIGNED: _____

DATE: _____

APPENDIX V

ESCA REPORT

Recycled Paper

ESCA
CONSULTANTS, INC.

September 10, 1993

Heritage Remediation/Engineering, Inc.
1319 Marquette Dr.
Romeoville, IL 60441-4054

Attn: Mr. Ron Wilkins

Subject: Secondary Containment Inspection & Evaluation
Heritage Environmental Services, Inc.
Lemont, Illinois

Dear Mr. Wilkins:

Per your request ESCA Consultants, Inc. (ESCA) has performed a structural inspection of five secondary containment areas at the subject plant in Lemont, Illinois. We have noted structural deficiencies which are shown on the exhibits in Appendix A. We have also assessed the suitability of these areas to perform their functions in accordance with applicable design standards.

Inspection

On August 18 and 19, 1993, ESCA visited the plant site and inspected the structural condition of each of the five areas. Following is a description of the results of this inspection:

Outdoor Container Storage Area

At the time of our inspection, this area was being used for drum storage. It consists of a concrete slab with concrete dikewalls on all sides. The drums are supported up off the slab on pallets. The slab is generally in good condition, with a few shrinkage cracks. The walls are also in good condition, and have widely spaced vertical shrinkage cracks. See pages A-2 and A-3.

Roll-Off Storage Area

This area consists of a concrete slab (sloped down to the north) with curbs on three sides. The high (south) side has no curb. Two roll-off containers were temporarily relocated to facilitate our inspection. The concrete is in fair condition. Several cracks are present in the slab, some of which continue through the curb. There is one small spalled area, probably created by impact from a roll-off container. See page A-2.

Van Trailer Farm

Semi-trailers are stored in this area. It consists of an asphalt pavement bounded by a concrete wall on the north and asphalt roll-over curbs on the other three sides. The asphalt is generally in good condition. There are numerous areas where the asphalt has cracked and settled due to overload from trailer supports. Also, a rebar driven into the pavement and a 2"± diameter hole were noted. See page A-4.

Truck Transfer Area

At the time of our inspection, this area was used for unloading waste from trucks. It is an asphalt pavement bounded by an existing building, roll-over curbs, and the tank farm dikewall. The asphalt is generally in good condition. There are several 2"± deep depressions at locations where the asphalt has been overloaded, or scraped by lift forks. See page A-5.

Tank Farm

This area consists of a concrete slab with concrete dikewalls on all sides. The concrete is in good condition. There are several shrinkage cracks in the slab and walls. Some expansion joints have deteriorated seals. See pages A-6 through A-9.

Discussion/Evaluation

All of the areas are in fair to good structural condition. No significant deterioration due to exposure to corrosive substances was noted. Their structural design appears to be adequate, and there are no deficiencies which cause immediate concern regarding their structural integrity. There are, however, deficiencies which may be questioned in regard to the ability of the areas to contain releases of waste. Discussion of these deficiencies and possible corrective measures follows:

Concrete Areas[1]

Two types of deficiencies may need to be addressed. They are:

1) Open cracks.
2) Expansion joints.

---

[1] Outdoor Container Storage Area, Roll-Off Storage Area, and Tank Farm.

Open Cracks

All open cracks can be sealed with an acceptable epoxy sealing product.[1] Slab cracks can be prepared for sealing by chipping away the sides of the crack such that a "vee" cross section is created, and removing all dust, debris, or disintegrated material from the crack by use of oil-free compressed air or vacuuming. Any cracks holding oil or grease must be chipped out to clean concrete. The cracks should then be grouted by pouring the material into the clean "vee'd" out cracks. When the material is cured, the surface may be smoothed by grinding.

Wall cracks can be sealed by pressure injection. Cracks and injection ports must be covered with a suitable epoxy paste adhesive[2] prior to injection.

Expansion Joints

Joints in concrete walls and slabs can be sealed with an acceptable flexible sealing material. One acceptable product is Sikaflex-1A by Sika Corp.

Asphalt Areas

Two types of deficiencies were noted. They are:

1) Holes in pavement.
2) Depressions in pavement.

Holes in Pavement

Holes should be patched. The rebar should be removed and the resulting hole patched.

---

[1] One acceptable material is Sikadur 35, H-Mod LV by Sika Corp.

[2] One acceptable material is Sikadur 31, Hi-Mod Gel by Sika Corp.

Depressions in Pavement

The pavement depressions appear to result primarily from long term concentrated loads which exceeded the pavement load bearing capacity. In the Van Trailer Farm, they occur where supports at the front end of semi-trailers rest on the pavement. These areas should be removed and patched. In the future, efforts should be made to spread the load out by use of bearing plates at these locations.

Certification

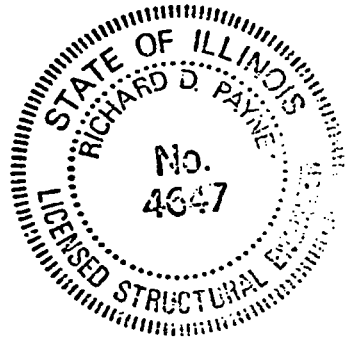
Based upon our field inspections and assessments of the physical condition of each of the five (5) secondary containment areas described herein, and contingent upon sealing of cracks and other remedial measures as necessary, we certify that the structural integrity of these areas complies with all applicable design standards.

Sincerely,
ESCA CONSULTANTS, INC.

Richard D. Payne, P.E., S.E.
President

RDP/ejm

Attachments



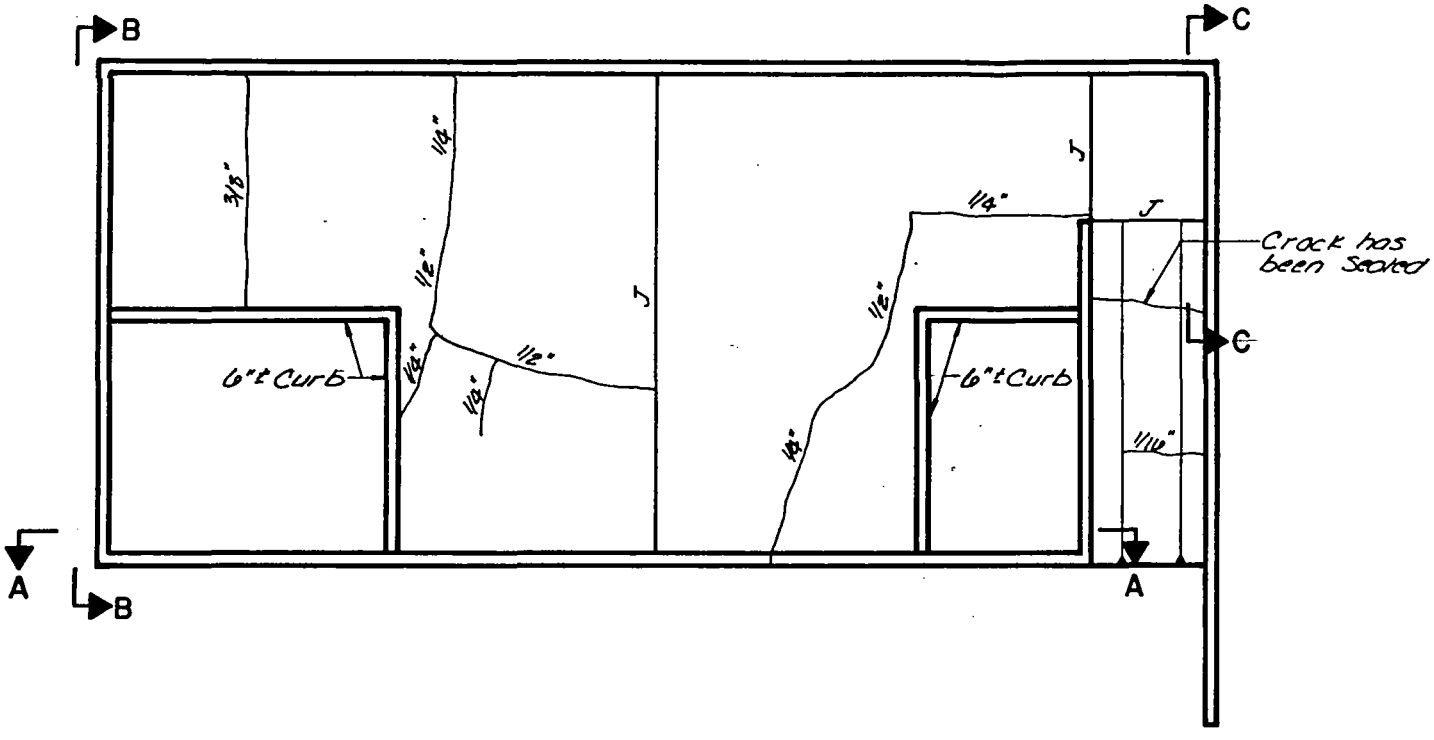
APPENDIX A

CONDITION SKETCHES

LEGEND

———	OPEN CRACK
+-+-+-+-+-	TIGHT HAIRLINE CRACK
	SPALLED AREA
1/8", ETC.	MAX. OPEN WIDTH OF CRACK
J	EXPANSION JOINT *

* ALL JOINTS NEED TO BE SEALED UNLESS NOTED OTHERWISE.



OUTDOOR CONTAINER STORAGE AREA
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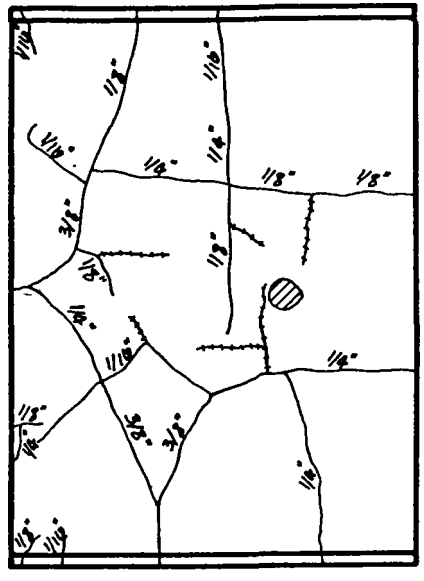
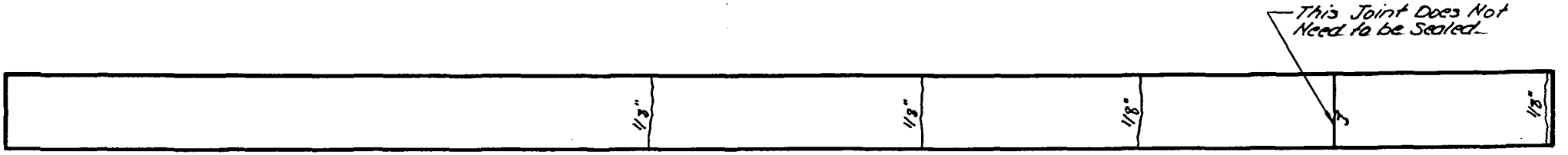
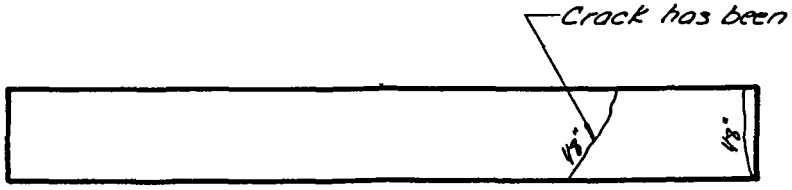


ROLL-OFF STORAGE AREA
SCALE: 1/8"=1'-0"



SECTION A-A
SCALE: 3/8"=1'-0"

SECTION B-B
SCALE: 3/8"=1'-0"



SECTION C-C
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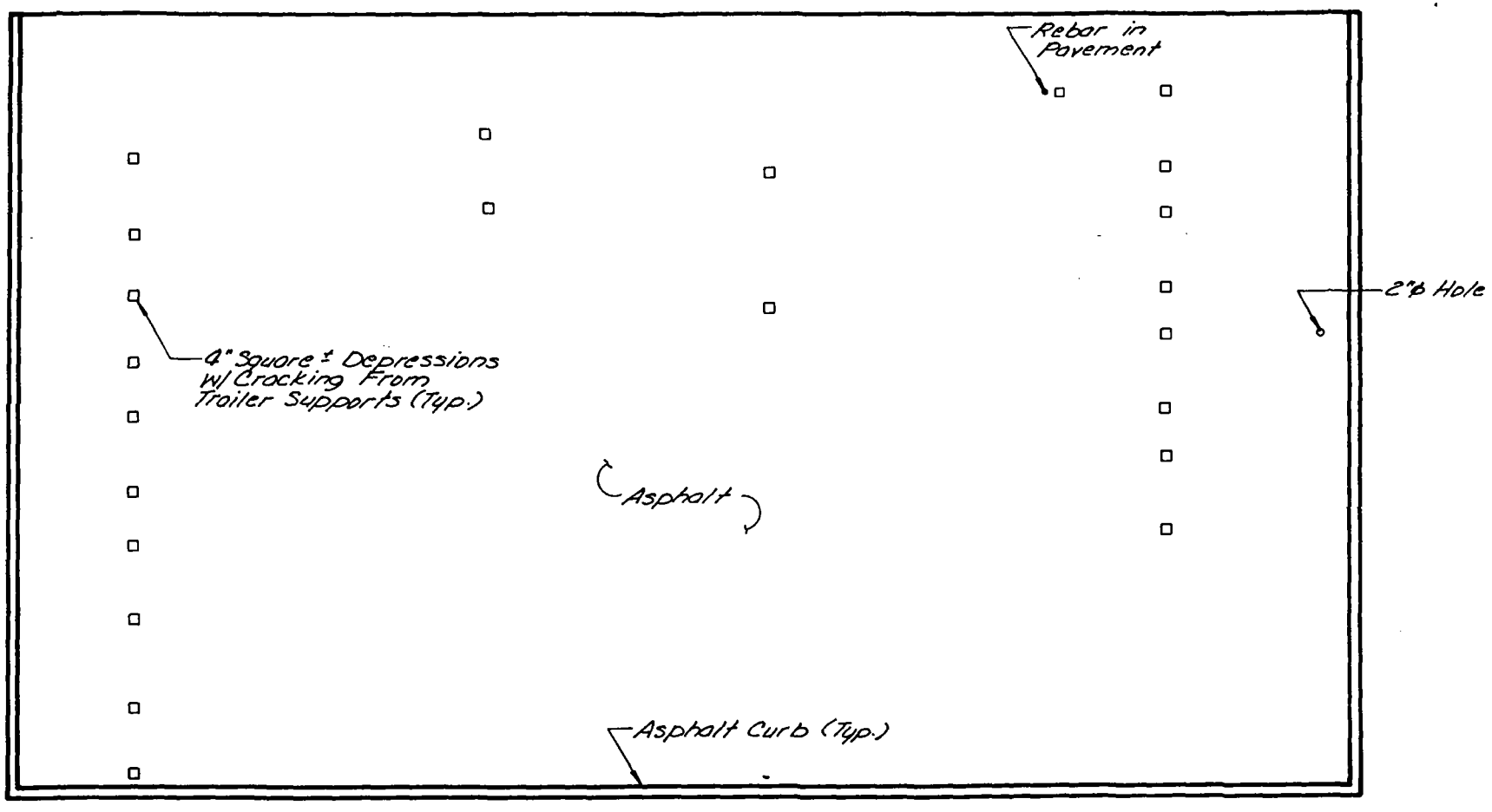

VAN TRAILER FARM
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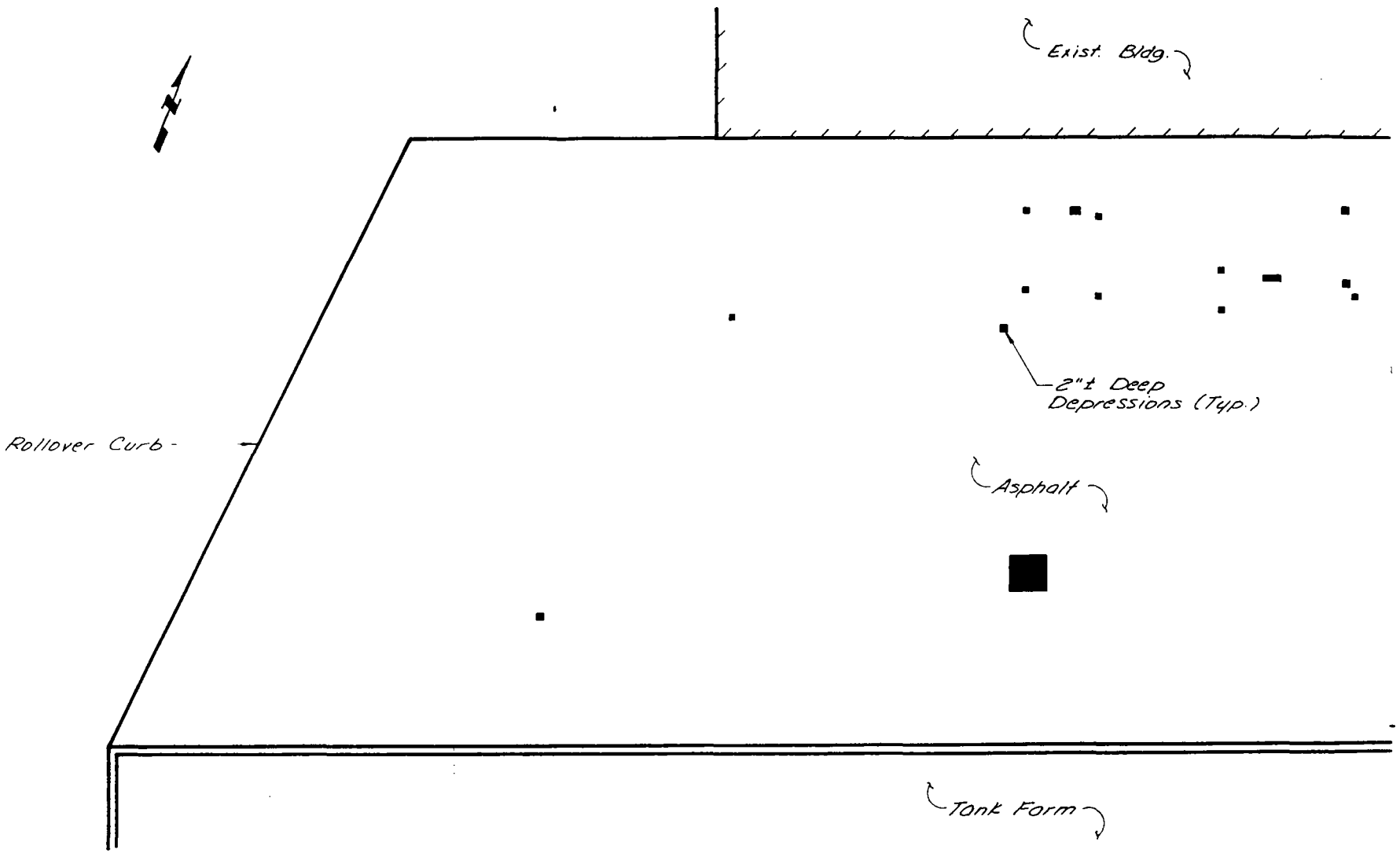

TRUCK TRANSFER AREA
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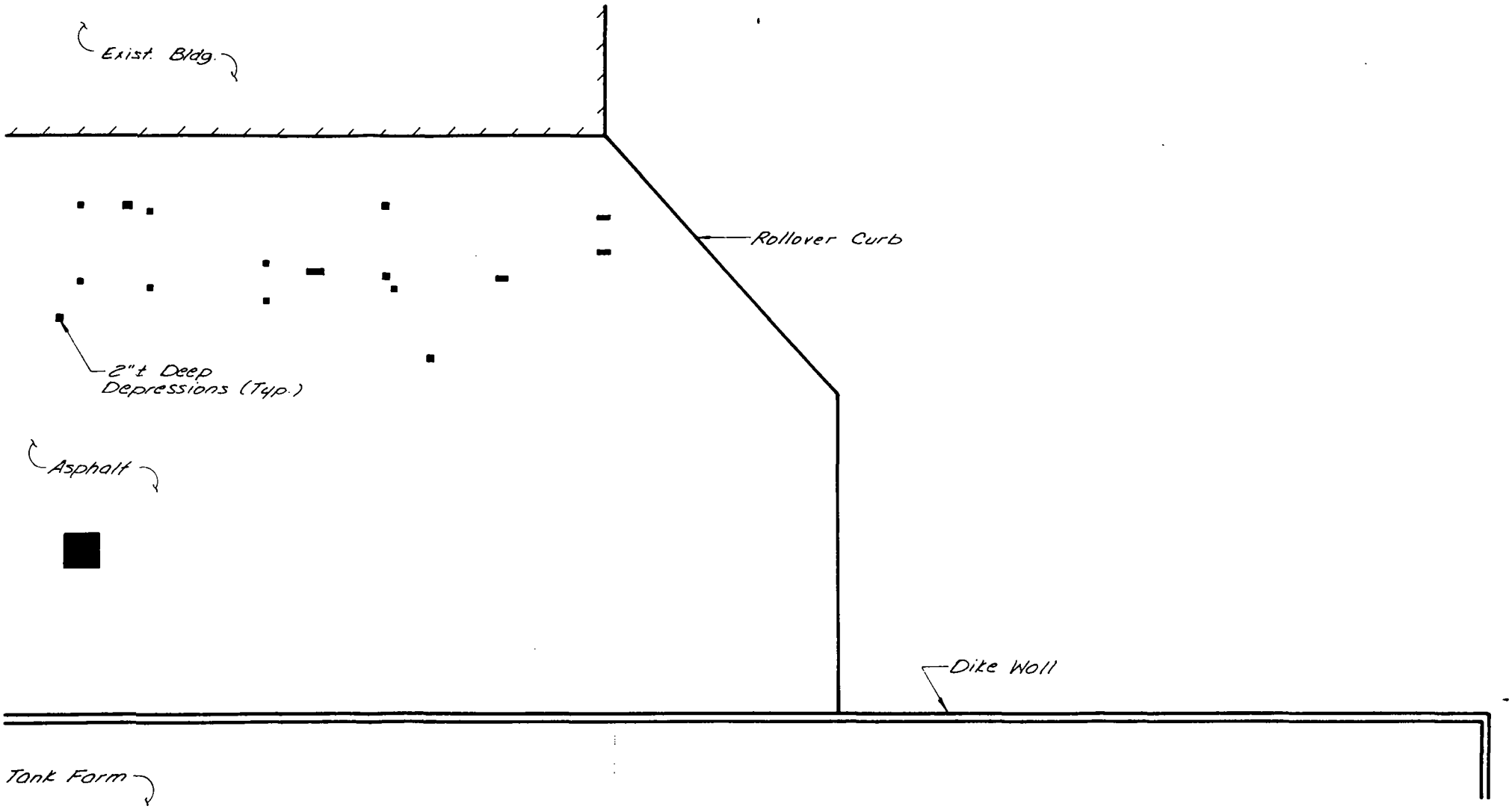
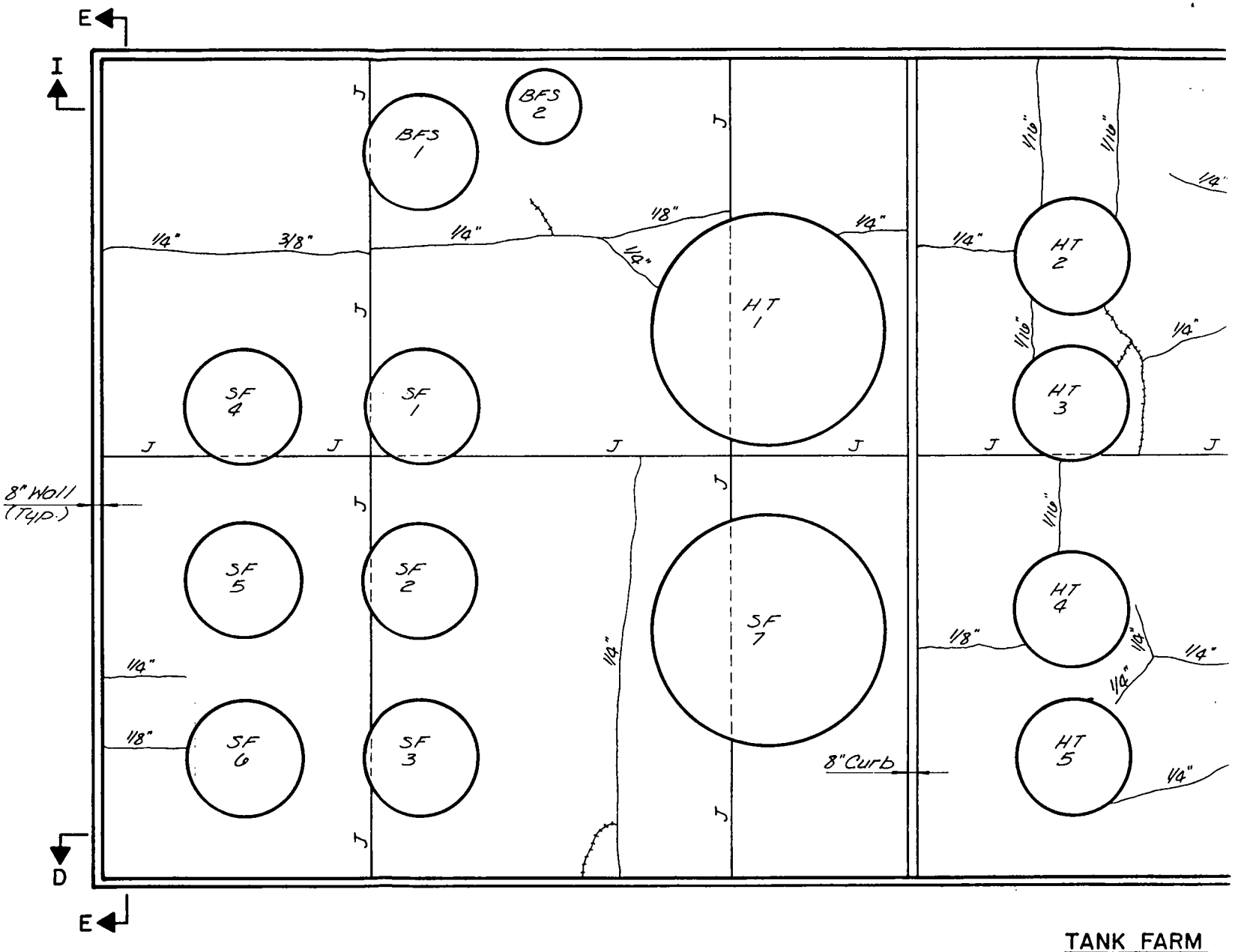


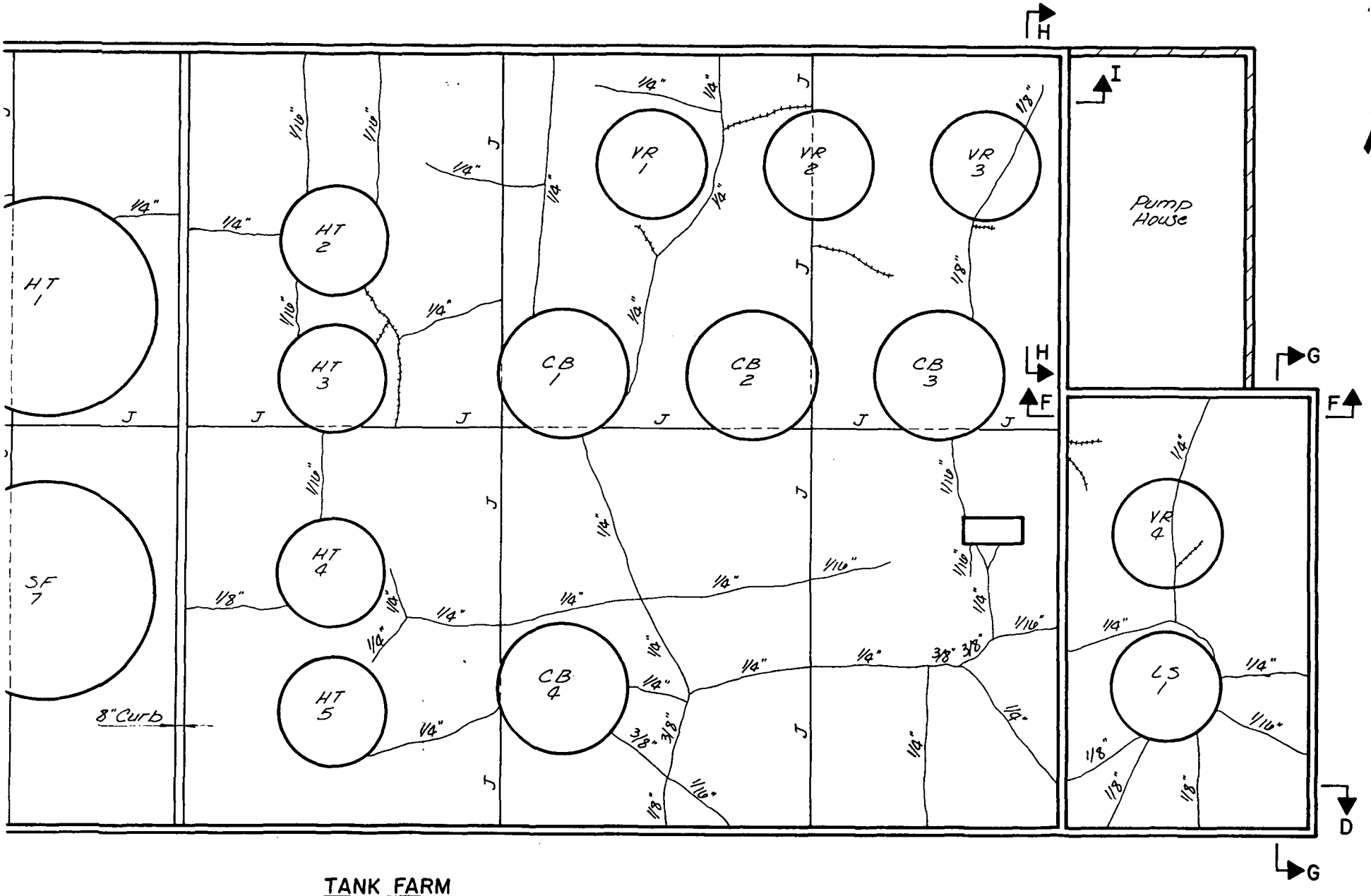
CK TRANSFER AREA

1/8"=1'-0"



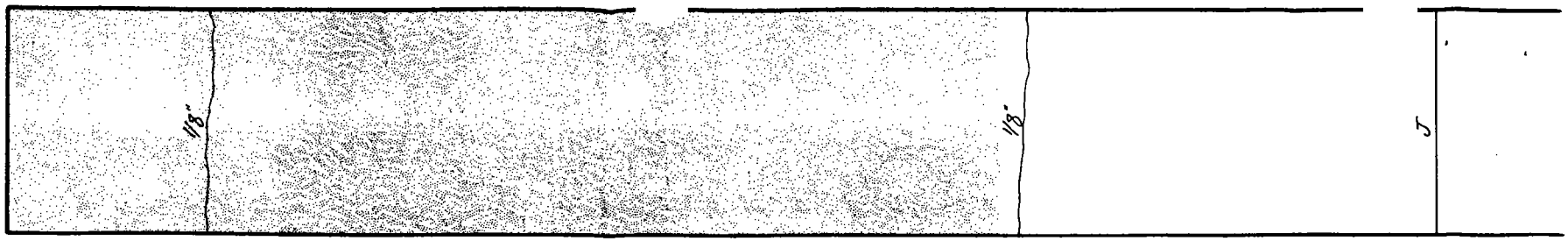
TANK FARM

SCALE: 1/8"=1'-0"



TANK FARM

SCALE: 1/8" = 1'-0" ±



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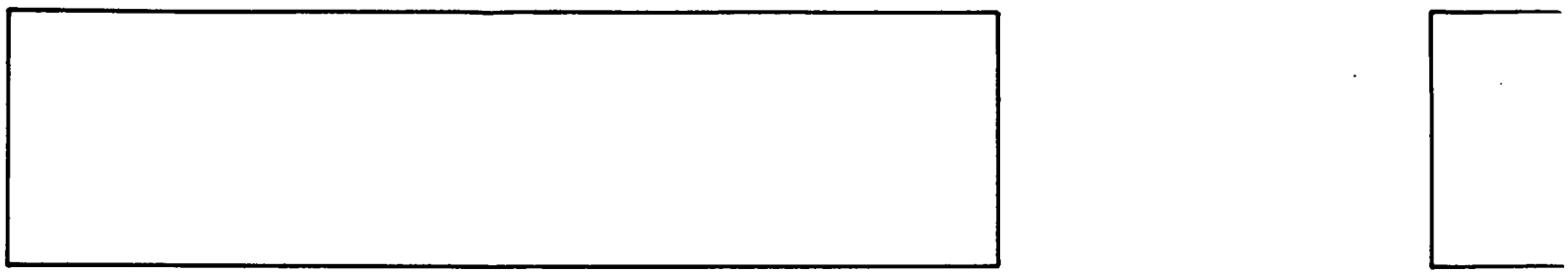

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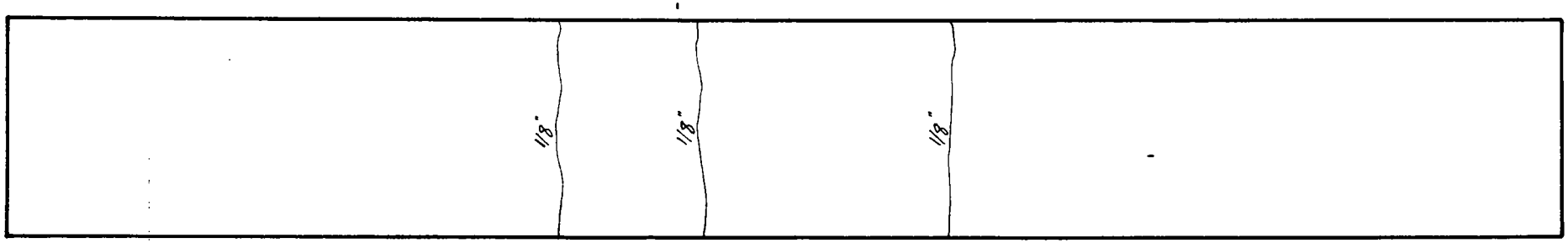

SECTION G-G
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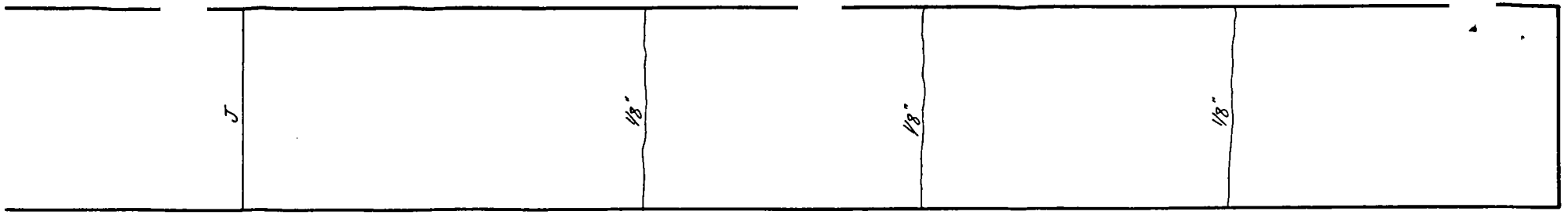

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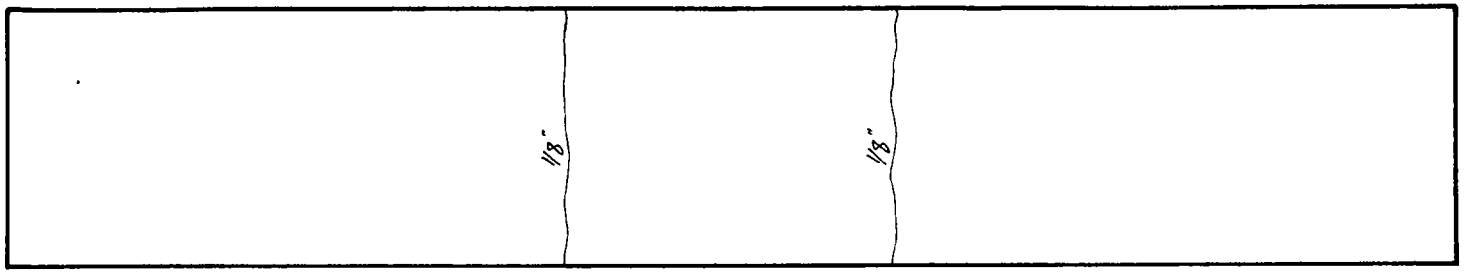

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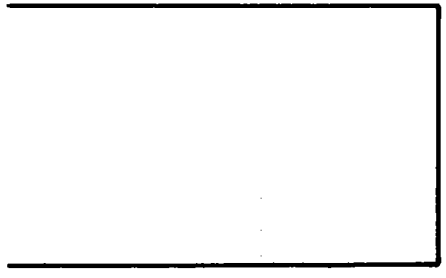
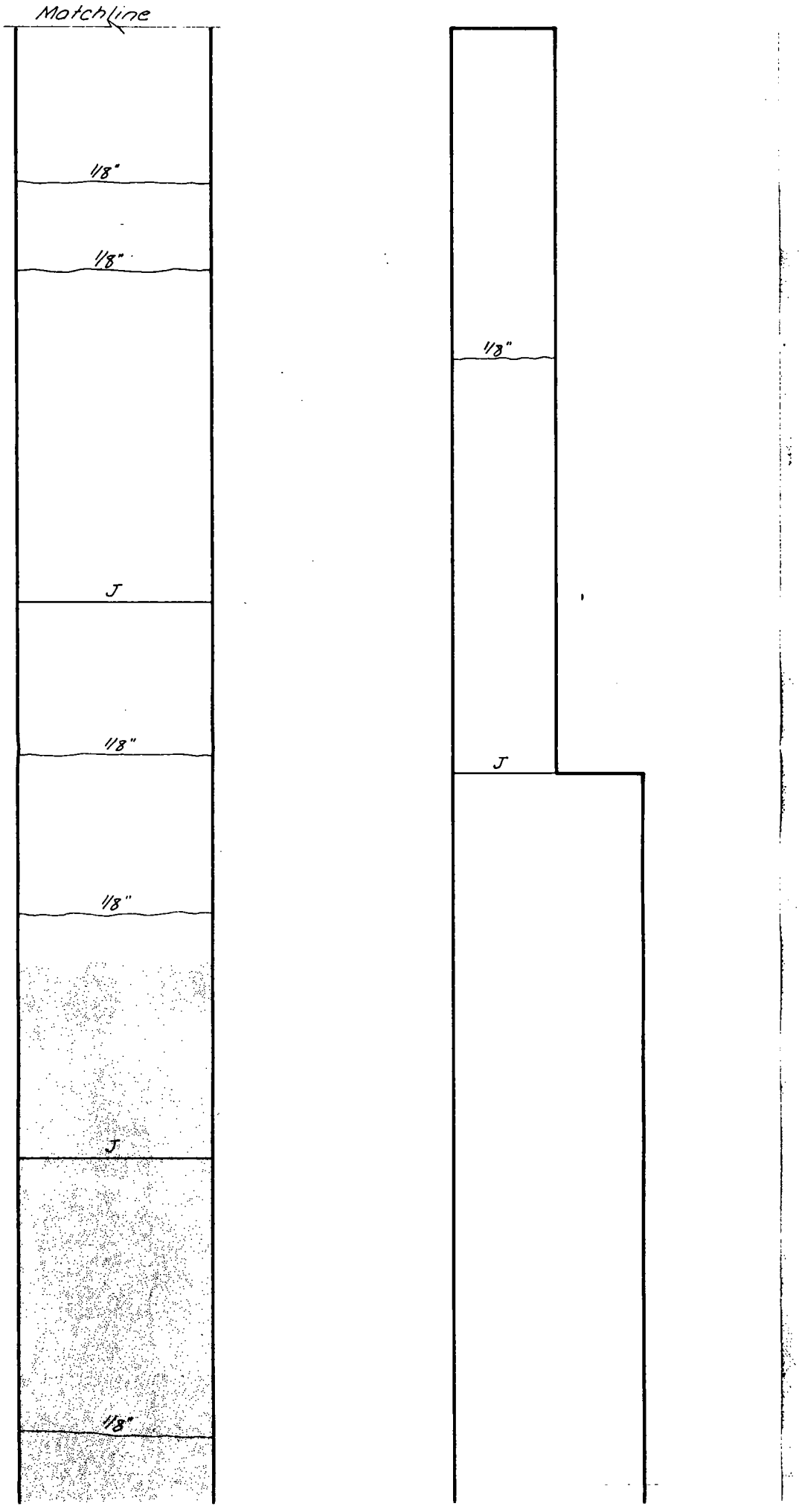
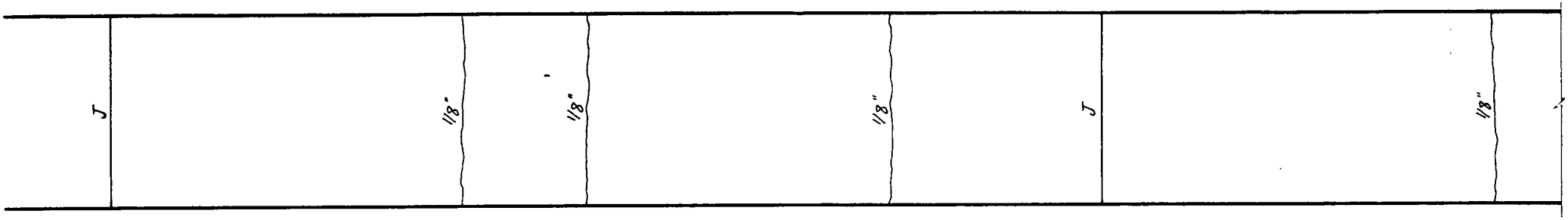
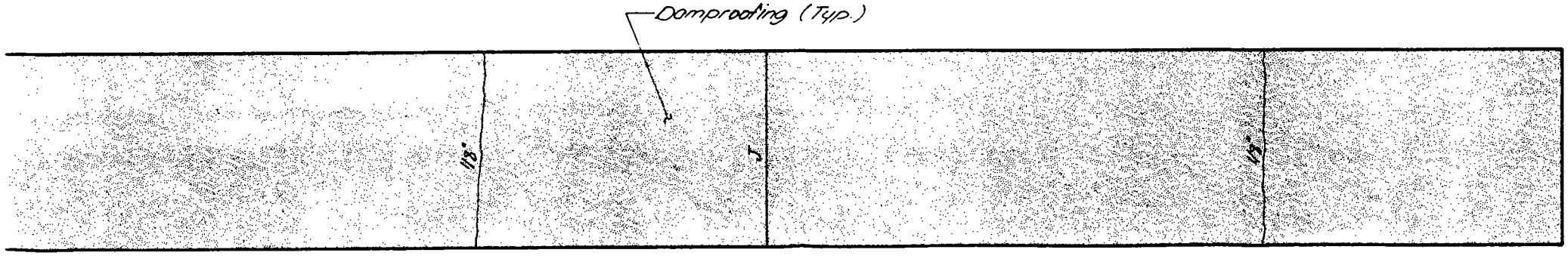




SECT
SCALE





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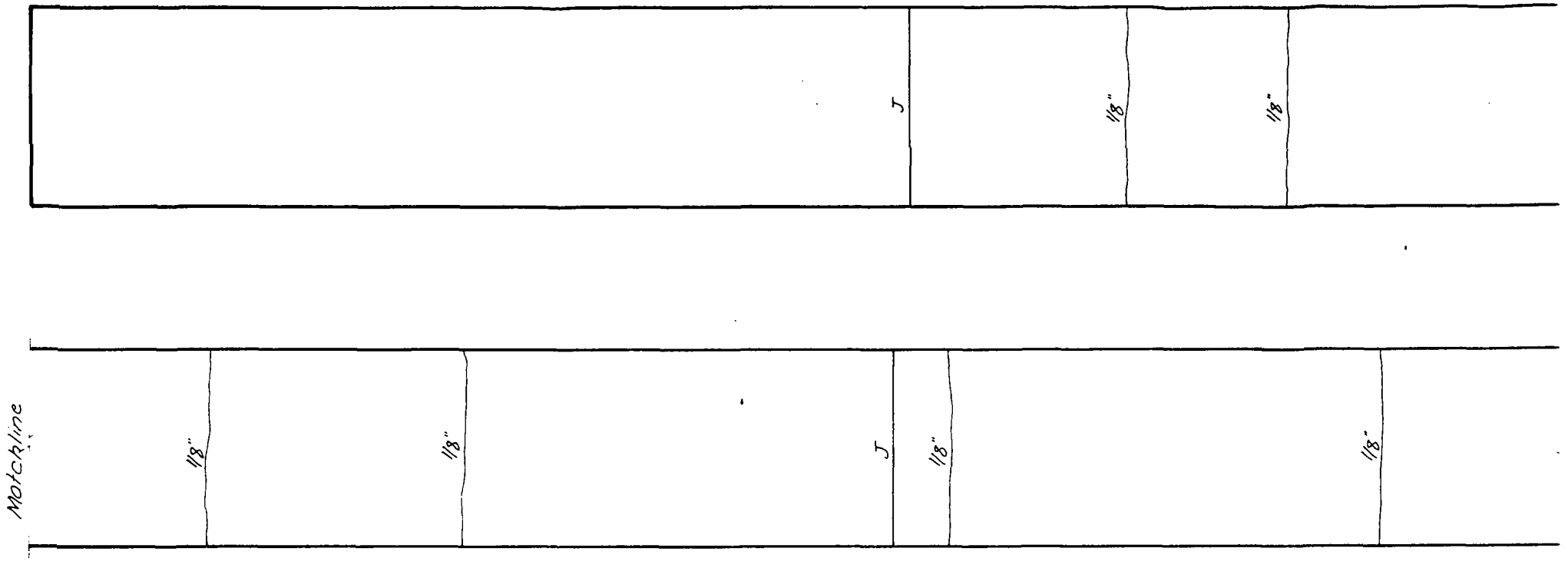

SECTION I - I
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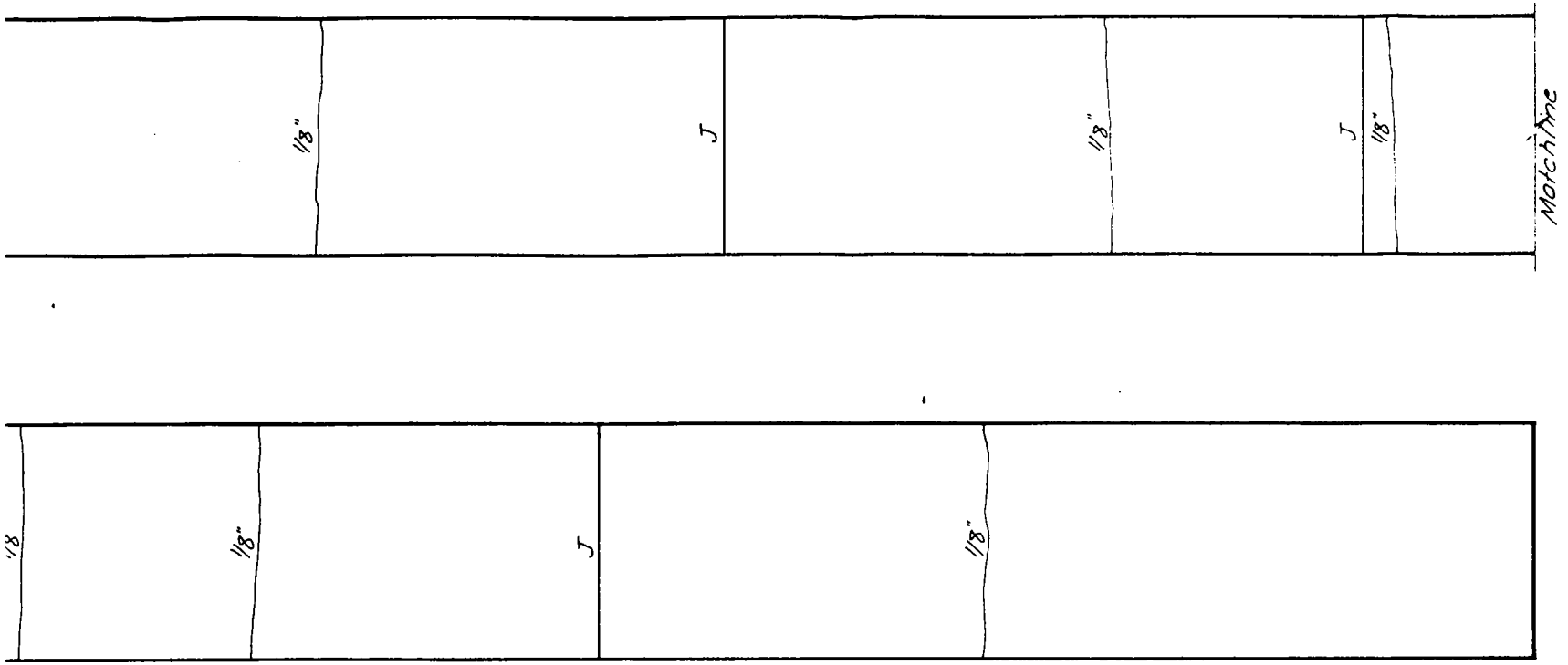


I - I
3/8" = 1'-0"

A-

APPENDIX VI

IWS WELL LIST

Recycled Paper

County: DuPage

Township Code: 37N
Range Code: 11E
Section Codes: 16, 17

61 records were found for the specified locations.

Questions : Contact the Illinois State Water Survey's Ground Water Division @ (217)333-9043
Publication: Please cite the Illinois State Water Survey's Private-Well Database in all publications based wholly or partially on this information.

Please Note:

The data in the Private Well Inventory Database is a listing of those non-municipal wells which are known to the Illinois State Water Survey (ISWS). This information has been entered verbatim from well logs submitted by the driller, chemical analysis reports, well sealing forms, well inventory forms from the 1930-1934 well survey, and other special projects. The accuracy of this data is controlled by those who submitted the form. Information in the private well database has not been verified.

DuPage County - Private Well Database - Page 3

(OFFICE) (USE ONLY)	TWN	RNG	SC	PL	OWNER	DRILLER	DATE	PERMIT	DPTH	REC	US	TY	AQ
181699	37N	11E	17	5H	C V CARLSON CONST	FYKES	01/15/1978	070612	205	L	DO	--	BR
181697	37N	11E	17	5H	C V CARLSON CONST LOT 16	FYKES	01/26/1979	083162	200	LX	DO	--	BR
181698	37N	11E	17	5H	NICK BATISTICH CONST LOT 13	DUPAGE PUMP INC	03/21/1977	057497	205	LX	DO	--	BR
181696	37N	11E	17	5H	C V CARLSON CONST CO LOT 21	FYKES	07/25/1978	076893	200	LX	DO	--	BR
181695	37N	11E	17	5H	NICK BATISTICH BLDR LOT 19	DUPAGE PUMP	09/13/1976	046930	205	LX	DO	--	BR
181700	37N	11E	17	6B	P VILLIRIAEAN & HINDU TEMPLE	GAFFKE	07/13/1984	113110	128	L	DO	--	BR
181701	37N	11E	17	6C	GERRY WARTHAN LOT 11,12,13	FYKES	05/17/1982	103394	180	LX	DO	--	BR
176196	37N	11E	17	6D	MURPHY	TADYSHAK	00/00/1914		75	L	DO	--	BR
181702	37N	11E	17	6G	RICHARD KNOEBEL LOT 1	FYKES	11/15/1985	120925	165	LX	DO	--	BR
181703	37N	11E	17	6H	NICK BATISTICH LOT 25	DUPAGE PUMP INC	03/17/1976	042863	210	LX	DO	--	BR
181704	37N	11E	17	6H	C V CARLSON CONST CO LOT 6	DUPAGE PUMP INC	09/22/1976	048255	205	LX	DO	--	BR
176197	37N	11E	17	7B	STAULEY (FORMERLY)	TADYSHAK	00/00/1913		77	LX	DO	--	BR
181705	37N	11E	17	7B	BOB KOWOLSKI LOT 5	FYKES	09/19/1974	033141	155	LX	DO	--	BR
181706	37N	11E	17	7C	HARRY PIJANOWSKI	FYKES	01/04/1978	068864	175	L	DO	--	BR
176195	37N	11E	17	7E	59 BULL 51		00/00/0000		96	LX	MO	--	BR
181707	37N	11E	17	8H	GREGORY GOLIOS LOT 3	FYKES	04/28/1980	093107	185	LX	DO	--	BR

(OFFICE) (USE ONLY)	TWN	RNG	SC	PL	OWNER	DRILLER	DATE	PERMIT	DPTH	REC	US	TY	AQ
222681	37N	11E	16		ARGONNE NATIONAL LAB A	J.MURDOCH	04/16/1990		57	A	MO	--	--
222736	37N	11E	16		ARGONNE NATIONAL LAB B	MURDOCH	04/16/1990		103	A	MO	--	--
181663	37N	11E	16	1A	RICHMOND BUILDERS	K K WELL DRILL	12/13/1970	011306	160	L	DO	--	BR
181358	37N	11E	16	1F	LINCOLN PARK NURSURIES	TADYSHAK	00/00/0000		18	L	PK	--	BR
176192	37N	11E	16	1F	IBID	IBID	00/00/1930		49	L	DO	--	BR
181359	37N	11E	16	4C	LINCOLN PARK NURSURIES	TADYSHAK	00/00/0000		18	L	PK	--	BR
176191	37N	11E	16	4C	LINCOLN PK NURSURIES	TADYSHAK	00/00/1935		65	L	IN	--	BR
176193	37N	11E	16	5C	CRANNA CONSTRUCTION CO LOT 16	FYKES	07/29/1986	125506	225	LX	DO	--	BR
181667	37N	11E	16	5C	CRANNA CONST CO LOT 14	FYKES	10/09/1986	125507	205	LX	DO	--	BR
176194	37N	11E	17		NICK PAPAS	EGGERT	00/00/0000		40	L	DO	--	BR
181665	37N	11E	17		STANLEY	TADYSHAK	00/00/1913		60	L	DO	--	BR
181666	37N	11E	17		MRS MURPHY	M TADYSHAK	00/00/1914		67	L	DO	--	BR
181664	37N	11E	17			TADYSHAK	00/00/1934		87	L	DO	--	BR
181360	37N	11E	17		LEO BROMBEREK	EGGERT	00/00/1940			L	DO	--	--
181690	37N	11E	17		NICK BATISTICH BLDR LOT 10	DUPAGE PUMP INC	02/16/1976	042869	205	LX	DO	--	BR
181684	37N	11E	17		NICK BATISTICH LOT 24	DUPAGE PUMP INC	02/24/1975	035154	175	LX	DO	--	BR
181688	37N	11E	17		C V CARLSON CONST CO LOT 4	DUPAGE PUMP INC	02/24/1976	045384	210	LX	DO	--	BR
175993	37N	11E	17		LOREN KOCH	MEADOW EQUIPMENT	03/08/1991		135	A	DO	--	--
181669	37N	11E	17		NICK BATISTICH BLDR LOT 25	DUPAGE PUMP INC	03/11/1976	042864	205	LX	DO	--	BR
181681	37N	11E	17		ERVIN FANDREY	DUPAGE PUMP INC	03/14/1983		90	A	DO	--	--
181671	37N	11E	17		NICK BATISTICH LOT 8	DUPAGE PUMP INC	04/23/1977	059253	190	LX	DO	--	BR
181687	37N	11E	17		OAK BROOK CONST CO LOT 20	DUPAGE PUMP INC	05/06/1976	046844	135	LX	DO	--	BR
181672	37N	11E	17		NICK BATISTICH LOT 18	DUPAGE PUMP INC	05/10/1977	059257	190	LX	DO	--	BR
181675	37N	11E	17		NICK BATISTICH LOT 12	DUPAGE PUMP	05/11/1977	060490	200	LX	DO	--	BR
181680	37N	11E	17		BANYAN CONSTRUCTION	LIBERG	05/16/1988		180	A	DO	--	--
181682	37N	11E	17		NICK BATISTICH BUILDER LOT 22	DUPAGE PUMP INC	06/02/1975	037579	175	LX	DO	--	BR
181673	37N	11E	17		CATILLUS DEVELOPMENT CORP LOT8	BRICKEY	07/06/1990		140	AX	IN	--	--
181674	37N	11E	17		CATILLUS DEVELOPMENT CORP LOT2	BRICKEY	07/06/1990		130	AX	IN	--	--
181689	37N	11E	17		CONCRETE SPECIALISTS LOT 1	DUPAGE PUMP INC	07/23/1975	039914	100	LX	IN	--	BR
181668	37N	11E	17		MARTHA BROMBEREK LOT 4	DUPAGE PUMP INC	07/25/1981	100763	100	LX	DO	--	BR
181670	37N	11E	17		C U CARLSON (BATISTICH) LOT 1	DUPAGE PUMP	08/23/1977	064681	210	LX	DO	--	BR
181692	37N	11E	17		NICK BATISTICH CONST CO LOT 15	DUPAGE PUMP INC	10/03/1978	076052	210	LX	DO	--	BR
181685	37N	11E	17		C V CARLSON CONST CO LOT 3	DUPAGE PUMP INC	10/19/1975	37N11E17	175	LX	DO	--	BR
181686	37N	11E	17		NICK BATISTICH LOT 5	DUPAGE PUMP INC	10/23/1975	040246	175	LX	DO	--	BR
176028	37N	11E	17		CATTELLUS DEV LOT 9(ROBINETTE)	BRICKEY	10/30/1990		140	AX	DO	--	--
181679	37N	11E	17		DAVID SZYMANDI LOT 3	K & K WELL DRILLING	11/00/1967	003107	168	LX	DO	--	BR
181677	37N	11E	17		NICK BATISTICH BLDR LOT 11	DUPAGE PUMP	11/03/1977	068653	205	LX	DO	--	BR
181676	37N	11E	17		NICK BATISTICH BLDR LOT 14	DUPAGE PUMP	11/03/1977	068654	205	LX	DO	--	BR
181678	37N	11E	17		RALPH CARPA LOT 1	K & K WELL DRILLING	11/21/1977	067125	180	LX	DO	--	BR
181683	37N	11E	17		FRANK SLIVIANSKI LOT 8	DUPAGE PUMP INC	11/23/1973	026275	130	LX	DO	--	BR
181691	37N	11E	17		NICK BATISTICH LOT 9	DUPAGE PUMP INC	12/18/1975	042867	205	LX	DO	--	BR
176198	37N	11E	17	4D		TADYSHAK	00/00/1930		87	L		--	BR
213571	37N	11E	17	5A	PETER HOWE		00/00/1971		60	ICG	CM	--	BR
181693	37N	11E	17	5D	PAUL MOSER CONST CO	UNKNOWN	[illegible]						

County: Cook

Township Code: 37N
Range Code: 11E
Section Codes: 20, 21

34 records were found for the specified locations.

Questions : Contact the Illinois State Water Survey's Ground Water Division @ (217)333-9043
Publication: Please cite the Illinois State Water Survey's Private-Well Database in all publications based wholly or partially on this information.

Please Note:

The data in the Private Well Inventory Database is a listing of those non-municipal wells which are known to the Illinois State Water Survey (ISWS). This information has been entered verbatim from well logs submitted by the driller, chemical analysis reports, well sealing forms, well inventory forms from the 1930-1934 well survey, and other special projects. The accuracy of this data is controlled by those who submitted the form. Information in the private well database has not been verified.

(OFFICE) (USE ONLY)	TWN	RNG	SC	PL	OWNER	DRILLER	DATE	PERMIT	DPTH	REC	US	TY	AQ
29710	37N	11E	20		L L BROWN (SPRING)		00/00/1906			LX	DO		
24182	37N	11E	20		L L BROWN (SPRING)		00/00/1906			LX	DO		
27533	37N	11E	20		TIEDT TRUCKING CO	DUPAGE PUMP	05/10/1976	M046841	100	RG	IN		BR
25515	37N	11E	20	2A	NO. 6	DUPAGE WELL DRILLERS	00/00/1957		82	RG			BR
25516	37N	11E	20	2C	KONDZIORA	TADYSHAK	00/00/1915		35	DG	DO		BR
218607	37N	11E	20	4C	LEMONT		11/00/1916		1000	C	MU	--	--
25517	37N	11E	20	5H	INLAND RYERSON	DUPAGE PUMP	06/26/1981	M100710	130	RG	DO		BR
25518	37N	11E	20	7B	KENNETH SIMPSON	FYKES	03/03/1975	M036217	200	RG	DO		BR
25519	37N	11E	20	8A	FRED ZIEMANN	KNIERIM	02/21/1986	M122371	120	RG	DO		BR
25520	37N	11E	20	8A	RON PITELKA	WILL-DUPAGE	05/16/1979	M085126	145	RG	DO		BR
25523	37N	11E	21		I.S.O.B. CONST CO	KNIERIM	03/30/1978	M072397	200	RG	DO		BR
25527	37N	11E	21		SUSAN & FRED BLACK	LODE	05/11/1988	M132768	185	RG	DO		BR
25522	37N	11E	21		GERHARD SCHULZ	KNIERIM	05/26/1967	M002549	191	RG	DO		BR
25524	37N	11E	21		RAY RUDIS BLDR	KNIERIM	09/07/1971	M014095	200	RG	DO		BR
25525	37N	11E	21		RAY RUDIS BLDR	KNIERIM	10/11/1971	M014094	170	RG	DO		BR
25526	37N	11E	21		ROBERN BUILDERS	WILL-DUPAGE	10/27/1979	M090957	190	RG	DO		BR
25521	37N	11E	21		AUGUST MIKSYS	K & K	11/05/1973	M026030	200	RG	DO		BR
25529	37N	11E	21	1A	R SLOMCZYNSKI	FYKES	04/12/1979	M084457	200	RG	DO		BR
25528	37N	11E	21	1A	ANTHONY MACEBIEIUS	FYKES	06/06/1977	M058568	185	RG	DO		BR
235065	37N	11E	21	1A	E.GIACCHETTI LOT 79	KUEHN	12/28/1992	031-00002--93	300	RG	DO	--	BR
25530	37N	11E	21	1B	JAMES MAZA	FOYLE	08/22/1978	M074154	180	RG	DO		BR
189259	37N	11E	21	1B	JOHN NOWOBILSKI LOT #127	DUPAGE PUMP INC	09/20/1989	010244	205	RG	DO	--	BR
25531	37N	11E	21	1D	CHARLES WALKER	DUPAGE PUMP	07/19/1976	M049880	100	RG	DO		BR
25532	37N	11E	21	1G	MRS POLSON	KNIERIM	02/05/1985	M116432	200	RG	DO		BR
25533	37N	11E	21	2A	SIMPSON WELL & PUMP	FYKES	08/12/1987	M130220	205	RG	DO		BR
25534	37N	11E	21	2B	C.V.E. BUILDERS	K & K	07/29/1970	M010200	220	RG	DO		BR
25535	37N	11E	21	2B	RAY RUDIS	K & K	09/00/1970	M010607	210	RG	DO		BR
25536	37N	11E	21	2B	ROBERT CROWHURST & SON	K & K	11/12/1973	M026301	200	RG	DO		BR
25537	37N	11E	21	2D	CHAS WALKER	FYKES	08/21/1974	M032157	725	RG	DO		BR
25538	37N	11E	21	2F	CARL A SANDBERG	FYKES	07/08/1975	M038968	305	RG	DO		BR
25541	37N	11E	21	3B	RAY RUDIS BLDR	KNIERIM	09/18/1972	M018816	135	RG	DO		BR
25542	37N	11E	21	3B	RAY RUDIS BLDR	KNIERIM	10/26/1972	M018817	180	RG	DO		BR
25539	37N	11E	21	3B	H R CUSTER & SON	KNIERIM	12/11/1971	M015738	180	RG	DO		BR
25540	37N	11E	21	3B	JAMES ARNOLD	K & K	12/12/1973	M024666	173	RG	DO		BR

County: DuPage

Township Code: 37N
Range Code: 11E
Section Codes: 16, 17

1 records were found for the specified locations.

Questions : Contact the Illinois State Water Survey's Ground Water Division @ (217)333-7223
Publication: Please cite the Illinois State Water Survey's PICS (Public-Industrial-Commercial) Database in all publications based wholly or partially on this information.

Please Note:

The data in the PICS Database is a listing of municipal and large industrial and commercial wells which are known to the Illinois State Water Survey (ISWS). The information was initially entered from public water supply data and supplemented with the Illinois Water Inventory Project data. This database is updated as additional information is received and verified.

SWS ID	Name	No.	Status	Location	Depth	Type log	Year constructed	Driller
04329645	HINDU TEMPLE OF GREATER CHICAG	1	I	04337N11E176B	128	D	1984	GEORGE E GAFFKE

County: Cook

Township Code: 37N
Range Code: 11E
Section Codes: 20, 21

5 records were found for the specified locations.

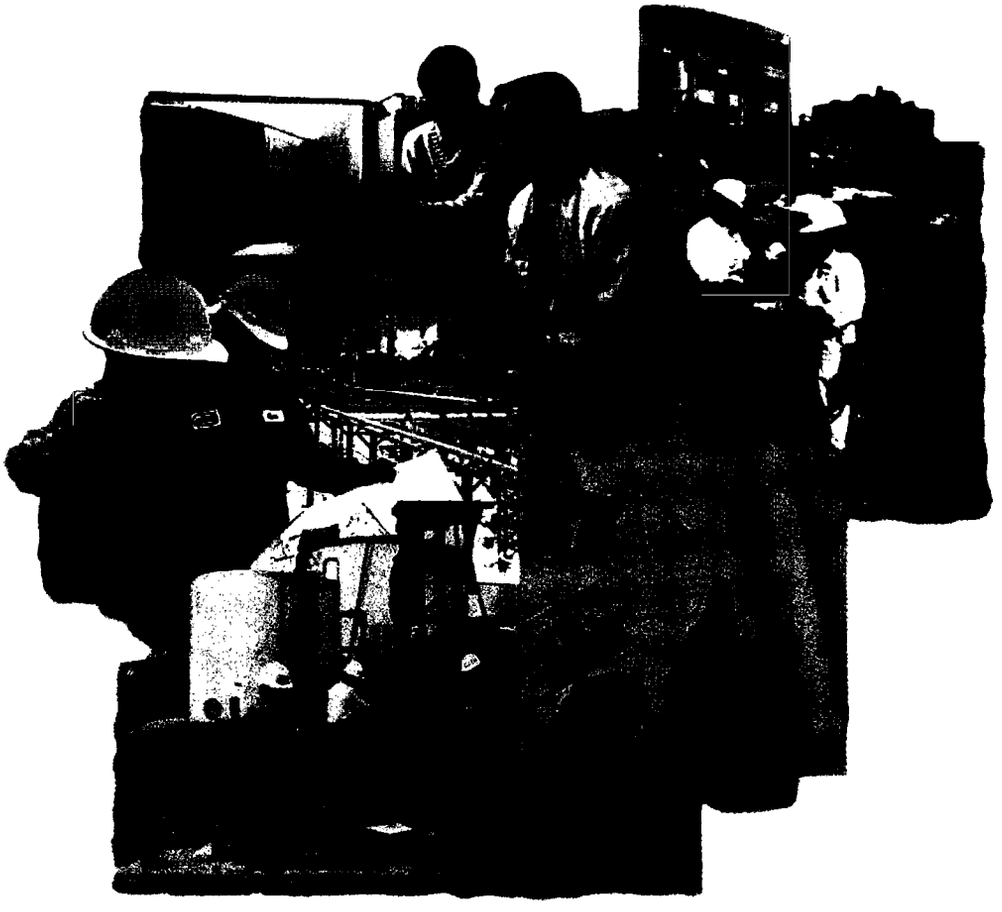
Questions : Contact the Illinois State Water Survey's Ground Water Division @ (217)333-7223
Publication: Please cite the Illinois State Water Survey's PICS (Public-Industrial-Commercial) Database in all publications based wholly or partially on this information.

Please Note:

The data in the PICS Database is a listing of municipal and large industrial and commercial wells which are known to the Illinois State Water Survey (ISWS). The information was initially entered from public water supply data and supplemented with the Illinois Water Inventory Project data. This database is updated as additional information is received and verified.

SWS ID	Name	No.	Status	Location	Depth	Type log	Year constructed	Driller
03114095	DONOHOE R P COMPANY	1	I	03137N11E20	870			
03114105	FRANCISCAN SISTERS OF CHICAGO	1	E	03137N11E213C	280	-	--	DUPAGE PUMP, INC
03114105	FRANCISCAN SISTERS OF CHICAGO	2	S	03137N11E213C	220	-	--	DUPAGE PUMP, INC
03114105	FRANCISCAN SISTERS OF CHICAGO	3	I	03137N11E213C	1633	D	1969	WEHLING WELL WORKS
03191620	LEMONT	1	S	03137N11E204C	2284	-	1882	W L THORNE CO

HERITAGE ENVIRONMENTAL SERVICES ■ HERITAGE LABORATORIES ■ HERITAGE TREATMENT CENTERS ■ HERITAGE REMEDIATION ENGINEERING ■ HERITAGE TRANSPORT



ATTACHMENT 2

DATA MANAGEMENT PLAN
RCRA FACILITY INVESTIGATION
PHASE I

Heritage Environmental Services
Lemont, Illinois
USEPA Identification No.: ILD 085349264
DLPC 0311620007

HERITAGE REMEDIATION / ENGINEERING, INC.

HERITAGE REMEDIATION/ENGINEERING, INC.

1319 Marquette Dr.
Romeoville, IL 60441
Phone: 708/378-1600
FAX: 708/378-2200

ATTACHMENT 2

DATA MANAGEMENT PLAN

RCRA FACILITY INVESTIGATION
PHASE I

Heritage Environmental Services
Lemont, Illinois
U.S.E.P.A. Identification No. ILD085349264
DLPC 0311620007

Prepared for:

Heritage Environmental Services
Canal Bank Road, N.E.
Lemont, Illinois 60439

Prepared By:

Heritage Remediation/Engineering, Inc.
Chicago Division
1319 Marquette Drive
Romeoville, Illinois 60441

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October 29, 1993

HR/E Job No. 6119

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Purpose 1
1.2 Project Files 1

2.0 FIELD SAMPLING 1
2.1 Field Sample Location Identifier 1
2.2 Labeling of Samples 2
2.3 Chain of Custody 2
2.4 Field Documentation 3
2.4.1 Field Logbook 3
2.4.2 Forms 4
2.4.3 Photographs 4

3.0 LABORATORY DATA 1
3.1 Laboratory Certificates of Analysis 1
3.2 Laboratory Identifier 2
3.3 QA/QC Data 2

4.0 PRESENTATION OF DATA 1
4.1 Tabular Presentations 1
4.2 Geographical Presentation 1

5.0 REPORTS 1

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1.0 INTRODUCTION

1.1 Purpose

This Data Management Plan (DMP) has been prepared to identify the methodology and procedures to document and track the investigative data and results of the RFI. This plan has been prepared as the DMP for all phases of the RFI as required. Elements specific to Phase I, II or III of the RFI are presented in the appropriate Project Management Plan of the phase of activities to be undertaken.

1.2 Project Files

All data or copies of data generated during the RFI will be placed in the job project file located at HR/E's office in Romeoville, Illinois. The project file shall be identifiable by a unique number. The job project shall be under the control of the project manager. Material placed into the job project file shall only be removed for purposes of data evaluation or reference. When removing material from the file, a "removed card" shall be filled out indicating material removed, person removing material and date out. Upon return, the date shall be indicated on the "removed card". Electronic documents generated shall be stored on 5.25 disks and a paper copy generated for placement in the job project file.

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2.0 FIELD SAMPLING

2.1 Field Sample Location Identifier

Each sample location shall be designated by a unique identification code. Soil boring locations shall be prefixed by "SB". This prefix shall be followed by a unique number for each location which will be numbered sequentially. In the event that more than one soil sample is collected from a given sample location, (i.e., multiple depths) the depth will be recorded as the third entry to the unique sample identifier. Where duplicate samples are collected they shall be identified by the letter "D" following the identifier. Samples collected for matrix spike shall be designated by the letter "R" following the identifier. In all sampling events, the following prefix system shall be followed:

SB	-	Soil Borings Soil Sample
MW	-	Monitoring Wells
GW	-	Groundwater (other than monitoring wells)
SW	-	Surface Waters
SD	-	Sediments
W	-	Other Wastes
S	-	Other Solid Samples
TB	-	Trip Blank
FB	-	Field Blank

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As necessary in the performance of the RFI, should additional identifiers be appropriate they will be incorporated by revision of this section.

2.2 Labeling of Samples

Samples collected during the RFI activities will be labeled upon their collection. The labels will be completed to include the following information using permanent marker:

- Sample Identifier
- Date and Time of Sample Collection
- Sample Matrix
- Name of Sampler
- Analysis to Be Performed
- Preservative (if applicable)

Sample labels will be affixed to the sample containers prior to the time of sampling and will not be affixed to lids or caps.

2.3 Chain of Custody

To track QA/QC handling protocols, the labels will be filled out by the sampler and the Chain of Custody form will be completed in the field before the sampling team leaves the site. The sampler will be responsible for maintaining custody of the samples until they are delivered to the laboratory. The Chain of Custody form will then be signed and the custody formally relinquished. A copy of this Chain of

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Custody will be placed in the project job file to be maintained at HR/E's offices in Romeoville, Illinois.

2.4 Field Documentation

2.4.1 Field Logbook

A bound logbook will be used to record all daily activities performed at the site. Entries will be written in sufficient detail so that a particular situation can be reconstructed. This field logbook will be a bound book. Logbooks will be assigned to field personnel, but will be stored securely in the office when not in use. After project completion, the field book will be placed in the job project file. Entries in the logbook will be dated and signed by the person making the entry. The logbook will be kept in a secure, dry place. Entries will be made in indelible ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark.

Entries into the logbook will contain a variety of information including the date, start time, weather, all field personnel present, level of personnel protection being used on site, and the signature of the person making the entry. The names of visitors to the site, all field sampling team personnel, and the purpose of their visit will be recorded in the field logbook. Any information that is not normally recorded on forms should also be included in the logbook (e.g., delays, unusual situations, well damage, departure from established QA/QC field procedures, instrument problems, accidents).

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2.4.2 Forms

Forms, when used during this project, will be placed in the job project file upon completion. These forms include the original and copies of signatory pages, (i.e., HASP), equipment calibration, and other forms as necessary. Whenever a sample is collected or a measurement is made, a detailed description of sampling location will be recorded in the field logbook. All equipment used to make measurements will be identified.

2.4.3 Photographs

When a photograph is taken, a notation will be made in the logbook indicating the date, roll number, photo number, time, direction that the camera is facing, location, and description (e.g., person(s) in photograph, activity taking place, etc.). In addition, a completed photographic identifier may be placed in the photograph, whenever appropriate and feasible. For example, a photographic identifier could be used in a close-up photograph of a sediment sampling location.

All photographs taken during the Pre-Design Studies will be reviewed after processing. The negative numbers will be compared to the photograph numbers indicated in the logbook and on the photographic identifier in the picture. A log of photographs taken will be compiled and included in the appropriate report. This log will indicate both the photograph number assigned in the field and the negative number, in order to avoid confusion

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associated with future references to photographs. Any missing, indistinguishable, or poor quality photographs will also be noted in the photographic log.

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3.0 LABORATORY DATA

3.1 Laboratory Certificates of Analysis

The laboratory shall provide laboratory certificates of analysis for all data to HR/E. These laboratory certificates of analysis shall identify the following at a minimum:

- Site;
- Who the report is being provided to;
- The assigned unique sample identifier;
- Laboratory identifier;
- Description of sample matrix;
- Date sample was collected;
- Date sample received by laboratory;
- Date sample analysis completed;
- Analysis performed;
- Test methods;
- Date of analysis;
- Name of analyst;
- Detection limits of analysis;
- Results of analysis of sample;
- Signature of laboratory Quality Assurance officer;
- Chain of Custody number.

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3.2 Laboratory Identifier

The laboratory shall provide to HR/E a copy of the sample identifier and corresponding laboratory identifier. This may be provided in the Chain of Custody form

3.3 QA/QC Data

As part of its submittal of the data, the laboratory shall provide a copy of all QA/QC data in its raw and reduced form to HR/E. Wherein qualifiers of data were necessary, the laboratory shall provide a brief description of the qualifier, reason for qualifier and actions undertaken to correct or prevent reoccurrences if applicable. This data will be kept in HR/E's job project file.

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4.0 PRESENTATION OF DATA

4.1 Tabular Presentations

The raw data generated during the RFI shall be filed in HR/E's job project file. This data shall then be compiled in tabular form for inclusion in the appropriate RFI reports. This data shall represent:

- Results for each medium;
- Results for each constituent monitored (where appropriate);
- Results for each SWMU.

This data shall then be further reduced by summarizing the data and reducing the data for statistical analysis by presentation of the significant concentrations of contamination if determined to exist.

4.2 Geographical Presentation

Figures will be provided showing the location of the sampling points and the SWMUs in relationship to the other areas as well as the facility. Based upon the tabular presentation of the data in summary form, various plans may be prepared depicting the estimated extent of contaminants, changes in containment concentrations with distance from the source and areas requiring further action. This data will be presented on a scale of 1" = 200 feet or as appropriate for presentation in the RFI

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report. These documents will be prepared using Auto Cadd and stored on a 3.5 inch disk.

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5.0 REPORTS

In the course of performing the RFI activities, copies of all correspondence shall be placed into HR/E's job project file. HR/E will also prepare and submit quarterly progress reports to HERITAGE for submittal to the IEPA. These reports will summarize the activities performed during the reporting period, an estimate of the percentage of the project completed, projected work to be performed the next reporting period, presentation of any proposed changes to the Work Plan or its implementation, summaries of any problems encountered, corrective action proposed or implemented.

RFI reports will be prepared and submitted to HERITAGE for submittal to the IEPA at the conclusion of each phase of activity. These reports will present a summary of and document all activities conducted at the facility, and present the raw and compiled data in the manner in which they were used in evaluating the condition at each SWMU. The report will summarize the conclusion and recommendations based upon the evaluation of this data. An original and two copies of all reports will be submitted to the IEPA for their review nd approval.

All documents transmitted to the IEPA shall reference the USEPA I.D. number and the DLPC number.

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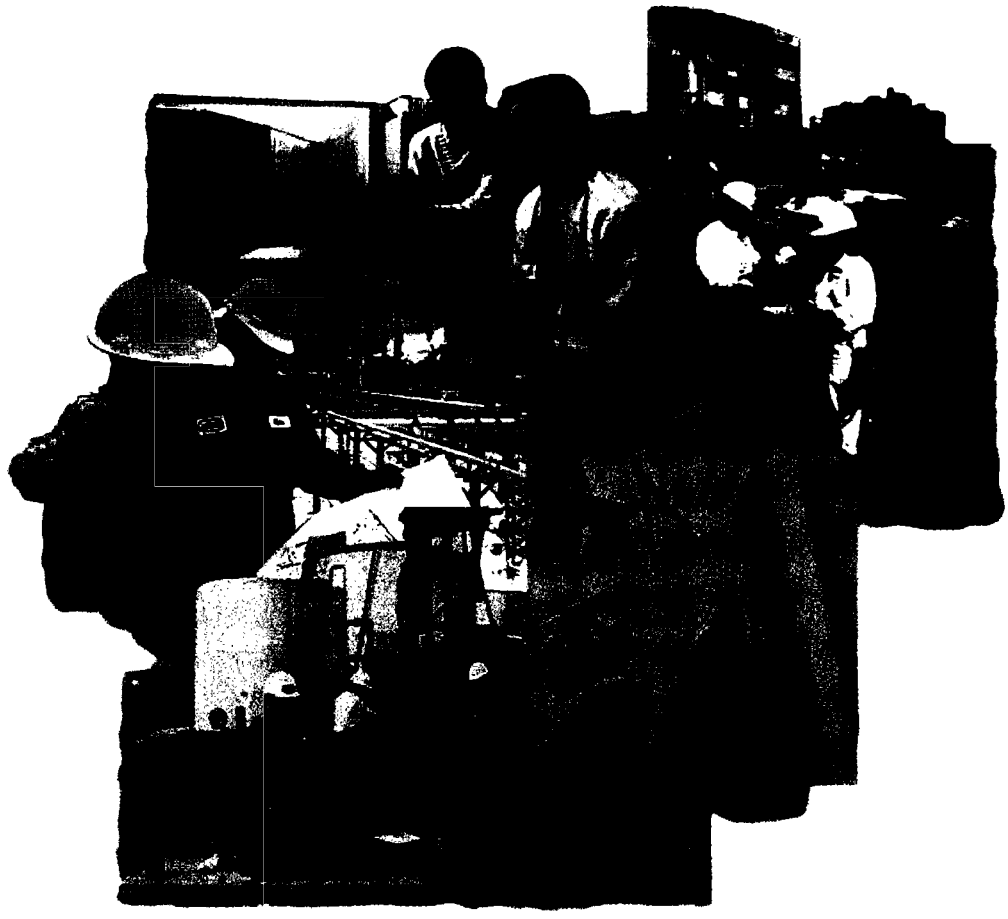

ATTACHMENT 1A

FIELD SAMPLING PLAN
RCRA FACILITY INVESTIGATION
PHASE I

Heritage Environmental Services
Lemont, Illinois
USEPA Identification No.: ILD 085349264
DLPC 0311620007

HERITAGE REMEDIATION / ENGINEERING, INC.

HERITAGE TREATMENT CENTERS ■ HERITAGE REMEDIATION ENGINEERING ■ HERITAGE TRANSPORT ■ HERITAGE ENVIRONMENTAL SERVICES ■ HERITAGE LABORATORIES

HERITAGE REMEDIATION/ENGINEERING, INC.

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ATTACHMENT 1A

FIELD SAMPLING PLAN

RCRA FACILITY INVESTIGATION
PHASE I

Heritage Environmental Services
Lemont, Illinois
U.S.E.P.A. Identification No. ILD085349264
DLPC 0311620007

Prepared for:

Heritage Environmental Services
Canal Bank Road, N.E.
Lemont, Illinois 60439

Prepared By:

Heritage Remediation/Engineering, Inc.
Chicago Division
1319 Marquette Drive
Romeoville, Illinois 60441

October 29, 1993

HR/E Job No. 6119

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TABLE OF CONTENTS

1.0 INTRODUCTION 1
- 1.1 Project Description 3
- 1.2 Project Objectives 3
- 1.3 Project Scope of Work 4

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES 1
- 2.1 Heritage Environmental Services (HERITAGE) 1
- 2.2 Contractor Personnel 1
  - 2.2.1 Project Manager 1
  - 2.2.2 Field Project Manager 2
  - 2.2.3 QA Director 2
  - 2.2.4 Heritage Laboratories Project Manager 3
  - 2.2.5 Heritage Laboratories Quality Assurance Officer 3
- 2.3 Subcontractor 4

3.0 PHYSICAL SETTING 1

4.0 SAMPLING PROCEDURES 1
- 4.1 Soil Borings 1
  - 4.1.1 Soil Boring Procedures 2
  - 4.1.2 Soil Sampling 2
- 4.2 Other Sampling 4

5.0 DECONTAMINATION PROCEDURES 1
- 5.1 Equipment Decontamination 1
- 5.2 Sample Bottles 2
- 5.3 Analytical Methodology 2
- 5.4 Storage and Disposal of Generated Wastes 2
- 5.5 Abandonment of Soil Boring and Groundwater Probes 3

6.0 SAMPLE AND DOCUMENT CUSTODY PROCEDURES 1

7.0 SCHEDULE 1

Appendix I Figures

Appendix II Tables

Appendix III Chain of Custody

Appendix IV List of Equipment

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1.0 INTRODUCTION

Heritage Environmental Services, Inc. (HERITAGE) owns and operates a commercial and industrial waste storage and treatment facility in Lemont Township, unincorporated Cook County, Illinois. See Figures 1 and 2, Appendix I. HERITAGE also engages in the cleaning of industrial and marine storage vessels at this facility. As part of the requirements under the facility's RCRA permit, the facility has been requested by the Illinois Environmental Protection Agency's (IEPA) Division of Land Pollution Control (DLPC) to conduct a RCRA Facility Investigation (RFI) and as necessary to implement a Corrective Action Plan (CAP).

The purpose of the RFI is to determine whether releases of hazardous wastes and hazardous constituents have occurred from any of the solid waste management units (SWMUs) identified during the IEPA's RCRA Facility Assessment (RFA) as listed in Table 1 of Appendix II, and the nature and extent of these releases. Table 1 also presents the environmental element of concern at each of the SWMUs as identified in the permit.

Based upon an evaluation of the secondary containment system integrity in the Truck Transfer area, additional sampling is not required in this area. Based upon the evaluation of the secondary containment system integrity in the remaining areas, soil sampling activities are proposed to be conducted in accordance with the permit. Sampling of the environmental media of concern will also be conducted in the other SWMU areas identified in Table 1. An evaluation of the secondary containment integrity will be performed at the Drum Crushing Unit SWMU area. Should this evaluation indicate failure of the secondary containment additional soil sampling will be performed in this area as part of the Phase II RFI activities.

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The overall RFI will be conducted in three phases;

- Phase I is to provide information on the characteristics and integrity of each SWMU and to conduct the necessary field activities to evaluate the potential for a release to occur to the soil or air from these SWMUs.

- Phase II may be required if the IEPA's DLPC determines that it is necessary to define the extent of any release identified as having occurred or is occurring to the soils and air from any SWMU or if the results are inconclusive.

- Phase III will be required if the IEPA's DLPC determines that hazardous wastes or constituents have potentially migrated to the groundwater. The purpose of the Phase III efforts are to define the extent of the release and its migration on and off-site within the groundwater.

This Phase I RFI Field Sampling Plan (FSP) has been prepared to specify the procedures for conducting additional field investigation studies at the site to meet the objectives of Phase I. The purpose of these investigative studies are to:

- Identify and evaluate potential pre-existing source(s) of contamination at the site.

- Identify and evaluate the potential impact, if any, of the contamination upon the soils at the site.

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- Identify and evaluate the potential horizontal and vertical extent of contamination at the site.

- Provide a rationale for evaluating the necessity for additional investigation and/or remedial actions at the site.

1.1 Project Description

HR/E will advance a series of soil borings at the site for the purposes of collecting soil samples at the various SWMUs. The location of these soil borings are shown in Figures 3, 4, 5, and 6, Appendix I. Table 2 in Appendix II summarizes the soil samples to be collected for analysis at the laboratory.

1.2 Project Objectives

The objectives of these activities are to collect data pertaining to soil conditions at the SWMUs identified and to characterize potential contamination at these areas. This data in conjunction with other background, historical and general informational data will be utilized to:

- Identify the potential source(s) of contaminants at the site.

- Identify and evaluate the potential horizontal and vertical extent of contamination at the site.

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- Identify and evaluate the potential impact of the contamination upon the environment.

- Provide a rationale for evaluating the necessity for additional investigations and/or remedial action at the site.

- Identification of potential interim and/or corrective actions at the site.

1.3 Project Scope of Work

The scope of work for which this Phase I RFI Field Sampling Plan is intended to encompass is summarized as follows:

- Advance soil borings at seven (7) SWMU locations at the site.

- Collect soil samples at twenty-four soil boring locations at the SWMUs. These soils samples will be collected from the material between the impervious surfaces and bedrock or from the surface to the top of bedrock (approximately 6 to 12 inches if existing).

- Submit the soil samples, as collected at the soil boring locations for analysis to the laboratory for volatile, base/neutral and acid extractable semi-volatile organic constituent analysis.

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- Submit soil samples from eighteen selected locations for TCLP metal analysis at the laboratory.

- Collect three soil samples from the office parking lot area to evaluate the potential impact of the asphaltic covering which is prevalent at the site.

- Collect and submit one sample of the contents of the Sanitary Waste Holding Tanks.

- Conduct an evaluation of the integrity of the secondary containment system at the Drum Crushing SWMU.

- Evaluation of the field investigative data with other data as collected in the performance of the Phase I RFI.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The specific responsibilities of the key personnel involved in the management and the performance of the project are summarized herein. Figure 7, Appendix 1 presents a Project organizational chart.

2.1 Heritage Environmental Services (HERITAGE)

Mr. Robert Garcia of HERITAGE will be the Project Manager. Mr. Garcia will be responsible, for coordinating all communications between HERITAGE, HR/E and the IEPA.

2.2 Contractor Personnel

2.2.1 Project Manager

The Contractor Project Manager, Mr. Robert J. Millman of HR/E, will be responsible for coordinating all efforts necessary to implement the Sampling and Analysis Plan. These shall include the subcontracting and financial as well as technical aspects of the project. The Contractor Project Manager will report directly to the HERITAGE designated Project Manager. The Contractor Project Manager will be responsible for coordinating the efforts of the HERITAGE Project Manager, subcontractors, as well as other Contractor Corporate technical support.

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2.2.2 Field Project Manager

The Contractor Field Manager, Mr. Ronald Wilkins of HR/E will be responsible for coordination with subcontractors and conducting all field work. He will also be responsible for coordinating all field activities as they relate with the sample collection. This will include obtaining sample containers and delivery of the collected samples to the laboratory. He will also be responsible for coordinating all contractor personnel involved in the sampling, and other activities as conducted at the site. The Field Project Manager will be responsible for ensuring that the Health and Safety Plan and Field Sampling Plans are complied with by all personnel at the site. The Field Project Manager will report to the Project Manager..

2.2.3 QA Director

The QA director is Mr. Roger J. Breitenfield. The QA director will remain independent of direct job involvement and day-to-day operations, and has direct access to corporate executive staff as necessary to resolve any QA dispute. He is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations, HR/E's policies, and IEPA requirements. Specific functions and duties include:

- Provide QA audit on various phases of the field operations;
- Review and approval of QA plans and procedures;

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- Providing QA technical assistance to project staff;

- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the project manager.

2.2.4 Heritage Laboratories Project Manager - Ms. Dawn Siekerman

- Ensures all resources of the laboratory are available on an as-required basis;

- Overview of final analytical reports;

- Approval of the QAPjP.

2.2.5 Heritage Laboratories Quality Assurance Officer - Ms. Christine Sarkan

- Overview laboratory quality assurance;

- Overview QA/QC documentation;

- Conduct detailed data review;

- Decides laboratory corrective actions, if required;

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- Technical representation of laboratory QA procedures;
- Preparation of laboratory Standard Operation Procedures;
- Approval of the QAPjP

2.3 Subcontractor

At this time there are no subcontractors proposed to be utilized.

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3.0 PHYSICAL SETTING

The HERITAGE facility is located on the north bank of the Chicago Sanitary and Ship Canal, Mile 301.2 in Lemont Township, Cook County, Illinois. The HERITAGE facility is a commercial industrial waste storage and treatment facility which also engages in the cleaning of industrial and marine storage vessels. The location of the facility is shown in Figure 1 and a plan of the existing operating area of the facility is presented in Figure 2.

The operating portion of the facility occupies approximately 8.7 acres of the 17.2 acres of property leased from the Metropolitan Water Reclamation District of Greater Chicago. As a result of its activities, HERITAGE has located on-site a variety of hazardous materials and wastes which may include ignitable, corrosive, reactive and toxic substances held in tanks and containers. A listing of the materials accepted at the HERITAGE facility are presented in Appendix III.

As seen in Figure 1, the site is bounded to the north by the Des Plaines River and to the south by the Chicago Sanitary and Ship Canal. Located to the north of the Des Plaines River, is the Argonne National Laboratory Reservation. This area is typified by forest and wetland areas. To the south of the Chicago Sanitary and Ship Canal the area is typified by former quarry operations and KA Steel Chemical, Inc., a barge facility. Immediately to the east of the site is Egan Marine which engages in barge cleaning, chartering and towing. To the east of the facility are located several light industrial type operations.

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4.0 SAMPLING PROCEDURES

The specific sampling procedures to be followed in the performance of the scope of work defined in the Phase I RFI Work Plan are outlined in this section.

4.1 Soil Borings

The following procedures describe the procedures to be followed in obtaining soil samples at the site, at the soil boring locations shown in Figures 3, 4, 5, and 6, Appendix I. These procedures are based upon sufficient "soil" material being present to collect a representative sample. In review of the information presented in the permit and as referenced herein, the site facilities are built on bedrock. Soil material at the site is essentially less than six inches in thickness. Where concrete slabs and/or bituminous pavement exists the underlying surface consists of bedrock and/or crushed stone. Therefore, HR/E proposes to advance the soil borings to the bedrock surface and wherein, materials other than the concrete slab and/or bituminous pavement are encountered to collect a sample of these materials since this would essentially constitute the soil.

Should the subsurface encountered within the SWMU areas consist of materials or which preclude the collection of a sample, where less than 50% of the sample will pass a 9mm sieve, then a soil sample will not be collected in this area. Materials greater than 9mm in size would required alteration of the soil sample by crushing, prior to laboratory analysis. This would no longer be representative of the subsurface conditions.

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4.1.1 Soil Boring Procedures

Prior to commencement of soil boring activities at the site, HERITAGE will be contacted to clear the appropriate areas where the soil samples are to be obtained. HR/E and HERITAGE will coordinate the activities to minimize waste handling in the specific areas while the sampling is being performed.

HR/E will use a six inch concrete coring saw to score the surface of the concrete areas. A jack hammer will then be utilized to advance an opening through the concrete. In the areas of the bituminous pavement the coring machines will be used to advance an opening through this material into the underlying materials.

Following removal of the overlying concrete and/or bituminous material, HR/E personnel will utilize a stainless steel hand auger and/or stainless scoops and trowels to collect a sample of the underlying subsurface materials overlying the bedrock.

4.1.2 Soil Sampling

At each of the soil sampling locations, a soil sample will be collected from the interval underlying the concrete or bituminous surface and overlying the bedrock, where feasible. At the barge cleaning transfer point and the drainage ditch, these units are essentially at bedrock. To the extent practical

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HR/E will collect a soil sample of these areas using stainless steel scopes and trowels.

The soil samples collected will be visually examined by the field geologist within notations as to its lithological characteristics, color, odor, and other physical features. The soil samples will be placed into the appropriate containers for laboratory analysis. The specific laboratory analysis to be performed on the soil samples collected at each SWMU are presented in Table 2. Table 3 provides a summary of preservatives; containers, number and type; for each analysis to be preformed and holding times prior to analysis.

At each soil sampling location, a portion of the soil sample will be immediately placed into the appropriate 2 ounce glass containers for volatile organic constituent analysis. A zero space contamination sampler is not considered applicable for use at the site as a result of the relative absence of soil and presence of large stones which would prevent the collection of a representative soil sample. A separate portion of the soil sample will be placed in an amber glass quart container for base/neutral and acid extractable semi-volatile organic constituent analysis. The remaining sample volume will be used to fill a one quart glass container for TCLP metal analysis where appropriate.

The soil sample containers will be provided by Heritage Laboratories. Each sample container will be pre-labeled and will be marked as to the analysis to

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be performed and will indicate whether preservatives have been added. After collection of the soil sample, the sample container will be sealed and the label will be completed by insertion of the site designated project identification, sample location, depth of sample, time and date of sample collection and the sampler's initials. The samples will be placed into an ice packed cooler and will be kept iced until delivered to the laboratory accompanied by the appropriate Chain-of-Custody Documentation.

At three sample locations, as presented in Table 2, duplicate soil samples will be collected.

4.2 Other Sampling

In the course of conducting the Phase I RFI activities, HR/E will collect one sample of the contents of the 10,000 gallon fiberglass sanitary waste holding tank. This sample of the contents of the sanitary waste holding tank will be collected using a dedicated teflon boiler. Sufficient sample volume will be collected to fill two (2) 40 ml glass vials with "Teflon" coated septums for volatile organic constituent analysis at the laboratory in accordance with SW846-8240 methodology. A trip blank and a field blank will also be submitted for analysis. Since this is the only water sample duplicate and matrix spike analysis will not be performed.

All sampling equipment will be decontaminated in accordance with the procedures as summarized in Section 5.0 of this plan. The sampler will wear single use latex gloves during the collection of all samples. These single use latex gloves will be

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disposed between each sampling interval and event to prevent cross contamination of the soil samples.

A list of field equipment required to perform these activities as specified herein are presented in Appendix IV.

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5.0 DECONTAMINATION PROCEDURES

Procedures to be followed to decontaminate equipment are summarized below.

5.1 Equipment Decontamination

Decontamination of large equipment (vehicles, compressors and associated equipment) is not anticipated to be necessary since the only part of the equipment coming into contact with the contaminated soils are the jackhammer bits, augers, and other sampling devices. However, all equipment will be cleaned to remove any accumulation of dirt/mud, etc. prior to leaving the HERITAGE facility. This will be accomplished within the truck transfer area which will constitute the decontamination pad as shown in the Health and Safety Plan (HASP). Decontamination of auger, trowels, jackhammer bits and scoops will consist of a soap and water wash and potable water rinse. Additional scrubbing may be required to remove all encrusted materials followed by rinsing with water. Decontaminated equipment will be stored on plastic sheeting and/or platforms above the ground surface.

All sampling equipment will be decontaminated prior to use, and all reusable non-dedicated equipment (stainless steel pans and spatulas, etc.) will be decontaminated between samples, and before removal from the site. The procedure is described in Table 4, Appendix II.

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5.2 Sample Bottles

All sample bottles will be provided by Heritage Laboratories and will be provided to HR/E with lids on and as necessary, preservatives.

Decontamination of the sample containers will be performed by the laboratory in accordance with their QAPjP.

5.3 Analytical Methodology

Heritage Laboratories, Inc. will analyze all soil samples in accordance with the methodology specified in the QAPjP for volatile organic, base/neutral and acid extractable semi-volatile organic and TCLP metal constituents.

5.4 Storage and Disposal of Generated Wastes

The sampling and boring activities are expected to generate minimal solid "waste". The decontamination activities are anticipated to generate a limited amount of waste water. These solids and liquids will be managed in accordance with the management of similar waste materials at the site. Until disposal they shall be stored in 55 gallon drums in the container storage SWMU area.

5.5 Abandonment of Soil Boring and Groundwater Probes

All soil borings will be abandoned by filling the open holes with dry granular bentonite to the concrete and/or bituminous interface and then this area will be patched in accordance with the recommendations of ESCA. (See RFI Work Plan, Appendix IV.)

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6.0 SAMPLE AND DOCUMENT CUSTODY PROCEDURES

Information regarding samples collected for laboratory analysis will be entered into the appropriate spaces on a chain-of-custody record form. This form will remain with the samples, and a record of transfer from party to party will be maintained on the form, until finally received by the laboratory where the analysis is performed. An example of the chain-of-custody form is provided in Appendix III.

All samples will be delivered to the laboratory within 24-hours of collection. Documentation, data, and reports generated from the site investigation activities will be maintained in a central file at the contractors offices. Field notes generated during the site investigation will be photocopied from the field notebook and placed in the central file. Field notes shall contain accurate records of daily field site investigation activities. Each notebook page will be printed with the job name and number, dated and signed preparer.

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7.0 SCHEDULE

With the approval of this plan by HERITAGE and the Illinois Environmental Protection Agency and receipt of a notice to proceed, the Contractor shall perform the tasks, from the date of receipt of the notice to proceed, as shown in Figure 8, Appendix I.

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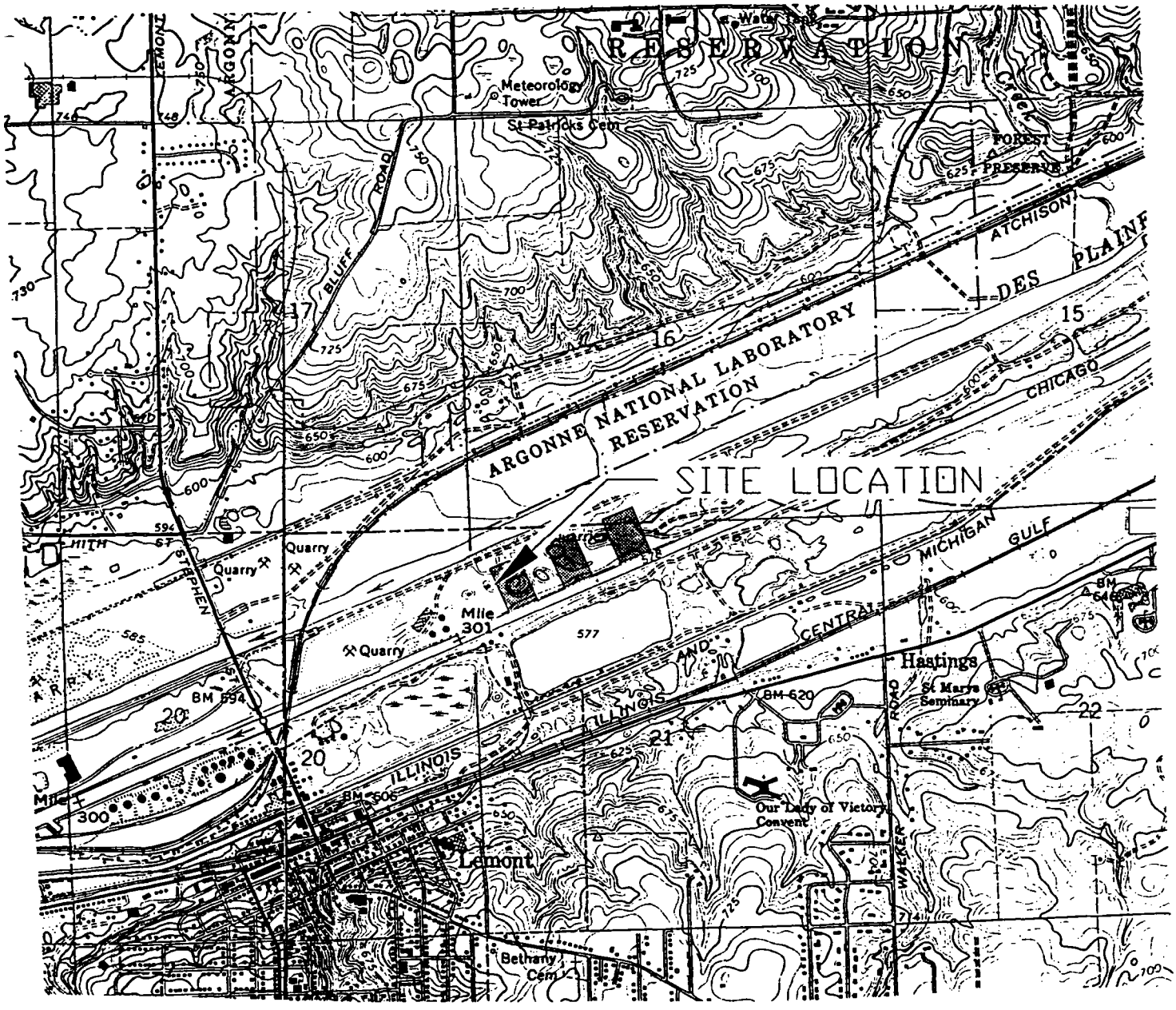
APPENDIX I

FIGURES



SAG BRIDGE AND ROMEOVILLE QUADRANGLES

Illinois 7.5 Minute Series

SCALE

2000' 0 1000' 2000'

NORTH

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

SITE LOCATION MAP

REVISIONS

HERITAGE

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE 26 OCT 1993	FIGURE 1
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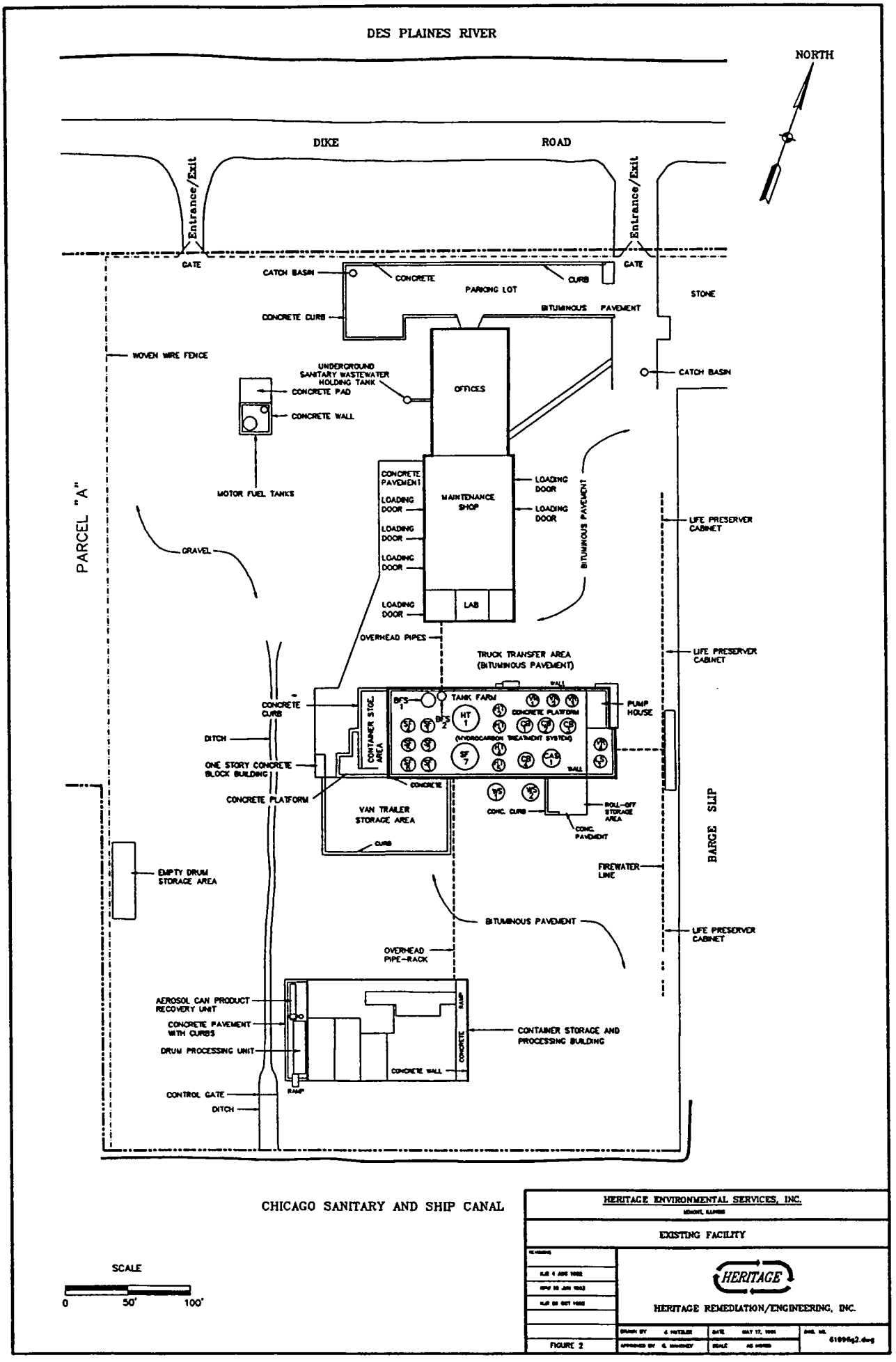
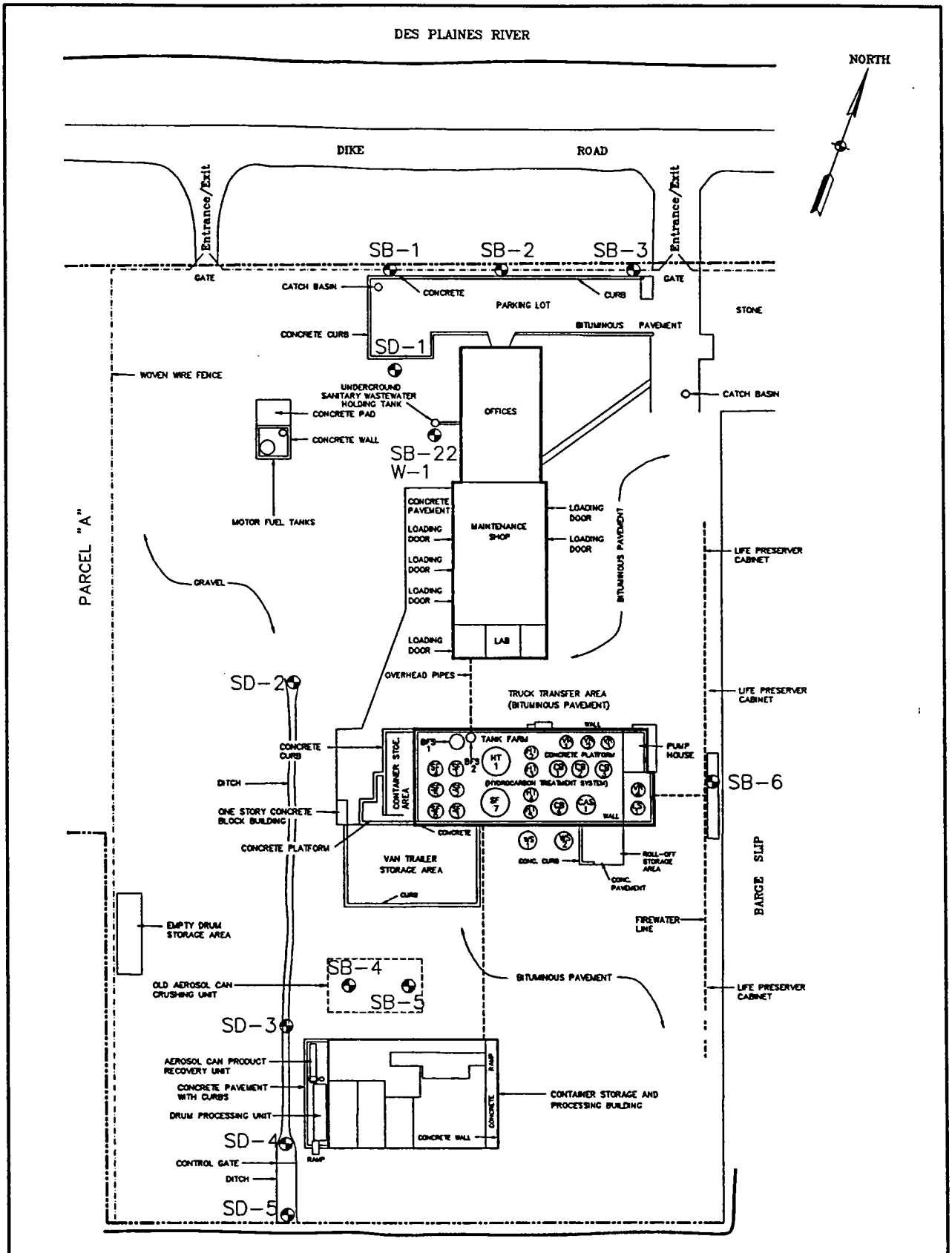


HERITAGE ENVIRONMENTAL SERVICES, INC.

EXISTING FACILITY

HERITAGE REMEDIATION/ENGINEERING, INC.

FIGURE 2



HERITAGE ENVIRONMENTAL SERVICES, INC.

PROPOSED SAMPLE LOCATIONS

HERITAGE

HERITAGE REMEDIATION/ENGINEERING, INC.

FIGURE 3

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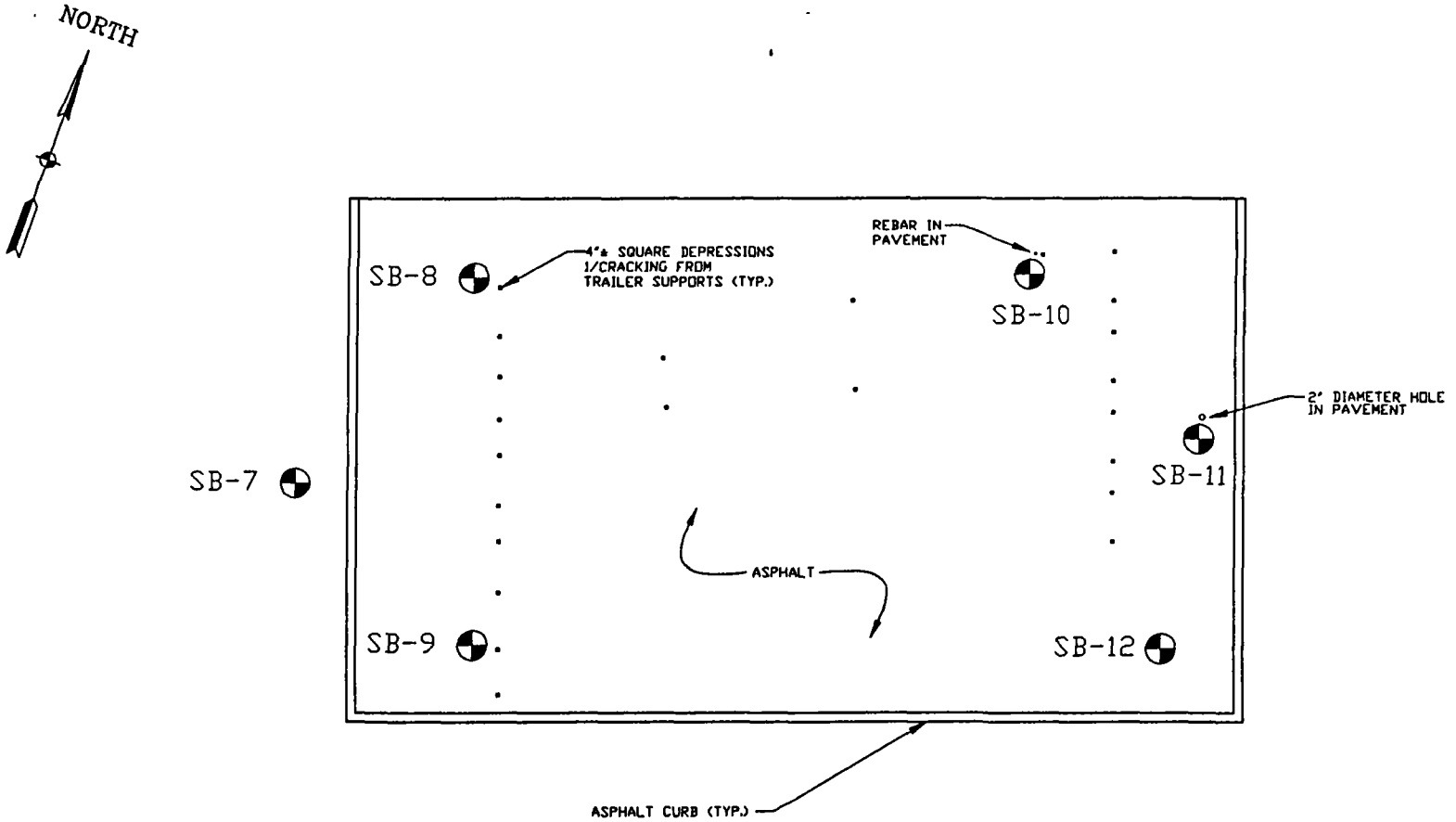


⊕ - PROPOSED SOIL SAMPLE LOCATION

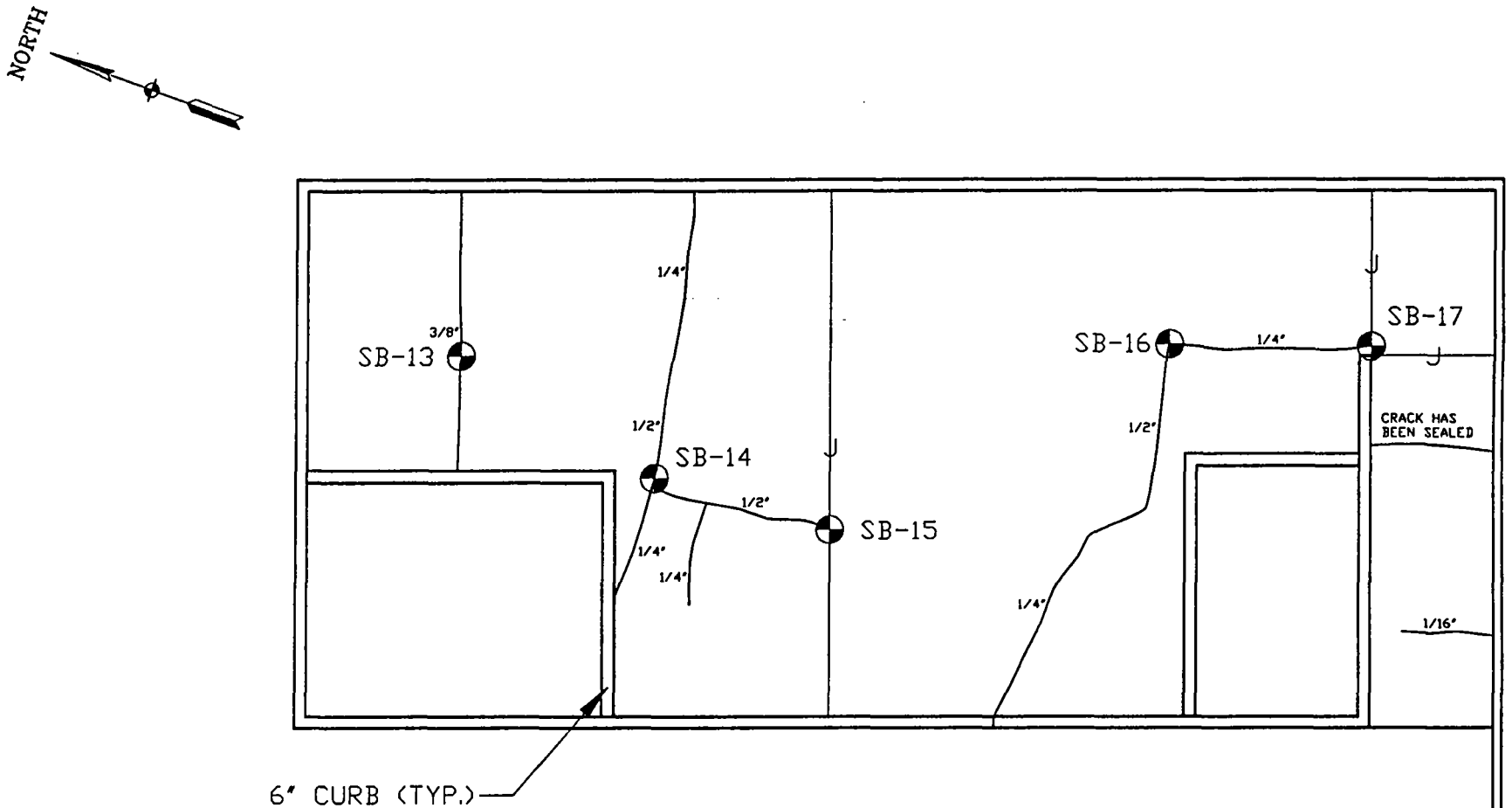
SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

VAN TRAILER FARM - PROPOSED SAMPLE LOCATIONS

REVISIONS			
	HERITAGE REMEDIATION/ENGINEERING, INC.		
	DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 4
	APPROVED BY	SCALE 1"=20'	JOB NO. 6119



- PROPOSED SOIL SAMPLE LOCATION

- DENOTES CONSTRUCTION JOINT

SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

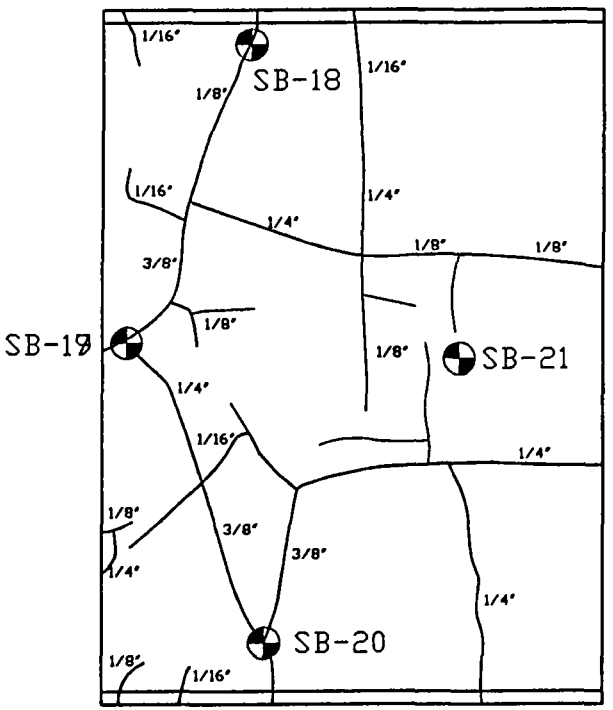
OUTDOOR CONTAINER STORAGE AREA

REVISIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 5	
APPROVED BY	SCALE 1"=10'	JOB NO. 6119	

NORTH



⊕ - PROPOSED SOIL SAMPLE LOCATION

SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

ROLL-OFF STORAGE AREA

REVISIONS

HERITAGE

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 6
APPROVED BY	SCALE 1"=10'	JOB NO. 6119

FIGURE 7

PROJECT ORGANIZATIONAL CHART

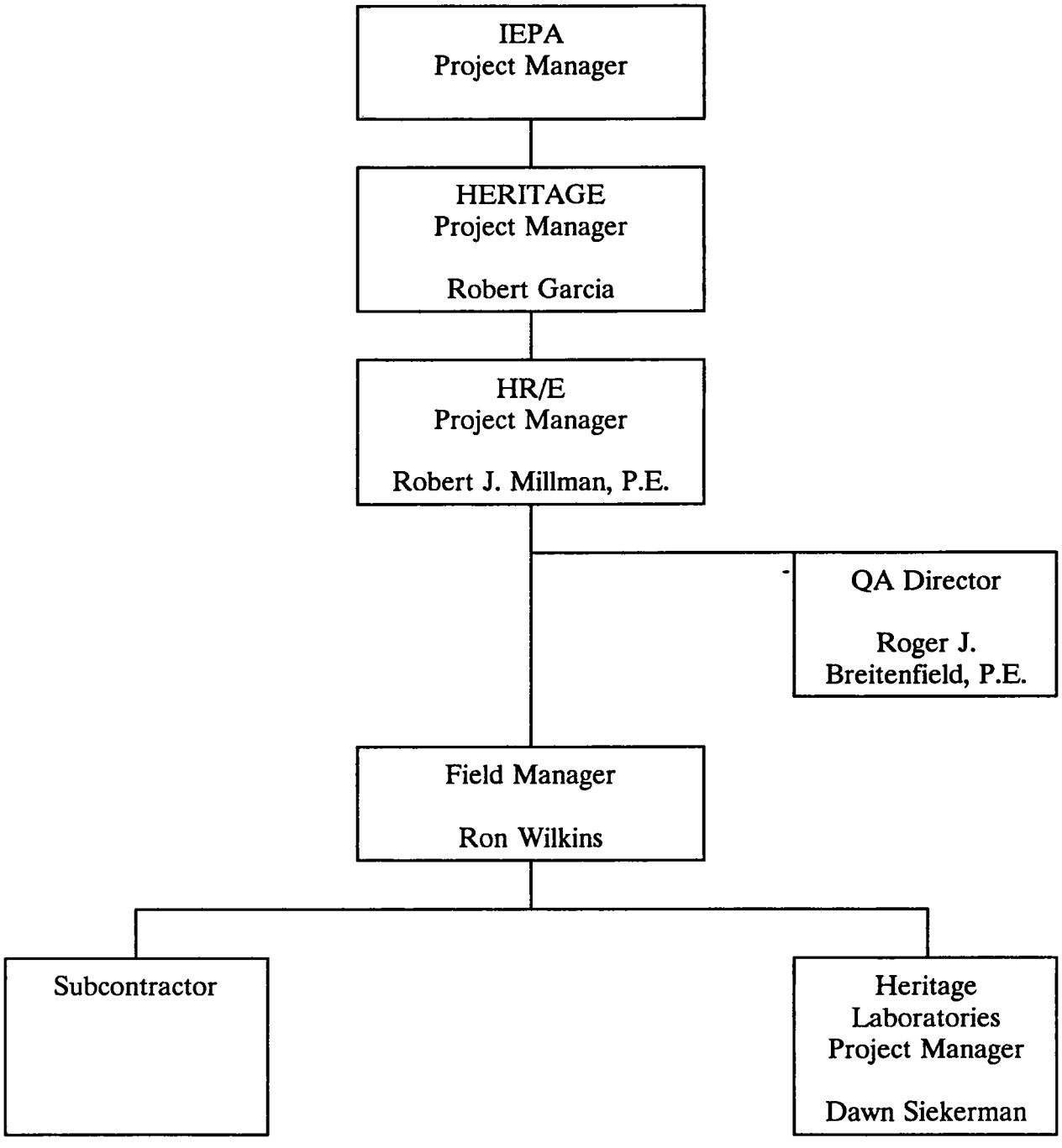


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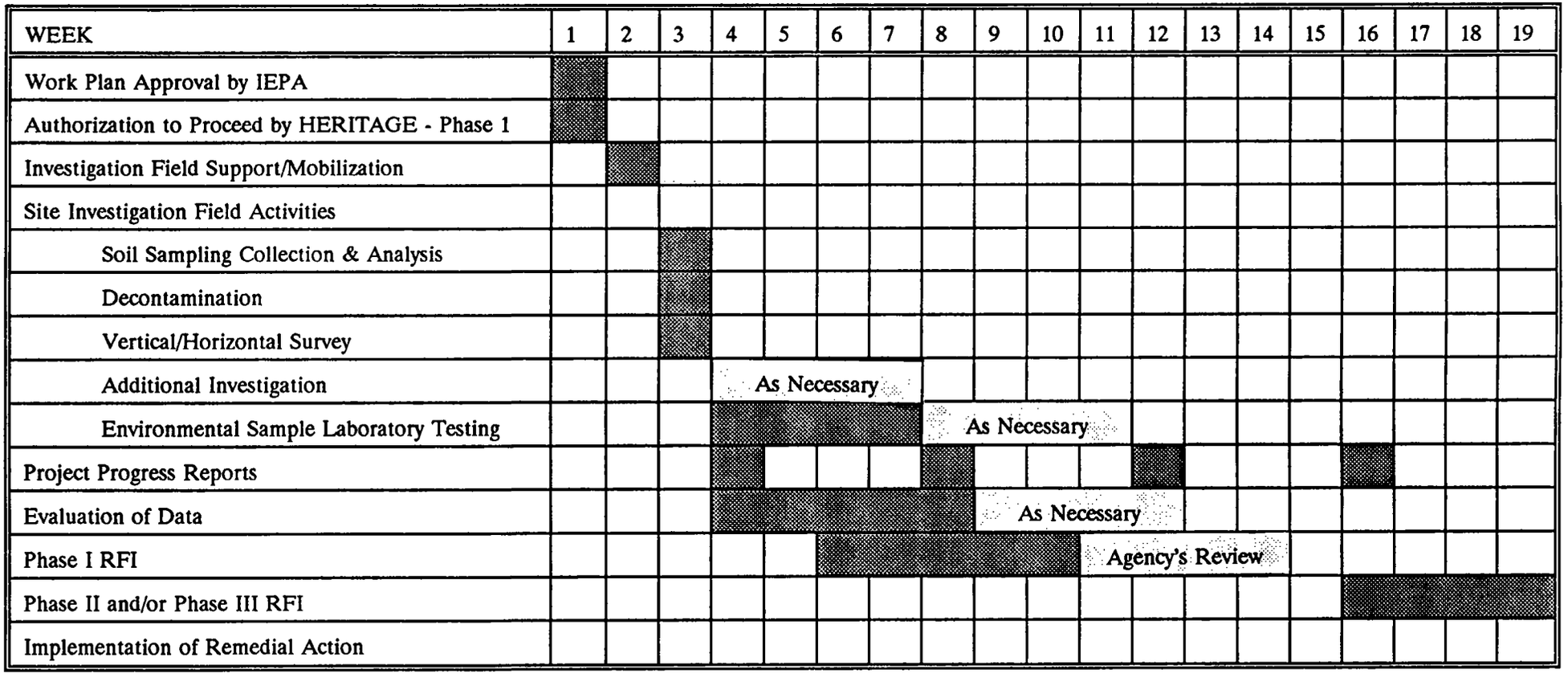
FIGURE 8

PROJECT SCHEDULE



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APPENDIX II

TABLES

TABLE 1

SOLID WASTE MANAGEMENT UNITS
Heritage Environmental Services, Inc.
Lemont, Illinois

Solid Waste Management Unit (SWMU)	Environmental Element of Concern
Truck Transfer Area	Secondary Containment System Integrity
Outdoor Container Storage Area	Secondary Containment System Integrity
Van Trailer Container Storage Area	Soil and Secondary Containment System Integrity
Old Aerosol Can Crushing Unit	Soil
Roll-off Box Storage Area	Secondary Containment System Integrity and Soil Sampling During Closure
Drum Crushing Unit	Secondary Containment Integrity and Soil Sampling During Closure
Underground Sanitary Waste Holding Tanks	Tank Integrity and SW846-8240 Run-On Contents
Barge Cleaning Transfer Point	Soil
Drainage Ditch and Tile Leading to Chicago	Soil Along Length of Ditch and Provisions for Lining of Ditch

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TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field Measurements	Laboratory Parameters[1]	Analytical Method[1]	# of Samples	Quality Control Samples				Total # of Samples
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
Soils									
Outdoor Container Storage Area	---	Volatile Organics	SW846	5	N/A	N/A	N/A	N/A	5
	---	Semi-Volatile Organics	SW 846	5	N/A	N/A	N/A	N/A	5
	---	TCLP Metals Organics	SW 846	5	N/A	N/A	N/A	N/A	5
Van Trailer Container Storage Area	---	Volatile Organics	SW846	6	1	N/A	N/A	N/A	7
	---	Semi-Volatile Organics	SW 846	6	1	N/A	N/A	N/A	7
	---	TCLP Metals	SW846	6	1	N/A	N/A	N/A	7
Old Aerosol Can Crushing Unit	---	Volatile Organics	SW846	2	N/A	N/A	N/A	N/A	2
	---	Semi-Volatile Organics	SW846	2	N/A	N/A	N/A	N/A	2
	---	TCLP Metals	SW846	2	N/A	N/A	N/A	N/A	2
Roll-off Box Storage Area	---	Volatile Organics	SW846	4	N/A	N/A	N/A	N/A	4
	---	Semi-Volatile Organics	SW846	4	N/A	N/A	N/A	N/A	4
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---
Barge Cleaning Transfer Point	---	Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	Semi-Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---

TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field *Measurements*	Laboratory *Parameters*(1)	Analytical *Method*(1)	# of Samples	Quality Control Samples				Total # of *Samples*
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
Drainage Ditch	---	Volatile Organics	SW846	5	1	N/A	N/A	1	7
	---	Semi-Volatile Organics	SW846	5	1	N/A	N/A	1	7
	---	TCLP Metals	SW846	5	1	N/A	N/A	N/A	6
Other - Parking Lot	---	Volatile Organics	SW846	3	1	N/A	N/A	N/A	4
	---	Semi-Volatile Organics	SW846	3	1	N/A	N/A	N/A	4
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---
Sanitary Holding Tanks	---	Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	Semi-Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	TCLP Metals	Sw846	---	N/A	N/A	N/A	N/A	---
Soils Total	---	Volatile Organics	SW846	27	3	N/A	N/A	1	31
	---	Semi-Volatile Organics	SW846	27	3	N/A	N/A	1	31
	---	TCLP Metals	SW846	18	2	N/A	N/A	N/A	20
Water									
Sanitary Holding Tanks	---	Volatile Organics	SW 846	1	N/A	1	1	N/A	3

(1) See Table 2 for a listing of specific analyses, methodology and detection concentrations.
(2) *One duplicate for every 10 soil samples.*
(3) One matrix spike for every 20 soil samples.

TABLE 3

SAMPLING CONTAINERS, PRESERVATION AND HOLDING TIMES

Sample Type/ Analysis	Container	Preservation	Holding Time[1]
Soil			
Volatile Organics	Glass with Teflon® lined septum; 2 oz.; 2 containers	Cooled to 4°C	14 days
Base/ Neutral and Acid Extractable Semi-volatile Organics	Glass with Teflon Lined lid; 1 quart; 1 container	Cooled to 4°C	7 days until extraction, 30 days after extraction
TCLP Metals	Plastic or glass; 1 quart; 1 container	Cooled to 4°C	6 months
Water			
Volatile Organics	Glass with Teflon lined septum; 40 ml; 2 containers	Cooled to 4°C	14 days

(1) Maximum time until analyzed.

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TABLE 4

STANDARD DECONTAMINATION PROTOCOL FOR SAMPLING EQUIPMENT

STEP 1	Scrub equipment thoroughly with soft-bristled brushes in a low-sudsing detergent solution.
STEP 2	Rinse equipment with steam cleaner or high pressure hot water cleaning unit.
STEP 3	Rinse equipment with deionized water by spraying until dripping.
STEP 4	Rinse equipment with deionized free water a second time by spraying until dripping.
STEP 5	Place equipment on plastic or aluminum foil and allow to air dry for five to ten minutes.
STEP 6	Wrap equipment in plastic or aluminum foil for handling and/or storage until next use.

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APPENDIX III

CHAIN OF CUSTODY

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TO ENSURE PROPER HANDLING OF SAI :S PLEASE COMPLETE THIS ENTIRE FORM

EMS HERITAGE LABORATORIES, INC.

2805

1319 Marquette Drive
Romeoville, Illinois 60441 708-378-1600

Co. Name:

Project Name:

Quote No.: PO No.:

ENVIRONMENTAL PROGRAM:

CWA NPDES_____ IWP _____SLUDGE_____

RCRA MW_____ SW _____ DISPOSAL_____

SDWA_____CERCLA/SUPERFUND_____OTHER _____

Sampled by:

Analyses Requested
(Note special detection limits or methods)

Report To:
Co:
Add:
Attn:
Phone:

Accelerated Turnaround Requested _____
(Subject to Additional Charge)

Result Request by: ____/____/____
Mo Day Yr
(Date must be Accepted and Approved by Lab.)

Sample ID:	Date:	Time:	Comp	Grab	Sample Description:	No. of Containers	Remarks:	EMS Sample No.

Relinquished by: (Signature)	Date /Time /	Received by: (Signature)	Relinquished by: (Signature)	Date /Time /	Received by: (Signature)
Relinquished by: (Signature)	Date /Time /	Received by: (Signature)	Relinquished by: (Signature)	Date /Time /	Received by: (Signature)
Relinquished by: (Signature)	Date /Time /	Received for Lab by: (Signature)	Remarks:		

Distribution: Original and yellow copies accompany sample shipment to laboratory;
Original copy to returned to client

APPENDIX IV

LIST OF FIELD EQUIPMENT

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LIST OF EQUIPMENT

Purpose	Item	Number
Personnel Protection*	Hard hat	1 per person
	Safety Glasses	
	Safety Boots (pr.)	
	Gloves (pr.)	
	Uniform or Coveralls	
	Half-face Air Purifying Respirator with GMA-F Cartridges (pr.)	1 Box/person
	PVC Boot Covers	1 Box
	Tyvex	1 Box
	Full Face Air Purifying Respirator	As Needed
	GMC-H Cartridges (pr.)	As Needed
Air Monitoring*	Micro Tip II PID Meter	1
	LEL/O_2 Monitor	1
	Aerosol Monitor	1
	Radiation Meter	1
	SKC Gilian Pump	1
	PVC Filters	1 Box

* All units will be backed up by providing for alternative unit procurement within 8 hours.

Decontamination	Water Supply (Low pressure)	1
	Deionized Water	As Needed
	Detergent (TSP)	1 Box
	Brushes	6
	Buckets	
	5 gallon	4
	20 gallon	3
	Chairs	3
	Small Card Table	1
		High Pressure
Steam Washer	1	
	55 gallon DOT Drums	
	H	2
	E	2
	Duct Tape, rolls	4

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Purpose	Item	Number
Sampling	2 oz. glass Teflon lidded jars	31
	2 oz.. glass Teflon septum lidded jars	6
	32 oz. glass Teflon lidded jars	31
	Coolers	2
	Miscellaneous pens, spatulas, spoons, trowels, etc.	
	Auger (4 inch bucket)	1
	Concrete Coring Machine	1
	Jack Hammer & Bits	1
	Dry/Vac Unit (5 gallon)	1
	Compressor, 125 cfm	1
Emergency	Mobile Telephone	1
	First Aid Kit	1
	Fire Extinguisher [A, B, C]	1
	Dry Adsorbents (oil dry) bags	4
Other	Hazardous work area signs	4
	No entry without approval signs	4
	Warning tape (yellow), rolls	4
	Tape (red) rolls	4

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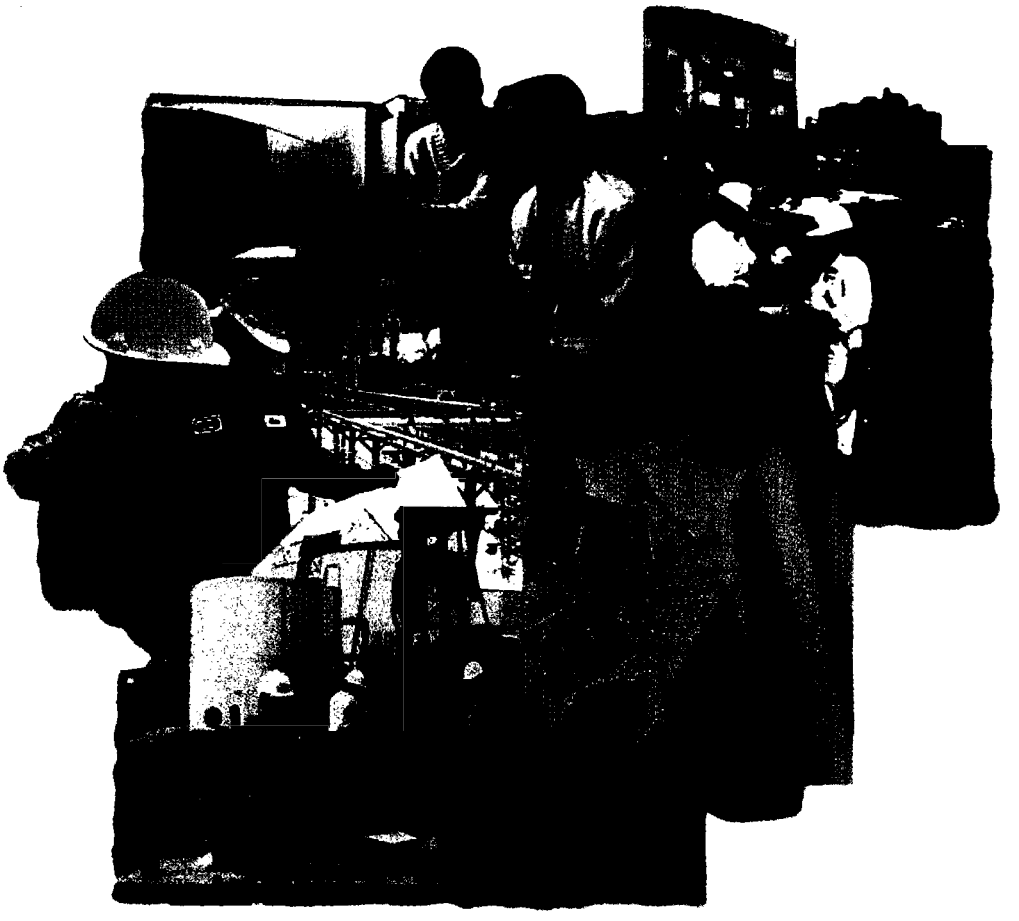
HERITAGE ENVIRONMENTAL SERVICES ■ HERITAGE LABORATORIES ■ HERITAGE TREATMENT CENTERS ■ HERITAGE REMEDIATION ENGINEERING ■ HERITAGE TRANSPORT



ATTACHMENT 3

HEALTH & SAFETY PLAN
RCRA FACILITY INVESTIGATION

Heritage Environmental Services
Lemont, Illinois
USEPA Identification No.: ILD 085349264
DLPC 0311620007

HERITAGE REMEDIATION / ENGINEERING, INC.

HERITAGE REMEDIATION/ENGINEERING, INC.

1319 Marquette Dr.
Romeoville, IL 60441
Phone: 708/378-1600
FAX: 708/378-2200

ATTACHMENT 3

HEALTH & SAFETY PLAN
RCRA FACILITY INVESTIGATION

Heritage Environmental Services, Inc.
Lemont, Illinois

DLPC - 0311620007
USEPA I.D. ILD085349264

Prepared For:

Heritage Environmental Services, Inc.
P.O. Box 337
Lemont, Illinois 60439

Prepared By:

Heritage Remediation/Engineering, Inc.
Chicago Division
1319 Marquette Drive
Romeoville, Illinois 60441

October 29, 1993

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HEALTH AND SAFETY PLAN

This health and safety plan is designed to establish line responsibilities, personal protection guidelines, air monitoring protocol, specify operating procedures, decontamination procedures, and emergency procedures that may be necessary during the site investigation activities.

IDPC Identification Number: 0311620007--Cook County
USEPA Identification Number: ILD085349264

CLIENT: Heritage Environmental Services, Inc. (HERITAGE)
P.O. Box 337
Canal Bank Road, N.E.
Lemont, Illinois 60439

TELEPHONE NUMBER:

Robert D. Garcia	HERITAGE	708-739-1151 (Office) 708-379-6076 (Beeper)

FACILITY: HERITAGE
Canal Bank Road N.E.
Lemont, Illinois 60439

FACILITY TELEPHONE NUMBER: 708-739-1151

PROJECT MANAGER:

Robert J. Millman, P.E., HR/E

HR/E PROJECT NUMBER:

9206119

HEALTH AND SAFETY COORDINATOR

Ronald P. Wilkins, HR/E

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DESCRIPTION OF SITE PROCESSES AND OPERATIONS:

Soil boring activities utilizing the hand augering procedures, including soil sampling.

PROJECT OBJECTIVES

Evaluate the extent and magnitude of potential contamination related to past site activities.

PROPOSED DATE(S) OF WORK:

Winter 1993/1994

HEALTH AND SAFETY PLAN PREPARED BY: Robert J. Millman

TITLE: Sr. Project Engineer, Heritage Remediation/Engineering, Inc.

REVIEW AND APPROVALS

PROJECT MANAGER: _____ **DATE:** 10/29/93
Robert J. Millman (Signature)

HEALTH/SAFETY MANAGER: _____ **DATE:** 10/29/93
Alan E. Kalmar (Signature)
For ALAN Kalmar

4016RM93.R1/6119

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This Health & Safety Plan is provided as the Health and Safety Plan by which all site investigative activities identified in the RCRA Facility Investigation Work Plan (RFI) will be conducted at the Heritage Environmental Services (HES) facility at Canal Bank Road N.E. in Lemont, Cook County, Illinois. As such this Health and Safety Plan has been prepared specific to those tasks as defined in of the RFI Work Plan. Since this is an operating RCRA facility this HASP shall be considered to be secondary to the HERITAGE, Lemont facility Contingency Plan.

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As of the date indicated I, the undersigned, acknowledge that I have read and I understand the provisions and procedures presented in this Health and Safety Plan.

DATE	NAME	SIGNATURE

4016RM93.R1/6119

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TABLE OF CONTENTS

Section	Description	Page #
I.	ORGANIZATION / COORDINATION	1
II.	SITE ASSESSMENT AND CHARACTERISTICS	1
III.	DESCRIPTION OF EXPECTED HAZARDS	1
IV.	ON-SITE PERSONNEL EDUCATION AND TRAINING	1
V.	PERSONAL PROTECTIVE EQUIPMENT	1
VI.	MEDICAL SURVEILLANCE	1
VII.	SAMPLING AND AIR MONITORING PROTOCOL	1
VIII.	SITE CONTROL	1
IX.	DECONTAMINATION PROCEDURE	1
X.	EMERGENCY PROCEDURES	1
XI.	SPILL CONTAINMENT PROGRAM	1

Appendix I Figures

Appendix II Air Monitoring Equipment

Appendix III Summary of Previous Analytical Data

Appendix IV Standard Operating Procedures

Appendix V Material Safety Data Sheets

Appendix VI Forms

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I. ORGANIZATION / COORDINATION

A. PERSONNEL ON-SITE:

1. Division or Project Manager(s): Robert J. Millman, P.E. (HR/E)
2. Supervisors: Field Manager: Ronald P. Wilkins (HR/E)
3. Health/Safety Coordinator: Ronald P. Wilkins (HR/E)
4. Laborers/Technicians: See Appendix VII.
5. Sub-Contractors: Not Applicable

B. PERSONNEL DUTIES:

1. Project Manager(s) will be responsible for :
   a. Overall project management activities;
   b. Ensuring scope of services completed as specified in proposal;
   c. Supervising activities to ensure all applicable legal and safety requirements are met.

2. Field Managers will be responsible for:
   a. On-site supervision of activities;
   b. Supervision of laborers and technicians;

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c. Ensuring that all procedures (security, health and safety, decontamination and emergency) are followed.

3. Health/Safety Coordinator will be responsible for:

a. On-site health and safety surveillance to ensure compliance with established health, safety and environmental protection procedures;

b. Performance of all on-site air monitoring activities and surveillance of environmental conditions;

c. Providing first aid and CPR when necessary; and

d. Maintaining all personal, ambient and environmental surveillance logs.

4. Laborers/Technicians will be responsible for actual labor and performance of site activities necessary to complete project.

5. Sub-Contractor's Duties: Not Applicable

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II. SITE ASSESSMENT AND CHARACTERISTICS

A. FACILITY DESCRIPTION

(describe current and past uses of the site, age, condition, etc.):

The HERITAGE facility is located on the north bank of the Chicago Sanitary and Ship Canal, mile 301.2; on the south bank of the Des Plaines River; ½ mile northeast of the Lemont Highway bridge, in unincorporated Cook County, Illinois. The site is located within the MW quarter of Section 21, Township 37N, Range 11E. The site location is depicted in Figure 1, Appendix I.

HERITAGE is a commercial industrial waste storage and treatment facility which also engages in the cleaning of industrial and marine storage vessels. Because of these activities, HERITAGE has a variety of hazardous materials and wastes located on-site, which may include ignitable, corrosive, reactive and toxic substances. The facility currently operates twenty-four (24) hours a day, five days a week (Monday through Friday).

B. UNUSUAL FEATURES:

(containers, building, dikes, power lines, terrain, degree of contamination, etc.):

The site is typified by the presence of buildings, aboveground storage tanks, container storage and processing facilities, containment berms and dikes, and other process features associated with the management of hazardous materials and wastes at the facility. The site is bordered to the south by the Chicago Sanitary and Ship Canal and to the north by the south levee of the Des Plaines River. The site is also characterized along its eastern side by a barge slip off of the Chicago Sanitary and Ship canal. A site plan of the operational portion of the facility is shown in Figure 2, Appendix I.

Materials are transported into the site through the west gate and proceed to the Truck Transfer Area. From this point the loads are transferred or routed

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to the appropriate area for processing. Truck traffic primarily exits by the east gate.

Current inventories of materials located in the tank farm, container storage area, van trailer storage area, roll-off storage area and the container storage and processing building are kept in the plant supervisor's office.

Generally, HERITAGE is permitted to accept the following types of materials and would be located as described below:

1. Materials typically designated as ignitable hazardous wastes (EPA Waste Code D001) for blending into supplemental fuels to be used in cement kilns or other industrial boilers and furnaces. These materials are stored and/or treated in the tank farm, or stored and processed in the drum storage building or outdoor container storage area.

2. Non-recoverable organic materials for blending prior to off-site disposal by incineration. These materials are stored and/or processed in the tank farm, or stored and processed in the container storage and processing building, or stored in the outdoor container storage area.

3. Acid/caustic materials are stored in the drum storage building or outdoor container storage area. These materials are typically classified as corrosive hazardous wastes (EPA waste Code D002) and are subsequently transported for treatment at HERITAGE'S Indianapolis, Indiana, facility.

4. Inorganic based materials are stored in the container storage area and outdoor container storage areas. These materials are typically metal bearing hazardous wastes (EPA waste Codes D004 through D011, and K002 through K008, K046, K048 through K052, K061, K062, K069, K071, K086, K100, and K106). These materials are subsequently transported for treatment at HERITAGE'S Indianapolis, Indiana, facility.

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5. Aqueous cyanide wastewaters are stored in the container storage and processing Building. These materials are typically designated as cyanide bearing hazardous wastes (EPA waste codes F006 and F012 through F019). These materials are subsequently transported to HERITAGE'S Indianapolis facility for treatment.

6. Aerosol commercial consumer commodities are stored in the container storage and processing building prior to their crushing in order to facilitate recovery and/or proper disposal of the propellant gases and active ingredients.

7. Small (labpack) quantities of commercial chemical products and chemical intermediates are stored in the container storage area and container storage and processing building for the purposes of storage, depacking and consolidation for treatment/disposal coordination. These materials are typically designated as listed hazardous wastes (EPA U-listed and P-listed wastes).

8. Storage, characterization, and staging of waste materials associated with emergency response activities (stored and treated in accordance with the above described items).

9. Pumpable materials typically designated as non-hazardous special wastes derived from petroleum based releases from Leaking Underground Storage Tank remediations (no solids are handled). These materials are stored and/or treated in the tank farm, stored in the outdoor container storage area, or the container storage and processing building.

The site also has aboveground motor fuel storage tanks and dispensing facilities located in the Northwest corner of the facility. An underground sanitary wastewater tank is also located west of the office building.

C. STATUS: [X] Active [ ] Inactive

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D. HISTORY:

The property occupied by HERITAGE is owned by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) (formerly Metropolitan Sanitary District of Greater Chicago) and leased to HERITAGE. Prior to December 1992, the Lemont Industrial District leased the property from the MWRDGC and in turn subleased the 17.2 acres to HERITAGE. Based upon records from the Lemont Industrial District, Inc., the property was leased to Marine Fleeting Company which repaired and maintained fleeting and storage of barges and boats from May 1965 to April 1966. From July 1971 to May 1979, Certified Cleaning Services leased the property for the same purpose as Marine Fleeting. In late 1980 Petrochem subleased the property from the Lemont Industrial District. At this time, the property was undeveloped. With occupancy of the site by Petrochem, the office/maintenance shop building and parking areas were constructed. Petrochem was primarily involved in the cleaning of industrial marine vessels. In 1981, the tank farm was constructed. During the time period from 1981 to 1987, Petrochem provided maintenance and cleaning services and stored and disposed of oily waste, hazardous waste fuels and fuels/oils at and from its tank farm facility. It also provided brokering services for other wastes generated in responding to emergency spills.

In 1987 Petrochem constructed an aerosol can crushing unit which was located to the southwest of the tank farm in the area which is presently south of the Van Trailer Storage Area. The facility in 1987 consisted of the office/maintenance shop, the tank farm, truck transfer area, container storage area, the aerosol crushing unit and the barge unloading area. All waste materials brought in to the facility were stored and processed in the appropriate manner within these areas.

In September 1988 the aerosol can crushing unit burned and was destroyed. This incident and the actions undertaken are described in the substance release report provided in the Part B Application Permit, Section L-Z, Attachment L-1.

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In 1988 Petrochem was acquired by Heritage Environmental Services, Inc. and merged with Process Engineering Group to form Heritage Remediation/Engineering, Inc. (HR/E). At this time the operations involving the storage and handling of wastes at the Lemont facility were incorporated into HERITAGE, separating this element from HR/E. Presently HERITAGE - Lemont consists of the facilities as shown in Figure 2.

E. SOIL TYPE AND TOPOGRAPHY

Based upon visual inspection of the site, the topography is relatively flat. Review of the Illinois State Geological Survey Stack-Unit Map of Northern Illinois indicates the site is located on Silurian Age Dolomite bedrock. Based upon experiences during construction of the various structures and support facilities at the site bedrock is encountered within less than one (1) foot of the surface. In the area of the SWMUs, as a result of the construction of these and other supportive facilities, an overlying soil above the bedrock will not be encountered. Typically these areas consist of the concrete, asphalt or other surface overlying crushed stone aggregate which rests on the bedrock surface.

The Des Plaines River is located to the north of the site with the Illinois Sanitary and Ship Canal located along the southern side of the site. The elevation of the Illinois Sanitary and Ship Canal is approximately nine (9) feet lower than the site surfaces. The Des Plaines River is separated from the site by an earthen berm.

F. SURROUNDING AREA:

As seen in Figure 1, the site is bounded to the north by the Des Plaines River and to the south by the Chicago Sanitary and Ship Canal. Located to the north of the Des Plaines River, is the Argonne National Laboratory Reservation. This area is typified by forest and wetland areas. To the south of the Chicago Sanitary and Ship Canal the area is typified by former quarry operations and KA Steel Chemical, Inc., a barge facility. Immediately to the

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east of the site is Egan Marine which engages in barge cleaning, chartering and towing. To the east of the facility are located several light industrial type operations.

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III. DESCRIPTION OF EXPECTED HAZARDS

A. HEALTH HAZARD OF POTENTIAL CONTAMINANTS ENCOUNTERED

In the course of performing the activities defined in the RFI Work Plan it will be necessary for HR/E personnel to enter the areas in which the multitude of waste materials are handled at the site.

A listing of the materials permitted for storage and/or treatment at the site are provided in Appendix IV. The identity of the waste, its location, basis for hazard and estimated volume are provided in Appendix IV. These materials are also sorted by IDLH in Appendix IV.

Since this list of potential contaminants is extensive. The following table has been prepared to address the materials handled on a general basis rather than specific contaminant basis. Reference to the MSDS and NIOSH pocket guide to chemical hazards maintained at the site will be referenced for specific information in regards to the potential contaminants present in consultation with plant personnel specific to materials present in the area of the sampling activities.

Contaminant	Exposure Limit	IDLH	Primary Route of Entry	Symptoms	Target Organs	Chemical Properties
Flammable Liquids/Solids	0.05 ppm TWA	2 ppm to 20,000ppm	Inhalation Skin Adsorption	Nausea, Headache, Vomiting, Spasticity	Eyes, Mucous Membranes, Upper Respiratory, Liver	F.P. - 140°F I.P. - <11.02 eV
Corrosive	0.2 ppm TWA	10 ppm to 4800 ppm	Inhalation and Skin Adsorption, and Ingestion	Irritated Eyes, Throat; palm edema; burns eyes; skin	Respiratory System, Eyes, Skin	pH < 2 or >125
Reactives	0.025 ppm TWA	55 ppm to 500 ppm	Inhalation and Skin Adsorption and Ingestion	Burns eyes, skin, burns mouth, esophagus; nausea; muscle twitches, mental confusion; blurred vision	Respiratory System, Skin, Eyes	React violently with water

N/A = Not Applicable; F.P. = Flash Point; V.P. = Vapor Pressure; I.P. = Ionization Potential

Are MSDSs Available? [X] Yes [ ] No

Specific Material MSDSs are available on-site in the facility office.

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B. JOB/OPERATION TASKS

In the course of performing the activities at the site the specific tasks to be performed on-site are summarized in Table 1. This table also lists the potential health and safety hazards anticipated to be encountered in the performance of each specific task, precautions, the level of personnel protection required, and air monitoring requirements. Table 2 provides a summary of the potential hazards/precautions associated with each job/operation task.

C. DESCRIPTION OF POTENTIAL HAZARDS TO THE PUBLIC AND ENVIRONMENT:

Hazard to the public or environment are not anticipated due to activities proposed by HR/E at HERITAGE. However, on-site conditions will be monitored daily by the field project manager and addressed, as needed.

The work site areas will be secured and adequately demarcated. Only authorized personnel will be permitted to enter the work site.

The decontamination area will be defined to ensure protection of environment. All contaminated decontamination water and sediment from decontamination of personnel, equipment and vehicles will be collected.

Should conditions become dusty as a result of the sampling activities all operations will cease until appropriate dust control measures are implemented.

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TABLE 1

JOB TASK / OPERATION	POTENTIAL HEALTH & SAFETY HAZARDS										PRE-CAUTION	LEVEL OF PROTECTION	AIR MONITORING
	Inhalation Hazard	Cont w/Contam. Liquid	Noise Hazard	Heat Stress see Appendix 4, Sec. C	Electrical Hazard	Potential For Fire/Explosion	Contact w/Contam. Soil	Cold Stress see Appendix 4, Sec. D	Physical Injury	Underground Pipes			
Site Characterization	X			X				X			SOP Appendix IV, Sect. A, B, C	Level C (Downgrade to D)	Continuous PID, LEL-O_2 Aerosol Monitor, Radiation Meter, PID
Coring and Jack Hammering	X	X	X	X			X		X	X	SOP Appendix IV, Sect. A, B, C	Level D	Continuous PID Aerosol Monitor
Soil Sample Collection	X			X			X	X		X	SOP Appendix IV, Sect. A, B, C	Level D	Continuous PID Aerosol Monitor
Water Sample Collection		X		X				X			SOP Appendix Level D IV, Sect. A,B,C,D	Level D	PID

TABLE II

ACTIVITY/HAZARD/PRECAUTIONS

Activity	Potential Hazard	Precautions
Site Characterization	Contact with contaminated wastes and vapors	- Level C protective equipment. - Do not walk through obvious signs of potential contamination. - Do not place equipment on ground. - Continuous air monitoring with equipment as indicated in section. - Follow decontamination procedures outlined in section.
	Heat Stress	- Increase liquid consumption (i.e., Gatorade) to replace liquids lost during sweating. - Take additional rest breaks. - Do not use salt tablets. - Follow procedures in Appendix IV, Section C.
	Cold Stress	- Increase warm liquids consumption. - Take additional rest breaks in warm area. - Wear multiple layers of clothing. - Follow procedures in Appendix IV, Section D.
Coring and Jack Hammering	Physical Injury	- Exercise caution in vicinity of coring and jack hammer. - Minimize number of personnel in vicinity of coring and jack hammer. - Follow procedures in Appendix I, Section B.3.
	Contact with contaminated soils, liquids and vapors	- Use protective equipment defined in Section V and upgrade as necessary. - Perform air monitoring at borehole and breathing zone. - Follow decontamination procedures defined in Section V.
	Heat Stress	- Same as Activity 1 above.

TABLE II

ACTIVITY/HAZARD/PRECAUTIONS

Activity	Potential Hazard	Precautions
Soil Sample Collection	Physical Injury	- Same as Activity 2 above.
	Contact with contaminated soils, liquids and vapors	- Same as Activity 2 above.
	Heat Stress	- Same as Activity 2 above.
Water Sampling	Heat Stress	- Same as Activity 1 above.
	Cold Stress	- Same as Activity 2 above.
	Contact with contaminated soils, liquids and vapors	- Same as Activity 2 above.

IV. ON-SITE PERSONNEL EDUCATION AND TRAINING

A. EDUCATION/TRAINING REQUIRED

All personnel involved in the on-site activities outlined in Section III must participate in routine health and safety education and training programs in compliance with OSHA 29 CFR 1910.180(e). These programs are designed to provide the personnel with a thorough knowledge of hazardous materials, health and safety protocols and compliance with federal OSHA 29 CFR 1910.120(e): 40 hours initial instruction, 8 hours specialized training and EPA requirements for supervisors and annual 8 hours refresher training.

B. EVIDENCE OF COMPLIANCE

Prior to entering the designated work area each person shall provide a certificate of completion/compliance with these training requirements. Heritage's Health and Safety Officer, who directs the program or the subcontractors' designated Health and Safety Officer shall provide a certification that a list of designated and named personnel are in compliance with 29 CFR 1910.120(e) and certificate of completion/compliance are on file with the Health and Safety Office.

A certificate that all personnel have been FIT tested and are qualified to work while wearing respiratory protection must also be provided. Wherein, a list of personnel are certified, the responsible Health and Safety Director must be able to provide the individuals certification.

*Note - certification of an individual's capabilities to work while wearing respiratory protection must be by a licensed doctor.

Any and all personnel not directly involved with performance of the job/operation tasks and who intend to enter other areas than the support zone (see Section IX) shall provide evidence of compliance with the above. All such personnel shall provide their own PPE.

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C. PRE-ENTRY SAFETY BRIEFING

Prior to performing the job/operation tasks all personnel to be involved will be provided with the opportunity to read this HASP. Upon mobilization to the site and prior to any on-site activities being undertaken a meeting will be held to review the HASP. The site Health and Safety Coordinator will be responsible for conducting this meeting to review, discuss, and answer any questions in regards to this HASP. Documentation of attendance at a pre-entry safety briefing shall be maintained at the site.

D. 40 HOUR HEALTH AND SAFETY TRAINING CONTENTS

At a minimum HR/E's 40 hour Health and Safety Training includes:

- General Safety Rules
- Basics of General Chemistry
- Basics of Toxicology/Physiology
- Hazardous Materials (types/characteristics)
- Hazard Communication Information
- Respiratory Protection
- Respirator Training (use and maintenance)
- Chemical Protective Clothing
- Decontamination Procedures/Personal Hygiene
- Fire Prevention/Protection
- Basic First Aid/CPR
- Confined Space Work/Safety
- Atmospheric Testing/Sampling Procedures
- Emergency Response Procedures
- Electrical Hazard
- Federal and State Regulations

In providing a certificate of compliance with the training requirements, the Health and Safety Director certifying such or the individual providing such certification shall ensure that the training addressed these minimum areas.

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V. PERSONAL PROTECTIVE EQUIPMENT

A. PROTECTIVE EQUIPMENT LEVEL NECESSARY FOR ON-SITE ACTIVITIES (check all that apply).

[ ] LEVEL A [ ] LEVEL B [ ] LEVEL C [X] LEVEL D

PERMITTED MODIFICATIONS:

Site characterization shall be performed at Level D. Upgrade in the Level of PPE may be required if on site observations from air monitoring procedures indicate additional PPE is appropriate.

Tip II Microtip (PID)

Background	D
0-5	C
5-50	B
>50	A

Aerosol Monitor

0-5 mg/m^3	D
>5 mg/m^3	C

O_2/LEL Meter

O_2 <19.5	Evacuate Area (Reevaluate)
O_2 >22.5	Evacuate Area (Reevaluate)
LEL<10%	Evacuate Area (Reevaluate)

Radiation Meter

>0	Evacuate Area (Reevaluate)

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B. PROTECTIVE EQUIPMENT NEEDED (check all that apply):

RESPIRATORY PROTECTION

Supplied Air Respirators

[ ] SCBA

[ ] Airline W/Escape SCBA

[ ] Airline

Air Purifying Respirators

[X] Full Face Air Purifying Respirator

[X] Half Face Air Purifying Respirator

Cartridges (MSA)

[ ] GMD - Ammonia/ Methylamine TC-23C-43

[ ] GMC - Organic Vapor/Acid Gases TC-23C-47

[ ] GMA - Organic Vapor TC-23C-40

[ ] Metallic Mercury Vapor/Chlorine TC-23C-629

[ ] GMB-H Acid Gases/Particulates TC-23C-150

[X] GMA-F Organic Vapor/Dust & Mist TC-23C-151

[X] GMC-H Organic Vapor/Acid Gases/ Particulates TC-23C-153

[ ] Type H Dusts/Fumes/Mists TC-21C-135

[ ] GMP - Pesticides, Organic Vapor, Paint mists, dusts, mists TC-23C-79

[ ] GMB - Acid Gases/Formaldehyde TC-23C-41

CLOTHING

[X] Work Uniform

[X] Tyvek

[ ] Polycoated Tyvek

[ ] Saranex Coated Tyvek

Totally Encapsulated Chemical Protective Suit

[ ] Butyl

[ ] Chemrel

[ ] PVC

[ ] Teflon

[ ] Other

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Gloves

[X] Surgical Latex
[X] PVC
[ ] Nitrile
[ ] Butyl
[ ] Viton
[ ] Neoprene
[X] Noise Protection

Miscellaneous

[X] Steel Toe Shoes/Boots
[ ] Chemical Resistant Boots
[X] PVC Boot Covers
[X] Hard Hat
[X] Safety Glasses
[ ] Chemical Goggle
[ ] Face Shield

C. PERMEATION RATES

N/A

D. PERSONAL PROTECTION LEVELS FOR DESIGNATED AREAS:

Based on a preliminary evaluation of the potential hazards, the following levels of personal protection have been designated for the applicable work areas or tasks:

LOCATION	TASK	PROTECTION LEVEL (LEVEL A,B,C,D)	PERMITTED MODIFICATION
Exclusion Zone	Coring	D	Upgrade only
	Sampling	D	Upgrade only

NO CHANGES TO THE SPECIFIED LEVEL OF PROTECTION SHALL BE MADE WITHOUT THE APPROVAL OF THE PROJECT MANAGER OR SAFETY/HEALTH OFFICER.

E. PROTECTIVE EQUIPMENT LEVELS:

The following is a brief description of the personal protective equipment which may be required during various phases of the project. Although there is some flexibility to custom fit the actual items of protective equipment to the real-life situation, in general the levels of protection are defined as follows.

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1. LEVEL A - The highest level of protection used when:

   a. Unknown chemicals are involved and there is high risk for chemical release.

   b. Chemical concentrations are known to be above safe levels (IDLH atmospheres).

   c. Extremely hazardous substances are present or suspected.

   d. Chemicals and/or vapor and mists are destructive to tissue.

   e. Oxygen deficient atmospheres or confined space conditions.

2. LEVEL B - The second highest level of protection used when:

   a. Concentrations of chemicals in the air are IDLH or above the protection factor provided by a APR with full-face mask.

   b. Oxygen deficient atmospheres or confined space conditions.

   c. Vapor absorption or contact with skin not critical.

3. LEVEL C - An intermediate level of chemical protection used when:

   a. Air concentrations of chemical are potentially above or known to be above ACGIH TWA-TLVs and APR will provide adequate protection

   b. Non-IDLH atmospheres

   c. Chemicals are not destructive to skin

4. LEVEL D - Minimum level of chemical protection used when:

   a. No concentrations of chemicals in excess of ACGIH TWA-TLV's

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Minimum OSHA-recommended Requirements for Worker Protective Levels:

Protection Level	Equipment	
All outer gloves and booties to be duct taped to chemical resistant clothing.		
Level A	(1)	Pressure-demand, full-face SCBA[1] or pressure-demand air-supplied respirator with escape SCBA
	(2)	Fully encapsulating, chemical-resistant suit
	(3)	Inner and outer chemical-resistant gloves
	(4)	Chemical-resistant safety boots
	(5)	Hard hat
Level B	(1)	Pressure-demand, full-face SCBA or pressure-demand air-supplied respirator with escape SCBA
	(2)	Chemical-resistant clothing (overalls and long-sleeved jacket; hooded one- or two-piece chemical splash suit; disposable chemical-resistant one-piece suit)
	(3)	Inner and outer chemical-resistant gloves
	(4)	Chemical-resistant safety boots
	(5)	Hard hat
Level C	(1)	Full-faced, air-purifying, canister-equipped respirator
	(2)	Chemical-resistant clothing (overalls and long-sleeved jacket; hooded, one- or two-piece chemical splash suit; disposal chemical-resistant one-piece suit)
	(3)	Inner and outer chemical-resistant gloves
	(4)	Chemical-resistant safety boots
	(5)	Hard hat
	(6)	Safety glasses, goggles, or face shield as necessary
Level D	(1)	Safety boots
	(2)	Safety glasses or splash goggles
	(3)	Hard hat
	(4)	Gloves as necessary
	(5)	Standard work uniform or coveralls
Modified Level D	(1)	Same as Level D including chemical resistant one-piece suit (Tyvex)

[1]SCBA = Self-contained breathing apparatus

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VI. MEDICAL SURVEILLANCE

All HR/E employees are included in HR/E's Medical Surveillance program. This program involves medical monitoring prior to employment, on an annual basis and at termination of employment. In the event of potential exposure to contaminants which necessitates medical monitoring at that time or more frequently, as determined by a licensed consulting physician, personnel shall be monitored accordingly. Details of HR/E's Medical Surveillance Program are outlined below. If additional medical surveillance procedures are necessary for this project, they are outlined below.

Medical Monitoring Plan

All employees whose job requires them to;

A. Enter the hazardous waste site;

B. Otherwise come in contact with hazardous materials (e.g., contaminated equipment, laboratory samples);

C. Perform physical activities more strenuous than normal; must be included in a medical surveillance program. This program should involve medical monitoring prior to employment, on an annual basis and at termination of employment as specified by 29 CFR 1910.134 and 29 CFR 1910.120.

All employees involved in hazardous waste activities must be medically fit to wear respiratory protection as required in (OSHA Respiratory Protection Standard 29 CFR 1910.134) and Hazardous Waste and Emergency Response Operations Standard (HAZWOPER) (29 CFR 1910.120). All on-site personnel must provide certification to assure medical fitness with OSHA respiratory protection protocol and respiratory fit-testing (qualitative or quantitative).

In addition, all on-site personnel must be actively involved in a comprehensive medical surveillance program as required in HAZWOPER Standard (29 CFR 1910.120) to ensure physical capabilities.

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The HR/E medical surveillance program includes the following examinations:

1. Physical Examination - During this physical examination the physician considers the individual's capability to wear respiratory protection. Pulmonary function, cardiovascular status and weight carrying capacities is evaluated. Ability to detect odors is also be included. A licensed Occupational Physician performs the examination. The physician provides a written certification that each employee is medically fit to wear respiratory protection. Additional testing protocol may include:

2. Audiogram

3. Wellness blood profile - including complete blood count (CBC), SMAC-24, coronary risk profile.

4. Spirometry

5. Urine for heavy metals

6. Blood lead with ZPP (Zinc Protoporphren)

7. Respirator certification (by examining physician)

8. Red blood cell (RBC) cholinesterase

9. Serum PCB

10. Titus and Snellen Vision Screen

11. Electrocardiogram - resting

12. Chest x-ray

13. Methemoglobin

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14. Urinalysis

15. Physician's written medical opinion

16. Liver enzymes (if needed)

17. Vision testing (distant, near, color)

18. Health and Exposure history

Special Considerations

D. Certain prescription drugs may effect an individual's ability to work in temperature extreme conditions. The physician should note special limited capabilities under these conditions.

E. The purpose of the site safety and health plan is to prevent worker exposure. Biological monitoring activities measure the amount of a specific chemical or its metabolite which is excreted from the body. Examples include phenol monitoring in urine for benzene exposures, lead in blood, chlorinated hydrocarbon solvents in exhaled breath, etc.

F. Due to work proposed at the anticipated site concentrations of contaminants, additional biological monitoring parameters, beyond the comprehensive medical surveillance program, should not be necessary.

Access to Medical Records: All employees may obtain copies of their medical records upon written request to the HR/E Corporate Health & Safety Director.

Subcontractors: All subcontractors shall document their compliance with the requirements of 29 CFR 1910.134 and 29 CFR 1910.120 prior to mobilization to the site.

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VII. SAMPLING AND AIR MONITORING PROTOCOL

A. SOIL SAMPLE COLLECTION:

1. Laboratory samples will be collected in the following containers:

   a. VOC analysis -

      (1) Soils - wide mouth glass jars with Teflon lid. Soil sample packed to minimize air space.

      (2) Water - Dome Teflon Septum glass vials.

   b. SVOC analysis - wide mouth glass jars with Teflon lids.

   c. Metals analysis - wide mouth glass jars.

2. All samples will be stored in an iced cooler and transported to laboratories under chain of custody procedures.

B. AIR MONITORING

The following equipment must be used to monitor conditions at the specified intervals (circle applicable interval).

In the course of performing the site characterization all meters will be utilized and will be operated on a continuous basis. Upon establishing the site characteristics, if conditions warrant based upon review of the data by HR/E's Health and Safety Director, the conditions of the ambient air during the drilling and soil sampling tasks will be monitored using Microtip II and Aerosol Monitors at a distance of 18 inches below the worker's zone of inhalation and will be monitored on a continuous basis. During other site activities, decontamination, site preparation, etc., conditions will be monitored on an hourly basis.

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EQUIPMENT NEEDED	FREQUENCY OF USE
[X] LEL/0_2 Monitor	continuous / hourly / daily / other _____
[ ] LEL/0_2/H_2S Monitor	continuous / hourly / daily / other _____
[ ] HNu	continuous / hourly / daily / other _____
[ ] OVA	continuous / hourly / daily / other _____
[X] TIP II/Microtip	continuous / hourly / daily / other continuous during soil boring operations
[ ] Hand-held Aerosol Monitor (HAM)	continuous / hourly / daily / other _____
[X] Aerosol Monitor	continuous / hourly / daily / other continuous during soil boring operations
[ ] H_2S Monitor	continuous / hourly / daily / other _____
[ ] HCN Monitor	continuous / hourly / daily / other _____
[X] Radiation Meter	continuous / hourly / daily / other _____
[ ] Detector Tubes	continuous / hourly / daily / other _____

List Type:

[ ] Heat Stress Monitor	continuous / hourly / daily / other _____
[ ] Other: _____	continuous / hourly / daily / other _____
[ ] Other: _____	continuous / hourly / daily / other _____

[ ] Long Term Ambient / Personnel Monitoring (samples require lab analysis)

*[X] SKC/Gilian Pumps

[ ] Charcoal Tubes	[X] PVC Filters
[ ] Silica Gel Tubes	[ ] MCEF Filters
[ ] Orbo Tubes	[ ] Impingers (Soln: _____)

*If dust levels are monitored at >.05 mg/cm^3.

Personnel will monitor dust conditions at the site work areas. Wherein, conditions become dusty, appropriate dust control measures will be implemented and/or personnel will upgrade to Level C with a full face respirator.

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C. EQUIPMENT CALIBRATION AND PREVENTATIVE MAINTENANCE

TIP II Microtip - See Appendix II
LEL/O_2 Monitor - See Appendix II
Aerosol Monitor* - See Appendix II
Radiation Meter* - See Appendix II

* These meters are only checked for their operability - calibration must be done by factory qualified personnel only.

An equipment calibration/maintenance log shall be maintained at the site. A copy of this log is provided in Appendix II.

All instruments will be calibrated and/or checked for their operability as appropriate and recommended by the manufacturer or at a minimum at the beginning of activity at the site (morning) and at end of day's activity or at any time the performance of the instrumentation is suspect.

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VIII. SITE CONTROL

A. SITE ENTRY/EXIT PROCEDURES:

All personnel will sign in and sign out on a log sheet provided at the site. The Project Manager will be responsible for notifying HERITAGE of the number of personnel on site at the beginning of each day's activity and location of the work areas for the day. The Project Manager will notify HERITAGE at the end of each day that all personnel have left the site. Physical access into the site shall be through the gate located at the northwest corner of the facility.

B. SITE SECURITY:

Work zones will be established on-site. All site personnel are required to sign a log-in and log-out sheet. Unauthorized personnel will be restricted from access into the work zones. Necessary and authorized visitors will be allowed in the work zones on-site only if accompanied by the project manager or his designee. Only properly trained personnel will be permitted in the exclusion zone.

C. IDENTIFY WORK ZONES (hot, warm, cold areas):

Work zones may be changed only at the discretion of the project manager and HR/E's Health and Safety Manager.

The exclusion (hot) zone is that area where contaminated materials may be present exposed during specific operations and the potential for worker exposure exists. The hot zone will be demarcated with the use of red barrier tape or red flags. Activities conducted in this zone will include drilling and sampling. This area shall be considered as within 10 feet of the sampling activities.

The contamination reduction (warm) zone is that area that separates the exclusion and support zones. Activities conducted within this zone include decontamination of work equipment and personal protective equipment and will be adjacent to the exclusion zone.

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The office area of the site is considered the support (cold) zone. Contaminated equipment will not be allowed into this area without first going through the warm zone. Eating, smoking and drinking will be allowed only within the support zone.

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IX. DECONTAMINATION PROCEDURE

A. INITIAL DECONTAMINATION

All equipment and non-disposable materials shall be decontaminated prior to mobilization to the site. Where appropriate the cleaned equipment and/or materials will be wrapped in aluminum foil or other sealable material.

B. DECONTAMINATION STATION

The decontamination station shall be the truck transfer area. This area will allow the decontamination of the large of piece of equipment prior to its leaving the site. The station shall also provide for personnel decontamination. The specific layout of the station shall be established by the site Health and Safety Coordinator prior to work commencing at the site.

The layout shall provide for all equipment and personnel to leave the potentially contaminated zones through the contaminant reduction zones to the support zones (duty area to clean).

C. DETAIL DECONTAMINATION METHOD AND PROCEDURE:

All sampling material, equipment, and non-disposal materials shall be decontaminated as follows:

- Earthen materials will be scraped and removed from the equipment
- Equipment will be washed with a non-phosphate detergent solution.
- Equipment will be rinsed with deionized water.

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D. DECONTAMINATION EQUIPMENT NEEDED:

[X] Disposable protective clothing/equipment
[X] Water

[X] Low pressure [ ] High pressure

[X] Deionized Water
[ ] Steam
[X] Detergent/Water
[ ] Compressed air
[X] Scrub brushes/scrapers/sponges
[ ] Chemical detoxification

[ ] Acids [ ] Bases [ ] Solvents

[X] Containers (buckets, wading pools)
[ ] Hoses -
[X] Chairs
[X] Plastic Sheeting

E. SEGREGATION, DECONTAMINATION AND DISPOSAL:

[ ] LEVEL A - Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, tape removal, boot cover removal, outer glove removal, suit/safety hat removal, SCBA backpack removal, inner glove removal, inner clothing removal, field wash, redress.

[ ] LEVEL B - Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, tape removal, boot cover removal, outer glove removal, safety boot removal, SCBA backpack/airline removal, facepiece removal, inner glove removal, inner clothing removal, field wash, redress.

[ ] LEVEL C - Segregated equipment drop, boot cover and glove wash, boot cover and glove rinse, tape removal, boot cover removal, outer glove removal, safety boot removal, splash suit removal, facepiece

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removal, inner glove removal, inner clothing removal, field wash, redress.

[X] LEVEL D - Segregated equipment drop, boot and glove wash, boot and glove rinse.

F. DISPOSAL PROCEDURES
(contaminated equipment, supplies, disposable washwater):

All items shall be disposed in a manner agreeable to both representatives of HERITAGE and representatives of Heritage Remediation/Engineering, Inc. (HR/E), and in accordance with Federal, State and Local regulations.

Used PPE will be placed in containers, sealed, labeled and accumulated adjacent to the decontamination area. Any reusable PPE that is damaged beyond repair or that cannot be properly decontaminated will be contained in the same manner. Discharged PPE containers will remain closed except when adding to the contents. Once a used PPE container becomes full, it will be disposed of by HERITAGE.

Decontamination fluids will be containerized in DOT approved 55 gallon drums and will be disposed of by HERITAGE.

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X. EMERGENCY PROCEDURES

A. EMERGENCY RESPONSE CONTACTS:

AGENCY/FACILITY NAME	PHONE NUMBER	RESPONSE TIME
Ambulance: Lemont Fire Department	708-257-2221	5 minutes
Fire Department: Lemont Fire Department	708-257-2221	5 minutes
Police Department: Cook County Sheriffs Dept.	708-458-1000	5 minutes
Lemont Police Dept.	708-257-2226	5 minutes
Hospital: Palos Community Hospital	708-361-4500	N/A
State Emergency Response:		
IEMA	1-800-782-7860	N/A
IEPA	1-217-782-3637	N/A
National Response Center:	1-800-424-8802 1-202-462-2657	N/A
Chemtrec	1-800-424-9300	N/A
Poison Control Center: Palos Community Hospital	708-361-4500	N/A
Utilities:		
JULIE	1-800	N/A
Others:		
Metropolitan Water Reclamation Dist. of Greater Chicago	312-751-5600	N/A
U. S. Coast Guard, Marine Safety Office, Chicago	312-353-1226	N/A

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Emergency Response Contractor:
HR/E — 708-378-1600 or 1-800-487-7455 (1-800-48-SPILL) — 30 minutes

IEPA Project Manager

Health & Safety Personnel
Alan Kalmar — 1-708-378-1600 Office
1-708-379-6073 Pager

Project Manager
Robert J. Millman, P.E. — 1-708-378-1600 Office
1-708-379-6067 Pager

B. **EMERGENCY ROUTES:** (Attach a map)
Hospital: Palos Community Hospital
In no event will personnel be transported to the Hospital except by the ambulance service.

C. **THE FOLLOWING EMPLOYEES ARE TRAINED IN FIRST AID AND/OR CPR:**

Employee	First Aid	CPR
All HR/E Employees	X	X

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D. EMERGENCY EQUIPMENT AVAILABLE:

The following emergency equipment (indicated by a check mark) is available on site:

- Communications Equipment — LOCATION / EXTENSION
  - [ ] Public Telephones
  - [ ] Private Telephones
  - [X] Mobile Telephones — HR/E Vehicle, 708-641-3050
  - [ ] Two-way Radios
  - [ ] Air Horn
  - [ ] Rope Tugs
  - [ ] Hand Signals

- Medical Equipment — LOCATION
  - [X] First Aid Kits* — HR/E Vehicle
  - [ ] Stretcher/Backboard
  - [X] Eyewash
  - [ ] Oxygen
  - [ ] Other

- Fire Fighting Equipment — LOCATION
  - [X] Fire Extinguishers — HR/E vehicle
  - [ ] Other (Fire hoses)

- Spill or Leak Equipment — LOCATION
  - [ ] Absorbent Boom/Pad
  - [X] Dry Adsorbents — HR/E Vehicle
  - [ ] Tools
  - [ ] Other

- Other Related Documents
  - [ ] Confined Space Entry Policy & Procedures
  - [ ] Hot Works Policy & Procedures
  - [ ] Lock Out/Tag Out Policy & Procedures
  - [ ] Asbestos Handling Policy & Procedures
  - [ ] Spill Containment Policy & Procedures
  - [ ] Pipe Breaking Policy & Procedures
  - [ ] Excavation Guidelines
  - [ ] Drillers Safety Manual

* As approved by HR/E's consulting physician.

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E. COMMUNICATION PROCEDURES:

1. Pre-Mobilization

PRIOR TO MOBILIZATION TO THE SITE THE FOLLOWING SHALL BE NOTIFIED and provided with information pertaining to the activities to be conducted at the site and potential contaminants.

- Hazardous Materials Unit
  City of Chicago Fire Department
  John M. Eversole
  312-744-8610

- Palos Community Hospital
  708-361-4500

- Cook County Sheriff's Department
  708-458-1000

- Lemont Police Department
  708-257-2226

- Lemont Fire Department
  708-257-2221

2. Working Procedures

A communication system will be established in order for personnel to communicate with each other on-site, as well as off-site.

Hand signals, airhorn and two way radios may be utilized to communicate between exclusion zone operators and support zone personnel. Emergency hand and audible signals which can be used in the event of an emergency include:

- Clutching throat - personal distress

A phone system will be available to communicate to off-site locations.

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F. EMERGENCY PROCEDURES:

The following standard emergency procedures will be used by on-site personnel. The Project Manager shall be notified of any on-site emergencies and will be responsible for ensuring that appropriate procedures are followed.

1. Personal Injury: Upon notification of an injury, all site personnel will lend assistance to remove the injured from the work area, if necessary. The Field Project Manager will determine the extent of injury and determine first aid measures necessary. Contact should be made for an ambulance to transport injured to a medical facility (if required). If injured person is contaminated with hazardous materials, decontamination will take place to the extent possible. If the cause of the injury does not affect the performance of other site personnel, normal operations may resume. If there is risk to others, all site personnel will move from the work area until further instruction is given. Activities will cease until the risk is removed or reduced.

2. Personal Protective Equipment Failure: If a site worker should experience a failure or alteration of protective equipment that affects the protection factor, that person and his/her buddy shall immediately leave the working area. Re-entry shall not be permitted until the equipment has been repaired or replaced.

3. Other Equipment Failure: If any of the equipment on-site fails to operate properly, the Project Team Leaders will be notified. They will determine the effect of this failure on continuing operations. If the failure effects the safety of personnel or prevents completion of the work plan tasks, all personnel will leave the area until the situation is evaluated and appropriate actions performed.

4. Fire/Explosion: Upon notification of a serious fire or explosion, a designated representative of HERITAGE will be contacted at once to call 911 for emergency assistance. A serious fire is considered to be one that is beyond the incipient stage. All personnel shall move to a safe distance from the involved area. The Field Project Manager or his designee shall direct fire equipment arriving at the scene to the appropriate area. Personnel will attempt to extinguish small or incipient stage fires.

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5. Spills or Leaks: In the event of a spill or a leak, employees will:

   a. Contact the designated HERITAGE representative.

   b. Locate the source of the spillage and stop the flow if it can be done safely.

   c. Begin containment and recovery of the spilled materials.

   d. If necessary contact Spill Response contractor.

6. Weather Emergencies: In the event of heavy weather, the Field Project Manager will oversee the securing of the site, materials and equipment in order to prevent the loss or migration of hazardous materials from the site and to prevent public access to the site.

7. Evacuation Procedures: The following evacuation procedures have been established for this site.

   Excavation

   The need to evacuate may be determined by local authority notification or by the Field Manager of HERITAGE personnel. Procedures will be followed to insure everyone in the work area is accounted for and is safe.

   Sound Alarm

   a. Personnel should, when hearing alarm, report to the designated assembly area. The designated assembly area is shown in Figure 3, Appendix 1.

   b. The Field Manager will inspect the work area to insure everyone has been notified of the danger and has gone to the designated area. Power will be disconnected.

   c. Roll call will be taken at the designated area to be sure everyone is accounted for.

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d. A safe evacuation route, preferably in an upwind direction, will be determined by HR/E personnel and all persons will leave the premises in accordance with the specified routes. See Figure 3, Appendix 1.

e. To return employees to the work area, the work area must be declared safe by HR/E and HERITAGE and the provisions of Item f (below) followed.

f. In All Situations: When an on-site emergency results in evacuation, personnel shall not re-enter until:

(1) The conditions resulting in the emergency have been corrected.
(2) The hazards have been reassessed.
(3) The Site Safety Plan has been reviewed.
(4) Site personnel have been briefed on any changes in the Site Safety Plan.

8. General Chemical First Aid Procedures

a. INHALATION

- Remove victim to fresh air

NOTE: DO NOT ENTER CONFINED SPACE OR SPILL AREA WITHOUT PROPER PROTECTION

- Give artificial respiration if person is not breathing
- Get medical attention

b. EYE CONTACT

- Flush immediately with large amounts of water for at least 15 minutes, while holding eyelids open
- Get medical attention promptly after flushing eyes with water

NOTE: Flushing for 30 minutes is recommended if contact with strong alkalies occurs (caustic soda - sodium hydroxide)

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c. SKIN CONTACT

- Flush affected area with large amounts of water while removing contaminated clothing
- Flush for 15 minutes if contact with concentrated chemical
- If irritation persists, get medical attention
- Wash contaminated clothing before reuse

d. INGESTION

- The decision whether to induce vomiting is chemical-specific
- Do not induce vomiting without first contacting the MSDS Poison Control Center or local emergency room for instructions. The MSDS may have specific instructions
- In some cases, vomiting will cause additional damage, so the use of an antidote is sometimes appropriate
- If vomiting occurs uncontrollably, keep head below hips to prevent vomit from getting into lungs
- Never induce vomiting or give anything by mouth to an unconscious person
- Get medical attention as soon as possible

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XI. SPILL CONTAINMENT PROGRAM

In the course of performing the specific job/operational tasks as anticipated (drilling and sampling) material spills are not anticipated to occur. Should a spill occur, HR/E will maintain 20 absorbent pads, two 50 lb. bags of oil dry, a broom and a shovel along with one 30 gallon plastic drum on the HR/E vehicle. The worst spill anticipated would be approximately 5 gallons of hydraulic fluid for the drilling equipment.

In the event of a spill of any nature the Health and Safety Coordinator will:

1) Locate the source of the spilling and stop the flow if it can be done safely;

2) Begin containment and recovery of the spilled material;

3) Contact HERITAGE representative;

4) Contact HR/E Health and Safety Officer;

Alan Kalmar	708-378-1600

5) If necessary contact Spill Response Contractor;

HR/E	708-378-1600 1-800-48-SPILL

6) If necessary contact the following:

Lemont Fire Department	708-257-2221
Lemont Police Department	708-257-2226
Cook County Sheriff's Dept.	708-458-1000
Palos Community Hospital (if injuries or exposures involved)	708-361-4500
State Emergency Response	1-800-782-7860
National Response Center	1-800-424-8802

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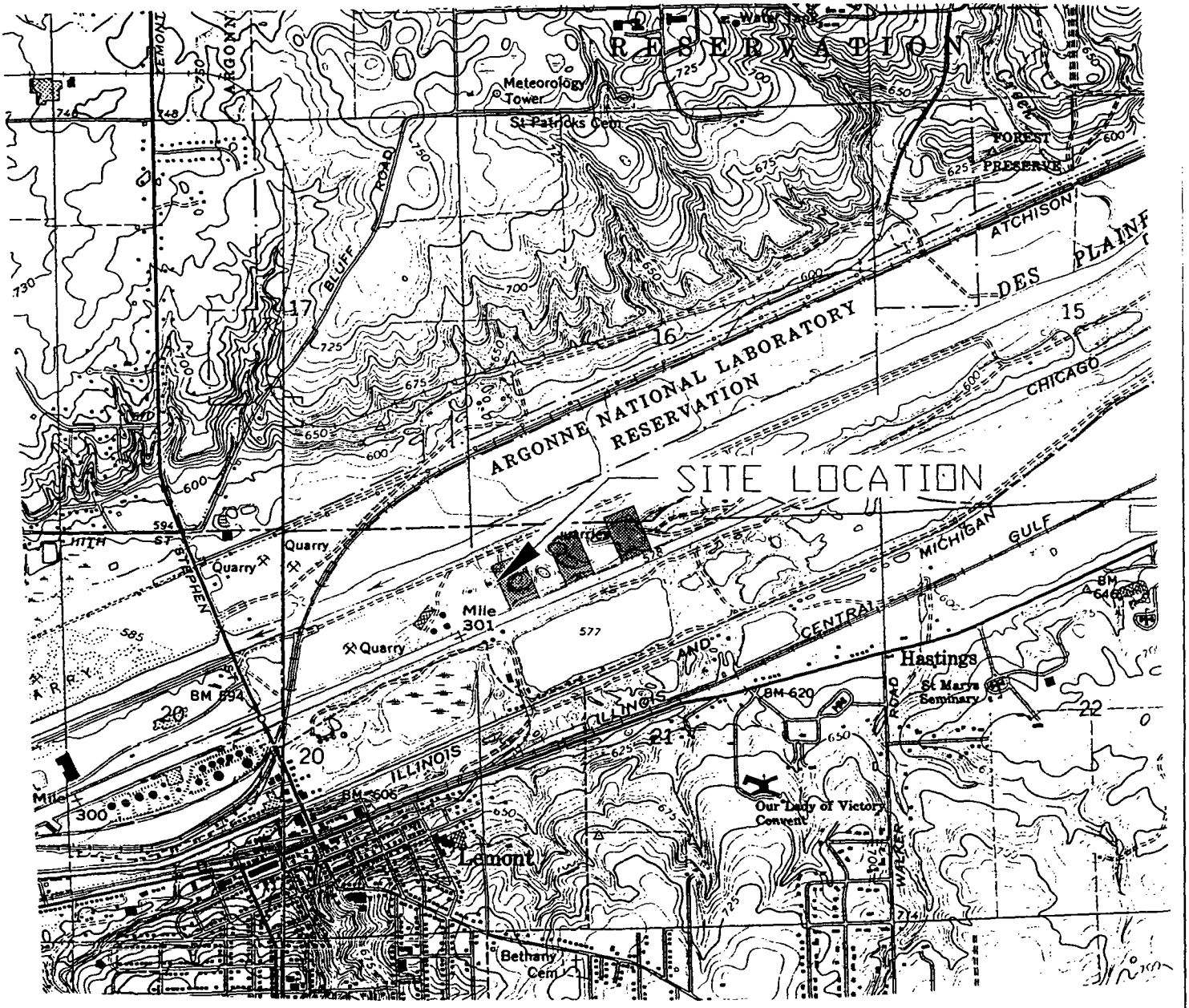
APPENDIX I

FIGURES

Recycled Paper



SAG BRIDGE AND ROMEOVILLE QUADRANGLES

Illinois 7.5 Minute Series

SCALE

2000' 0 1000' 2000'

NORTH

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

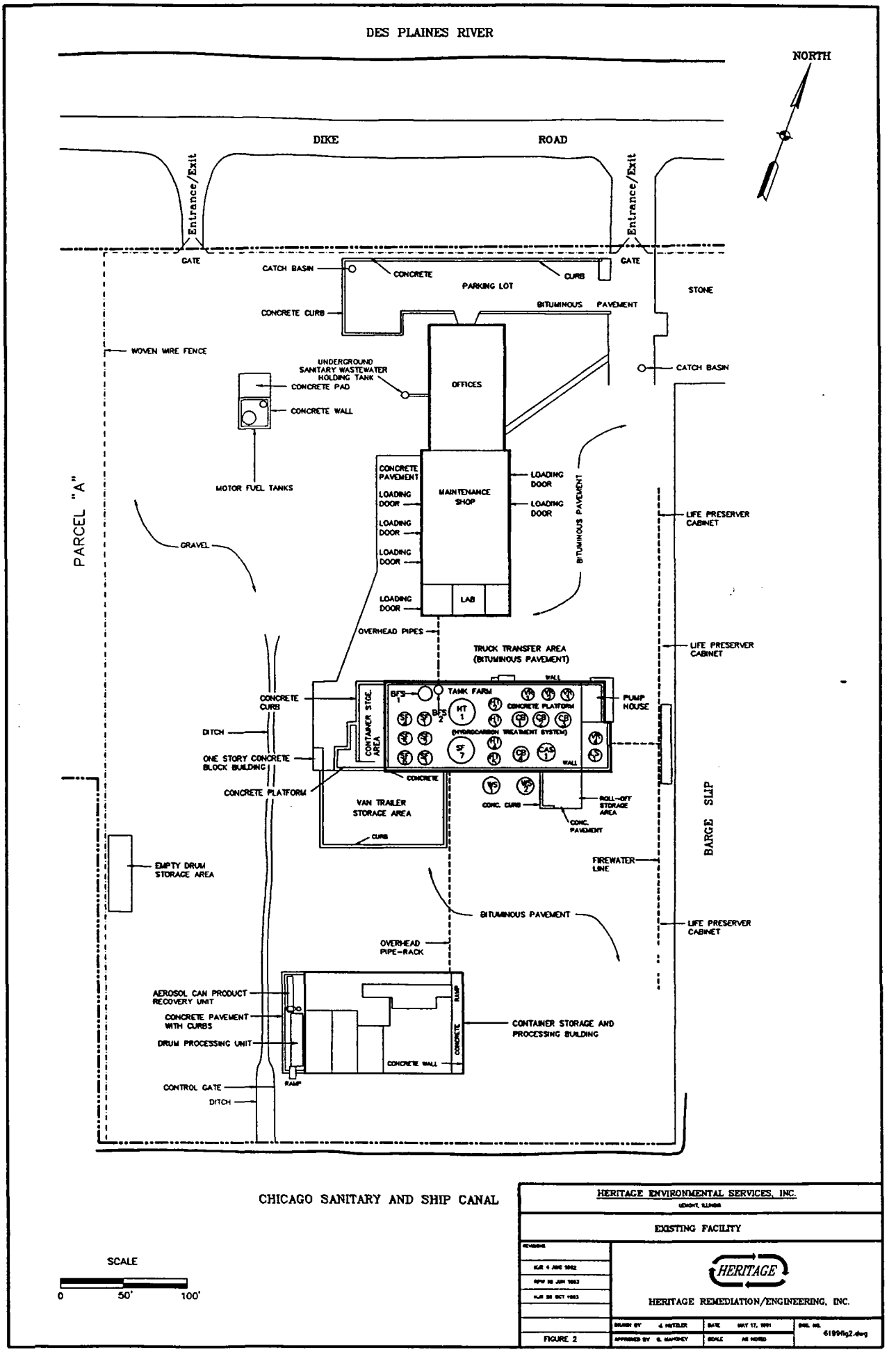
SITE LOCATION MAP

REVISIONS

HERITAGE

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE 26 OCT 1993	FIGURE 1
APPROVED BY	SCALE AS SHOWN	JOB NO. 6199



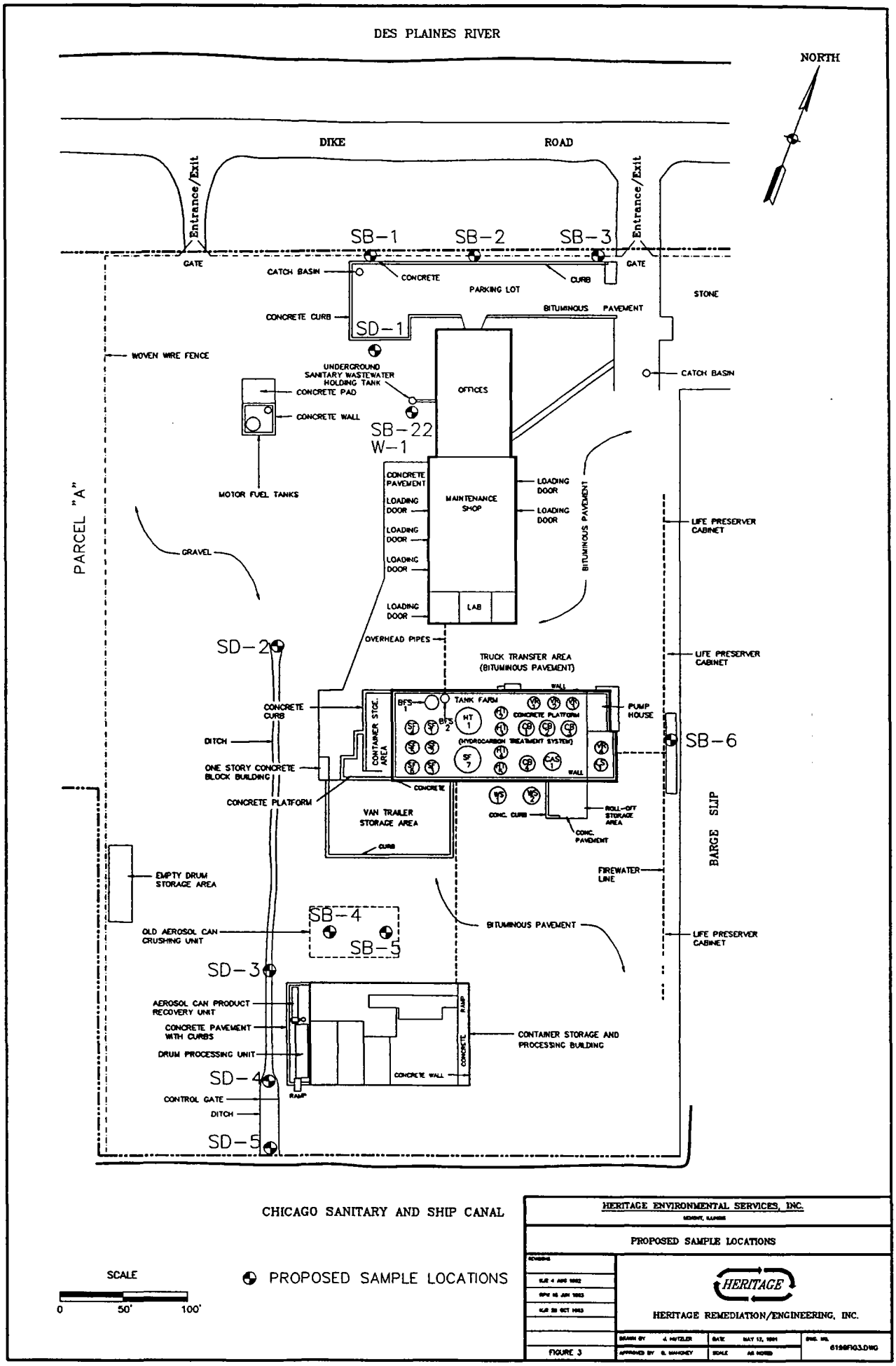
HERITAGE ENVIRONMENTAL SERVICES, INC.

EXISTING FACILITY

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY J. METZLER	DATE MAY 17, 1991	DWG. NO. 61994fig2.dwg
APPROVED BY S. MAHONEY	SCALE AS NOTED	

FIGURE 2

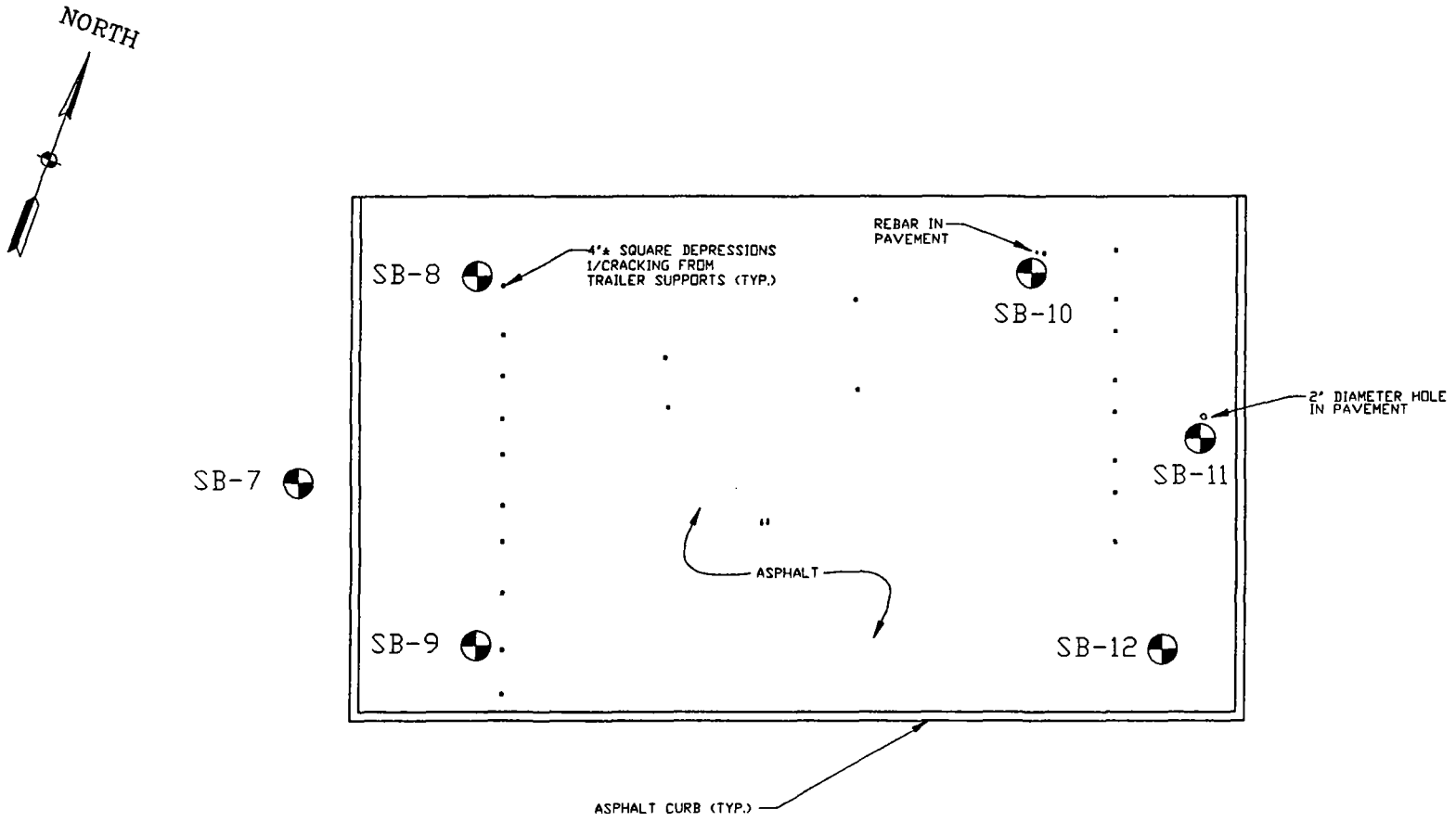


HERITAGE ENVIRONMENTAL SERVICES, INC.

PROPOSED SAMPLE LOCATIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

FIGURE 3



◓ - PROPOSED SOIL SAMPLE LOCATION

SCALE

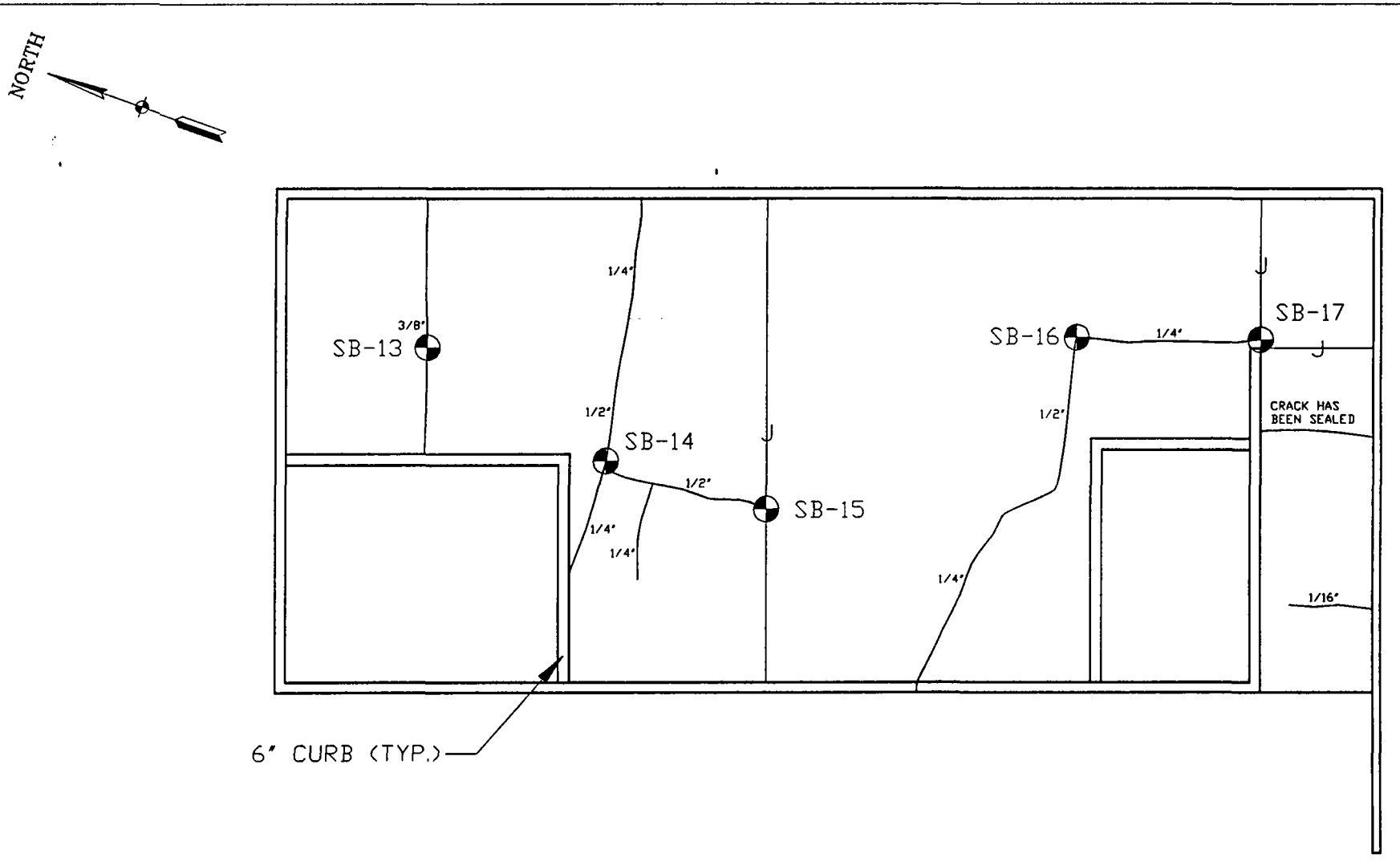
0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

VAN TRAILER FARM - PROPOSED SAMPLE LOCATIONS

REVISIONS			
	DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 4
	APPROVED BY	SCALE 1"=20'	JOB NO. 6119

HERITAGE REMEDIATION/ENGINEERING, INC.



- PROPOSED SOIL SAMPLE LOCATION

- DENOTES CONSTRUCTION JOINT

SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

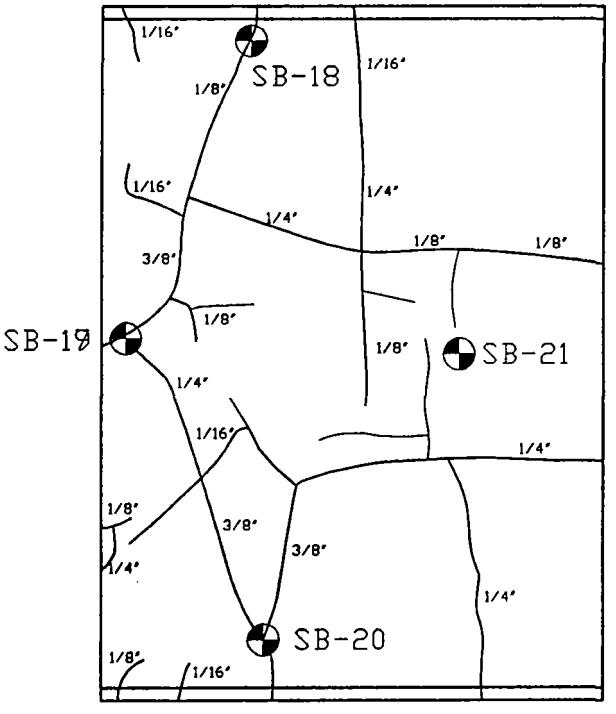
OUTDOOR CONTAINER STORAGE AREA

REVISIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 5	
APPROVED BY	SCALE 1"=10'	JOB NO. 5119	

NORTH



⊕ - PROPOSED SOIL SAMPLE LOCATION

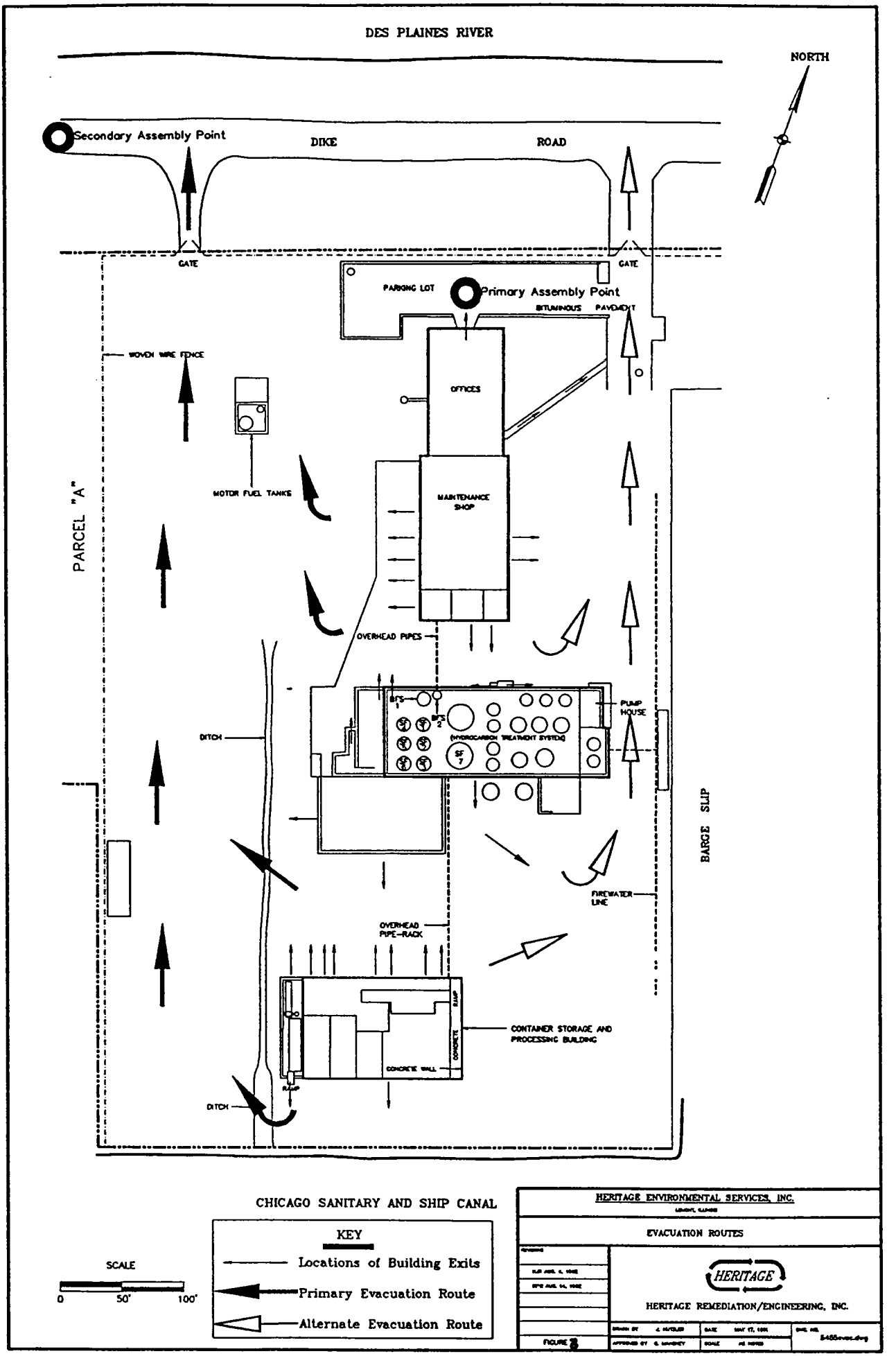
SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

ROLL-OFF STORAGE AREA

REVISIONS			
	HERITAGE REMEDIATION/ENGINEERING, INC.		
	DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 6
	APPROVED BY	SCALE 1"=10'	JOB NO. 6119


DES PLAINES RIVER
NORTH
Secondary Assembly Point
DIKE
ROAD
GATE
GATE
PARKING LOT
Primary Assembly Point
BITUMINOUS PAVEMENT
WOVEN WIRE FENCE
OFFICES
MOTOR FUEL TANKS
MAINTENANCE SHOP
PARCEL "A"
OVERHEAD PIPES
BPS 1
BPS 2
(HYDROCARBON TREATMENT SYSTEM)
PUMP HOUSE
DITCH
BARGE SLIP
FIREWATER LINE
OVERHEAD PIPE-RACK
CONTAINER STORAGE AND PROCESSING BUILDING
CONCRETE RAMP
CONCRETE WALL
RAMP
DITCH
CHICAGO SANITARY AND SHIP CANAL
KEY
Locations of Building Exits
Primary Evacuation Route
Alternate Evacuation Route
SCALE
0
50'
100'
HERITAGE ENVIRONMENTAL SERVICES, INC.
EVACUATION ROUTES
HERITAGE
HERITAGE REMEDIATION/ENGINEERING, INC.
FIGURE 3

APPENDIX II

AIR MONITORING EQUIPMENT

Recycled Paper

APPENDIX II
SECTION A

MICROTIP II

Calibrate with Isobutylene - 100 ppm

Recycled Paper

MICROTIP™ HL-200

Hand Held Air Monitor/Photoionization Detector

CLASS 1, DIVISION 2
GROUPS A, B, C, D
HAZARDOUS LOCATIONS
Classified by Underwriters Laboratories Inc. as to electrical shock, fire and explosion hazards only.

User's Manual

Photovac International Incorporated

741 Park Avenue
Huntington, New York 11743
USA
Telephone: 516-351-5809
Fax: 516-549-8031

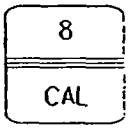
PHOTOVAC incorporated

Photovac Incorporated

105 Doncaster Avenue
Thornhill, Ontario
Canada L3T 1L6
Telephone: 416-881-8225
Fax: 416-881-3961
Telex: (USA)7608242
Telex Answerback: PHOTO

Part No. 395015

The PLAY function provides a speed search to find the desired start and stop Event numbers for printing or graphing.



2.14 CAL

MicroTIP must be calibrated in order to display concentration in units equivalent to ppm. First a supply of Zero Gas, which contains no ionizable gases or vapors, is used to set MicroTIP's zero point. Then, Span Gas, containing a known concentration of an ionizable gas or vapor, is used to set the sensitivity.

Usually clean outdoor air will be suitable as Zero Gas. If there is any doubt, use a commercial source of Zero Grade Gas and a second sampling bag. A supply of Span Gas of the desired compound and concentration must be obtained for calibration. Observe proper handling techniques for all gases.

Isobutylene at 100 ppm in air is recommended as Span Gas. To calibrate the instrument use the Calibration Kit (Photovac Part No. 390033) as follows:

1. Connect the supplied regulator to the Span Gas cylinder. Hand tighten the fittings.

2. Open the valve on the gas bag by turning the valve stem fully counterclockwise.

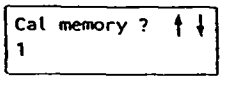
3. Attach the gas bag adapter nut to the regulator. Hand tighten the fittings.

4. Turn the regulator knob counterclockwise about half a turn to start the flow of gas.

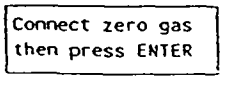
5. Fill the gas bag about half full and then close the regulator fully clockwise to turn off the flow of gas.

6. Disconnect the bag from the adapter and empty it. Flush the bag a few times with the Span Gas and then fill it.

7. Close the gas bag by turning the valve clockwise.

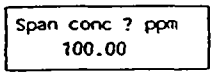


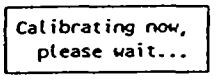
8. Press SETUP and select the desired Cal Memory with the arrow keys and press ENTER. Press EXIT to leave Setup.



9. Press CAL and expose MicroTIP to Zero Gas. Press ENTER and MicroTIP sets its zero point.

10. MicroTIP then asks for the Span Gas concentration. Enter





the known Span Gas concentration and then connect the Span Gas bag adapter to the inlet.

11. Press ENTER and MicroTIP sets its sensitivity.

12. When MicroTIP's display reverts to normal, MicroTIP is calibrated and ready for use. Remove the Span Gas bag from the inlet.

MicroTIP has 5 Cal Memories and can be calibrated with 5 different span gases if desired. Only one Cal Memory can be used at a time. Each memory stores a different zero point and sensitivity. To program the Cal Memories:

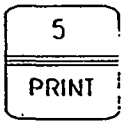
1. Press SETUP and select the desired Cal Memory (1 to 5) with the arrow keys.

2. Exit from Setup and press the CAL key.

3. Follow the displayed calibration instructions. When the calibration is completed it is automatically stored in the selected Cal Memory.

Whenever the instrument is calibrated, MicroTIP updates the selected Cal Memory. The instrument should be calibrated once a day.

No matter which Cal Memory is selected, MicroTIP's response is not specific to any one compound. The reading displayed represents the total concentration of all ionizable compounds in the sample.



2.15 PRINT

MicroTIP was designed to be used with an Epson FX-80® or 100% compatible printer. If another type of printer is to be used, the appropriate printer cable must be obtained. See Section 3.1 for details on the type of cable required.

The printer must be set to 8 data bits and 1 stop bit to communicate with MicroTIP. MicroTIP's baud rate and parity must be set depending on the printer requirements. Refer to the printer user's manual for more information.

MicroTIP is not UL®-classified for use in hazardous locations with printers.

To print recorded data:

1. Use the printer cable and suitable adapter (Photovac Part No.

The gas stream is directed into the PID through a small port at the center of the lamp window and through a series of larger ports around the perimeter of the lamp window. This bypass arrangement permits a high sample flowrate and short response time, while minimizing contamination of the lamp window.

The ionized molecules in the detector cell are subjected to a continuous electric field between the repeller electrode and the collector electrode. The ions move in the electric field, generating a current which is proportional to the concentration of the ionized molecules in the detector cell. An electrometer circuit converts the current to a voltage which is then fed to the microprocessor.

The detector lamp is operated by an HF lamp driver circuit which delivers high frequency energy to the lamp through an antenna wrapped around the lamp holder. The lamp driver power supply is controlled by the microprocessor based on a feedback signal from a light sensor on the HF driver circuit board.

6.3 CALIBRATION AND RECORDING

Periodic calibration is required to compensate for PID output changes due to inlet filter restriction, lamp window cleanliness, sample pump wear and other factors.

During calibration, MicroTIP's PID is first exposed to Zero Gas. A small signal is generated, and this zero signal is stored by the microprocessor.

In High Sensitivity operation, the microprocessor subtracts the zero signal from the PID signal, and multiplies the difference by 1000. This number is then displayed.

When one of the 5 Cal Memories is selected, MicroTIP's PID is next exposed to Span Gas. This span signal is stored. The microprocessor subtracts the zero signal from the span signal and divides the difference by the user-entered Span Gas concentration. The resulting sensitivity is stored in the selected Cal Memory with the zero signal. In operation, the microprocessor first subtracts the zero signal from the PID signal, then divides the difference by the sensitivity. This number is then displayed.

The microprocessor accumulates all readings over a 15 second interval and determines the minimum, average and maximum readings. It stores these numbers along with the highest priority instrument status and the most recent time, date and Event

APPENDIX II
SECTION B

LEL/O_2 MONITOR

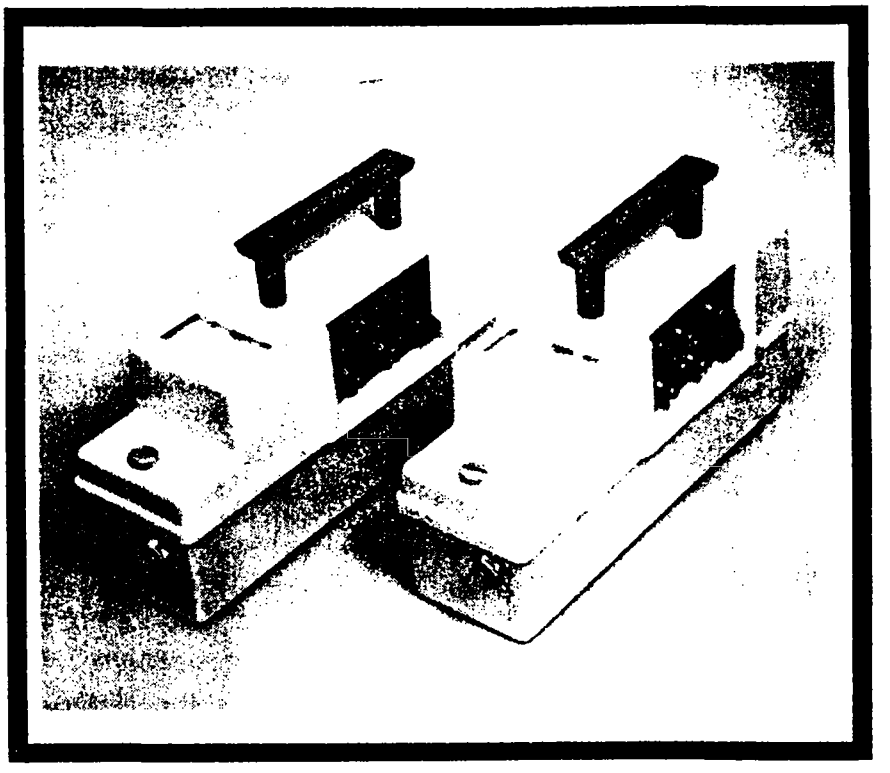
40% LEL
Calibrate with Hexane - 375 ppm
100 % O_2
Calibrate with Nitrogen

Recycled Paper

GASTECH

MODELS 1238 & 1314
GASTECHTOR

INSTRUCTION MANUAL



MADE BY

GASTECH INC

8445 CENTRAL AVE., NEWARK, CA 94560

V. CALIBRATION AND ADJUSTMENT

A. Combustibles Calibration

To check and adjust calibration on a known gas sample.

1. Turn instrument on and allow it to warm up and stabilize, preferably for 5 minutes. Be sure batteries are charged sufficiently to read above the check mark.

2. Open instrument case by loosening captive screw at front. Lift upper half of case slightly, move 1/4" to rear to disengage rear clamp; then separate the two halves. Locate COARSE ZERO potentiometer on underside of circuit board (marked "ZERO").

3. Turn external PPM/LEL ZERO control to center of its span. Then turn COARSE ZERO potentiometer to bring meter to zero reading.

4. To calibrate the LEL range, insert sample inlet tube into a vessel or other source of known calibrating gas. Watch meter and note highest reading. If it is incorrect, turn LEL SPAN potentiometer to give desired reading.

5. For PPM calibration, follow same procedure with range switch in PPM position, and use PPM SPAN potentiometer. Before making this adjustment, allow system to warm up and stabilize thoroughly, and zero carefully in the PPM range.

NOTE

In the sensitive ppm range it is important that the humidity of the sample be the same as that of the air used for zero adjustment. If they are different, a significant offset in zero reading may be observed. To overcome this, a humidifier may be used for both zero and calibration tests, providing the calibrating gas is one that will not be absorbed in water. The GasTech Calibration Kit is supplied complete with humidifier and accessories for this effect. See Appendix A.

6. If zero cannot be adjusted, or if reading cannot be set high enough, replace detector.

B. Combustibles Alarm Threshold

The reading at which the alarm is actuated in each range can be set by use of the corresponding ALARM Threshold potentiometer.

To Set:

1. With instrument in range to be set, turn PPM/LEL ZERO adjust to bring meter to desired alarm setting. It may be necessary to use the COARSE ZERO to reach this point, in LEL range.

2. Turn corresponding (LEL or PPM) ALARM Threshold potentiometer to the point where alarm just operates. Clockwise rotation will lower alarm setting. Verify setting by turning PPM/LEL ZERO control to bring meter indication into and out of alarm zone.

3. When the combustibles Alarm Threshold has been satisfactorily set, readjust the zero potentiometers to establish a zero meter reading as in A.3 above.

C. Oxygen Zero Adjustment

The following steps should be carried out with OXY-PPM/LEL switch on OXY (in) position. To check and adjust zero on a known oxygen-free sample:

1. While instrument case is open, identify ZERO potentiometer, which is located on oxygen (upper) circuit board and which can be reached through the rearmost of the two clearance holes in the main circuit board.

2. Allow instrument to sample a known oxygen-free sample, such as nitrogen, argon, or helium.

3. Watch meter carefully. If reading does not go exactly to zero, adjust it by turning ZERO potentiometer. Counterclockwise rotation will decrease reading.

4. If zero adjustment cannot be made, have oxygen cell reactivated.

5. After zero adjustment has been completed, return hose inlet to normal atmospheric air. Readjust OXY CAL control as necessary to bring meter reading to 21.

6. If reading cannot be set high enough, have oxygen cell reactivated.

D. Oxygen Alarm Threshold

The reading at which the oxygen alarm is actuated can be set by use of the ALARM Threshold potentiometer.

To Set:

1. Turn OXY CAL to bring meter to desired alarm setting.

2. Locate oxygen alarm threshold potentiometer, on oxygen circuit board, which is accessible through the hole adjacent to the LEL Alarm adjustment.

3. Turn ALARM Threshold potentiometer to the point where alarm just operates. Clockwise rotation will raise alarm setting. Verify setting by turning OXY CAL control to bring meter into and out of alarm zone.

4. When the oxygen Alarm Threshold has been satisfactorily set, readjust the OXY CAL potentiometer to bring the meter reading to 21% (O_2 CAL).

E. Oxygen High Alarm (25%)

This alarm point is factory set and generally need not be changed. It can be readjusted to some other level, by trial, but this can only be done when the main board is loosened and pulled aside (see Section VI.D. steps 1-6). The high alarm potentiometer is the one closest to the rear, without an access hole.

VI. MAINTENANCE

A. Batteries

1. Check battery voltage periodically by pressing BATTERY CHECK switch. Recharge before voltage reaches minimum.

   When connecting charger, always follow these steps:

   a) Confirm that the plug is inserted in the correct way, with the THIS SIDE UP label upwards. The socket is polarized, with the pins offset below the centerline, but can sometimes be forced on the wrong way, particularly if it has become worn with use.

   b) Verify that a charge is actually entering battery. To do this, turn instrument on and check meter reading while BATTERY CHECK button is pressed. Observe reading while charger is plugged and unplugged at wall socket. If reading increases when charger is connected, and decreases when unplugged, battery is receiving a charge. If no change is observed, then probably charger or power circuit is at fault. If charger is defective, return it for repair or replacement.

      After verifying that instrument is accepting a charge, turn instrument switch off. Do not attempt to charge while instrument is turned on.

2. If sufficient voltage cannot be obtained after charging, open instrument and:

   a) Check voltage output with a voltmeter, between red and black wires (unplug connector to gain access to pins). Voltage should be about 8.5 volts.

      If voltage is acceptable, but volt check reading is too low, meter or switch could be at fault. If voltage is too low, battery is at fault.

   b) If no output voltage can be obtained, check fuse by unscrewing recessed cap, marked "FUSE", and removing fuse. It can be checked visually or with an ohmmeter. If burned out, replace with a new one, but be sure to attempt to identify the cause of the overload or short circuit. Fuse must be type 3AG-1A.

   c) If battery voltage is too low, and cannot be brought up by overnight charging, it probably needs replacement. To remove, take out the two screws holding it to bottom of case, and unplug black and orange wire connector at charging end.

B. Combustibles Detector

1. Sensor assembly may require replacement if:

   a) Meter cannot be set to zero within range of ZERO potentiometer. (Including COARSE ZERO)

   b) Meter cannot be set to desired level within range of SPAN Adjust, either range.

2. To replace detector:

   a) Open instrument case.

   b) Loosen and remove the red, green and white wires at terminals on main circuit board, noting color coding.

   c) Unscrew knurled retaining cap at reaction chamber.

   d) Pull out original detector and install new one, being sure that O-ring is in place, under flange of detector.

   e) Connect wires to terminals, turn power on, and adjust COARSE ZERO as in Section V.A.3.

C. Oxygen Detector

1. Oxygen sensor assembly may require repair if:

   a) Meter cannot be set to desired level within range of OXY CAL Adjust.

   b) Meter cannot be set to zero within range of ZERO potentiometer.

2. If oxygen sensor assembly requires repair, it should be sent to factory for reactivation. Alternatively, a complete new detector can be ordered, on an exchange basis.

   Oxygen cell is an electrochemical device similar to a battery, which gradually depletes itself, regardless of usage of the cell. It requires periodic reactivation, consisting of replacement of the electrolyte and the membrane, plus cleaning and inspection of the electrodes. This is most economically done at the factory.

   New and reactivated oxygen cells carry a factory guarantee based on length of time from date of original shipment, and are date-coded. Cells returned for reactivation are inspected and in-warranty cells are tested for operability. Any that fail prematurely receive a warranty allowance.

To replace oxygen sensor:

   a) Open instrument case. Locate oxygen cell.

   b) Swing retainer clamp clockwise and remove it to release cell.

   c) Tilt cell upward and pull it out of case. Unplug cell wire at socket.

   d) Reinstall new or newly reactivated cell in same position. Before installing, remove protective seal from face of cell, and shake out any drops of water that may be found under seal.

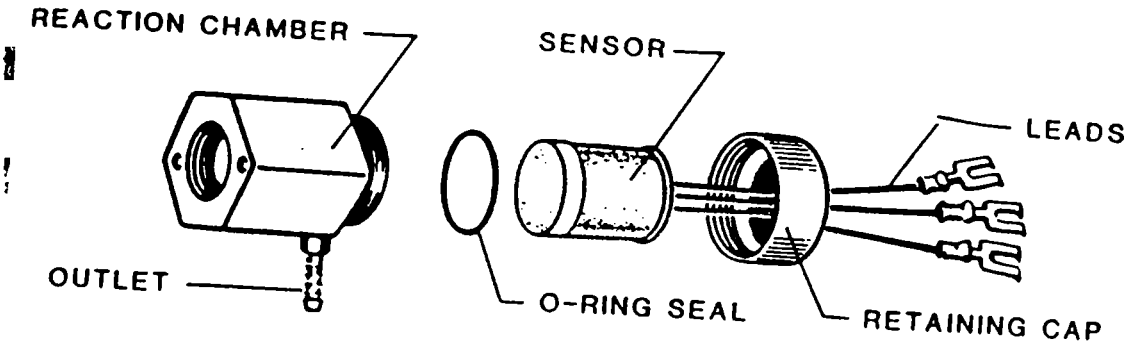


FIGURE 12. COMBUSTIBLES DETECTOR

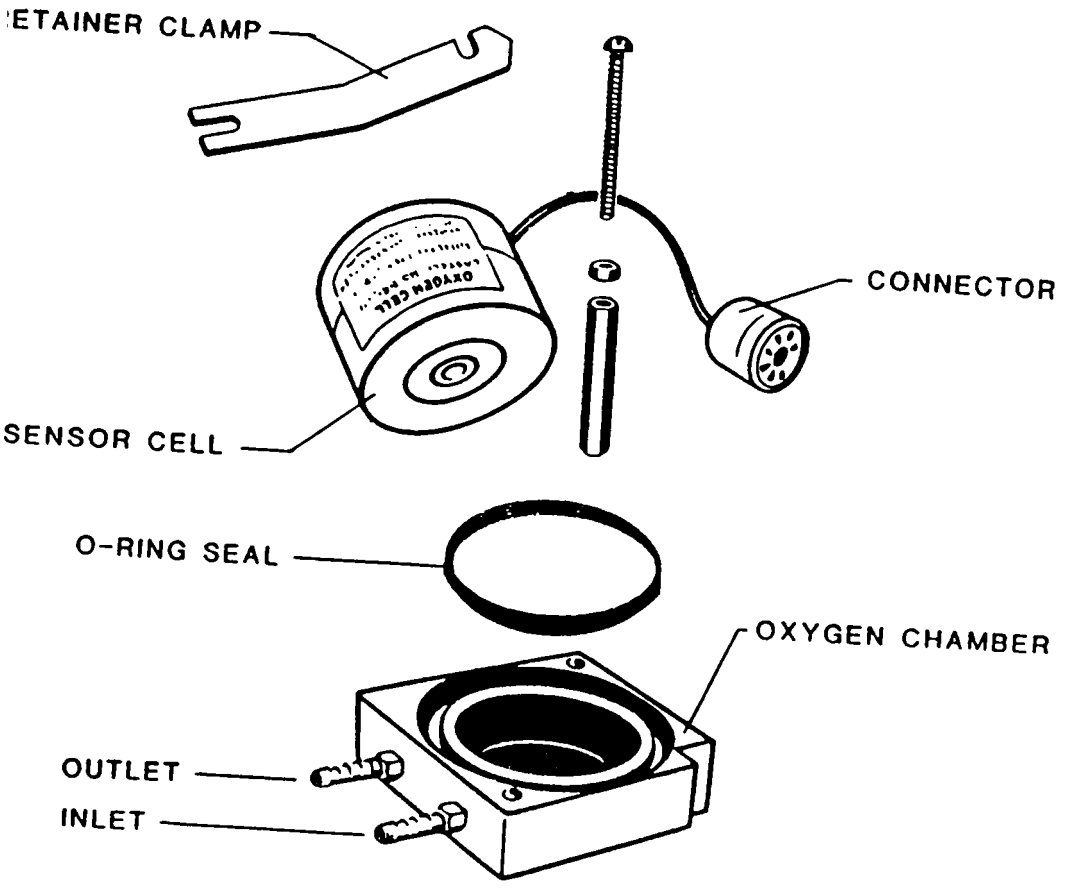


FIGURE 13. OXYGEN DETECTOR

D. Meter

If meter is damaged, it can be removed for repairs or replacement, as follows:

1. With upper half of instrument removed from lower half and inverted, loosen internal lock nuts from POWER and BATTERY CHECK switch bushings and PPM/LEL ZERO potentiometer bushing.

2. Remove external lock nut from PPM/LEL ZERO potentiometer. (First remove knob, if one is used.)

3. Remove external face nuts from switch bushings.

4. Remove three screws holding circuit board into case.

5. Remove two nuts from meter studs.

6. Pull circuit board out of case as far as connecting wires permit.

7. Lift out meter.

E. Buzzer

If buzzer fails, it can be removed by first taking out circuit board (Steps D.1-D.6) and unsoldering red and black wires at board. Then remove retaining screws and nuts.

Note: Before removal, first verify that buzzer is actually defective. Connect to a 6 volt battery (Red +, Black -). A good buzzer will give a steady tone.

F. Circuit Board

Main circuit board can be removed by steps D.1-D.6, plus E, plus disconnection of pump and detector wires at terminals. This allows the board to be pulled out of the case and put aside for access to the oxygen circuit board. However, it will remain connected to the oxygen board until the interconnecting wires are unsoldered.

Preferably, both boards will be removed as a unit, and returned to factory for repairs. To complete removal, loosen internal lock nuts, remove external lock nuts from remaining controls, and take off the hex plastic spacers which hold oxygen board in place.

G. Filter

The filter element in inlet fitting is pressed in but can be pushed out and replaced. When necessary, the complete fitting can be replaced.

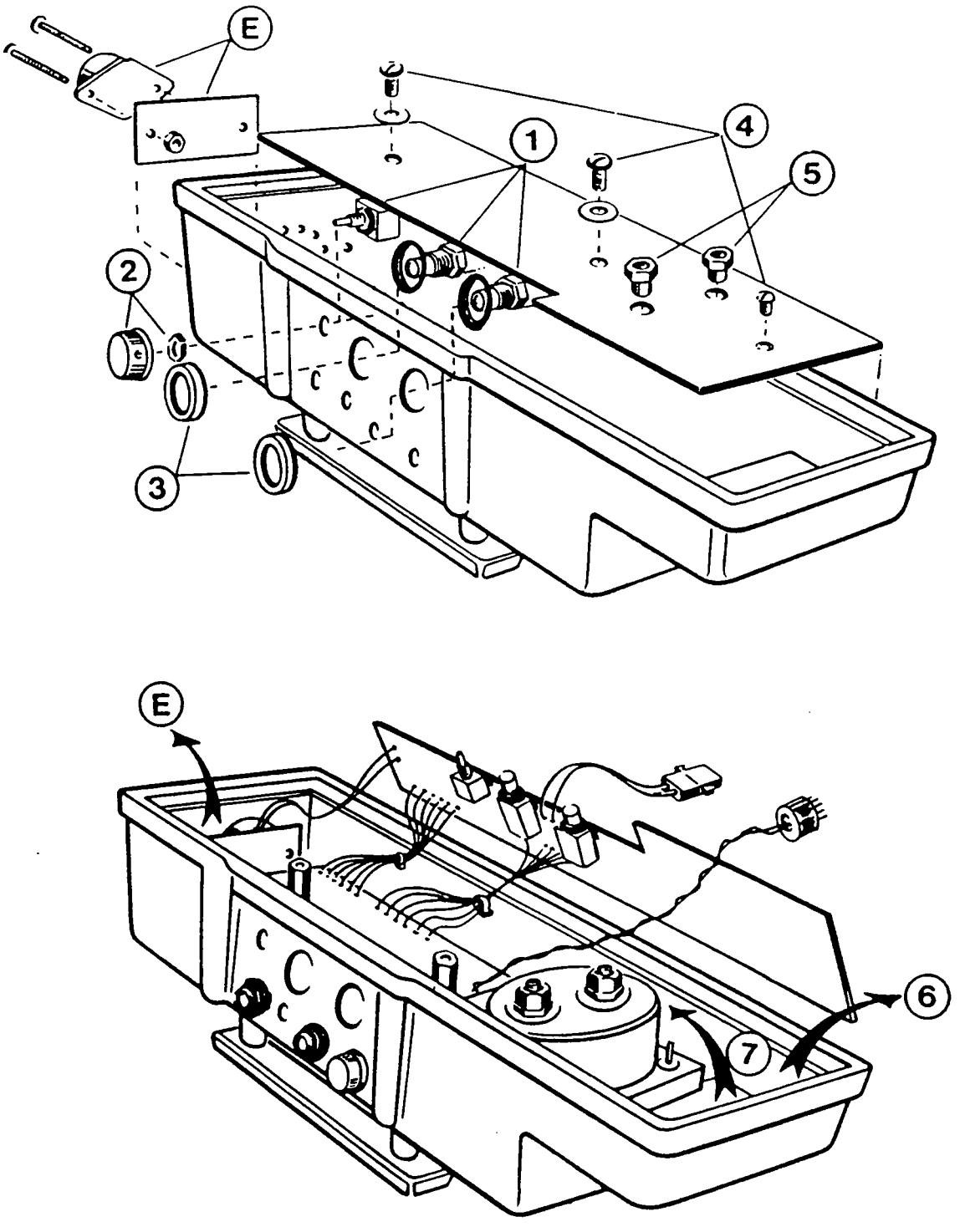


FIGURE 14. METER, BUZZER AND CIRCUIT BOARD REMOVAL / REPLACEMENT

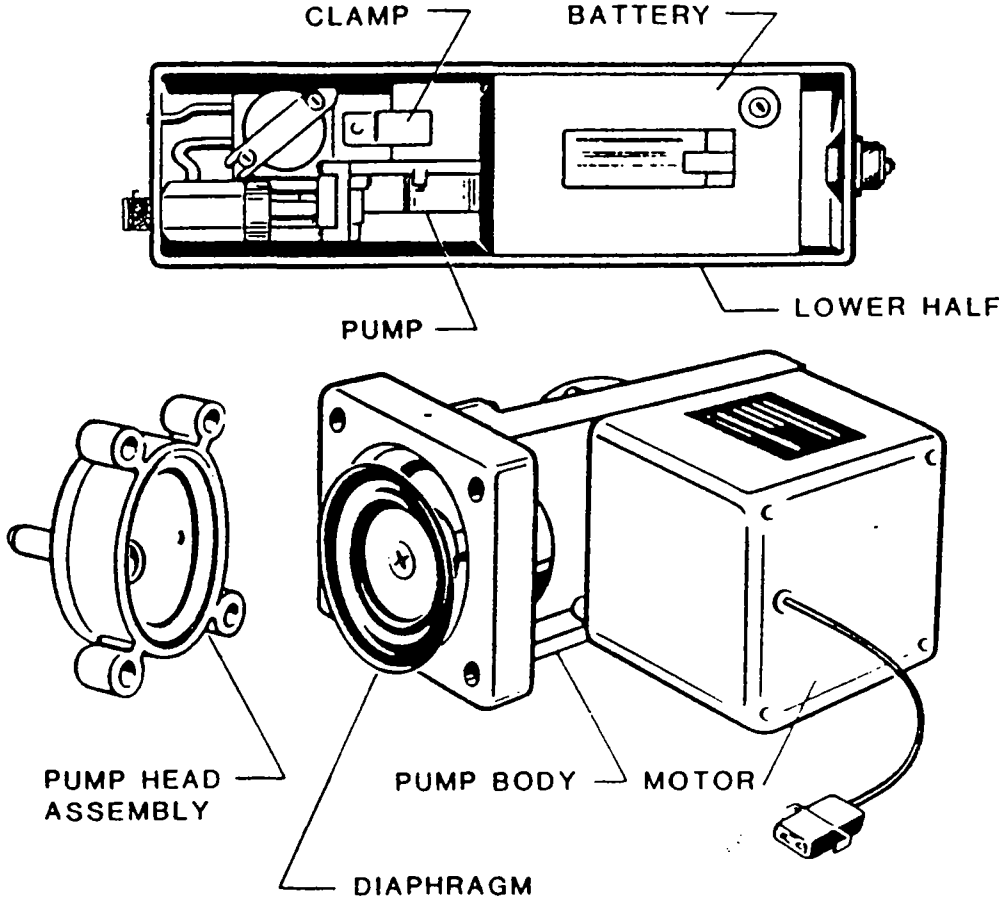


FIGURE 15. PUMP ASSEMBLY FOR MODEL 1314

APPENDIX II
SECTION C

AEROSOL MONITOR

Recycled Paper

INSTRUCTIONS
FOR
HAZ-DUST™
10μm Particulate Monitor

Calibration Adjust

The calibration adjustment screw (Cal) should only be adjusted when the user wants to change the slope of the calibration curve to match an aerosol whose composition differs for the factory specifications. Please consult factory before adjusting.

Battery Pack

To replace battery pack remove the four screws that hold the battery cover in place. Disconnect the nylon connector and replace battery pack. NiCd batteries have a variable life time which can range from 500-1000 hours. Batteries need to be replaced when they do not hold a charge for 8 hours. To check if batteries need charging depress "Bat " on power switch and then LED located on side of unit will be off signifying the user to charge the batteries.

When charging batteries leave charger connected for 10-12 hours. Unit may be run on charger indefinitely.

MAINTENANCE

Maintenance on the unit is minimal. Replacement of the battery pack and cleaning of the sensing chamber are the must frequent procedures that must be performed.

Cleaning the instrument sensing chamber depends on the length of time and the concentration of dust the unit has been exposed too. In general, if monitoring a concentration of 1 mg/m^3 for a period 8 hours, cleaning should be performed every 24 hours. It is always recommended to check the zero reading after cleaning.

Procedures for cleaning

1. Remove optical light trap that is held in place by screws located on the reverse side of the unit.

2. Observe optical block. Using the dust free air, blow off any residue dust inside the optical light trap and on the optical block.

3. Clean windows with cotton swab rinsed in cleaning solution and allow to air dry.

4. Replace optical light trap.

5. Re-zero Unit (see Zeroing instructions)

CERTIFICATE OF CALIBRATION

Enviromental Devices Corporation certifies the ***HAZ-DUST*** particulate monitor is calibrated against the specifications and protocol set forth in *NIOSH method #600* using a represenative test dust standard whose size distribution is listed below:

Fine Test Dust Specifications:

Micrometers (um)	Precentage (%)
0-5	39+/-2
5-10	18+/-3
10-20	16+/-3
20-40	18+/-3
40-80	9+/-3

This product is certfied to perform within published specifications.

Technician SP Model Number HD-1000 Serial Number 69364

APPENDIX II
SECTION D

RADIATION METER

Recycled Paper

Bicron micro rem dose rate meter

Daily Pre-operation Check

1. If batteries are installed, turn the control switch to the "bat." position. The meter should read in the black band marked "bat. ok". If it doesn't, or batteries have not yet been installed, go to step 2. If ok, continue with step 3.

2. Replace or install two 9-volt MN 1604 or equivalent batteries as follows:

   a. Turn instrument off.

   b. Open pull catches at ends of the case and separate the case bottom from the top.

   c. Install batteries in clips on the bottom circuit board. Be sure to observe proper polarity. One battery will power the instrument, but at reduced battery life.

   d. Replace bottom part of the case, orienting the rubber pad under the battery; close the catches. Repeat step 1.

3. Turn the control switch to the "HV" position. The meter should indicate in the "HV ok" checkband.

4. Using a gamma check source (1μCi Cs-137), place the source on the front ⊕ symbol with the instrument in the x10 range. The instrument should deflect to a 100 μrem/hr reading (approximate). If the instrument does not deflect with a source on the front monitoring point, check and adjust the control switch to a smaller scale multiplier. If there is still no deflection of the meter on any scale, the meter is inoperable - **DO NOT USE.**

APPENDIX III

Recycled Paper

HERITAGE ENVIRONMENTAL SERVICES, INC.
LEMONT, IL

LIST OF MATERIALS PERMITTED FOR STORAGE AND/OR TREATMENT

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
CHARACTERISTICALLY HAZARDOUS MATERIALS (IGNITABLE, CORROSIVE, REACTIVE OR HEAVY METAL-BEARING):					
D001	SOLID & LIQUID IGNITABLE INDUSTRIAL WASTES	D1,D2,D3,T1	IGNITABILITY	1000	300
D002	SOLID & LIQUID CORROSIVE INDUSTRIAL WASTES (ACIDS & CAUSTICS)	D1,D2,D3,T1	CORROSIVITY	400	100
D003	SOLID & LIQUID REACTIVE INDUSTRIAL WASTES (CYANIDE/SULFIDE-BEARING, OXIDIZERS)	D1,D2,D3	REACTIVITY	10	1
D004	ARSENIC-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D005	BARIUM-CONTAINING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D006	CADMIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D007	CHROMIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D008	LEAD-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D009	MERCURY-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D010	SELENIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D011	SILVER-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D018	BENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D019	CARBON TETRACHLORIDE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D020	CHLORDANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D021	CHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D022	CHLOROFORM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D023	O-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D024	m-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D025	p-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D026	CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
D027	1,4-DICHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D028	1,2-DICHLOROETHANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D029	1,1-DICHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D030	2,4-DINITROTOLUENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D031	HEPTACHLOR (and its hydroxide)-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D032	HEXACHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D033	HEXACHLOROBUTADIENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D034	HEXACHLOROETHANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D035	METHYL ETHYL KETONE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D036	NITROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D037	PENTACHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D038	PYRIDINE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D039	TETRACHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D040	TRICHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D041	2,4,5-TRICHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D042	2,4,6-TRICHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D043	VINYL CHLORIDE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
HAZARDOUS WASTE FROM NON-SPECIFIC SOURCES: (Hazardous Constituents Included w/Materials Description)					
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE, AND CHLORINATED FLUOROCARBONS	D1,D2,D3,T1	TOXIC	1000	300
F002	SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,1,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE AND 1,1,2-TRICHLOROETHANE	D1,D2,D3,T1	TOXIC	1000	300

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
F003	SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYLCOHEXANONE, AND METHANOL	D1,D2,D3,T1	TOXIC, IGNITABLE	1000	300
F004	SPENT NON-HALOGENATED SOLVENTS: CRESOLS AND CRESYLIC ACID, AND NITROBENZENE	D1,D2,D3,T1	TOXIC	1000	300
F005	SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL AND 2-NITROPROPANE	D1,D2,D3,T1	TOXIC	1000	300
F006	WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS (Camium, Hexavalent Chromium, Nickel, Complexed Cyanides)	D1,D2,D3,T1	TOXIC	100	20
F007	SPENT CYANIDE PLATING BATH SOLUTIONS FROM ELECTROPLATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F008	PLATING BATH RESIDUES FROM ELECTROPLATING OPERATIONS WHERE CYANIDES ARE USED (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F009	SPENT STRIPPING AND CLEANING BATH CYANIDE SOLUTIONS FROM ELECTROPLATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F010	QUENCHING BATH CYANIDE RESIDUES FROM OIL BATHS FROM METAL HEAT TREATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F011	SPENT CYANIDE SOLUTIONS FROM SALT BATH POT CLEANING FROM METAL HEAT TREATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F012	QUENCHING WASTEWATER TREATMENT CYANIDE SLUDGES FROM METAL HEAT TREATING OPERATIONS (Cyanide Complexes)	D1,D2,D3,T1	TOXIC	100	20
F019	WASTEWATER TREATMENT SLUDGES FROM THE CHEMICAL CONVERSION COATING OF ALUMINUM (Hexavalent Chromium, Complexed Cyanides)	D1,D2,D3,T1	TOXIC	100	20
HAZARDOUS WASTES FROM SPECIFIC SOURCES: (Hazardous Constituents included w/Materials Description)					
K002	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME YELLOW AND ORANGE PIGMENTS (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5
K003	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF MOLYBDATE ORANGE PIGMENTS (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K004	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF ZINC YELLOW PIGMENTS (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K005	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5
K006	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS, ANHYDROUS AND HYDRATED (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K007	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF IRON BLUE PIGMENTS (Complexed Cyanides, Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K008	OVEN RESIDUE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K022	DISTILLATION BOTTOM TARS FROM THE PRODUCTION OF PHENOL/ACETONE FROM CUMENE (Phenol, Tars/Polycyclic Aromatic Hydrocarbons)	D1,D2,D3,T1	TOXIC	100	5
K023	DISTILLATION LIGHT ENDS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE (Phthalic Anydride, Maleic Anydride)	D1,D2,D3,T1	TOXIC	100	5
K024	DISTILLATION BOTTOMS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride, 1,4-Napthoquinone)	D1,D2,D3,T1	TOXIC	100	5
K025	DISTILLATION BOTTOMS FROM THE PRODUCTION OF NITROBENZENE BY THE NITRATION OF BENZENE (m-Dinitrobenzene, 2,4-Dinitrotoluene)	D1,D2,D3,T1	TOXIC	100	5
K029	WASTE FROM THE PRODUCT STEAM STRIPPER IN THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,2-Dichloroethane, 1,1,1-Trichloroethane, Vinyl Chloride, Vinylidene Chloride, Chloroform)	D1,D2,D3,T1	TOXIC	100	5
K032	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHLORDANE (Hexachloropentadiene)	D1,D2,D3,T1	TOXIC	100	5
K035	WASTEWATER TREATMENT SLUDGES GENERATED IN THE PRODUCTION OF CREOSOTE (Creosote, Chrysene, Naphthalene, Fluoranthene, Benzo(a)pyrene, Indeno (1,2,3-cd) pyrene, Benzo(a)anthracene, Dibenzo(a)anthracene, Acenapthalene)	D1,D2,D3,T1	TOXIC	100	5
K041	WASTEWATER TREATMENT SLUDGES FROM THE PRODUCTION OF TOXAPHENE (Toxaphene)	D1,D2,D3,T1	TOXIC	100	5
K046	WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING , FORMULATION AND LOADING OF LEAD-BASED INITIATING COMPOUNDS (Lead)	D1,D2,D3,T1	TOXIC	100	5

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K048	DISSOLVED AIR FLOATATION FLOAT FROM THE PETROLEUM REFINING INDUSTRY (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20
K049	SLOP OIL EMULSION SOLIDS FROM THE PETROLEUM REFINING INDUSTRY (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20
K050	HEAT EXCHANGER BUNDLE CLEANING SLUDGE FROM THE PETROLEUM REFINING INDUSTRY (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	20
K051	API SEPARATOR SLUDGE FROM THE PETROLEUM REFINING INDUSTRY (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20
K052	LEADED TANK BOTTOMS FROM THE PETROLEUM REFINING INDUSTRY	D1,D2,D3,T1	TOXIC	100	20
K060	AMMONIA STILL LIME SLUDGE FROM COKING OPERATIONS (Cyanide, Napthalene, Phenolic Compounds, Arsenic)	D1,D2,D3,T1	TOXIC	100	1
K061	EMISSION CONTROL DUST/SLUDGE FROM THE PRIMARY PRODUCTION OF STEEL IN ELECTRIC ARC FURNACES (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	1000	100
K062	SPENT PICKLE LIQUOR GENERATED BY STEEL FINISHING OPERATIONS WITHIN THE IRON AND STEEL INDUSTRY (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC, CORROSIVE	1000	100
K069	EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	100	1
K071	BRINE PURIFICATION MUDS FROM THE MERCURY CELL PROCESS IN CHLORINE PRODUCTION (Mercury)	D1,D2,D3,T1	TOXIC	100	1
K083	DISTILLATION BOTTOMS FROM ANILINE PRODUCTION (Aniline, diphenylamine, Nitrobenzene, Phenylenediamine)	D1,D2,D3,T1	TOXIC	100	1
K084	WASTEWATER TRMT. SLUDGES GENERATED DURING THE PRODUCTION OF VETERINARY PHARMACEUTICAL FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS	D1,D2,D3,T1	TOXIC	100	1
K086	SOLVENT, CAUSTIC OR WATER WASHES AND SLUDGES FROM CLEANING EQUIPMENT USED IN THE FORMULATION OF INK FROM PIGMENTS , DRIERS, SOAPS & STABILIZERS CONTAINING CHROMIUM & LEAD (Lead, Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	1
K087	DECANTER TANK TAR SLUDGE FROM COKING OPERATIONS (Phenol, Naphthalene)	D1,D2,D3,T1	TOXIC	100	1
K093	DISTILLATION LIGHT ENDS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride, Maleic Anhydride)	D1,D2,D3,T1	TOXIC	100	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K094	DISTILLATION BOTTOMS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride)	D1,D2,D3,T1	TOXIC	100	1
K095	DISTILLATION BOTTOMS FROM THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,1,2-Trichloroethane, 1,1,1,2-Tetrachloroethane, 1,1,2,2-Tetrachloroethane)	D1,D2,D3,T1	TOXIC	100	1
K096	HEAVY ENDS FROM THE HEAVY ENDS COLUMN FROM THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,2-Dichloroethane, 1,1,1-Trichloroethane, 1,1,2- Trichloroethane)	D1,D2,D3,T1	TOXIC	100	1
K099	UNTREATED WASTEWATER FROM THE PRODUCTION OF 2,4-D (2,4-Dichlorophenol, 2,4,6-Trichlorophenol)	D1,D2,D3,T1	TOXIC	100	1
K100	WASTE LEACHING SOLUTION FROM ACID LEACHING OF EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	100	1
K104	COMBINED WASTEWATER STREAMS GENERATED FROM NITROBENZENE/ANILINE PRODUCTION (Aniline, Benzene, Diphenylamine, Nitrobenzene, Phenylenediamine)	D1,D2,D3,T1	TOXIC	100	1
K106	WASTEWATER TREATMENT SLUDGES FROM THE MERCURY CELL PROCESS IN CHLORINE PRODUCTION (Mercury)	D1,D2,D3,T1	TOXIC	100	1
COMMERCIAL CHEMICAL PRODUCTS & CHEMICAL MFG. INTERMEDIATES (INCL. OFF-SPEC. MATERIALS): (DOT HAZARD CLASS INCLUDED IN MATERIALS DESCRIPTION*)					
P003	ACROLEIN (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P004	ALDRIN (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P005	ALLYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P008	4-AMINOPYRIDINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P009	AMMONIUM PICRATE (FLAMMABLE SOLID)	D1,D2,D3	REACTIVE	1	100 LBS.
P010	ARSENIC ACID (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P011	ARSENIC (V) OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P012	ARSENIC (VII) OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P013	BARIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P014	THIOPHENOL (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P015	BERYLLIUM DUST (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P021	CALCIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P022	CARBON DISULFIDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P023	CHLOROACETALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P024	P-CHLOROANILINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P028	BENZYL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P029	COPPER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P030	SOLUBLE CYANIDE SALTS, N.O.S. (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P031	CYANOGEN (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P033	CYANOGEN CHLORIDE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P037	DIELDRIN (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P039	DISULFOTON (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P040	0,0-DIETHYL-0-PRYAZINLY-PHOSPHOROTHIOATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P041	DIETHYL-P-NITROPHENYL PHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P042	EPINEPHRIN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P043	DIISPROPYLFLUOROPHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P048	2,4-DINITROPHENOL (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P050	ENDOSULFAN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P051	ENDRIN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P058	FLUOROACETIC ACID, SODIUM SALT (CORROSIVE MATERIAL)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P062	TETRAPHOSPHORIC ACID, HEXAETHYL ESTER (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P063	HYDROCYANIC ACID < 5% (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P064	METHYL ISOCYANATE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P067	2-METHYLAZIRIDINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P068	METHYL HYDRAZINE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P069	METHYACRYLONITRILE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P070	ALDICARB (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P071	METHYL PARATHION (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P072	ALPHA-NAPHTHYLTHIOUREA (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P074	NICKEL CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P075	NICOTINE & SALTS (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P076	NITRIC OXIDE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P077	P-NITROANILINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P078	NITROGEN OXIDES (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P081	SPIRITS OF NITROGLYCERINE < 10% (FLAMMABLE LIQUID)	D1,D2,D3	REACTIVE	1	100 LBS.
P082	N-NITROSODIMETHYLAMINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P087	OSMIUM TETRAOXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P089	PARATHION (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P092	PHENYLMERCURIC ACETATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P093	N-PHENYLTHIOUREA (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P094	PHORATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P095	PHOSGENE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P097	FAMPHUR (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P098	POTASSIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P099	POTASSIUM SILVER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P101	PROPANENITRILE (FLAMMABLE LIQUID)	D1,D2,D32	ACUTE TOXICITY	1	100 LBS.
P102	PROPARGYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P104	SILVER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P105	SODIUM AZIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P106	SODIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P107	STRONTIUM SULFIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P108	STRYCHNINE & SALTS (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P110	TETRAETHYL LEAD (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P111	TETRAETHYL PYROPHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P112	TETRANITROMETHANE (OXIDIZER)	D1,D2,D3	REACTIVE	1	100 LBS.
P113	THALLIC OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P114	THALLIUM SELENITE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P115	THALLIUM SULFATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P118	TRICHLOROMETHANETHIOL (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P119	AMMONIUM VANADATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P120	VANADIUM OXIDE (ORM-E)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P121	ZINC CYANIDE (POISON B	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P122	ZINC PHOSPHIDE >10% (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P123	TOXAPHENE (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
U001	ACETALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	1	100 LBS.
U002	ACETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	1
U003	ACETONITRILE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	10	1
U004	ACETOPHENONE (ORM-E)	D1,D2,D3	TOXIC	10	1
U005	0-ACETYLAMINOFLUORENE (POISON B)	D1,D2,D3	TOXIC	10	1
U006	ACETYL CHLORIDE (FLAMMABLE LIQUID OR GAS)	D1,D2,D3	CORROSIVE, REACTIVE, TOXIC	10	1
U007	ACRYLAMIDE (ORM-E)	D1,D2,D3	TOXIC	10	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U008	ACRYLIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	IGNITABLE	10	1
U009	ACRYLONITRILE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	10	1
U010	PORFIROMYCIN (ORM-E)	D1,D2,D3	TOXIC	10	1
U011	AMITROLE (POISON B)	D1,D2,D3	TOXIC	10	1
U012	ANILINE (POISON B)	D1,D2,D3	TOXIC	10	1
U014	AURAMINE (POISON B)	D1,D2,D3	TOXIC	10	1
U015	AZASERINE (POISON B)	D1,D2,D3	TOXIC	10	1
U017	BENZAL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U018	BENZ[A]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U019	BENZENE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U020	BENZENESULFONYL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U021	BENZIDINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U022	BENZOPYRENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U023	BENZOTRICHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U024	BIS(2-CHLOROETHOXY) METHANE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U025	DICHLOROETHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U027	BIS(2-CHLOROISOPROPYL) ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U028	BIS-(2-ETHYLHEXYL) PHTHALATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U030	BENZENE, 1-BROMO-4-PHENOXY (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U031	N-BUTYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	100	1
U032	CALCIUM CHROMATE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U034	CHLORAL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U035	CHLORAMBUCIL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U036	CHLORDANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U037	CHLOROBENZENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U038	ETHYL-4-4-DICHLOROBENZILATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U039	4-CHLORO-M-CRESOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U041	EPICHLOROHYDRIN (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U043	VINYL CHLORIDE (FLAMMABLE GAS)	D1,D2,D3	TOXIC	1	100 LBS.
U044	CHLOROFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U046	CHLOROMETHYL METHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U047	2-CHLORONAPHTHALENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U048	2-CHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U049	2-CHLORO-0-TOLUIDINE HYDROCHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U050	CHRYSENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U051	CREOSOTE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U052	CREOSOLS (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U053	CROTONALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U055	CUMENE (FLAMMABLE LIQUID, POISON B)	D1,D2,D3	IGNITABLE	1	100 LBS.
U056	CYCLOHEXANE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U057	CYCLOHEXANONE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U060	DDD (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U061	DDT (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U063	DIBENZ[A,H]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U064	DIBENZOPYRENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U067	ETHYLENE DIBROMIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U069	DIBUTYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U070	0-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U071	M-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U072	1,4-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U076	1,1-DICHLOROETHANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U077	ETHYLENE DICHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U078	1,1-DICHLOROETHYLENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U079	1,2-TRANS-DICHLOROETHYLENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U080	METHYLENE CHLORIDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U081	2,4-DICHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U082	2,6-DICHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U083	1,2-DICHLOROPROPANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U084	1,3-DICHLOROPROPENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U085	1,2:3,4-DIEPOXYBUTANE (CORROSIVE MATERIAL/FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U086	N,N-DIETHYLHYDRAZINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U087	0,0-DIETHYL-S-METHYL-DITHIOPHOSPHATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U088	DIETHYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U089	DIETHYLSTIBESTROL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U090	DIHYDROSAFROLE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U092	DIMETHYLAMINE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U093	DIMETHYLAMINOAZOBENZENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U094	7,12-DIMETHYLBENZ[A]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U096	DIMETHYLBENZYL HYDROPEROXIDE (ORGANIC PEROXIDE)	D1,D2,D3	REACTIVE	1	100 LBS.
U101	2,4-DIMETHYLPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U102	DIMETHYLPHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U103	DIMETHYL SULFATE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U105	2,4-DINITROTOLUENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U106	2,6-DINITROTOLUENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U107	DI-N-OCTYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U108	1,4-DIOXANE (FLAMMABLE LIQUIDS)	D1,D2,D3	TOXIC	1	100 LBS.
U112	ETHYL ACETATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U113	ETHYL ACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U117	ETHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U118	ETHYLMETHACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U120	FLUORANTHENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U121	TRICHLORO-MONOFLUORO-METHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U122	FORMALDEHYDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U123	FORMIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U124	FURAN (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U125	FURFURAL (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U127	HEXACHLOROBENZENE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U128	HEXACHLOROBUTADIENE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U129	LINDANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U130	HEXACHLOROCYCLOPENTADIENE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U131	HEXACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U133	HYDRAZINE (CORROSIVE MATERIAL)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U134	HYDROFLUORIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U135	HYDROGEN SULFIDE (FLAMMABLE GAS)	D1,D2,D3	TOXIC	1	100 LBS.
U136	CACODYLIC ACID (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U138	METHYL IODIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U140	ISOBUTYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	100	1
U151	MERCURY, METALLIC (ORM-B)	D1,D2,D3	TOXIC	100	1
U154	METHANOL (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	20
U157	3-METHYCHOLANTHRENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U158	4,4'-METHYLENE-BIS(-2-CHLOROANILINE) (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U159	METHYL ETHYL KETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	100	20
U160	METHYL ETHYL KETONE PEROXIDE (ORGANIC PEROXIDE)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.
U161	METHYL ISOBUTYL KETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	1
U162	METHYL METHACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U165	NAPHTHALENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U168	2-NAPHTHYLAMINE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U169	NITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U170	NITROPHENOLS (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U171	2-NITROPROPANE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U181	5-NITRO-O-TOLUIDINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U182	PARALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U183	PENTACHLOROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U185	PENTACHLORONITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U187	PHENACETIN (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U188	PHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U190	PHTHALIC ANHYDRIDE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U196	PYRIDINE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U197	P-BENZOQUINONE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U200	RESERPINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U201	RESORCINOL (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U202	SACCHARIN AND SALTS (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U203	SAFROLE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U204	SELENIOUS ACID (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U205	SELENIUM DISULFIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U207	1,2,4,5-TETRACHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U208	1,1,1,2-TETRACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U209	1,1,2,2-TETRACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U210	TETRACHLOROETHYLENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U211	CARBON TETRACHLORIDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U213	TETRAHYDROFURAN (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U214	THALLIUM ACETATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U215	THALLIUM CARBONATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U216	THALLIUM CHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U217	THALLIUM NITRATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U219	THIOUREA (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U220	TOLUENE (FLAMMABLE LIQUID)	D1,D2,D3,T1	TOXIC	100	20

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U221	TOLUENEDIAMINE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U222	O-TOLUIDINE HYDROCHLORIDE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U223	TOLUENEDIISOCYANATE (POISON B)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.
U225	BROMOFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U226	METHYLCHLOROFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U227	1,1,2-TRICHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U228	TRICHLOROETHYLENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U234	SYM-TRINITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U236	TRYPAN BLUE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U238	ETHYL CARBAMATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U239	XYLENE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	20
U240	2,4-D (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U246	CYANOGEN BROMIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U247	METHOXYCHLOR (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U249	ZINC PHOSPHIDE < 10% (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U328	O-TOLUIDINE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U353	P-TOLUIDINE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U359	ETHYLENE GLYCOL MONOETHYL ETHER (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	10	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.

DEFINITIONS OF HAZARDOUS CHARACTERISTICS AND HAZARD CLASSES:

RCRA (HAZARDOUS WASTE, 40CFR) DEFINITIONS:

IGNITABLE:	LIQUID MATERIALS W/FLASHPOINT < 140 DEGREES F; SOLIDS CAPABLE OF IGNITING AND VIGOUROUSLY BURNING THROUGH FRICTION, ABSORPTION OF MOISTURE OR SPONTANEOUS CHEMICAL CHANGE; AND OXIDIZERS UNDER DOT DEFINITIONS
CORROSIVE:	AQUEOUS SOLUTIONS OF MATERIALS W/ pH LESS THAN 2.0 OR GREATER THAN 12.5; OR LIQUIDS THAT CORRODES STEEL AT A RATE GREATER THAN 0.250 IN./YR.
REACTIVE:	MATERIALS THAT ARE UNSTABLE, REACTS VIOLENTLY W/WATER, FORMS POTENTIALLY EXPLOSIVE MIXTURES W/WATER, FORMS TOXIC GASES, VAPORS OR FUMES WHEN MIXED W/WATER; CYANIDE OR SULFIDE BEARING CAPABLE OF FORMING TOXIC GASES, VAPORS OR FUMES WHEN SUBJECT TO pH CONDITIONS BETWEEN 2 AND 12
EP TOXIC:	MATERIALS CAPABLE OF LEACHING HEAVY METALS AT CONCENTRATIONS GREATER THAN THOSE PRESCRIBED BY THE EPA WHEN SUBJECTED TO EXTRACTION PROCEDURE TESTING

DOT HAZARD CLASSES (49 CFR):

FLAMMABLE LIQUIDS:	MATERIALS W/FLASHPOINT < 100 DEGREES F
COMBUSTIBLE LIQUIDS:	MATERIALS W/ 100 DEGREES F < FLASHPOINT < 200 DEGREES F
FLAMMABLE SOLIDS:	MATERIALS POSING A FIRE HAZARD DUE TO FRICTION, HEAT EXPOSURE, OR BURNS VIGOROUSLY WHEN IGNITED, INCLUDES SPONTANEOUS COMBUSTIBLE OR WATER REACTIVE MATERIALS
OXIDIZERS:	CHLORATES, PERMANGANATES, INORGANIC PEROXIDES, OR NITRATES THAT YIELD OXYGEN READILY TO STIMULATE THE COMBUSTION OF ORGANIC MATTER
ORGANIC PEROXIDES:	
CORROSIVE MATERIALS:	LIQUID OR SOLID THAT CAUSES VISIBLE DESTRUCTION OR IRREVERSIBLE ALTERATIONS IN HUMAN SKIN TISSUE AT THE SITE OF CONTACT; OR HAS A SEVERE CORROSION RATE ON STEEL
POISON A:	POISONOUS GASES OR LIQUIDS IN VERY SMALL AMOUNTS THAT WHEN MIXED WITH AIR ARE DANGEROUS TO LIFE
POISON B:	LIQUID & SOLID SUBSTANCES KNOWN TO BE TOXIC VIA INHALATION, DIGESTION OR SKIN ABSORPTION
ORM-A:	MATERIALS W/ANESTHETIC, IRRITATING, NOXIOUS, TOXIC OR OTHER PROPERTIES CAUSING ANNOYANCE OR DISCOMFORT
ORM-B:	MATERIALS CAPABLE OF CAUSING SIGNIFICANT DAMAGE OR LEAKAGE DURING TRANSPORTATION (OR STORAGE)
ORM-E:	HAZARDOUS WASTES OR HAZARDOUS SUBSTANCES NOT INCLUDED IN ANY OTHER HAZARD CLASS

[1] Storage Areas: D1=Drum Storage Building;
D2=Outdoor Drum Storage;
D3=Drum Storage - Trailer;
T1=Tank Farm

APPENDIX IV

STANDARD OPERATING PROCEDURES

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APPENDIX IV
SECTION A

General Personnel

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STANDARD OPERATING PROCEDURES

General Personnel

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated contaminated.

- Hands and face must be thoroughly washed upon leaving the work area.

- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.

- No facial hair which interferes with a satisfactory fit of the mask-to-face-seal is allowed on personnel required to wear respirators.

- Contact with contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate, discolored surfaces, kneel on ground, lean, sit, or place equipment on drums, containers, or the ground.

- Medicine and alcohol can potentiate the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel at hazardous waste operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Alcoholic beverage intake should be minimized or avoided.

- All personnel must be familiar with standard operating safety procedures and any additional instructions and information contained in the Site Safety Plan.

- All personnel must adhere to the information contained in the Site Safety Plan.

- Contact lenses cannot be worn when respirator protection is required or when the hazard of a splash exists.

- Personnel will be aware of symptoms for toxic chemicals on site and for heat or cold stress.

- Respirators shall be cleaned and disinfected after each day's use or more often if necessary.

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- Prior to donning, respirators will be inspected for worn or deteriorated parts. Emergency respirators or self-contained devices will be inspected at least once a month and after each use.

- The employee will be familiar with all sections of the established respirator program.

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APPENDIX IV
SECTION B

General Operations

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STANDARD OPERATING PROCEDURES

General Operations

- All personnel going on-site must be adequately trained and thoroughly briefed on anticipated hazards, equipment to be worn, safety practices to be followed, emergency procedures, and communications.

- Any required respiratory protective devices and clothing must be worn by all personnel going into areas designated for wearing protective equipment.

- Personnel on-site must use the buddy system when wearing respiratory protective equipment. As a minimum, a third person, suitably equipped as a safety backup, is required during extremely hazardous entries.

- Visual contact must be maintained between pairs on-site and safety personnel. Entry team members should remain close together to assist each other during emergencies.

- During continual operations, on-site workers act as safety backup to each other. Off-site personnel provide emergency assistance.

- Personnel should practice unfamiliar operations prior to doing the actual procedure.

- Entrance and exit locations must be designated and emergency escape routes delineated. Warning signals for site excavation must be established.

- Communications using radios, hand signals, or other means must be maintained between initial entry members at all times. Emergency communications should be prearranged in case of radio failure, necessity for evacuation of site, or other reasons.

- Wind indicators visible to all personnel should be strategically located throughout the site.

- Personnel and equipment in the contaminated area should be minimized, consistent with effective site operations.

- Work areas for various operational activities must be established.

- Procedures for leaving a contaminated area must be planned and implemented prior to going on-site. Work areas and decontamination procedures must be established based on expected site conditions.

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- Frequent and regular inspections of site operations will be conducted to insure compliance with the Site Safety Plan. If any changes in operation occur, the Site Safety Plan must be modified to reflect changes.

- All electrical equipment (power tools, extension cords, instruments, radios, etc.) shall conform to the section anticipated for OSHA 29 CFR 1926.400 Subpart K.

- Fire prevention protection (appropriate signs for flammable liquids, smoking areas, storage areas of combustible or flammable materials, etc.) shall be in accordance with OSHA 29 CFR 1926.150 Subpart F.

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APPENDIX IV
SECTION C

Heat Stress

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Heat Stress Prevention

Heat stress symptoms will be monitored closely and a work/rest regime will be developed on a daily basis by the Site Health and Safety Officer. The work/rest schedule will be dependent on weather conditions encountered. Physiological monitoring of deep body temperature and body water loss will not be feasible. Heart rate monitoring will be possible during break periods. When temperatures reach above 70°F, the Site Health and Safety Officer will monitor heart rate by monitoring each person's heart rate every 90 minutes. If temperatures reach above 80°F, heart rate will be monitored every 60 minutes, and above 90°F every 30 minutes. A 10-minute break will be taken at these times to allow the Site Health and Safety Officer to check heart rates. If individuals' heart rates are 110 beats per minutes or less, they can resume work. If greater than 110 beats per minute, individuals will break another 10 minutes and the next work period shorted by 33-percent. If at the end of that 10-minute period, heart rate is still above 110, the individual will proceed to the decontamination area, decon out and rest in the support zone for at least one hour. These periods will be modified as employees become acclimatized to the heat.

To prevent heat-related illness, each site personnel will be required to drink at least 8 ounces of water or electrolyte-added drink at each break and at least 16 ounces at lunch. In addition, self-monitoring and buddy monitoring will be essential in order to prevent any heat stress illness. If the dry bulb air temperature exceeds 70°F, the Site Health and Safety Officer and buddy system shall watch HR/E and subcontractor personnel for any potential symptoms of heat stress or any unusual behavior. These measures, in addition to training on heat stress, should help prevent any heat stress illness from occurring.

If the air temperature remains below 70°F, the following work schedule is a guideline for all levels of protection listed in this HASP:

2 hrs - work
15 min - rest
2 hrs - work
45 min - lunch
2 hrs - work
15 min - rest
2 hrs - work

Rest means minimal physical activity. Rest should be accomplished in the shade. Any activity requiring only minimal physical activity can be performed during rest periods, e.g., preparation of sampling documentation, other paperwork requirements.

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APPENDIX IV
SECTION D

Cold Stress

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Preventing cold stress

In preventing cold stress the health and safety professional must consider factors relating both to the individual and the environment.

Acclimatization, water and salt replacement, medical screening, continuing medical supervision, proper work clothing, and training and education will contribute to the prevention of cold stress and injury related to working in a cold environment.

Acclimatization. Some degree of acclimatization may be achieved in cold environments. With sufficient exposure to cold, the body does undergo some changes that increase comfort and reduce the risk of cold injury. However, these physiological changes are usually minor and require repeated uncomfortably cold exposures to induce them. People who are physically unfit, older, obese, taking medications or using alcohol or drugs may not acclimatize readily.

Dehydration. Working in cold areas causes significant water losses through the skin and lungs as a result of the dryness of the air. Increased fluid intake is essential to prevent dehydration, which affects the flow of blood to the extremities and increases the risk of cold injury.

Warm, sweet, caffeine-free, non-alcoholic drinks and soup should be available at the worksite for fluid replacement and caloric energy.

Salt. The body needs a certain amount of salt and other electrolytes to function properly. However, using salt tablets is not recommended. Salt tablets cause stomach irritation, which may include nausea and vomiting. A normal, balanced diet should take care of salt needs. Anyone with high blood pressure or who is on a restricted sodium diet should consult a physician for advice on salt intake.

Diet. It is important for people who work in cold environments to eat a well-balanced diet. Restricted diets can deprive the body of elements needed to withstand cold stress.

Control measures. Continuous exposure of skin should not be permitted when the windchill factor results in an equivalent temperature of -32 C (-26 F). Workers exposed to air temperatures of 2 C (35.6 F) or lower who become immersed in water or whose clothing gets wet should be given dry clothing immediately and treated for hypothermia.

Engineering controls. The following are some of the ways engineering controls can be used to reduce the stress of a cold environment.

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- General or spot heating should be used to increase temperature at the workplace.
- If fine work is to be performed with bare hands for 10 or 20 minutes or more, special provisions should be made to keep the worker's hand warm. Warm air jets, radiant heaters, or contact warm plates can be used.
- The work area should be shielded if the air velocity at the job site is increased by wind, draft, or ventilating equipment.
- The air velocity in refrigerated rooms should be minimized as much as possible, and should not exceed 1 m/sec (200 fpm) at the job site.
- At temperatures below -1 C(30 F), metal handles of tools and control bars should be covered with thermal insulating material.
- Unprotected metal chair seats should not be used.
- When necessary, equipment and processes should be substituted, isolated, relocated, or redesigned to reduce cold stress at the worksite.
- Power tools, hoists, cranes or lifting aids should be used to reduce the metabolic workload.
- Heated warming shelters such as tents and cabins should be made available if work is performed continuously in an equivalent chill temperature of -7 C(20 F) or below. Workers should be encouraged to use the shelters regularly.

Engineering control of cold stress can be very complex, and often depends more on ingenuity than on standard methods.

Administrative work practice controls. These controls include work practices or rules designed to reduce the total cold-stress burden. Some of these include:

- a work-rest schedule to reduce the peak of cold stress;
- enforcing scheduled rest breaks;
- enforcing frequent intake of warm, sweet, caffeine-free, non-alcoholic drinks or soup;
- scheduling the coldest work for the warmest part of the day;
- moving work to warmer areas whenever possible;
- assigning extra workers to highly demanding task;
- allowing workers to pace themselves, and take extra work breaks when needed;
- making relief workers available for workers who need a break;

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- teaching workers the basic principles of preventing cold stress and emergency response to cold stress;
- maintaining protective supervision or a buddy system for those who work at -12 C (10 F) or below;
- allowing new employees time to adjust to conditions before they work full-time in cold environments;
- arranging work to minimize sitting soil or standing for long periods of time;
- reorganizing work procedures so as much of a job as possible is performed in a warm environmental. This will reduce the amount of work that must be done in a cold environment;
- including the weight and bulkiness of clothing when estimating work performance requirements and weights to be lifted.

Special considerations. Older workers, or workers with circulatory problems need to be extra careful in the cold. Additional insulating clothing and reduced exposure time should be considered for these workers. Obese and chronically ill people need to make a special effort to follow preventive measures. Sufficient sleep and good nutrition are important for maintaining a high level of tolerance to cold. If possible, the most stressful tasks should be performed during the warmer parts of the day.

Double shifts and overtime should be avoided. Rest periods should be extended to cope with increases in cold stress.

A worker should immediately go to warm shelter if any of the following symptoms are spotted: the onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, and/or euphoria. The outer layer of clothing should be removed when entering a heated shelter. If possible, a change of dry work clothing should be provided to prevent workers from returning to work with wet clothing. If this is not feasible, the remaining clothing should be loosened to permit sweat to evaporate.

Alcohol should not be consumed while in the warmer environment. Anyone on medications such as blood pressure control or water pills should consult a physician about possible side effects from cold stress. It is strongly recommended that workers suffering from diseases or taking medication that interferes with normal body temperature regulation, or that reduces tolerance of cold, not be permitted to work in temperatures of -1 C (30 F) or below.

It may be advisable for workers to weigh themselves at the beginning and end of the workday to check for weight loss that might occur from progressive dehydration.

A control program for cold stress. A control program for cold stress in industry should include the following elements:

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- *Medical supervision of workers:* including preplacement physicals that evaluate fitness, weight, the cardiovascular system, and other conditions that might make worker susceptible to cold stress. Medical evaluation during and after cold illnesses and a medical release for returning to work should be required.

- *Employee orientation and training* on cold stress, cold-induced illnesses and their symptoms, water and salt replacement, proper clothing, work practices and emergency first aid procedures.

- *Work-rest regimens,* with heated rest areas and enforced rest breaks.

- *Scheduled drink breaks* for recommended fluids.

- *Environmental monitoring,* using the air temperature and wind speed indices to determine wind chill and adjust work-rest schedules accordingly.

- *Reduction of cold stress* through engineering and administrative controls, and the use of personal protective equipment.

Personal protective equipment and clothing. Personal protective equipment and protective clothing is essential. The correct clothing depends on the specific sold stress situation. It is important to preserve the air space between the body and the outer layer of clothing in order to retain body heat. The more air pockets each layer of clothing has, the better the insulation. However, the insulating effect is negated if the clothing interferes with the evaporation of sweat, or if the skin or clothing is wet.

The most important parts of the body to protect are the feet, hands, head, and face. Hands and feet are the farthest from the heart, and become cooled most easily. Keeping the head covered is important, because as much as 40 percent of body heat can be lost when the head is exposed.

Clothing made of thin cotton fabric is ideal - it helps evaporate sweat by picking it up and bringing it to the surface. Loosely fitted clothing also aids sweat evaporation. Tightly fitted clothing of synthetic fabrics interferes with evaporation.

Recommended clothing may include: a cotton t-shirt and shorts or underpants under cotton and wool thermal underwear.

Two-piece long underwear is preferred, because the top can be removed and put back on as needed. Socks with high wool content are best. When two pairs of socks are worn, the inside pair should be smaller, and be made of cotton. If necessary, wool socks can also double as mittens. Wool or thermal trousers (either quilted or specially lined) are preferred. Belts can constrict and reduce circulation. Suspenders may be preferred. You will need

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extra room for trousers to fit over long underwear. Trousers should be lapped over boot tops to keep out snow or water. For heavy work, a felt-lined, rubber-bottomed, leather-topped boot with a removable felt insole is preferred. Boots should be waterproofed and socks changed when they become sweat soaked. Air insole cushions and felt liners should be used with chemical and/or water-resistant boots. The best foot protection is provided by insulated boots sealed inside and outside by vapor barriers. Either a wool shirt or a wool sweater over a cotton shirt should be worn. Size-graduated shirts and sweaters can be worn in layers. An anorak or snorkel coat or arctic parka should fit loosely, with a drawstring at the waits. Sleeves should fit snugly. The hood prevents the escape of warm air from around the neck, and can be extended past the face to create a frost tunnel, which warms the air for breathing. A wool knit cap provides the best head protection. When a hard hat is worn, a liner should be used. Wool mittens are more efficient insulators than gloves; they can be worn over gloves for extra warmth.

A face mask or scarf is vital when working in a cold wind. A ski mask with eye openings gives better visibility than a snorkel hood. Face protectors must be removed periodically, so the worker can be checked for signs of frostbite.

Workers should wear several layers of clothing instead of a single heavy outer garment. In addition to offering better insulation, layers of clothing can be removed as needed to keep the worker from overheating. The outer layer should be windproof and waterproof. Body heat is lost quickly if the protective layer isn't windproof.

All clothing and equipment must be properly fitted and worn to avoid interfering with the circulation. Thermal-type masks and respirators are available for those bothered by breathing very cold air. Full-facepiece respirators must have separate respirator channels to prevent fogging and frosting of the facepiece. Double-layered goggles with foam padding around the edges are effective in extremely cold conditions.

Liquids conduct heat better than air, and have a greater capacity for heat than air. For example, a spill of cold gasoline on skin can freeze the tissue quickly. That is why it is a good idea to wear chemical-resistant gloves (such as neoprene gloves with cotton inserts) for chemical handling operations. Workers handling chemicals with permeable-type gloves should always keep extra gloves available should one pair become contaminated.

Gloves should be used by workers if manual dexterity is not required, or if the air temperature falls below 16C (60F) for sedentary work, 4C (40F) for light work, and 7C (20F) for moderate work. Mittens should be used instead of gloves if the air temperature is 18C (0F) or less.

Avoid the following : Dirty or greasy clothing loses much of its insulation value. Air pockets in dirty clothes are crushed or filled, and heat can escape more easily. Denim is not a good protective fabric. It is relatively loosely woven, which allows water to penetrate and wind

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to blow away body heat that should be rapped between the body and clothing. Any interference with the circulation of the blood reduces the amount of heat delivered to the extremities.

Outdoor construction workers, as well as mountain hikers, and farmers are likely victims of hypothermia if proper precautions to ward off exposure and exhaustion caused by low (not necessarily freezing) temperatures, wind, and rain are not taken. When stranded during a storm in a vehicle, it is best to stay with the vehicle. The engine can furnish heat, while the a vehicle itself can act as a shelter from outside elements. (measures should be taken, however, to prevent a buildup of carbon monoxide gas in the closed vehicle. For additional warmth, insulation can be taken from vehicle seats and stuffed in clothing. If travel is in areas where storms occur frequently, emergency supplies should be carried to meet any weather conditions. Survival depends on a clear understanding of the situation. The rules of survival are the same, no matter what the emergency, think clear, be properly prepared, and keep a weather eye open. These are the best safeguards against hypothermia.

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APPENDIX V

MATERIAL SAFETY DATA SHEETS

(Available at Plant Office)

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APPENDIX VI

FORMS

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HERITAGE®

EQUIPMENT CALIBRATION/MAINTENANCE LOG

	Date	Time	Calibration Performed		Operability Check		Comments	By
			(Y/N)	By	(Y/N)	By		
Microtip II								
Aerosol Monitor								
LEL/O_2 Meter								
Radiation Meter								
Microtip II								
Aerosol Monitor								
LEL/O_2 Meter								
Radiation Meter								
Microtip II								
Aerosol Monitor								
LEL/O_2 Meter								
Radiation Meter								
Microtip II								
Aerosol Monitor								
LEL/O_2 Meter								
Radiation Meter								
Microtip II								
Aerosol Monitor								
LEL/O_2 Meter								
Radiation Meter								
Microtip II								
Aerosol Monitor								
LEL/O_2 Meter								
Radiation Meter								

All entries must be initialled by person performing work.

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Sheet _____ of _____

HERITAGE

Site Entry/Exit Log

All personnel are required to sign in and sign out when entering or leaving the site.

Date	Name	Signature	Time In	Time Out

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_____ HERITAGE® _____

, the undersigned, acknowledge that I have attended a pre-site entry meeting where the contents of the Health and Safety Plan and Work Plan have been reviewed.

Date	Name	Signature

formation Training Conducted At: _____

Date / Time: _____ Project Manager:

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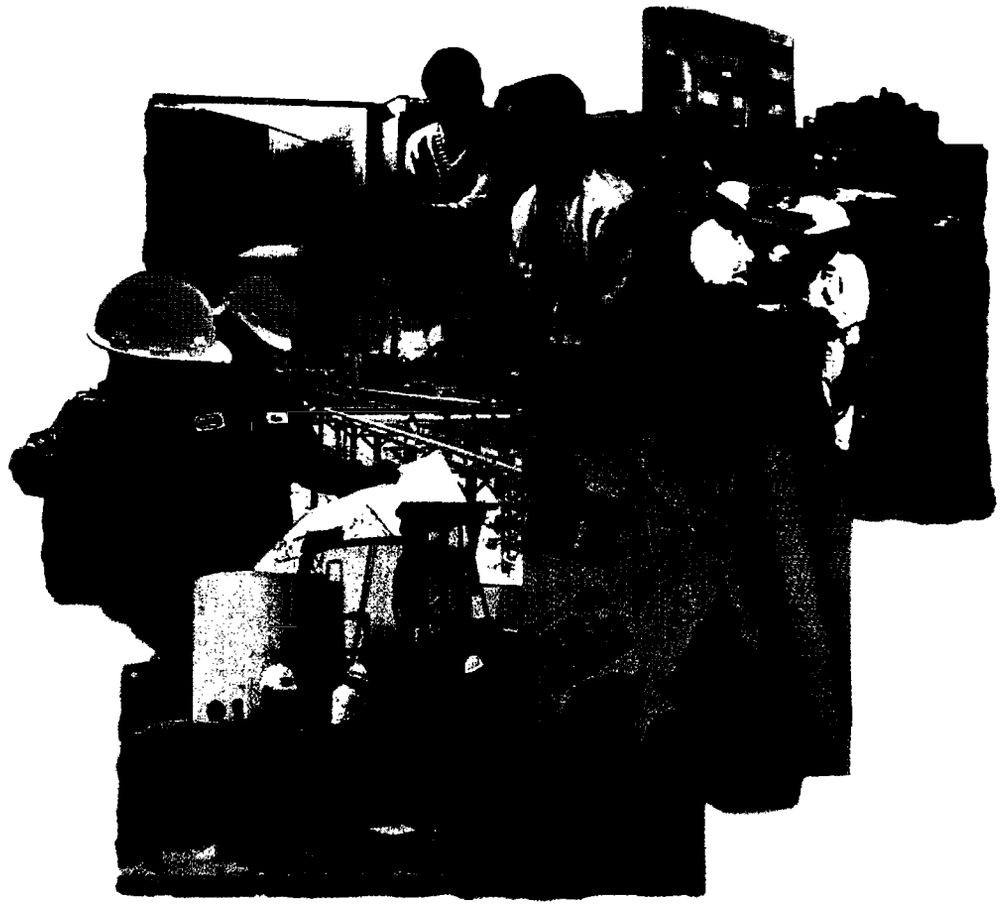
HERITAGE ENVIRONMENTAL SERVICES ■ HERITAGE LABORATORIES ■ HERITAGE TRANSPORT ■ HERITAGE REMEDIATION ENGINEERING ■ HERITAGE TREATMENT CENTERS



ATTACHMENT 4

PROJECT MANAGEMENT PLAN
RCRA FACILITY INVESTIGATION
PHASE I

Heritage Environmental Services
Lemont, Illinois
USEPA Identification No.: ILD 085349264
DLPC 0311620007

HERITAGE REMEDIATION / ENGINEERING, INC.

HERITAGE ENVIRONMENTAL SERVICES ■ HERITAGE LABORATORIES ■ HERITAGE TRANSPORT ■ HERITAGE REMEDIATION ENGINEERING ■ HERITAGE TREATMENT CENTERS

HERITAGE REMEDIATION/ENGINEERING, INC.

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ATTACHMENT 4

PROJECT MANAGEMENT PLAN

RCRA FACILITY INVESTIGATION
PHASE I

Heritage Environmental Services
Lemont, Illinois
USEPA ID No. ILD 085349264
DPLC 0311620007

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October 29, 1993

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PROJECT MANAGEMENT PLAN
RCRA FACILITY INVESTIGATION
PHASE I

Heritage Environmental Services
Lemont, Illinois
USEPA I.D. No.: ILD 08534926 4
DPLC 0311620007

Prepared By: _____ Date 10-28-93
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Approved By: _____ Date 10-29-93
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Approved By: _____ Date _____
Clarence Smith
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Approved By: _____ Date _____
Lawrence W. Eastep, P.E.
Manager, Permit Section IEPA

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TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 PROJECT OBJECTIVE 1

3.0 PROJECT APPROACH 1
- 3.1 Truck Transfer Area 1
- 3.2 Outdoor Container Storage Area 2
- 3.3 Van Trailer Container Storage Area 2
- 3.4 Old Aerosol Can Crushing Unit 4
- 3.5 Roll-off Box Storage Area 5
- 3.6 Drum Crushing Unit 5
- 3.7 Underground Sanitary Waste Holding Tanks 6
- 3.8 Barge Cleaning Transfer Point 6
- 3.9 Drainage Ditch and Tiles to Chicago Sanitary and Ship Canal 6
- 3.10 Other 7
- 3.11 Summary of Phase I Investigative Activities 8
- 3.12 Data Evaluation and Reporting 8

4.0 PROJECT ORGANIZATION AND RESPONSIBILITIES 1
- 4.1 Heritage Environmental Services (HERITAGE) 1
- 4.2 Contractor Personnel 1
  - 4.2.1 Project Manager 1
  - 4.2.2 Field Project Manager 2
  - 4.2.3 QA Director 2
  - 4.2.4 Heritage Laboratories Project Manager 3
  - 4.2.5 Heritage Laboratories Quality Assurance Officer - Ms. Christine Sarkan 3
- 4.3 Subcontractor 3

5.0 SCHEDULE 1

6.0 PROJECT COSTS 1

APPENDICES

APPENDIX I FIGURES

APPENDIX II TABLES

APPENDIX III RESUMES

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1.0 INTRODUCTION

As part of the requirements under the Heritage Environmental Services (HERITAGE), RCRA Part B permit the Illinois Environmental Protection Agency (IEPA) has requested that the facility conduct a RCRA Facility Investigation (RFI) and as necessary prepare and implement a Corrective Action Plan (CAP) in regards to the SWMUs identified by the IEPA. In compliance with this requirement a RCRA Facility Investigation Work Plan (RFI) has been prepared by Heritage Remediation/Engineering, Inc., (HR/E). This Project Management Plan (PjMP) and its supporting documents have been prepared to accomplish the objectives of Phase I of the RFI Work Plan.

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2.0 PROJECT OBJECTIVE

The objective of Phase I of the RFI is to collect the necessary information on the characteristics and integrity of each of the identified Solid Waste Management Units (SWMUs) at the facility to evaluate the potential for a release to have occurred or to occur to the soil or air from these SWMUs. Based upon the results of the Phase I activities additional phases of the RFI may be required to be performed.

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3.0 PROJECT APPROACH

In the development of the activities as outlined herein and as specified in the attached Field Sampling Plan, RFI, Phase I (Attachment 1), the past and current operating practices and site conditions as presented in the facility's RCRA Permit and the RFI Work Plan were considered and are included in this document by reference. All work performed in the collection and evaluation of data at the site will be conducted in accordance with this Project Management Plan and the RFI Work Plan, including the Health and Safety Plan (HASP), Quality Assurance Project Plan (QAPjP), and the Data Management Plan.

In accordance with the requirements of the RCRA permit, Section IV-B.1 and the RCRA Facility Assessment (RFA) and the results of the assessment secondary containment system integrity at the appropriate SWMU the following investigative activities are proposed. Figures 1 through 6 - Appendix I, indicate the site locations and the specific sampling locations at the SWMUs. Table 1 - Appendix II, list the specific SWMUs and the environmental concerns.

3.1 Truck Transfer Area

The secondary containment system integrity was evaluated by ESCA, Inc. The findings of this evaluation, Appendix V of the RFI Work Plan, revealed the system to be sound. Therefore, in accordance with these results and the conditions of the RCRA Permit no further investigative activities are proposed at this SWMU at this time.

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3.2 Outdoor Container Storage Area

The secondary containment system evaluation by ESCA, Inc., revealed several shrinkage cracks which may penetrate through the full thickness of the concrete. While the potential for a release in this area is minimal and would generally involve minimal volumes (individual 55-gallon containers) HR/E proposes to collect soil samples from within the secondary containment area of this SWMU at the intersection of the wider shrinkage cracks as noted by ESCA, Inc.

A total of five (5) soil sample locations are proposed at the SWMU. Since this area is essentially utilized to store those containers which are to be transported to other facilities for management, as a temporary storage area for excess containers to be processed at the Drum Processing and Container Storage Building, and/or materials to be bulked into the tank farm potential hazardous wastes and/or constituents involved at this SWMU include virtually all hazardous wastes as accepted at the HERITAGE facility. Therefore, HR/E proposes to submit the soil samples as collected for volatile organic and acid/base neutral semi-volatile organic constituent analysis and TCLP metals analysis in accordance with EPA SW846 methodologies and procedures. The specific locations, sampling method and procedures and laboratory methodology are described in the Attached Field Sampling Plan and the RFI Work Plan QAPjP.

3.3 Van Trailer Container Storage Area

The secondary containment system evaluation by ESCA, Inc. revealed several depressions and cracks within these depressions inside the secondary containment

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system of this SWMU. This evaluation also revealed a 2-inch diameter hole in the bituminous material and a metal rod penetrating the bituminous surface. While, the potential for a release at this SWMU is minimal, since the containers are stored in trailers within the secondary containment area and the quantity of a release would be limited (individual containers of 55-gallon or less) the presence of the 2-inch diameter hole and the depth of the depressions in the bituminous surface (4 inches) indicate a potential for a release into the underlying materials. Therefore, HR/E proposes to collect soil samples from this SWMU area.

HR/E proposes to collect a soil sample at representative areas of the highest potential for a release migrating from the secondary containment system. This includes the area of the 2-inch diameter hole and the metal rod which penetrates the bituminous surface. Since both of these areas are located in the northeast corner of the SWMU area, HR/E proposes to collect one soil sample from the remaining three corners of the unit at those depressions which appear to be the deepest and most stressed (cracks).

In the course of conducting the RFA the Agency noted that a portion of the western containment berm was deteriorated. HERITAGE repaired this berm area prior to the ESCA evaluation. Based upon the conditions of the permit a soil sample will be collected in the area of this past deterioration. A total of five soil sample locations are within the secondary containment system of this SWMU and one soil sample location is outside the SWMU.

This area is utilized to store those containers which can not be initially transported for storage at the Drum Processing and Containment Storage Building, material which are

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being temporarily stored at the facility awaiting transportation to another facility for management and are being stored on an emergency basis for industry and the government until the ultimate disposal can be arranged. This later event primarily occurs as the result of emergency response actions. Therefore, HR/E propose to collect soil samples for volatile organic, acid/base neutral, semi-volatile organic and TCLP metal constituent analyses in accordance with USEPA SW-846 methods and procedures. The specific sampling locations, methodologies and procedures are described in the attached Field Sampling Plan, RFI Work Plan QAPjP.

3.4 Old Aerosol Can Crushing Unit

In 1988, a fire destroyed the aerosol can crushing unit at the HERITAGE Lemont, Illinois facility. The fire resulted in the total destruction of the unit and the materials as contained therein. The release report associated with this event is presented in Appendix II of the RFI Work Plan. Based upon this report, the constituents as contained in the aerosol containers involved in this release consisted of volatile organics, alcohols, and mineral spirits and propellants (propane). While most of these constituents would have been combusted by the fire and/or volatilized, verification of the conditions of the soils at this area will be accomplished through the advancement of two soil borings at the site. The area of the former aerosol can crushing unit is currently overlain by bituminous pavement located between the van trailer area and the container storage and processing building.

HR/E proposes to collect soil samples for volatile and semi-volatile organic constituents, and alcohol compounds. The specific sampling locations and methodology and

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procedures for sampling are presented in the Field Sampling Plan and the RFI Work Plan QAPjP.

3.5 Roll-off Box Storage Area

The secondary containment system evaluation by ESCA, Inc., revealed several cracks in the concrete slab at this SWMU. While the potential for a release to occur in this area is minimal since the materials are solids and are contained in the roll-off containers, HR/E proposes to soil sample from four locations in this SWMW area. This location will be in those areas where the wider cracks were observed and at the area where the concrete was observed to be spalled.

Since materials as handled in this area primarily consist of tank bottoms, HR/E proposes to collect soil samples from four locations for volatile and semi-volatile organic constituents. The specific sampling locations, procedures and methodologies for sampling and analysis are presented in the Field Sampling Plan, RFI Work Plan QAPjP.

3.6 Drum Crushing Unit

In accordance with the permit, HR/E proposes to conduct an evaluation of the integrity of the secondary containment of this area. Based upon this evaluation should the integrity of the secondary system be found lacking, soil sampling in the area of the failure will be conducted.

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3.7 Underground Sanitary Waste Holding Tanks

In accordance with the permit specified by the IEPA the integrity of tanks should be determined and as necessary soil samples collected in the area. Since these tanks are fiberglass construction and are directly connected to the sanitary sewers conventional tightness tests are not feasible. Therefore, HR/E proposes to advance one soil boring in this area. This soil sample will be visually observed for evidence of contamination and will be analyzed for volatile organic constituents.

3.8 Barge Cleaning Transfer Point

In accordance with the permit a soil sample will be collected at the transfer point from the barge to land based facility. Since these operations primarily involved petroleum fuel barges, HR/E propose to analyze one soil sample from this area for volatile and semi-volatile organic compounds. These specific locations of the sampling point and the procedures and methodologies for sampling and analysis of the samples is provided in the Field Sampling Plan and the RFI Work Plan QAPjP.

3.9 Drainage Ditch and Tiles to Chicago Sanitary and Ship Canal

As specified in the permit, soil samples will be collected along the length of the ditch as part of the Phase I - RI activities. HR/E proposes to collect soil samples at five locations along the ditch from the start of the drainage ditch at the office parking area to its discharge into the Chicago Sanitary and Ship Canal. Since this drainage ditch

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would be the primary pathway for transport of contaminants offsite in the event that a release was not contained within the secondary containment areas of the SWMUs.

HR/E proposes to submit the samples collected from the drainage ditch to the laboratory for volatile and base/neutral and acid extractable semi-volatile organic constituent analysis.

3.10 Other

As a result of the extensive covering of the site by bituminous materials and the relative absence of soil cover, HR/E proposes to collect soil samples at three (3) locations along the north edge of the office parking lot. This represents the upgradient side of the property. These soil samples will be analyzed for volatile, base/neutral and acid extractable semi-volatile organic constituents.

The purpose of these soil samples are to determine the potential impact of the overlying bituminous materials upon the analytical results, since many of the constituents present in the bituminous materials and which may be present in the soils underlying these materials could be detected in the soil samples collected in the SWMU areas, erroneously indicating potential trace contamination from the operation of these units. The results of these three soil samples will be utilized to negate the effect of the bituminous materials upon the analytical results. This area would be representative since there have been no waste management activities in this area.

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3.11 Summary of Phase I Investigative Activities

Table 2, Appendix II presents a summary of the sampling and analytical program to be undertaken as part of the Phase I RFI activities. ESCA will, under separate control, conduct and amend their assessment of the secondary containment areas to include the drum crushing unit SWMU.

3.12 Data Evaluation and Reporting

Upon receipt of the laboratory analysis and HR/E will assemble the data in a manner to evaluate the significance of the data (i.e., contamination exists). This data and the results of the evaluation will be presented in a Phase I - RFI Report as prepared by HR/E. This report will identify the necessity for further investigative studies, corrective actions which may be undertaken, and/or future courses of action.

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4.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

In the implementation of the Phase I, RFI activities the specific responsibilities of the key personnel involved in the management and the performance of the project are summarized herein. Figure 7, Appendix 1 presents a Project organizational chart.

4.1 Heritage Environmental Services (HERITAGE)

Mr. Robert Garcia of HERITAGE will be the Project Manager. Mr. Garcia will be responsible, for coordinating all communications between HERITAGE, HR/E and the IEPA.

4.2 Contractor Personnel

4.2.1 Project Manager

The Contractor Project Manager, Mr. Robert J. Millman of HR/E, will be responsible for coordinating all efforts necessary to implement the Sampling and Analysis Plan. These shall include the subcontracting, if necessary, and financial as well as technical aspects of the project. The Contractor Project Manager shall ensure that the work performed is conducted in accordance with the Phase I Field Sampling Plan, RFI QAPjP and Data Management Plan. The Contractor Project Manager will report directly to the HERITAGE designated Project Manager. The Contractor Project Manager will be responsible for coordinating the efforts of the HERITAGE Project Manager, subcontractors, as

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well as other Contractor Corporate technical support. Mr. Millman's resume is provided in Appendix III.

4.2.2 Field Project Manager

The Contractor Field Manager, Mr. Ronald Wilkins of HR/E will be responsible for coordination with subcontractors and conducting all field work. He will also be responsible for coordinating all field activities as they relate with the sample collection. This will include obtaining sample containers and delivery of the collected samples to the laboratory. He will also be responsible for coordinating all contractor personnel involved in the sampling, and other activities as conducted at the site. The Field Project Manager will be responsible for ensuring that the Health and Safety Plan and Field Sampling Plans are complied with by all personnel at the site. The Field Project Manager will report to the Project Manager. Mr. Wilkin's resume is presented in Appendix III.

4.2.3 QA Director

The QA director is Mr. Roger J. Breitenfield. The QA director will remain independent of direct job involvement and day-to-day operations, and has direct access to corporate executive staff as necessary to resolve any QA dispute. He is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations, HR/E's policies, and IEPA requirements. Specific functions and duties include:

- Provide QA audit on various phases of the field operations;

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- Review and approval of QA plans and procedures;
- Providing QA technical assistance to project staff;
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the project manager.

4.2.4 Heritage Laboratories Project Manager - Ms. Dawn Siekerman

- Ensures all resources of the laboratory are available on an as-required basis;
- Overview of final analytical reports;
- Approval of the QAPjP.

4.2.5 Heritage Laboratories Quality Assurance Officer - Ms. Christine Sarkan

- Overview laboratory quality assurance;
- Overview QA/QC documentation;
- Conduct detailed data review;
- Decides laboratory corrective actions, if required;
- Technical representation of laboratory QA procedures;
- Preparation of laboratory Standard Operation Procedures;
- Approval of the QAPjP

4.3 Subcontractor

At this time there are no subcontractors proposed to be utilized.

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5.0 SCHEDULE

With the approval of this plan by HERITAGE and the Illinois Environmental Protection Agency and receipt of a notice to proceed, the Contractor shall perform the Phase I - RFI tasks, from the date of receipt of the notice to proceed, as shown in Figure 8, Appendix I.

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6.0 PROJECT COSTS

The estimated costs to perform the scope of services in the performance of the Phase I - RCRA Facility Investigations as specified in this Phase I - RFI Project Management Plan and its supportive attachment are Sixty-One Thousand Six Hundred Dollars ($61,600.00). These costs reflect Twenty-Nine Thousand Three Hundred Eighty-Four Dollars ($29,384.00) in laboratory costs and Eight Hundred Forty Dollars ($840.00) for the performance of the secondary containment assessment in the Drum Crushing Unit SWMU area.

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APPENDIX I

FIGURES

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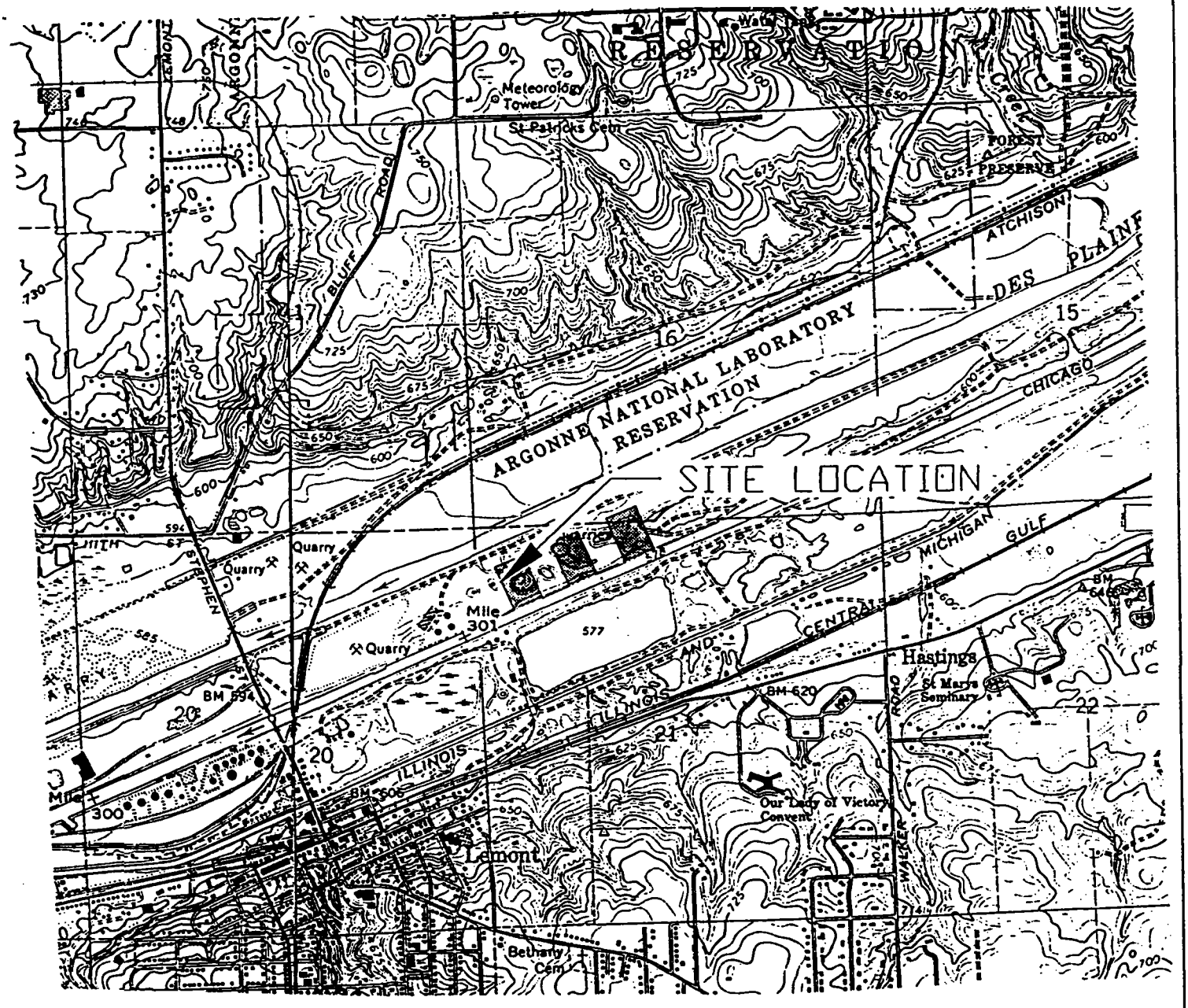


SAG BRIDGE AND ROMEOVILLE QUADRANGLES

Illinois 7.5 Minute Series

SCALE

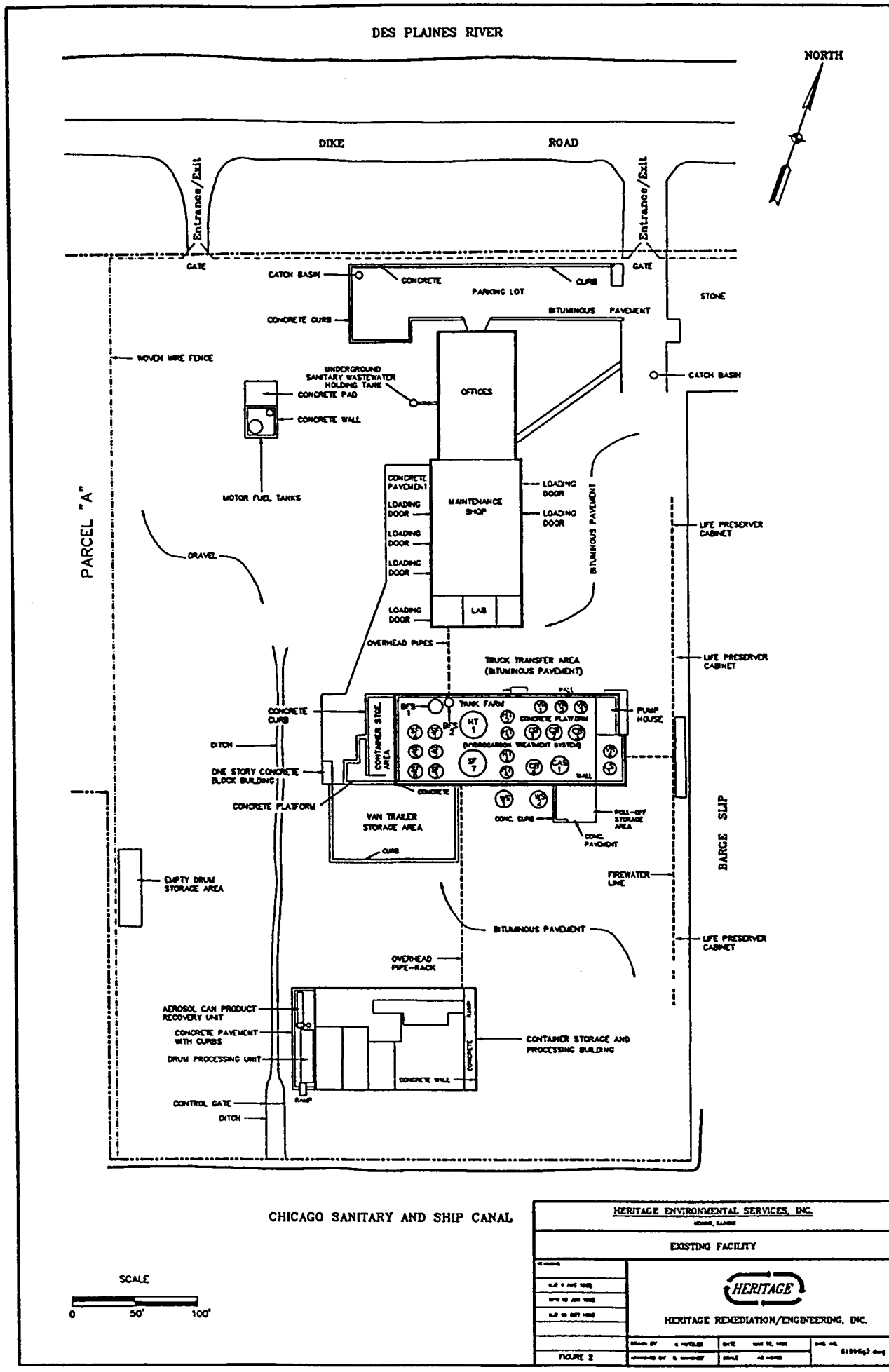
2000' 0 1000' 2000'

NORTH

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

SITE LOCATION MAP

REVISIONS			
	HERITAGE REMEDIATION/ENGINEERING, INC.		
	DRAWN BY KJR	DATE 26 OCT 1993	FIGURE 1
	APPROVED BY	SCALE AS SHOWN	JOB NO. 6199

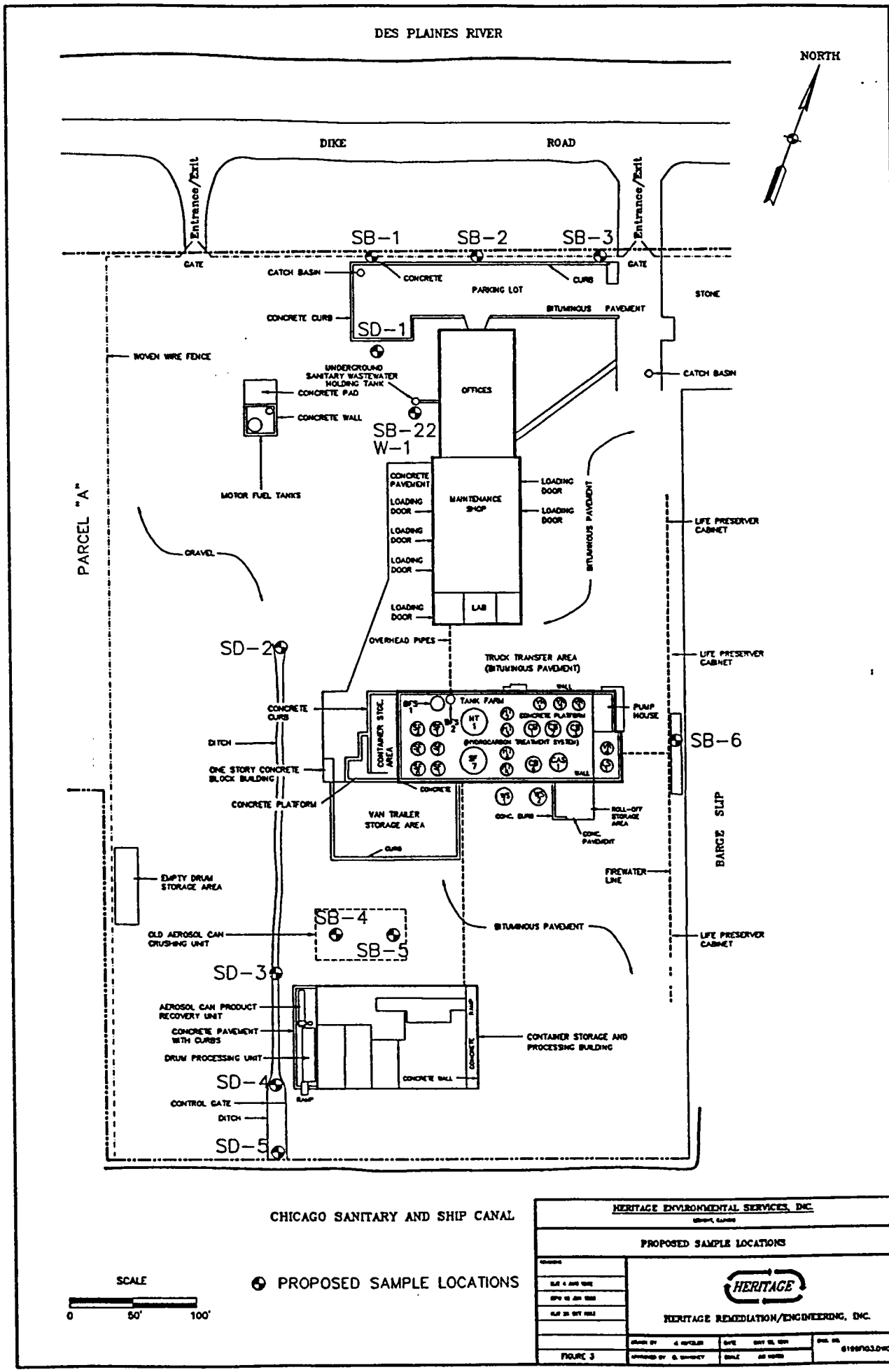


HERITAGE ENVIRONMENTAL SERVICES, INC.

EXISTING FACILITY

HERITAGE REMEDIATION/ENGINEERING, INC.

FIGURE 2

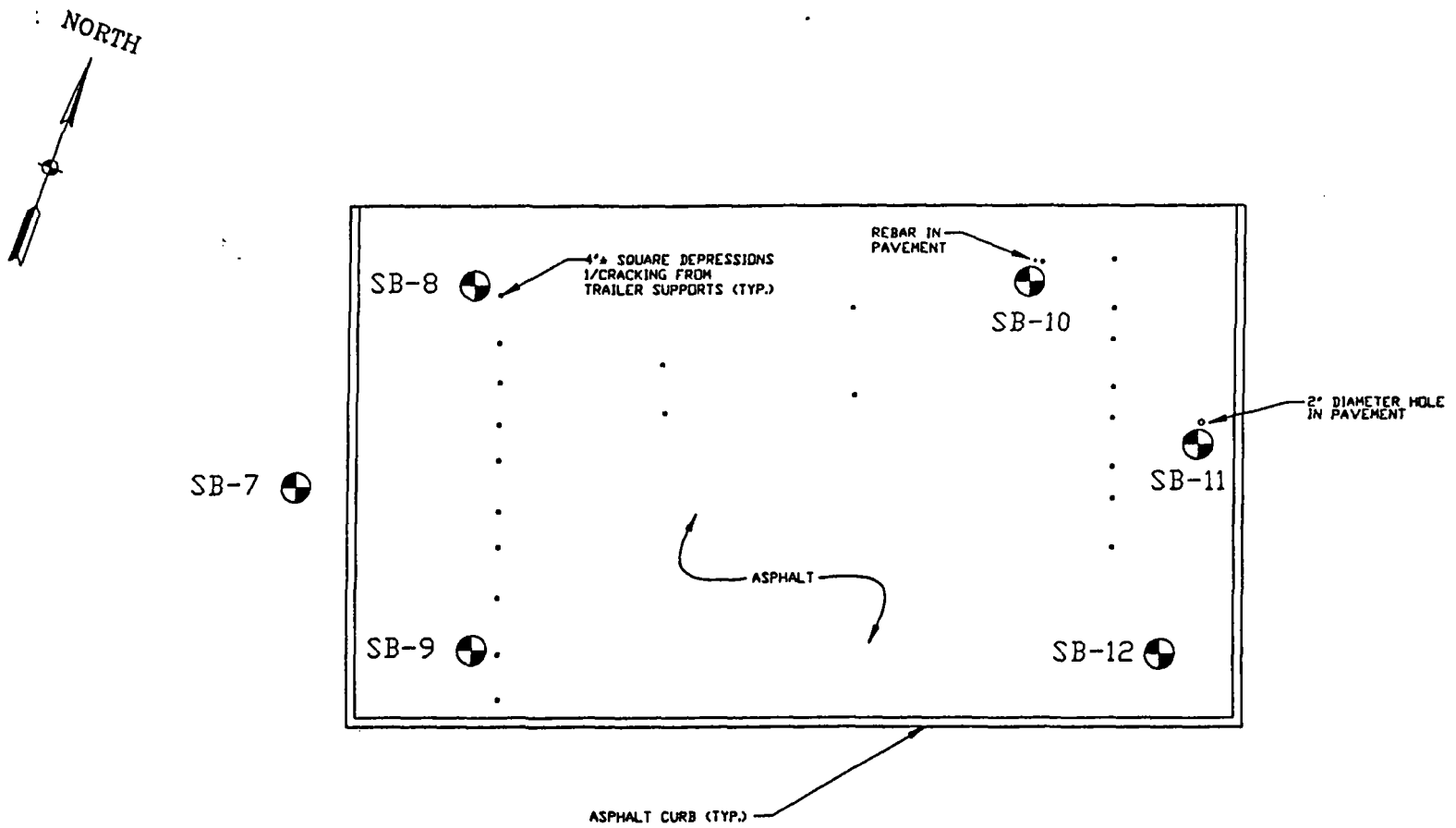


HERITAGE ENVIRONMENTAL SERVICES, INC.

PROPOSED SAMPLE LOCATIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

FIGURE 3



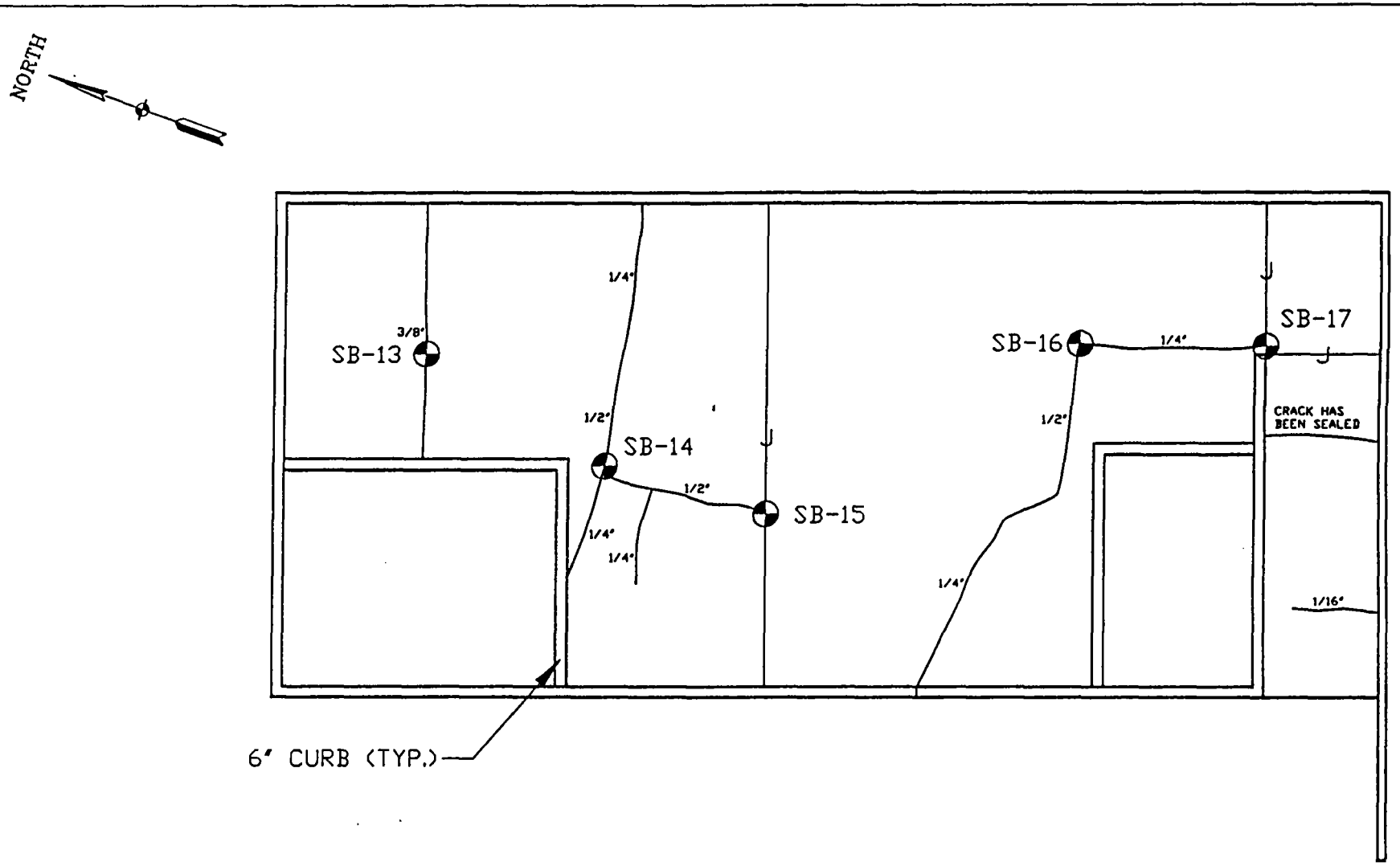
⊕ - PROPOSED SOIL SAMPLE LOCATION

SCALE
0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

VAN TRAILER FARM - PROPOSED SAMPLE LOCATIONS

REVISIONS			
	HERITAGE REMEDIATION/ENGINEERING, INC.		
	DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 4
	APPROVED BY	SCALE 1"=20'	JOB NO. 6119



- PROPOSED SOIL SAMPLE LOCATION

- DENOTES CONSTRUCTION JOINT

SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

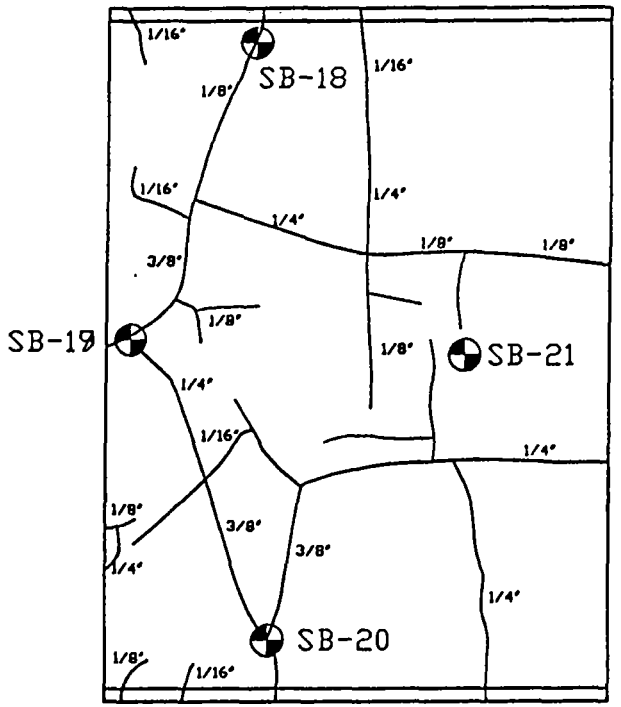
OUTDOOR CONTAINER STORAGE AREA

REVISIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 5
APPROVED BY	SCALE 1"=10'	JOB NO. 6119

NORTH



⊕ - PROPOSED SOIL SAMPLE LOCATION

SCALE

0 10' 20'

HERITAGE TREATMENT CENTER LEMONT, ILLINOIS	
ROLL-OFF STORAGE AREA	
REVISIONS	HERITAGE HERITAGE REMEDIATION/ENGINEERING, INC.
DRAWN BY KJR	DATE OCT. 25, 1993 — FIGURE 6
APPROVED BY	SCALE 1"=10' — JOB NO. 5119

FIGURE 7

PROJECT ORGANIZATIONAL CHART

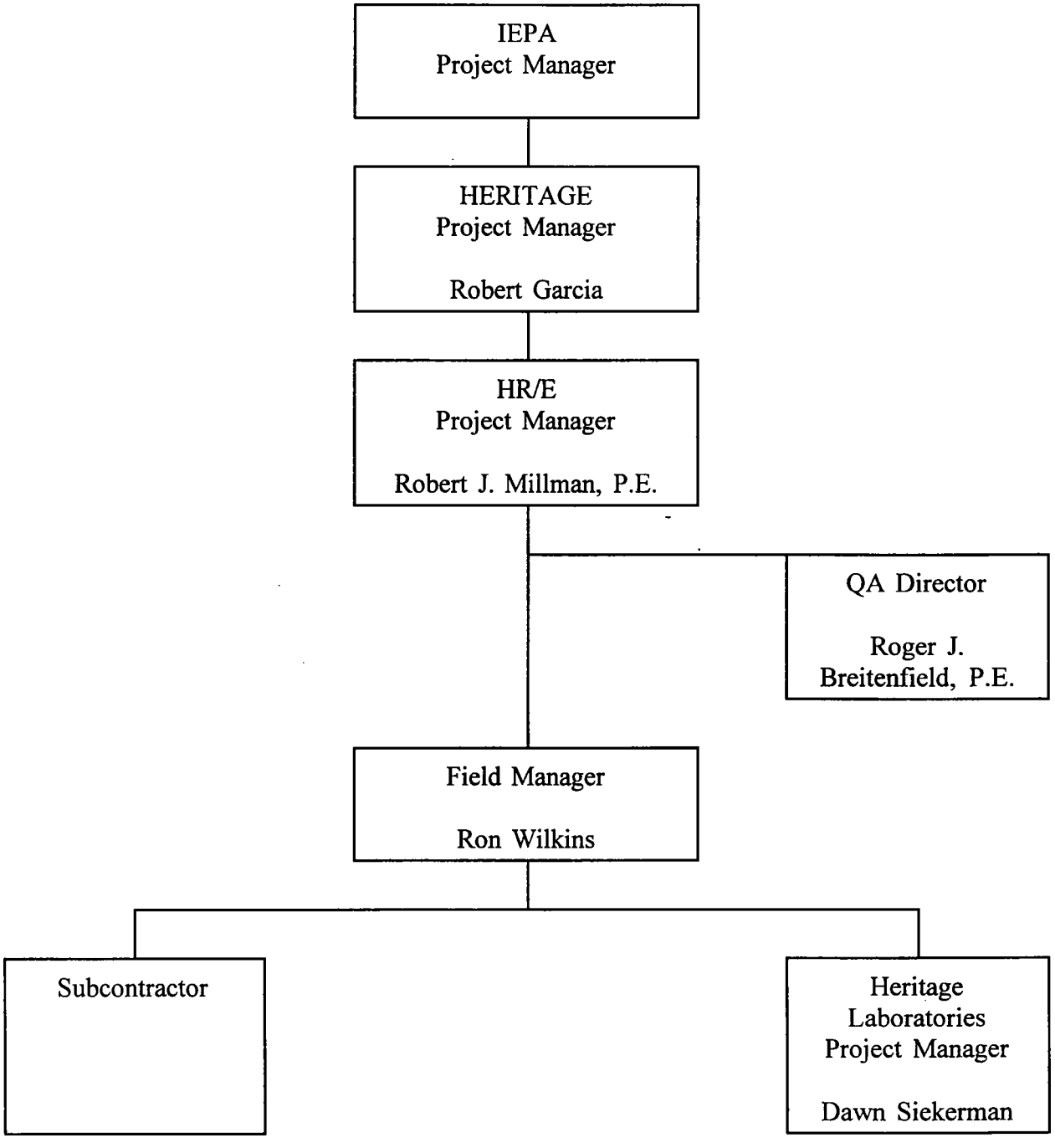


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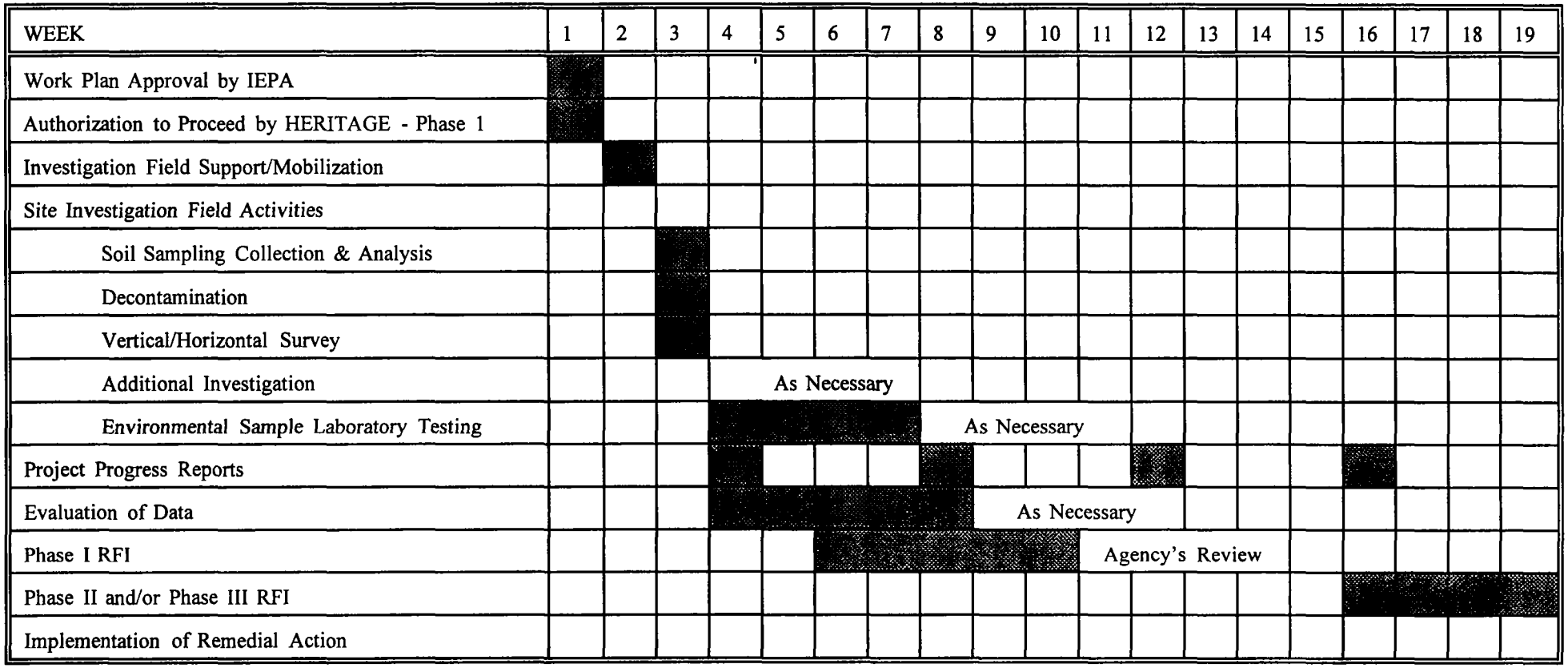
FIGURE 8

PROJECT SCHEDULE



APPENDIX II

TABLES

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TABLE 1

SOLID WASTE MANAGEMENT UNITS
Heritage Environmental Services, Inc.
Lemont, Illinois

Solid Waste Management Unit (SWMU)	Environmental Element of Concern
Truck Transfer Area	Secondary Containment System Integrity
Outdoor Container Storage Area	Secondary Containment System Integrity
Van Trailer Container Storage Area	Soil and Secondary Containment System Integrity
Old Aerosol Can Crushing Unit	Soil
Roll-off Box Storage Area	Secondary Containment System Integrity and Soil Sampling During Closure
Drum Crushing Unit	Secondary Containment Integrity and Soil Sampling During Closure
Underground Sanitary Waste Holding Tanks	Tank Integrity and SW846-8240 Run-On Contents
Barge Cleaning Transfer Point	Soil
Drainage Ditch and Tile Leading to Chicago	Soil Along Length of Ditch and Provisions for Lining of Ditch

Recycled Paper

TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field Measurements	Laboratory Parameters[1]	Analytical Method[1]	# of Samples	Quality Control Samples				Total # of Samples
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
Soils									
Outdoor Container Storage Area	---	Volatile Organics	SW846	5	N/A	N/A	N/A	N/A	5
	---	Semi-Volatile Organics	SW 846	5	N/A	N/A	N/A	N/A	5
	---	TCLP Metals Organics	SW 846	5	N/A	N/A	N/A	N/A	5
Van Trailer Container Storage Area	---	Volatile Organics	SW846	6	1	N/A	N/A	N/A	7
	---	Semi-Volatile Organics	SW 846	6	1	N/A	N/A	N/A	7
	---	TCLP Metals	SW846	6	1	N/A	N/A	N/A	7
Old Aerosol Can Crushing Unit	---	Volatile Organics	SW846	2	N/A	N/A	N/A	N/A	2
	---	Semi-Volatile Organics	SW846	2	N/A	N/A	N/A	N/A	2
	---	TCLP Metals	SW846	2	N/A	N/A	N/A	N/A	2
Roll-off Box Storage Area	---	Volatile Organics	SW846	4	N/A	N/A	N/A	N/A	4
	---	Semi-Volatile Organics	SW846	4	N/A	N/A	N/A	N/A	4
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---
Barge Cleaning Transfer Point	---	Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	Semi-Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---

TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field Measurements	Laboratory Parameters[1]	Analytical Method[1]	# of Samples	Quality Control Samples				Total # of Samples
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
Drainage Ditch	---	Volatile Organics	SW846	5	1	N/A	N/A	1	7
	---	Semi-Volatile Organics	SW846	5	1	N/A	N/A	1	7
	---	TCLP Metals	SW846	5	1	N/A	N/A	N/A	6
Other - Parking Lot	---	Volatile Organics	SW846	3	1	N/A	N/A	N/A	4
	---	Semi-Volatile Organics	SW846	3	1	N/A	N/A	N/A	4
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---
Sanitary Holding Tanks	---	Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	Semi-Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	TCLP Metals	Sw846	---	N/A	N/A	N/A	N/A	---
Soils Total	---	Volatile Organics	SW846	26	3	N/A	N/A	1	30
	---	Semi-Volatile Organics	SW846	26	3	N/A	N/A	1	30
	---	TCLP Metals	SW846	18	2	N/A	N/A	N/A	20
Water									
Sanitary Holding Tanks	---	Volatile Organics	SW 846	1	N/A	1	1	N/A	3

(1) See Table 2 for a listing of specific analyses, methodology and detection concentrations.
(2) One duplicate for every 10 soil samples.
(3) One matrix spike for every 20 soil samples.

APPENDIX III

RESUMES

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EDUCATION

Bachelor of Science Degree in Civil Engineering, University of Wisconsin - Platteville, 1971.
Master of Science Degree in Sanitary/Environmental Engineering, University of Wisconsin - Madison, 1974.
Registered Professional Engineer in Illinois, Indiana, Michigan, Missouri, Ohio and Wisconsin.

AREAS OF EXPERTISE

- Hazardous waste site investigation/remediation
- LUST investigation/remediation
- Property transfer environmental assessments
- Industrial wastewater characterization/process treatment design
- Solid waste management/landfill design and operation

EMPLOYMENT HISTORY

1986 - Present	Heritage Remediation/Engineering, Inc., Chicago, Illinois Engineering Manager
1983 - 1986	Laidlaw Waste Systems, Inc., Arlington Heights, Illinois Senior Environmental Engineer/Director of Landfill Operations
1980 - 1983	Andrews Environmental Engineering, Inc., Springfield, Illinois Project Manager
1973 - 1980	Clark Dietz Engineers, Inc., Urbana, Illinois Project Engineer/Project Manager/Director - Industrial Waste Division

KEY PROJECTS

- Directed a Remedial Investigation (RI) at an industrial facility, including offsite investigation of solvent contamination of groundwater, pursuant to a negotiated administrative order issued by Illinois EPA.
- Directed a comprehensive evaluation of a former municipal solid waste incinerator and ash disposal site for a proposed $40 million development.

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KEY PROJECTS (cont'd)

- Directed the multiple task investigation and $800,000 remediation of paint related lead and solvent contamination of a 10 acre steel fabrication site in conjunction with the sale of the property.
- Directed the investigation and development of remedial alternatives for a 17 acre lead contaminated industrial site located in an area of surface water and shallow aquifer use for public water supplies.
- Directed numerous LUST investigations, corrective plan development and implementation.
- Conducted numerous property transfer environmental assessments for sellers, buyers and lenders of industrial and commercial real estate.
- Conducted numerous wastewater characterization programs, waste treatability studies, detailed design of industrial and municipal wastewater treatment and sludge dewatering systems, operation and maintenance manual preparation, wastewater treatment plant startup, and operator training.
- Conducted field work, engineering design and permit application for new sanitary landfills, and design modifications and closure plans for existing sites.
- Successfully responded to the proposed Superfund (NPL) listing by USEPA of a sanitary landfill in Michigan.
- Coordinated siting efforts for a proposed new 160 acre sanitary landfill in Illinois.
- Coordinated the design, bidding and construction of a $3 million dollar surface water drainage re-routing project at a sanitary landfill. Construction included the excavation of 200,000 cubic yards of previously landfilled solid waste and ongoing controls to minimize leachate and odor problems for an adjacent residential area.

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EDUCATION

Bachelor of Science in Civil Engineering, University of Missouri at Rolla - Sanitary and Environmental Engineering, 1969
Master of Science in Civil Engineering, University of Missouri at Rolla - Sanitary and Environmental Engineering, 1973
Registered Professional Engineer in Illinois and Wisconsin.

AREAS OF EXPERTISE

- Hazardous waste site investigations and feasibility studies.
- LUST remediation.
- RCRA permitting and closures.
- Industrial wastewater characterization and process treatment design.
- Industrial pretreatment and user surcharge regulations.
- Environmental Property Audits

EMPLOYMENT HISTORY

♦	1989 - Present	Heritage Remediation/Engineering, Inc., Chicago, Illinois Senior Project Engineer/Project Manager
♦	1985 - 1988	Camp Dresser & McKee, Chicago, Illinois Site Manager/Project Manager
♦	1984 - 1985	Metcalf & Eddy, Chicago, Illinois Project Manager
♦	1973 - 1984	Roy F. Weston, Chicago, Illinois Project Engineer

KEY PROJECTS

- Prepared Feasibility Study for remediation of solvent contamination of soils and groundwater at a site located in a northeastern Illinois community.
- Developed corrective action plans for several LUST sites in Illinois.
- Managed RI/FS efforts at United Scrap Lead, Ohio; Hedblum, MI, Fisher-Calo, IN; Chem-Dyne, Ohio; and supervised efforts at other Superfund sites.

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KEY PROJECTS (cont'd)

- Prepared technology review position papers for management of hazardous waste for the State of Minnesota.
- Provided technical assistance to industry in legal proceedings to revise Industrial Surcharge Ordinances.
- Treatability studies for pharmaceutical, aerosol packaging, oil refining, pulp and paper mill, organic chemical plants, metal finishing, corn wet milling, breweries, and other industries. This included flow measurement, sampling, data collection and analysis, evaluation and development of design parameters, cost estimates and the preparation of an engineering report including a process design of the wastewater treatment facility.
- Preparation of the RCRA Part B submittal for two hazardous waste management units, including landfill operations, for a national waste management firm.
- Conducted and prepared documentation of Environmental Audits for industrial and commercial property transfers.

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EDUCATION

Bachelor of Science in Engineering Geology, Purdue University - 1987

SUBSEQUENT TRAINING

- Leaking Underground Storage Tank Workshop - Georgia Institute of Technology.
- Management of Hazardous Wastes - Institute for Regulatory Science.
- Hazardous Materials Manager Training - Institute of Hazardous Materials Management.
- Management & Oversight/Risk Tree (MORT), Accident/Incident Investigation - EG & G -Idaho.
- Hazardous Waste Site Worker Training - Heritage Environmental Services, Inc.

AREAS OF EXPERTISE

- Environmental regulatory compliance
- Hazardous waste management (RCRA)
- Radioactive mixed waste management
- High level radioactive waste management
- Property Transfer Assessments

EMPLOYMENT HISTORY

1990 - Present	Heritage Remediation/Engineering, Inc., Chicago, Illinois - Project Geologist
1988 - 1990	U.S. Department of Energy - Chicago Operations Office - Chicago, Illinois - General Engineer
1987 - 1988	U.S. Department of Energy - Salt Repository Project - Hereford, Texas Staff Engineering Geologist

KEY PROJECTS

- Participated in the NRC licensing process for the civilian high-level nuclear waste repository.

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- Participated in the development of a project charter and management plan for the certification of transuranic nuclear waste at generator sites.
- Developed a guidebook on Federal Environmental regulations for the Chicago Operations Office of the U. S. Department of Energy.
- Managed regulatory aspect of radioactive mixed waste generation activities at Chicago Operations Office facilities.
- Responded to notices of deficiency on RCRA Part B permit applications for the hazardous waste operations of a Department of Defense ordnance manufacturer.
- Participated in emergency response and subsequent remediation activities at the site of an explosion and fire at a major chemical manufacturing plant. Experience during this activity included drum sampling & overpacking, labpacking, manifesting/labelling of hazardous waste drums, bulk, and labpack shipments.
- Prepared, reviewed and evaluated compliance documentation prepared under the National Environmental Policy Act (NEPA) for federal energy and research projects with the potential to impact the environment.
- Conducted oversight during numerous UST projects including removals, site investigations, groundwater remediation and other associated activities.
- Prepared an air dispersion model for a hazardous waste storage facility in an effort to assess off-site impacts and health and environmental risks associated with a release.
- Conducted environmental site audits/inspections at laboratories, refineries, waste management operations, industrial facilities.
- Conducted numerous property transfer assessments and site inspections at refineries, industrial facilities, office building, and commercial facilities.

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HERITAGE REMEDIATION/ENGINEERING, INC.

1319 Marquette Dr.
Romeoville, IL 60441
Phone: 708/378-1600
FAX: 708/378-2200

MEMORANDUM

TO: William T. Sinnott

FROM: Robert J. Millman, P.E

DATE: January 31, 1994

RE: RFI Work Plans
HES - Lemont
ILD-085349264
Attachment 1, QAPjP, Appendix II, Tables

Please find attached revised Tables 2 and 3 of the QAPjP, Appendix II of the RFI Work Plar These revisions incorporated the addition of the analytical method number for semi-vol organic analysis to be performed by the laboratory, SW846-8270.

As you requested in our telephone conversation of January 27, 1994, I am faxing to you with hard copies by regular mail. Should you have any questions, plea contact the undersigned at your earliest convenience.

pc: Bob Garcia

1115RM94.R2/6119

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TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field Measurements	Laboratory Parameters[1]	Analytical Method[1]	# of Samples	Quality Control Samples				Total # of Samples
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
SOILS									
Outdoor Container Storage Area	---	Volatile Organics	SW846 8240	5	N/A	N/A	N/A	N/A	5
	---	Semi-Volatile Organics	SW 846 8270	5	N/A	N/A	N/A	N/A	5
	---	TCLP Metals Organics	SW 846	5	N/A	N/A	N/A	N/A	5
Van Trailer Container Storage Area	---	Volatile Organics	SW846 8240	6	1	N/A	N/A	N/A	7
	---	Semi-Volatile Organics	SW 846 8270	6	1	N/A	N/A	N/A	7
	---	TCLP Metals	SW846	6	1	N/A	N/A	N/A	7
Old Aerosol Can Crushing Unit	---	Volatile Organics	SW846 8240	2	N/A	N/A	N/A	N/A	2
	---	Semi-Volatile Organics	SW846 8270	2	N/A	N/A	N/A	N/A	2
	---	TCLP Metals	SW846	2	N/A	N/A	N/A	N/A	2
Roll-off Box Storage Area	---	Volatile Organics	SW846 8240	4	N/A	N/A	N/A	N/A	4
	---	Semi-Volatile Organics	SW846 8270	4	N/A	N/A	N/A	N/A	4
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---

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HERITAGE ®

TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field Measurements	Laboratory Parameters[1]	Analytical Method[1]	# of Samples	Quality Control Samples				Total # of Samples
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
Barge Cleaning Transfer Point	---	Volatile Organics	SW846 8240	1	N/A	N/A	N/A	N/A	1
	---	Semi-Volatile Organics	SW846 8270	1	N/A	N/A	N/A	N/A	1
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---
Drainage Ditch	---	Volatile Organics	SW846 8240	5	1	N/A	N/A	1	7
	---	Semi-Volatile Organics	SW846 8270	5	1	N/A	N/A	1	7
	---	TCLP Metals	SW846	5	1	N/A	N/A	N/A	6
Other - Parking Lot	---	Volatile Organics	SW846 8240	3	1	N/A	N/A	N/A	4
	---	Semi-Volatile Organics	SW846 8270	3	1	N/A	N/A	N/A	4
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---
Sanitary Holding Tanks	---	Volatile Organics	SW846 8240	1	N/A	N/A	N/A	N/A	1
	---	Semi-Volatile Organics	SW846 8270	1	N/A	N/A	N/A	N/A	1
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---

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TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field Measurements	Laboratory Parameters[1]	Analytical Method[1]	# of Samples	Quality Control Samples				Total # of Samples
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
Soils Total	---	Volatile Organics	SW846 8240	27	3	N/A	N/A	1	31
	---	Semi-Volatile Organics	SW846 8270	27	3	N/A	N/A	1	31
	---	TCLP Metals	SW846	18	2	N/A	N/A	N/A	20
WATER									
Sanitary Holding Tanks	---	Volatile Organics	SW 846 8240	1	N/A	1	1	N/A	3

(1) See Table 3 for a listing of specific analyses, methodology and detection concentrations.
(2) One duplicate for every 10 soil samples.
(3) One matrix spike for every 20 soil samples.
N/A Not Applicable.

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TABLE 3
LABORATORY ANALYSES AND QUANTITATION LIMITS

COMPOUNDS	CAS NUMBER	QUANTITATION LIMITS	METHOD
		SOIL - ug/kg	
VOLATILE ORGANICS			
Chloromethane	74-87-3	10	SW846 - 8240
Bromomethane	74-83-9	10	SW846 - 8240
Vinyl Chloride	75-01-4	10	SW846 - 8240
Chloroethane	75-00-3	100	SW846 - 8240
Methylene Chloride	75-09-2	5	SW846 - 8240
Acetone	67-64-1	20	SW846 - 8240
Carbon Disulfide	75-15-0	5	SW846 - 8240
1,1-Dichloroethene	75-35-4	5	SW846 - 8240
1,1-Dichloroethane	75-34-3	5	SW846 - 8240
1,2-Dichloroethene (Total)	540-59-0	5	SW846 - 8240
2-Butanone	78-93-3	5	SW846 - 8240
1,1,1-Trichloroethane	71-55-6	5	SW846 - 8240
Carbon Tetrachloride	56-23-5	5	SW846 - 8240
Bromodichloromethane	75-27-4	5	SW846 - 8240
1,2-Dichloropropane	78-87-5	5	SW846 - 8240
cis-1,3-Dichloropropene	10061-01-5	5	SW846 - 8240
Trichloroethene	79-01-6	5	SW846 - 8240
Dibromochloromethane	124-48-1	5	SW846 - 8240
1,1,2-Trichloroethane	79-00-5	5	SW846 - 8240
Benzene	71-43-2	5	SW846 - 8240
trans-1,3-Dichloropropene	10061-02-6	5	SW846 - 8240
Bromoform	75-25-2	5	SW846 - 8240
4-Methyl-2-pentanone	108-10-1	10	SW846 - 8240
2-Hexanone	591-78-6	10	SW846 - 8240

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TABLE 3
LABORATORY ANALYSES AND
QUANTITATION LIMITS

COMPOUNDS	CAS NUMBER	QUANTITATION LIMITS	METHOD
		SOIL - ug/kg	
Tetrachloroethene	127-18-4	5	SW846 - 8240
Toluene	108-88-3	5	SW846 - 8240
1,1,2,2-Tetrachloroethane	79-34-5	5	SW846 - 8240
Chlorobenzene	108-90-7	5	SW846 - 8240
Ethylbenzene	100-41-4	5	SW846 - 8240
Stryene	100-42-5	5	SW846 - 8240
Xylenes (total)	1330-20-7	5	SW846 - 8240
Acrolein	107-02-8	50	SW846 - 8240
Acrylonitrile	107-13-1	70	SW846 - 8240
Fluorotrichloromethane	75-69-4	5	SW846 - 8240
Methylethyl Ketone	78-93-3	10	SW846 - 8240
Tetrahydrofuran	109-99-0	25	SW846 - 8240
Vinyl Acetate	10-05-4	10	SW846 - 8240
METALS			
TCLP Preparation	--	--	SW846 - 1311
TCLP Lead by FAA	--	20 *	SW846 - 7420
TCLP Lead by GFAA	--	5 *	SW846 - 7421
Total Lead by FAA/ICP	--	5000	SW846 - 7421
SEMI-VOLATILE ORGANICS			
1,2-Dichlorobenzene	95-50-1	330	SW846 - 8270
1,3-Dichlorobenzene	541-73-1	330	SW846 - 8270
1,4-Dichlorobenzene	106-46-7	330	SW846 - 8270
3,3-Dichlorobenzidine	91-94-1	660	SW846 - 8270
Diethylphthalate	84-66-2	330	SW846 - 8270
Dimethylphthalate	131-11-3	330	SW846 - 8270

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TABLE 3
LABORATORY ANALYSES AND QUANTITATION LIMITS

COMPOUNDS	CAS NUMBER	QUANTITATION LIMITS	METHOD
		SOIL - ug/kg	
Di-n-butylphthalate	84-74-2	330	SW846 - 8270
Dinitrobenzenes, n.o.s.	25154-54-5	1600	SW846 - 8270
2,4-Dinitrotoluene	121-14-2	330	SW846 - 8270
2,6-Dinitrotoluene	606-20-2	330	SW846 - 8270
Di-n-octylphthalate	117-84-0	330	SW846 - 8270
Fluoranthene	206-44-0	330	SW846 - 8270
Fluorene	86-73-7	330	SW846 - 8270
Hexachlorobenzene	118-74-1	330	SW846 - 8270
Hexachlorobutadiene	87-68-3	330	SW846 - 8270
Hexachlorocyclopentadiene	77-47-4	330	SW846 - 8270
Hexachloroethane	67-72-1	330	SW846 - 8270
Indeno(1,2,2-cd)pyrene	193-39-5	330	SW846 - 8270
Isophorone	78-59-1	330	SW846 - 8270
2-Methylnaphthalene	91-57-6	330	SW846 - 8270
Naphthalene	91-20-3	330	SW846 - 8270
2-Nitroaniline	88-74-4	1600	SW846 - 8270
3-Nitroaniline	99-09-2	1600	SW846 - 8270
4-Nitroaniline	100-01-6	1600	SW846 - 8270
Nitrobenzene	98-95-3	330	SW846 - 8270
N-Nitroso-diphenylamine n.o.s.	86-30-6	330	SW846 - 8270
N-Nitroso-di-n-propylamine n.o.s.	621-64-7	330	SW846 - 8270
Phenanthrene	85-01-8	330	SW846 - 8270
2-Picoline	109-06-8	1600	SW846 - 8270
Pyrene	129-00-0	330	SW846 - 8270
Pyridine	110-86-1	1600	SW846 - 8270

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TABLE 3
LABORATORY ANALYSES AND QUANTITATION LIMITS

COMPOUNDS	CAS NUMBER	QUANTITATION LIMITS	METHOD
		SOIL - ug/kg	
Toluenediamine	95-80-7	1600	SW846 - 8270
1,2,4-Trichlorobenzene	120-82-1	330	SW846 - 8270
Benzoic Acid	65-85-0	1600	SW846 - 8270
4-Chloro-3-methylphenol	59-50-7	330	SW846 - 8270
2-Chlorophenol	95-57-8	330	SW846 - 8270
2,4-Dichlorophenol	120-83-2	330	SW846 - 8270
2,4-Dimethylphenol	105-67-9	330	SW846 - 8270
4,6-Dinitro-2-methylphenol	534-52-1	1600	SW846 - 8270
2,4-Dinitrophenol	121-14-2	1600	SW846 - 8270
2-Methylphenol	95-48-7	330	SW846 - 8270
4-Methylphenol	106-44-5	330	SW846 - 8270
2-Nitrophenol	88-75-5	330	SW846 - 8270
4-Nitrophenol	100-02-7	1600	SW846 - 8270
Pentachlorophenol	87-86-5	1600	SW846 - 8270
Phenol	108-95-2	330	SW846 - 8270
Tetrachlorophenol	25167-88-3	330	SW846 - 8270
2,4,5-Trichlorophenol	95-95-4	1600	SW846 - 8270
2,4,6-Trichlorophenol	88-06-2	330	SW846 - 8270

* ug/l on liquid extract.

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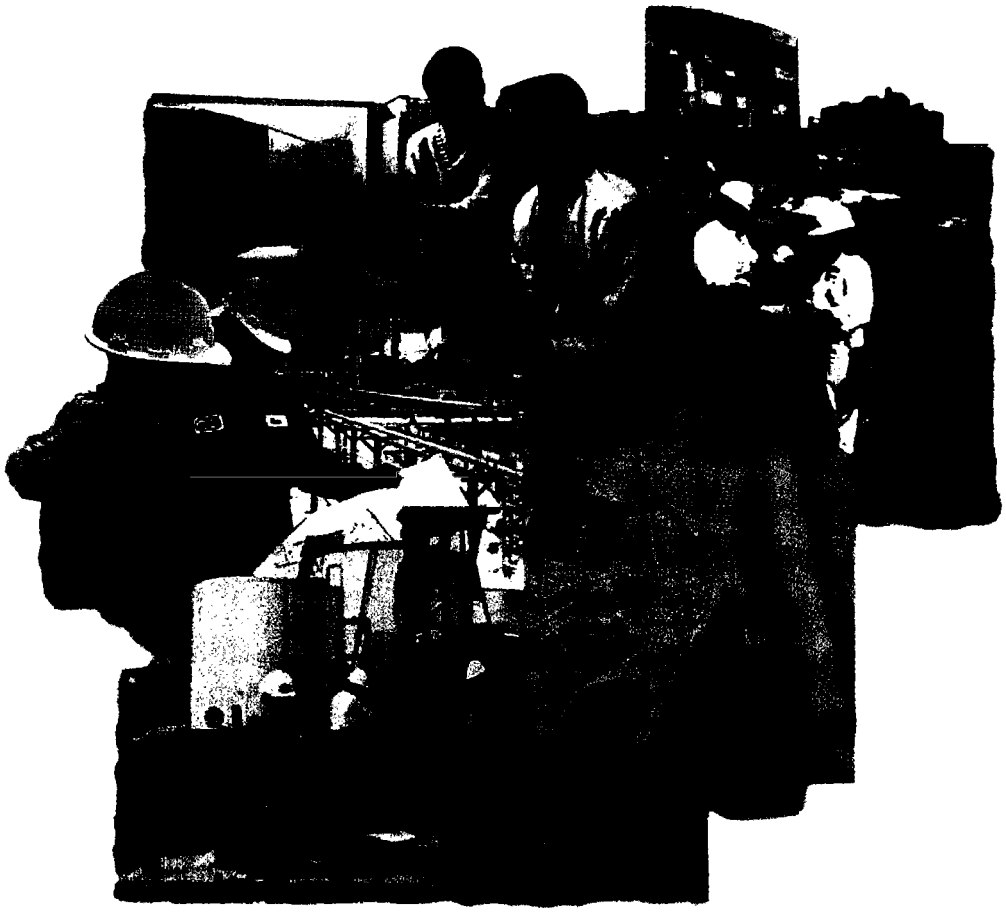

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ATTACHMENT 1

QUALITY ASSURANCE PROJECT PLAN RCRA FACILITY INVESTIGATION

Heritage Environmental Services
Lemont, Illinois
USEPA Identification No.: ILD 085349264
DLPC 0311620007

HERITAGE REMEDIATION / ENGINEERING, INC.

HERITAGE REMEDIATION/ENGINEERING, INC.

1319 Marquette Dr.
Romeoville, IL 60441
Phone: 708/378-1600
FAX: 708/378-2200

ATTACHMENT I

QUALITY ASSURANCE PROJECT PLAN

RCRA FACILITY INVESTIGATION

HERITAGE ENVIRONMENTAL SERVICES
Lemont, Illinois
USEPA Identification No. ILD085349264
DLPC 0311620007

Prepared By: _____ Date: 10-28-93
Robert J. Millman, P.E.
Contractor Project Manager, HR/E

Approved By: _____ Date: 10-29-93
Roger J. Breitenfield, P.E.
Contractor Quality Assurance Project Director

Approved By: _____ Date: 10-29-93
Dawn Siekerman
Laboratory Project Manager

Approved By: _____ Date: 10-29-93
Christine Sarkan
Laboratory Quality Assurance Officer
Manager, Permit Section, IEPA

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TABLE OF CONTENTS

1.0 PROJECT DESCRIPTION 1
1.1 Facility Background 1
1.1.1 Facility Description 1
1.1.2 Facility History 2
1.1.3 SWMUs 3
1.2 Past Data Collection Activity / Current Status 7
1.3 Sample Network Design and Rationale 9
1.4 Parameters to be Tested and Frequency 9
1.5 Data Quality Objectives 9
1.6 Project Schedule 11

2.0 PROJECT ORGANIZATION AND RESPONSIBILITY 1

3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA 1
3.1 Level of Quality Control Effort 1
3.2 Accuracy, Precision, and Sensitivity of Analysis 3
3.3 Completeness, Representativeness and Comparability 3

4.0 SAMPLING PROCEDURES 1

5.0 SAMPLE CUSTODY 1
5.1 Field Chain-of-Custody Procedures 1
5.1.1 Field Procedures 1
5.2 Laboratory Chain-of-Custody Procedures 4

6.0 CALIBRATION PROCEDURES AND FREQUENCY 1
6.1 Field Instruments/Equipment 1

7.0 ANALYTICAL PROCEDURES 1
7.1 Laboratory Analysis 1
7.2 Field Screening Analytical Protocols 1

8.0 INTERNAL QUALITY CONTROL CHECKS 1
8.1 Field Sample Collection 1
8.2 Field Measurement 1
8.3 Laboratory Analysis 1
8.3.1 QA Program 2
8.3.2 Quality Control Checks 3

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9.0 DATA REDUCTION, VALIDATION AND REPORTING 1
9.1 Field Measurements and Sample Collection 1
9.2 Laboratory Services 1

10.0 PERFORMANCE AND SYSTEM AUDITS 1
10.1 Field Audits 1
10.2 Laboratory Audits 1

11.0 PREVENTATIVE MAINTENANCE PROCEDURES 1
11.1 Field Equipment/Instruments 1

12.0 SPECIFIC ROUTINE PROCEDURES TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS 1
12.1 Field Measurements 1
12.2 Laboratory Data 1
12.2.1 Precision 1
12.2.2 Accuracy 2
12.2.3 Completeness 3
12.2.4 Sensitivity 3

13.0 CORRECTIVE ACTIONS 1
13.1 Sample Collection/Field Measurements 1
13.2 Laboratory Analyses 2

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT 1

APPENDICES

APPENDIX I FIGURES

APPENDIX II TABLES

APPENDIX III LIST OF MATERIALS PERMITTED FOR STORAGE AND/OR TREATMENT

APPENDIX IV HERITAGE LABORATORIES QUALITY ASSURANCE PLAN

INTRODUCTION

This Quality Assurance Project Plan (QAPjP) presents the organization, objectives, functional activities and specific Quality Assurance (QA) and Quality Control (QC) procedures associated with the performance of a RCRA Facility Investigation at the Heritage Environmental Services (HERITAGE) facility in Lemont, Illinois. This QAPjP also describes the specific protocols which will be followed for sampling, sample handling and storage, Chain-of-Custody, laboratory and field analysis.

All QA/QC procedures will be in accordance with applicable professional technical standards, government regulations and guidelines, and specific project goals and requirements. This QAPjP is prepared by Heritage Remediation/Engineering, Inc., (HR/E) utilizing the Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAMS-005/80), and the Region V Model QAPjP (1991).

Heritage Environmental Services, Inc. (HERITAGE) owns and operates a commercial and industrial waste storage and treatment facility in Lemont Township, unincorporated Cook County, Illinois (see Figures 1 and 2 in Appendix I). HERITAGE also engages in the cleaning of industrial and marine storage vessels at this facility. As part of the requirements under the facility's RCRA permit, the facility has been requested by the Illinois Environmental Protection Agency's (IEPA) Division of Land Pollution Control (DLPC) to conduct a RCRA Facility Investigation (RFI) and as necessary to implement a Corrective Action Plan (CAP). The purpose of the RFI is to determine whether releases of hazardous wastes and hazardous constituents have occurred from any of the solid waste management units (SWMUs) identified

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during the IEPA's RCRA Facility Assessment (RFA) as listed in Table 1 - Appendix II, and the nature and extent of these releases. Based upon the results of the RFI, a CAP will be developed and implemented by HERITAGE as necessary to protect the human health and the environment from all releases of hazardous wastes and hazardous constituents, listed in Appendix H of 35 IAC Part 721.

The RFI Work Plan describes procedures for performing an evaluation of potential releases at the SWMUs as identified in Table 1 at the HERITAGE - Lemont facility. Table 1 also presents the environmental element of concern at each of the SWMUs as identified in the permit.

This RFI Work Plan describes the location and characteristic of each SWMU; discusses the integrity of the secondary containment where of concern, the specific sampling requirements at each SWMU where required; the rationale for collection of samples, test parameters; and summarizes quality assurance/quality control (QA/QC) requirements for the investigation.

The RFI will be conducted in three phases;

- Phase I is to provide information on the characteristics and integrity of each SWMU and to conduct the necessary field activities to evaluate the potential for a release to occur to the soil or air from these SWMUs.

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- Phase II may be required if the IEPA's DLPC determines that it is necessary to define the extent of any release identified as having occurred or is occurring to the soils and air from any SWMU or if the results are inconclusive.

- Phase III will be required if the IEPA's DLPC determines that hazardous wastes or constituents have potentially migrated to the groundwater. The purpose of the Phase III efforts are to define the extent of the release and its migration on and off-site within the groundwater.

This QAPjP has been prepared to address the Phase I activities. In the event that Phase II and/or Phase III activities are required this QAPjP will be amended to appropriately address these activities.

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1.0 PROJECT DESCRIPTION

1.1 Facility Background

1.1.1 Facility Description

The HERITAGE facility is located on the north bank of the Chicago Sanitary and Ship Canal, Mile 301.2 in Lemont Township, Cook County, Illinois. The HERITAGE facility is a commercial industrial waste storage and treatment facility which also engages in the cleaning of industrial and marine storage vessels. The location of the facility is shown in Figure 1, Appendix I and a plan of the existing operating area of the facility is presented in Figure 2.

The operating portion of the facility occupies approximately 8.7 acres of the 17.2 acres of property leased from the Metropolitan Water Reclamation District of Greater Chicago. As a result of its activities, HERITAGE has located on-site a variety of hazardous materials and wastes which may include ignitable, corrosive, reactive and toxic substances. A listing of the materials accepted at the HERITAGE facility are presented in Appendix III.

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1.1.2 Facility History

The property occupied by HERITAGE is owned by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) (formerly Metropolitan Sanitary District of Greater Chicago) and leased to HERITAGE. Prior to December 1992, the Lemont Industrial District leased the property from the MWRDGC and in turn subleased the 17.2 acres to HERITAGE. Based upon records from the Lemont Industrial District, Inc., the property was leased to Marine Fleeting Company which repaired and maintained fleeting and storage of barges and boats from May 1965 to April 1966. From July 1971 to May 1979, Certified Cleaning Services leased the property for the same purpose as Marine Fleeting. In late 1980 Petrochem subleased the property from the Lemont Industrial District. At this time, the property was undeveloped. With occupancy of the site by Petrochem, the office/maintenance shop building and parking areas were constructed. Petrochem was primarily involved in the cleaning of industrial marine vessels. In 1981, the tank farm was constructed. During the time period from 1981 to 1987, Petrochem provided maintenance and cleaning services and stored and disposed of oily waste, hazardous waste fuels and fuels/oils at and from its tank farm facility. It also provided brokering services for other wastes generated in responding to emergency spills.

In 1987, Petrochem constructed an aerosol can crushing unit which was located to the southwest of the tank farm in the area which is presently south of the Van

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Trailer Storage Area. The facility in 1987 consisted of the office/maintenance shop, the tank farm, truck transfer area, container storage area, the aerosol crushing unit and the barge unloading area. All waste materials brought in to the facility were stored and processed in the appropriate manner within these areas.

In September 1988, the aerosol can crushing unit burned and was destroyed. This incident and the actions undertaken are described in the substance release report provided in the Part B Application Permit, Section L-Z, Attachment L-1.

In 1988 Petrochem was acquired by Heritage Environmental Services, Inc. and merged with Process Engineering Group to form Heritage Remediation/ Engineering, Inc. (HR/E). At this time the operations involving the storage and handling of wastes at the Lemont facility were incorporated into HERITAGE, separating this element from HR/E. Presently, HERITAGE - Lemont consists of the facilities as shown in Figure 2.

1.1.3 SWMUs

In accordance with condition B.1 of Section III, the following SWMUs, shown in Figure 2, were identified to be addressed in the RFI.

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— Truck Transfer Area

The truck transfer area is located as shown in Figure 2. All materials transported to the site are received in this area for acceptance prior to their being processed at the facility. Bulk organic-based materials are sampled and tested to ensure the material is within the permitted criteria for acceptance at the facility. Upon acceptance, the material is off-loaded at the liquid transfer station located along the north side of the tank farm and the south side of the truck transfer area.

— Outdoor Container Storage Area

The outdoor container storage area is located at the west end of the tank farm. This area is utilized to store containers which will be staged with other compatible material, and transported to other facilities for final management.

— Van Container Storage Area

The van container storage area is located to the south of the tank farm as shown in Figure 2. This area is used to temporarily hold and store containerized waste materials for further processing at the facility, materials resulting from industrial and governmental emergency response

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actions and the storage of materials in quantity to be transported to other facilities for final management.

— Roll-off Box Storage Area

The roll-off box storage area is located at the southeast corner of the tank farm area. This area is utilized to store roll-off containers of non-hazardous tank bottoms, emergency response debris, strained/filtered solids and debris, and "RCRA-empty" crushed drums.

— Drum Crushing Unit

The drum crushing unit is located at the southwest corner of the container storage and processing building. This unit is utilized to compact "RCRA-empty" drums.

— Barge Cleaning Transfer Point

The barge cleaning transfer point is the location along the west side of the barge slip at which all connections to hosing for pumping materials from the barges are located.

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— Old Aerosol Can Crushing Unit

This area was located south of the existing van trailer area and was utilized to empty and collect the contents of aerosol cans with the empty container being crushed and disposed as a "RCRA-empty" container. In 1988 this unit was destroyed by a fire. This area is now a bituminous paved area for the movement of vehicles into and out of the container storage and processing building and the van trailer storage area, see Figure 3.

— Underground Sanitary Waste Holding Tank

This unit consists of a 10,000 gallon sanitary waste holding tank and a 2,000 gallon overflow tank. These tanks are located to the west of the offices at the northwest corner of the office building. Sanitary wastes from the facility are accumulated within these tanks. The tanks are periodically pumped of their contents and transported to the Lemont Wastewater Treatment Plant for disposal.

— Drainage Ditch and Tile Leading to Chicago Sanitary and Ship Canal

The drainage ditch is located to the west of the office building and traverses the site from north to south. The drainage pattern is shown in

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Figure 7. At this time flow in the ditch occurs during rain events draining the site and is also the conveyance for water seepage from the Des Plaines River south dike during periods of high water. The seepage primarily occurs along the bank area adjacent to and north of the office parking area. In order to minimize the impact of this non-site surface water at the facility, it is HERITAGE's intent to either construct an asphalt lined swale or to install a culvert in place of the ditch as it exists along the upper portion of the site. At the discharge end of the ditch HERITAGE has constructed a weir and a control gate by which flow to the Chicago Sanitary and Ship Canal can be stopped in the event that a release occurs at the facility which might migrate via this route.

1.2 Past Data Collection Activity / Current Status

The investigative phase of the Phase I Remedial Facility Investigation will include:

- Advance soil borings at seven (7) SWMU locations at the site.
- Collect soil samples at twenty-four soil boring locations at the SWMUs. These soils samples will be collected from the material between the impervious surfaces and bedrock or from the surface to the top of bedrock (approximately 6 to 12 inches if existing).

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- Submit the soil samples, as collected at the soil boring locations for analysis to the laboratory for volatile, base/neutral and acid extractable semi-volatile organic constituent analysis.

- Submit soil samples from eighteen selected locations for TCLP metal analysis at the laboratory.

- Collect three soil samples from the office parking lot area to evaluate the potential impact of the asphaltic covering which is prevalent at the site.

- Collect and submit one sample of the contents of the Sanitary Waste Holding Tanks.

- Conduct an evaluation of the integrity of the secondary containment system at the Drum Crushing SWMU.

- Evaluation of the field investigative data with other data as collected in the performance of the Phase I RFI.

If the data collected during this investigation indicates the necessity for additional investigative studies, these will be identified as addendums to the Work Plan. HR/E will prepare the addendum for any additional investigative activities for submittal to the IEPA for review and approval prior to implementation.

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1.3 Sample Network Design and Rationale

The sample network design and rationale for sample locations are described in detail in the Phase I RFI Field Sampling Plan (FSP).

1.4 Parameters to be Tested and Frequency

Sample matrices, analytical parameters and frequencies of sample collection can be found in Table 2, Appendix II.

1.5 Data Quality Objectives

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

- Screening (DQO Level 1): This provides the lowest data quality but the most rapid results. It is often used for health and safety monitoring at the site, preliminary comparison to ARARs, initial site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening of

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alternatives (bench-scale tests). These types of data include those generated on-site through the use of pH, conductivity, and other real-time monitoring equipment at the site.

- Field Analyses (DQO Level 2): This provides rapid results and better quality than in Level 1. This level may include mobile lab generated data depending on the level of quality control exercised.
- Engineering (DQO Level 3): This provides an intermediate level of data quality and is used for site characterization. Engineering analyses may include mobile lab generated data and some analytical lab methods (e.g., laboratory data with quick turnaround used for screening but without full quality control documentation).
- Confirmational (DQO Level 4): This provides the highest level of data quality and is used for purposes of risk assessment, evaluation of remedial alternatives and PRP determination. These analyses require full laboratory analytical and data validation procedures in accordance with EPA and industry recognized protocol.
- Non-Standard (DQO Level 5): This refers to analyses by non-standard protocols, for example, when exacting detection limits or analysis of an unusual chemical compound is required. These analyses often require method development or adaptation. The level of quality control is usually similar to DQO Level 4 data.

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DQO levels of 4 and 5 will be used during the investigations at the HERITAGE - Lemont site. Soil samples will be analyzed in the laboratory for volatile and semi-volatile organic compounds, and TCLP metals using a DQO level of 5.

1.6 Project Schedule

Samples are planned to be collected in the Spring of 1994. See Figure 8, Appendix I, for the project schedule.

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2.0 PROJECT ORGANIZATION AND RESPONSIBILITY

HR/E will perform the field investigation activities and will direct and oversee the activities of subcontractors as utilized during these activities. HR/E will also prepare all reports as necessary. Figure 7, Appendix I, is a detailed organizational chart that shows the management responsibilities of project personnel and lines of authority and communication.

IEPA Project Manager

The designated Illinois Environmental Protection Agency Project Manager(PM) for the site will have the overall responsibility for administration of the investigation for the Agency.

HERITAGE Project Manager

Mr. Robert Garcia of HERITAGE is the Project Managers for HERITAGE. Mr. Garcia will be responsible for coordination and communications between HERITAGE, HR/E and the IEPA.

Contractor Project Manager

The Contractor Project Manager, Mr. Robert J. Millman of HR/E, will be responsible for coordinating all efforts necessary to implement the Sampling and Analysis Plan. These shall include the subcontracting and financial as well as technical aspects of the project. The Contractor Project Manager will report directly to the HERITAGE designated Project Manager. The Contractor Project Manager will be responsible for coordinating the efforts of the

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HERITAGE Project Manager, subcontractors, as well as other Contractor Corporate technical support.

Field Project Manager

The Contractor Field Manager, Mr. Ron Wilkins of HR/E will be responsible for coordination with subcontractors and conducting all field work. He will also be responsible for coordinating all field activities as they relate with the sample collection. This will include obtaining sample containers and delivery of the collected samples to the laboratory. He will also be responsible for coordinating all contractor personnel involved in the sampling, and other activities as conducted at the site. The Field Project Manager will be responsible for ensuring that the Health and Safety Plan and Field Sampling Plans are complied with by all personnel at the site. The Field Project Manager will report to the Project Manager.

QA Director

The QA director is Mr. Roger J. Breitenfield. The QA director will remain independent of direct job involvement and day-to-day operations, and has direct access to corporate executive staff as necessary to resolve any QA dispute. He is responsible for auditing the implementation of the QA program in conformance with the demands of specific investigations, HR/E's policies, and IEPA requirements. Specific functions and duties include:

- Provide QA audit on various phases of the field operations;
- Review and approval of QA plans and procedures;

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- Providing QA technical assistance to project staff;
- Reporting on the adequacy, status, and effectiveness of the QA program on a regular basis to the project manager.

Heritage Laboratories

Heritage Laboratories will conduct all analyses of the soil and any necessary groundwater samples as collected by HR/E. The responsibility of the laboratory personnel are:

Laboratory Project Manager - Dawn Siekerman

- Ensures all resources of the laboratory are available on an as-required basis;
- Overview of final analytical reports; signs completed report package;
- Approval of the QAPjP.

Laboratory Operations Manager - Melody M. Carroll

- Coordinates laboratory analyses;
- Supervises in-hours Chain-of-Custody;
- Schedules sample analyses;
- Oversees data review;
- Oversees preparation of analytical reports;
- Approves final analytical reports prior to submission to HR/E.

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Laboratory Quality Assurance Officer - Christine Sarkan

- Overview laboratory quality assurance;
- Overview QA/QC documentation;
- Conduct detailed data review;
- Decides laboratory corrective actions, if required;
- Technical representation of laboratory QA procedures;
- Preparation of laboratory Standard Operation Procedures;
- Signs completed analytical reports;
- Approval of the QAPjP

Laboratory Sample Custodian - Kyle Sowatzke

- Receive and inspect the incoming sample containers;
- Record the condition of the incoming sample containers;
- Sign appropriate documents;
- Verify Chain-of-Custody and its correctness;
- Notify laboratory manager and laboratory supervisor of sample receipt and inspection;
- Assign a unique identification number and customer number, and enter each into the sample receiving log;
- With the help of the laboratory manager, initiate transfer of the samples to appropriate lab sections;
- Control and monitor access/storage of samples and extracts.

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Primary responsibility for project quality rests with HR/E's Project Manager. Independent quality assurance will be provided by the Laboratory Project Manager and QA Officer prior to release of all data to HR/E.

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3.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The Overall QA objective is to develop and implement procedures for field sampling, Chain-of-Custody, laboratory analysis, and reporting that will provide data of the known quality which are usable, defensible and can be used for decision making.

Specific procedures for sampling, Chain-of-Custody, laboratory instruments calibration, laboratory analysis, reporting of data, internal quality control, audits, preventive maintenance of field equipment, and corrective action are described in other sections of this QAPjP. The purpose of this section is to address the specific objectives for accuracy, precision, completeness, representativeness, and comparability.

3.1 Level of Quality Control Effort

Field blank, trip blank, duplicate and matrix spike samples will be analyzed to assess the quality of the data resulting from the field sampling program. Field and trip blanks consisting of distilled water, will be submitted to the analytical Laboratories to provide the means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the site which may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Duplicate samples are analyzed to check for sampling and analytical reproducibility. Matrix spikes provide information about the effect of the sample matrix on the digestion and measurement methodology. All matrix spikes are performed in duplicate and are hereinafter referred to as MS/MSD samples. One matrix spike/matrix spike duplicate is collected for every 20 or fewer investigative samples or one for every

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set of samples. MS/MSD samples are designated to be collected for organic analysis only.

The general level of the QC effort will be one field duplicate and one field blank for every 10 or fewer investigative samples.

MS/MSD samples are investigative samples. Soil MS/MSD samples will require no extra volume for volatile organic constituents. However, aqueous MS/MSD samples must be collected at triple the volume for volatile organic constituents. One MS/MSD sample will be collected/designated for every 20 or fewer investigative samples per sample matrix (i.e., soil, groundwater). The number of duplicate samples to be collected are listed in Table 2, Appendix II. Sampling procedures are specified in the Phase I RFI Field Sampling Plan.

All samples will be sent to Heritage Laboratories for analysis. The analysis will be performed in accordance with the procedures as presented in Table 3, Appendix II. The laboratory protocols and QC effort for the performance of these analysis are specified in Sections 8, 9, and 11 of Appendix IV.

The procedure for performing the field screening of the soil sampled by field GC for BETX are presented in Section 6 of Appendix IV. The QC level of effort associated with the performance of these field analysis are presented in Section 3.0 of Appendix IV.

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3.2 Accuracy, Precision, and Sensitivity of Analysis

The fundamental QA objective with respect to accuracy, precision, and sensitivity of laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols.

SOPs for laboratory analyses of the specific compounds are identified in Table 3, Appendix II. The required accuracy, precision, sensitivity of the analyses are addressed in Section 5, Appendix IV.

3.3 Completeness, Representativeness and Comparability

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that Heritage Laboratories will provide data meeting QC acceptance criteria for 95 percent or more for all samples tested using the methods identified in Table 3, Appendix II. Following completion of the analytical testing, the percent completeness will be calculated by the following equations: completeness (%): =

$$\frac{\text{(number of valid data)}}{\text{(number of sample collected for each parameter analyzed)}} \times 100$$

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Representativeness expresses the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Representativeness is a qualitative parameter which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of site conditions. During development of this network, consideration was given to site investigations, existing analytical data, physical setting, and constraints of the site. The rationale of the sampling network is discussed in detail in the field sampling plan (FSP). Representativeness will be satisfied by insuring that the FSP is followed, proper sampling technique are used, proper analytical procedure are followed and holding times of the samples are not exceeded in the laboratory. Representativeness will be assessed by the analysis of field duplicated samples.

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 on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in the QAPjP, are expected to provide comparable data. These new analytical data, however, may not be directly comparable to existing data because of difference in procedures and QA objectives.

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4.0 SAMPLING PROCEDURES

Sampling procedures are described in the Phase I RFI Field Sampling Plan (FSP).

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operating procedures and the individual method requirements in a manner consistent with the appropriate methods as outlined in Appendix IV.

8.3.2 Quality Control Checks

These specifications include the types of audits required (sample spikes, surrogate spikes, reference samples, controls, blanks), the frequency of each audit, the compounds to be used for sample spikes and surrogate spikes, and the quality control acceptance criteria for these audits.

The laboratory will document, in each data package provided, that both initial and ongoing instrument and analytical QC functions have been met. Any samples analyzed in non-conformance with the QC criteria will be reanalyzed by the laboratory, if sufficient sample volume is available. Sufficient volume of samples will be collected for reanalyses.

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9.0 DATA REDUCTION, VALIDATION AND REPORTING

9.1 Field Measurements and Sample Collection

Raw data from field measurements and sample collection activities will be appropriately recorded in the field log book. The data will be copied and replaced into the central project file.

9.2 Laboratory Services

Heritage Laboratories will perform in-house analytical data reduction and validation under the direction of the Laboratory QA Officer in accordance with Section 12, Appendix IV. The Laboratory QA Officer is responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other notations which would caution the data user of possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as follows:

- Raw data produced by the analyst is turned over to the respective area supervisor.
- The area supervisor reviews the data for attainment of quality control criteria as outlined in SOP protocols.
- Upon acceptance of the raw data by the area supervisor, a computerized report is generated and sent to the Laboratory QA Officer.

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- The Laboratory QA Officer or his designated representative will complete a thorough audit of reports at a frequency of one in ten, and an audit of every report for consistency.
- The QA Officer and area supervisors will decide whether any sample reanalysis is required.
- Upon acceptance of the preliminary reports by the QA Officer, final reports will be generated and signed by the QA Officer. The laboratory package shall be presented in the same order in which the samples were analyzed.
- The Project Manager will sign the completed report package.

The laboratory will report the data in the same chronological order of the analyses along with QC data. The laboratory will provide the following information to HR/E in each analytical data package submitted:

1. Cover sheets listing the samples included in the report and narrative comments describing problems encountered in analysis.
2. Tabulated results compound identified and quantified.
3. Analytical results for QC sample spikes, sample duplicates, initial and a continuous calibration verifications of standards and blanks, standard procedural blanks and laboratory control samplers.
4. Tabulation of instrument detection limits determined in pure water.

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5. Raw data system printouts (or legible photocopies) identifying date of analyses, analyst, parameters determined, calibration curve, calibration verifications, method blanks, sample and any dilutions, sample duplicates, spikes and control samples.

HR/E assessment will be accomplished by the joint efforts of the Data Reviewer and Project Manager. The data assessment by the Project Manager will be based on the criteria that the sample was properly collected and handled according to the FSP and Section 5 of this QAPjP.

HR/E's Reviewer will conduct a systematic review of the data for compliance with the established QC criteria based on the spike, duplicate and blank results provided by the laboratory. An evaluation of data accuracy, precision, sensitivity and completeness, based on criteria in Section 12, will be performed and presented in project report.

The Data Review will identify any out-of-control data points and data omissions and interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the Project Manager based on the extent of the deficiencies and their importance in the overall context of the project.

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10.0 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 FSP and QAPjP. The audits of field and laboratory activities include two separate independent parts: Internal and External audits.

10.1 Field Audits

Internal audits of field activities (sampling and measurements) will be conducted by the HR/E's QA Officer and/or Project Manager. 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, Chain-of-Custody, etc. These audits will be occur at the onset of the project to verify that all established procedures are followed. Follow-up audits will be conducted to correct deficiencies, and to verify that QA procedures are maintained throughout the remediation. The audits will involve review of field measurement records, instrumentation calibration records, and sample documentation.

10.2 Laboratory Audits

The internal performance and system audits of laboratory is conducted by the QA Manager of the laboratory in accordance with Section 14, Appendix IV. The QA Officer will review all documentation of the audits performed. The system audits

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include examination and laboratory documentation on sample receiving, sample log-in, sample storage, Chain-of-Custody procedure, sample preparation and analysis, instrument operating records, etc. The performance audits may consist of blind QC samples being prepared and submitted to the laboratory for analysis throughout the project. The QA Officer evaluates the analytical results of these blind performance samples to ensure the laboratories maintain a good performance.

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11.0 PREVENTATIVE MAINTENANCE PROCEDURES

11.1 Field Equipment/Instruments

The field equipment for this project includes a field GC. Specific preventative maintenance procedures to be followed for field equipment are those recommended by the manufacturer.

Field instruments will be checked and calibrated at GeoTrace's offices before they are shipped or carried to the field. These instruments will be checked and calibrated daily before use. Calibration checks will be performed after every 10 samples and will be documented in the field log book.

Backup instruments and equipment are available within three-day shipment.

11.2 Laboratory Instruments

As part of their QA/QC Program, a routine preventative maintenance program is conducted by Heritage Laboratories (HL) to minimize the occurrence of instrument failure and other system malfunctions, Section 10, Appendix IV. HL has an internal group to perform routine scheduled maintenance, and to repair or to coordinate with the vendor for the repair of all instruments. All laboratory instruments are maintained in accordance with manufacturer's specifications and the requirements of the specific method employed. This maintenance is carried out on a regular, scheduled basis, and

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is documented in the laboratory instrument service logbook for each instrument. Emergency repair or scheduled manufacture's maintenance is provided under a repair and maintenance contract with factory representatives.

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12.0 SPECIFIC ROUTINE PROCEDURES TO ASSESS DATA PRECISION, ACCURACY, AND COMPLETENESS

12.1 Field Measurements

Field data will be assessed by the site Quality Control (QC) Officer. The site QC Officer will review the field results for compliance with the established QC criteria that are specified in the QAPjP and FSP. Accuracy of the field measurements will be assessed using daily instrument calibration, calibration check, and analysis of blanks. Precision will be assess on the basis of reproducibility by multiple readings of a single sample: Data completeness will be calculated using Equation 12-1.

$$Completeness = \frac{Valid\ Data\ Obtained}{Total\ Data\ Planned} \times 100 \qquad Equ.12\text{-}1$$

12.2 Laboratory Data

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

12.2.1 Precision

Precision of laboratory analysis will be assessed by comparing the analytical results between matrix spike/matrix spike duplicate (MS/MSD) for organic analysis, and laboratory duplicate analyses for inorganic analysis. The relative

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percent difference (%RPD) will be calculated for each pair of duplicate analysis using the Equation 12-2.

$$\% RPD = \frac{S - D}{(S + D) / 2} \times 100 \qquad Equ.\ 12\text{-}2$$

Where: S = First sample value (original or MS value)
D = Second sample value (duplicate or MSD value)

12.2.2 Accuracy

Accuracy of laboratory results will be assessed for compliance with the established QC criteria that are described in Section 3 of the QAPjP using the analytical results of method blanks, reagent/preparation blank, matrix spike/matrix spike duplicate samples, field blank, and bottle blanks. The percent recovery (%R) of matrix spike samples will be calculated using Equation 12-3.

$$\% R = \frac{A - B}{C} \times 100 \qquad Equ.\ 12\text{-}3$$

Where:

A = The analyte concentration determined experimentally from the spiked sample;

B = The background level determined by a separate analysis of the unspiked sample and;

C = The amount of the spike added.

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12.2.3 Completeness

The data completeness of laboratory analyses results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using Equation 12-1.

12.2.4 Sensitivity

The achievement of method detection limits depend on instrumental sensitivity and matrix effects. Therefore, it is important to monitor the instrumental sensitivity to ensure the data quality through constant instrument performance. The instrumental sensitivity will be monitored through the analysis of method blank, calibration check sample, and laboratory control samples, etc.

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13.0 CORRECTIVE ACTIONS

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

For noncompliance problems, a formal corrective action program will be determined and implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying HR/E's Project Manager.

Any nonconformance with the established quality control procedures in the QAPjP or FSP will be identified and corrected in accordance with the QAPjP.

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 insufficient, work may be stopped by stop-work order by the HR/E Project Manager.

13.1 Sample Collection/Field Measurements

Technical staff and project personnel will be responsible for reporting all suspected technical or QA nonconformances or suspected deficiencies of any activity or issued document by reporting the situation to HR/E's Project Manager. This manager will be responsible for assessing the suspected problems in consultation with the Project QA

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Manager on making a decision based on the potential for the situation to impact the quality of the data.

The manager will be responsible for ensuring that corrective action for nonconformances are initiated no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed.

Corrective action for field measurements may include:

- Repeat the measurement to check the error;
- Check for all proper adjustments for ambient conditions such as temperature;
- Check the batteries;
- Re-Calibration;
- Check the calibration;
- Replace the instrument or measurement devices;
- Stop work (if necessary).

13.2 Laboratory Analyses

Laboratory Corrective Actions

The specific corrective action procedures as outlined in Section 13, Appendix IV will be followed.

14.0 QUALITY ASSURANCE REPORTS TO MANAGEMENT

The audit report(s) will be submitted to the site manager in accordance with QAPjP Section 12.

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APPENDIX I

FIGURES

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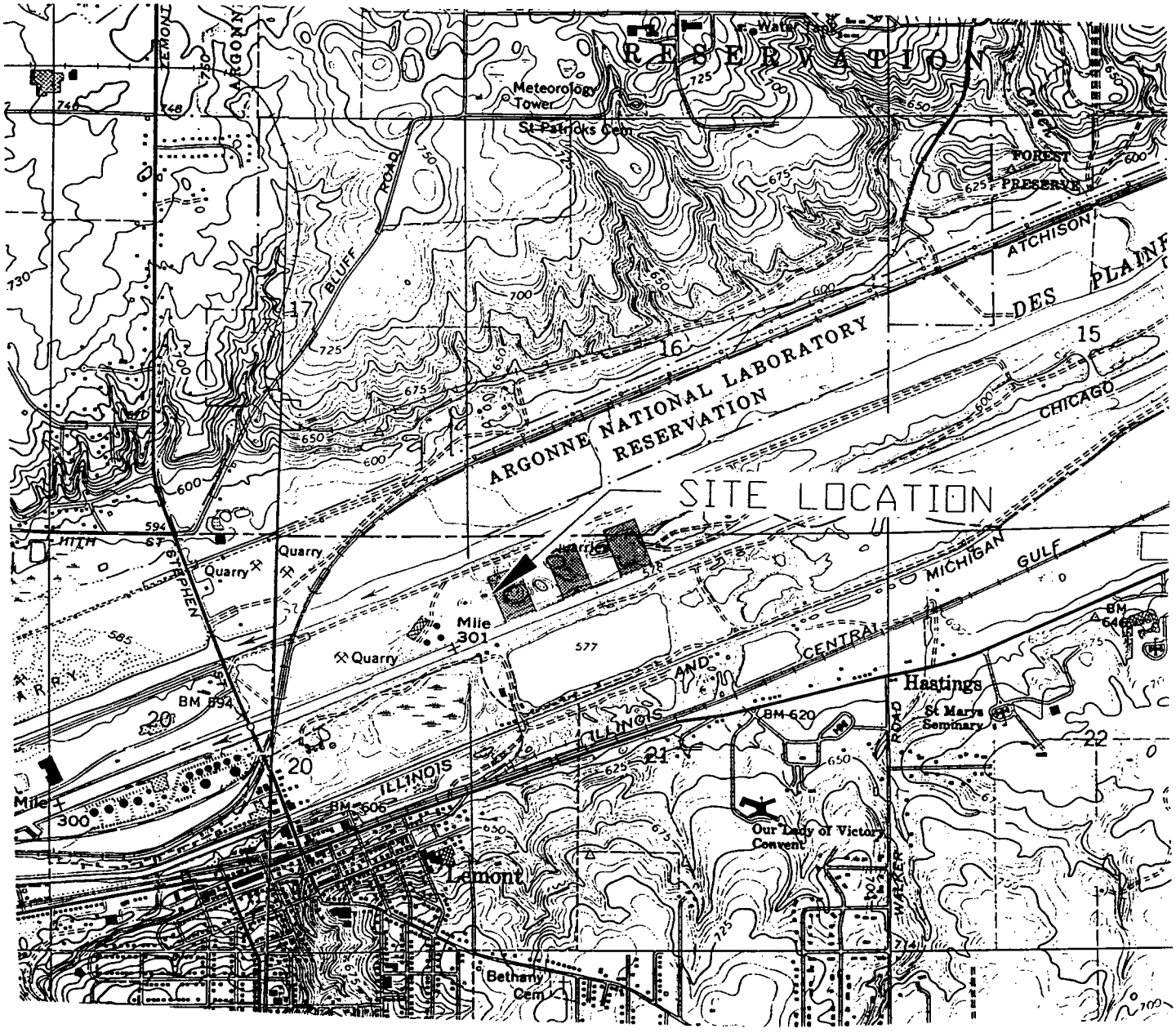


SAG BRIDGE AND ROMEOVILLE QUADRANGLES

Illinois 7.5 Minute Series

SCALE

2000' 0 1000' 2000'

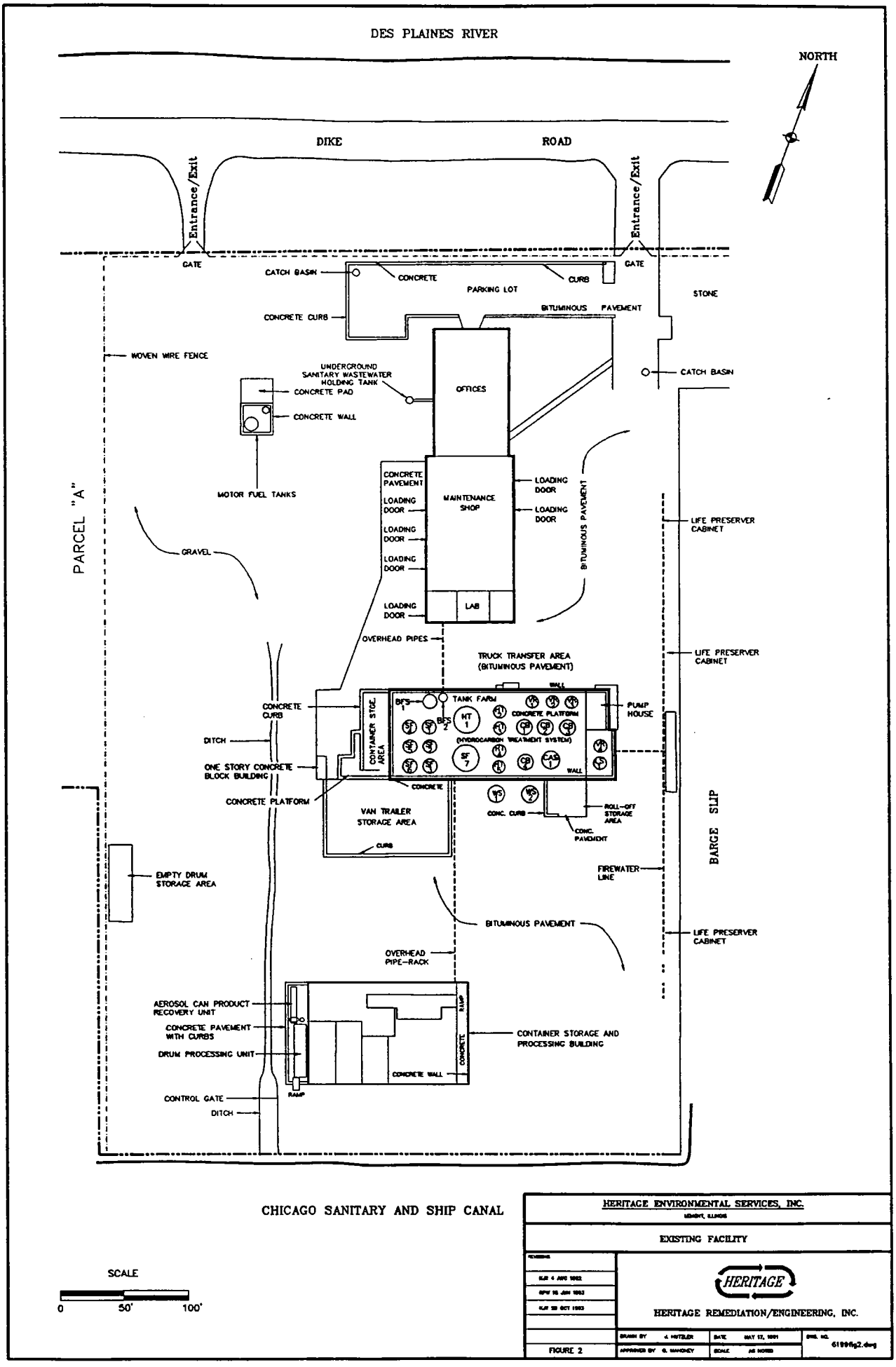
NORTH

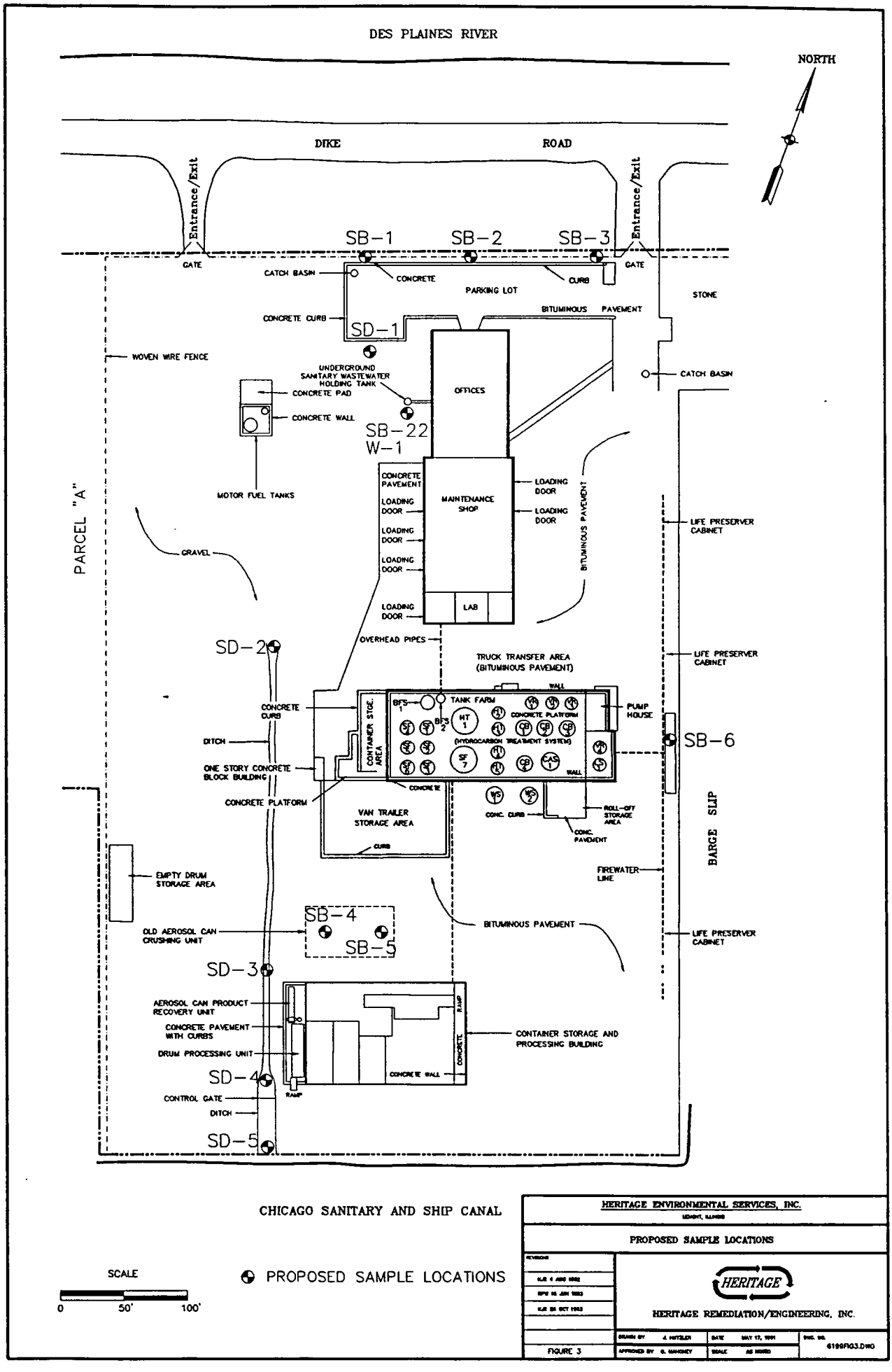
HERITAGE TREATMENT CENTER

LEMONT, ILLINOIS

SITE LOCATION MAP

REVISIONS			
	HERITAGE REMEDIATION/ENGINEERING, INC.		
	DRAWN BY KJR	DATE 26 OCT 1993	FIGURE 1
	APPROVED BY	SCALE AS SHOWN	JOB NO. 6199


DES PLAINES RIVER
NORTH
DIKE
ROAD
Entrance/Exit
Entrance/Exit
GATE
GATE
CATCH BASIN
CONCRETE
CURB
PARKING LOT
STONE
CONCRETE CURB
BITUMINOUS PAVEMENT
WOVEN WIRE FENCE
UNDERGROUND SANITARY WASTEWATER HOLDING TANK
CONCRETE PAD
CONCRETE WALL
OFFICES
CATCH BASIN
MOTOR FUEL TANKS
CONCRETE PAVEMENT
LOADING DOOR
MAINTENANCE SHOP
LOADING DOOR
LOADING DOOR
LOADING DOOR
LOADING DOOR
LOADING DOOR
LAB
BITUMINOUS PAVEMENT
LIFE PRESERVER CABINET
PARCEL "A"
GRAVEL
OVERHEAD PIPES
TRUCK TRANSFER AREA (BITUMINOUS PAVEMENT)
LIFE PRESERVER CABINET
CONCRETE CURB
TANK FARM
CONCRETE PLATFORM
PUMP HOUSE
CONTAINER STGE. AREA
(HYDROCARBON TREATMENT SYSTEM)
DITCH
ONE STORY CONCRETE BLOCK BUILDING
CONCRETE
CONCRETE PLATFORM
VAN TRAILER STORAGE AREA
CONC. CURB
ROLL-OFF STORAGE AREA
CONC. PAVEMENT
CURB
BARGE SLIP
EMPTY DRUM STORAGE AREA
FIREWATER LINE
BITUMINOUS PAVEMENT
LIFE PRESERVER CABINET
OVERHEAD PIPE-RACK
AEROSOL CAN PRODUCT RECOVERY UNIT
CONCRETE PAVEMENT WITH CURBS
DRUM PROCESSING UNIT
RAMP
CONCRETE
CONTAINER STORAGE AND PROCESSING BUILDING
CONCRETE WALL
CONTROL GATE
RAMP
DITCH
CHICAGO SANITARY AND SHIP CANAL
SCALE
0
50'
100'
HERITAGE ENVIRONMENTAL SERVICES, INC.
EXISTING FACILITY
HERITAGE
HERITAGE REMEDIATION/ENGINEERING, INC.
FIGURE 2



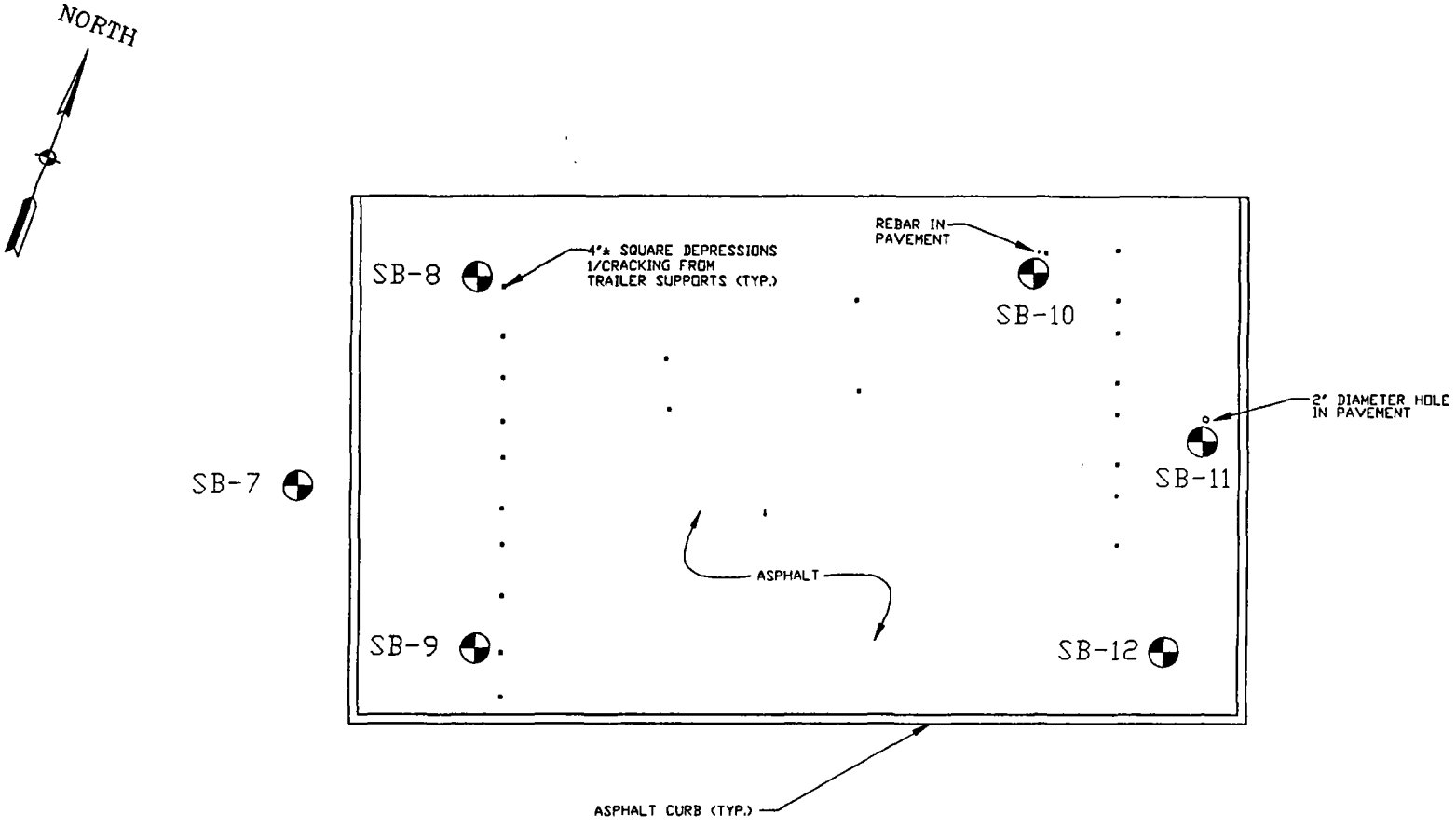
HERITAGE ENVIRONMENTAL SERVICES, INC.

PROPOSED SAMPLE LOCATIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

FIGURE 3

6199FIG3.DWG



⊕ - PROPOSED SOIL SAMPLE LOCATION

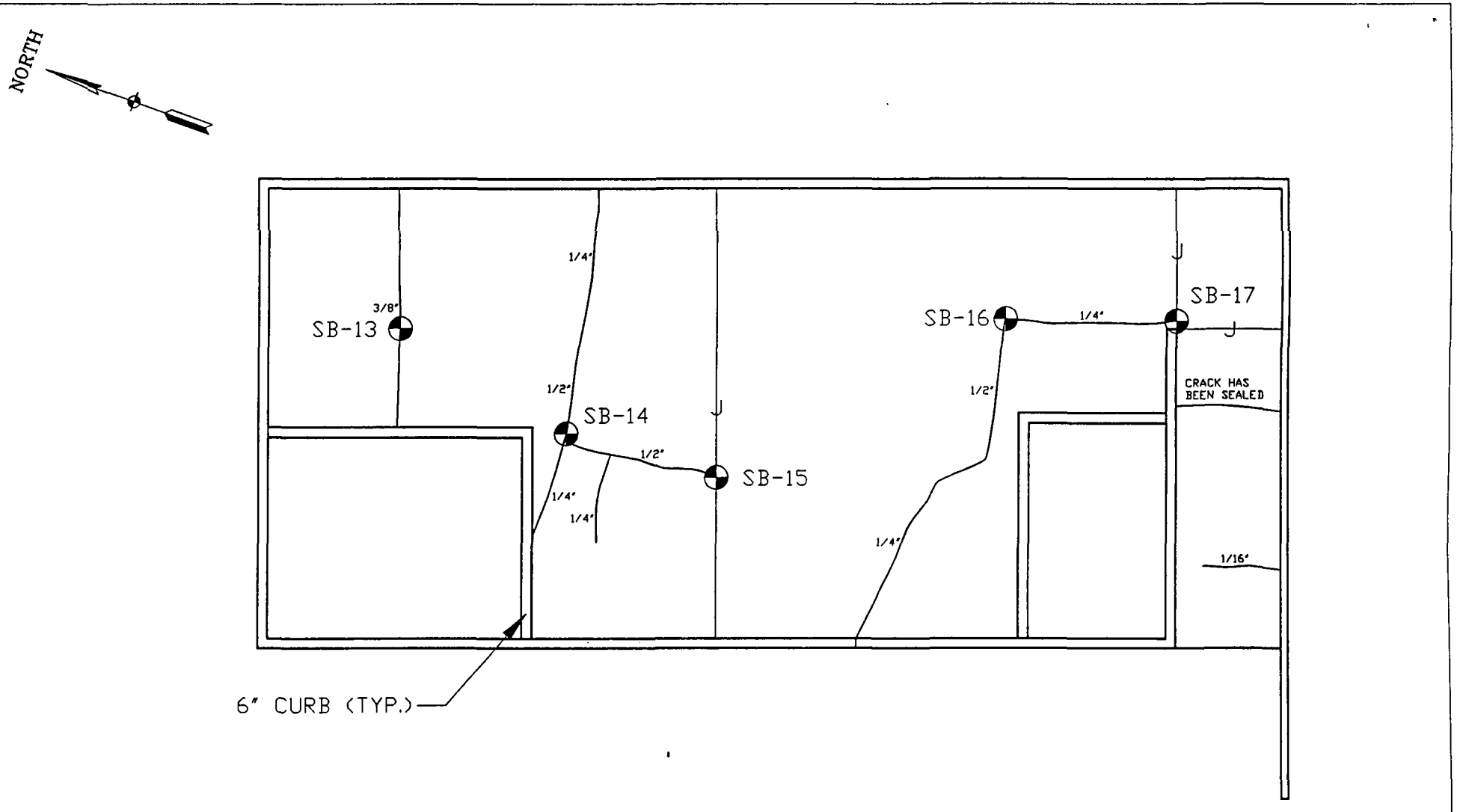
SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

VAN TRAILER FARM - PROPOSED SAMPLE LOCATIONS

REVISIONS			
	HERITAGE REMEDIATION/ENGINEERING, INC.		
	DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 4
	APPROVED BY	SCALE 1"=20'	JOB NO. 6119



- PROPOSED SOIL SAMPLE LOCATION

J - DENOTES CONSTRUCTION JOINT

SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

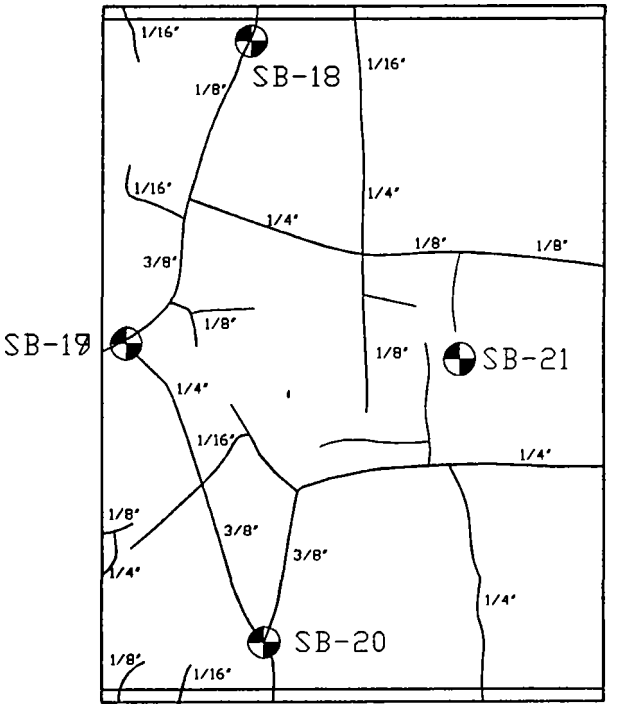
OUTDOOR CONTAINER STORAGE AREA

REVISIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

	DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 5
	APPROVED BY	SCALE 1"=10'	JOB NO. 6119

NORTH



⊕ - PROPOSED SOIL SAMPLE LOCATION

SCALE

0 10' 20'

HERITAGE TREATMENT CENTER
LEMONT, ILLINOIS

ROLL-OFF STORAGE AREA

REVISIONS

HERITAGE REMEDIATION/ENGINEERING, INC.

DRAWN BY KJR	DATE OCT. 25, 1993	FIGURE 6
APPROVED BY	SCALE 1"=10'	JOB NO. 6119

FIGURE 7

PROJECT ORGANIZATIONAL CHART

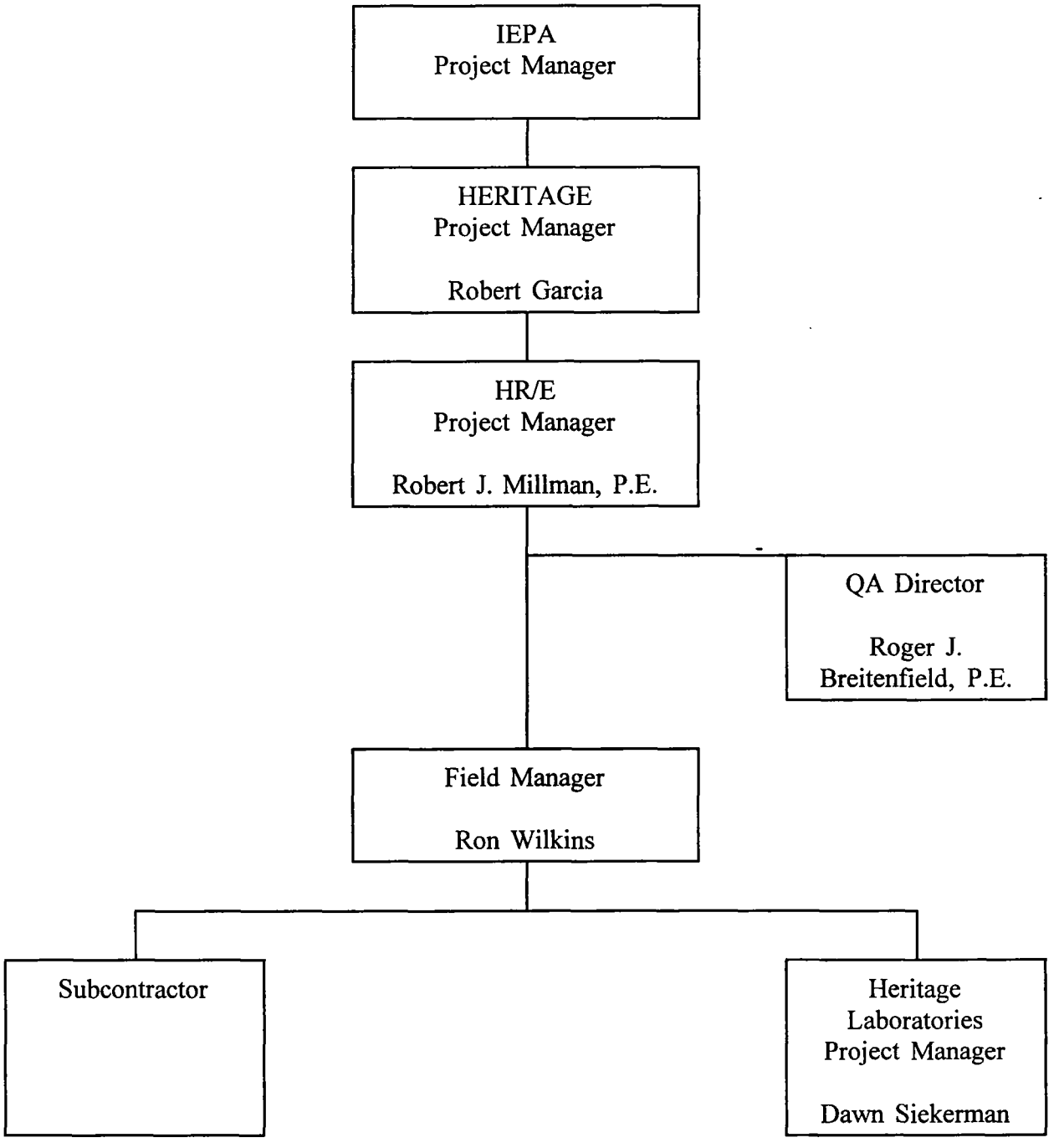


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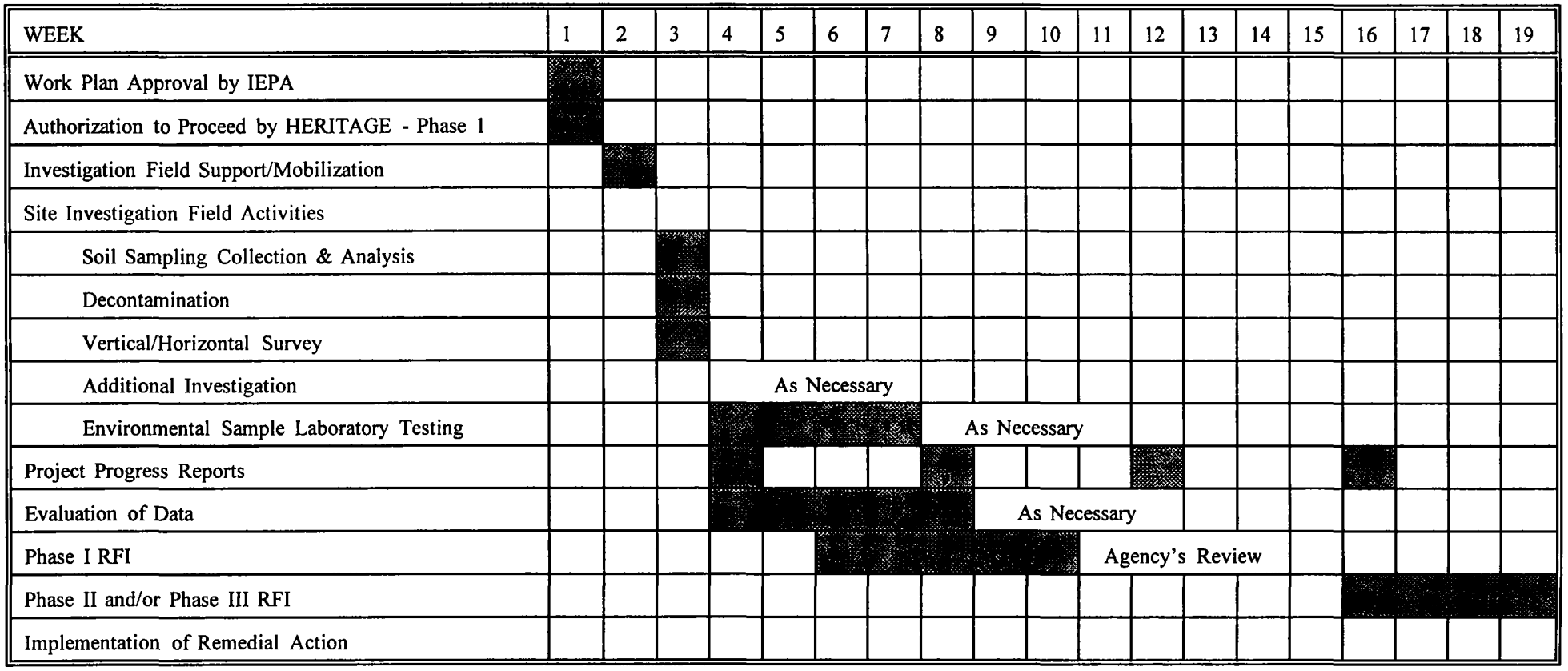
FIGURE 8

PROJECT SCHEDULE



APPENDIX II

TABLES

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TABLE 1

SOLID WASTE MANAGEMENT UNITS
Heritage Environmental Services, Inc.
Lemont, Illinois

Solid Waste Management Unit (SWMU)	Environmental Element of Concern
Truck Transfer Area	Secondary Containment System Integrity
Outdoor Container Storage Area	Secondary Containment System Integrity
Van Trailer Container Storage Area	Soil and Secondary Containment System Integrity
Old Aerosol Can Crushing Unit	Soil
Roll-off Box Storage Area	Secondary Containment System Integrity and Soil Sampling During Closure
Drum Crushing Unit	Secondary Containment Integrity and Soil Sampling During Closure
Underground Sanitary Waste Holding Tanks	Tank Integrity and SW846-8240 Run-On Contents
Barge Cleaning Transfer Point	Soil
Drainage Ditch and Tile Leading to Chicago	Soil Along Length of Ditch and Provisions for Lining of Ditch

Recycled Paper

TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field Measurements	Laboratory Parameters[1]	Analytical Method[1]	# of Samples	Quality Control Samples				Total # of Samples
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
Soils									
Outdoor Container Storage Area	---	Volatile Organics	SW846	5	N/A	N/A	N/A	N/A	5
	---	Semi-Volatile Organics	SW 846	5	N/A	N/A	N/A	N/A	5
	---	TCLP Metals Organics	SW 846	5	N/A	N/A	N/A	N/A	5
Van Trailer Container Storage Area	---	Volatile Organics	SW846	6	1	N/A	N/A	N/A	7
	---	Semi-Volatile Organics	SW 846	6	1	N/A	N/A	N/A	7
	---	TCLP Metals	SW846	6	1	N/A	N/A	N/A	7
Old Aerosol Can Crushing Unit	---	Volatile Organics	SW846	2	N/A	N/A	N/A	N/A	2
	---	Semi-Volatile Organics	SW846	2	N/A	N/A	N/A	N/A	2
	---	TCLP Metals	SW846	2	N/A	N/A	N/A	N/A	2
Roll-off Box Storage Area	---	Volatile Organics	SW846	4	N/A	N/A	N/A	N/A	4
	---	Semi-Volatile Organics	SW846	4	N/A	N/A	N/A	N/A	4
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---
Barge Cleaning Transfer Point	---	Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	Semi-Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---

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HERITAGE®

TABLE 2

Summary of Samples Collected for Analysis

Sample Type/Location	Field Measurements	Laboratory Parameters[1]	Analytical Method[1]	# of Samples	Quality Control Samples				Total # of Samples
					# Field (2) Duplicates	# Field Blanks	# of Trip Blanks	# of (3) MS/MSD	
Drainage Ditch	---	Volatile Organics	SW846	5	1	N/A	N/A	1	7
	---	Semi-Volatile Organics	SW846	5	1	N/A	N/A	1	7
	---	TCLP Metals	SW846	5	1	N/A	N/A	N/A	6
Other - Parking Lot	---	Volatile Organics	SW846	3	1	N/A	N/A	N/A	4
	---	Semi-Volatile Organics	SW846	3	1	N/A	N/A	N/A	4
	---	TCLP Metals	SW846	---	N/A	N/A	N/A	N/A	---
Sanitary Holding Tanks	---	Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	Semi-Volatile Organics	SW846	1	N/A	N/A	N/A	N/A	1
	---	TCLP Metals	Sw846	---	N/A	N/A	N/A	N/A	---
Soils Total	---	Volatile Organics	SW846	27	3	N/A	N/A	1	31
	---	Semi-Volatile Organics	SW846	27	3	N/A	N/A	1	31
	---	TCLP Metals	SW846	18	2	N/A	N/A	N/A	20
Water									
Sanitary Holding Tanks	---	Volatile Organics	SW 846	1	N/A	1	1	N/A	3

(1) See Table 2 for a listing of specific analyses, methodology and detection concentrations.
(2) One duplicate for every 10 soil samples.
(3) One matrix spike for every 20 soil samples.

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TABLE 3
LABORATORY ANALYSES AND QUANTITATION LIMITS

COMPOUNDS	CAS NUMBER	QUANTITATION LIMITS	METHOD
		SOIL - ug/kg	
VOLATILE ORGANICS			
Chloromethane	74-87-3	10	SW846 - 8240
Bromomethane	74-83-9	10	SW846 - 8240
Vinyl Chloride	75-01-4	10	SW846 - 8240
Chloroethane	75-00-3	100	SW846 - 8240
Methylene Chloride	75-09-2	5	SW846 - 8240
Acetone	67-64-1	20	SW846 - 8240
Carbon Disulfide	75-15-0	5	SW846 - 8240
1,1-Dichloroethene	75-35-4	5	SW846 - 8240
1,1-Dichloroethane	75-34-3	5	SW846 - 8240
1,2-Dichloroethene (Total)	540-59-0	5	SW846 - 8240
2-Butanone	78-93-3	5	SW846 - 8240
1,1,1-Trichloroethane	71-55-6	5	SW846 - 8240
Carbon Tetrachloride	56-23-5	5	SW846 - 8240
Bromodichloromethane	75-27-4	5	SW846 - 8240
1,2-Dichloropropane	78-87-5	5	SW846 - 8240
cis-1,3-Dichloropropene	10061-01-5	5	SW846 - 8240
Trichloroethene	79-01-6	5	SW846 - 8240
Dibromochloromethane	124-48-1	5	SW846 - 8240
1,1,2-Trichloroethane	79-00-5	5	SW846 - 8240
Benzene	71-43-2	5	SW846 - 8240
trans-1,3-Dichloropropene	10061-02-6	5	SW846 - 8240
Bromoform	75-25-2	5	SW846 - 8240
4-Methyl-2-pentanone	108-10-1	10	SW846 - 8240
2-Hexanone	591-78-6	10	SW846 - 8240
Tetrachloroethene	127-18-4	5	SW846 - 8240
Toluene	108-88-3	5	SW846 - 8240

TABLE 3 LABORATORY ANALYSES AND QUANTITATION LIMITS			
COMPOUNDS	**CAS NUMBER**	**QUANTITATION LIMITS**	**METHOD**
		SOIL - ug/kg	
VOLATILE ORGANICS			
1,1,2,2-Tetrachloroethane	79-34-5	5	SW846 - 8240
Chlorobenzene	108-90-7	5	SW846 - 8240
Ethylbenzene	100-41-4	5	SW846 - 8240
Stryene	100-42-5	5	SW846 - 8240
Xylenes (total)	1330-20-7	5	SW846 - 8240
Acrolein	107-02-8	50	SW846 - 8240
Acrylonitrile	107-13-1	70	SW846 - 8240
Fluorotrichloromethane	75-69-4	5	SW846 - 8240
Methylethyl Ketone	78-93-3	10	SW846 - 8240
Tetrahydrofuran	109-99-0	25	SW846 - 8240
Vinyl Acetate	10-05-4	10	SW846 - 8240
METALS			
TCLP Preparation	--	--	SW846 - 1311
TCLP Lead by FAA	--	20 *	SW846 - 7420
TCLP Lead by GFAA	--	5 *	SW846 - 7421
Total Lead by FAA/ICP	--	5000	SW846 - 7421

* ug/l on liquid extract.

APPENDIX III

LIST OF MATERIALS PERMITTED FOR STORAGE AND/OR TREATMENT

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HERITAGE ENVIRONMENTAL SERVICES, INC.
LEMONT, IL

LIST OF MATERIALS PERMITTED FOR STORAGE AND/OR TREATMENT

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
CHARACTERISTICALLY HAZARDOUS MATERIALS (IGNITABLE, CORROSIVE, REACTIVE OR HEAVY METAL-BEARING):					
D001	SOLID & LIQUID IGNITABLE INDUSTRIAL WASTES	D1,D2,D3,T1	IGNITABILITY	1000	300
D002	SOLID & LIQUID CORROSIVE INDUSTRIAL WASTES (ACIDS & CAUSTICS)	D1,D2,D3,T1	CORROSIVITY	400	100
D003	SOLID & LIQUID REACTIVE INDUSTRIAL WASTES (CYANIDE/SULFIDE-BEARING, OXIDIZERS)	D1,D2,D3	REACTIVITY	10	1
D004	ARSENIC-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D005	BARIUM-CONTAINING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D006	CADMIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D007	CHROMIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D008	LEAD-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D009	MERCURY-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D010	SELENIUM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D011	SILVER-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D018	BENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D019	CARBON TETRACHLORIDE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D020	CHLORDANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D021	CHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D022	CHLOROFORM-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D023	O-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D024	m-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D025	p-CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D026	CRESOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
D027	1,4-DICHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D028	1,2-DICHLOROETHANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D029	1,1-DICHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D030	2,4-DINITROTOLUENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D031	HEPTACHLOR (and its hydroxide)-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D032	HEXACHLOROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D033	HEXACHLOROBUTADIENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D034	HEXACHLOROETHANE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D035	METHYL ETHYL KETONE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D036	NITROBENZENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D037	PENTACHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D038	PYRIDINE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D039	TETRACHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D040	TRICHLOROETHYLENE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D041	2,4,5-TRICHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D042	2,4,6-TRICHLOROPHENOL-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
D043	VINYL CHLORIDE-BEARING INDUSTRIAL WASTES	D1,D2,D3,T1	TOXICITY	400	5
HAZARDOUS WASTE FROM NON-SPECIFIC SOURCES: (Hazardous Constituents Included w/Materials Description)					
F001	SPENT HALOGENATED SOLVENTS USED IN DEGREASING: TETRACHLOROETHYLENE, TRICHLOROETHYLENE, METHYLENE CHLORIDE, 1,1,1-TRICHLOROETHANE, CARBON TETRACHLORIDE, AND CHLORINATED FLUOROCARBONS	D1,D2,D3,T1	TOXIC	1000	300
F002	SPENT HALOGENATED SOLVENTS: TETRACHLOROETHYLENE, METHYLENE CHLORIDE, TRICHLOROETHYLENE, 1,1,1-TRICHLOROETHANE, CHLOROBENZENE, 1,1,2-TRICHLORO-1,1,2-TRIFLUOROETHANE, ORTHO-DICHLOROBENZENE, TRICHLOROFLUOROMETHANE AND 1,1,2-TRICHLOROETHANE	D1,D2,D3,T1	TOXIC	1000	300

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
F003	SPENT NON-HALOGENATED SOLVENTS: XYLENE, ACETONE, ETHYL ACETATE, ETHYL BENZENE, ETHYL ETHER, METHYL ISOBUTYL KETONE, N-BUTYL ALCOHOL, CYLCOHEXANONE, AND METHANOL	D1,D2,D3,T1	TOXIC, IGNITABLE	1000	300
F004	SPENT NON-HALOGENATED SOLVENTS: CRESOLS AND CRESYLIC ACID, AND NITROBENZENE	D1,D2,D3,T1	TOXIC	1000	300
F005	SPENT NON-HALOGENATED SOLVENTS: TOLUENE, METHYL ETHYL KETONE, CARBON DISULFIDE, ISOBUTANOL, PYRIDINE, BENZENE, 2-ETHOXYETHANOL AND 2-NITROPROPANE	D1,D2,D3,T1	TOXIC	1000	300
F006	WASTEWATER TREATMENT SLUDGES FROM ELECTROPLATING OPERATIONS (Camium, Hexavalent Chromium, Nickel, Complexed Cyanides)	D1,D2,D3,T1	TOXIC	100	20
F007	SPENT CYANIDE PLATING BATH SOLUTIONS FROM ELECTROPLATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F008	PLATING BATH RESIDUES FROM ELECTROPLATING OPERATIONS WHERE CYANIDES ARE USED (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F009	SPENT STRIPPING AND CLEANING BATH CYANIDE SOLUTIONS FROM ELECTROPLATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F010	QUENCHING BATH CYANIDE RESIDUES FROM OIL BATHS FROM METAL HEAT TREATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F011	SPENT CYANIDE SOLUTIONS FROM SALT BATH POT CLEANING FROM METAL HEAT TREATING OPERATIONS (Cyanide Salts)	D1,D2,D3,T1	REACTIVE, TOXIC	100	20
F012	QUENCHING WASTEWATER TREATMENT CYANIDE SLUDGES FROM METAL HEAT TREATING OPERATIONS (Cyanide Complexes)	D1,D2,D3,T1	TOXIC	100	20
F019	WASTEWATER TREATMENT SLUDGES FROM THE CHEMICAL CONVERSION COATING OF ALUMINUM (Hexavalent Chromium, Complexed Cyanides)	D1,D2,D3,T1	TOXIC	100	20
HAZARDOUS WASTES FROM SPECIFIC SOURCES: (Hazardous Constituents included w/Materials Description)					
K002	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME YELLOW AND ORANGE PIGMENTS (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5
K003	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF MOLYBDATE ORANGE PIGMENTS (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5
K004	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF ZINC YELLOW PIGMENTS (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K005	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	5
K006	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS, ANHYDROUS AND HYDRATED (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K007	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF IRON BLUE PIGMENTS (Complexed Cyanides, Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K008	OVEN RESIDUE FROM THE PRODUCTION OF CHROME OXIDE GREEN PIGMENTS (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	5
K022	DISTILLATION BOTTOM TARS FROM THE PRODUCTION OF PHENOL/ACETONE FROM CUMENE (Phenol, Tars/Polycyclic Aromatic Hydrocarbons)	D1,D2,D3,T1	TOXIC	100	5
K023	DISTILLATION LIGHT ENDS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM NAPHTHALENE (Phthalic Anydride, Maleic Anydride)	D1,D2,D3,T1	TOXIC	100	5
K024	DISTILLATION BOTTOMS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride, 1,4-Napthoquinone)	D1,D2,D3,T1	TOXIC	100	5
K025	DISTILLATION BOTTOMS FROM THE PRODUCTION OF NITROBENZENE BY THE NITRATION OF BENZENE (m-Dinitrobenzene, 2,4-Dinitrotoluene)	D1,D2,D3,T1	TOXIC	100	5
K029	WASTE FROM THE PRODUCT STEAM STRIPPER IN THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,2-Dichloroethane, 1,1,1-Trichloroethane, Vinyl Chloride, Vinylidene Chloride, Chloroform)	D1,D2,D3,T1	TOXIC	100	5
K032	WASTEWATER TREATMENT SLUDGE FROM THE PRODUCTION OF CHLORDANE (Hexachloropentadiene)	D1,D2,D3,T1	TOXIC	100	5
K035	WASTEWATER TREATMENT SLUDGES GENERATED IN THE PRODUCTION OF CREOSOTE (Creosote, Chrysene, Naphthalene, Fluoranthene, Benzo(a)pyrene, Indeno (1,2,3-cd) pyrene, Benzo(a)anthracene, Dibenzo(a)anthracene, Acenapthalene)	D1,D2,D3,T1	TOXIC	100	5
K041	WASTEWATER TREATMENT SLUDGES FROM THE PRODUCTION OF TOXAPHENE (Toxaphene)	D1,D2,D3,T1	TOXIC	100	5
K046	WASTEWATER TREATMENT SLUDGES FROM THE MANUFACTURING , FORMULATION AND LOADING OF LEAD-BASED INITIATING COMPOUNDS (Lead)	D1,D2,D3,T1	TOXIC	100	5
K048	DISSOLVED AIR FLOATATION FLOAT FROM THE PETROLEUM REFINING INDUSTRY (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20
K049	SLOP OIL EMULSION SOLIDS FROM THE PETROLEUM REFINING INDUSTRY (Hexavalent Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K050	HEAT EXCHANGER BUNDLE CLEANING SLUDGE FROM THE PETROLEUM REFINING INDUSTRY (Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	20
K051	API SEPARATOR SLUDGE FROM THE PETROLEUM REFINING INDUSTRY (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC	100	20
K052	LEADED TANK BOTTOMS FROM THE PETROLEUM REFINING INDUSTRY	D1,D2,D3,T1	TOXIC	100	20
K060	AMMONIA STILL LIME SLUDGE FROM COKING OPERATIONS (Cyanide, Napthalene, Phenolic Compounds, Arsenic)	D1,D2,D3,T1	TOXIC	100	1
K061	EMISSION CONTROL DUST/SLUDGE FROM THE PRIMARY PRODUCTION OF STEEL IN ELECTRIC ARC FURNACES (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	1000	100
K062	SPENT PICKLE LIQUOR GENERATED BY STEEL FINISHING OPERATIONS WITHIN THE IRON AND STEEL INDUSTRY (Hex. Chromium, Lead)	D1,D2,D3,T1	TOXIC, CORROSIVE	1000	100
K069	EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	100	1
K071	BRINE PURIFICATION MUDS FROM THE MERCURY CELL PROCESS IN CHLORINE PRODUCTION (Mercury)	D1,D2,D3,T1	TOXIC	100	1
K083	DISTILLATION BOTTOMS FROM ANILINE PRODUCTION (Aniline, diphenylamine, Nitrobenzene, Phenylenediamine)	D1,D2,D3,T1	TOXIC	100	1
K084	WASTEWATER TRMT. SLUDGES GENERATED DURING THE PRODUCTION OF VETERINARY PHARMACEUTICAL FROM ARSENIC OR ORGANO-ARSENIC COMPOUNDS	D1,D2,D3,T1	TOXIC	100	1
K086	SOLVENT, CAUSTIC OR WATER WASHES AND SLUDGES FROM CLEANING EQUIPMENT USED IN THE FORMULATION OF INK FROM PIGMENTS , DRIERS, SOAPS & STABILIZERS CONTAINING CHROMIUM & LEAD (Lead, Hex. Chromium)	D1,D2,D3,T1	TOXIC	100	1
K087	DECANTER TANK TAR SLUDGE FROM COKING OPERATIONS (Phenol, Naphthalene)	D1,D2,D3,T1	TOXIC	100	1
K093	DISTILLATION LIGHT ENDS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride, Maleic Anhydride)	D1,D2,D3,T1	TOXIC	100	1
K094	DISTILLATION BOTTOMS FROM THE PRODUCTION OF PHTHALIC ANHYDRIDE FROM ORTHO-XYLENE (Phthalic Anhydride)	D1,D2,D3,T1	TOXIC	100	1
K095	DISTILLATION BOTTOMS FROM THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,1,2-Trichloroethane, 1,1,1,2-Tetrachloroethane, 1,1,2,2-Tetrachloroethane)	D1,D2,D3,T1	TOXIC	100	1
K096	HEAVY ENDS FROM THE HEAVY ENDS COLUMN FROM THE PRODUCTION OF 1,1,1-TRICHLOROETHANE (1,2-Dichloroethane, 1,1,1-Trichloroethane, 1,1,2- Trichloroethane)	D1,D2,D3,T1	TOXIC	100	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
K099	UNTREATED WASTEWATER FROM THE PRODUCTION OF 2,4-D (2,4-Dichlorophenol, 2,4,6-Trichlorophenol)	D1,D2,D3,T1	TOXIC	100	1
K100	WASTE LEACHING SOLUTION FROM ACID LEACHING OF EMISSION CONTROL DUST/SLUDGE FROM SECONDARY LEAD SMELTING (Hex. Chromium, Lead, Cadmium)	D1,D2,D3,T1	TOXIC	100	1
K104	COMBINED WASTEWATER STREAMS GENERATED FROM NITROBENZENE/ANILINE PRODUCTION (Aniline, Benzene, Diphenylamine, Nitrobenzene, Phenylenediamine)	D1,D2,D3,T1	TOXIC	100	1
K106	WASTEWATER TREATMENT SLUDGES FROM THE MERCURY CELL PROCESS IN CHLORINE PRODUCTION (Mercury)	D1,D2,D3,T1	TOXIC	100	1
COMMERCIAL CHEMICAL PRODUCTS & CHEMICAL MFG. INTERMEDIATES (INCL. OFF-SPEC. MATERIALS): (DOT HAZARD CLASS INCLUDED IN MATERIALS DESCRIPTION*)					
P003	ACROLEIN (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P004	ALDRIN (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P005	ALLYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P008	4-AMINOPYRIDINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P009	AMMONIUM PICRATE (FLAMMABLE SOLID)	D1,D2,D3	REACTIVE	1	100 LBS.
P010	ARSENIC ACID (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P011	ARSENIC (V) OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P012	ARSENIC (VII) OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P013	BARIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P014	THIOPHENOL (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P015	BERYLLIUM DUST (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P021	CALCIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P022	CARBON DISULFIDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P023	CHLOROACETALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P024	P-CHLOROANILINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P028	BENZYL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P029	COPPER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P030	SOLUBLE CYANIDE SALTS, N.O.S. (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P031	CYANOGEN (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P033	CYANOGEN CHLORIDE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P037	DIELDRIN (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P039	DISULFOTON (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P040	0,0-DIETHYL-0-PRYAZINLY-PHOSPHOROTHIOATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P041	DIETHYL-P-NITROPHENYL PHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P042	EPINEPHRIN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P043	DIISPROPYLFLUOROPHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P048	2,4-DINITROPHENOL (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P050	ENDOSULFAN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P051	ENDRIN (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P058	FLUOROACETIC ACID, SODIUM SALT (CORROSIVE MATERIAL)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P062	TETRAPHOSPHORIC ACID, HEXAETHYL ESTER (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P063	HYDROCYANIC ACID < 5% (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P064	METHYL ISOCYANATE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P067	2-METHYLAZIRIDINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P068	METHYL HYDRAZINE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P069	METHYACRYLONITRILE (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P070	ALDICARB (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P071	METHYL PARATHION (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P072	ALPHA-NAPHTHYLTHIOUREA (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P074	NICKEL CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P075	NICOTINE & SALTS (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P076	NITRIC OXIDE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P077	P-NITROANILINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P078	NITROGEN OXIDES (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P081	SPIRITS OF NITROGLYCERINE < 10% (FLAMMABLE LIQUID)	D1,D2,D3	REACTIVE	1	100 LBS.
P082	N-NITROSODIMETHYLAMINE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P087	OSMIUM TETRAOXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P089	PARATHION (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P092	PHENYLMERCURIC ACETATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P093	N-PHENYLTHIOUREA (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P094	PHORATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P095	PHOSGENE (POISON A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P097	FAMPHUR (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P098	POTASSIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P099	POTASSIUM SILVER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P101	PROPANENITRILE (FLAMMABLE LIQUID)	D1,D2,D32	ACUTE TOXICITY	1	100 LBS.
P102	PROPARGYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P104	SILVER CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P105	SODIUM AZIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P106	SODIUM CYANIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P107	STRONTIUM SULFIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P108	STRYCHNINE & SALTS (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P110	TETRAETHYL LEAD (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P111	TETRAETHYL PYROPHOSPHATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
P112	TETRANITROMETHANE (OXIDIZER)	D1,D2,D3	REACTIVE	1	100 LBS.
P113	THALLIC OXIDE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P114	THALLIUM SELENITE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P115	THALLIUM SULFATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P118	TRICHLOROMETHANETHIOL (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P119	AMMONIUM VANADATE (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P120	VANADIUM OXIDE (ORM-E)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P121	ZINC CYANIDE (POISON B	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P122	ZINC PHOSPHIDE >10% (POISON B)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
P123	TOXAPHENE (ORM-A)	D1,D2,D3	ACUTE TOXICITY	1	100 LBS.
U001	ACETALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	1	100 LBS.
U002	ACETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	1
U003	ACETONITRILE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	10	1
U004	ACETOPHENONE (ORM-E)	D1,D2,D3	TOXIC	10	1
U005	0-ACETYLAMINOFLUORENE (POISON B)	D1,D2,D3	TOXIC	10	1
U006	ACETYL CHLORIDE (FLAMMABLE LIQUID OR GAS)	D1,D2,D3	CORROSIVE, REACTIVE, TOXIC	10	1
U007	ACRYLAMIDE (ORM-E)	D1,D2,D3	TOXIC	10	1
U008	ACRYLIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	IGNITABLE	10	1
U009	ACRYLONITRILE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	10	1
U010	PORFIROMYCIN (ORM-E)	D1,D2,D3	TOXIC	10	1
U011	AMITROLE (POISON B)	D1,D2,D3	TOXIC	10	1
U012	ANILINE (POISON B)	D1,D2,D3	TOXIC	10	1
U014	AURAMINE (POISON B)	D1,D2,D3	TOXIC	10	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U015	AZASERINE (POISON B)	D1,D2,D3	TOXIC	10	1
U017	BENZAL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U018	BENZ[A]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U019	BENZENE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U020	BENZENESULFONYL CHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U021	BENZIDINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U022	BENZOPYRENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U023	BENZOTRICHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U024	BIS(2-CHLOROETHOXY) METHANE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U025	DICHLOROETHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U027	BIS(2-CHLOROISOPROPYL) ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U028	BIS-(2-ETHYLHEXYL) PHTHALATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U030	BENZENE, 1-BROMO-4-PHENOXY (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U031	N-BUTYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	100	1
U032	CALCIUM CHROMATE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U034	CHLORAL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U035	CHLORAMBUCIL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U036	CHLORDANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U037	CHLOROBENZENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U038	ETHYL-4-4-DICHLOROBENZILATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U039	4-CHLORO-M-CRESOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U041	EPICHLOROHYDRIN (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U043	VINYL CHLORIDE (FLAMMABLE GAS)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U044	CHLOROFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U046	CHLOROMETHYL METHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U047	2-CHLORONAPHTHALENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U048	2-CHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U049	2-CHLORO-0-TOLUIDINE HYDROCHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U050	CHRYSENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U051	CREOSOTE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U052	CREOSOLS (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U053	CROTONALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U055	CUMENE (FLAMMABLE LIQUID, POISON B)	D1,D2,D3	IGNITABLE	1	100 LBS.
U056	CYCLOHEXANE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U057	CYCLOHEXANONE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U060	DDD (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U061	DDT (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U063	DIBENZ[A,H]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U064	DIBENZOPYRENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U067	ETHYLENE DIBROMIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U069	DIBUTYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U070	0-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U071	M-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U072	1,4-DICHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U076	1,1-DICHLOROETHANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U077	ETHYLENE DICHLORIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U078	1,1-DICHLOROETHYLENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U079	1,2-TRANS-DICHLOROETHYLENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U080	METHYLENE CHLORIDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U081	2,4-DICHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U082	2,6-DICHLOROPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U083	1,2-DICHLOROPROPANE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U084	1,3-DICHLOROPROPENE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U085	1,2:3,4-DIEPOXYBUTANE (CORROSIVE MATERIAL/FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U086	N,N-DIETHYLHYDRAZINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U087	0,0-DIETHYL-S-METHYL-DITHIOPHOSPHATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U088	DIETHYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U089	DIETHYLSTIBESTROL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U090	DIHYDROSAFROLE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U092	DIMETHYLAMINE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U093	DIMETHYLAMINOAZOBENZENE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U094	7,12-DIMETHYLBENZ[A]ANTHRACENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U096	DIMETHYLBENZYL HYDROPEROXIDE (ORGANIC PEROXIDE)	D1,D2,D3	REACTIVE	1	100 LBS.
U101	2,4-DIMETHYLPHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U102	DIMETHYLPHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U103	DIMETHYL SULFATE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U105	2,4-DINITROTOLUENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U106	2,6-DINITROTOLUENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U107	DI-N-OCTYL PHTHALATE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U108	1,4-DIOXANE (FLAMMABLE LIQUIDS)	D1,D2,D3	TOXIC	1	100 LBS.
U112	ETHYL ACETATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U113	ETHYL ACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U117	ETHYL ETHER (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U118	ETHYLMETHACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U120	FLUORANTHENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U121	TRICHLORO-MONOFLUORO-METHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U122	FORMALDEHYDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U123	FORMIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U124	FURAN (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U125	FURFURAL (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U127	HEXACHLOROBENZENE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U128	HEXACHLOROBUTADIENE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U129	LINDANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U130	HEXACHLOROCYCLOPENTADIENE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U131	HEXACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U133	HYDRAZINE (CORROSIVE MATERIAL)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.
U134	HYDROFLUORIC ACID (CORROSIVE MATERIAL)	D1,D2,D3	CORROSIVE, TOXIC	1	100 LBS.
U135	HYDROGEN SULFIDE (FLAMMABLE GAS)	D1,D2,D3	TOXIC	1	100 LBS.
U136	CACODYLIC ACID (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U138	METHYL IODIDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U140	ISOBUTYL ALCOHOL (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	1OO	1
U151	MERCURY, METALLIC (ORM-B)	D1,D2,D3	TOXIC	100	1
U154	METHANOL (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	20
U157	3-METHYCHOLANTHRENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U158	4,4'-METHYLENE-BIS(-2-CHLOROANILINE) (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U159	METHYL ETHYL KETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE, TOXIC	100	20
U160	METHYL ETHYL KETONE PEROXIDE (ORGANIC PEROXIDE)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.
U161	METHYL ISOBUTYL KETONE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	1
U162	METHYL METHACRYLATE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U165	NAPHTHALENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U168	2-NAPHTHYLAMINE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U169	NITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U170	NITROPHENOLS (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U171	2-NITROPROPANE (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE, TOXIC	1	100 LBS.
U181	5-NITRO-O-TOLUIDINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U182	PARALDEHYDE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U183	PENTACHLOROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U185	PENTACHLORONITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U187	PHENACETIN (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U188	PHENOL (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U190	PHTHALIC ANHYDRIDE (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.
U196	PYRIDINE (FLAMMABLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U197	P-BENZOQUINONE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U200	RESERPINE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U201	RESORCINOL (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U202	SACCHARIN AND SALTS (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U203	SAFROLE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U204	SELENIOUS ACID (CORROSIVE MATERIAL)	D1,D2,D3	TOXIC	1	100 LBS.

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U205	SELENIUM DISULFIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U207	1,2,4,5-TETRACHLOROBENZENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U208	1,1,1,2-TETRACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U209	1,1,2,2-TETRACHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U210	TETRACHLOROETHYLENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U211	CARBON TETRACHLORIDE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U213	TETRAHYDROFURAN (FLAMMABLE LIQUID)	D1,D2,D3	IGNITABLE	1	100 LBS.
U214	THALLIUM ACETATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U215	THALLIUM CARBONATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U216	THALLIUM CHLORIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U217	THALLIUM NITRATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U219	THIOUREA (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U220	TOLUENE (FLAMMABLE LIQUID)	D1,D2,D3,T1	TOXIC	100	20
U221	TOLUENEDIAMINE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U222	O-TOLUIDINE HYDROCHLORIDE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U223	TOLUENEDIISOCYANATE (POISON B)	D1,D2,D3	REACTIVE, TOXIC	1	100 LBS.
U225	BROMOFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U226	METHYLCHLOROFORM (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U227	1,1,2-TRICHLOROETHANE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U228	TRICHLOROETHYLENE (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U234	SYM-TRINITROBENZENE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U236	TRYPAN BLUE (ORM-E)	D1,D2,D3	TOXIC	1	100 LBS.
U238	ETHYL CARBAMATE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U239	XYLENE (FLAMMABLE LIQUID)	D1,D2,D3,T1	IGNITABLE	100	20

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.
U240	2,4-D (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U246	CYANOGEN BROMIDE (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U247	METHOXYCHLOR (ORM-A)	D1,D2,D3	TOXIC	1	100 LBS.
U249	ZINC PHOSPHIDE < 10% (POISON B)	D1,D2,D3	TOXIC	1	100 LBS.
U328	O-TOLUIDINE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U353	P-TOLUIDINE (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	1	100 LBS.
U359	ETHYLENE GLYCOL MONOETHYL ETHER (COMBUSTIBLE LIQUID)	D1,D2,D3	TOXIC	10	1

EPA & INDUSTRY HAZARDOUS #	HAZARDOUS MATERIALS GENERIC NAME/DESCRIPTION	LOCATION[1]	BASIS FOR HAZARD	ESTIMATED VOLUME (Tons)	
				MAX.	AVG.

DEFINITIONS OF HAZARDOUS CHARACTERISTICS AND HAZARD CLASSES:

RCRA (HAZARDOUS WASTE, 40CFR) DEFINITIONS:

IGNITABLE:	LIQUID MATERIALS W/FLASHPOINT < 140 DEGREES F; SOLIDS CAPABLE OF IGNITING AND VIGOUROUSLY BURNING THROUGH FRICTION, ABSORPTION OF MOISTURE OR SPONTANEOUS CHEMICAL CHANGE; AND OXIDIZERS UNDER DOT DEFINITIONS
CORROSIVE:	AQUEOUS SOLUTIONS OF MATERIALS W/ pH LESS THAN 2.0 OR GREATER THAN 12.5; OR LIQUIDS THAT CORRODES STEEL AT A RATE GREATER THAN 0.250 IN./YR.
REACTIVE:	MATERIALS THAT ARE UNSTABLE, REACTS VIOLENTLY W/WATER, FORMS POTENTIALLY EXPLOSIVE MIXTURES W/WATER, FORMS TOXIC GASES, VAPORS OR FUMES WHEN MIXED W/WATER; CYANIDE OR SULFIDE BEARING CAPABLE OF FORMING TOXIC GASES, VAPORS OR FUMES WHEN SUBJECT TO pH CONDITIONS BETWEEN 2 AND 12
EP TOXIC:	MATERIALS CAPABLE OF LEACHING HEAVY METALS AT CONCENTRATIONS GREATER THAN THOSE PRESCRIBED BY THE EPA WHEN SUBJECTED TO EXTRACTION PROCEDURE TESTING

DOT HAZARD CLASSES (49 CFR):

FLAMMABLE LIQUIDS:	MATERIALS W/FLASHPOINT < 100 DEGREES F
COMBUSTIBLE LIQUIDS:	MATERIALS W/ 100 DEGREES F < FLASHPOINT < 200 DEGREES F
FLAMMABLE SOLIDS:	MATERIALS POSING A FIRE HAZARD DUE TO FRICTION, HEAT EXPOSURE, OR BURNS VIGOROUSLY WHEN IGNITED, INCLUDES SPONTANEOUS COMBUSTIBLE OR WATER REACTIVE MATERIALS
OXIDIZERS:	CHLORATES, PERMANGANATES, INORGANIC PEROXIDES, OR NITRATES THAT YIELD OXYGEN READILY TO STIMULATE THE COMBUSTION OF ORGANIC MATTER
ORGANIC PEROXIDES:	
CORROSIVE MATERIALS:	LIQUID OR SOLID THAT CAUSES VISIBLE DESTRUCTION OR IRREVERSIBLE ALTERATIONS IN HUMAN SKIN TISSUE AT THE SITE OF CONTACT; OR HAS A SEVERE CORROSION RATE ON STEEL
POISON A:	POISONOUS GASES OR LIQUIDS IN VERY SMALL AMOUNTS THAT WHEN MIXED WITH AIR ARE DANGEROUS TO LIFE
POISON B:	LIQUID & SOLID SUBSTANCES KNOWN TO BE TOXIC VIA INHALATION, DIGESTION OR SKIN ABSORPTION
ORM-A:	MATERIALS W/ANESTHETIC, IRRITATING, NOXIOUS, TOXIC OR OTHER PROPERTIES CAUSING ANNOYANCE OR DISCOMFORT
ORM-B:	MATERIALS CAPABLE OF CAUSING SIGNIFICANT DAMAGE OR LEAKAGE DURING TRANSPORTATION (OR STORAGE)
ORM-E:	HAZARDOUS WASTES OR HAZARDOUS SUBSTANCES NOT INCLUDED IN ANY OTHER HAZARD CLASS

[1] Storage Areas: D1=Drum Storage Building;
D2=Outdoor Drum Storage;
D3=Drum Storage - Trailer;
T1=Tank Farm

APPENDIX IV

Heritage Laboratories
Quality Assurance Plan

HERITAGE ENVIRONMENTAL SERVICES
Lemont, Illinois
USEPA Identification No.: ILD 085349264
DLPC 0311620007

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APPENDIX IV

ATTACHMENT 1

Heritage Laboratories
QUALITY ASSURANCE PROJECT PLAN
RCRA FACILITY INVESTIGATION

HERITAGE ENVIRONMENTAL SERVICES
Lemont, Illinois
USEPA Identification No.: ILD 085349264
DLPC 0311620007

10/27/92

SECTION 1.0

COMPREHENSIVE QUALITY ASSURANCE PLAN

Heritage Laboratories, Inc.

Indianapolis Division
Two Environmental Plaza
7901 West Morris Street
Indianapolis, Indiana 46231
(317) 243-8304

Chicago Division
1319 Marquette Drive
Romeoville, Illinois 60441
(708) 378-1600

Charlotte Division
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Charlotte, NC 28216
(704) 393-1853

Kansas City Division
8525 NE 38th Street
Kansas City, MO 64161
(816) 454-0222

Prepared by
Heritage Laboratories, Inc.
Indianapolis, Indiana

C. Steven Gohmann, President
Heritage Laboratories, Inc.

10/27/92
Date

Dr. D. L. Peterson, QA Officer
Heritage Laboratories, Inc.

10/30/92
Date

James Coplen, VP Operations
Heritage Laboratories, Inc.

10/27/92
Date

[DER QA Officer]

Date

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EMS HERITAGE LABORATORIES, INC.

7901 West Morris Street
Indianapolis, IN 46231
Phone: 317/243-0811
FAX: 317/243-0360

November 1, 1991

To Whom It May Concern:

In order to more adequately serve the needs of our clients, EMS Heritage Laboratories, Inc. has adopted a Comprehensive Quality Assurance Plan (CompQAP) according to the guidelines established in EPA document number QAMS-005/80 and Florida DER-QA-001/90. This CompQAP will be implemented and all EMS Heritage divisions will be in substantial compliance by December 31, 1992.

This CompQAP covers such laboratory functions as data acquisition, review and reporting, and establishes QA objectives and mechanisms by which these objectives are measured, documented and reported. In addition, such functions as training and safety are covered.

It is our intention that all who use our services be provided with the opportunity to understand the procedures used in acquiring, reviewing and reporting laboratory results.

It is our requirement that all laboratory personnel read, review and understand the procedures and requirements established by this document.

Sincerely,

EMS HERITAGE LABORATORIES, INC.

C. Steven Gohmann
President

CSG/ps

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7901 West Morris Street
Indianapolis, IN 46231
Phone: 317/243-0811
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Comprehensive Quality Assurance Plan

EMS Heritage Laboratories, Inc.
Two Environmental Plaza
7901 West Morris Street
Indianapolis, Indiana 46231

Issued to: Robert Millman

Date: 10/28/93

Copy Number: 8A

PROPRIETARY MATERIAL

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SECTION 2.0

TABLE OF CONTENTS

QA PLAN ELEMENTS

SECTION	TITLE	# OF PAGES	REVISION DATE
1.0	Title Pages	3	Nov. 1, 1991
2.0	Table of Contents	6	Nov. 1, 1991
3.0	Statement of Policy	2	Nov. 1, 1991
4.0	Organization and Responsibility	10	Nov. 1, 1991
	4.1 Introduction		
	4.2 President		
	4.3 Vice-President of Operations		
	4.4 Quality Assurance Officer		
	4.5 Organization Charts/Job Descriptions (Appendix E)		
	4.6 Deputies to Cover Absences		
5.0	QA Targets for Precision, Accuracy and Method Detection Limits	82	Nov. 1, 1991
6.0	Sampling Procedures	23	Nov. 1, 1991
	6.1 Introduction		
	6.2 Sample Containers		
	6.3 Preservation		
7.0	Sample Custody	21	Nov. 1, 1991
	7.1 Introduction		
	7.2 Facilities and Sample Security		
	7.3 Sample Custody Records		
	7.4 Legal Chain of Custody		
	7.5 Sample Labels, Seals and Chain of Custody		
	7.6 Field Sampling/Custody		
	7.7 Sample Dispatch		
	7.8 Laboratory Custody/Receiving		
	7.9 Sample Log-In		
	7.10 Sample Storage		
	7.11 Log-In Accuracy		
	7.12 Project Schedules		
	7.13 Inter and Intra-Lab-Shipping		
	7.14 Documentation of Sample Disposition		
	7.15 Electronic Data Records		

SECTION	TITLE	# OF PAGES	REVISION DATE
8.0	Analytical Procedures	15	Nov. 1, 1991
	8.1 Introduction		
	8.2 Standard Operating Procedures		
	8.3 Laboratory Glassware Cleaning		
	8.4 Reagent and Standard Storage		
	8.5 Sample and Waste Disposal		
9.0	Calibration Procedures and Frequency	41	Nov. 1, 1991
	9.1 Laboratory Instrumentation		
	9.2 Standards Receipt and Traceability		
	9.3 Standard Sources and Preparation		
	9.4 Standardization of Titrating Solutions		
	9.5 Calibration of Thermometers		
	9.6 Calibration of Balances		
	9.7 Calibration of Eppendorfs/Pipettors		
	9.8 Instrument Performance Parameters - Start-up QC		
	9.9 Instrument Calibration Criteria		
10.0	Preventive Maintenance	9	Nov. 1, 1991
	10.1 Maintenance Agreements		
	10.2 Instrument Logs		
	10.3 Spare Parts		
	10.4 Equipment Logbooks		
	10.5 Routine Preventive Maintenance		
11.0	Quality Control Checks, Routines to Assess Precision and Accuracy and Calculation of Method Detection Limits (MDL)	32	Nov. 1, 1991
	11.1 Quality Control Checks-Field QC		
	11.2 Quality Control Checks-Laboratory QC		
	11.3 Determination of Frequency of QC Measurements		
	11.4 Routine Methods Used to Assess Precision and Accuracy		
	11.5 Methods Used to Generate Precision and Accuracy Targets		
	11.6 Significant Figures		
	11.7 Control Charts		
	11.8 Instrument Detection Limits and Method Detection Limits		

SECTION	TITLE	# OF PAGES	REVISION DATE
12.0	Data Reduction, Validation and Reporting	40	Nov. 1, 1991
	12.1 Introduction		
	12.2 Data Reduction		
	12.3 Data Validation - During Data Collection		
	12.4 Data Validation - Post Completion		
	12.5 Laboratory Quality Control Checks		
	12.6 Review of Project Data		
	12.7 Data Reporting		
	12.8 Data Storage		
13.0	Corrective Action	6	Nov. 1, 1991
	13.1 Introduction		
	13.2 Warning Limits		
	13.3 Control Limits		
	13.4 Notification		
	13.5 Trends Analysis		
	13.6 Specific Corrective Actions		
	13.7 Corrective Action Documentation		
14.0	Performance and Systems Audits	5	Nov. 1, 1991
	14.1 Performance Audits		
	14.2 Systems Audits		
15.0	Quality Assurance Reports	4	Nov. 1, 1991
	15.1 QCTS Review		
	15.2 Correction of Deficiencies		
	15.3 Performance and Systems Audits Summary		
	15.4 Significant Problems and Solutions		
	15.5 Outside Reporting		
16.0	Resumes	27	Nov. 1, 1991

TABLE OF CONTENTS

FIGURES

Figure #	Description	Revision Date
4.1	EMS Heritage Corporate Organization Chart	Nov. 1, 1991
4.2	Indianapolis Divisional Organization Chart	Nov. 1, 1991
4.3	Charlotte Divisional Organization Chart	Nov. 1, 1991
4.4	Chicago Divisional Organization Chart	Nov. 1, 1991
4.5	Kansas City Divisional Organization Chart	Nov. 1, 1991
4.6	Heritage Environmental Services Corporate Organization Chart	Nov. 1, 1991
5.1	Matrix Accuracy Control Criteria Usage	Nov. 1, 1991
5.2	Matrix Precision Control Criteria Usage	Nov. 1, 1991
7.1	Container Label	Nov. 1, 1991
7.2	Custody Seal	Nov. 1, 1991
7.3	Chain of Custody	Nov. 1, 1991
7.4-7.8	Field Sampling Documentation Forms	Nov. 1, 1991
9.1	Calculation of Theoretical Plates	Nov. 1, 1991
9.2	Calculation of Resolution	Nov. 1, 1991
11.1	Metals Analysis Scheme for Spiking (SPI01)	Nov. 1, 1991
11.2	CLP-GFAA Analysis Scheme	Nov. 1, 1991
11.3	IDL/MDL Reporting Form	Nov. 1, 1991
12.1	Data Review Protocol	Nov. 1, 1991
12.2	Sample Modification Form	Nov. 1, 1991
15.1	APG Results Summary	Nov. 1, 1991
15.2	EPA Performance Evaluation Summary	Nov. 1, 1991

TABLES

Table #	Description	# of Pages	Revision Date
5.1	QA Targets for Precision, Accuracy and Method Detection Limits	38	Nov. 1, 1991
5.2	Sample Preparation Methods	40	Nov. 1, 1991
6.1	Sample Container Preparation Protocols	3	Nov. 1, 1991
6.2	Aqueous Sample Preservatives	1	Nov. 1, 1991
6.3	Sample Requirements	16	Nov. 1, 1991
8.1	EPA Approved Analytical Methods and References for Water Analyses	2	Nov. 1, 1991
8.2	EPA Approved Analytical Methods and References for Sediments, Soils, Residuals and Solid and Hazardous Wastes	1	Nov. 1, 1991
8.3	Reagent and Standard Storage	3	Nov. 1, 1991
9.1	Instrument List	5	Nov. 1, 1991
9.2	Standard Sources and Preparation	9	Nov. 1, 1991
9.3	Standardization of Titrating Solutions	1	Nov. 1, 1991
9.4	GFAA Minimum Absorbance Criteria	1	Nov. 1, 1991
9.5	Instrument Calibration	13	Nov. 1, 1991
10.1	Routine Preventive Maintenance	6	Nov. 1, 1991
11.1	ICP Run Sequence	1	Nov. 1, 1991
11.2	FAA Run Sequence	1	Nov. 1, 1991
11.3	GFAA Run Sequence	1	Nov. 1, 1991
11.4	CLP-GFAA Run Sequence	1	Nov. 1, 1991
11.5	Analytical Run Requirements/Frequency	9	Nov. 1, 1991
11.6	Methods Used to Generate Precision and Accuracy Targets	1	Nov. 1, 1991
12.1	Organic Spike Recovery Criteria	8	Nov. 1, 1991
12.2	Inorganic Spiking Levels and Control Limits	2	Nov. 1, 1991
12.3	Organic Precision Control Limits	2	Nov. 1, 1991

Table #	Description	# of Pages	Revision Date
12.4	Internal Standard Area Criteria	1	Nov. 1, 1991
12.5	Surrogate Recovery Criteria	1	Nov. 1, 1991
14.1	Reference Materials and Performance Evaluation Participation	1	Nov. 1, 1991

APPENDICES

Appendix ID	Description	# of Pages	Revision Date
A	References	3	Nov. 1, 1991
B	Method Validations	[Reserved]	Nov. 1, 1991
C	Safety Issues	6	Nov. 1, 1991
D	Definitions and Acronyms	27	Nov. 1, 1991
E	Job Descriptions	13	Nov. 1, 1991
F	Final Report Examples	25	Nov. 1, 1991
G	Internal Systems Audit Forms	12	Nov. 1, 1991
H	Training Forms	64	Nov. 1, 1991

SECTION 3.0

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3.0 Statement of Policy

It is our policy that all who use our services be provided with the opportunity to understand the procedures used in acquiring, reviewing and reporting laboratory results.

It is our requirement that all laboratory personnel read, review, have free access to and understand the procedures and requirements established by this document as they relate to their job function. It is to be used as a basic reference in the laboratory. Each staff member is obligated to comply with the stated requirements of this Comprehensive Quality Assurance Plan (Comp QAP).

The United States Environmental Protection Agency (EPA) requires that laboratories generating data implement minimum procedures which assure that the precision, accuracy, completeness and representativeness of its data are known and documented. In addition, the laboratory must specify the minimum quality levels which data must meet in order to be acceptable for a specific regulatory program.

To insure that EMS Heritage Laboratories (EMS) meets these responsibilities, the following Comprehensive Quality Assurance Plan has been adopted by the company.

The EPA has established specific requirements for the development of Quality Assurance Project Plans. All Quality Assurance Project Plans must address sixteen specific areas which are outlined in QAMS-005/80 "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans". This Comprehensive Quality Assurance Plan covers those 16 points and also applies to environmental monitoring and measurement efforts which are outlined in Rule 17-160 Part III, F.A.C. of the State of Florida. This Comp QAP is generic in nature and summarizes the criteria/procedures used under standard operating conditions. Different Data Quality Objectives (DQO's) may require a specific project plan utilizing the basic procedures set forth in this comprehensive plan. This Comp QAP covers all samples submitted to the laboratory except those samples requiring different DQO's as specified by the client. All exceptions to this Comp QAP must be approved in writing by the Laboratory Director, QA Unit, Chief Chemist or the QA Officer. The certificate of analysis will contain a statement to reflect this deviation from the Comp QAP.

EMS Heritage Laboratories, Inc. is a nationally integrated network of commercial testing laboratories specializing in the analysis of groundwater, surface and wastewater as well as solid and hazardous wastes. EMS Heritage operates laboratories in Indianapolis, Indiana; Charlotte, North Carolina; Kansas City, Missouri; and Chicago, Illinois. Each of these laboratory divisions operates under the same Standard Operating Procedures Manuals (SOPs). All laboratory divisions are in direct communication with each other through a single Laboratory Information Management System (LIMS) which incorporates data from

all divisions and generates the Quality Assurance Targets for all laboratories. All data from each laboratory is accessible through the LIMS to all other divisions.

EMS utilizes a system of project managers in charge of specific projects. Each project manager is responsible for receiving and approving completeness of final data reports relating to their assigned project even if the data is generated by another laboratory division. The Quality Assurance Unit at each division is responsible for reviewing and signing all final certificates of analysis. Employees from other branches are under supervision of the project manager in charge of the project, even if that manager is located in another division office. This system of dedicated project managers and quality assurance staff insures that the client's specific DQO's are met.

As outlined in the EMS Heritage Statement of Operations and Quality Assurance Policy, procedures must be uniquely defined in operation specific SOPs. These SOPs are subject to change without notice, but will not be less stringent than the requirements of this QAP. Where appropriate, these SOPs have been summarized in this document.

This Comp QAP will be reviewed and revised as necessary and at least annually. Major revisions will be forwarded to appropriate copy holders.

SECTION 4.0

4.0 Organization and Responsibility

4.1 Introduction

EMS Heritage Laboratories is primarily an environmental analytical chemistry laboratory. Bacteriological testing is not specifically covered under this comp QAP. Field operations consist primarily of sample pick-up services. EMS Heritage does perform composite and grab wastewater sampling for those clients desiring this service. Other types of sampling may be offered depending on the equipment required and the hazards involved.

4.2 President's Duties

EMS Heritage Laboratories, Inc. currently operates laboratories in four locations. The President of EMS Heritage Laboratories, Inc. serves as the Chief Operating Officer (COO). Furthermore, the President shall:

4.2.1 Designate a Laboratory Director at each laboratory.
4.2.2 Replace Laboratory Directors promptly should such replacement become necessary.
4.2.3 Assure that there is a Corporate Quality Assurance Officer.
4.2.4 Assure that the Vice-President of Operations, Quality Assurance Officer and Corporate Sales Personnel clearly understand their functions and responsibilities.
4.2.5 Establish and revise company policy.

4.3 Vice-President of Operations' Duties

The Vice-President of Operations (VPO) is the only additional operating officer of the company. The VPO shall nominate Laboratory Directors to the President who will promptly act to confirm or reject their nomination. The VPO is charged with the overall coordination of all the laboratory locations so that they perform as one cohesive and integrated network of laboratories. Furthermore, the VPO shall:

4.3.1 Assure that personnel, resources, facilities, equipment, materials, and methodologies are known and available as scheduled.
4.3.2 Assure that any deviations from policy reported by the Quality Assurance Officer are communicated to the President and to the Laboratory Directors and that corrective actions are taken and documented.

4.4 Quality Assurance Officer Duties

The Corporate Quality Assurance Officer is responsible for assuring that all QA policies and procedures are followed and that the Data Quality Objectives of this QA Plan are met. Management will provide the QAO with the support and tools necessary to achieve this goal.

Several principles underlie the Quality Assurance Policy. These principles are:

- Defensible Data
- Documented Analytical Methods
- Sample Control
- Equipment Calibration
- Training and Training Documentation
- Internal and External Assessments
- QA/QC Policy

4.4.1 Defensible Data

Data shall be generated, recorded and archived in such a way that it will withstand challenge. All reported information shall be accurate and properly documented. By correct use of traceable calibration standards, verification standards, blanks, method blanks, duplicates, spikes and spike duplicates, the Company shall obtain and record data necessary to demonstrate that analytical systems remain in control for all sample data reported.

4.4.1.1 Computerized data records must follow strict guidelines for security and defensibility. These guidelines are established in the QAP.

4.4.1.2 Defensible data includes the use of analytical methods which are appropriate and adequate. Analytical methods used will be strictly adhered to and any deviations will be documented and reported; these deviations are subject to approval of the QAO and the Chief Chemist.

4.4.1.3 Defensible data includes adherence to pre-analytical holding time requirements. Wisconsin Administrative Code NR149.11(s) specifically requires flagging of any holding time violation. The State of Wisconsin further considers "recommended" holding times as required holding times.

EMS Heritage will adhere to the requirement for the flagging of any holding time violation for those states or organizations requiring such flagging.

4.4.1.4 Defensible data includes the laboratory analysts demonstration of their ability to generate data of acceptable precision and accuracy, in addition to the laboratory demonstration of detection limits. IDLs and MDLs must be approved, performed at the required frequency and kept on file by the QA Unit. See Section 11.0, Figure 11.3, IDL/MDL Reporting Form.

4.5 Organization Charts/Job Descriptions (Appendix E)

Job Descriptions of all key personnel within EMS Heritage Laboratories, Inc. are contained in Appendix E. Company Organization Charts are provided in the figures listed below.

Corporate Organization	Figure 4.1
Indianapolis Division	Figure 4.2
Charlotte Division	Figure 4.3
Chicago Division	Figure 4.4
Kansas City Division	Figure 4.5
Heritage Environmental Services, Inc.	Figure 4.6

4.6 Deputies to Cover Absences

In the event of the absence of a key person, the authority for that position will generally rest with the next in line, most senior staffer as per the EMS Heritage Organizational Charts.

Specific lines of authority exist for the following positions:

4.6.1 In the absence of the Chief Chemist the Senior Chemists will be in charge until the return of the Chief Chemist, unless otherwise delegated by the Vice-President of Operations.

4.6.2 In the absence of the Quality Assurance Officer, the senior staffer from the Indianapolis QA Unit will be in charge until the return of the QA Officer. In the absence of all QA Unit staff from the Indianapolis Division, the QA Unit from another EMS Heritage Division as appointed by the President of EMS Heritage will be in charge until the return of the QA Officer or the QA Unit staff of the Indianapolis Division.

4.6.3 In the absence of all QA Unit staff from any EMS Heritage Division, the QA Unit from another EMS Heritage Division as appointed by the QA Officer or the President of EMS Heritage will be in charge until the return of the absent QA Unit staff.

FIGURE 4.1
EMS HERITAGE LABORATORIES, INC.
CORPORATE ORGANIZATION CHART

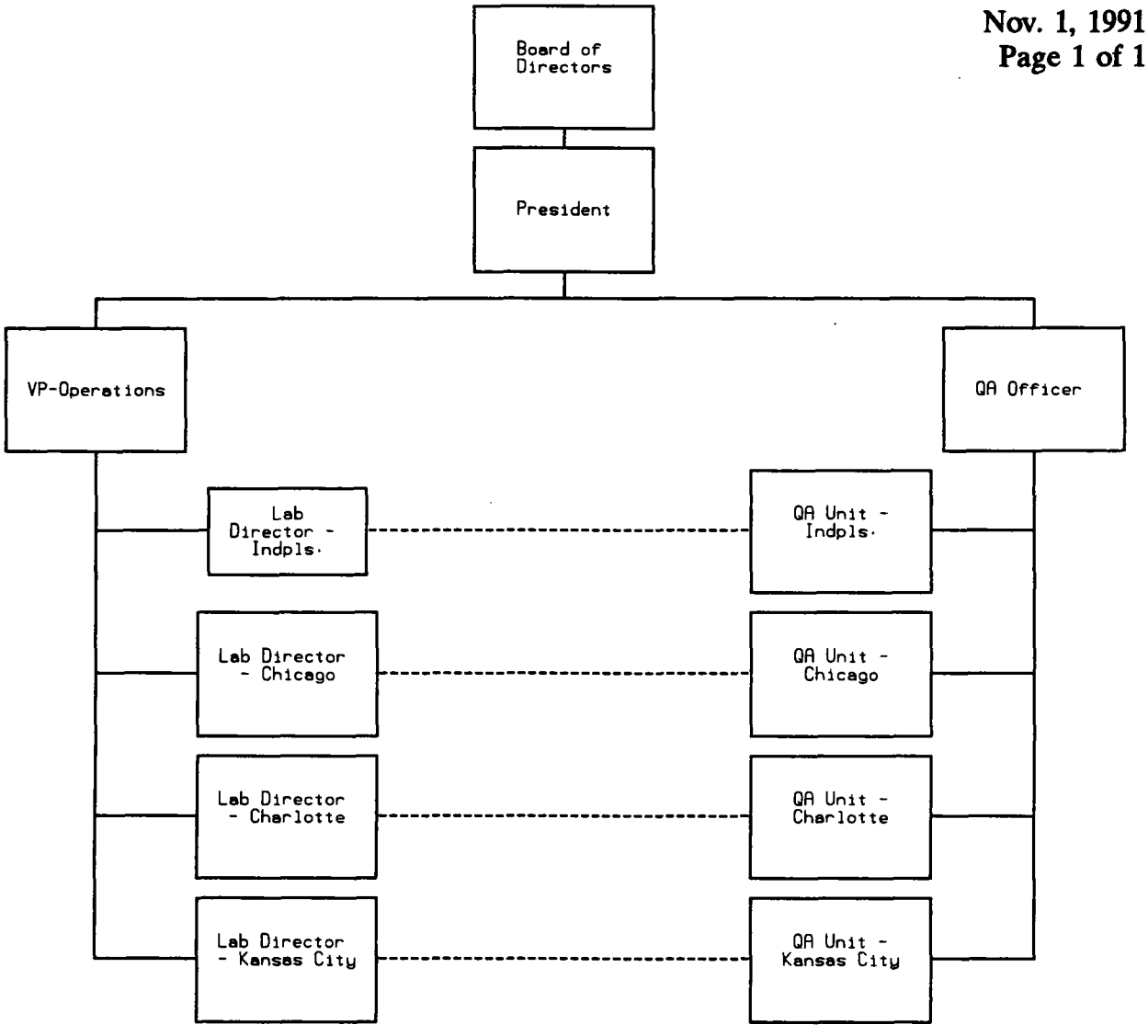
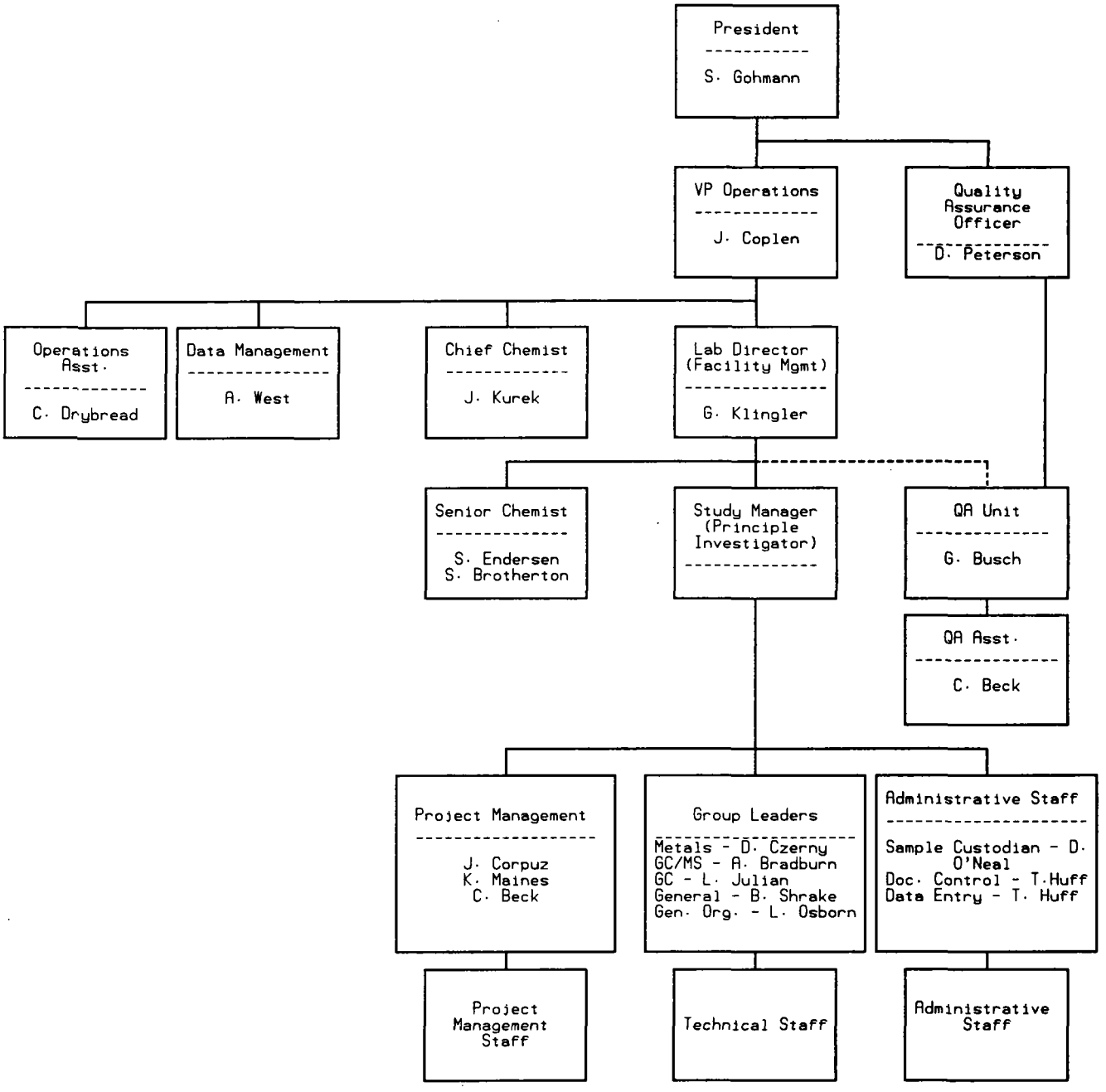


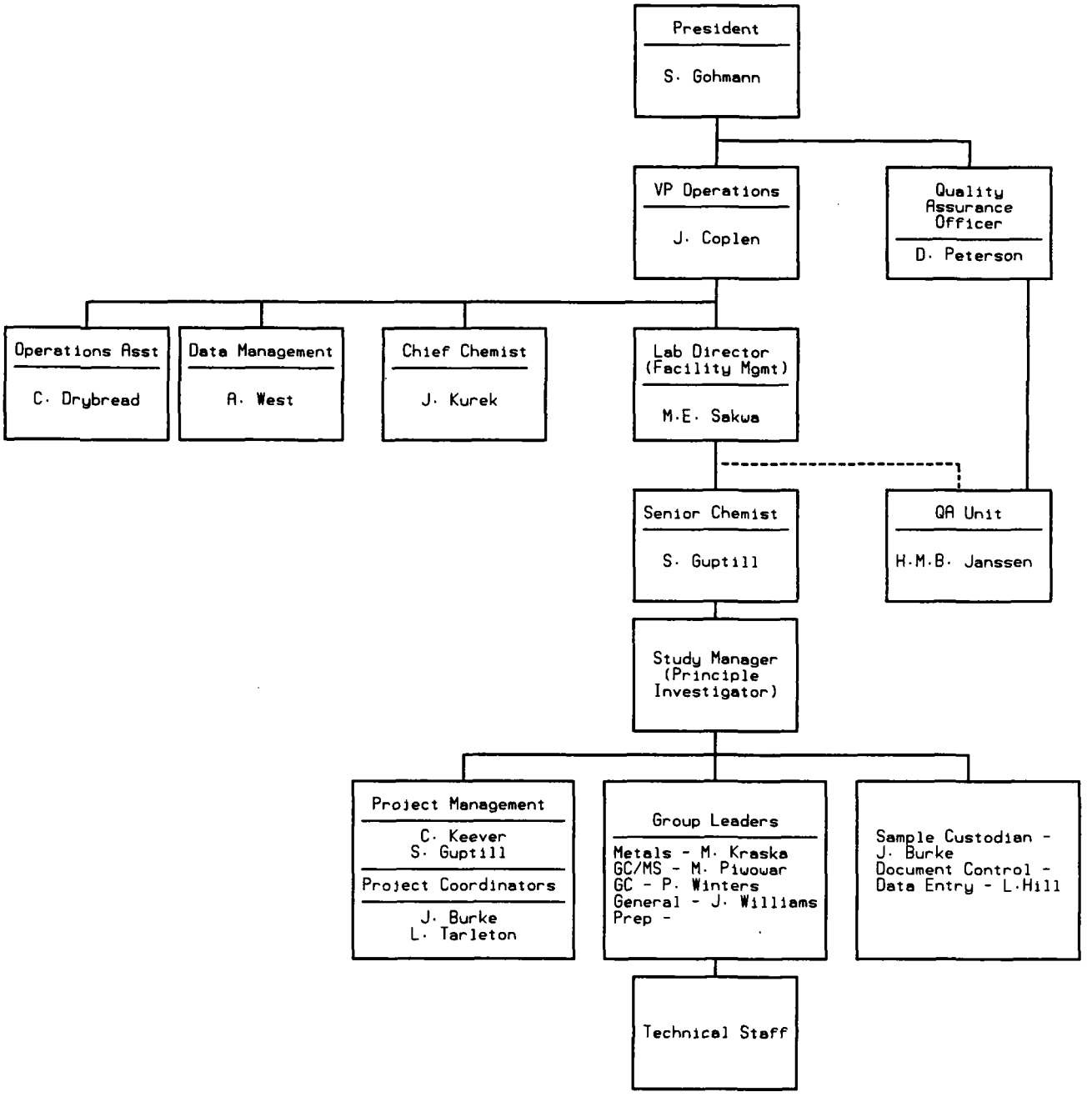
Figure 4.1 - Management and Quality Assurance Structure

FIGURE 4.2
ORGANIZATIONAL CHART
EMS HERITAGE LABORATORIES, INC.
INDIANAPOLIS, INDIANA



NOTE: For non-GLP work, delete study manager position.

FIGURE 4.3
ORGANIZATIONAL CHART
EMS HERITAGE LABORATORIES, INC.
CHARLOTTE, NORTH CAROLINA



NOTE: For non-GLP work, delete study manager position.

FIGURE 4.4
ORGANIZATIONAL CHART
EMS HERITAGE LABORATORIES, INC.
CHICAGO (ROMEOVILLE), ILLINOIS

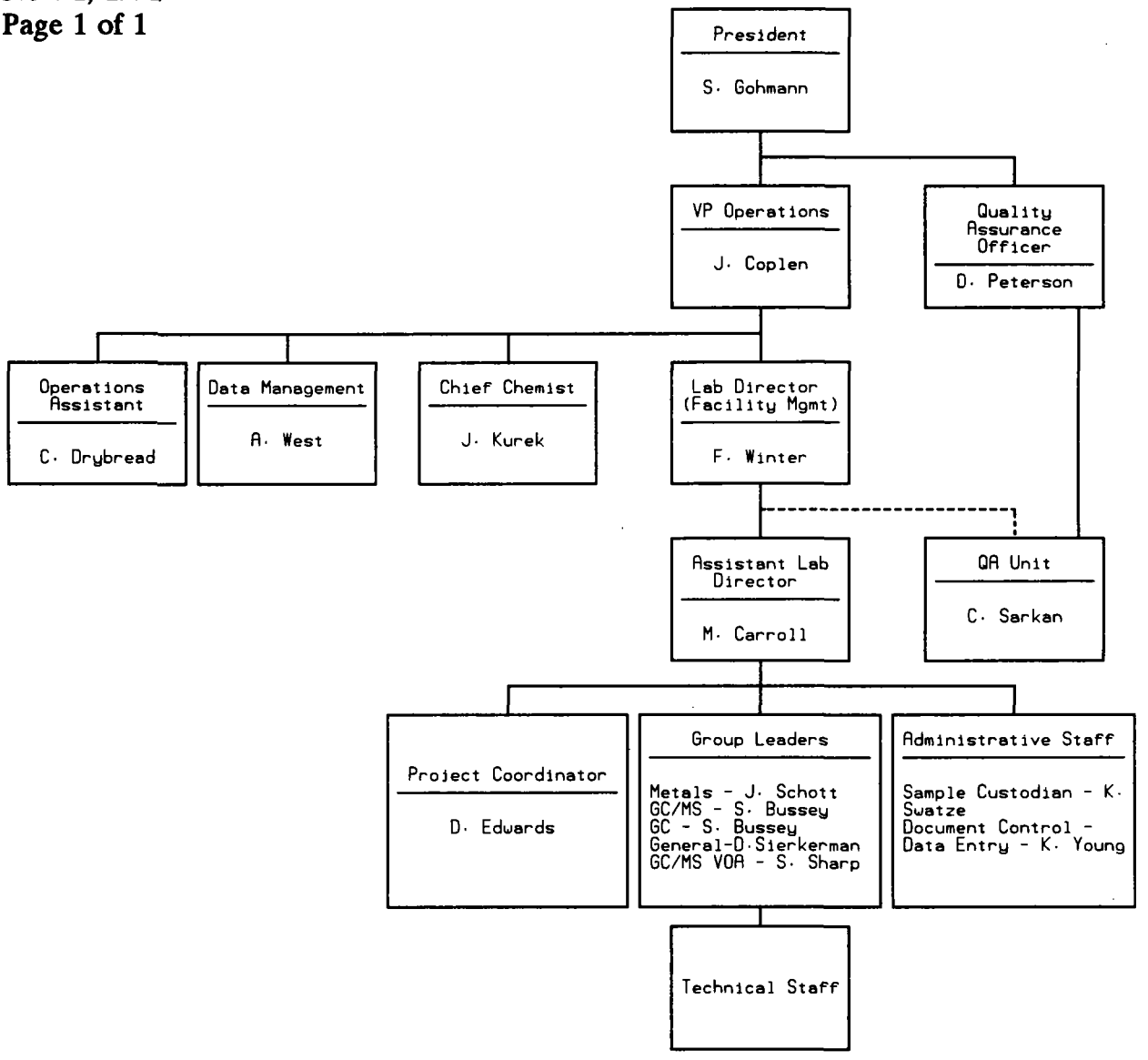


FIGURE 4.5
ORGANIZATIONAL CHART
EMS HERITAGE LABORATORIES, INC.
KANSAS CITY, MISSOURI

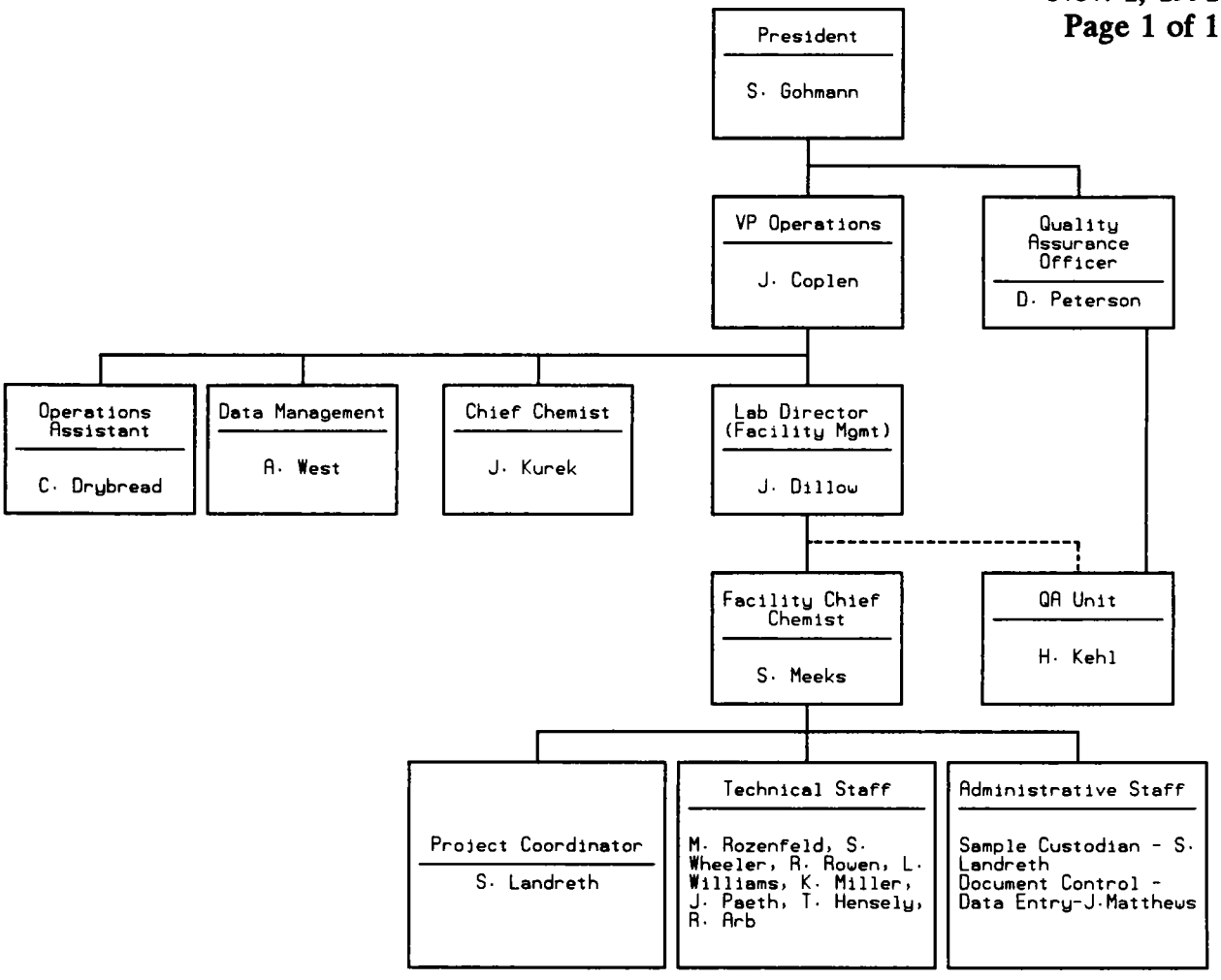
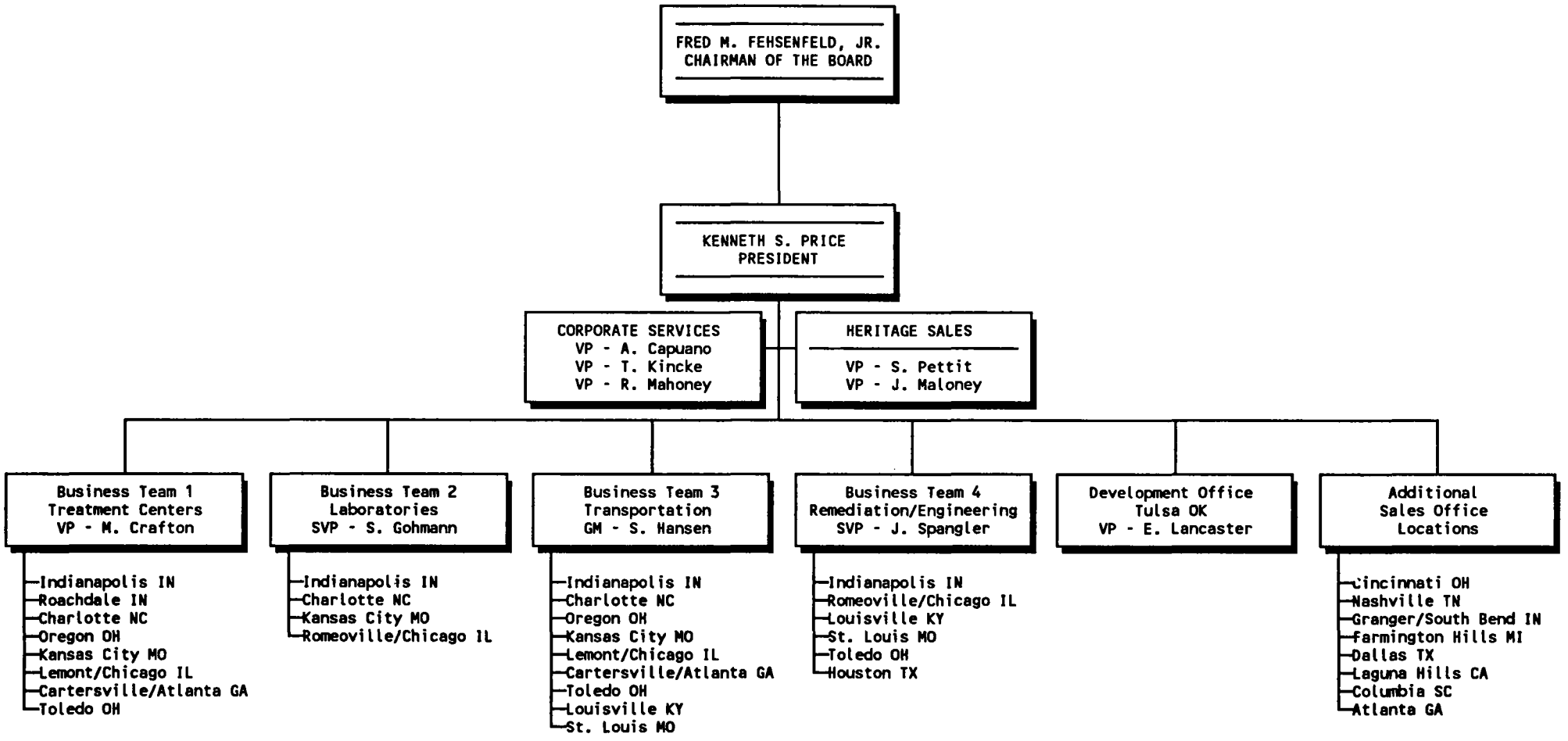


FIGURE 4.6

Heritage Environmental Services, Inc.
("HERITAGE")



JJ913260.18

5.0 QA Targets for Precision, Accuracy and Method Detection Limits

The targets for precision (duplicates), accuracy (spikes), and practical (reporting) detection limits for each sample matrix are given for each method performed by EMS Heritage in Table 5.1, Quality Assurance Targets for Precision, Accuracy and Method Detection Limits. Precision and accuracy targets and detection limits are developed from in-house data when possible. Precision and accuracy data are compiled continuously and reported quarterly using the Quality Control Tracking System (QCTS). The goals for precision and accuracy are reviewed quarterly by the QA Officer. The precision, accuracy, and detection limits presented in this CompQAP are routine target values. Deviations from these criteria must be addressed in individual project plans if required.

The QCTS specifies sample matrix as well as preparation procedures in summarizing QA data. Using this system, it is possible to insure that the QA Objectives for the analytical procedures using various sample matrices and preparation procedures are being met and are "representative of the media".

When precision and accuracy data are not available due to the newness or infrequency of use of a method, the literature or method values will be used until such time as in-house data can be accumulated sufficient to establish control limits. In any case those in-house control limits must be as stringent as the literature or method control limits given for the particular matrix. Some methods and testing programs specify control limits which will be used; these are identified in Section 12.0.

Since sample precision and accuracy data are matrix dependent, these criteria are "targets or goals". Out of control sample results may be reported with comments only after a determination is made by the QA Officer and/or QA Unit that based on the Laboratory Control Sample (LCS, an extracted or digested standard) results, a reanalysis of the out of control sample or best professional judgment that matrix problems prevent performance of the particular method within the established criteria. When out of control results are reported by the above protocol the QA Officer and/or the QA Unit will make the determination as to whether to enter the data into the QC data base (QCTS) or determine that the results are true outliers which will not be entered into the data base. The validity and the "completeness" of the results will be left for the sample submitter to evaluate in the few cases (less than 1% of all data reported) where interference and other matrix problems cannot be overcome by the methods employed.

The laboratory defines completeness as a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under current normal conditions. The QA objective for completeness is 99%.

The following tables are compiled from the QCTS where data is available and contain:

a. Component
b. Matrix
c. Method
d. Precision (RPD)
e. Accuracy (% Recovery)
f. PQL, MDL or other reporting limit

The variance of the analytical method changes as the analyte concentration increases from the MDL. Precision and accuracy will be evaluated as a function of concentration when comparing the QC data obtained for an analytical batch versus the QC criteria arrived at from the QCTS data base. Concentrations of analyte less than 10 times the method detection limit (MDL) present in non-spiked (lab duplicate) samples will not be considered as out-of-control based on the QCTS data. RPD's exceeding 20 percent for inorganic analyses and 50 percent for organic analyses will be considered as out-of-control for concentrations of analyte greater than 10 times the reporting detection limit.

Figure 5.1, Matrix Accuracy Control Criteria Usage is a flow chart which outlines the control limit criteria to be applied for accuracy measurements.

Figure 5.2, Matrix Precision Control Criteria Usage is a flow chart which outlines the control limit criteria to be applied for precision measurements.

EPA SW-846 methods that do not specify a sample preparation (extraction, digestion, clean-up, etc.) method are listed in Table 5.2, Sample Preparation Method, which includes a reference to the proposed sample preparation method.

FIGURE 5.1
Matrix Accuracy (% Recovery) Control Criteria Usage

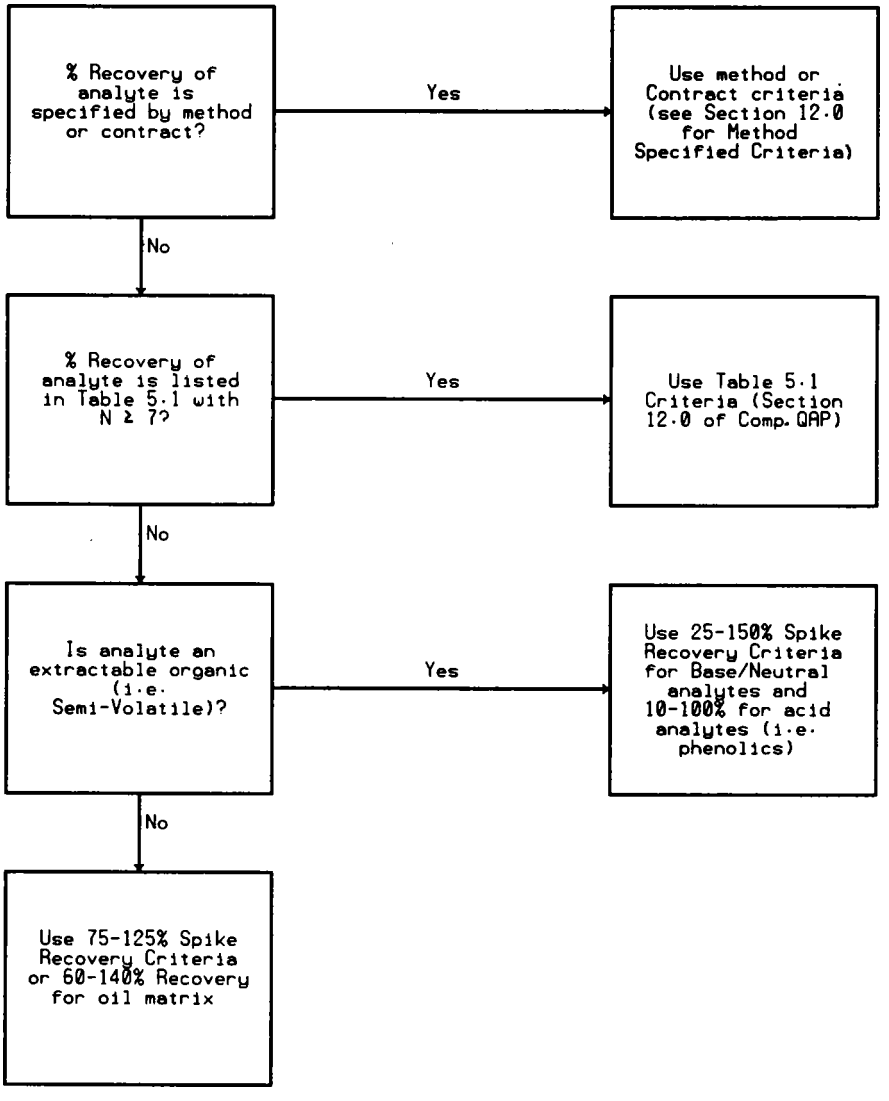
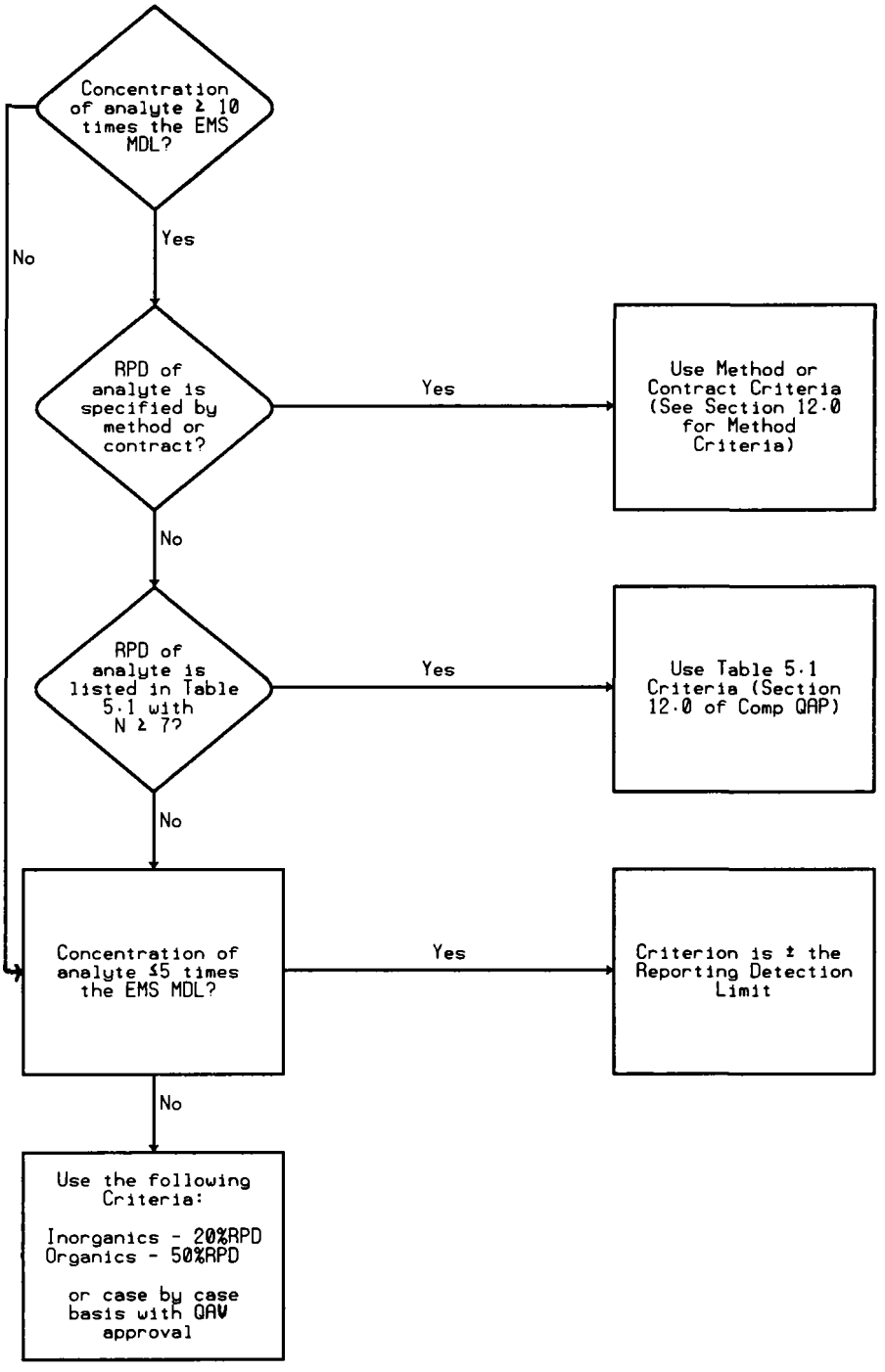


FIGURE 5.2
Matrix Precision (RPD) Control Criteria Usage



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Tab 5.1

Quality Assurance Ob ives for Location ALL

PERIOD: 01-APR- THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
AOAC 57-3	S/S/S	CATION EXCHANGE CAPACITY			2	0 - 43		
APHA 209A	Non-Spec Water	SOLIDS			2	0 - 0		
	S/S/S	SOLIDS			15	0 - 4		
APHA 213E	S/S/S	GRAVITY			1	0 - 0		
APHA 312B	Non-Spec Water	HEXAVALENT CHROMIUM	22	74 - 127	25	0 - 10		
	S/S/S	HEXAVALENT CHROMIUM			1	0 - 7		
APHA 314A	Non-Spec Water	HARDNESS			1	0 - 3		
APHA 412K	Non-Spec Water	THIOCYANATE	1	81 - 81	1	0 - 13		
APHA 415A (16E)	S/S/S	IODINE	2	81 - 97	1	0 - 5		
APHA 509A	Non-Spec Water	ALDRIN			2	0 - 32		
		4,4'-DDD			2	0 - 52		
		4,4'-DDT			2	0 - 17		
		HEPTACHLOR			2	0 - 41		
		HEPTACHLOR EPOXIDE			2	0 - 5		
APHA 909C (MOD)	Drinking Water	COLIFORM BACTERIA, FECAL			1	0 - 0		
	Non-Spec Water	COLIFORM BACTERIA, FECAL			3	0 - 0		
ASTM D-129	Non-Spec Water	SULFUR			1	0 - 7		
ASTM D-240	Non-Spec Water	HEAT OF COMBUSTION			1	0 - 13		
	Oil	HEAT OF COMBUSTION			3	0 - 10		
	S/S/S	HEAT OF COMBUSTION			40	0 - 22		
ASTM D-244	Non-Spec Water	GRAVITY			3	0 - 19		
	S/S/S	GRAVITY			8	0 - 0		
ASTM D-482	Oil	RESIDUE, PERCENT ASH			1	0 - 2		
	S/S/S	RESIDUE, PERCENT ASH			40	0 - 21		
ASTM D-70	S/S/S	DENSITY			3	0 - 4		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
ASTM D-808	Oil	TOTAL HALOGEN (TX)			1	0 - 5		
	S/S/S	TOTAL HALOGEN (TX)			3	0 - 23		
ASTM D-86	S/S/S	BOILING POINT			6	0 - 7		
ASTM D-92	S/S/S	FLASH POINT			23	0 - 0		
ASTM D-93	Non-Spec Water	FLASH POINT			1	0 - 5		
	S/S/S	FLASH POINT			1	0 - 0		
ASTM D-95	Oil	WATER			1	0 - 0		
	S/S/S	WATER	1	100 - 100	3	0 - 37		
ASTM D-96	S/S/S	BOTTOM SEDIMENT AND WATER			7	0 - 10		
		OIL			5	0 - 18		
		SOLIDS			3	0 - 45		
		WATER			4	0 - 6		
CLP SOW 2/88	Non-Spec Water	BENZENE	4	75 - 123	2	0 - 0		
		CHLOROBENZENE	4	93 - 121	2	0 - 2		
		1,1-DICHLOROETHENE	4	43 - 163	2	0 - 24		
		PCB AROCLOR 1260	14	68 - 118	7	0 - 26		
		TOLUENE	4	82 - 121	2	0 - 7		
		TRICHLOROETHENE	4	94 - 114	2	0 - 4		
	S/S/S	ACENAPHTHENE	2	91 - 99	1	0 - 2		
		4-CHLORO-3-METHYLPHENOL	2	94 - 102	1	0 - 2		
		2-CHLOROPHENOL	2	82 - 90	1	0 - 2		
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	2	85 - 85	1	0 - 0		
		2,4-DINITROTOLUENE	2	90 - 116	1	0 - 6		
		N-NITROSO-DI-N-PROPYLAMINE	2	72 - 98	1	0 - 7		
		4-NITROPHENOL	2	54 - 104	1	0 - 15		
		PENTACHLOROPHENOL	2	53 - 92	1	0 - 12		
		PHENOL	2	76 - 84	1	0 - 3		
		PYRENE	2	51 - 132	1	0 - 21		
		1,2,4-TRICHLOROBENZENE	2	83 - 96	1	0 - 3		
EPA 110.3	Non-Spec Water	COLOR			10	0 - 0		
EPA 120.1	Non-Spec Water	CONDUCTIVITY			13	0 - 0		
EPA 130.2	Non-Spec Water	HARDNESS	2	100 - 100	8	0 - 5		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 150.1	Drinking Water	PH			5	0 - 0		
	Non-Spec Water	PH			304	0 - 2		
	S/S/S	PH			8	0 - 3		
EPA 160.1	Drinking Water	SOLIDS			7	0 - 15		
	Non-Spec Water	SOLIDS	8	87 - 131	84	0 - 13		
	S/S/S	SOLIDS			1	0 - 1		
EPA 160.2	Non-Spec Water	SOLIDS			23	0 - 50		
		SUSPENDED SOLIDS	21	62 - 128	112	0 - 34		
EPA 160.3	Non-Spec Water	SOLIDS			6	0 - 6		
	S/S/S	SOLIDS			86	0 - 6		
EPA 160.4	Non-Spec Water	TOTAL SOLIDS, VOLATILE			1	0 - 0		
		VOLATILE SUSPENDED SOLIDS			11	0 - 19		
	S/S/S	TOTAL SOLIDS, VOLATILE			6	0 - 27		
EPA 180.1	Drinking Water	TURBIDITY			2	0 - 20		
	Non-Spec Water	TURBIDITY			1	0 - 4		
EPA 200.7	Drinking Water	BARIUM	9	80 - 117	7	0 - 4		
		BORON	3	51 - 163	3	0 - 44		
		CALCIUM	1	86 - 86	1	0 - 0		
		CHROMIUM	10	75 - 123				
		COPPER	13	72 - 128	4	0 - 146		
		IRON	6	80 - 110	8	0 - 60		
		MAGNESIUM	2	84 - 113	2	0 - 12		
		MANGANESE	8	75 - 124	3	0 - 4		
		NICKEL	1	90 - 90				
		POTASSIUM	1	88 - 88	1	0 - 5		
		SILVER	9	73 - 127				
		SODIUM	2	83 - 112	2	0 - 32		
		ZINC	8	63 - 131	7	0 - 45		
	Non-Spec Water	ALUMINUM	68	82 - 110	33	0 - 26		
		ANTIMONY	26	67 - 102	12	0 - 10		
		BARIUM	32	87 - 108	15	0 - 5		
		BERYLLIUM	25	69 - 134	8	0 - 1		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 200.7	Non-Spec Water	BORON	2	73 - 128	1	0 - 2		
		CADMIUM	69	60 - 116	16	0 - 10		
		CALCIUM	43	80 - 106	28	0 - 4		
		CHROMIUM	122	76 - 111	40	0 - 44		
		COBALT	21	85 - 106	11	0 - 3		
		COPPER	182	77 - 121	86	0 - 27		
		IRON	47	73 - 111	35	0 - 13		
		LEAD	75	69 - 115	16	0 - 25		
		LITHIUM	2	79 - 129				
		MAGNESIUM	39	87 - 111	25	0 - 4		
		MANGANESE	26	88 - 108	15	0 - 5		
		MOLYBDENUM	3	66 - 124	2	0 - 0		
		NICKEL	73	77 - 108	43	0 - 19		
		POTASSIUM	26	86 - 104	17	0 - 8		
		SILICON			1	0 - 4		
		SILVER	58	80 - 123	13	0 - 9		
		SODIUM	26	89 - 108	17	0 - 19		
		STRONTIUM	2	66 - 121	1	0 - 4		
		THALLIUM	4	50 - 101				
		TITANIUM	2	76 - 123				
		VANADIUM	22	84 - 104	10	0 - 3		
		ZINC	132	70 - 118	107	0 - 56		
		ZIRCONIUM	2	64 - 145				
	S/S/S	ALUMINUM	2	80 - 101	2	0 - 10		
		BARIUM	1	99 - 99	1	0 - 2		
		CADMIUM	4	69 - 110	3	0 - 65		
		CALCIUM	1	94 - 94	1	0 - 1		
		CHROMIUM	4	61 - 126	5	0 - 38		
		COBALT	1	93 - 93	1	0 - 1		
		COPPER	5	87 - 105	6	0 - 13		
		IRON	2	69 - 85	3	0 - 5		
		LEAD	4	62 - 111	3	0 - 37		
		MAGNESIUM	1	99 - 99	1	0 - 1		
		NICKEL	3	81 - 113	5	0 - 37		
		POTASSIUM	3	87 - 94	3	0 - 21		
		SILVER	1	93 - 93	2	0 - 22		
		SODIUM			1	0 - 16		
		ZINC	4	76 - 105	5	0 - 19		
EPA 202.1	Non-Spec Water	ALUMINUM	42	58 - 132	21	0 - 16		
EPA 204.1	Non-Spec Water	ANTIMONY	2	92 - 134	1	0 - 5		
EPA 204.2	Non-Spec Water	ANTIMONY	9	0 - 173	7	0 - 25		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 206.2	Drinking Water	ARSENIC	13	71 - 127	4	0 - 14		
	Non-Spec Water	ARSENIC	105	65 - 133	38	0 - 21		
	S/S/S	ARSENIC	1	95 - 95	1	0 - 200		
EPA 208.1	Drinking Water	BARIUM	3	106 - 113				
	Non-Spec Water	BARIUM	16	66 - 116	9	0 - 18		
EPA 210.1	Non-Spec Water	BERYLLIUM	2	100 - 100	1	0 - 0		
EPA 210.2	Non-Spec Water	BERYLLIUM	45	53 - 161	23	0 - 21		
EPA 212.3	Non-Spec Water	BORON			2	0 - 21		
EPA 213.1	Non-Spec Water	CADMIUM	133	74 - 123	58	0 - 7		
	S/S/S	CADMIUM	2	80 - 114	2	0 - 13		
EPA 213.2	Drinking Water	CADMIUM	20	54 - 138	1	0 - 0		
	Non-Spec Water	CADMIUM	23	54 - 150	7	0 - 10		
EPA 215.1	Drinking Water	CALCIUM			1	0 - 0		
	Non-Spec Water	CALCIUM	3	90 - 100	1	0 - 0		
EPA 218.1	Drinking Water	CHROMIUM	4	78 - 108				
	Non-Spec Water	CHROMIUM	141	74 - 117	69	0 - 12		
	S/S/S	CHROMIUM	1	93 - 93	1	0 - 14		
EPA 218.2	Drinking Water	CHROMIUM	2	90 - 95	2	0 - 1		
	Non-Spec Water	CHROMIUM	8	77 - 123	4	0 - 12		
EPA 219.1	Non-Spec Water	COBALT	2	97 - 110	1	0 - 3		
EPA 220.1	Non-Spec Water	COPPER	139	81 - 117	72	0 - 10		
	S/S/S	COPPER			1	0 - 0		
EPA 220.2	Non-Spec Water	COPPER	59	38 - 176	30	0 - 26		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 236.1	Drinking Water	IRON	3	40 - 141	1	0 - 0		
	Non-Spec Water	IRON	19	37 - 135	13	0 - 20		
EPA 239.1	Non-Spec Water	LEAD	106	74 - 123	49	0 - 19		
	S/S/S	LEAD	2	0 - 342	2	0 - 13		
EPA 239.2	Drinking Water	LEAD	21	67 - 131	4	0 - 94		
	Non-Spec Water	LEAD	217	67 - 134	74	0 - 25		
	S/S/S	LEAD	3	47 - 137	3	0 - 57		
EPA 243.1	Drinking Water	MANGANESE	4	78 - 112				
	Non-Spec Water	MANGANESE	5	77 - 111	5	0 - 234		
	S/S/S	MANGANESE			1	0 - 2		
EPA 245.1	Drinking Water	MERCURY	9	81 - 120				
	Non-Spec Water	MERCURY	110	58 - 129	53	0 - 32		
	S/S/S	MERCURY	2	78 - 120				
EPA 246.2	Non-Spec Water	MOLYBDENUM	2	69 - 129	1	0 - 11		
EPA 249.1	Non-Spec Water	NICKEL	115	71 - 123	58	0 - 9		
	S/S/S	NICKEL	2	2 - 143	2	0 - 20		
EPA 258.1	S/S/S	POTASSIUM			1	0 - 3		
EPA 270.2	Drinking Water	SELENIUM	12	70 - 129	2	0 - 42		
	Non-Spec Water	SELENIUM	45	56 - 142	14	0 - 21		
	S/S/S	SELENIUM	1	122 - 122				
EPA 272.1	Drinking Water	SILVER	1	40 - 40				
	Non-Spec Water	SILVER	92	71 - 125	35	0 - 5		
	S/S/S	SILVER	1	82 - 82				

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 272.2	Drinking Water	SILVER	2	101 - 106	1	0 - 0		
	Non-Spec Water	SILVER	15	89 - 113	8	0 - 24		
EPA 273.1	Drinking Water	SODIUM	2	120 - 120	2	0 - 0		
	Non-Spec Water	SODIUM			3	0 - 6		
EPA 279.2	Non-Spec Water	THALLIUM	37	65 - 125	19	0 - 12		
EPA 282.1	Non-Spec Water	TIN	2	76 - 144	1	0 - 14		
EPA 283.2	Non-Spec Water	TITANIUM	2	103 - 103	1	0 - 0		
	S/S/S	TITANIUM	1	129 - 129				
EPA 286.1	Non-Spec Water	VANADIUM	2	40 - 150	1	0 - 25		
EPA 289.1	Drinking Water	ZINC	1	120 - 120				
	Non-Spec Water	ZINC	144	73 - 121	72	0 - 9		
	S/S/S	ZINC	1	### - ###	2	0 - 23		
EPA 305.1	Non-Spec Water	ACIDITY			1	0 - 18		
	S/S/S	ACIDITY			6	0 - 14		
EPA 310.1	Drinking Water	ALKALINITY			1	0 - 2		
	Non-Spec Water	ALKALINITY	9	61 - 159	66	0 - 7		
	S/S/S	ALKALINITY			25	0 - 9		
EPA 310.2	Non-Spec Water	ALKALINITY			2	0 - 5		
EPA 325.1	Drinking Water	CHLORIDE	1	90 - 90	3	0 - 0		
	Non-Spec Water	CHLORIDE	56	89 - 120	47	0 - 4		
	S/S/S	CHLORIDE	2	105 - 105	1	0 - 0		
EPA 325.2	Drinking Water	CHLORIDE	1	100 - 100	1	0 - 3		
	Non-Spec Water	CHLORIDE	12	74 - 123	13	0 - 5		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 325.3	Non-Spec Water	CHLORIDE			1	0 - 2		
EPA 330.5	Non-Spec Water	CHLORINE			7	0 - 3		
EPA 335.1	Non-Spec Water	CYANIDE, AMENABLE			2	0 - 26		
EPA 335.2	Non-Spec Water	CYANIDE	50	64 - 121	51	0 - 22		
	S/S/S	CYANIDE	8	52 - 113	1	0 - 0		
EPA 335.3	Drinking Water	CYANIDE	1	100 - 100				
	Non-Spec Water	CYANIDE	119	67 - 129	18	0 - 47		
	S/S/S	CYANIDE	4	55 - 129				
EPA 340.2	Drinking Water	FLUORIDE	2	67 - 122				
	Non-Spec Water	FLUORIDE	25	59 - 125	23	0 - 39		
	S/S/S	FLUORIDE	1	79 - 79	1	0 - 20		
EPA 350.1	Non-Spec Water	NITROGEN, AMMONIA	8	67 - 132	8	0 - 11		
EPA 350.3	Non-Spec Water	NITROGEN, AMMONIA	74	64 - 124	69	0 - 20		
	S/S/S	NITROGEN, AMMONIA	10	0 - 181	14	0 - 31		
EPA 351.2	Non-Spec Water	NITROGEN, KJELDAHL	7	59 - 147	8	0 - 16		
EPA 351.3	Non-Spec Water	NITROGEN, KJELDAHL	1	100 - 100	1	0 - 0		
	S/S/S	NITROGEN, KJELDAHL	11	66 - 139	14	0 - 11		
EPA 353.1	Drinking Water	NITROGEN, NITRATE	3	82 - 108	2	0 - 26		
	Non-Spec Water	NITROGEN, NITRATE	5	85 - 113	5	0 - 27		
		NITROGEN, NITRATE-NITRITE	4	86 - 140	4	0 - 4		
	S/S/S	NITROGEN, NITRATE	1	90 - 90	1	0 - 0		
EPA 353.2	Drinking Water	NITROGEN, NITRATE	1	120 - 120	3	0 - 15		
	Non-Spec Water	NITROGEN, NITRATE	37	69 - 130	59	0 - 15		
		NITROGEN, NITRATE-NITRITE	18	89 - 128	11	0 - 17		
		NITROGEN, NITRITE			2	0 - 20		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 353.2	S/S/S	NITROGEN, NITRATE			3	0 - 14		
		NITROGEN, NITRITE	4	77 - 135	2	0 - 27		
EPA 353.3	Non-Spec Water	NITROGEN, NITRATE	8	79 - 121	15	0 - 10		
		NITROGEN, NITRATE-NITRITE	9	85 - 113	11	0 - 30		
EPA 354.1	Non-Spec Water	NITROGEN, NITRITE	1	97 - 97				
EPA 365.1	Non-Spec Water	ORTHO-PHOSPHORUS			2	0 - 4		
EPA 365.2	Non-Spec Water	ORTHO-PHOSPHORUS	12	69 - 128	28	0 - 12		
		PHOSPHORUS	74	67 - 129	99	0 - 19		
	S/S/S	ORTHO-PHOSPHORUS	5	87 - 117				
		PHOSPHORUS	3	64 - 138	7	0 - 42		
EPA 365.4	Non-Spec Water	PHOSPHORUS	8	77 - 125	4	0 - 16		
EPA 375.4	Drinking Water	SULFATE	7	83 - 112	7	0 - 12		
	Non-Spec Water	SULFATE	50	79 - 127	55	0 - 10		
	S/S/S	SULFATE	4	96 - 121	3	0 - 3		
EPA 376.1	Non-Spec Water	SULFIDE	1	82 - 82	4	0 - 0		
	S/S/S	SULFIDE	2	99 - 107	1	0 - 2		
EPA 377.1	Non-Spec Water	SULFITE	2	104 - 109	1	0 - 0		
	S/S/S	SULFITE	2	91 - 112	1	0 - 5		
EPA 405.1	Non-Spec Water	BIOCHEMICAL OXYGEN DEMAND			157	0 - 43		
EPA 410.2	Non-Spec Water	CHEMICAL OXYGEN DEMAND			1	0 - 28		
EPA 410.3	Non-Spec Water	CHEMICAL OXYGEN DEMAND	1	104 - 104	1	0 - 32		
EPA 410.4	Drinking Water	CHEMICAL OXYGEN DEMAND	1	96 - 96	1	0 - 14		
	Non-Spec Water	CHEMICAL OXYGEN DEMAND	38	75 - 126	20	0 - 33		
	S/S/S	CHEMICAL OXYGEN DEMAND			6	0 - 13		
EPA 413.1	Non-Spec Water	OIL AND GREASE			19	0 - 13		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 413.1	S/S/S	OIL AND GREASE			1	0 - 24		
EPA 415.1	Drinking Water	TOTAL ORGANIC CARBON (TOC)	2	109 - 109	1	0 - 9		
	Non-Spec Water	TOTAL ORGANIC CARBON (TOC)	10	81 - 116	11	0 - 9		
EPA 418.1 (MOD)	S/S/S	HYDROCARBONS	12	60 - 121	10	0 - 36		
EPA 420.1	Non-Spec Water	PHENOL	8	28 - 159	12	0 - 38		
	S/S/S	PHENOL						
EPA 420.2	Drinking Water	PHENOL	1	95 - 95				
	Non-Spec Water	PHENOL	53	72 - 119	13	0 - 27		
	S/S/S	PHENOL			1	0 - 1		
EPA 425.1	Non-Spec Water	SURFACTANTS, MBAS	3	2 - 176	3	0 - 20		
EPA 502.2	Drinking Water	BENZENE			2	0 - 39		
		BROMODICHLOROMETHANE			1	0 - 1		
		BROMOFORM			2	0 - 32		
		CHLOROFORM			1	0 - 0		
		DIBROMOCHLOROMETHANE			1	0 - 3		
		1,1-DICHLOROETHANE			1	0 - 16		
		DICHLOROMETHANE (METHYLENE CHLORIDE)			1	0 - 2		
		ETHYL BENZENE			2	0 - 20		
		M/P-XYLENE			1	0 - 10		
		O-XYLENE			1	0 - 7		
		TOLUENE			1	0 - 10		
		TOTAL TRIHALOMETHANES			1	0 - 6		
		1,1,1-TRICHLOROETHANE			1	0 - 20		
	Non-Spec Water	BENZENE			1	0 - 13		
		ETHYL BENZENE			1	0 - 10		
		M/P-XYLENE			1	0 - 15		
EPA 504	Drinking Water	1,2-DIBROMO-3-CHLOROPROPANE (DBCP)	2	96 - 101	1	0 - 1		
		1,2-DIBROMOETHANE (EDB)	2	46 - 114	1	0 - 20		
	Non-Spec Water	1,2-DIBROMO-3-CHLOROPROPANE (DBCP)	6	63 - 129	3	0 - 26		
		1,2-DIBROMOETHANE (EDB)	6	69 - 125	3	0 - 30		
EPA 507	Non-Spec Water	AMETRYN	2	120 - 125	1	0 - 1		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 507	Non-Spec Water	ATRATON	2	0 - 328	1	0 - 128	———	———
		ATRAZINE	2	0 - 199			———	———
		BROMACIL	2	0 - 248	1	0 - 81	———	———
		CHLOROPROPHAM	2	17 - 213	1	0 - 40	———	———
		CYCLOATE	2	93 - 119	1	0 - 6	———	———
		DIPHENAMID	5	42 - 145	2	0 - 1	———	———
		DISULFOTON	2	57 - 133	1	0 - 19	———	———
		EPTC (ERADICANE)	5	46 - 120	2	0 - 24	———	———
		ETHOPROP	6	0 - 304	2	0 - 11	———	———
		HEXAZINONE	2	32 - 160	1	0 - 31	———	———
		MERPHOS	2	31 - 183	1	0 - 34	———	———
		MEVINPHOS	4	0 - 221	1	0 - 20	———	———
		MOLINATE	2	98 - 132	1	0 - 7	———	———
		PROMETON (PRAMITOL)	2	46 - 174	1	0 - 28	———	———
		PROMETRYN (CAPAROL)	5	40 - 135	2	0 - 5	———	———
		PRONAMIDE	2	81 - 131	1	0 - 12	———	———
		PROPAZINE (MILOGARD)	6	0 - 207	2	0 - 4	———	———
		STIROFOS	2	107 - 136	1	0 - 6	———	———
		TERBUTRYN	5	49 - 125	2	0 - 10	———	———
		TRIADEMEFON	6	0 - 248	2	0 - 8	———	———
EPA 508	Non-Spec Water	ETHALFLURALIN	14	23 - 52	7	0 - 26	———	———
		FLUCHLORALIN	14	35 - 53	7	0 - 11	———	———
		PENDIMETHALIN	14	37 - 63	6	0 - 14	———	———
		PROFLURALIN	14	36 - 56	7	0 - 20	———	———
		PROPACHLOR	14	28 - 92	7	0 - 15	———	———
EPA 515.1	Non-Spec Water	2,4-DB	16	13 - 167	7	0 - 95	———	———
		DCPA (DACTHAL)	16	0 - 260	7	0 - 106	———	———
		2,4-DICHLOROPHENOXYACETIC ACID	16	9 - 172	5	0 - 14	———	———
		4-NITROPHENOL	14	0 - 182	6	0 - 143	———	———
		PICLORAM	15	0 - 180	7	0 - 115	———	———
		2,4,5-T	16	31 - 158	6	0 - 27	———	———
		2,4,5-TRICHLOROPHENOXYACETIC ACID (SILVEX)	16	30 - 172	6	0 - 26	———	———
EPA 524.2	Non-Spec Water	BENZENE	16	77 - 114	8	0 - 21	———	———
		BROMOBENZENE	16	75 - 115	8	0 - 30	———	———
		BROMOCHLOROMETHANE	16	67 - 125	8	0 - 18	———	———
		BROMODICHLOROMETHANE	16	76 - 115	8	0 - 14	———	———
		BROMOFORM	16	69 - 126	8	0 - 19	———	———
		BROMOMETHANE	16	72 - 110	6	0 - 8	———	———
		CARBON TETRACHLORIDE	16	55 - 118	7	0 - 6	———	———
		CHLOROBENZENE	16	77 - 117	8	0 - 22	———	———
		CHLOROETHANE	15	63 - 116	8	0 - 48	———	———

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

ENS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 524.2	Non-Spec Water	CHLOROFORM	16	77 - 110	8	0 - 12		
		CHLOROMETHANE	16	64 - 121	7	0 - 20		
		2-CHLOROTOLUENE (O-CHLOROTOLUENE)	16	73 - 113	8	0 - 16		
		4-CHLOROTOLUENE (P-CHLOROTOLUENE)	16	62 - 136	8	0 - 27		
		CIS-1,2-DICHLOROETHENE	16	73 - 116	8	0 - 16		
		DIBROMOMETHANE	16	76 - 124	7	0 - 19		
		1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	16	75 - 116	8	0 - 16		
		1,2-DICHLORDBENZENE (O-DICHLOROBENZENE)	16	76 - 120	8	0 - 22		
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	16	66 - 126	8	0 - 21		
		DICHLORODIFLUOROMETHANE	15	60 - 99	7	0 - 9		
		1,1-DICHLOROETHANE	16	72 - 114	6	0 - 6		
		1,2-DICHLOROETHANE	16	75 - 122	8	0 - 23		
		1,1-DICHLORDETHENE	16	58 - 117	8	0 - 28		
		DICHLOROMETHANE (METHYLENE CHLORIDE)	16	51 - 158	8	0 - 67		
		1,2-DICHLOROPROPANE	16	79 - 116	8	0 - 19		
		2,2-DICHLOROPROPANE	16	55 - 109	8	0 - 17		
		1,3-DICHLOROPROPANE	16	82 - 114	8	0 - 12		
		1,1-DICHLOROPROPENE	16	65 - 119	8	0 - 14		
		ETHYL BENZENE	16	71 - 115	8	0 - 28		
		FLUOROTRICHLOROMETHANE	16	0 - 188	8	0 - 102		
		HEXACHLOROBUTADIENE	16	45 - 141	8	0 - 39		
		ISOPROPYLBENZENE (CUMENE)	16	62 - 123	6	0 - 4		
		4-ISOPROPYLTOLUENE (P-ISOPROPYLTOLUENE)	16	62 - 123	8	0 - 19		
		N-BUTYLBENZENE	16	66 - 115	8	0 - 19		
		N-PROPYLBENZENE	16	66 - 120	7	0 - 19		
		NAPHTHALENE	16	71 - 140	7	0 - 16		
		O-XYLENE	16	78 - 111	7	0 - 8		
		SEC-BUTYLBENZENE	16	65 - 121	8	0 - 20		
		STYRENE	14	80 - 107	7	0 - 8		
		TERT-BUTYLBENZENE	16	43 - 133	8	0 - 7		
		1,1,1,2-TETRACHLOROETHANE	16	73 - 117	7	0 - 7		
		1,1,2,2-TETRACHLOROETHANE	16	81 - 124	8	0 - 22		
		TETRACHLOROETHENE	16	59 - 124	8	0 - 20		
		TOLUENE	16	78 - 110	8	0 - 15		
		TRANS-1,2-DICHLOROETHENE	16	66 - 116	8	0 - 20		
		1,2,3-TRICHLOROBENZENE	16	68 - 138	9	0 - 31		
		1,2,4-TRICHLOROBENZENE	16	69 - 133	8	0 - 17		
		1,1,1-TRICHLOROETHANE	16	66 - 117	8	0 - 18		
		1,1,2-TRICHLOROETHANE	16	79 - 119	8	0 - 21		
		TRICHLOROETHENE	16	72 - 111	8	0 - 21		
		1,2,3-TRICHLOROPROPANE	16	72 - 135	8	0 - 33		
		1,2,4-TRIMETHYLBENZENE	16	53 - 133	7	0 - 20		
		1,3,5-TRIMETHYLBENZENE	16	41 - 132	8	0 - 12		
		VINYL CHLORIDE	16	68 - 123	8	0 - 14		
EPA 525	Drinking Water	ACENAPHTHYLENE	1	36 - 36				

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 525	Drinking Water	ALACHLOR	1	86 - 86				
		ALDRIN	1	76 - 76				
		ALPHA-CHLORDANE	1	78 - 78				
		ANTHRACENE	1	38 - 38				
		ATRAZINE	1	82 - 82				
		BENZ(A)ANTHRACENE	1	80 - 80				
		BENZO(A)PYRENE	1	0 - 0				
		BENZO(B)FLUORANTHENE	1	220 - 220				
		BENZO(G,H,I)PERYLENE	1	260 - 260				
		BENZO(K)FLUORANTHENE	1	220 - 220				
		(BENZYLBUTYLPHTHALATE) BUTYLBENZYLPHTHALATE	1	88 - 88				
		BIS(2-ETHYLHEXYL)PHTHALATE	1	98 - 98				
		2-CHLOROBIPHENYL	1	88 - 88				
		CHRYSENE	1	98 - 98				
		DI(2-ETHYLHEXYL)ADIPATE	1	92 - 92				
		DI-N-BUTYLPHTHALATE	1	88 - 88				
		DIBENZ(A,H)ANTHRACENE	1	300 - 300				
		2,3-DICHLOROBIPHENYL	1	84 - 84				
		DIETHYLPHTHALATE	1	86 - 86				
		DIMETHYLPHTHALATE	1	88 - 88				
		FLUORENE	1	90 - 90				
		GAMMA-CHLORDANE	1	80 - 80				
		HEPTACHLOR	1	108 - 108				
		HEPTACHLOR EPOXIDE	1	80 - 80				
		2,2',3,3',4,4',6-HEPTACHLOROBIPHENYL	1	74 - 74				
		HEXACHLOROBENZENE	1	80 - 80				
		2,2',4,4',5,6'-HEXACHLOROBIPHENYL	1	80 - 80				
		HEXACHLOROCYCLOPENTADIENE	1	68 - 68				
		INDENO(1,2,3-CD)PYRENE	1	380 - 380				
		2,2',3,3',4,5',6,6'-OCTACHLOROBIPHENYL	1	72 - 72				
		2,2',3',4,6-PENTACHLOROBIPHENYL	1	78 - 78				
		PENTACHLOROPHENOL	1	108 - 108				
		PHENANTHRENE	1	84 - 84				
		PYRENE	1	78 - 78				
		SIMAZINE (PRINCEP)	1	84 - 84				
		2,2',4,4'-TETRACHLOROBIPHENYL	1	82 - 82				
		TRANS-NONACHLOR	1	82 - 82				
		2,4,5-TRICHLOROBIPHENYL	1	84 - 84				
	Non-Spec Water	ACENAPHTHYLENE	21	17 - 126	8	0 - 13		
		ALACHLOR	11	51 - 126	5	0 - 28		
		ALDRIN	9	57 - 98	4	0 - 29		
		ALPHA-CHLORDANE	9	43 - 113	4	0 - 38		
		ANTHRACENE	21	45 - 111	10	0 - 48		

N : Sample count
REC = Percent Recovery (observed/actual*100)
RPD : Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 525	Non-Spec Water	ATRAZINE	11	43 - 112	5	0 - 15		
		BENZ(A)ANTHRACENE	21	53 - 121	9	0 - 12		
		BENZO(A)PYRENE	21	0 - 149	9	0 - 18		
		BENZO(B)FLUORANTHENE	21	27 - 157	9	0 - 21		
		BENZO(G,H,I)PERYLENE	21	0 - 162	10	0 - 41		
		BENZO(K)FLUORANTHENE	21	32 - 135	10	0 - 55		
		(BENZYLBUTYLPHTHALATE) BUTYLBENZYLPHTHALATE	22	39 - 165	10	0 - 24		
		BIS(2-ETHYLHEXYL)PHTHALATE	22	13 - 187	9	0 - 15		
		2-CHLOROBIPHENYL	23	40 - 105	9	0 - 10		
		CHRYSENE	21	45 - 127	8	0 - 9		
		DI(2-ETHYLHEXYL)ADIPATE	22	1 - 208	11	0 - 47		
		DI-N-BUTYLPHTHALATE	23	42 - 156	11	0 - 43		
		DIBENZ(A,H)ANTHRACENE	21	19 - 155	10	0 - 43		
		2,3-DICHLOROBIPHENYL	23	42 - 114	10	0 - 17		
		DIETHYLPHTHALATE	23	42 - 138	8	0 - 8		
		DIMETHYLPHTHALATE	22	41 - 124	10	0 - 39		
		ENDRIN	9	29 - 184	4	0 - 28		
		FLUORENE	21	47 - 113	9	0 - 14		
		GAMMA-BHC (LINDANE)	9	51 - 119	4	0 - 26		
		GAMMA-CHLORDANE	9	38 - 117	4	0 - 19		
		HEPTACHLOR	9	17 - 167	4	0 - 22		
		HEPTACHLOR EPOXIDE	9	49 - 134	4	0 - 42		
		2,2',3,3',4,4',6-HEPTACHLOROBIPHENYL	23	27 - 123	10	0 - 29		
		HEXACHLOROBENZENE	23	39 - 113	11	0 - 49		
		2,2',4,4',5,6'-HEXACHLOROBIPHENYL	23	37 - 113	10	0 - 24		
		HEXACHLOROCYCLOPENTADIENE	23	0 - 125	11	0 - 52		
		INDENO(1,2,3-CD)PYRENE	21	0 - 186	10	0 - 58		
		METHOXYCHLOR	9	24 - 154	4	0 - 28		
		2,2',3,3',4,5',6,6'-OCTACHLORODIPHENYL	23	31 - 115	10	0 - 25		
		2,2',3',4,6-PENTACHLOROBIPHENYL	23	45 - 111	9	0 - 9		
		PENTACHLOROPHENOL	11	0 - 121	5	0 - 47		
		PHENANTHRENE	21	54 - 114	9	0 - 18		
		PYRENE	21	20 - 140	9	0 - 19		
		SIMAZINE (PRINCEP)	10	52 - 95	5	0 - 30		
		2,2',4,4'-TETRACHLOROBIPHENYL	23	42 - 115	9	0 - 11		
		TRANS-NONACHLOR	23	41 - 116	10	0 - 18		
		2,4,5-TRICHLOROBIPHENYL	17	43 - 107	6	0 - 7		
EPA 531.1	Non-Spec Water	ALDICARB	16	36 - 111	7	0 - 18		
		ALDICARB SULFONE	16	52 - 128	8	0 - 15		
		ALDICARB SULFOXIDE	16	51 - 129	7	0 - 13		
		CARBARYL	16	59 - 113	8	0 - 12		
		CARBOFURAN	16	49 - 126	8	0 - 18		
		3-HYDROXYCARBOFURAN	16	45 - 132	7	0 - 18		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 531.1	Non-Spec Water	METHIOCARB	14	56 - 88	8	0 - 23		
		METHOMYL	16	45 - 125	8	0 - 10		
		OXAMYL	16	41 - 134	8	0 - 17		
		PROPOXUR (BAYGON)	16	49 - 126	8	0 - 28		
EPA 548.1	Non-Spec Water	ENDOTHALL	2	79 - 129	1	0 - 12		
EPA 601/602 MOD	Drinking Water	BENZENE	12	35 - 143	5	0 - 74		
		DI-ISOPROPYL ETHER (IPE)	2	34 - 141				
		1,2-DIBROMOETHANE (EDB)	8	70 - 132	3	0 - 50		
		1,2-DICHLOROETHANE	15	18 - 182	6	0 - 87		
		ETHYL BENZENE	12	56 - 124	5	0 - 37		
		M/P-XYLENE	7	74 - 112	3	0 - 31		
		METHYL-T-BUTYL ETHER (MTBE)	7	59 - 124	3	0 - 78		
		O-XYLENE	7	72 - 113	3	0 - 35		
		TOLUENE	12	53 - 135	5	0 - 62		
	Non-Spec Water	BENZENE	1	97 - 97				
		DI-ISOPROPYL ETHER (IPE)						
		1,2-DIBROMOETHANE (EDB)	1	139 - 139				
		1,2-DICHLOROETHANE	1	96 - 96				
		ETHYL BENZENE	1	99 - 99				
		M/P-XYLENE	1	99 - 99				
		METHYL-T-BUTYL ETHER (MTBE)	1	65 - 65				
		O-XYLENE	1	100 - 100				
		TOLUENE	1	98 - 98				
EPA 602	Drinking Water	BENZENE	7	31 - 146	3	0 - 58		
		ETHYL BENZENE	7	43 - 144	3	0 - 18		
		METHYL-T-BUTYL ETHER (MTBE)	5	0 - 229	2	0 - 62		
		TOLUENE	7	44 - 142	3	0 - 22		
	Non-Spec Water	BENZENE	1	97 - 97				
		DI-ISOPROPYL ETHER (IPE)	1	99 - 99				
		ETHYL BENZENE	1	115 - 115				
		METHYL-T-BUTYL ETHER (MTBE)	1	98 - 98				
		TOLUENE	1	113 - 113				
		XYLENES (O/M/P-XYLENE)	1	116 - 116				
EPA 608	Drinking Water	ENDRIN	2	110 - 110	1	0 - 0		
		GAMMA-BHC (LINDANE)	2	60 - 76	1	0 - 6		
	Non-Spec Water	ALDRIN	4	55 - 112	2	0 - 34		
		CHLORDANE	1	78 - 78				
		4,4'-DDT	18	76 - 137	8	0 - 15		
		DIELDRIN	18	72 - 137	9	0 - 28		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 608	Non-Spec Water	ENDRIN	4	77 - 176	3	0 - 25		
		GAMMA-BHC (LINDANE)	4	69 - 123	3	0 - 30		
		HEPTACHLOR	4	79 - 122	3	0 - 9		
		HEPTACHLOR EPOXIDE			1	0 - 3		
		METHOXYCHLOR			1	0 - 6		
		PCB AROCLOR 1242	3	20 - 166	1	0 - 0		
		PCB AROCLOR 1248	3	73 - 92	1	0 - 6		
		PCB AROCLOR 1260	48	30 - 128	10	0 - 20		
		TOXAPHENE	1	124 - 124	1	0 - 2		
	S/S/S	PCB AROCLOR 1260	5	50 - 174	2	0 - 6		
EPA 624	Non-Spec Water	ACROLEIN	13	0 - 208	5	0 - 58		
		ACRYLONITRILE	11	42 - 169	5	0 - 71		
		BENZENE	16	75 - 133	8	0 - 13		
		BROMODICHLOROMETHANE	19	83 - 146	5	0 - 16		
		4-BROMOFLUOROBENZENE	8	87 - 111	3	0 - 8		
		BROMOFORM	19	72 - 138	5	0 - 33		
		BROMOMETHANE	18	50 - 148	5	0 - 27		
		CARBON TETRACHLORIDE	19	80 - 143	5	0 - 13		
		CHLOROBENZENE	16	88 - 116	8	0 - 9		
		CHLOROETHANE	19	64 - 143	5	0 - 25		
		2-CHLOROETHYLVINYLETHER	15	0 - 193	2	0 - 31		
		CHLOROFORM	17	102 - 123	6	0 - 14		
		CHLOROMETHANE	18	22 - 180	5	0 - 41		
		DIBROMOCHLOROMETHANE	19	79 - 140	5	0 - 27		
		1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	3	69 - 138				
		1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	3	69 - 138				
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	3	70 - 133				
		1,1-DICHLOROETHANE	18	83 - 127	5	0 - 15		
		1,2-DICHLOROETHANE	19	81 - 151	5	0 - 17		
		DICHLOROETHANE-D4	8	82 - 110	3	0 - 8		
		1,1-DICHLOROETHENE	16	65 - 140	8	0 - 18		
		1,2-DICHLOROETHENE (CIS AND TRANS)	17	81 - 122	4	0 - 18		
		DICHLOROMETHANE (METHYLENE CHLORIDE)	19	5 - 193	5	0 - 9		
		1,2-DICHLOROPROPANE	19	69 - 146	5	0 - 28		
		ETHYL BENZENE	20	65 - 133	5	0 - 22		
		FLUOROTRICHLOROMETHANE	19	71 - 156	5	0 - 20		
		1,1,2,2-TETRACHLOROETHANE	19	62 - 158	5	0 - 29		
		TETRACHLOROETHENE	19	77 - 139	5	0 - 15		
		TOLUENE	14	86 - 121	7	0 - 9		
		TOLUENE-D8	8	87 - 110	3	0 - 2		
		TRANS-1,3-DICHLOROPROPENE	19	66 - 136	5	0 - 31		
		1,1,1-TRICHLOROETHANE	19	75 - 150	6	0 - 12		
		1,1,2-TRICHLOROETHANE	19	71 - 150	5	0 - 13		
		TRICHLOROETHENE	16	63 - 134	8	0 - 20		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 624	Non-Spec Water	VINYL CHLORIDE	20	59 - 142	5	0 - 28		
EPA 625	Non-Spec Water	ACENAPHTHENE	22	49 - 117	10	0 - 17		
		ACENAPHTHYLENE	11	73 - 108	5	0 - 18		
		ANTHRACENE	11	78 - 110	5	0 - 6		
		BENZ(A)ANTHRACENE	11	86 - 124	5	0 - 15		
		BENZIDINE						
		BENZO(A)PYRENE	11	69 - 137	5	0 - 23		
		BENZO(B)FLUORANTHENE	11	50 - 169	5	0 - 29		
		BENZO(G,H,I)PERYLENE	11	15 - 194	5	0 - 58		
		BENZO(K)FLUORANTHENE	11	36 - 165	5	0 - 47		
		(BENZYLBUTYLPHTHALATE) BUTYLBENZYLPHTHALATE	11	42 - 171	5	0 - 16		
		BIS(2-CHLOROETHOXY)METHANE	11	30 - 142	5	0 - 18		
		BIS(2-CHLOROETHYL)ETHER	11	57 - 123	5	0 - 26		
		BIS(2-CHLOROISOPROPYL)ETHER	11	49 - 142	4	0 - 20		
		BIS(2-ETHYLHEXYL)PHTHALATE	11	0 - 232	5	0 - 35		
		4-BROMOPHENYL-PHENYLETHER	11	77 - 112	5	0 - 26		
		4-CHLORO-3-METHYLPHENOL	22	29 - 138	10	0 - 22		
		2-CHLORONAPHTHALENE	10	87 - 103	5	0 - 16		
		2-CHLOROPHENOL	22	26 - 130	10	0 - 45		
		4-CHLOROPHENYL-PHENYLETHER	11	83 - 109	5	0 - 17		
		CHRYSENE	11	70 - 122	5	0 - 31		
		DI-N-BUTYLPHTHALATE	12	48 - 136	5	0 - 21		
		DI-N-OCTYLPHTHALATE	11	0 - 239	5	0 - 35		
		DIBENZ(A,H)ANTHRACENE	11	17 - 195	5	0 - 63		
		1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	11	36 - 119	5	0 - 28		
		1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	11	45 - 121	5	0 - 19		
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	18	19 - 119	8	0 - 29		
		3,3'-DICHLOROBENZIDINE	10	13 - 131	5	0 - 45		
		2,4-DICHLOROPHENOL	11	65 - 111	5	0 - 17		
		DIETHYLPHTHALATE	11	79 - 122	5	0 - 22		
		2,4-DIMETHYLPHENOL	11	33 - 92	5	0 - 39		
		DIMETHYLPHTHALATE	11	53 - 151	5	0 - 10		
		4,6-DINITRO-O-CRESOL	11	0 - 160	5	0 - 102		
		2,4-DINITROPHENOL	11	0 - 170	5	0 - 330		
		2,4-DINITROTOLUENE	22	0 - 175	10	0 - 33		
		2,6-DINITROTOLUENE	11	82 - 123	5	0 - 23		
		FLUORANTHENE	11	52 - 124	5	0 - 19		
		FLUORENE	11	76 - 114	5	0 - 15		
		2-FLUOROBIPHENYL	1	89 - 89				
		2-FLUOROPHENOL	1	71 - 71				
		HEXACHLOROBENZENE	11	52 - 143	5	0 - 41		
		HEXACHLORODBUTADIENE	11	36 - 125	5	0 - 47		
		HEXACHLOROCYCLOPENTADIENE	11	18 - 142	5	0 - 37		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 625	Non-Spec Water	HEXACHLOROETHANE	11	11 - 153	5	0 - 37		
		INDENO(1,2,3-CD)PYRENE	11	28 - 173	5	0 - 41		
		ISOPHORONE	11	69 - 121	5	0 - 16		
		N-NITROSO-DIPROPYLAMINE	16	30 - 151	6	0 - 9		
		N-NITROSODIMETHYLAMINE	1	20 - 20				
		N-NITROSODIPHENYLAMINE	11	62 - 121	5	0 - 29		
		NAPHTHALENE	11	61 - 115	5	0 - 7		
		NITROBENZENE	11	59 - 151	5	0 - 20		
		NITROBENZENE-D5	1	68 - 68				
		2-NITROPHENOL	11	80 - 140	5	0 - 18		
		4-NITROPHENOL	22	0 - 110	10	0 - 109		
		PENTACHLOROPHENOL	20	18 - 131	9	0 - 13		
		PHENANTHRENE	10	83 - 109	5	0 - 19		
		PHENOL	20	0 - 187	7	0 - 21		
		PHENOL-D5	1	72 - 72				
		PYRENE	20	29 - 156	10	0 - 18		
		TERPHENYL-D14	1	90 - 90				
		2,4,6-TRIBROMOPHENOL	1	98 - 98				
		1,2,4-TRICHLOROBENZENE	22	44 - 115	9	0 - 13		
		2,4,6-TRICHLOROPHENOL	11	57 - 114	5	0 - 27		
	S/S/S	ACENAPHTHENE	4	57 - 107	2	0 - 26		
		ACENAPHTHYLENE	2	46 - 114	1	0 - 20		
		ANTHRACENE	2	69 - 90	1	0 - 18		
		BENZ(A)ANTHRACENE	2	38 - 140	1	0 - 27		
		BENZO(A)PYRENE	2	46 - 135	1	0 - 23		
		BENZO(B)FLUORANTHENE	2	35 - 171	1	0 - 16		
		BENZO(G,H,I)PERYLENE	2	4 - 101	1	0 - 40		
		BENZO(K)FLUORANTHENE	2	82 - 108	1	0 - 6		
		(BENZYLBUTYLPHTHALATE) BUTYLBENZYLPHTHALATE	2	69 - 77	1	0 - 3		
		BIS(2-CHLOROETHOXY)METHANE	2	37 - 84	1	0 - 18		
		BIS(2-CHLOROETHYL)ETHER	2	45 - 108	1	0 - 20		
		BIS(2-CHLOROISOPROPYL)ETHER	2	54 - 109	1	0 - 16		
		BIS(2-ETHYLHEXYL)PHTHALATE	2	61 - 82	1	0 - 7		
		4-BROMOPHENYL-PHENYLETHER	2	40 - 124	1	0 - 24		
		4-CHLORO-3-METHYLPHENOL	2	63 - 92	1	0 - 9		
		2-CHLORONAPHTHALENE	2	38 - 145	1	0 - 27		
		2-CHLOROPHENOL	2	50 - 113	1	0 - 18		
		4-CHLOROPHENYL-PHENYLETHER	2	78 - 107	1	0 - 8		
		CHRYSENE	2	51 - 114	1	0 - 18		
		DI-N-BUTYLPHTHALATE	2	63 - 79	1	0 - 6		
		DI-N-OCTYLPHTHALATE	2	22 - 129	1	0 - 33		
		DIBENZ(A,H)ANTHRACENE	2	6 - 108	1	0 - 42		
		1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	2	47 - 115	1	0 - 20		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
EPA 625	S/S/S	1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	2	47 - 115	1	0 - 20		
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	4	51 - 100	2	0 - 34		
		3,3'-DICHLOROBENZIDINE	2	39 - 55	1	0 - 9		
		2,4-DICHLOROPHENOL	2	51 - 98	1	0 - 15		
		DIETHYLPHTHALATE	2	78 - 94	1	0 - 5		
		2,4-DIMETHYLPHENOL	2	46 - 96	1	0 - 11		
		DIMETHYLPHTHALATE	2	82 - 108	1	0 - 6		
		4,6-DINITRO-O-CRESOL	2	0 - 71	1	0 - 92		
		2,4-DINITROPHENOL	1	25 - 25				
		2,4-DINITROTOLUENE	4	27 - 141	2	0 - 43		
		2,6-DINITROTOLUENE	2	85 - 93	1	0 - 2		
		FLUORANTHENE	2	32 - 116	1	0 - 27		
		FLUORENE	2	88 - 104	1	0 - 14		
		HEXACHLOROBENZENE	2	49 - 122	1	0 - 20		
		HEXACHLOROBUTADIENE	2	50 - 113	1	0 - 18		
		HEXACHLOROCYCLOPENTADIENE	2	5 - 120	1	0 - 40		
		HEXACHLOROETHANE	2	52 - 102	1	0 - 16		
		INDENO(1,2,3-CD)PYRENE	2	2 - 117	1	0 - 45		
		ISOPHORONE	2	58 - 87	1	0 - 10		
		N-NITROSO-DIPROPYLAMINE	2	52 - 91	1	0 - 13		
		N-NITROSODIPHENYLAMINE	2	50 - 105	1	0 - 17		
		NAPHTHALENE	2	47 - 115	1	0 - 20		
		NITROBENZENE	2	54 - 101	1	0 - 14		
		2-NITROPHENOL	2	65 - 128	1	0 - 9		
		4-NITROPHENOL	2	0 - 179	1	0 - 76		
		PENTACHLOROPHENOL	2	1 - 85	1	0 - 47		
		PHENANTHRENE	2	45 - 126	1	0 - 14		
		PHENOL	2	51 - 98	1	0 - 15		
		PYRENE	4	51 - 116	2	0 - 48		
		1,2,4-TRICHLOROBENZENE	4	49 - 105	2	0 - 31		
		2,4,6-TRICHLOROPHENOL	2	55 - 94	1	0 - 12		
ILM01	Non-Spec Water	ALUMINUM	40	88 - 107	19	0 - 5		
		ANTIMONY	37	75 - 103	16	0 - 7		
		ARSENIC	28	74 - 116	13	0 - 11		
		BARIUM	42	87 - 110	19	0 - 4		
		BERYLLIUM	39	81 - 129	17	0 - 5		
		CADMIUM	42	71 - 120	20	0 - 9		
		CALCIUM	38	81 - 104	17	0 - 4		
		CHROMIUM	42	82 - 109	20	0 - 4		
		COBALT	40	84 - 110	19	0 - 3		
		COPPER	39	86 - 120	18	0 - 5		
		IRON	38	75 - 116	16	0 - 5		
		LEAD	62	82 - 111	27	0 - 7		
		MAGNESIUM	38	82 - 113	17	0 - 4		
		MANGANESE	40	87 - 112	18	0 - 3		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

CMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
ILM01	Non-Spec Water	MERCURY	28	76 - 111	14	0 - 7		
		NICKEL	41	82 - 110	19	0 - 3		
		POTASSIUM	38	87 - 107	18	0 - 5		
		SELENIUM	26	75 - 117	13	0 - 15		
		SILVER	42	85 - 120	20	0 - 11		
		SODIUM	38	84 - 109	18	0 - 5		
		THALLIUM	65	70 - 111	30	0 - 11		
		VANADIUM	40	82 - 108	19	0 - 3		
		ZINC	37	77 - 116	17	0 - 7		
	Oil	ALUMINUM	2	71 - 79	1	0 - 1		
		ANTIMONY	2	55 - 63	1	0 - 2		
		ARSENIC	2	83 - 104	1	0 - 5		
		BARIUM	4	85 - 102	2	0 - 4		
		BERYLLIUM	2	81 - 115	1	0 - 7		
		CADMIUM	4	20 - 144	2	0 - 3		
		CALCIUM	2	69 - 77	1	0 - 2		
		CHROMIUM	4	47 - 133	2	0 - 11		
		COBALT	2	74 - 74	1	0 - 0		
		COPPER	2	81 - 89	1	0 - 2		
		IRON	2	68 - 110	1	0 - 11		
		LEAD	6	26 - 142	3	0 - 4		
		MAGNESIUM	2	80 - 80	1	0 - 1		
		MANGANESE	2	77 - 85	1	0 - 2		
		NICKEL	2	66 - 66	1	0 - 1		
		POTASSIUM	2	77 - 85	1	0 - 3		
		SELENIUM	2	82 - 103	1	0 - 5		
		SILVER	6	59 - 90	3	0 - 21		
		SODIUM	2	83 - 91	1	0 - 2		
		THALLIUM	2	75 - 75	1	0 - 0		
		VANADIUM	2	75 - 83	1	0 - 2		
		ZINC	2	64 - 64	1	0 - 0		
	S/S/S	ANTIMONY	12	0 - 105	6	0 - 31		
		ARSENIC	40	45 - 137	19	0 - 28		
		BARIUM	54	76 - 118	25	0 - 12		
		BERYLLIUM	51	64 - 128	23	0 - 11		
		CADMIUM	45	64 - 127	22	0 - 16		
		CALCIUM	34	61 - 125	15	0 - 38		
		CHROMIUM	49	67 - 128	24	0 - 25		
		COBALT	51	69 - 119	25	0 - 11		
		COPPER	42	71 - 120	19	0 - 15		
		LEAD	42	66 - 112	20	0 - 19		
		MAGNESIUM	47	75 - 122	23	0 - 19		
		MANGANESE	13	70 - 138	4	0 - 28		
		MERCURY	49	70 - 123	23	0 - 11		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
ILM01	S/S/S	NICKEL	49	70 - 118	25	0 - 15		
		POTASSIUM	49	75 - 113	22	0 - 8		
		SELENIUM	38	61 - 128	19	0 - 24		
		SILVER	48	75 - 120	24	0 - 13		
		SODIUM	52	72 - 120	24	0 - 6		
		THALLIUM	83	60 - 126	36	0 - 11		
		VANADIUM	53	70 - 122	26	0 - 15		
		ZINC	36	70 - 126	18	0 - 24		
NIOSH P&CAM 125	Non-Spec Water	FORMALDEHYDE	2	73 - 107				
	S/S/S	FORMALDEHYDE			2	0 - 13		
SAS	Non-Spec Water	ACIDITY TO PH 11			1	0 - 19		
		ACRYLAMIDE	2	150 - 155	1	0 - 1		
		ACRYLIC ACID	25	86 - 124	13	0 - 5		
		BENZOIC ACID	2	110 - 110	1	0 - 0		
		BIS-ACRYLAMIDE	2	100 - 113	1	0 - 3		
		DIQUAT	4	59 - 114	2	0 - 57		
		HYDROQUINONE	2	85 - 89	1	0 - 0		
		4-METHYLPHENOL (P-CRESOL)	2	95 - 95	1	0 - 0		
		NITRATE	2	99 - 104	1	0 - 0		
		PARAQUAT	3	31 - 92	2	0 - 71		
		PHENOL	2	95 - 95	1	0 - 0		
		UREA	2	12 - 177	1	0 - 52		
	011	LEAD	2	92 - 113	1	0 - 3		
	S/S/S	ACIDITY TO PH 11			40	0 - 16		
		ETHYLENE GLYCOL	2	20 - 75	1	0 - 25		
		HYDROFLUORIC ACID			3	0 - 34		
		ISOFENPHOS	2	99 - 112	1	0 - 2		
		4-METHYLPHENOL (P-CRESOL)	2	68 - 136	1	0 - 16		
		MOISTURE CONTENT			3	0 - 10		
		NITRIC ACID			4	0 - 17		
		PH			1	0 - 0		
		PHENOL	2	97 - 97	1	0 - 0		
		SOLIDS			17	0 - 19		
		TETRAMETHYLTHIURAM DISULFIDE	2	79 - 129	1	0 - 12		
SM 320A 14TH ED	Drinking Water	CHLORIDE	1	114 - 114	1	0 - 5		
	Non-Spec Water	CHLORIDE	1	118 - 118	1	0 - 4		
SM 405	S/S/S	BROMIDE	2	92 - 118	1	0 - 10		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SM 407A	Drinking Water	CHLORIDE	1	100 - 100				
	Non-Spec Water	CHLORIDE	11	83 - 124	14	0 - 6		
	S/S/S	CHLORIDE	4	92 - 120	15	0 - 11		
SM 503B	S/S/S	OIL AND GREASE	2	56 - 124	1	0 - 18		
SM 503E	S/S/S	PETROLEUM HYDROCARBONS	49	76 - 108	29	0 - 22		
SW846-1010	S/S/S	IGNITABILITY			19	0 - 8		
SW846-6010	Non-Spec Water	ALUMINUM	15	72 - 124	10	0 - 35		
		ANTIMONY	30	65 - 100	7	0 - 6		
		BARIUM	149	82 - 111	85	0 - 8		
		BERYLLIUM	28	53 - 154	9	0 - 222		
		BORON	70	81 - 127	14	0 - 50		
		CADMIUM	137	59 - 124	52	0 - 14		
		CALCIUM	37	79 - 104	29	0 - 4		
		CHROMIUM	143	77 - 111	52	0 - 19		
		COBALT	25	77 - 107	7	0 - 3		
		COPPER	58	84 - 112	16	0 - 290		
		IRON	111	72 - 114	69	0 - 30		
		LEAD	17	75 - 111	3	0 - 24		
		LITHIUM	40	89 - 110	19	0 - 6		
		MAGNESIUM	35	85 - 109	25	0 - 3		
		MANGANESE	112	82 - 114	57	0 - 4		
		MOLYBDENUM	40	85 - 107	19	0 - 4		
		NICKEL	126	79 - 111	57	0 - 27		
		POTASSIUM	25	85 - 109	16	0 - 6		
		SILICON			4	0 - 5		
		SILVER	147	80 - 121	47	0 - 11		
		SODIUM	124	81 - 113	73	0 - 5		
		STRONTIUM	40	78 - 109	18	0 - 4		
		THALLIUM	1	89 - 89				
		TIN	34	80 - 105	16	0 - 4		
		TITANIUM	38	86 - 111	18	0 - 4		
		VANADIUM	28	78 - 103	10	0 - 40		
		ZINC	53	81 - 106	35	0 - 107		
	Oil	ALUMINUM	4	37 - 132	6	0 - 12		
		BARIUM	16	77 - 110	11	0 - 13		
		BERYLLIUM	4	40 - 151				
		CADMIUM	13	52 - 108	8	0 - 26		
		CALCIUM	3	42 - 112	7	0 - 19		
		CHROMIUM	21	37 - 142	18	0 - 16		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-6010	Oil	COPPER	2	42 - 136	5	0 - 18		
		IRON	1	68 - 68	5	0 - 11		
		LEAD	13	43 - 107	15	0 - 20		
		LITHIUM	2	89 - 97	1	0 - 1		
		MAGNESIUM	4	49 - 111	5	0 - 30		
		MOLYBDENUM	2	71 - 79	1	0 - 2		
		NICKEL	4	58 - 100	2	0 - 4		
		SILICON			5	0 - 16		
		SILVER	10	63 - 120	3	0 - 23		
		SODIUM	4	54 - 113	6	0 - 61		
		STRONTIUM	2	80 - 96	1	0 - 3		
		TIN	1	68 - 68	6	0 - 27		
		TITANIUM	5	71 - 92	5	0 - 10		
		ZINC	1	124 - 124	7	0 - 13		
	S/S/S	ALUMINUM	5	95 - 102	14	0 - 15		
		ANTIMONY	5	45 - 87	1	0 - 0		
		BARIUM	74	72 - 121	54	0 - 24		
		BERYLLIUM	27	52 - 130	9	0 - 1		
		BORON	4	82 - 125	8	0 - 150		
		CADMIUM	64	47 - 127	24	0 - 40		
		CALCIUM	12	67 - 116	21	0 - 18		
		CHROMIUM	82	56 - 132	82	0 - 36		
		COBALT	11	71 - 105	7	0 - 5		
		COPPER	52	72 - 121	59	0 - 22		
		IRON	6	60 - 126	18	0 - 149		
		LEAD	82	52 - 128	63	0 - 39		
		LITHIUM	53	82 - 112	24	0 - 7		
		MAGNESIUM	21	71 - 125	22	0 - 26		
		MANGANESE	8	57 - 135	12	0 - 9		
		MOLYBDENUM	57	76 - 104	25	0 - 4		
		NICKEL	53	65 - 121	52	0 - 29		
		POTASSIUM	12	74 - 116	5	0 - 6		
		SILICON			2	0 - 1		
		SILVER	64	64 - 123	15	0 - 21		
		SODIUM	20	80 - 110	15	0 - 9		
		STRONTIUM	53	75 - 112	27	0 - 10		
		THALLIUM	13	67 - 94				
		TIN	44	67 - 117	20	0 - 9		
		TITANIUM	29	0 - 199	13	0 - 39		
		VANADIUM	14	66 - 126	11	0 - 11		
		ZINC	32	61 - 122	60	0 - 149		
SW846-7020	Non-Spec Water	ALUMINUM	13	0 - 258	7	0 - 6		
	S/S/S	ALUMINUM	4	50 - 174	6	0 - 27		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-7040	S/S/S	ANTIMONY	4	48 - 136				
SW846-7041	Non-Spec Water	ANTIMONY	5	56 - 125	2	0 - 49		
	Oil	ANTIMONY	4	55 - 114				
	S/S/S	ANTIMONY	5	71 - 97	1	0 - 1		
SW846-7060	Non-Spec Water	ARSENIC	171	70 - 123	72	0 - 16		
	Oil	ARSENIC	21	33 - 129	4	0 - 26		
	S/S/S	ARSENIC	158	47 - 139	94	0 - 23		
SW846-7080	Non-Spec Water	BARIUM	29	71 - 131	13	0 - 28		
	Oil	BARIUM	2	68 - 118	1	0 - 8		
	S/S/S	BARIUM	60	55 - 150	85	0 - 18		
SW846-7090	S/S/S	BERYLLIUM	5	88 - 132				
SW846-7091	Non-Spec Water	BERYLLIUM	4	83 - 95	2	0 - 9		
	S/S/S	BERYLLIUM	4	44 - 162	3	0 - 20		
SW846-7130	Non-Spec Water	CADMIUM	10	69 - 123	4	0 - 21		
	Oil	CADMIUM	7	61 - 121	3	0 - 16		
	S/S/S	CADMIUM	118	69 - 124	69	0 - 20		
SW846-7131	Non-Spec Water	CADMIUM	87	56 - 135	17	0 - 20		
	Oil	CADMIUM	8	56 - 134				
	S/S/S	CADMIUM	5	45 - 136	7	0 - 11		
SW846-7140	Non-Spec Water	CALCIUM	2	99 - 99	5	0 - 17		
SW846-7190	Non-Spec Water	CHROMIUM	19	72 - 113	12	0 - 10		
	Oil	CHROMIUM	6	52 - 143	2	0 - 10		
	S/S/S	CHROMIUM	178	45 - 140	125	0 - 25		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-7191	Non-Spec Water	CHROMIUM	12	73 - 117	3	0 - 17		
SW846-7196	Non-Spec Water	HEXAVALENT CHROMIUM	7	76 - 124	3	0 - 12		
	S/S/S	HEXAVALENT CHROMIUM			1	0 - 18		
SW846-7200	S/S/S	COBALT	6	66 - 130	2	0 - 92		
SW846-7210	Non-Spec Water	COPPER	22	80 - 124	9	0 - 6		
	S/S/S	COPPER	53	54 - 136	36	0 - 21		
SW846-7380	Non-Spec Water	IRON	18	70 - 122	8	0 - 5		
	S/S/S	IRON	6	37 - 179	9	0 - 18		
SW846-7420	Non-Spec Water	LEAD	13	89 - 113	7	0 - 7		
	Oil	LEAD	6	65 - 103	6	0 - 12		
	S/S/S	LEAD	181	65 - 134	117	0 - 21		
SW846-7421	Non-Spec Water	LEAD	298	72 - 125	107	0 - 16		
	Oil	LEAD	8	51 - 145				
	S/S/S	LEAD	6	62 - 124	26	0 - 19		
SW846-7450	Non-Spec Water	MAGNESIUM	2	80 - 80	5	0 - 13		
	S/S/S	MAGNESIUM	1	88 - 88	1	0 - 12		
SW846-7460	Non-Spec Water	MANGANESE	4	57 - 123	2	0 - 5		
	S/S/S	MANGANESE	4	59 - 152	5	0 - 16		
SW846-7470	Non-Spec Water	MERCURY	167	65 - 125	55	0 - 13		
	S/S/S	MERCURY	51	65 - 128	10	0 - 10		
SW846-7471	Oil	MERCURY	7	69 - 120	2	0 - 0		
	S/S/S	MERCURY	112	60 - 129	33	0 - 26		
SW846-7480	S/S/S	MOLYBDENUM	2	74 - 150				

N : Sample count
REC = Percent Recovery (observed/actual*100)
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EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-7520	Non-Spec Water	NICKEL	14	58 - 128	7	0 - 20		
	S/S/S	NICKEL	34	61 - 132	50	0 - 17		
SW846-7610	Non-Spec Water	POTASSIUM	4	89 - 92	3	0 - 27		
	S/S/S	POTASSIUM			2	0 - 3		
SW846-7740	Non-Spec Water	SELENIUM	141	64 - 134	46	0 - 19		
	Oil	SELENIUM	9	41 - 117	4	0 - 6		
	S/S/S	SELENIUM	100	39 - 146	27	0 - 28		
SW846-7760	Non-Spec Water	SILVER	3	72 - 141	1	0 - 0		
	Oil	SILVER	2	96 - 96	1	0 - 0		
	S/S/S	SILVER	51	51 - 135	13	0 - 9		
SW846-7761	Non-Spec Water	SILVER	4	104 - 118	1	0 - 3		
SW846-7770	Non-Spec Water	SODIUM	5	74 - 148	4	0 - 6		
	S/S/S	SODIUM	2	105 - 105	3	0 - 22		
SW846-7780	Non-Spec Water	STRONTIUM	17	42 - 150	9	0 - 12		
	S/S/S	STRONTIUM	8	68 - 140	4	0 - 22		
SW846-7840	S/S/S	THALLIUM	2	74 - 121				
SW846-7841	Non-Spec Water	THALLIUM	42	57 - 126	11	0 - 9		
	Oil	THALLIUM	4	55 - 115				
	S/S/S	THALLIUM	20	32 - 145	7	0 - 24		
SW846-7870	Non-Spec Water	TIN						
	Oil	TIN	1	89 - 89				
SW846-7910	Non-Spec Water	VANADIUM			1	0 - 3		
	S/S/S	VANADIUM	4	28 - 165	1	0 - 0		

N = Sample count
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(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-7950	Non-Spec Water	ZINC	21	77 - 118	10	0 - 11		
	S/S/S	ZINC	43	61 - 136	35	0 - 26		
SW846-8000	Non-Spec Water	CYCLOHEXANONE	2	73 - 123	1	0 - 12		
		DIESEL FUEL	2	71 - 134	1	0 - 15		
		1,4-DIOXANE	2	65 - 78	1	0 - 5		
		ETHYLENE GLYCOL	2	0 - 150	1	0 - 5		
		ETHYLENE OXIDE	2	60 - 110	1	0 - 14		
		GASOLINE	8	47 - 133	4	0 - 10		
		ISOBUTANOL	2	110 - 118	1	0 - 2		
		ISOPROPYL ALCOHOL (2-PROPANOL)	2	99 - 115	1	0 - 4		
		METHANOL	2	105 - 186	1	0 - 13		
		MINERAL SPIRITS	1	62 - 62				
		N,N-DIMETHYLFORMAMIDE (DMF)	2	94 - 120	1	0 - 6		
		UNKNOWN HYDROCARBON			1	0 - 0		
	Oil	BENZENE	2	89 - 94	1	0 - 2		
		CHLOROBENZENE	2	88 - 96	1	0 - 2		
		2-METHYLPHENOL (O-CRESOL)	2	93 - 93	1	0 - 0		
		XYLENES (O/M/P-XYLENE)	2	90 - 95	1	0 - 2		
	S/S/S	ACETONE	16	62 - 123	8	0 - 24		
		BENZENE	2	76 - 110	1	0 - 9		
		CHLOROBENZENE	2	57 - 130	1	0 - 18		
		DICHLOROMETHANE (METHYLENE CHLORIDE)	2	69 - 124	1	0 - 13		
		DIESEL FUEL	2	11 - 147	1	0 - 34		
		ETHANOL	7	51 - 142	3	0 - 25		
		ETHYL ACETATE	8	35 - 119	4	0 - 17		
		GASOLINE	2	70 - 78	1	0 - 3		
		ISOAMYL ALCOHOL, PRIMARY	2	87 - 92	1	0 - 1		
		METHANOL	6	41 - 127	3	0 - 30		
		2-METHYL-1-BUTANOL	2	87 - 92	1	0 - 1		
		2-METHYLPHENOL (O-CRESOL)	2	40 - 163	1	0 - 29		
		3-METHYLPHENOL/4-METHYLPHENOL (M/P-CRESOL)	4	62 - 150	2	0 - 82		
		MINERAL SPIRITS	1	94 - 94				
		N,N-DIMETHYLFORMAMIDE (DMF)	10	73 - 132	5	0 - 18		
		N-AMYL ALCOHOL, PRIMARY	2	68 - 89	1	0 - 6		
		N-BUTYL ACETATE	2	85 - 90	1	0 - 1		
		N-HEXANE	2	94 - 95	1	0 - 11		
		2-NITROPROPANE	2	68 - 115	1	0 - 12		
		OTHER HYDROCARBONS	4	86 - 109	2	0 - 14		
		PYRIDINE	2	44 - 146	1	0 - 25		

N = Sample count
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EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8000	S/S/S	TOLUENE	4	68 - 112	2	0 - 39		
		1,1,2-TRICHLOROETHANE	2	62 - 125	1	0 - 16		
		TRICHLOROETHENE	2	90 - 103	1	0 - 3		
		TRICHLOROETHYLENE	1	110 - 110				
		TRIETHYLAMINE	1	20 - 20				
		XYLENES (O/M/P-XYLENE)	2	59 - 59	1	0 - 0		
SW846-8010	Non-Spec Water	1,1-DICHLOROETHANE			1	0 - 7		
		1,2-DICHLOROETHANE			1	0 - 27		
		1,1-DICHLOROETHENE			1	0 - 22		
		DICHLOROMETHANE (METHYLENE CHLORIDE)			1	0 - 6		
		TRANS-1,2-DICHLOROETHENE			1	0 - 10		
		1,1,1-TRICHLOROETHANE			2	0 - 66		
		TRICHLOROETHENE			2	0 - 25		
	S/S/S	1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)			1	0 - 10		
		1,1-DICHLOROETHENE	14	46 - 133	7	0 - 17		
		1,1,1-TRICHLOROETHANE	14	52 - 135	7	0 - 18		
SW846-8015	Non-Spec Water	CYCLOHEXANONE	2	100 - 108	1	0 - 2		
		ETHANOL	2	81 - 86	1	0 - 1		
		GASOLINE	2	56 - 95				
		ISOBUTANOL	6	87 - 113	3	0 - 16		
		METHANOL	2	112 - 125	1	0 - 3		
		N-BUTYL ALCOHOL	2	97 - 105	1	0 - 2		
	Oil	CYCLOHEXANONE	2	84 - 113	1	0 - 7		
		ETHANOL	2	72 - 127	1	0 - 13		
		ISOBUTANOL	2	81 - 128	1	0 - 11		
		METHANOL	2	111 - 116	1	0 - 1		
		N-BUTYL ALCOHOL	2	86 - 112	1	0 - 6		
	S/S/S	CYCLOHEXANONE	7	44 - 143	3	0 - 16		
		GASOLINE	2	92 - 92				
		ISOBUTANOL	9	53 - 131	4	0 - 17		
		ISOPROPYL ALCOHOL (2-PROPANOL)	1	97 - 97				
		METHANOL	10	47 - 157	5	0 - 31		
		N-BUTYL ALCOHOL	9	60 - 147	4	0 - 10		
		TERTIARY BUTYL ALCOHOL	2	40 - 56	1	0 - 8		
SW846-8015 MOD	Non-Spec Water	2-BUTOXYETHANOL			1	0 - 3		
		GASOLINE	10	80 - 127	5	0 - 11		
		HEXANE	2	101 - 101	1	0 - 0		
		ISOBUTANOL	2	102 - 110	1	0 - 2		
		ISOPROPYL ALCOHOL (2-PROPANOL)			1	0 - 0		
		METHANOL	2	85 - 98	1	0 - 3		

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(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8015 MOD	Non-Spec Water	PYRIDINE	2	57 - 65	1	0 - 3		
		TERPINEOL(ALPHA)			1	0 - 5		
	S/S/S	ACETONE	2	85 - 101	1	0 - 4		
		DIESEL FUEL	6	79 - 137	4	0 - 26		
		2-ETHOXYETHANOL	2	106 - 111	1	0 - 1		
		GASOLINE	26	72 - 129	13	0 - 33		
		HEXANE	6	60 - 122	3	0 - 3		
		ISOBUTANOL	2	95 - 100	1	0 - 1		
		METHANOL	4	73 - 110	2	0 - 23		
		2-NITROPROPANE	2	93 - 109	1	0 - 4		
		PYRIDINE	8	61 - 138	4	0 - 7		
SW846-8020	Non-Spec Water	BENZENE	3	5 - 108	2	0 - 35		
		ETHYL BENZENE	3	54 - 117	2	0 - 37		
		M/P-XYLENE	3	61 - 118	2	0 - 4		
		METHYL-T-BUTYL ETHER (MTBE)	3	19 - 105				
		O-XYLENE	3	74 - 113	2	0 - 26		
		TOLUENE	3	12 - 140	2	0 - 21		
	S/S/S	BENZENE	68	63 - 125	34	0 - 15		
		ETHYL BENZENE	74	59 - 127	36	0 - 19		
		M/P-XYLENE	59	55 - 129	30	0 - 19		
		METHYL-T-BUTYL ETHER (MTBE)	1	138 - 138	1	0 - 11		
		NAPHTHALENE	2	70 - 117	1	0 - 12		
		O-XYLENE	59	54 - 137	28	0 - 21		
		TOLUENE	74	51 - 136	37	0 - 26		
SW846-8021	Non-Spec Water	BENZENE	1	92 - 92				
		1,1-DICHLOROETHANE	1	114 - 114				
		DICHLOROMETHANE (METHYLENE CHLORIDE)	1	85 - 85				
		ETHYL BENZENE	1	89 - 89				
		TOLUENE	1	90 - 90				
	S/S/S	BENZENE	22	64 - 122	11	0 - 14		
		CARBON TETRACHLORIDE	2	79 - 87	1	0 - 2		
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	2	82 - 124	1	0 - 10		
		1,1-DICHLOROETHANE	4	37 - 162	2	0 - 13		
		1,2-DICHLOROETHANE	2	101 - 117	1	0 - 4		
		1,1-DICHLOROETHENE	16	59 - 120	8	0 - 20		
		ETHYL BENZENE	20	55 - 129	10	0 - 13		
		M/P-XYLENE	2	74 - 90	1	0 - 5		
		O-XYLENE	2	83 - 83	1	0 - 0		
		TOLUENE	18	60 - 126	8	0 - 8		
		1,1,1-TRICHLOROETHANE	20	60 - 136	10	0 - 17		
		TRICHLOROETHENE	2	116 - 121	1	0 - 1		

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EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8021	S/S/S	VINYL CHLORIDE	2	143 - 203	1	0 - 8		
SW846-8040	S/S/S	4-CHLORO-3-METHYLPHENOL	2	40 - 100	1	0 - 20		
		2,4-DICHLOROPHENOL	2	58 - 79	1	0 - 7		
		4,6-DINITRO-2-METHYLPHENOL	2	32 - 45	1	0 - 8		
		2-NITROPHENOL	2	70 - 75	1	0 - 1		
		PENTACHLOROPHENOL	2	36 - 57	1	0 - 11		
		PHENOL	4	90 - 106	2	0 - 11		
		2,4,6-TRICHLOROPHENOL	2	88 - 93	1	0 - 1		
SW846-8080	Drinking Water	ENDRIN	4	64 - 125	2	0 - 17		
		GAMMA-BHC (LINDANE)	4	76 - 85	2	0 - 10		
	Non-Spec Water	ALDRIN	59	24 - 121	29	0 - 34		
		4,4'-DDT	57	48 - 135	29	0 - 36		
		DIELDRIN	59	60 - 120	28	0 - 18		
		ENDRIN	56	59 - 148	27	0 - 30		
		GAMMA-BHC (LINDANE)	59	50 - 114	30	0 - 22		
		HEPTACHLOR	61	39 - 137	29	0 - 34		
		PCB AROCLOR 1232			1	0 - 13		
		PCB AROCLOR 1254			1	0 - 21		
		PCB AROCLOR 1260	82	59 - 126	38	0 - 20		
	Oil	ALDRIN	2	66 - 79	1	0 - 13		
		4,4'-DDT	2	116 - 132	1	0 - 4		
		DIELDRIN	2	110 - 115	1	0 - 6		
		ENDRIN	2	133 - 138	1	0 - 8		
		GAMMA-BHC (LINDANE)	2	92 - 113	1	0 - 4		
		HEPTACHLOR	2	102 - 107	1	0 - 9		
		PCB AROCLOR 1016						
		PCB AROCLOR 1221						
		PCB AROCLOR 1232						
		PCB AROCLOR 1242			1	0 - 35		
		PCB AROCLOR 1248	24	61 - 119	13	0 - 29		
		PCB AROCLOR 1254	2	50 - 66	1	0 - 3		
		PCB AROCLOR 1260	154	54 - 129	74	0 - 26		
		PCB AROCLOR 1262						
	S/S/S	ALDRIN	6	4 - 183	3	0 - 13		
		2-CHLOROBIPHENYL	24	0 - 197	8	0 - 64		
		3-CHLOROBIPHENYL	24	29 - 164	8	0 - 61		
		4-CHLOROBIPHENYL	26	0 - 232	9	0 - 69		
		4,4'-DDT	8	0 - 164	4	0 - 36		
		DIELDRIN	6	22 - 172	3	0 - 50		
		ENDRIN	15	0 - 362	4	0 - 159		
		GAMMA-BHC (LINDANE)	14	21 - 157	4	0 - 88		

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(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8080	S/S/S	HEPTACHLOR	15	29 - 151	4	0 - 23		
		HEPTACHLOR EPOXIDE	9	0 - 189	2	0 - 22		
		METHOXYCHLOR	9	18 - 135	2	0 - 30		
		PCB AROCLOR 1232	1	59 - 59				
		PCB AROCLOR 1242	7	46 - 106	5	0 - 83		
		PCB AROCLOR 1248	77	35 - 158	12	0 - 15		
		PCB AROCLOR 1254	18	51 - 154	9	0 - 37		
		PCB AROCLOR 1260	366	41 - 140	124	0 - 23		
		TOXAPHENE	8	67 - 124	2	0 - 17		
SW846-8100	S/S/S	ACENAPHTHENE	7	22 - 151	3	0 - 32		
		ACENAPHTHYLENE	9	25 - 147	4	0 - 30		
		ANTHRACENE	7	0 - 200	3	0 - 23		
		BENZO(A)PYRENE	9	31 - 182	4	0 - 51		
		BENZO(B)FLUORANTHENE	5	21 - 200	2	0 - 51		
		BENZO(G,H,I)PERYLENE	11	44 - 166	5	0 - 47		
		BENZO(K)FLUORANTHENE	5	19 - 175	2	0 - 13		
		CHRYSENE	7	46 - 167	3	0 - 26		
		DIBENZ(A,H)ANTHRACENE	5	1 - 200	2	0 - 25		
		FLUORANTHENE	11	0 - 180	5	0 - 66		
		FLUORENE	11	21 - 164	5	0 - 26		
		INDENO(1,2,3-CD)PYRENE	5	0 - 231	2	0 - 152		
		NAPHTHALENE	11	32 - 136	5	0 - 33		
		PHENANTHRENE	7	0 - 209	3	0 - 38		
		PYRENE	5	74 - 152	2	0 - 16		
SW846-8141	Non-Spec Water	DISULFOTON	2	100 - 113	1	0 - 3		
		FAMPHUR	2	103 - 108	1	0 - 1		
		METHYL PARATHION	6	23 - 169	3	0 - 16		
		PARATHION	6	25 - 143	3	0 - 16		
		PHORATE	2	90 - 116	1	0 - 5		
	S/S/S	MALATHION	2	52 - 149	3	0 - 32		
SW846-8150	Drinking Water	2,4-DICHLOROPHENOXYACETIC ACID	5	41 - 189	2	0 - 48		
		SILVEX	5	68 - 137	2	0 - 13		
		2,4,5-TRICHLOROPHENOXYACETIC ACID (SILVEX)	2	87 - 121	1	0 - 8		
	Non-Spec Water	2,4-DICHLOROPHENOXYACETIC ACID	11	0 - 183	4	0 - 25		
		SILVEX	11	13 - 174	4	0 - 30		
		2,4,5-TRICHLOROPHENOXYACETIC ACID (SILVEX)	6	41 - 129	3	0 - 41		

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EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8150	S/S/S	2,4-DICHLOROPHENOXYACETIC ACID	23	0 - 194	5	0 - 43		
		SILVEX	21	22 - 160	4	0 - 27		
		2,4,5-TRICHLOROPHENOXYACETIC ACID (SILVEX)	2	54 - 88	1	0 - 11		
SW846-8240	Non-Spec Water	BENZENE	27	85 - 124	14	0 - 16		
		BROMODICHLOROMETHANE						
		4-BROMOFLUOROBENZENE	2	88 - 96	1	0 - 2		
		BROMOFORM						
		BROMOMETHANE						
		CARBON TETRACHLORIDE						
		CHLOROBENZENE	19	86 - 117	10	0 - 11		
		CHLORODETHANE						
		2-CHLOROETHYLVINYLETHER						
		CHLOROFORM						
		CHLOROMETHANE						
		CIS-1,3-DICHLOROPROPENE						
		DIBROMOCHLOROMETHANE						
		1,1-DICHLORODETHANE						
		1,2-DICHLORODETHANE						
		DICHLORODETHANE-D4	2	93 - 101	1	0 - 2		
		1,1-DICHLORODETHENE	17	59 - 137	9	0 - 36		
		1,2-DICHLORODETHENE (CIS AND TRANS)						
		DICHLOROMETHANE (METHYLENE CHLORIDE)						
		1,2-DICHLOROPROPANE						
		ETHYL BENZENE						
		FLUOROTRICHLOROMETHANE						
		METHYL-T-BUTYL ETHER (MTBE)						
		1,1,2,2-TETRACHLORODETHANE						
		TETRACHLORODETHENE						
		TOLUENE	25	84 - 121	13	0 - 13		
		TOLUENE-D8	2	90 - 95	1	0 - 2		
		TRANS-1,3-DICHLOROPROPENE						
		1,1,1-TRICHLORODETHANE						
		1,1,2-TRICHLORODETHANE						
		TRICHLORODETHENE	16	72 - 124	9	0 - 13		
		VINYL CHLORIDE						
	Oil	BENZENE	4	92 - 109	2	0 - 11		
		CHLOROBENZENE	4	63 - 153	2	0 - 13		
		1,1-DICHLORODETHENE	4	70 - 96	2	0 - 7		
		TOLUENE	4	0 - 205	2	0 - 64		
		TRICHLORODETHENE	4	60 - 102	2	0 - 25		
	S/S/S	ACETONE	1	89 - 89				

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8240	S/S/S	BENZENE	25	79 - 122	12	0 - 19		
		4-BROMOFLUOROBENZENE	14	70 - 119	3	0 - 17		
		CARBON TETRACHLORIDE	15	71 - 129				
		CHLOROBENZENE	18	69 - 119	9	0 - 14		
		CHLOROFORM	17	83 - 122	1	0 - 4		
		1,2-DICHLOROETHANE	17	79 - 126	1	0 - 2		
		DICHLOROETHANE-D4	14	76 - 123	3	0 - 25		
		1,1-DICHLOROETHENE	16	39 - 159	8	0 - 22		
		1,1-DICHLOROETHYLENE	15	81 - 126				
		METHYL ETHYL KETONE	17	0 - 209	1	0 - 19		
		STYRENE			1	0 - 2		
		TETRACHLOROETHYLENE	15	63 - 118				
		TOLUENE	25	60 - 139	12	0 - 18		
		TOLUENE-D8	14	80 - 127	3	0 - 6		
		TRICHLOROETHENE	16	66 - 110	8	0 - 16		
		TRICHLOROETHYLENE	15	71 - 122				
		VINYL CHLORIDE	15	69 - 122				
SW846-8270	Non-Spec Water	ACENAPHTHENE	56	40 - 129	28	0 - 21		
		ACENAPHTHYLENE						
		ANTHRACENE						
		BENZ(A)ANTHRACENE						
		BENZO(A)PYRENE						
		BENZO(B)FLUORANTHENE						
		BENZO(G,H,I)PERYLENE						
		BENZO(K)FLUORANTHENE						
		(BENZYLBUTYLPHTHALATE) BUTYLBENZYLPHTHALATE						
		BIS(2-CHLOROETHOXY)METHANE						
		BIS(2-CHLOROETHYL)ETHER						
		BIS(2-CHLOROISOPROPYL)ETHER						
		BIS(2-ETHYLHEXYL)PHTHALATE						
		4-BROMOPHENYL-PHENYLETHER						
		4-CHLORO-3-METHYLPHENOL	51	30 - 145	27	0 - 26		
		2-CHLORONAPHTHALENE						
		2-CHLOROPHENOL	53	35 - 130	27	0 - 22		
		4-CHLOROPHENYL-PHENYLETHER						
		CHRYSENE						
		DI-N-BUTYLPHTHALATE						
		DI-N-OCTYLPHTHALATE						
		DIBENZ(A,H)ANTHRACENE						
		1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)						
		1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)						
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	53	29 - 109	26	0 - 39		
		3,3'-DICHLOROBENZIDINE						

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8270	Non-Spec Water	2,4-DICHLOROPHENOL					———	———
		DIETHYLPHTHALATE					———	———
		2,4-DIMETHYLPHENOL					———	———
		DIMETHYLPHTHALATE					———	———
		4,6-DINITRO-O-CRESOL					———	———
		2,4-DINITROPHENOL					———	———
		2,4-DINITROTOLUENE	54	38 - 148	28	0 - 22	———	———
		2,6-DINITROTOLUENE					———	———
		FLUORANTHENE					———	———
		FLUORENE					———	———
		HEXACHLOROBENZENE					———	———
		HEXACHLOROBUTADIENE					———	———
		HEXACHLOROCYCLOPENTADIENE					———	———
		HEXACHLOROETHANE					———	———
		INDENO(1,2,3-CD)PYRENE					———	———
		ISOPHORONE					———	———
		N-NITROSO-DI-N-PROPYLAMINE	52	32 - 149	26	0 - 28	———	———
		N-NITROSODIMETHYLAMINE					———	———
		N-NITROSODIPHENYLAMINE					———	———
		NAPHTHALENE					———	———
		NITROBENZENE					———	———
		2-NITROPHENOL					———	———
		4-NITROPHENOL	57	0 - 70	29	0 - 56	———	———
		PENTACHLOROPHENOL	55	0 - 187	28	0 - 43	———	———
		PHENANTHRENE					———	———
		PHENOL	21	0 - 81	11	0 - 61	———	———
		PYRENE	58	43 - 134	27	0 - 19	———	———
		1,2,4-TRICHLOROBENZENE	53	29 - 110	26	0 - 32	———	———
		2,4,6-TRICHLOROPHENOL					———	———
	Oil	ACENAPHTHENE	3	12 - 73	1	0 - 7	———	———
		4-CHLORO-3-METHYLPHENOL	3	0 - 88	1	0 - 15	———	———
		2-CHLOROPHENOL	3	14 - 65	1	0 - 17	———	———
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	3	18 - 69	1	0 - 7	———	———
		2,4-DINITROTOLUENE	3	0 - 83	1	0 - 7	———	———
		N-NITROSO-DI-N-PROPYLAMINE	3	16 - 77	1	0 - 8	———	———
		4-NITROPHENOL	3	0 - 95	1	0 - 21	———	———
		PENTACHLOROPHENOL	3	0 - 153	1	0 - 24	———	———
		PHENOL	3	23 - 53	1	0 - 13	———	———
		PYRENE	3	17 - 41	1	0 - 11	———	———
		1,2,4-TRICHLOROBENZENE	3	7 - 83	1	0 - 10	———	———
	S/S/S	ACENAPHTHENE	36	35 - 132	18	0 - 22	———	———
		ACENAPHTHYLENE	2	69 - 111	1	0 - 11	———	———
		ANTHRACENE	2	69 - 116	1	0 - 12	———	———
		BENZ(A)ANTHRACENE	2	50 - 144	1	0 - 12	———	———

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8270	S/S/S	BENZO(A)PYRENE	2	93 - 114	1	0 - 5		
		BENZO(B)FLUORANTHENE	2	115 - 120	1	0 - 1		
		BENZO(G,H,I)PERYLENE	2	48 - 197	1	0 - 29		
		BENZO(K)FLUORANTHENE	2	79 - 105	1	0 - 7		
		(BENZYLBUTYLPHTHALATE) BUTYLBENZYLPHTHALATE	2	73 - 112	1	0 - 10		
		BIS(2-CHLOROETHOXY)METHANE	2	89 - 97	1	0 - 2		
		BIS(2-CHLOROETHYL)ETHER	2	0 - 236	1	0 - 49		
		BIS(2-CHLORDISOPROPYL)ETHER	2	63 - 123	1	0 - 15		
		BIS(2-ETHYLHEXYL)PHTHALATE	2	48 - 137	1	0 - 23		
		4-BROMOPHENYL-PHENYLETHER	2	87 - 100	1	0 - 3		
		4-CHLORO-3-METHYLPHENOL	34	13 - 135	16	0 - 41		
		2-CHLORONAPHTHALENE	2	84 - 113	1	0 - 7		
		2-CHLOROPHENOL	36	21 - 142	18	0 - 29		
		4-CHLOROPHENYL-PHENYLETHER	2	68 - 107	1	0 - 10		
		CHRYSENE	2	44 - 133	1	0 - 2		
		DI-N-BUTYLPHTHALATE	2	57 - 125	1	0 - 18		
		DI-N-OCTYLPHTHALATE	2	78 - 104	1	0 - 7		
		DIBENZ(A,H)ANTHRACENE	2	69 - 166	1	0 - 20		
		1,3-DICHLOROBENZENE (M-DICHLOROBENZENE)	2	70 - 112	1	0 - 11		
		1,2-DICHLOROBENZENE (O-DICHLOROBENZENE)	2	68 - 118	1	0 - 13		
		1,4-DICHLOROBENZENE (P-DICHLOROBENZENE)	40	35 - 123	20	0 - 21		
		3,3'-DICHLOROBENZIDINE	2	62 - 67	1	0 - 2		
		2,4-DICHLOROPHENOL	2	43 - 140	1	0 - 25		
		DIETHYLPHTHALATE	2	39 - 133	1	0 - 21		
		2,4-DIMETHYLPHENOL	2	44 - 125	1	0 - 22		
		DIMETHYLPHTHALATE	2	85 - 98	1	0 - 3		
		4,6-DINITRO-O-CRESOL	2	21 - 183	1	0 - 35		
		2,4-DINITROPHENOL	2	0 - 302	1	0 - 98		
		2,4-DINITROTOLUENE	36	15 - 143	16	0 - 23		
		2,6-DINITROTOLUENE	1	84 - 84	1	0 - 7		
		FLUORANTHENE	2	7 - 172	1	0 - 44		
		FLUORENE	2	42 - 126	1	0 - 24		
		HEXACHLOROBENZENE	2	86 - 102	1	0 - 4		
		HEXACHLOROBUTADIENE	2	93 - 98	1	0 - 1		
		HEXACHLOROCYCLOPENTADIENE	2	35 - 142	1	0 - 28		
		HEXACHLOROETHANE	2	75 - 109	1	0 - 9		
		INDENO(1,2,3-CD)PYRENE	2	59 - 182	1	0 - 16		
		ISOPHORONE	2	70 - 104	1	0 - 9		
		N-NITROSO-DI-N-PROPYLAMINE	30	31 - 129	14	0 - 26		
		N-NITROSODIPHENYLAMINE	2	68 - 128	1	0 - 14		
		NAPHTHALENE	2	73 - 112	1	0 - 10		
		NITROBENZENE	2	85 - 98	1	0 - 3		
		2-NITROPHENOL	2	72 - 119	1	0 - 12		
		4-NITROPHENOL	36	0 - 167	18	0 - 52		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-8270	S/S/S	PENTACHLOROPHENOL	36	0 - 161	18	0 - 64		
		PHENANTHRENE	2	58 - 134	1	0 - 19		
		PHENOL	34	0 - 143	17	0 - 45		
		PYRENE	37	26 - 124	18	0 - 44		
		1,2,4-TRICHLOROBENZENE	34	33 - 143	17	0 - 26		
		2,4,6-TRICHLOROPHENOL	2	71 - 113	1	0 - 11		
SW846-8310	Non-Spec Water	ACENAPHTHENE	4	22 - 105	2	0 - 25		
		ACENAPHTHYLENE	4	55 - 84	2	0 - 25		
		ANTHRACENE	2	68 - 81	1	0 - 4		
		BENZO(A)PYRENE	2	76 - 84	1	0 - 3		
		BENZO(B)FLUORANTHENE	4	74 - 96	2	0 - 13		
		BENZO(G,H,I)PERYLENE	4	28 - 125	2	0 - 22		
		BENZO(K)FLUORANTHENE	4	73 - 99	2	0 - 6		
		CHRYSENE	4	71 - 92	2	0 - 5		
		DIBENZ(A,H)ANTHRACENE	4	47 - 100	2	0 - 29		
		FLUORANTHENE	4	63 - 105	2	0 - 14		
		FLUORENE	4	69 - 96	2	0 - 5		
		INDENO(1,2,3-CD)PYRENE	4	65 - 100	2	0 - 13		
		NAPHTHALENE	2	23 - 86	1	0 - 28		
		PHENANTHRENE	4	66 - 106	2	0 - 11		
		PYRENE	4	46 - 119	2	0 - 20		
	S/S/S	ACENAPHTHENE	10	20 - 202	5	0 - 31		
		ACENAPHTHYLENE	8	38 - 194	4	0 - 22		
		ANTHRACENE	12	25 - 136	6	0 - 43		
		BENZO(A)PYRENE	10	0 - 182	5	0 - 72		
		BENZO(B)FLUORANTHENE	10	56 - 139	5	0 - 40		
		BENZO(G,H,I)PERYLENE	10	0 - 233	5	0 - 27		
		BENZO(K)FLUORANTHENE	10	41 - 151	5	0 - 28		
		CHRYSENE	10	53 - 158	4	0 - 11		
		DIBENZ(A,H)ANTHRACENE	5	87 - 122	4	0 - 77		
		FLUORANTHENE	10	47 - 157	5	0 - 27		
		FLUORENE	8	30 - 171	4	0 - 44		
		INDENO(1,2,3-CD)PYRENE	8	28 - 165	4	0 - 13		
		NAPHTHALENE	8	57 - 198	4	0 - 20		
		PHENANTHRENE	12	53 - 165	6	0 - 28		
		PYRENE	10	15 - 169	5	0 - 34		
SW846-9010	Non-Spec Water	CYANIDE	7	55 - 130	1	0 - 16		
	S/S/S	CYANIDE	14	31 - 134	5	0 - 18		
SW846-9012	Non-Spec Water	CYANIDE	60	69 - 115	28	0 - 26		
	S/S/S	CYANIDE	21	60 - 125	10	0 - 47		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-9012	S/S/S	CYANIDE, AMENABLE	1	100 - 100				
SW846-9020	Drinking Water	TOTAL ORGANIC HALOGEN (TOX)			2	0 - 26		
	Non-Spec Water	TOTAL ORGANIC HALOGEN (TOX)	72	68 - 129	136	0 - 34		
	Oil	TOTAL ORGANIC HALOGEN (TOX)			6	0 - 33		
	S/S/S	TOTAL ORGANIC HALOGEN (TOX)	26	79 - 124	15	0 - 29		
SW846-9030	Non-Spec Water	SULFIDE	6	91 - 107				
	Oil	SULFIDE	2	93 - 93	1	0 - 0		
	S/S/S	SULFIDE	6	90 - 109	4	0 - 21		
SW846-9038	Non-Spec Water	SULFATE	79	81 - 123	47	0 - 12		
	S/S/S	SULFATE	6	88 - 124	5	0 - 11		
SW846-9040	Non-Spec Water	PH			86	0 - 3		
	S/S/S	PH			40	0 - 0		
SW846-9041	Non-Spec Water	PH			10	0 - 0		
	S/S/S	PH			56	0 - 0		
SW846-9045	Oil	PH			1	0 - 0		
	S/S/S	PH			182	0 - 2		
SW846-9050	Drinking Water	CONDUCTIVITY			1	0 - 0		
	Non-Spec Water	CONDUCTIVITY			56	0 - 0		
SW846-9060	Drinking Water	TOTAL ORGANIC CARBON (TOC)	2	100 - 100	1	0 - 0		
	Non-Spec Water	TOTAL ORGANIC CARBON (TOC)	131	75 - 125	84	0 - 21		
	S/S/S	TOTAL ORGANIC CARBON (TOC)	11	75 - 135	8	0 - 9		
SW846-9065	S/S/S	PHENOL	7	43 - 125	10	0 - 23		
SW846-9066	Non-Spec Water	PHENOL	15	68 - 119	5	0 - 12		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)

(qao2.sql)

EMS HERITAGE LABORATORIES
Table 5.1
Quality Assurance Objectives for Location ALL
PERIOD: 01-APR-91 THRU 30-SEP-91

Method	Matrix	Parameter	N	% REC	N	RPD	Limit	Units
SW846-9066	S/S/S	PHENOL	12	64 - 128	7	0 - 15		
SW846-9067	Non-Spec Water	PHENOL			1	0 - 5		
SW846-9070	S/S/S	OIL AND GREASE			1	0 - 8		
SW846-9071	S/S/S	OIL AND GREASE			8	0 - 40		
SW846-9071(MOD)	S/S/S	OIL AND GREASE	3	108 - 117	2	0 - 23		
SW846-9251	Non-Spec Water	CHLORIDE	42	76 - 124	30	0 - 5		
	S/S/S	CHLORIDE	2	115 - 115	2	0 - 0		

N = Sample count
REC = Percent Recovery (observed/actual*100)
RPD = Relative Percent Difference (2*(rep1-rep2)/(rep1+rep2)*100)
(qao2.sql)

1337 rows selected.

Disconnected from ORACLE RDBMS V6.0 [illegible] 3.4 [illegible] transaction [illegible] ssi[illegible]pti Pr io
SQL [illegible] 0.3 [illegible] 1 - [illegible]

P	sc . on	ix	te	cr n
CLP SOW 2/	CLP PESTICIDE/PCB EXTRACTION	1	SOW 2/88	CLP PESTICIDE/PCB ORGANICS
	CLP PCB EXTRACTION	1	CLP SOW 2/88	CLP POLYCHLORINATED BIPHENYLS (PCBS)
	CLP SEMI-VOLATILE EXTRACTION	1	CLP SOW 2/88	CLP SEMI-VOLATILE ORGANICS
	CLP PESTICIDE/PCB EXTRACTION	2	CLP SOW 2/88	CLP PESTICIDE/PCB ORGANICS
	CLP PCB EXTRACTION	2	CLP SOW 2/88	CLP POLYCHLORINATED BIPHENYLS (PCBS)
	CLP SEMI-VOLATILE EXTRACTION	2	CLP SOW 2/88	CLP SEMI-VOLATILE ORGANICS
		3	CLP SOW 2/88	CLP SEMI-VOLATILE ORGANICS
		4	CLP SOW 2/88	CLP SEMI-VOLATILE ORGANICS
	CLP PESTICIDE/PCB EXTRACTION	5	CLP SOW 2/88	CLP PESTICIDE/PCB ORGANICS
	CLP PCB EXTRACTION	5	CLP SOW 2/88	CLP POLYCHLORINATED BIPHENYLS (PCBS)
	CLP SEMI-VOLATILE EXTRACTION	5	CLP SOW 2/88	CLP SEMI-VOLATILE ORGANICS
EPA 200.0	FAA OR ICP ACID DIGESTION	1	APHA 303A	LITHIUM
			EPA 200.7	ALUMINUM (ICP-SEQ)
			EPA 200.7	ALUMINUM ICP
			EPA 200.7	ANTIMONY (ICP-SEQ)
			EPA 200.7	ANTIMONY ICP
			EPA 200.7	BARIUM (ICP-SEQ)
			EPA 200.7	BARIUM ICP
			EPA 200.7	BERYLLIUM (ICP-SEQ)
			EPA 200.7	BERYLLIUM ICP
			EPA 200.7	BISMUTH ICP
			EPA 200.7	BORON ICP
			EPA 200.7	CADMIUM (ICP-SEQ)
			EPA 200.7	CADMIUM ICP
			EPA 200.7	CALCIUM ICP
			EPA 200.7	CHROMIUM (ICP-SEQ)
			EPA 200.7	CHROMIUM ICP
			EPA 200.7	COBALT (ICP-SEQ)
			EPA 200.7	COBALT ICP
			EPA 200.7	COPPER (ICP-SEQ)
			EPA 200.7	COPPER ICP
			EPA 200.7	DYSPROSIUM ICP
			EPA 200.7	ICP SCAN
			EPA 200.7	IRON (ICP-SEQ)
			EPA 200.7	IRON ICP
			EPA 200.7	LEAD (ICP-SEQ)
			EPA 200.7	LEAD ICP
			EPA 200.7	LITHIUM ICP
			EPA 200.7	MAGNESIUM ICP
			EPA 200.7	MANGANESE (ICP-SEQ)
			EPA 200.7	MANGANESE ICP
			EPA 200.7	MISCELLANEOUS (ICP-SEQ)

(preptest.sql)

PREP	Description	Matrix	Tr	Method	Description
EPA 200.0	FAA OR ICP ACID DIGESTION	1	EPA	200.7	MOLYBDENUM ICP
			EPA	200.7	NICKEL (ICP-SEQ)
			EPA	200.7	NICKEL ICP
			EPA	200.7	POTASSIUM ICP
			EPA	200.7	SILICON ICP
			EPA	200.7	SILVER (ICP-SEQ)
			EPA	200.7	SILVER ICP
			EPA	200.7	SODIUM ICP
			EPA	200.7	STRONTIUM ICP
			EPA	200.7	THALLIUM (ICP-SEQ)
			EPA	200.7	THALLIUM ICP
			EPA	200.7	TIN ICP
			EPA	200.7	TITANIUM ICP
			EPA	200.7	TUNGSTEN ICP
			EPA	200.7	VANADIUM (ICP-SEQ)
			EPA	200.7	VANADIUM ICP
			EPA	200.7	ZINC (ICP-SEQ)
			EPA	200.7	ZINC ICP
			EPA	202.1	ALUMINUM FAA
	GFAA ACID DIGESTION	1	EPA	202.2	ALUMINUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA	204.1	ANTIMONY FAA
	GFAA ACID DIGESTION	1	EPA	204.2	ANTIMONY GFAA
			EPA	206.2	ARSENIC GFAA
			EPA	206.2	ARSENIC GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	1	EPA	208.1	BARIUM FAA
	GFAA ACID DIGESTION	1	EPA	208.2	BARIUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA	210.1	BERYLLIUM FAA
	GFAA ACID DIGESTION	1	EPA	210.2	BERYLLIUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA	212.3	BORON COLORIMETRIC
			EPA	213.1	CADMIUM FAA
	GFAA ACID DIGESTION	1	EPA	213.2	CADMIUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA	215.1	CALCIUM FAA
			EPA	218.1	CHROMIUM FAA
	GFAA ACID DIGESTION	1	EPA	218.2	CHROMIUM GFAA
			EPA	218.2	CHROMIUM GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	1	EPA	219.1	COBALT FAA
	GFAA ACID DIGESTION	1	EPA	219.2	COBALT GFAA
	FAA OR ICP ACID DIGESTION	1	EPA	220.1	COPPER FAA

(preptest.sql)

P	sc ion	ix	M	cr n
EPA 200.0	GFAA ACID DIGESTION	1	220.2	COPPER GFAA
			EPA 220.2	COPPER GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	1	EPA 236.1	IRON FAA
			EPA 239.1	LEAD FAA
	GFAA ACID DIGESTION	1	EPA 239.2	LEAD GFAA
			EPA 239.2	LEAD GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	1	EPA 242.1	MAGNESIUM FAA
			EPA 243.1	MANGANESE FAA
			EPA 246.1	MOLYBDENUM FAA
	GFAA ACID DIGESTION	1	EPA 246.2	MOLYBDENUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA 249.1	NICKEL FAA
	GFAA ACID DIGESTION	1	EPA 249.2	NICKEL GFAA
	FAA OR ICP ACID DIGESTION	1	EPA 258.1	POTASSIUM FAA
	GFAA ACID DIGESTION	1	EPA 270.2	SELENIUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA 272.1	SILVER FAA
	GFAA ACID DIGESTION	1	EPA 272.2	SILVER GFAA
	FAA OR ICP ACID DIGESTION	1	EPA 273.1	SODIUM FAA
	GFAA ACID DIGESTION	1	EPA 276.2	VANADIUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA 279.1	THALLIUM FAA
	GFAA ACID DIGESTION	1	EPA 279.2	THALLIUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA 282.1	TIN FAA
	GFAA ACID DIGESTION	1	EPA 282.2	TIN GFAA
	FAA OR ICP ACID DIGESTION	1	EPA 283.1	TITANIUM FAA
	GFAA ACID DIGESTION	1	EPA 283.2	TITANIUM GFAA
	FAA OR ICP ACID DIGESTION	1	EPA 286.1	VANADIUM FAA
			EPA 289.1	ZINC FAA
	GFAA ACID DIGESTION	1	EPA 289.2	ZINC GFAA
	FAA OR ICP ACID DIGESTION	2	APHA 303A	LITHIUM
			EPA 200.7	ALUMINUM (ICP-SEQ)
			EPA 200.7	ALUMINUM ICP
			EPA 200.7	ANTIMONY (ICP-SEQ)
			EPA 200.7	ANTIMONY ICP

(preptest.sql)

TABLE 5.2
SAMPLE PREPARATION METHODS

PREP	Description	Matrix	Te	Method	Description
EPA 200.0	FAA OR ICP ACID DIGESTION	2	EPA	200.7	BARIUM (ICP-SEQ)
			EPA	200.7	BARIUM ICP
			EPA	200.7	BERYLLIUM (ICP-SEQ)
			EPA	200.7	BERYLLIUM ICP
			EPA	200.7	BISMUTH ICP
			EPA	200.7	BORON ICP
			EPA	200.7	CADMIUM (ICP-SEQ)
			EPA	200.7	CADMIUM ICP
			EPA	200.7	CALCIUM ICP
			EPA	200.7	CHROMIUM (ICP-SEQ)
			EPA	200.7	CHROMIUM ICP
			EPA	200.7	COBALT (ICP-SEQ)
			EPA	200.7	COBALT ICP
			EPA	200.7	COPPER (ICP-SEQ)
			EPA	200.7	COPPER ICP
			EPA	200.7	DYSPROSIUM ICP
			EPA	200.7	ICP SCAN
			EPA	200.7	IRON (ICP-SEQ)
			EPA	200.7	IRON ICP
			EPA	200.7	LEAD (ICP-SEQ)
			EPA	200.7	LEAD ICP
			EPA	200.7	LITHIUM ICP
			EPA	200.7	MAGNESIUM ICP
			EPA	200.7	MANGANESE (ICP-SEQ)
			EPA	200.7	MANGANESE ICP
			EPA	200.7	MOLYBDENUM ICP
			EPA	200.7	NICKEL (ICP-SEQ)
			EPA	200.7	NICKEL ICP
			EPA	200.7	POTASSIUM ICP
			EPA	200.7	SILICON ICP
			EPA	200.7	SILVER (ICP-SEQ)
			EPA	200.7	SILVER ICP
			EPA	200.7	SODIUM ICP
			EPA	200.7	STRONTIUM ICP
			EPA	200.7	THALLIUM (ICP-SEQ)
			EPA	200.7	THALLIUM ICP
			EPA	200.7	TIN ICP
			EPA	200.7	TITANIUM ICP
			EPA	200.7	TUNGSTEN ICP
			EPA	200.7	VANADIUM (ICP-SEQ)
			EPA	200.7	VANADIUM ICP
			EPA	200.7	ZINC (ICP-SEQ)
			EPA	200.7	ZINC ICP
			EPA	202.1	ALUMINUM FAA
	GFAA ACID DIGESTION	2	EPA	202.2	ALUMINUM GFAA
	FAA OR ICP ACID DIGESTION	2	EPA	204.1	ANTIMONY FAA
	GFAA ACID DIGESTION	2	EPA	204.2	ANTIMONY GFAA
			EPA	206.2	ARSENIC GFAA
			EPA	206.2	ARSENIC GFAA (3 POINT MSA)

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...CP	...sc...ion	ix	Mc	scr...n
EPA 200.0	FAA OR ICP ACID DIGESTION	2	EPA 208.1	BARIUM FAA
	GFAA ACID DIGESTION	2	EPA 208.2	BARIUM GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 210.1	BERYLLIUM FAA
	GFAA ACID DIGESTION	2	EPA 210.2	BERYLLIUM GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 212.3	BORON COLORIMETRIC
			EPA 213.1	CADMIUM FAA
	GFAA ACID DIGESTION	2	EPA 213.2	CADMIUM GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 215.1	CALCIUM FAA
			EPA 218.1	CHROMIUM FAA
	GFAA ACID DIGESTION	2	EPA 218.2	CHROMIUM GFAA
			EPA 218.2	CHROMIUM GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	2	EPA 219.1	COBALT FAA
	GFAA ACID DIGESTION	2	EPA 219.2	COBALT GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 220.1	COPPER FAA
	GFAA ACID DIGESTION	2	EPA 220.2	COPPER GFAA
			EPA 220.2	COPPER GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	2	EPA 236.1	IRON FAA
			EPA 239.1	LEAD FAA
	GFAA ACID DIGESTION	2	EPA 239.2	LEAD GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 242.1	MAGNESIUM FAA
			EPA 243.1	MANGANESE FAA
			EPA 246.1	MOLYBDENUM FAA
	GFAA ACID DIGESTION	2	EPA 246.2	MOLYBDENUM GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 249.1	NICKEL FAA
	GFAA ACID DIGESTION	2	EPA 249.2	NICKEL GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 258.1	POTASSIUM FAA
	GFAA ACID DIGESTION	2	EPA 270.2	SELENIUM GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 272.1	SILVER FAA
			EPA 273.1	SODIUM FAA
	GFAA ACID DIGESTION	2	EPA 276.2	VANADIUM GFAA
	FAA OR ICP ACID DIGESTION	2	EPA 279.1	THALLIUM FAA

(preptest.sql)

PREP	Description	Matrix	Te	Method	Description
EPA 200.0	GFAA ACID DIGESTION	2		EPA 279.2	THALLIUM GFAA
	FAA OR ICP ACID DIGESTION	2		EPA 282.1	TIN FAA
	GFAA ACID DIGESTION	2		EPA 282.2	TIN GFAA
	FAA OR ICP ACID DIGESTION	2		EPA 283.1	TITANIUM FAA
	GFAA ACID DIGESTION	2		EPA 283.2	TITANIUM GFAA
	FAA OR ICP ACID DIGESTION	2		EPA 286.1	VANADIUM FAA
				EPA 289.1	ZINC FAA
	GFAA ACID DIGESTION	2		EPA 289.2	ZINC GFAA
	FAA OR ICP ACID DIGESTION	3		APHA 303A	LITHIUM
				EPA 200.7	ALUMINUM (ICP-SEQ)
				EPA 200.7	ALUMINUM ICP
				EPA 200.7	ANTIMONY (ICP-SEQ)
				EPA 200.7	ANTIMONY ICP
				EPA 200.7	BARIUM (ICP-SEQ)
				EPA 200.7	BARIUM ICP
				EPA 200.7	BERYLLIUM (ICP-SEQ)
				EPA 200.7	BERYLLIUM ICP
				EPA 200.7	BISMUTH ICP
				EPA 200.7	BORON ICP
				EPA 200.7	CADMIUM (ICP-SEQ)
				EPA 200.7	CADMIUM ICP
				EPA 200.7	CALCIUM ICP
				EPA 200.7	CHROMIUM (ICP-SEQ)
				EPA 200.7	CHROMIUM ICP
				EPA 200.7	COBALT (ICP-SEQ)
				EPA 200.7	COBALT ICP
				EPA 200.7	COPPER (ICP-SEQ)
				EPA 200.7	COPPER ICP
				EPA 200.7	DYSPROSIUM ICP
				EPA 200.7	ICP SCAN
				EPA 200.7	IRON (ICP-SEQ)
				EPA 200.7	IRON ICP
				EPA 200.7	LEAD (ICP-SEQ)
				EPA 200.7	LEAD ICP
				EPA 200.7	LITHIUM ICP
				EPA 200.7	MAGNESIUM ICP
				EPA 200.7	MANGANESE (ICP-SEQ)
				EPA 200.7	MANGANESE ICP
				EPA 200.7	MOLYBDENUM ICP
				EPA 200.7	NICKEL (ICP-SEQ)
				EPA 200.7	NICKEL ICP
				EPA 200.7	POTASSIUM ICP
				EPA 200.7	SILICON ICP
				EPA 200.7	SILVER (ICP-SEQ)
				EPA 200.7	SILVER ICP

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P	sc ion	ix	M	cr n
EPA 200.0	FAA OR ICP ACID DIGESTION	3	200.7	SODIUM ICP
			EPA 200.7	STRONTIUM ICP
			EPA 200.7	THALLIUM (ICP-SEQ)
			EPA 200.7	THALLIUM ICP
			EPA 200.7	TIN ICP
			EPA 200.7	TITANIUM ICP
			EPA 200.7	TUNGSTEN ICP
			EPA 200.7	VANADIUM (ICP-SEQ)
			EPA 200.7	VANADIUM ICP
			EPA 200.7	ZINC (ICP-SEQ)
			EPA 200.7	ZINC ICP
			EPA 202.1	ALUMINUM FAA
	GFAA ACID DIGESTION	3	EPA 202.2	ALUMINUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA 204.1	ANTIMONY FAA
	GFAA ACID DIGESTION	3	EPA 204.2	ANTIMONY GFAA
			EPA 206.2	ARSENIC GFAA
	FAA OR ICP ACID DIGESTION	3	EPA 208.1	BARIUM FAA
	GFAA ACID DIGESTION	3	EPA 208.2	BARIUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA 210.1	BERYLLIUM FAA
	GFAA ACID DIGESTION	3	EPA 210.2	BERYLLIUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA 212.3	BORON COLORIMETRIC
			EPA 213.1	CADMIUM FAA
	GFAA ACID DIGESTION	3	EPA 213.2	CADMIUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA 215.1	CALCIUM FAA
			EPA 218.1	CHROMIUM FAA
	GFAA ACID DIGESTION	3	EPA 218.2	CHROMIUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA 219.1	COBALT FAA
	GFAA ACID DIGESTION	3	EPA 219.2	COBALT GFAA
	FAA OR ICP ACID DIGESTION	3	EPA 220.1	COPPER FAA
	GFAA ACID DIGESTION	3	EPA 220.2	COPPER GFAA
			EPA 220.2	COPPER GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	3	EPA 236.1	IRON FAA
			EPA 239.1	LEAD FAA
	GFAA ACID DIGESTION	3	EPA 239.2	LEAD GFAA
	FAA OR ICP ACID DIGESTION	3	EPA 242.1	MAGNESIUM FAA

(preptest.sql)

PREP	>scription	Matrix	Id	Method	Description
EPA 200.0	FAA OR ICP ACID DIGESTION	3	EPA	243.1	MANGANESE FAA
			EPA	246.1	MOLYBDENUM FAA
	GFAA ACID DIGESTION	3	EPA	246.2	MOLYBDENUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA	249.1	NICKEL FAA
	GFAA ACID DIGESTION	3	EPA	249.2	NICKEL GFAA
	FAA OR ICP ACID DIGESTION	3	EPA	258.1	POTASSIUM FAA
	GFAA ACID DIGESTION	3	EPA	270.2	SELENIUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA	272.1	SILVER FAA
	GFAA ACID DIGESTION	3	EPA	272.2	SILVER GFAA
	FAA OR ICP ACID DIGESTION	3	EPA	273.1	SODIUM FAA
	GFAA ACID DIGESTION	3	EPA	276.2	VANADIUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA	279.1	THALLIUM FAA
	GFAA ACID DIGESTION	3	EPA	279.2	THALLIUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA	282.1	TIN FAA
	GFAA ACID DIGESTION	3	EPA	282.2	TIN GFAA
	FAA OR ICP ACID DIGESTION	3	EPA	283.1	TITANIUM FAA
	GFAA ACID DIGESTION	3	EPA	283.2	TITANIUM GFAA
	FAA OR ICP ACID DIGESTION	3	EPA	286.1	VANADIUM FAA
			EPA	289.1	ZINC FAA
	GFAA ACID DIGESTION	3	EPA	289.2	ZINC GFAA
	FAA OR ICP ACID DIGESTION	4	APHA	303A	LITHIUM
			EPA	200.7	ALUMINUM (ICP-SEQ)
			EPA	200.7	ALUMINUM ICP
			EPA	200.7	ANTIMONY (ICP-SEQ)
			EPA	200.7	ANTIMONY ICP
			EPA	200.7	BARIUM (ICP-SEQ)
			EPA	200.7	BARIUM ICP
			EPA	200.7	BERYLLIUM (ICP-SEQ)
			EPA	200.7	BERYLLIUM ICP
			EPA	200.7	BISMUTH ICP
			EPA	200.7	BORON ICP
			EPA	200.7	CADMIUM (ICP-SEQ)
			EPA	200.7	CADMIUM ICP
			EPA	200.7	CALCIUM ICP
			EPA	200.7	CHROMIUM (ICP-SEQ)

(preptest.sql)

EPA	Description	Mix	Method	Description
EPA 200.0	FAA OR ICP ACID DIGESTION	4	200.7	CHROMIUM ICP
			EPA 200.7	COBALT (ICP-SEQ)
			EPA 200.7	COBALT ICP
			EPA 200.7	COPPER (ICP-SEQ)
			EPA 200.7	COPPER ICP
			EPA 200.7	DYSPROSIUM ICP
			EPA 200.7	ICP SCAN
			EPA 200.7	IRON (ICP-SEQ)
			EPA 200.7	IRON ICP
			EPA 200.7	LEAD (ICP-SEQ)
			EPA 200.7	LEAD ICP
			EPA 200.7	LITHIUM ICP
			EPA 200.7	MAGNESIUM ICP
			EPA 200.7	MANGANESE (ICP-SEQ)
			EPA 200.7	MANGANESE ICP
			EPA 200.7	MOLYBDENUM ICP
			EPA 200.7	NICKEL (ICP-SEQ)
			EPA 200.7	NICKEL ICP
			EPA 200.7	POTASSIUM ICP
			EPA 200.7	SILICON ICP
			EPA 200.7	SILVER (ICP-SEQ)
			EPA 200.7	SILVER ICP
			EPA 200.7	SODIUM ICP
			EPA 200.7	STRONTIUM ICP
			EPA 200.7	THALLIUM (ICP-SEQ)
			EPA 200.7	THALLIUM ICP
			EPA 200.7	TIN ICP
			EPA 200.7	TITANIUM ICP
			EPA 200.7	TUNGSTEN ICP
			EPA 200.7	VANADIUM (ICP-SEQ)
			EPA 200.7	VANADIUM ICP
			EPA 200.7	ZINC (ICP-SEQ)
			EPA 200.7	ZINC ICP
			EPA 202.1	ALUMINUM FAA
	GFAA ACID DIGESTION	4	EPA 202.2	ALUMINUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA 204.1	ANTIMONY FAA
	GFAA ACID DIGESTION	4	EPA 204.2	ANTIMONY GFAA
			EPA 206.2	ARSENIC GFAA
	FAA OR ICP ACID DIGESTION	4	EPA 208.1	BARIUM FAA
	GFAA ACID DIGESTION	4	EPA 208.2	BARIUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA 210.1	BERYLLIUM FAA
	GFAA ACID DIGESTION	4	EPA 210.2	BERYLLIUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA 212.3	BORON COLORIMETRIC
			EPA 213.1	CADMIUM FAA

(preptest.sql)

PREP	Description	Matrix	Te	Method	Description
EPA 200.0	GFAA ACID DIGESTION	4	EPA	213.2	CADMIUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	215.1	CALCIUM FAA
			EPA	218.1	CHROMIUM FAA
	GFAA ACID DIGESTION	4	EPA	218.2	CHROMIUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	219.1	COBALT FAA
	GFAA ACID DIGESTION	4	EPA	219.2	COBALT GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	220.1	COPPER FAA
	GFAA ACID DIGESTION	4	EPA	220.2	COPPER GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	236.1	IRON FAA
			EPA	239.1	LEAD FAA
	GFAA ACID DIGESTION	4	EPA	239.2	LEAD GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	242.1	MAGNESIUM FAA
			EPA	243.1	MANGANESE FAA
			EPA	246.1	MOLYBDENUM FAA
	GFAA ACID DIGESTION	4	EPA	246.2	MOLYBDENUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	249.1	NICKEL FAA
	GFAA ACID DIGESTION	4	EPA	249.2	NICKEL GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	258.1	POTASSIUM FAA
	GFAA ACID DIGESTION	4	EPA	270.2	SELENIUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	272.1	SILVER FAA
			EPA	273.1	SODIUM FAA
	GFAA ACID DIGESTION	4	EPA	276.2	VANADIUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	279.1	THALLIUM FAA
	GFAA ACID DIGESTION	4	EPA	279.2	THALLIUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	282.1	TIN FAA
	GFAA ACID DIGESTION	4	EPA	282.2	TIN GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	283.1	TITANIUM FAA
	GFAA ACID DIGESTION	4	EPA	283.2	TITANIUM GFAA
	FAA OR ICP ACID DIGESTION	4	EPA	286.1	VANADIUM FAA
			EPA	289.1	ZINC FAA

(preptest.sql)

GP	Preparation	Ix	Method	Description
EPA 200.0	GFAA ACID DIGESTION	4	EPA 289.2	ZINC GFAA
	FAA OR ICP ACID DIGESTION	5	APHA 303A	LITHIUM
			EPA 200.7	ALUMINUM (ICP-SEQ)
			EPA 200.7	ALUMINUM ICP
			EPA 200.7	ANTIMONY (ICP-SEQ)
			EPA 200.7	ANTIMONY ICP
			EPA 200.7	BARIUM (ICP-SEQ)
			EPA 200.7	BARIUM ICP
			EPA 200.7	BERYLLIUM (ICP-SEQ)
			EPA 200.7	BERYLLIUM ICP
			EPA 200.7	BISMUTH ICP
			EPA 200.7	BORON ICP
			EPA 200.7	CADMIUM (ICP-SEQ)
			EPA 200.7	CADMIUM ICP
			EPA 200.7	CALCIUM ICP
			EPA 200.7	CHROMIUM (ICP-SEQ)
			EPA 200.7	CHROMIUM ICP
			EPA 200.7	COBALT (ICP-SEQ)
			EPA 200.7	COBALT ICP
			EPA 200.7	COPPER (ICP-SEQ)
			EPA 200.7	COPPER ICP
			EPA 200.7	DYSPROSIUM ICP
			EPA 200.7	ICP SCAN
			EPA 200.7	IRON (ICP-SEQ)
			EPA 200.7	IRON ICP
			EPA 200.7	LEAD (ICP-SEQ)
			EPA 200.7	LEAD ICP
			EPA 200.7	LITHIUM ICP
			EPA 200.7	MAGNESIUM ICP
			EPA 200.7	MANGANESE (ICP-SEQ)
			EPA 200.7	MANGANESE ICP
			EPA 200.7	MISCELLANEOUS (ICP-SEQ)
			EPA 200.7	MOLYBDENUM ICP
			EPA 200.7	NICKEL (ICP-SEQ)
			EPA 200.7	NICKEL ICP
			EPA 200.7	POTASSIUM ICP
			EPA 200.7	SILICON ICP
			EPA 200.7	SILVER (ICP-SEQ)
			EPA 200.7	SILVER ICP
			EPA 200.7	SODIUM ICP
			EPA 200.7	STRONTIUM ICP
			EPA 200.7	THALLIUM (ICP-SEQ)
			EPA 200.7	THALLIUM ICP
			EPA 200.7	TIN ICP
			EPA 200.7	TITANIUM ICP
			EPA 200.7	TUNGSTEN ICP
			EPA 200.7	VANADIUM (ICP-SEQ)
			EPA 200.7	VANADIUM ICP
			EPA 200.7	ZINC (ICP-SEQ)
			EPA 200.7	ZINC ICP
			EPA 202.1	ALUMINUM FAA

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PREP	Description	Matrix	fe	Method	Description
EPA 200.0	GFAA ACID DIGESTION	S		EPA 202.2	ALUMINUM GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 204.1	ANTIMONY FAA
	GFAA ACID DIGESTION	S		EPA 204.2	ANTIMONY GFAA
				EPA 206.2	ARSENIC GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 208.1	BARIUM FAA
	GFAA ACID DIGESTION	S		EPA 208.2	BARIUM GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 210.1	BERYLLIUM FAA
	GFAA ACID DIGESTION	S		EPA 210.2	BERYLLIUM GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 212.3	BORON COLORIMETRIC
				EPA 213.1	CADMIUM FAA
	GFAA ACID DIGESTION	S		EPA 213.2	CADMIUM GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 215.1	CALCIUM FAA
				EPA 218.1	CHROMIUM FAA
	GFAA ACID DIGESTION	S		EPA 218.2	CHROMIUM GFAA
				EPA 218.2	CHROMIUM GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	S		EPA 219.1	COBALT FAA
	GFAA ACID DIGESTION	S		EPA 219.2	COBALT GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 220.1	COPPER FAA
	GFAA ACID DIGESTION	S		EPA 220.2	COPPER GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 236.1	IRON FAA
				EPA 239.1	LEAD FAA
	GFAA ACID DIGESTION	S		EPA 239.2	LEAD GFAA
				EPA 239.2	LEAD GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION	S		EPA 242.1	MAGNESIUM FAA
				EPA 243.1	MANGANESE FAA
				EPA 246.1	MOLYBDENUM FAA
	GFAA ACID DIGESTION	S		EPA 246.2	MOLYBDENUM GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 249.1	NICKEL FAA
	GFAA ACID DIGESTION	S		EPA 249.2	NICKEL GFAA
	FAA OR ICP ACID DIGESTION	S		EPA 258.1	POTASSIUM FAA

(preptest.sql)

EP	Description	Matrix	Method	Description
EPA 200.0	GFAA ACID DIGESTION	5	270.2	SELENIUM GFAA
	FAA OR ICP ACID DIGESTION	5	EPA 272.1	SILVER FAA
			EPA 273.1	SODIUM FAA
	GFAA ACID DIGESTION	5	EPA 276.2	VANADIUM GFAA
	FAA OR ICP ACID DIGESTION	5	EPA 279.1	THALLIUM FAA
	GFAA ACID DIGESTION	5	EPA 279.2	THALLIUM GFAA
	FAA OR ICP ACID DIGESTION	5	EPA 282.1	TIN FAA
	GFAA ACID DIGESTION	5	EPA 282.2	TIN GFAA
	FAA OR ICP ACID DIGESTION	5	EPA 283.1	TITANIUM FAA
	GFAA ACID DIGESTION	5	EPA 283.2	TITANIUM GFAA
	FAA OR ICP ACID DIGESTION	5	EPA 286.1	VANADIUM FAA
			EPA 289.1	ZINC FAA
	GFAA ACID DIGESTION	5	EPA 289.2	ZINC GFAA
EPA 335.1	CYANIDE AMENABLE DISTILLATION	1	EPA 335.1	CYANIDE AMENABLE TO CHLORINATION
			EPA 335.1	CYANIDE AMENABLE TO CHLORINATION
		4	EPA 335.1	CYANIDE AMENABLE TO CHLORINATION
			EPA 335.1	CYANIDE AMENABLE TO CHLORINATION
		5	EPA 335.1	CYANIDE AMENABLE TO CHLORINATION
			EPA 335.1	CYANIDE AMENABLE TO CHLORINATION
EPA 335.2	CYANIDE DISTILLATION	1	EPA 335.2	CYANIDE, TOTAL (MANUAL)
			EPA 335.3	CYANIDE, TOTAL (AUTOMATED)
		2	EPA 335.2	CYANIDE, TOTAL (MANUAL)
			EPA 335.3	CYANIDE, TOTAL (AUTOMATED)
		3	EPA 335.2	CYANIDE, TOTAL (MANUAL)
			EPA 335.3	CYANIDE, TOTAL (AUTOMATED)
		4	EPA 335.2	CYANIDE, TOTAL (MANUAL)
			EPA 335.3	CYANIDE, TOTAL (AUTOMATED)
		5	EPA 335.2	CYANIDE, TOTAL (MANUAL)
			EPA 335.3	CYANIDE, TOTAL (AUTOMATED)
EPA 340.1	FLUORIDE DISTILLATION	1	EPA 340.2	FLUORIDE (ION SELECTIVE ELECTRODE)
		5	EPA 340.2	FLUORIDE (ION SELECTIVE ELECTRODE)
			EPA 340.2	FLUORIDE (LEACHATE)

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PREP	escription	Matrix	T	Method	Description
EPA 350.2	AMMONIA DISTILLATION		1	EPA 350.1	AMMONIA NITROGEN (AUTOMATED PHENATE METH
				EPA 350.3	AMMONIA NITROGEN
			2	EPA 350.1	AMMONIA NITROGEN (AUTOMATED PHENATE METH
				EPA 350.3	AMMONIA NITROGEN
			3	EPA 350.1	AMMONIA NITROGEN (AUTOMATED PHENATE METH
				EPA 350.3	AMMONIA NITROGEN
			5	EPA 350.1	AMMONIA NITROGEN (AUTOMATED PHENATE METH
				EPA 350.3	AMMONIA NITROGEN
				EPA 350.3	AMMONIA NITROGEN (LEACHATE)
EPA 420.1	PHENOLS DISTILLATION		1	EPA 420.2	PHENOLS 4AAP (AUTOMATED)
			2	EPA 420.2	PHENOLS 4AAP (AUTOMATED)
			3	EPA 420.2	PHENOLS 4AAP (AUTOMATED)
			4	EPA 420.2	PHENOLS 4AAP (AUTOMATED)
			5	EPA 420.2	PHENOLS 4AAP (AUTOMATED)
EPA 504	MICRO-EXTRACTION FOR EDB AND DCBP		1	EPA 504	ETHYLENE DIBROMIDE AND DIBROMOCHLOPROPAN
			2	EPA 504	ETHYLENE DIBROMIDE AND DIBROMOCHLOPROPAN
			3	EPA 504	ETHYLENE DIBROMIDE AND DIBROMOCHLOPROPAN
EPA 515.1	DIAZOMETHANE DERIVATIZATION FOR CHLORINA		1	EPA 515.1	CHLORINATED HERBICIDE ACIDS
			2	EPA 515.1	CHLORINATED HERBICIDE ACIDS
			3	EPA 515.1	CHLORINATED HERBICIDE ACIDS
EPA 548.1	ENDOTHALL DERIVATIZATION		1	EPA 548.1	ENDOTHALL BY GC/ECD
			2	EPA 548.1	ENDOTHALL BY GC/ECD
			3	EPA 548.1	ENDOTHALL BY GC/ECD
EPA 608	ORGANOCHLORINE PESTICIDES AND PCBS EXTRA		1	EPA 508	ORGANOCHLORINE PESTICIDES IN WATER BY GC
				EPA 608	ORGANOCHLORINE PESTICIDES AND PCBS IN WA
				EPA 608	ORGANOCHLORINE PESTICIDES BY GC:ECD
	PCB EXTRACTION		1	EPA 608	POLYCHLORINATED BIPHENYLS (PCBS)
	ORGANOCHLORINE PESTICIDES AND PCBS EXTRA		2	EPA 508	ORGANOCHLORINE PESTICIDES IN WATER BY GC
				EPA 608	ORGANOCHLORINE PESTICIDES AND PCBS IN WA
				EPA 608	ORGANOCHLORINE PESTICIDES BY GC:ECD
	PCB EXTRACTION		2	EPA 608	POLYCHLORINATED BIPHENYLS (PCBS)

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EPA 608	ORGANOCHLORINE PESTICIDES AND PCBS EXTRA	3	508	ORGANOCHLORINE PESTICIDES IN WATER BY GC
			EPA 608	ORGANOCHLORINE PESTICIDES AND PCBS IN WA
			EPA 608	ORGANOCHLORINE PESTICIDES BY GC:ECD
	PCB EXTRACTION	3	EPA 608	POLYCHLORINATED BIPHENYLS (PCBS)
	ORGANOCHLORINE PESTICIDES AND PCBS EXTRA	5	EPA 608	ORGANOCHLORINE PESTICIDES AND PCBS IN WA
			EPA 608	ORGANOCHLORINE PESTICIDES BY GC:ECD
	PCB EXTRACTION	5	EPA 608	POLYCHLORINATED BIPHENYLS (PCBS)
EPA 625	SEMI-VOLATILE EXTRACTION (ACID FRACTION)	1	EPA 625	SEMI-VOLATILE PRIORITY POLLUTANTS (ACID
	SEMI-VOLATILE EXTRACTION (NEUTRAL/BASE/A	1	EPA 625	SEMI-VOLATILE PRIORITY POLLUTANTS (BASE/
	SEMI-VOLATILE EXTRACTION (BASE/NEUTRAL F	1	EPA 625	SEMI-VOLATILE PRIORITY POLLUTANTS (BASE/
	SEMI-VOLATILE EXTRACTION (NEUTRAL/BASE/A	2	EPA 625	SEMI-VOLATILE PRIORITY POLLUTANTS (BASE/
	SEMI-VOLATILE EXTRACTION (ACID FRACTION)	5	EPA 625	SEMI-VOLATILE PRIORITY POLLUTANTS (ACID
	SEMI-VOLATILE EXTRACTION (NEUTRAL/BASE/A	5	EPA 625	SEMI-VOLATILE PRIORITY POLLUTANTS (BASE/
	SEMI-VOLATILE EXTRACTION (BASE/NEUTRAL F	5	EPA 625	SEMI-VOLATILE PRIORITY POLLUTANTS (BASE/
FUTURE CLP ONLY	CLP PESTICIDE/PCB EXTRACTION	1	FUTURE CLP ONLY	CLP PESTICIDE/PCB ORGANICS
	CLP SEMI-VOLATILE EXTRACTION	1	FUTURE CLP ONLY	CLP SEMI-VOLATILE ORGANICS
	CLP PESTICIDE/PCB EXTRACTION	2	FUTURE CLP ONLY	CLP PESTICIDE/PCB ORGANICS
	CLP SEMI-VOLATILE EXTRACTION	2	FUTURE CLP ONLY	CLP SEMI-VOLATILE ORGANICS
		3	FUTURE CLP ONLY	CLP SEMI-VOLATILE ORGANICS
		4	FUTURE CLP ONLY	CLP SEMI-VOLATILE ORGANICS
	CLP PESTICIDE/PCB EXTRACTION	5	FUTURE CLP ONLY	CLP PESTICIDE/PCB ORGANICS
	CLP SEMI-VOLATILE EXTRACTION	5	FUTURE CLP ONLY	CLP SEMI-VOLATILE ORGANICS
ILM01	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1	ILM01	ALUMINUM FAA (CLP)
			ILM01	ALUMINUM ICP (CLP)
			ILM01	ANTIMONY FAA (CLP)
			ILM01	ANTIMONY ICP (CLP)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES (	1	ILM01	ARSENIC GFAA (3 POINT MSA) (CLP)
			ILM01	ARSENIC GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1	ILM01	BARIUM FAA (CLP)
			ILM01	BARIUM ICP (CLP)
			ILM01	BERYLLIUM FAA (CLP)
			ILM01	BERYLLIUM ICP (CLP)

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PREP	escription	Matrix	l	Method	Description
ILM01	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1		ILM01	CADMIUM FAA (CLP)
				ILM01	CADMIUM ICP (CLP)
				ILM01	CALCIUM FAA (CLP)
				ILM01	CALCIUM ICP (CLP)
				ILM01	CHROMIUM FAA (CLP)
				ILM01	CHROMIUM ICP (CLP)
				ILM01	COBALT FAA (CLP)
				ILM01	COBALT ICP (CLP)
				ILM01	COPPER FAA (CLP)
				ILM01	COPPER ICP (CLP)
	CYANIDE DISTILLATION (CLP)	1		ILM01	CYANIDE, TOTAL (MANUAL) (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1		ILM01	IRON FAA (CLP)
				ILM01	IRON ICP (CLP)
				ILM01	LEAD FAA (CLP)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES (	1		ILM01	LEAD GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1		ILM01	LEAD ICP (CLP)
				ILM01	MAGNESIUM FAA (CLP)
				ILM01	MAGNESIUM ICP (CLP)
				ILM01	MANGANESE FAA (CLP)
				ILM01	MANGANESE ICP (CLP)
	MERCURY CVAA ACID DIGESTION OF AQUEOUS S	1		ILM01	MERCURY CVAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1		ILM01	NICKEL FAA (CLP)
				ILM01	NICKEL ICP (CLP)
				ILM01	POTASSIUM FAA (CLP)
				ILM01	POTASSIUM ICP (CLP)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES (	1		ILM01	SELENIUM GFAA (3 POINT MSA) (CLP)
				ILM01	SELENIUM GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1		ILM01	SILVER FAA (CLP)
				ILM01	SILVER ICP (CLP)
				ILM01	SODIUM FAA (CLP)
				ILM01	SODIUM ICP (CLP)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES (	1		ILM01	THALLIUM GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1		ILM01	VANADIUM FAA (CLP)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	1		ILM01	VANADIUM ICP (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1		ILM01	ZINC FAA (CLP)
				ILM01	ZINC ICP (CLP)
		2		ILM01	ALUMINUM FAA (CLP)
				ILM01	ALUMINUM ICP (CLP)
				ILM01	ANTIMONY FAA (CLP)
				ILM01	ANTIMONY ICP (CLP)

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TABLE 5.2
SAMPLE PREPARATION METHODS

EP	...ion	rix	M	scr...n
ILM01	GFAA ACID DIGESTION OF AQUEOUS SAMPLES (	2	ILM01	ARSENIC GFAA (3 POINT MSA) (CLP)
			ILM01	ARSENIC GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	2	ILM01	BARIUM FAA (CLP)
			ILM01	BARIUM ICP (CLP)
			ILM01	BERYLLIUM FAA (CLP)
			ILM01	BERYLLIUM ICP (CLP)
			ILM01	CADMIUM FAA (CLP)
			ILM01	CADMIUM ICP (CLP)
			ILM01	CALCIUM FAA (CLP)
			ILM01	CALCIUM ICP (CLP)
			ILM01	CHROMIUM FAA (CLP)
			ILM01	CHROMIUM ICP (CLP)
			ILM01	COBALT FAA (CLP)
			ILM01	COBALT ICP (CLP)
			ILM01	COPPER FAA (CLP)
			ILM01	COPPER ICP (CLP)
	CYANIDE DISTILLATION (CLP)	2	ILM01	CYANIDE, TOTAL (MANUAL) (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	2	ILM01	IRON FAA (CLP)
			ILM01	IRON ICP (CLP)
			ILM01	LEAD FAA (CLP)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES (	2	ILM01	LEAD GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	2	ILM01	LEAD ICP (CLP)
			ILM01	MAGNESIUM FAA (CLP)
			ILM01	MAGNESIUM ICP (CLP)
			ILM01	MANGANESE FAA (CLP)
			ILM01	MANGANESE ICP (CLP)
	MERCURY CVAA ACID DIGESTION OF AQUEOUS S	2	ILM01	MERCURY CVAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	2	ILM01	NICKEL FAA (CLP)
			ILM01	NICKEL ICP (CLP)
			ILM01	POTASSIUM FAA (CLP)
			ILM01	POTASSIUM ICP (CLP)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES (	2	ILM01	SELENIUM GFAA (3 POINT MSA) (CLP)
			ILM01	SELENIUM GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	2	ILM01	SILVER FAA (CLP)
			ILM01	SILVER ICP (CLP)
			ILM01	SODIUM FAA (CLP)
			ILM01	SODIUM ICP (CLP)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES (	2	ILM01	THALLIUM GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	2	ILM01	VANADIUM FAA (CLP)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	2	ILM01	VANADIUM ICP (CLP)

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PREP	Description	Matrix	T	Method	Description
ILM01	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	2		ILM01	ZINC FAA (CLP)
				ILM01	ZINC ICP (CLP)
	CYANIDE DISTILLATION (CLP)	3		ILM01	CYANIDE, TOTAL (MANUAL) (CLP)
	ACID DIGESTION OF OILS/SOLVENTS (CLP)	4		ILM01	ALUMINUM FAA (CLP)
				ILM01	ALUMINUM ICP (CLP)
				ILM01	ANTIMONY FAA (CLP)
				ILM01	ANTIMONY ICP (CLP)
				ILM01	ARSENIC GFAA (3 POINT MSA) (CLP)
				ILM01	ARSENIC GFAA (CLP)
				ILM01	BARIUM FAA (CLP)
				ILM01	BARIUM ICP (CLP)
				ILM01	BERYLLIUM FAA (CLP)
				ILM01	BERYLLIUM ICP (CLP)
				ILM01	CADMIUM FAA (CLP)
				ILM01	CADMIUM ICP (CLP)
				ILM01	CALCIUM FAA (CLP)
				ILM01	CALCIUM ICP (CLP)
				ILM01	CHROMIUM FAA (CLP)
				ILM01	CHROMIUM ICP (CLP)
				ILM01	COBALT FAA (CLP)
				ILM01	COBALT ICP (CLP)
				ILM01	COPPER FAA (CLP)
				ILM01	COPPER ICP (CLP)
	CYANIDE DISTILLATION (CLP)	4		ILM01	CYANIDE, TOTAL (MANUAL) (CLP)
	ACID DIGESTION OF OILS/SOLVENTS (CLP)	4		ILM01	IRON FAA (CLP)
				ILM01	IRON ICP (CLP)
				ILM01	LEAD FAA (CLP)
				ILM01	LEAD GFAA (CLP)
				ILM01	LEAD ICP (CLP)
				ILM01	MAGNESIUM FAA (CLP)
				ILM01	MAGNESIUM ICP (CLP)
				ILM01	MANGANESE FAA (CLP)
				ILM01	MANGANESE ICP (CLP)
				ILM01	NICKEL FAA (CLP)
				ILM01	NICKEL ICP (CLP)
				ILM01	POTASSIUM FAA (CLP)
				ILM01	POTASSIUM ICP (CLP)
				ILM01	SELENIUM GFAA (3 POINT MSA) (CLP)
				ILM01	SELENIUM GFAA (CLP)
				ILM01	SILVER FAA (CLP)
				ILM01	SILVER ICP (CLP)
				ILM01	SODIUM FAA (CLP)
				ILM01	SODIUM ICP (CLP)
				ILM01	THALLIUM GFAA (CLP)
				ILM01	VANADIUM FAA (CLP)
				ILM01	VANADIUM ICP (CLP)
				ILM01	ZINC FAA (CLP)
				ILM01	ZINC ICP (CLP)

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TABLE 5.2
SAMPLE PREPARATION METHODS

P	...sc...ion	...rix	M	...scr...n
ILM01	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S	ILM01	ALUMINUM FAA (CLP)
			ILM01	ALUMINUM ICP (CLP)
			ILM01	ANTIMONY FAA (CLP)
			ILM01	ANTIMONY ICP (CLP)
	GFAA ACID DIGESTION OF S/S/S SAMPLES (CL	S	ILM01	ARSENIC GFAA (3 POINT MSA) (CLP)
			ILM01	ARSENIC GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S	ILM01	BARIUM FAA (CLP)
			ILM01	BARIUM ICP (CLP)
			ILM01	BERYLLIUM FAA (CLP)
			ILM01	BERYLLIUM ICP (CLP)
			ILM01	CADMIUM FAA (CLP)
			ILM01	CADMIUM ICP (CLP)
			ILM01	CALCIUM FAA (CLP)
			ILM01	CALCIUM ICP (CLP)
			ILM01	CHROMIUM FAA (CLP)
			ILM01	CHROMIUM ICP (CLP)
			ILM01	COBALT FAA (CLP)
			ILM01	COBALT ICP (CLP)
			ILM01	COPPER FAA (CLP)
			ILM01	COPPER ICP (CLP)
	CYANIDE DISTILLATION (CLP)	S	ILM01	CYANIDE, TOTAL (MANUAL) (CLP)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S	ILM01	IRON FAA (CLP)
			ILM01	IRON ICP (CLP)
			ILM01	LEAD FAA (CLP)
	GFAA ACID DIGESTION OF S/S/S SAMPLES (CL	S	ILM01	LEAD GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S	ILM01	LEAD ICP (CLP)
			ILM01	MAGNESIUM FAA (CLP)
			ILM01	MAGNESIUM ICP (CLP)
			ILM01	MANGANESE FAA (CLP)
			ILM01	MANGANESE ICP (CLP)
	MERCURY CVAA ACID DIGESTION OF S/S/S SAM	S	ILM01	MERCURY CVAA (CLP)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S	ILM01	NICKEL FAA (CLP)
			ILM01	NICKEL ICP (CLP)
			ILM01	POTASSIUM FAA (CLP)
			ILM01	POTASSIUM ICP (CLP)
	GFAA ACID DIGESTION OF S/S/S SAMPLES (CL	S	ILM01	SELENIUM GFAA (3 POINT MSA) (CLP)
			ILM01	SELENIUM GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S	ILM01	SILVER FAA (CLP)
			ILM01	SILVER ICP (CLP)
			ILM01	SODIUM FAA (CLP)
			ILM01	SODIUM ICP (CLP)

PREP	Description	Matrix	Te	Method	Description
ILM01	GFAA ACID DIGESTION OF S/S/S SAMPLES (CL	5	ILM01		THALLIUM GFAA (CLP)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	ILM01		VANADIUM FAA (CLP)
			ILM01		VANADIUM ICP (CLP)
			ILM01		ZINC FAA (CLP)
			ILM01		ZINC ICP (CLP)
OLM01	CLP PESTICIDE/PCB EXTRACTION	1	OLM01		CLP PESTICIDE/PCB ORGANICS
	CLP SEMI-VOLATILE EXTRACTION	1	OLM01		CLP SEMI-VOLATILE ORGANICS
	CLP PESTICIDE/PCB EXTRACTION	2	OLM01		CLP PESTICIDE/PCB ORGANICS
	CLP SEMI-VOLATILE EXTRACTION	2	OLM01		CLP SEMI-VOLATILE ORGANICS
	CLP PESTICIDE/PCB EXTRACTION	5	OLM01		CLP PESTICIDE/PCB ORGANICS
	CLP SEMI-VOLATILE EXTRACTION	5	OLM01		CLP SEMI-VOLATILE ORGANICS
SW 7.3.4.1	TOTAL AVAILABLE SULFIDE EXTRACTION	5	SW846-9030		SULFIDE
SW846-1310	NEUTRAL WATER LEACHING METHOD (MODIFIED	1	SW846-9030		SULFIDE (LEACHATE)
		2	SW846-9030		SULFIDE (LEACHATE)
		5	EPA 340.1		FLUORIDE DISTILLATION (LEACHATE)
			EPA 350.2		AMMONIA DISTILLATION
			EPA 375.4		SULFATE (LEACHATE)
	EXTRACTION PROCEDURE TOXICITY (EPTOX)	5	SW846-3010		FAA OR ICP ACID DIGESTION OF LEACHATE SA
	NEUTRAL WATER LEACHING METHOD (MODIFIED	5	SW846-3010		FAA OR ICP ACID DIGESTION OF LEACHATE SA
	EXTRACTION PROCEDURE TOXICITY (EPTOX)	5	SW846-3020		GFAA ACID DIGESTION OF LEACHATE SAMPLES
	NEUTRAL WATER LEACHING METHOD (MODIFIED	5	SW846-3020		GFAA ACID DIGESTION OF LEACHATE SAMPLES
	EXTRACTION PROCEDURE TOXICITY (EPTOX)	5	SW846-8150		DIAZOMETHANE HERBICIDE DERIVATIZATION
	NEUTRAL WATER LEACHING METHOD (MODIFIED	5	SW846-9010		CYANIDE LEACHATE DISTILLATION
			SW846-9030		SULFIDE (LEACHATE)
SW846-1311	TOX CHAR LEACHING PROCEDURE (TCLP METALS	4	SW846-3030	MOD	ACID DIGESTION OF OILS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	4	SW846-3030	MOD	ACID DIGESTION OF OILS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG+	4	SW846-3030	MOD	ACID DIGESTION OF OILS
	TOX CHAR LEACHING PROCEDURE (TCLP METALS	5	SW846-3010		FAA OR ICP ACID DIGESTION OF LEACHATE SA
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG+	5	SW846-3010		FAA OR ICP ACID DIGESTION OF LEACHATE SA
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3010		FAA OR ICP ACID DIGESTION OF LEACHATE SA

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CP	Description	Ix	Method	Description
SW846-1311	TOX CHAR LEACHING PROCEDURE (TCLP METALS	5	SW846-3020	GFAA ACID DIGESTION OF LEACHATE SAMPLES
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3020	GFAA ACID DIGESTION OF LEACHATE SAMPLES
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3020	GFAA ACID DIGESTION OF LEACHATE SAMPLES
	TOX CHAR LEACHING PROCEDURE (TCLP METALS	5	SW846-3030 MOD	ACID DIGESTION OF OILS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3030 MOD	ACID DIGESTION OF OILS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3030 MOD	ACID DIGESTION OF OILS
			SW846-3510	GC SEPARATORY FUNNEL LIQUID-LIQUID EXTRA
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3510	GC SEPARATORY FUNNEL LIQUID-LIQUID EXTRA
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3510	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3510	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3510	TCLP GC SEPARATORY FUNNEL LIQUID-LIQUID
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3510	TCLP GC SEPARATORY FUNNEL LIQUID-LIQUID
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3510	TCLP GC/MS SEPARATORY FUNNEL LIQUID-LIQU
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3510	TCLP GC/MS SEPARATORY FUNNEL LIQUID-LIQU
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3580	GC/MS WASTE DILUTION FOR ORGANICS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3580	GC/MS WASTE DILUTION FOR ORGANICS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3580	TCLP GC WASTE DILUTION FOR ORGANICS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3580	TCLP GC WASTE DILUTION FOR ORGANICS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3580	TCLP GC/MS WASTE DILUTION FOR ORGANICS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3580	TCLP GC/MS WASTE DILUTION FOR ORGANICS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-3580	WASTE DILUTION FOR ORGANICS
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-3580	WASTE DILUTION FOR ORGANICS
	ZERO HEADSPACE EXTRACTION (TCLP)	5	SW846-8015	ALCOHOLS BY GC:FID
			SW846-8015	TCLP ALCOHOLS BY GC:FID
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-8150	DIAZOMETHANE HERBICIDE DERIVATIZATION
	TOX CHAR LEACHING PROCEDURE (TCLP W/ ORG	5	SW846-8150	TCLP DIAZOMETHANE HERBICIDE DERIVATIZATI
	TOX CHAR LEACHING PROCEDURE (TCLP W/ORG)	5	SW846-8150	TCLP DIAZOMETHANE HERBICIDE DERIVATIZATI

PREP	Description	Matrix	Fe	Method	Description
SW846-1311	ZERO HEADSPACE EXTRACTION (TCLP)	S	SW846-8240		TCLP VOLATILE ORGANICS (LANDBAN)
			SW846-8240		TCLP VOLATILE ORGANICS (LANDBAN)
			SW846-8240		TCLP VOLATILE ORGANICS (TOXICITY CHARACT
			SW846-8240		TCLP VOLATILE ORGANICS (TOXICITY CHARACT
SW846-3005	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	W	SAS		GOLD (ICP-SEQ)
			SW846-6010		ALUMINUM (ICP-SEQ)
			SW846-6010		ALUMINUM ICP
			SW846-6010		ANTIMONY (ICP-SEQ)
			SW846-6010		ANTIMONY ICP
			SW846-6010		BARIUM (ICP-SEQ)
			SW846-6010		BARIUM ICP
			SW846-6010		BARIUM ICP (3 POINT MSA)
			SW846-6010		BARIUM ICP-SEQ (1 POINT MSA)
			SW846-6010		BERYLLIUM (ICP-SEQ)
			SW846-6010		BERYLLIUM ICP
			SW846-6010		BISMUTH ICP
			SW846-6010		BORON ICP
			SW846-6010		CADMIUM (ICP-SEQ)
			SW846-6010		CADMIUM ICP
			SW846-6010		CADMIUM ICP (3 POINT MSA)
			SW846-6010		CALCIUM ICP
			SW846-6010		CHROMIUM (ICP-SEQ)
			SW846-6010		CHROMIUM ICP
			SW846-6010		COBALT (ICP-SEQ)
			SW846-6010		COBALT ICP
			SW846-6010		COPPER (ICP-SEQ)
			SW846-6010		COPPER ICP
			SW846-6010		ICP SCAN
			SW846-6010		IRON (ICP-SEQ)
			SW846-6010		IRON ICP
			SW846-6010		LEAD (ICP-SEQ)
			SW846-6010		LEAD ICP
			SW846-6010		LEAD ICP (3 POINT MSA)
			SW846-6010		LITHIUM ICP
			SW846-6010		MAGNESIUM ICP
			SW846-6010		MANGANESE (ICP-SEQ)
			SW846-6010		MANGANESE ICP
			SW846-6010		MISCELLANEOUS (ICP-SEQ)
			SW846-6010		MOLYBDENUM ICP
			SW846-6010		NICKEL (ICP-SEQ)
			SW846-6010		NICKEL ICP
			SW846-6010		POTASSIUM ICP
			SW846-6010		SILICON ICP
			SW846-6010		SILVER (ICP-SEQ)
			SW846-6010		SILVER ICP
			SW846-6010		SILVER ICP (3 POINT MSA)
			SW846-6010		SODIUM ICP
			SW846-6010		STRONTIUM ICP
			SW846-6010		THALLIUM (ICP-SEQ)
			SW846-6010		THALLIUM ICP
			SW846-6010		TIN ICP
			SW846-6010		TITANIUM ICP

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SW846-3005	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	1	6-6010	VANADIUM (ICP-SEQ)
			SW846-6010	VANADIUM ICP
			SW846-6010	YTTRIUM ICP
			SW846-6010	ZINC (ICP-SEQ)
			SW846-6010	ZINC ICP
			SW846-7020	ALUMINUM FAA
			SW846-7040	ANTIMONY FAA
			SW846-7080	BARIUM FAA
			SW846-7080	BARIUM FAA (1 POINT MSA)
			SW846-7080	BARIUM FAA (3 POINT MSA)
			SW846-7090	BERYLLIUM FAA
			SW846-7090	BERYLLIUM FAA (3 POINT MSA)
			SW846-7130	CADMIUM FAA
			SW846-7130	CADMIUM FAA (1 POINT MSA)
			SW846-7130	CADMIUM FAA (3 POINT MSA)
			SW846-7140	CALCIUM FAA
			SW846-7190	CHROMIUM FAA
			SW846-7190	CHROMIUM FAA (3 POINT MSA)
			SW846-7200	COBALT FAA
			SW846-7210	COPPER FAA
			SW846-7380	IRON FAA
			SW846-7420	LEAD FAA
			SW846-7420	LEAD FAA (3 POINT MSA)
			SW846-7450	MAGNESIUM FAA
			SW846-7460	MANGANESE FAA
			SW846-7480	MOLYBDENUM FAA
			SW846-7520	NICKEL FAA
			SW846-7610	POTASSIUM FAA
			SW846-7760	SILVER FAA
			SW846-7770	SODIUM FAA
			SW846-7780	STRONTIUM FAA
			SW846-7840	THALLIUM FAA
			SW846-7870	TIN FAA
			SW846-7910	VANADIUM FAA
			SW846-7950	ZINC FAA
		2	SAS	GOLD (ICP-SEQ)
			SW846-6010	ALUMINUM (ICP-SEQ)
			SW846-6010	ALUMINUM ICP
			SW846-6010	ANTIMONY (ICP-SEQ)
			SW846-6010	ANTIMONY ICP
			SW846-6010	BARIUM (ICP-SEQ)
			SW846-6010	BARIUM ICP
			SW846-6010	BERYLLIUM (ICP-SEQ)
			SW846-6010	BERYLLIUM ICP
			SW846-6010	BISMUTH ICP
			SW846-6010	BORON ICP
			SW846-6010	CADMIUM (ICP-SEQ)
			SW846-6010	CADMIUM ICP
			SW846-6010	CALCIUM ICP
			SW846-6010	CHROMIUM (ICP-SEQ)
			SW846-6010	CHROMIUM ICP
			SW846-6010	COBALT (ICP-SEQ)

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PREP	Description	Matrix	fe	Method	Description
SW846-3005	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	2		SW846-6010	COBALT ICP
				SW846-6010	COPPER (ICP-SEQ)
				SW846-6010	COPPER ICP
				SW846-6010	ICP SCAN
				SW846-6010	IRON (ICP-SEQ)
				SW846-6010	IRON ICP
				SW846-6010	LEAD (ICP-SEQ)
				SW846-6010	LEAD ICP
				SW846-6010	LITHIUM ICP
				SW846-6010	MAGNESIUM ICP
				SW846-6010	MANGANESE (ICP-SEQ)
				SW846-6010	MANGANESE ICP
				SW846-6010	MOLYBDENUM ICP
				SW846-6010	NICKEL (ICP-SEQ)
				SW846-6010	NICKEL ICP
				SW846-6010	POTASSIUM ICP
				SW846-6010	SILICON ICP
				SW846-6010	SILVER (ICP-SEQ)
				SW846-6010	SILVER ICP
				SW846-6010	SODIUM ICP
				SW846-6010	STRONTIUM ICP
				SW846-6010	THALLIUM (ICP-SEQ)
				SW846-6010	THALLIUM ICP
				SW846-6010	TIN ICP
				SW846-6010	TITANIUM ICP
				SW846-6010	VANADIUM (ICP-SEQ)
				SW846-6010	VANADIUM ICP
				SW846-6010	YTTRIUM ICP
				SW846-6010	ZINC (ICP-SEQ)
				SW846-6010	ZINC ICP
				SW846-7020	ALUMINUM FAA
				SW846-7040	ANTIMONY FAA
				SW846-7080	BARIUM FAA
				SW846-7090	BERYLLIUM FAA
				SW846-7130	CADMIUM FAA
				SW846-7140	CALCIUM FAA
				SW846-7190	CHROMIUM FAA
				SW846-7200	COBALT FAA
				SW846-7210	COPPER FAA
				SW846-7380	IRON FAA
				SW846-7420	LEAD FAA
				SW846-7450	MAGNESIUM FAA
				SW846-7460	MANGANESE FAA
				SW846-7480	MOLYBDENUM FAA
				SW846-7520	NICKEL FAA
				SW846-7610	POTASSIUM FAA
				SW846-7760	SILVER FAA
				SW846-7770	SODIUM FAA
				SW846-7780	STRONTIUM FAA
				SW846-7840	THALLIUM FAA
				SW846-7870	TIN FAA
				SW846-7910	VANADIUM FAA
				SW846-7950	ZINC FAA

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SW846-3005	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	3 SAS	GOLD (ICP-SEQ)
		SW846-6010	ALUMINUM (ICP-SEQ)
		SW846-6010	ALUMINUM ICP
		SW846-6010	ANTIMONY (ICP-SEQ)
		SW846-6010	ANTIMONY ICP
		SW846-6010	BARIUM (ICP-SEQ)
		SW846-6010	BARIUM ICP
		SW846-6010	BERYLLIUM (ICP-SEQ)
		SW846-6010	BERYLLIUM ICP
		SW846-6010	BISMUTH ICP
		SW846-6010	BORON ICP
		SW846-6010	CADMIUM (ICP-SEQ)
		SW846-6010	CADMIUM ICP
		SW846-6010	CALCIUM ICP
		SW846-6010	CHROMIUM (ICP-SEQ)
		SW846-6010	CHROMIUM ICP
		SW846-6010	COBALT (ICP-SEQ)
		SW846-6010	COBALT ICP
		SW846-6010	COPPER (ICP-SEQ)
		SW846-6010	COPPER ICP
		SW846-6010	ICP SCAN
		SW846-6010	IRON (ICP-SEQ)
		SW846-6010	IRON ICP
		SW846-6010	LEAD (ICP-SEQ)
		SW846-6010	LEAD ICP
		SW846-6010	LITHIUM ICP
		SW846-6010	MAGNESIUM ICP
		SW846-6010	MANGANESE (ICP-SEQ)
		SW846-6010	MANGANESE ICP
		SW846-6010	MOLYBDENUM ICP
		SW846-6010	NICKEL (ICP-SEQ)
		SW846-6010	NICKEL ICP
		SW846-6010	POTASSIUM ICP
		SW846-6010	SILICON ICP
		SW846-6010	SILVER (ICP-SEQ)
		SW846-6010	SILVER ICP
		SW846-6010	SODIUM ICP
		SW846-6010	STRONTIUM ICP
		SW846-6010	THALLIUM (ICP-SEQ)
		SW846-6010	THALLIUM ICP
		SW846-6010	TIN ICP
		SW846-6010	TITANIUM ICP
		SW846-6010	VANADIUM (ICP-SEQ)
		SW846-6010	VANADIUM ICP
		SW846-6010	YTTRIUM ICP
		SW846-6010	ZINC (ICP-SEQ)
		SW846-6010	ZINC ICP
		SW846-7020	ALUMINUM FAA
		SW846-7040	ANTIMONY FAA
		SW846-7080	BARIUM FAA
		SW846-7090	BERYLLIUM FAA
		SW846-7130	CADMIUM FAA

(preptest.sql)

PREP	Description	Matrix	I	Method	Description
SW846-3005	FAA OR ICP ACID DIGESTION OF AQUEOUS SAM	3		SW846-7140	CALCIUM FAA
				SW846-7190	CHROMIUM FAA
				SW846-7200	COBALT FAA
				SW846-7210	COPPER FAA
				SW846-7380	IRON FAA
				SW846-7420	LEAD FAA
				SW846-7450	MAGNESIUM FAA
				SW846-7460	MANGANESE FAA
				SW846-7480	MOLYBDENUM FAA
				SW846-7520	NICKEL FAA
				SW846-7610	POTASSIUM FAA
				SW846-7760	SILVER FAA
				SW846-7770	SODIUM FAA
				SW846-7780	STRONTIUM FAA
				SW846-7840	THALLIUM FAA
				SW846-7870	TIN FAA
				SW846-7910	VANADIUM FAA
				SW846-7950	ZINC FAA
SW846-3010	FAA OR ICP ACID DIGESTION OF LEACHATE SA	1		SW846-6010	BARIUM ICP (3 POINT MSA)
				SW846-6010	CADMIUM ICP (3 POINT MSA)
				SW846-6010	CHROMIUM ICP (3 POINT MSA)
				SW846-6010	LEAD ICP (3 POINT MSA)
				SW846-6010	MISCELLANEOUS (ICP-SEQ)
				SW846-6010	NICKEL ICP (3 POINT MSA)
				SW846-6010	SILVER ICP (3 POINT MSA)
				SW846-6010	TCLP COPPER ICP (1 POINT MSA)
				SW846-6010	TCLP NICKEL ICP (1 POINT MSA)
				SW846-7080	BARIUM FAA (1 POINT MSA)
				SW846-7080	BARIUM FAA (3 POINT MSA)
				SW846-7080	TCLP BARIUM FAA (1 POINT MSA)
				SW846-7080	TCLP BARIUM FAA (3 POINT MSA)
				SW846-7090	BERYLLIUM FAA (3 POINT MSA)
				SW846-7130	CADMIUM FAA (1 POINT MSA)
				SW846-7130	CADMIUM FAA (3 POINT MSA)
				SW846-7130	TCLP CADMIUM FAA (1 POINT MSA)
				SW846-7130	TCLP CADMIUM FAA (3 POINT MSA)
				SW846-7140	CALCIUM FAA (3 POINT MSA)
				SW846-7190	CHROMIUM FAA (3 POINT MSA)
				SW846-7190	TCLP CHROMIUM FAA (1 POINT MSA)
				SW846-7190	TCLP CHROMIUM FAA (3 POINT MSA)
				SW846-7200	COBALT FAA (3 POINT MSA)
				SW846-7210	TCLP COPPER FAA (1 POINT MSA)
				SW846-7380	IRON FAA (3 POINT MSA)
				SW846-7420	LEAD FAA (3 POINT MSA)
				SW846-7420	TCLP LEAD FAA (1 POINT MSA)
				SW846-7420	TCLP LEAD FAA (3 POINT MSA)
				SW846-7450	MAGNESIUM FAA (3 POINT MSA)
				SW846-7460	MANGANESE FAA (3 POINT MSA)
				SW846-7480	MOLYBDENUM FAA (3 POINT MSA)
				SW846-7520	NICKEL FAA (3 POINT MSA)
				SW846-7610	POTASSIUM FAA (3 POINT MSA)
				SW846-7760	SILVER FAA (3 POINT MSA)

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SW846-3010	FAA OR ICP ACID DIGESTION OF LEACHATE SA	1	S -7760	TCLP SILVER FAA (1 POINT MSA)
			SW846-7760	TCLP SILVER FAA (3 POINT MSA)
			SW846-7950	ZINC FAA (3 POINT MSA)
		5	SW846-6010	ALUMINUM ICP (1 POINT MSA)
			SW846-6010	ALUMINUM ICP-SEQ (1 POINT MSA)
			SW846-6010	ANTIMONY ICP (1 POINT MSA)
			SW846-6010	BARIUM ICP (1 POINT MSA)
			SW846-6010	BARIUM ICP (3 POINT MSA)
			SW846-6010	BARIUM ICP-SEQ (1 POINT MSA)
			SW846-6010	BORON ICP (1 POINT MSA)
			SW846-6010	CADMIUM ICP (1 POINT MSA)
			SW846-6010	CADMIUM ICP (3 POINT MSA)
			SW846-6010	CADMIUM ICP-SEQ (1 POINT MSA)
			SW846-6010	CHROMIUM ICP (1 POINT MSA)
			SW846-6010	CHROMIUM ICP (3 POINT MSA)
			SW846-6010	CHROMIUM ICP-SEQ (1 POINT MSA)
			SW846-6010	COPPER ICP (1 POINT MSA)
			SW846-6010	COPPER ICP-SEQ (1 POINT MSA)
			SW846-6010	IRON ICP (1 POINT MSA)
			SW846-6010	IRON ICP-SEQ (1 POINT MSA)
			SW846-6010	LEAD ICP (1 POINT MSA)
			SW846-6010	LEAD ICP (3 POINT MSA)
			SW846-6010	LEAD ICP-SEQ (1 POINT MSA)
			SW846-6010	MAGNESIUM ICP (1 POINT MSA)
			SW846-6010	MANGANESE ICP (1 POINT MSA)
			SW846-6010	MANGANESE ICP-SEQ (1 POINT MSA)
			SW846-6010	MOLYBDENUM ICP (1 POINT MSA)
			SW846-6010	NICKEL ICP (1 POINT MSA)
			SW846-6010	NICKEL ICP (3 POINT MSA)
			SW846-6010	NICKEL ICP-SEQ (1 POINT MSA)
			SW846-6010	SILVER ICP (1 POINT MSA)
			SW846-6010	SILVER ICP (3 POINT MSA)
			SW846-6010	SILVER ICP-SEQ (1 POINT MSA)
			SW846-6010	SODIUM ICP (1 POINT MSA)
			SW846-6010	TCLP COPPER ICP (1 POINT MSA)
			SW846-6010	TCLP NICKEL ICP (1 POINT MSA)
			SW846-6010	TCLP ZINC ICP (1 POINT MSA)
			SW846-6010	VANADIUM ICP (1 POINT MSA)
			SW846-6010	VANADIUM ICP-SEQ (1 POINT MSA)
			SW846-6010	ZINC ICP (1 POINT MSA)
			SW846-6010	ZINC ICP (3 POINT MSA)
			SW846-6010	ZINC ICP-SEQ (1 POINT MSA)
			SW846-7020	ALUMINUM FAA (1 POINT MSA)
			SW846-7020	ALUMINUM FAA (3 POINT MSA)
			SW846-7040	ANTIMONY FAA (1 POINT MSA)
			SW846-7040	ANTIMONY FAA (3 POINT MSA)
			SW846-7040	TCLP ANTIMONY FAA (1 POINT MSA)
			SW846-7080	BARIUM FAA (1 POINT MSA)
			SW846-7080	BARIUM FAA (3 POINT MSA)
			SW846-7080	TCLP BARIUM FAA (1 POINT MSA)
			SW846-7080	TCLP BARIUM FAA (3 POINT MSA)
			SW846-7090	BERYLLIUM FAA (1 POINT MSA)

PREP	scription	Matrix	T	Method	Description
SW846-3010	FAA OR ICP ACID DIGESTION OF LEACHATE SA		5	SW846-7090	BERYLLIUM FAA (3 POINT MSA)
				SW846-7130	CADMIUM FAA (1 POINT MSA)
				SW846-7130	CADMIUM FAA (3 POINT MSA)
				SW846-7130	TCLP CADMIUM FAA (1 POINT MSA)
				SW846-7130	TCLP CADMIUM FAA (3 POINT MSA)
				SW846-7140	CALCIUM FAA (1 POINT MSA)
				SW846-7140	CALCIUM FAA (3 POINT MSA)
				SW846-7190	CHROMIUM FAA (1 POINT MSA)
				SW846-7190	CHROMIUM FAA (3 POINT MSA)
				SW846-7190	TCLP CHROMIUM FAA (1 POINT MSA)
				SW846-7190	TCLP CHROMIUM FAA (3 POINT MSA)
				SW846-7200	COBALT FAA (1 POINT MSA)
				SW846-7200	COBALT FAA (3 POINT MSA)
				SW846-7200	TCLP COBALT FAA (1 POINT MSA)
				SW846-7210	COPPER FAA (1 POINT MSA)
				SW846-7210	COPPER FAA (3 POINT MSA)
				SW846-7210	TCLP COPPER FAA (1 POINT MSA)
				SW846-7380	IRON FAA (1 POINT MSA)
				SW846-7380	IRON FAA (3 POINT MSA)
				SW846-7420	LEAD FAA (1 POINT MSA)
				SW846-7420	LEAD FAA (3 POINT MSA)
				SW846-7420	TCLP LEAD FAA (1 POINT MSA)
				SW846-7420	TCLP LEAD FAA (3 POINT MSA)
				SW846-7450	MAGNESIUM FAA (1 POINT MSA)
				SW846-7450	MAGNESIUM FAA (3 POINT MSA)
				SW846-7460	MANGANESE FAA (1 POINT MSA)
				SW846-7460	MANGANESE FAA (3 POINT MSA)
				SW846-7480	MOLYBDENUM FAA (3 POINT MSA)
				SW846-7520	NICKEL FAA (1 POINT MSA)
				SW846-7520	NICKEL FAA (3 POINT MSA)
				SW846-7520	TCLP NICKEL FAA (1 POINT MSA)
				SW846-7610	POTASSIUM FAA (3 POINT MSA)
				SW846-7760	SILVER FAA (1 POINT MSA)
				SW846-7760	SILVER FAA (3 POINT MSA)
				SW846-7760	TCLP SILVER FAA (1 POINT MSA)
				SW846-7760	TCLP SILVER FAA (3 POINT MSA)
				SW846-7770	SODIUM FAA (1 POINT MSA)
				SW846-7840	TCLP THALLIUM FAA (1 POINT MSA)
				SW846-7840	THALLIUM FAA (1 POINT MSA)
				SW846-7840	THALLIUM FAA (1 POINT MSA)
				SW846-7910	VANADIUM FAA (1 POINT MSA)
				SW846-7950	TCLP ZINC FAA (1 POINT MSA)
				SW846-7950	ZINC FAA (1 POINT MSA)
				SW846-7950	ZINC FAA (3 POINT MSA)
SW846-3020	GFAA ACID DIGESTION OF AQUEOUS SAMPLES		1	SW846-7021	ALUMINUM GFAA
				SW846-7041	ANTIMONY GFAA
				SW846-7060	ARSENIC GFAA
				SW846-7060	ARSENIC GFAA (1 POINT MSA)
	GFAA ACID DIGESTION OF LEACHATE SAMPLES		1	SW846-7060	ARSENIC GFAA (1 POINT MSA)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES		1	SW846-7060	ARSENIC GFAA (3 POINT MSA)

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SW846-3020	GFAA ACID DIGESTION OF LEACHATE SAMPLES	1	SW846-7060	ARSENIC GFAA (3 POINT MSA)
			SW846-7060	TCLP ARSENIC GFAA (1 POINT MSA)
			SW846-7060	TCLP ARSENIC GFAA (3 POINT MSA)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES	1	SW846-7091	BERYLLIUM GFAA
			SW846-7131	CADMIUM GFAA
			SW846-7131	CADMIUM GFAA (1 POINT MSA)
	GFAA ACID DIGESTION OF LEACHATE SAMPLES	1	SW846-7131	CADMIUM GFAA (1 POINT MSA)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES	1	SW846-7131	CADMIUM GFAA (3 POINT MSA)
	GFAA ACID DIGESTION OF LEACHATE SAMPLES	1	SW846-7131	CADMIUM GFAA (3 POINT MSA)
			SW846-7131	TCLP CADMIUM GFAA (1 POINT MSA)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES	1	SW846-7191	CHROMIUM GFAA
			SW846-7201	COBALT GFAA
			SW846-7211	COPPER GFAA (SW)
			SW846-7421	LEAD GFAA
			SW846-7421	LEAD GFAA (3 POINT MSA)
	GFAA ACID DIGESTION OF LEACHATE SAMPLES	1	SW846-7421	LEAD GFAA (3 POINT MSA)
			SW846-7421	TCLP LEAD GFAA (1 POINT MSA)
			SW846-7421	TCLP LEAD GFAA (3 POINT MSA)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES	1	SW846-7481	MOLYBDENUM GFAA
			SW846-7521	NICKEL GFAA
			SW846-7740	SELENIUM GFAA
	GFAA ACID DIGESTION OF LEACHATE SAMPLES	1	SW846-7740	SELENIUM GFAA (3 POINT MSA)
			SW846-7740	TCLP SELENIUM GFAA (1 POINT MSA)
			SW846-7740	TCLP SELENIUM GFAA (3 POINT MSA)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES	1	SW846-7761	SILVER GFAA
			SW846-7841	THALLIUM GFAA
			SW846-7841	THALLIUM GFAA (3 POINT MSA)
	GFAA ACID DIGESTION OF LEACHATE SAMPLES	1	SW846-7841	THALLIUM GFAA (3 POINT MSA)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES	1	SW846-7911	VANADIUM GFAA
		2	SW846-7021	ALUMINUM GFAA
			SW846-7041	ANTIMONY GFAA
			SW846-7060	ARSENIC GFAA
			SW846-7091	BERYLLIUM GFAA
			SW846-7131	CADMIUM GFAA
			SW846-7191	CHROMIUM GFAA
			SW846-7201	COBALT GFAA
			SW846-7211	COPPER GFAA (SW)
			SW846-7421	LEAD GFAA
			SW846-7481	MOLYBDENUM GFAA
			SW846-7521	NICKEL GFAA

(preptest.sql)

PREP	Description	Matrix	1	Method	Description
SW846-3020	GFAA ACID DIGESTION OF AQUEOUS SAMPLES	2		SW846-7740	SELENIUM GFAA
				SW846-7761	SILVER GFAA
				SW846-7841	THALLIUM GFAA
				SW846-7911	VANADIUM GFAA
		3		SW846-7021	ALUMINUM GFAA
				SW846-7041	ANTIMONY GFAA
				SW846-7060	ARSENIC GFAA
				SW846-7091	BERYLLIUM GFAA
				SW846-7131	CADMIUM GFAA
				SW846-7191	CHROMIUM GFAA
				SW846-7201	COBALT GFAA
				SW846-7211	COPPER GFAA (SW)
				SW846-7421	LEAD GFAA
				SW846-7481	MOLYBDENUM GFAA
				SW846-7521	NICKEL GFAA
				SW846-7740	SELENIUM GFAA
				SW846-7761	SILVER GFAA
				SW846-7841	THALLIUM GFAA
	GFAA ACID DIGESTION OF LEACHATE SAMPLES	5		EPA 206.2	ARSENIC GFAA (3 POINT MSA)
	GFAA ACID DIGESTION OF AQUEOUS SAMPLES	5		SW846-7060	ARSENIC GFAA (1 POINT MSA)
	GFAA ACID DIGESTION OF LEACHATE SAMPLES	5		SW846-7060	ARSENIC GFAA (1 POINT MSA)
				SW846-7060	ARSENIC GFAA (3 POINT MSA)
				SW846-7060	TCLP ARSENIC GFAA (1 POINT MSA)
				SW846-7060	TCLP ARSENIC GFAA (3 POINT MSA)
				SW846-7131	CADMIUM GFAA (1 POINT MSA)
				SW846-7131	CADMIUM GFAA (3 POINT MSA)
				SW846-7131	TCLP CADMIUM GFAA (1 POINT MSA)
				SW846-7421	LEAD GFAA (1 POINT MSA)
				SW846-7421	LEAD GFAA (3 POINT MSA)
				SW846-7421	TCLP LEAD GFAA (1 POINT MSA)
				SW846-7421	TCLP LEAD GFAA (3 POINT MSA)
				SW846-7740	SELENIUM GFAA (1 POINT MSA)
				SW846-7740	SELENIUM GFAA (3 POINT MSA)
				SW846-7740	TCLP SELENIUM GFAA (1 POINT MSA)
				SW846-7740	TCLP SELENIUM GFAA (3 POINT MSA)
				SW846-7841	THALLIUM GFAA (1 POINT MSA)
				SW846-7841	THALLIUM GFAA (3 POINT MSA)
SW846-3030 MOD	ACID DIGESTION OF OILS	4		SAS	GOLD (ICP-SEQ)
				SW846-6010	ALUMINUM (ICP-SEQ)
				SW846-6010	ALUMINUM ICP
				SW846-6010	ANTIMONY (ICP-SEQ)
				SW846-6010	ANTIMONY ICP
				SW846-6010	BARIUM (ICP-SEQ)
				SW846-6010	BARIUM ICP
				SW846-6010	BERYLLIUM (ICP-SEQ)
				SW846-6010	BERYLLIUM ICP
				SW846-6010	BISMUTH ICP
				SW846-6010	BORON ICP

(preptest.sql)

P	sc ion	ix	M	cr n
SW846-3030	ACID DIGESTION OF OILS	4	6-6010	CADMIUM (ICP-SEQ)
			SW846-6010	CADMIUM ICP
			SW846-6010	CALCIUM ICP
			SW846-6010	CHROMIUM (ICP-SEQ)
			SW846-6010	CHROMIUM ICP
			SW846-6010	COBALT (ICP-SEQ)
			SW846-6010	COBALT ICP
			SW846-6010	COPPER (ICP-SEQ)
			SW846-6010	COPPER ICP
			SW846-6010	ICP SCAN
			SW846-6010	IRON (ICP-SEQ)
			SW846-6010	IRON ICP
			SW846-6010	LEAD (ICP-SEQ)
			SW846-6010	LEAD ICP
			SW846-6010	LITHIUM ICP
			SW846-6010	MAGNESIUM ICP
			SW846-6010	MANGANESE (ICP-SEQ)
			SW846-6010	MANGANESE ICP
			SW846-6010	MOLYBDENUM ICP
			SW846-6010	NICKEL (ICP-SEQ)
			SW846-6010	NICKEL ICP
			SW846-6010	POTASSIUM ICP
			SW846-6010	SILICON ICP
			SW846-6010	SILVER (ICP-SEQ)
			SW846-6010	SILVER ICP
			SW846-6010	SODIUM ICP
			SW846-6010	STRONTIUM ICP
			SW846-6010	THALLIUM (ICP-SEQ)
			SW846-6010	THALLIUM ICP
			SW846-6010	TIN ICP
			SW846-6010	TITANIUM ICP
			SW846-6010	VANADIUM (ICP-SEQ)
			SW846-6010	VANADIUM ICP
			SW846-6010	YITRIUM ICP
			SW846-6010	ZINC (ICP-SEQ)
			SW846-6010	ZINC ICP
			SW846-7020	ALUMINUM FAA
			SW846-7021	ALUMINUM GFAA
			SW846-7040	ANTIMONY FAA
			SW846-7041	ANTIMONY GFAA
			SW846-7060	ARSENIC GFAA
			SW846-7060	ARSENIC GFAA (3 POINT MSA)
			SW846-7080	BARIUM FAA
			SW846-7090	BERYLLIUM FAA
			SW846-7091	BERYLLIUM GFAA
			SW846-7130	CADMIUM FAA
			SW846-7131	CADMIUM GFAA
			SW846-7140	CALCIUM FAA
			SW846-7190	CHROMIUM FAA
			SW846-7191	CHROMIUM GFAA
			SW846-7200	COBALT FAA
			SW846-7201	COBALT GFAA
			SW846-7210	COPPER FAA

(preptest.sql)

PREP	scription	Matrix	T	Method	Description
SW846-3030 MOD	ACID DIGESTION OF OILS	4		SW846-7380	IRON FAA
				SW846-7420	LEAD FAA
				SW846-7421	LEAD GFAA
				SW846-7450	MAGNESIUM FAA
				SW846-7460	MANGANESE FAA
				SW846-7470	MERCURY CVAA
				SW846-7471	MERCURY CVAA
				SW846-7480	MOLYBDENUM FAA
				SW846-7481	MOLYBDENUM GFAA
				SW846-7520	NICKEL FAA
				SW846-7521	NICKEL GFAA
				SW846-7610	POTASSIUM FAA
				SW846-7740	SELENIUM GFAA
				SW846-7760	SILVER FAA
				SW846-7761	SILVER GFAA
				SW846-7770	SODIUM FAA
				SW846-7780	STRONTIUM FAA
				SW846-7840	THALLIUM FAA
				SW846-7841	THALLIUM GFAA
				SW846-7870	TIN FAA
				SW846-7910	VANADIUM FAA
				SW846-7950	ZINC FAA
		5		SW846-6010	TCLP COPPER ICP (1 POINT MSA)
				SW846-6010	TCLP NICKEL ICP (1 POINT MSA)
				SW846-6010	TCLP ZINC ICP (1 POINT MSA)
				SW846-7040	TCLP ANTIMONY FAA (1 POINT MSA)
				SW846-7060	ARSENIC GFAA (3 POINT MSA)
				SW846-7060	TCLP ARSENIC GFAA (1 POINT MSA)
				SW846-7060	TCLP ARSENIC GFAA (3 POINT MSA)
				SW846-7080	TCLP BARIUM FAA (1 POINT MSA)
				SW846-7080	TCLP BARIUM FAA (3 POINT MSA)
				SW846-7130	TCLP CADMIUM FAA (1 POINT MSA)
				SW846-7130	TCLP CADMIUM FAA (3 POINT MSA)
				SW846-7131	TCLP CADMIUM GFAA (1 POINT MSA)
				SW846-7190	TCLP CHROMIUM FAA (1 POINT MSA)
				SW846-7190	TCLP CHROMIUM FAA (3 POINT MSA)
				SW846-7210	TCLP COPPER FAA (1 POINT MSA)
				SW846-7420	TCLP LEAD FAA (1 POINT MSA)
				SW846-7420	TCLP LEAD FAA (3 POINT MSA)
				SW846-7421	TCLP LEAD GFAA (1 POINT MSA)
				SW846-7421	TCLP LEAD GFAA (3 POINT MSA)
				SW846-7520	TCLP NICKEL FAA (1 POINT MSA)
				SW846-7740	TCLP SELENIUM GFAA (1 POINT MSA)
				SW846-7740	TCLP SELENIUM GFAA (3 POINT MSA)
				SW846-7760	TCLP SILVER FAA (1 POINT MSA)
				SW846-7760	TCLP SILVER FAA (3 POINT MSA)
				SW846-7840	TCLP THALLIUM FAA (1 POINT MSA)
SW846-3050	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5		SAS	GOLD (ICP-SEQ)
				SW846-6010	ALUMINUM (ICP-SEQ)
				SW846-6010	ALUMINUM ICP
				SW846-6010	ANTIMONY (ICP-SEQ)

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P	sc on	ix	Me	cr n
SW846-3050	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	6-6010	ANTIMONY ICP
			SW846-6010	BARIUM (ICP-SEQ)
			SW846-6010	BARIUM ICP
			SW846-6010	BARIUM ICP (1 POINT MSA)
			SW846-6010	BARIUM ICP (3 POINT MSA)
			SW846-6010	BARIUM ICP-SEQ (1 POINT MSA)
			SW846-6010	BERYLLIUM (ICP-SEQ)
			SW846-6010	BERYLLIUM ICP
			SW846-6010	BISMUTH ICP
			SW846-6010	BORON ICP
			SW846-6010	BORON ICP (1 POINT MSA)
			SW846-6010	CADMIUM (ICP-SEQ)
			SW846-6010	CADMIUM ICP
			SW846-6010	CADMIUM ICP (1 POINT MSA)
			SW846-6010	CADMIUM ICP (3 POINT MSA)
			SW846-6010	CALCIUM ICP
			SW846-6010	CHROMIUM (ICP-SEQ)
			SW846-6010	CHROMIUM ICP
			SW846-6010	CHROMIUM ICP (1 POINT MSA)
			SW846-6010	CHROMIUM ICP (3 POINT MSA)
			SW846-6010	CHROMIUM ICP-SEQ (1 POINT MSA)
			SW846-6010	COBALT (ICP-SEQ)
			SW846-6010	COBALT ICP
			SW846-6010	COPPER (ICP-SEQ)
			SW846-6010	COPPER ICP
			SW846-6010	ICP SCAN
			SW846-6010	IRON (ICP-SEQ)
			SW846-6010	IRON ICP
			SW846-6010	IRON ICP (1 POINT MSA)
			SW846-6010	IRON ICP-SEQ (1 POINT MSA)
			SW846-6010	LEAD (ICP-SEQ)
			SW846-6010	LEAD ICP
			SW846-6010	LEAD ICP (1 POINT MSA)
			SW846-6010	LEAD ICP (3 POINT MSA)
			SW846-6010	LEAD ICP-SEQ (1 POINT MSA)
			SW846-6010	LITHIUM ICP
			SW846-6010	MAGNESIUM ICP
			SW846-6010	MAGNESIUM ICP (1 POINT MSA)
			SW846-6010	MANGANESE (ICP-SEQ)
			SW846-6010	MANGANESE ICP
			SW846-6010	MANGANESE ICP (1 POINT MSA)
			SW846-6010	MANGANESE ICP-SEQ (1 POINT MSA)
			SW846-6010	MOLYBDENUM ICP
			SW846-6010	MOLYBDENUM ICP (1 POINT MSA)
			SW846-6010	NICKEL (ICP-SEQ)
			SW846-6010	NICKEL ICP
			SW846-6010	NICKEL ICP (1 POINT MSA)
			SW846-6010	NICKEL ICP (3 POINT MSA)
			SW846-6010	NICKEL ICP-SEQ (1 POINT MSA)
			SW846-6010	POTASSIUM ICP
			SW846-6010	SILICON ICP
			SW846-6010	SILVER (ICP-SEQ)
			SW846-6010	SILVER ICP

(preptest.sql)

PREP	scription	Matrix	1	Method	Description
SW846-3050	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S		SW846-6010	SILVER ICP (1 POINT MSA)
				SW846-6010	SILVER ICP (3 POINT MSA)
				SW846-6010	SILVER ICP-SEQ (1 POINT MSA)
				SW846-6010	SODIUM ICP
				SW846-6010	SODIUM ICP (1 POINT MSA)
				SW846-6010	STRONTIUM ICP
				SW846-6010	THALLIUM (ICP-SEQ)
				SW846-6010	THALLIUM ICP
				SW846-6010	TIN ICP
				SW846-6010	TITANIUM ICP
				SW846-6010	VANADIUM (ICP-SEQ)
				SW846-6010	VANADIUM ICP
				SW846-6010	VANADIUM ICP (1 POINT MSA)
				SW846-6010	VANADIUM ICP-SEQ (1 POINT MSA)
				SW846-6010	YTTRIUM ICP
				SW846-6010	ZINC (ICP-SEQ)
				SW846-6010	ZINC ICP
				SW846-6010	ZINC ICP (1 POINT MSA)
				SW846-6010	ZINC ICP (3 POINT MSA)
				SW846-6010	ZINC ICP-SEQ (1 POINT MSA)
				SW846-7020	ALUMINUM FAA
	GFAA ACID DIGESTION OF S/S/S SAMPLES	S		SW846-7021	ALUMINUM GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S		SW846-7040	ANTIMONY FAA
	GFAA ACID DIGESTION OF S/S/S SAMPLES	S		SW846-7041	ANTIMONY GFAA
				SW846-7060	ARSENIC GFAA
				SW846-7060	ARSENIC GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S		SW846-7080	BARIUM FAA
				SW846-7080	BARIUM FAA (1 POINT MSA)
				SW846-7080	BARIUM FAA (3 POINT MSA)
				SW846-7090	BERYLLIUM FAA
				SW846-7090	BERYLLIUM FAA (1 POINT MSA)
				SW846-7090	BERYLLIUM FAA (3 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	S		SW846-7091	BERYLLIUM GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S		SW846-7130	CADMIUM FAA
				SW846-7130	CADMIUM FAA (1 POINT MSA)
				SW846-7130	CADMIUM FAA (3 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	S		SW846-7131	CADMIUM GFAA
				SW846-7131	CADMIUM GFAA (1 POINT MSA)
				SW846-7131	CADMIUM GFAA (3 POINT MSA)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	S		SW846-7140	CALCIUM FAA
				SW846-7190	CHROMIUM FAA
				SW846-7190	CHROMIUM FAA (1 POINT MSA)
				SW846-7190	CHROMIUM FAA (3 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	S		SW846-7191	CHROMIUM GFAA

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P	sc .on	ix	Me	scr n
SW846-3050	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7200	COBALT FAA
			SW846-7200	COBALT FAA (1 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7201	COBALT GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7210	COPPER FAA
			SW846-7210	COPPER FAA (1 POINT MSA)
			SW846-7210	COPPER FAA (3 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7211	COPPER GFAA (SW)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7380	IRON FAA
			SW846-7380	IRON FAA (1 POINT MSA)
			SW846-7420	LEAD FAA
			SW846-7420	LEAD FAA (1 POINT MSA)
			SW846-7420	LEAD FAA (3 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7421	LEAD GFAA
			SW846-7421	LEAD GFAA (1 POINT MSA)
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7421	LEAD GFAA (3 POINT MSA)
			SW846-7450	MAGNESIUM FAA
			SW846-7450	MAGNESIUM FAA (1 POINT MSA)
			SW846-7460	MANGANESE FAA
			SW846-7460	MANGANESE FAA (1 POINT MSA)
			SW846-7480	MOLYBDENUM FAA
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7481	MOLYBDENUM GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7520	NICKEL FAA
			SW846-7520	NICKEL FAA (1 POINT MSA)
			SW846-7520	NICKEL FAA (3 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7521	NICKEL GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7610	POTASSIUM FAA
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7740	SELENIUM GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7740	SELENIUM GFAA (1 POINT MSA)
			SW846-7740	SELENIUM GFAA (3 POINT MSA)
			SW846-7760	SILVER FAA
			SW846-7760	SILVER FAA (1 POINT MSA)
			SW846-7760	SILVER FAA (3 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7761	SILVER GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7770	SODIUM FAA
			SW846-7770	SODIUM FAA (1 POINT MSA)
			SW846-7780	STRONTIUM FAA
			SW846-7840	THALLIUM FAA
			SW846-7840	THALLIUM FAA (1 POINT MSA)

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PREP	Description	Matrix	r	Method	Description
SW846-3050	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7840		THALLIUM FAA (1 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7841		THALLIUM GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7841		THALLIUM GFAA (3 POINT MSA)
			SW846-7870		TIN FAA
			SW846-7910		VANADIUM FAA
			SW846-7910		VANADIUM FAA (1 POINT MSA)
	GFAA ACID DIGESTION OF S/S/S SAMPLES	5	SW846-7911		VANADIUM GFAA
	FAA OR ICP ACID DIGESTION OF S/S/S SAMPL	5	SW846-7950		ZINC FAA
			SW846-7950		ZINC FAA (1 POINT MSA)
			SW846-7950		ZINC FAA (3 POINT MSA)
SW846-3510	GC SEPARATORY FUNNEL LIQUID-LIQUID EXTRA	1	SW846-8080		ORGANOCHLORINE PESTICIDE(S) BY GC:ECD
			SW846-8080		ORGANOCHLORINE PESTICIDES BY GC:ECD (19
			SW846-8080		ORGANOCHLORINE PESTICIDES BY GC:ECD (4 P
			SW846-8080		ORGANOCHLORINE PESTICIDES BY GC:ECD (7 P
			SW846-8080		PCB/PESTICIDE SCAN GC:ECD
			SW846-8080		POLYCHLORINATED BIPHENYLS (PCBS)
	TCLP GC SEPARATORY FUNNEL LIQUID-LIQUID	1	SW846-8080		TCLP ORGANOCHLORINE PESTICIDES BY GC:ECD
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX	1	SW846-8270		APPENDIX IX SEMIVOLATILE ORGANICS
			SW846-8270		IDEM SEMI-VOLATILE TARGET COMPOUND LIST
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID (A	1	SW846-8270		SEMI-VOLATILE ORGANICS (ACID FRACTION)
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID (B	1	SW846-8270		SEMI-VOLATILE ORGANICS (BASE/NEUTRAL FRA
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX	1	SW846-8270		SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACI
			SW846-8270		TCLP SEMIVOLATILE ORGANICS (LANDBAN)
	TCLP GC/MS SEPARATORY FUNNEL LIQUID-LIQU	1	SW846-8270		TCLP SEMIVOLATILE ORGANICS (LANDBAN)
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX	1	SW846-8270		TCLP SEMIVOLATILE ORGANICS (TOXICITY CHA
	TCLP GC/MS SEPARATORY FUNNEL LIQUID-LIQU	1	SW846-8270		TCLP SEMIVOLATILE ORGANICS (TOXICITY CHA
	GC SEPARATORY FUNNEL LIQUID-LIQUID EXTRA	2	SW846-8080		ORGANOCHLORINE PESTICIDE(S) BY GC:ECD
			SW846-8080		ORGANOCHLORINE PESTICIDES BY GC:ECD (19
			SW846-8080		ORGANOCHLORINE PESTICIDES BY GC:ECD (4 P
			SW846-8080		ORGANOCHLORINE PESTICIDES BY GC:ECD (7 P
			SW846-8080		PCB/PESTICIDE SCAN GC:ECD
			SW846-8080		POLYCHLORINATED BIPHENYLS (PCBS)
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX	2	SW846-8270		APPENDIX IX SEMIVOLATILE ORGANICS
			SW846-8270		IDEM SEMI-VOLATILE TARGET COMPOUND LIST
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID (A	2	SW846-8270		SEMI-VOLATILE ORGANICS (ACID FRACTION)
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID (B	2	SW846-8270		SEMI-VOLATILE ORGANICS (BASE/NEUTRAL FRA

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TABLE 5.2
SAMPLE PREPARATION METHODS

EP	...ior	...ix	M	...sci...n
SW846-3510	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX	2	SW846-8270	SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACI
			SW846-8270	TCLP SEMIVOLATILE ORGANICS (LANDBAN)
			SW846-8270	TCLP SEMIVOLATILE ORGANICS (TOXICITY CHA
	GC SEPARATORY FUNNEL LIQUID-LIQUID EXTRA	3	SW846-8080	ORGANOCHLORINE PESTICIDES BY GC:ECD (4 P
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX	3	SW846-8270	APPENDIX IX SEMIVOLATILE ORGANICS
			SW846-8270	IDEM SEMI-VOLATILE TARGET COMPOUND LIST
			SW846-8270	SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACI
	GC SEPARATORY FUNNEL LIQUID-LIQUID EXTRA	5	SW846-8080	ORGANOCHLORINE PESTICIDE(S) BY GC:ECD
	TCLP GC SEPARATORY FUNNEL LIQUID-LIQUID	5	SW846-8080	TCLP ORGANOCHLORINE PESTICIDES BY GC:ECD
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX	5	SW846-8270	TCLP SEMIVOLATILE ORGANICS (LANDBAN)
	TCLP GC/MS SEPARATORY FUNNEL LIQUID-LIQU	5	SW846-8270	TCLP SEMIVOLATILE ORGANICS (LANDBAN)
	GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EX	5	SW846-8270	TCLP SEMIVOLATILE ORGANICS (TOXICITY CHA
	TCLP GC/MS SEPARATORY FUNNEL LIQUID-LIQU	5	SW846-8270	TCLP SEMIVOLATILE ORGANICS (TOXICITY CHA
SW846-3550	SONICATION EXTRACTION FOR ORGANICS	5	SW846-8080	MONOCHLORINATED BIPHENYLS (MCBS)
			SW846-8080	ORGANOCHLORINE PESTICIDES BY GC:ECD (19
			SW846-8080	ORGANOCHLORINE PESTICIDES BY GC:ECD (4 P
			SW846-8080	ORGANOCHLORINE PESTICIDES BY GC:ECD (7 P
	GC & GC/MS SONICATION EXTRACTION FOR ORG	5	SW846-8080	PCB/PESTICIDE SCAN GC:ECD
	SONICATION EXTRACTION FOR ORGANICS	5	SW846-8080	PCB/PESTICIDE SCAN GC:ECD
	PCB SONICATION EXTRACTION	5	SW846-8080	POLYCHLORINATED BIPHENYLS (PCBS)
	GC/MS SONICATION EXTRACTION FOR ORGANICS	5	SW846-8270	APPENDIX IX SEMIVOLATILE ORGANICS
			SW846-8270	IDEM SEMI-VOLATILE TARGET COMPOUND LIST
			SW846-8270	SEMI-VOLATILE ORGANICS (ACID FRACTION)
			SW846-8270	SEMI-VOLATILE ORGANICS (BASE/NEUTRAL FRA
	GC & GC/MS SONICATION EXTRACTION FOR ORG	5	SW846-8270	SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACI
	GC/MS SONICATION EXTRACTION FOR ORGANICS	5	SW846-8270	SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACI
SW846-3580	WASTE DILUTION FOR ORGANICS	4	SW846-8080	MONOCHLORINATED BIPHENYLS (MCBS)
			SW846-8080	ORGANOCHLORINE PESTICIDE(S) BY GC:ECD
			SW846-8080	PCB/PESTICIDE SCAN GC:ECD
	PCB OIL EXTRACTION	4	SW846-8080	POLYCHLORINATED BIPHENYLS (PCBS)
	GC/MS WASTE DILUTION FOR ORGANICS	4	SW846-8270	IDEM SEMI-VOLATILE TARGET COMPOUND LIST
			SW846-8270	SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACI
			SW846-8270	TCLP SEMIVOLATILE ORGANICS (LANDBAN)
			SW846-8270	TCLP SEMIVOLATILE ORGANICS (TOXICITY CHA

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PREP	scription	Matrix	T.	Method	Description
SW846-3580	WASTE DILUTION FOR ORGANICS		5	SW846-8080	MONOCHLORINATED BIPHENYLS (MCBS)
				SW846-8080	ORGANOCHLORINE PESTICIDE(S) BY GC:ECD
				SW846-8080	ORGANOCHLORINE PESTICIDES BY GC:ECD (19
				SW846-8080	ORGANOCHLORINE PESTICIDES BY GC:ECD (4 P
				SW846-8080	ORGANOCHLORINE PESTICIDES BY GC:ECD (7 P
				SW846-8080	PCB/PESTICIDE SCAN GC:ECD
	PCB OIL EXTRACTION		5	SW846-8080	POLYCHLORINATED BIPHENYLS (PCBS)
	TCLP GC WASTE DILUTION FOR ORGANICS		5	SW846-8080	TCLP ORGANOCHLORINE PESTICIDES BY GC:ECD
	GC/MS WASTE DILUTION FOR ORGANICS		5	SW846-8270	APPENDIX IX SEMIVOLATILE ORGANICS
				SW846-8270	IDEM SEMI-VOLATILE TARGET COMPOUND LIST
				SW846-8270	SEMI-VOLATILE ORGANICS (BASE/NEUTRAL/ACI
				SW846-8270	TCLP SEMIVOLATILE ORGANICS (LANDBAN)
	TCLP GC/MS WASTE DILUTION FOR ORGANICS		5	SW846-8270	TCLP SEMIVOLATILE ORGANICS (LANDBAN)
	GC/MS WASTE DILUTION FOR ORGANICS		5	SW846-8270	TCLP SEMIVOLATILE ORGANICS (TOXICITY CHA
	TCLP GC/MS WASTE DILUTION FOR ORGANICS		5	SW846-8270	TCLP SEMIVOLATILE ORGANICS (TOXICITY CHA
SW846-5030	PURGE AND TRAP METHOD FOR ORGANIC ANALYT		5	EPA 601	PURGEABLE HALOCARBONS BY GC/ELCD
				EPA 601/602 MOD	HALOGENATED AND AROMATIC VOLATILE ORGANI
				EPA 602	PURGEABLE AROMATICS BY GC/PID ELCD (BTEX
				SW846-8010	HALOGENATED VOLATILE ORGANICS BY GC:ELCD
				SW846-8020	PURGEABLE AROMATICS BY GC/PID
				SW846-8021	HALOGENATED AND AROMATIC VOLATILE ORGANI
SW846-7470	MERCURY CVAA ACID DIGESTION OF LEACHATE		1	SW846-7470	TCLP MERCURY CVAA (1 POINT MSA)
				SW846-7470	TCLP MERCURY CVAA (3 POINT MSA)
			5	SW846-7470	TCLP MERCURY CVAA (1 POINT MSA)
				SW846-7470	TCLP MERCURY CVAA (3 POINT MSA)
SW846-8150	DIAZOMETHANE HERBICIDE DERIVATIZATION		1	SW846-8150	CHLORINATED HERBICIDES (2,4-D AND SILVEX
				SW846-8150	CHLORINATED HERBICIDES (2,4 D, SILVEX AN
				SW846-8150	TCLP CHLORINATED HERBICIDES (2,4-D AND S
	TCLP DIAZOMETHANE HERBICIDE DERIVATIZATI		1	SW846-8150	TCLP CHLORINATED HERBICIDES (2,4-D AND S
	DIAZOMETHANE HERBICIDE DERIVATIZATION		2	SW846-8150	CHLORINATED HERBICIDES (2,4-D AND SILVEX
				SW846-8150	CHLORINATED HERBICIDES (2,4 D, SILVEX AN
			3	SW846-8150	CHLORINATED HERBICIDES (2,4-D AND SILVEX
				SW846-8150	CHLORINATED HERBICIDES (2,4 D, SILVEX AN
			5	SW846-8150	CHLORINATED HERBICIDES (2,4-D AND SILVEX
				SW846-8150	CHLORINATED HERBICIDES (2,4 D, SILVEX AN
				SW846-8150	TCLP CHLORINATED HERBICIDES (2,4-D AND S
	TCLP DIAZOMETHANE HERBICIDE DERIVATIZATI		5	SW846-8150	TCLP CHLORINATED HERBICIDES (2,4-D AND S

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PREP	PREP DESCRIPTION	MIX	METHOD	METHOD DESCRIPTION
SW846-9010	CYANIDE DISTILLATION	1	ILM01	CYANIDE, TOTAL (AUTOMATED) (CLP)
	CYANIDE AMENABLE DISTILLATION	1	SW846-9010	CYANIDE, AMENABLE
	CYANIDE DISTILLATION	1	SW846-9010	CYANIDE, TOTAL (MANUAL)
	CYANIDE AMENABLE DISTILLATION	1	SW846-9012	CYANIDE AMENABLE TO CHLORINATION (AUTOMA
	CYANIDE DISTILLATION	1	SW846-9012	CYANIDE LEACHATE (AUTOMATED)
			SW846-9012	CYANIDE, TOTAL (AUTOMATED)
		2	ILM01	CYANIDE, TOTAL (AUTOMATED) (CLP)
			SW846-9010	CYANIDE, TOTAL (MANUAL)
	CYANIDE AMENABLE DISTILLATION	2	SW846-9012	CYANIDE AMENABLE TO CHLORINATION (AUTOMA
	CYANIDE DISTILLATION	2	SW846-9012	CYANIDE, TOTAL (AUTOMATED)
		3	ILM01	CYANIDE, TOTAL (AUTOMATED) (CLP)
			SW846-9012	CYANIDE, TOTAL (AUTOMATED)
		4	ILM01	CYANIDE, TOTAL (AUTOMATED) (CLP)
	CYANIDE AMENABLE DISTILLATION	4	SW846-9010	CYANIDE, AMENABLE
	CYANIDE DISTILLATION	4	SW846-9010	CYANIDE, TOTAL (MANUAL)
	CYANIDE AMENABLE DISTILLATION	4	SW846-9012	CYANIDE AMENABLE TO CHLORINATION (AUTOMA
	CYANIDE DISTILLATION	4	SW846-9012	CYANIDE, TOTAL (AUTOMATED)
		5	ILM01	CYANIDE, TOTAL (AUTOMATED) (CLP)
	CYANIDE AMENABLE DISTILLATION	5	SW846-9010	CYANIDE, AMENABLE
	CYANIDE DISTILLATION	5	SW846-9010	CYANIDE, LEACHATE (MANUAL)
			SW846-9010	CYANIDE, TOTAL (MANUAL)
	CYANIDE AMENABLE DISTILLATION	5	SW846-9012	CYANIDE AMENABLE TO CHLORINATION (AUTOMA
	CYANIDE DISTILLATION	5	SW846-9012	CYANIDE LEACHATE (AUTOMATED)
			SW846-9012	CYANIDE, TOTAL (AUTOMATED)
SW846-9065	PHENOLS DISTILLATION	1	SW846-9066	PHENOLS 4AAP (AUTOMATED)
		2	SW846-9066	PHENOLS 4AAP (AUTOMATED)
		3	SW846-9066	PHENOLS 4AAP (AUTOMATED)
		4	SW846-9066	PHENOLS 4AAP (AUTOMATED)
		5	SW846-9066	PHENOLS 4AAP (AUTOMATED)

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PREP	scription	Matrix	Fe	Method	Description
SW846-9065	PHENOLS DISTILLATION	5		SW846-9066	PHENOLS 4AAP (LEACHATE)

MATRIX 1 - NON-SPECIFIC WATER

MATRIX 2 - GROUND WATER

MATRIX 3 - DRINKING WATER

MATRIX 4 - OIL

MATRIX 5 - SOIL/SEDIMENT/SLUDGES, OTHER

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SECTION 6.0

6.0 Sampling Procedures

6.1 Introduction

During normal operations, no sampling will be performed by EMS Heritage. The sampling procedures for specific projects will be addressed on a case by case basis by the project manager.

In the event that sampling is to be performed, procedures in the EPA Region IV SOP and QA Manual, dated April 1, 1986 will be used and referenced.

6.2 Sample Containers

EMS Heritage does provide sample containers and preservatives to clients. All sample containers will be for one-time use only, therefore no sample bottle cleaning will be performed at EMS Heritage. Sample containers are prepared as "kits" which make up all the containers needed for a sample with multiple tests to be performed, including additional containers required for QC sample analysis. Clients requiring coolers are shipped kits in a styrofoam cooler packed inside of a cardboard box. Those clients using their own coolers for delivery are shipped containers in a cardboard box. All shipments are sealed such that any tampering or attempt to open the shipping container is evident. There are basically two general types of container categories: 1) new pre-cleaned and 2) new, as-is from the manufacturer.

6.2.1 Pre-Cleaned Containers

The pre-cleaned containers will be used when the client's Data Quality Objectives (DQO's) demand them or when the client or QA Unit requests pre-cleaned containers. These pre-cleaned containers will primarily be used for clients performing superfund type investigations (EPA, CLP methodology) or any other sensitive sampling event. The cleaning procedures used are broken down into protocols for different test requirements (see Table 6.1, Sample Container Preparation Protocols). These pre-cleaned containers may be purchased either with or without a certificate of analysis (QA analyzed) pertaining to the container lot from the vendor. If QA analyzed containers are not available from the vendor, EMS Heritage will perform the analysis from randomly selected containers of the lot shipped when the client or QA Unit requires containers that have been QA analyzed. The use

-Protocol A-

●Amber Glass Bottles ●Clear Glass Bottles ●Wide Mouth Amber Glass Jars
●Wide Mouth Clear Glass Jars

Cleaning Protocol A Specifications:

1. Wash containers, closures and teflon liners in hot tap water with laboratory grade non-phosphate detergent.
2. Rinse three times with tap water.
3. Rinse with 1:1 nitric acid.
4. Rinse three times with deionized water.
5. Rinse with pesticide grade methylene chloride.
6. Oven dry at 125°C. Allow to cool.
7. Remove containers, closures, and teflon liners from oven.
8. Place teflon liners in closures and place closures on container. Attendant to wear gloves and containers are not to be removed from preparation room until sealed.

Sample Containers Prepared According to Protocol A Are For Use In The Analysis Of:

Acidity/Alkalinity
Sulfate
Color
Phenols
Phosphate
Hardness
Chloride
Oil & Grease
pH
Turbidity
Settleable Residue/Suspended Solids
BOD (Biological Oxygen Demand)
COD (Chemical Oxygen Demand)
Sulfite
TOC (Total Organic Carbon)
Extractable Organics
Mercury
Metals
Sulfide
Conductivity
Cyanide

-Protocol B-

●40 ml Borosilicate Clear and Amber Glass Vials ●10 ml Polyethylene Vials
●40 ml and 20 ml Flint Glass Vials ●8 oz. and 4 oz. Septum Bottles
●Wide Mouth Clear Glass Jars*
and High Density Polyethylene Bottles (allow extra time for delivery)
*Wide Mouth Clear Glass Jars prepared according to Protocol B are supplied with Teflon-lines polypropylene closures attached

Cleaning Protocol B Specifications:

1. Wash containers, septa, and closures in hot water with laboratory grade non-phosphate detergent.
2. Rinse three times with tap water.
3. Rinse three times with deionized water.
4. Oven dry containers, septa and closures at 125°C.
5. Remove containers, septa, and closures, at 125°C.
6. Place liners in closures, teflon side down, and place on containers. Attendant to wear gloves and containers are not to be removed from preparation room until sealed.

Sample Containers Prepared According to Protocol B Are For Use In The Analysis Of:

COD (Chemical Oxygen Demand) Purgeable (Volatile) Organics
Trihalomethanes Nitrate-Nitrite TOC (Total Organic Carbon)

Note: Protocol B cleaning is performed in an environmentally controlled facility, free of volatile organic vapors.

-Protocol C-

●High Density Polyethylene Bottles and jars ●Polyethylene Cubitainers
●High Density Polyethylene Wide Mouth Jars
●High Density Polyethylene Products

Cleaning Protocol C Specifications:

1. Wash containers, closures, and teflon liners in hot tap water with laboratory grade non-phosphate detergent.
2. Rinse three times with tap water.
3. Rinse with 1:1 nitric acid.
4. Rinse three times with deionized water.
5. Air dry in contaminant-free-environment.
6. Place liners in closures and place closures on containers. Attendant to wear gloves and containers are not to be removed from preparation room until sealed.

Sample Containers Prepared According to Protocol C Are For Use In The Analysis Of:

All analysis noted for Protocol A except:
Phenols; Oils & Grease; TOC (Total Organic Carbon)

of QA analyzed containers may not be required in cases where the client will submit field blanks.

Containers that have been pre-cleaned or pre-cleaned and QA analyzed will be shipped to EMS Heritage with a custody seal. The certificate of analysis (when purchased) will be shipped inside the shipping container (box) and will remain there until the box is opened (custody seal is broken). Some client needs will not necessitate that the shipping container be opened in all instances. If this is the case, the certificate of analysis for bottle cleanliness must be retained by the client receiving the containers. In instances where preservatives must be added prior to transfer to the client and/or the original custody seal is broken on the container box, the certificate of analysis will be removed and filed for future reference. The containers will be re-sealed to establish a proper chain of custody.

All sample containers will be stored in their original packing containers. When packages of un-capped sample containers or closures are opened, they will be stored in plastic bags and sealed to prevent contamination during storage. Only EMS Heritage employees will have unsupervised access to the storage area. All other persons must be accompanied by an EMS Heritage employee while in the container storage area.

6.2.2 New, As-Is Containers

Each month EMS Heritage will use as-is sample containers to prepare blind performance evaluation samples. Any significant contamination will show up in these monthly reports, which is a check on container cleanliness. Any target analytes present at equal to or greater than the laboratory reporting detection limits will require that corrective actions be taken, including but not limited to, obtaining an alternate source of containers.

New containers used directly from the manufacturer without precleaning will have reagent water blanks analyzed for the tests which are conducted in that container type not covered in the monthly blind P.E. samples. The frequency of these analyses will be once per lot of the container type received or once per month when lot numbers are not available. These container blanks containing reagent water and preservative will be analyzed using the most sensitive techniques

routinely performed from those containers. The blank samples will be entered into the LIMS system for analysis and reporting. The QA Unit will review this final report and retain the report for cleanliness of container documentation.

6.3 Preservation

A basic requirement for preservation of samples for many types of analyses includes sample shipping and storage at 4°C immediately after collection. Wet ice is the only acceptable means of reducing temperature for all environmental samples with the exception of any biological tissue samples (i.e. fish). Biological tissue samples may be shipped with dry ice.

Chemical preservatives are to be added on-site at the time of sample collection. As a convenience to our clients and an assurance that chemical preservation is not omitted, EMS Heritage supplies containers which already contain the required preservative in the proper amount and concentration. All preservatives consist of reagent grade chemicals. Lot numbers of all chemical used are tracked so that any questions relating to the reagent (preservatives) used are traceable to the lot of reagent used for preservation.

The chemical preservatives used for preserving samples are listed in Table 6.2, Aqueous Sample Preservatives.

Table 6.3, Sample Requirements, includes all of the parameters listed in Table 5.1 (QA Targets for Precision, Accuracy and Method Detection Limits) and specifies:

- Container type
- Required sample amounts for analysis
- Preservation requirements
- Holding times
- Methods

Table 6.2
Aqueous Sample Preservatives

Reagent	Concentration	Pre-Preserved[1] Container Amount	Required pH	Test Categories
Hydrochloric Acid	Concentrated	0.1 mL/40mL	<2	Volatile Organics
Hydrochloric Acid	0.1M	See Footnote [2]	4 to 5	Acrolein, Acrylonitrile
Hydrochloric Acid	1:1	5mL/L	<2	Oil & Grease, TPH
Phosphoric Acid	Concentrated	4mL/L	<4	Phenols
Nitric Acid	Concentrated	5mL/Liter	<2	Metals, Alpha, Beta, Radium
Sulfuric acid	Concentrated	1mL/Liter	<2	Phenols, T-Phosphorus, Ammonia, COD, TKN, Nitrate-Nitrite, Oil & Grease, TOC
Sodium Hydroxide	Pellets	2 pellets/Liter	>9	Sulfide
Sodium Hydroxide	Pellets	2 pellets/Liter	>12	Cyanide
Zinc Acetate	Solid	0.1g/Liter	NA	Sulfide
Sodium Thiosulfate	Solid	80mg/Liter	NA	Coliforms, Organics
Ascorbic Acid	Solid	25mg/40mL	NA	SDWA Volatile Organics, Cyanide
Mercuric Chloride[3]	10mg/mL	1mL/Liter	NA	SDWA Herbicides, SDWA N&P Containing Pesticides
Monochloroacetic Acid Buffer	See Footnote [4]	1.2 mL/40mL	3	Carbamates

1 Preservative added per sample amount
2 To be adjusted in the field
3 Alternative preservative preferred (HCl)
4 156 mL of 2.5M Monochloroacetic acid and 100mL of 2.5M potassium acetate

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
General Chemistry								
Acidity	Titrimetric	EPA 305.1	P,G	Cool, 4°C	200mL	50g	14 days	
Alkalinity	Titrimetric	EPA 310.1	P,G	Cool, 4°C	200mL	50g	14 days	
Alkalinity	Titrimetric	EPA 310.2	P,G	Cool, 4°C	200mL	50g	14 days	
Ammonia Nitrogen		EPA 350.1	P,G	Cool, 4°C H_2SO_4 to pH <2	500mL	100g	28 days	28 days
Ammonia Nitrogen		EPA 350.2	P,G	Cool, 4°C H_2SO_4 to pH <2	500mL	100g	28 days	28 days
Ammonia Nitrogen	Potentiometric	EPA 350.3	P,G	Cool, 4°C H_2SO_4 to pH <2	1L	5g	28 days	28 days
Asbestos		NIOSH 239					NA	NA
Biochemical Oxygen Demand	Potentiometric	EPA 405.1	P,G	Cool, 4°C	1L	NA	48 hours	NA
Boron	Colorimetric	EPA 212.3	P	Cool, 4°C H_2SO_4 to pH <2	200mL	NA	28 days	NA
Bromide	Colorimetric	SM405	P,G	None	50mL	NA	28 days	NA
Bromide	Titrimetric	EPA320.1	P,G	None	50mL	NA	28 days	NA
Chemical Oxygen Demand	Open Reflux	SM508A	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	100g	28 days	28 days
Chemical Oxygen Demand	Mid-Level Titrimetric	EPA410.1	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	100g	28 days	28 days
Chemical Oxygen Demand	Low Level	EPA410.2	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	100g	28 days	28 days
Chemical Oxygen Demand	Block Digester, Colorimetric	EPA 410.4	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	100g	28 days	28 days
Chloride	Colorimetric, Automated	EPA 325.1	P,G	None	100mL	5g	28 days	28 days

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Chloride	Colorimetric, Automated	EPA 325.2	P,G	None	500mL	5g	28 days	28 days
Chloride	Titrimetric, Mercuric Nitrate	EPA 325.3	P,G	None	500mL	5g	28 days	28 days
Chloride	Ion Selective Electrode	14th Ed SM 320A	P,G	None	500mL	5g	28 days	28 days
Chloride		SM 407A	P,G	None	500mL	5g	28 days	28 days
Chlorine Demand	Starch-Iodine Titration	SAS	P,G	None	1L	NA	28 days	NA
Chlorine, Total		ASTM D-808	P,G	None			NA	
Coliform Bacteria, Fecal	Microbiological	SM 909C	P,G	0.008% $Na_2S_2O_3$[5] Cool, 4°C	100mL	NA	6 hours	NA
Coliform Bacteria, Total	Microbiological	SM 909A	P,G-Sterile	0.008% $Na_2S_2O_3$[5] Cool, 4°C	100mL	NA	6 hours	NA
Color Determination	HACH	EPA 110.3	P,G	Cool, 4°C	100mL	NA	48 hours	NA
Cyanide, Amenable		EPA 335.1	P,G	Cool, 4°C NaOH to pH > 10	1L	100g	14 days[6]	14 days
Cyanide, Amenable	Colorimetric, Automated	EPA 335.2	P,G	Cool, 4°C NaOH to pH > 10	1L	100g	14 days[6]	14 days
Cyanide, Total	Manual	EPA 335.2	P,G	Cool, 4°C NaOH to pH > 10	500mL	100g	14 days[6]	14 days
Cyanide, Total	Automated	EPA 335.3	P,G	Cool, 4°C NaOH to pH > 10	500mL	100g	14 days[6]	14 days
Cyanide, Amenable	Manual	SW846-9010	P,G	Cool, 4°C NaOH to pH > 10	1L	100g	14 days[6]	14 days
Cyanide, Amenable	Automated	SW 846-9012	P,G	Cool, 4°C NaOH to pH > 10	1L	100g	14 days[6]	14 days
Cyanide, Total	Manual	SW 846-9010	P,G	Cool, 4°C NaOH to pH > 10	500mL	100g	14 days[6]	14 days

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Cyanide, Total	Automated	SW 846-9012	P,G	Cool, 4°C NaOH to pH > 10	500mL	100g	14 days[5]	14 days
Cyanide, Total Available		SW 7.3.3.2	P,G	Cool, 4°C NaOH to pH > 10	1L	100g	14 days[5]	14 days
Dissolved Oxygen	Membrane Electrode	EPA 360.1	P,G	None	300mL	NA	Analyze Immediately	NA
Dissolved Oxygen	Winkler	EPA 360.2	P,G	Fix on site and store in dark	300mL	NA	8 hours	NA
Dissolved Solids, Total	Gravimetric	EPA 160.1	P,G	Cool, 4°C	500mL	NA	7 days	NA
Fluoride	Ion Selective Electrode	EPA 340.2	P,G	Cool, 4°C	500mL	50g	28 days	28 days
Fluoride		EPA 340.1	P,G	Cool, 4°C	500mL	50g	28 days	28 days
Formaldehyde		AOAC 20.047	G	Cool, 4°C	100mL	50g	28 days	28 days
Gross Alpha		EPA 900.0	P	HNO_3 to pH < 2	1 gallon	NA	6 months	NA
Gross Beta		EPA 900.0	P	HNO_3 to pH < 2	1 gallon	NA	6 months	NA
Hardness	Calculation	SM 314A	P,G	HNO_3 to pH < 2	200mL	NA	6 months	NA
Hardness	EDTA, Titrametric	EPA 130.2	P,G	HNO_3 to pH < 2	100mL	NA	6 months	NA
Hexavalent Chromium	Colorimetric	SM 312B	P,G	None	300mL	100g	24 hours	7 days
Hexavalent Chromium	Colorimetric, Manual	SW 846-7196	P,G	None	300mL	100g	24 hours	7 days
Iodine	Leuco Crystal Violet	16th Ed SM 415A	P,G	Cool 4°C	500mL	100g	Analyze Immediately	
Kjeldahl Nitrogen, Total	Automated	EPA 351.2	P,G	Cool, 4°C H_2SO_4 to pH <2	500mL	10g	28 days	28 days
Kjeldahl Nitrogen, Total	Potentiometric	EPA 351.3	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	50g	28 days	28 days
Nitrogen, Total Organic	Calculation	EPA 351.3	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	50g	28 days	28 days

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Nitrogen, Total Organic	Calculation	EPA 351.4	P,G	Cool, 4°C H_2SO_4 to pH <2	500mL	100g	28 days	28 days
Nitrogen, Nitrate	Colorimetric, Brucine	EPA 352.1	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	50g	48 hours	
Nitrogen, Nitrate	Colorimetric, Automated - Cd Red.	EPA 353.2	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	50g	48 hours	
Nitrogen, Nitrite	Colorimetric, Automated	EPA 353.2	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	50g	48 hours	
Nitrogen, Nitrate	Colorimetric, Automated-Hydrazine	EPA 353.1	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	50g	48 hours	
Nitrogen, Nitrate-Nitrite	Colorimetric, Automated-Hydrazine	EPA 353.1	P,G	Cool, 4°C H_2SO_4 to pH <2	100mL	50g	28 days	
Nitrogen, Nitrite	Spectrophotometric	EPA 354.1	P,G	Cool, 4°C	100mL	50g	48 hours	
Nuisance Dust	Analytical Micro-Balance	NIOSH 500	Air Filter	NA	NA	NA	NA	NA
Oil & Grease	Gravimetric, Sep. Funnel	EPA 413.1	G	Cool, 4°C H_2SO_4 to pH <2	2x1L	NA	28 days	NA
Oil & Grease	Soxhlet, Gravimetric	SW 846-9071	G	NA	NA	50g	NA	28 days
Paint Filter Test	Paint Filter	SW 846-9095	G	NA	NA	500g	NA	NA
Percent Solids	Gravimetric	SM 209A	P,G	Cool, 4°C	250mL	50g	7 days	7 days
Percent Solids		ASTM D-2042						
Percent Solids	Centrifuge	ASTM D-96						
pH	Electrode	EPA 150.1	P,G	Cool, 4°C	50mL	NA	Analyze Immediately	NA
pH	Electrode	SW 846-9040	P,G	Cool, 4°C	50mL	NA	Analyze Immediately	NA
pH	Paper	SW 846-9041	P,G	Cool, 4°C	50mL	NA	Analyze Immediately	NA

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
pH	Solids	SW 846-9045	P,G	Cool, 4°C	NA	50g	Analyze Immediately	Analyze Immediately
Phenols	Manual, 4AAP	EPA 420.1	G	Cool, 4°C H_3PO_4	500mL	100g	28 days	28 days
Phenols	Automated, 4AAP	EPA 420.2	G	Cool, 4°C H_3PO_4	500mL	50g	28 days	28 days
Phenols	Manual, 4AAP	SW 846-9065	G	Cool, 4°C H_3PO_4	500mL	50g	28 days	28 days
Phenols	Manual Distillation w/Automated, 4AAP	SW 846-9066	G	Cool, 4°C H_3PO_4	500mL	50g	28 days	28 days
Phenols	Spectrophotometric MBTH w/Distillation	SW846-9067	G	Cool, 4°C			28 days	28 days
Phosphorus, Ortho	Automated	EPA 365.1	P,G	Cool, 4°C	500mL	50g	48 hours	
Phosphorus, Ortho	Colorimetric, Manual	EPA 365.2	P,G	Cool, 4°C	500mL	50g	48 hours	
Phosphorus, Total	Colorimetric, Manual	EPA 365.4	P,G	Cool, 4°C H_2SO_4 to pH <2	500mL	50g	28 days	28 days
Radium		EPA 903.0	P,G	HNO_3 to pH <2	1 Gallon	NA	6 months	NA
Radium 226		EPA 903.1	P,G	HNO_3 to pH <2	1 Gallon	NA	6 months	NA
Residual Chlorine		EPA 330.5	P,G	None	100mL	25g	6 hours	
Saturation Index (Calculated from pH, Alkalinity, TDS, Calcium, Temperature)	Langlier	SM203	P,G	Cool, 4°C	1000mL	NA	NA	NA
Settleable Matter	Imhoff Cone	EPA 160.5	P,G	Cool, 4°C	1000mL	NA	48 hours	NA
Silica, Total		EPA 370.1	P	Cool, 4°C	200mL	NA	28 days	NA
Specific Conductance	Conductivity Bridge	EPA 120.1	P,G	Cool, 4°C	100mL	NA	28 days	NA
Specific Conductance	Conductivity Bridge	SW 846-9050	P,G	Cool, 4°C	100mL	NA	28 days	NA
Sulfate	Turbidimetric	EPA 375.4	P,G	Cool, 4°C	100mL	25g	28 days	
Sulfate	Turbidimetric	SW 846-9038	P,G	Cool, 4°C	100mL	25g	28 days	

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Sulfide	Colorimetric, Methylene Blue	EPA 376.2	P,G	Cool, 4°C $NaOH + ZnC_4H_6O_4$ to pH >9	1L	100g	7 days	7 days
Sulfide	Titrimetric, Iodine	EPA 376.1	P,G	Cool, 4°C $NaOH + ZnC_4H_6O_4$ to pH >9	1L	100g	7 days	7 days
Sulfide	Titrimetric, Iodine	SW 846-9030	P,G	Cool, 4°C $NaOH + ZnC_4H_6O_4$ to pH >9	1L	100g	7 days	7 days
Sulfite	Titrimetric	EPA 377.1	P,G	None	500mL	NA	Analyze Immediately	NA
Sulfur	Bomb	ASTM D-129	P,G	NA	NA	Oil:2g	NA	NA
Surfactants	MBAS	EPA 425.1	P,G	Cool, 4°C	500mL	NA	48 hours	NA
Temperature		EPA 170.1	P,G	None	100mL	–	Analyze Immediately	–
Thiocyanate		SM 412L	P,G	Cool, 4°C See Method	500mL	100g		
Sulfide, Total Available Extraction	Manual	SW 7.3.4.1	P,G	Cool, 4°C $NaOH + ZnC_4H_6O_4$ to pH >9	200mL	50g	7 days	7 days
Total Halogen		ASTM D-808	P,G	None	NA	10g	NA	
Total Organic Carbon	Combustion-IR	EPA 415.1	P,G	Cool, 4°C HCl or H_2SO_4 to pH <2	250mL		28 days	28 days
Total Organic Carbon	Combustion-IR	SW 846-9060	P,G	Cool, 4°C HCl or H_2SO_4 to pH <2	250mL		28 days	28 days
Total Organic Halides	Micro-Coulometric	SW 846-9020	GW/Teflon Liner[4]	Cool, 4°C	500mL	10g	7 days	7 days
Total Recoverable Oil & Grease	Gravimetric	EPA 160.3	G	Cool, 4°C HCl to pH <2	1L	50g	28 days	28 days

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Total Solids	Gravimetric	EPA 160.3	P,G	Cool, 4°C	250mL	50g	7 days	7 days
Total Suspended Solids	Gravimetric	EPA 160.2	P,G	Cool, 4°C	500mL	NA	7 days	NA
Total Volatile Solids	550C Oven	EPA 160.4	P,G	Cool, 4°C	250mL	10g	7 days	7 days
Total Volatile Solids	Weight Percent	ASTM 2369	P,G	Cool, 4°C	250mL	10g	7 days	7 days
Turbidity	Nephelometric	EPA 180.1	P,G	Cool, 4°C	100mL	NA	48 hours	NA
Volatile Acids	Distillation	SM 504B	G	Cool, 4°C	1L	NA		NA
Volatile Suspended Solids	550C Oven	EPA 160.4	P,G	Cool, 4°C	250mL	NA	7 days	NA
Miscellaneous Physical Tests								
API (Specific Gravity)	Hydrometer	ASTM D-287	P,G	NA	NA	Oil*: 100mL	NA	NA
Boiling Point	Distillation	ASTM D-86	P,G	NA	NA	Oil*: 200mL	NA	NA
Cation Exchange Capacity		AOAC 57-3	P,G	Cool, 4°C	NA	100g	NA	14 days
Coating Density		ASTM 1475	P	NA	NA	NA	NA	NA
Density at 60F		ASTM D-70	P,G					
Flash Point	Pensky-Martens	ASTM D-93	G	None	120mL	NA		NA
Ignitability Potential	Solids Assessment	ASTM D-49823	P,G	NA	NA	200g	NA	
Flash Point		SW 846-1010	G	None	120mL	NA		NA
Mineral Oil Flash Point	Cleveland Open Cup	ASTM D-92	P,G	NA	NA	200g	NA	
Flash Point	Cleveland Open Cup	ASTM D-92	P,G	NA	NA	200g	NA	
Percent Bottom Sediment & Water	Centrifuge	ASTM D-96	P,G	Cool, 4°C	NA	Oil*: 200mL	NA	

*Oil matrix includes solvents, fuels and other petroleum products.

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Percent Oil	Solubility	ASTM D-2042	P,G	NA	NA	Oil*: 200mL	NA	
Percent Oil	Centrifuge	ASTM D-96	P,G	NA	NA	Oil*: 200mL	NA	
Percent Water	Xylene Trap	ASTM D-95						
Percent Water	Karl Fischer Titration	ASTM 1744	P,G Airtight	None	100mL	Oil*: 100mL	NA	NA
Pounds per Cubic Foot		ASTM D-698						
Pour Point		ASTM D-97	P,G	NA	NA	Oil*: 100mL	NA	NA
Reid Vapor Pressure	Reid	ASTM D-323	Airtight	NA	NA	Oil*: 1L	NA	NA
Residue, Percent Ash		ASTM D-482	P,G	NA	NA	Oil*: 100g	NA	NA
Viscosity	Saybolt Furol	ASTM D-244	P,G	NA	NA	Oil*: 200mL	NA	
Viscosity	Saybolt Universal	ASTM D-445	P,G	NA	NA	Oil*: 200mL	NA	
Specific Gravity		ASTM D-244	P,G	NA	100g	100g	NA	NA
Specific Gravity	(Solids)	SM 213E	P,G	NA	100g	100g	NA	NA
Heat of Combustion	BTU/LB	ASTM D-240	P,G	NA	50mL	20g	NA	NA
Weight Per Gallon		ASTM D-244	P,G	NA	100g	100g	NA	NA
Metals:[9]								
Metals: Listed Below	ICP	EPA 200.7	P,G	HNO_3 to pH <2	500mL	100g	180 days	180 days
Al, As, Sb, Ba, Be, Bi, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Mo, Ni, K, Si, Se, Ag, Na, Sr, Tl, Sn, Ti, V, Zn, Y (31)								
Metals: Listed Below	ICP	SW 846-6010	P,G	HNO_3 to pH <2	500mL	100g	180 days	180 days
Al, As, Sb, Ba, Be, Bi, B, Cd, Ca, Cr, Co, Cu, Fe, Pb, Li, Mg, Mn, Mo, Ni, K, Si, Se, Ag, Na, Sr, Tl, Sn, Ti, V, Zn, Y (31)								
Metals: Listed Below	FAA	EPA 200 Series	P,G	HNO_3 to pH <2	500mL	100g	180 days	180 days

*Oil matrix includes solvents, fuels and other petroleum products.

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Al, Sb, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Ag, Na, Tl, Sn, Ti, V, Zn (23)								
Metals: Listed Below	FAA	SW 846-7000 Series	P,G	HNO_3 to pH <2	500mL	100g	180 days	180 days
Al, Sb, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Ag, Na, Sr, Tl, Sn, V, Zn (23)								
Metals: Listed Below	GFAA	EPA 200 Series	P,G	HNO_3 to pH <2	500mL	100g	180 days	180 days
Al, Sb, As, Ba, Be, Cd, Cr, Co, Cu, Pb, Mo, Ni, Se, Ag, V, Tl, Sn, Ti, Zn (19)								
Metals: Listed Below	GFAA	SW 846-7000 Series	P,G	HNO_3 to pH <2	500mL	100g	180 days	180 days
Al, As, Be, Cd, Cr, Co, Pb, Mo, Se, Ag, Tl, V (12)								
Metals: Listed Below	ICP (200.7 CLP-M)	CLP SOW 7/88	P,G	Cool, 4°C HNO_3 to pH <2	500mL	100g	180 days	180 days
Al, Sb, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Mg, Mn, Ni, K, Ag, Na, Zn, V								
Metals: Listed Below	ICP (200.7 CLP-M)	CLP SOW ILM01.0	P,G	Cool, 4°C HNO_3 to pH <2	500mL	100g	180 days	180 days
Al, Sb, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Mg, Mn, Ni, K, Ag, Na, Zn, V								
Metals: Listed Below	GFAA (CLP-M)	CLP SOW 7/88	P,G	Cool, 4°C HNO_3 to pH<2	500mL	100 g	180 days	180 days
As (206.2 CLP-M), Se (270.2 CLP-M), Pb (239.2 CLP-M), Tl (279.2 CLP-M)								
Metals: Listed Below	GFAA (CLP-M)	CLP SOW ILM01.1	P,G	Cool, 4°C HNO_3 to pH <2	500mL	100g	180 days	180 days
As (206.2 CLP-M), Se (270.2 CLP-M), Pb (239.2 CLP-M), Tl (279.2 CLP-M)								
Mercury	Manual CVAA (245.1 CLP-M)	CLP SOW 7/88	P,G	Cool, 4°C	500mL	100g	26 days	NA
Mercury	Manual CVAA (245.1 CLP-M)	CLP SOW ILM01.0	P,G	Cool, 4°C	500mL	10g	26 days	NA
Mercury	Manual CVAA (245.5 CLP-M)	CLP SOW 7/88	P,G	Soil/Sediment Cool, 4°C	NA	10g	NA	26 days

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Mercury	Manual CVAA (245.5 CLP-M)	CLP SOW ILM01.0	P,G	Soil/Sediment Cool, 4°C	NA	10g	NA	26 days
Mercury	CVAA - Manual	EPA 245.1	P,G	HNO_3 to pH <2	500mL	NA	13 days[7]	NA
Mercury	CVAA - Manual	SW 846-7470	P,G	HNO_3 to pH <2	500mL	NA	13 days[7]	NA
Mercury	CVAA - Manual, S/S/S	SW 846-7471	P,G	None	NA	10g	28 days	28 days
Organic Tests[16,11]								
2,3,7,8 TCDD[14]	GC/MS	EPA 613	G	Cool, 4°C	2L	NA	7 days to extract, 40 days to analysis	NA
2,3,7,8 TCDD[14]	GC/MS/MS	CLP SOW 8/88	G	Cool, 4°C	2L	100g	NA	NA
Organochlorine Pesticides/PCBs	GC/ECD	CLP SOW 2/88	G	Cool, 4°C	2L	100g	Extraction 5 days from VTSR**, 40 days to analysis	Extraction 10 days from VTSR**, 40 days to analysis
Organochlorine Pesticides/PCBs	GC/ECD	CLP SOW OLM01.5	G	Cool, 4°C	2L	100g		
Semi-Volatile Organics	GC/MS	CLP SOW 2/88	G	Cool, 4°C	2L	100g		
Semi-Volatile Organics	GC/MS	CLP SOW OLM01.5	G	Cool, 4°C	2L	100g		
Volatile Organics	GC/MS	CLP SOW 2/88	G - Zero Headspace	HCl to pH 2	2x40mL	40g	10 days from VTSR	10 days from VTSR
Volatile Organics	GC/MS	CLP SOW OLM01.2	G - Zero Headspace	HCl to pH2	2x40mL	40g		
Purgeable Halocarbons	GC/ELCD	EPA 601	G - Zero Headspace	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	2x40mL	40g	14 days	14 days
Halogenated and Aromatic Volatile Organics	GC/PID/ELCD	EPA 601/602 Modified	G - Zero Headspace	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	2x40mL	40g	14 days	14 days
Purgeable Aromatics	GC/PID	EPA 602	G - Zero Headspace	Cool, 4°C, 0.008% $Na_2S_2O_3$[5] HCl to pH2[12]	2x40mL	40 g	14 days	14 days

**VTSR-Validated Time of Sample Receipt, EPA contracts only.

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Nitrosamines[11, 17]	GC/NPD	EPA 607	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[3]		NA	7 days to extraction, 40 days to analysis	NA
Organochlorine Pesticides/ PCBs[14]	GC/ECD	EPA 608	G	Cool, 4°C, pH 5-9[18]	2L	100g	7 days to extraction, 40 days to analysis	7 days to extraction, 40 days to analysis
Volatile Priority Pollutants	GC/MS	EPA 624	G - Zero Headspace	Cool, 4°C, HCl to pH2, 0.008% $Na_2S_2O_3$[5,12]	2x40mL	40g	14 days	14 days
Semi-Volatile Priority Pollutants (BNA)[14]	GC/MS	EPA 625	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	2L	100g	7 days to extraction, 40 days to analysis[16]	7 days to extraction, 40 days to analysis[16]
Hydrocarbon Scan	GC/FID	SW 846-8000	G	Cool, 4°C	2x40mL	100g	14 days	14 days
RCRA Listed Solvents	GC/FID	SW 846-8000	G	Cool, 4°C	2x40mL	40g	14 days	14 days
Halogenated Volatile Organics	GC/ELCD	SW 846-8010	G	Cool, 4°C, 0.008% $Na_2S_2O_3$	2x40mL	40g	14 days	14 days
Alcohols	GC/FID	SW 846-8015	G	Cool, 4°C	2x40mL	40g	14 days	14 days
Petroleum Fuels	GC/FID	SW 846-8015 Modified	G	Cool, 4°C	2x40mL	100g	14 days	14 days
Total Petroleum Hydrocarbons	FTIR	EPA 418.1	G	Cool, 4°C HCl to pH 2	2L	NA	28 days	NA
Total Petroleum Hydrocarbons	FTIR	SM 503E	G	Cool, 4°C	NA	100g	NA	28 days
Purgeable Aromatics	GC/PID	SW 846-8020	G	Cool, 4°C, 0.008% $Na_2S_2O_3$ HCl to pH2[5,12]	2x40mL	40g	14 days	14 days
Halogenated and Aromatic Volatile Organics	GC/PID/ ELCD	SW 846-8021	G	Cool, 4°C HCl to pH2, 0.008% $Na_2S_2O_3$[5,12]	2x40mL	40g		
Acrolein, Acrylonitrile, Acetonitrile	GC/FID	SW 846-8030	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5] Adjust pH to 4-5[13]	2x40mL	40g		

Table 6.3
SAMPLE REQUIREMENTS

	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Organochlorine Pesticides & PCBs[14]	GC/ECD	SW 846-8080	G	Cool, 4°C pH 5-9[18]	2L	100g	7 days to extract, 40 days to analysis	14 days to extract, 40 days to analysis
PCBs[14]	GC/ECD	SW 846-8080	G	Cool, 4°C	2L	100g		
Polynuclear Aromatic Hydrocarbons[14]	GC/FID	SW 846-8100	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	2L	100g		
Chlorinated Hydrocarbons	GC/ELCD	SW 846-8120	G	Cool, 4°C	2x40mL	40g	14 days	14 days
Organophosphorus Pesticides[14]	GC/NPD	SW 846-8141	G	Cool, 4°C, pH 5-9[18]	2L	100g	7 days to extract, 40 days to analysis	14 days to extract 40 days to analysis
Chlorinated Herbicides	GC/ECD	SW 846-8150	G	Cool, 4°C	1L	100g		
Volatile Organics	GC/MS	SW 846-8240	G	Cool, 4°C, HCl to pH 2[12]	2x40mL	40g	14 days	14 days
Volatile Organics	GC/MS	SW 846-8260	G	Cool, 4°C, HCl to pH 2[12]	2x40mL	40g		
Appendix IX Volatile Organics	GC/MS	SW 846-8240	G	Cool, 4°C, HCl to pH 2[12]	2x40mL	40g		
Semi-Volatile Organics[14]	GC/MS	SW 846-8270	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	2L	100g	7 days to extract, 40 days to analysis	14 days to extract 40 days to analysis
Appendix IX Semi-Volatile Organics[14]	GC/MS	SW 846-8270	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	2L	100g		
Polychlorinated Dibenzo-P-Dioxins and Dibenzofurans[14]	GC/MS	SW 846-8280	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	2L	100g		
Polynuclear Aromatic Hydrocarbons	HPLC	SW 846-8310	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5]	2L	100g		
Volatile Organic Compounds in Drinking Water	GC/PID/ELCD	EPA 502.2	G	Cool, 4°C, 0.008% $Na_2S_2O_3$, HCl to pH 2[5]	3x40mL	NA	14 days	NA
SDWA EDB & DBCP	Micro-Extraction, GC/ECD	EPA 504	G	Cool, 4°C[5]	3x40mL	NA	7 days to extract, 40 days to analysis	NA

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Nitrogen & Phosphorus Containing Pesticides	GC/NPD	EPA 507	G	Cool, 4°C, $HgCl_2$ to conc. of 10mg/L***	2L	NA	28 days after extraction	NA
Volatile Organic Compounds in Drinking Water	GC/MS	EPA 524.2	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5], HCl to pH2[5]	3x40mL	NA	14 days	NA
Semi-Volatile Organic Compounds in Drinking Water	GC/MS	EPA 525	G	Cool, 4°C, 0.008% $Na_2S_2O_3$[5], HCl to pH2[5]	2x1L	NA	7 days to extract, 40 days to analysis	NA
SDWA Carbamates	HPLC	EPA 531.1	G	Monochloro-acetic Acid Buffer to pH3, Cool, 4°C	120mL	NA	28 days	NA
SDWA Herbicides	GC/ECD	EPA 515.1	G	Cool, 4°C, $HgCl_2$ to 10 mg/L conc.***	1L	NA	7 days to extract, 40 days to analysis	NA
Extraction Procedure Toxicity - Metals Only	Leachate Generation	SW 846-1310	P,G	None	100g @ 100% Solids >5,000g @ ≥.5% Solids		NA	NA
Indiana-Neutral Leaching Method	Leachate Generation	329IAC	G	None	100g @ 100% Solids >10kg @ ≥.5% Solids		NA	NA
Extraction Procedure Toxicity-Metals, Pesticides, Herbicides	Leachate Generation	SW 846-1310	G	None	100g @ 100% Solids >10kg @ ≥.5% Solids		NA	NA
Toxicity Characteristic Leaching Procedure (TCLP)-Metals Only	Leachate Generation	SW 846-1311	P,G	None	105g @ 100% Solids >5kg @ ≥.5% Solids		180 days to TCLP extraction 180 days to Analysis, except Hg - 28 days	
Toxicity Characteristic Leaching Procedure (TCLP)-All Regulated	Leachate Generation	SW 846-1311	G	None	500g @ 100% Solids 20kg @ ≥.5% Solids		See individual analyte groupings	
Toxicity Characteristic Leaching Procedure (TCLP)-Regulated Non-Volatile Organics	Leachate Generation	SW 846-1311	G	None	305g @ 100% Solids 15kg @ ≥.5% Solids		14 days to TCLP extraction, 7 days from TCLP extraction to preparative extraction, 40 days from preparative extraction to analysis	

***Alternate preservative preferred

Table 6.3
SAMPLE REQUIREMENTS

Test	Method	Reference	Container[1]	Water Sample Preservation[2,3]	Required Sample Quantity		Maximum Holding Time Water[4]	Maximum Holding Time S/S/S
					Water	S/S/S		
Toxicity Characteristic Leaching Procedure (TCLP)-Regulated Volatiles	Leachate Generation	SW 846-1311	G	None	125g @ ≤ 100% Solids 1200g @ <5% Solids		14 days to TCLP extraction, 14 days from TCLP extraction to analysis	

1. Polyethylene (P) or Glass (G). All organics containers will have a teflon-lined cap.

2. Sample preservation should be performed immediately upon sample collection. for composite chemical samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then chemical samples may be preserved by maintaining at 4°C until compositing and sample splitting is completed.

3. When any sample is to be shipped by common carrier or sent through the United States Mails, it must comply with the Department of Transportation Hazardous Materials Regulations (49 CFR Part 172). The person offering such material for transportation is responsible for ensuring such compliance. For the preservation requirements of Table II, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials Regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentrations of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solution sat concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or greater); and Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

4. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still be considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of samples under study are stable for the longer time, and has received a variance from the Regional Administrator under § 136.3(e). Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show that this is necessary to maintain sample stability. See § 136.3(e) for details.

5. Should only be used in the presence of residual chlorine. May use ascorbic acid or sodium bisulfate as allowed per regulation.

6. Maximum holding time is 24 hours when sulfide is present. Optionally all samples may be tested with lead acetate paper before pH adjustments in order to determine if sulfide is present. If sulfide is present, it can be removed by the addition of cadmium nitrate powder until a negative spot test is obtained. The sample is filtered and then NaOH is added to pH 12.

7. 13 days in plastic, 28 days in glass.

8. All organics containers have teflon lined caps. Required Sample quantity is listed to include MS or back-up sample.

9. Samples should be filtered immediately on-site before adding preservative for dissolved metals.

10. Guidance applies to samples to be analyzed by GC, LC, or GC/MS for specific compounds.

11. All drinking water samples must be preserved, regardless of holding time.

12. Sample receiving no pH adjustment must be analyzed within 7 days of sampling.

13. The pH adjustment is not required if acrolein will not be measured. Samples for acrolein receiving no pH adjustment must be analyzed within 3 days of sampling.

14. When the extractable analytes of concern fall within a single chemical category, the specified preservative and maximum holding times should be observed for optimum safeguard of sample integrity. When the analytes of concern fall within two or more chemical categories, the sample may be preserved by cooling to 4°C, reducing residual chlorine with 0.008% sodium thiosulfate, storing in the dark, and adjusting the pH to 6-9; samples preserved in this manner may be held for seven days before extraction and for forty days after extraction. Exceptions to this optional preservation and holding time procedure are noted in footnote 5 (re: the requirement for thiosulfate reduction of residual chlorine), and footnotes 15 and 16 (re: the analysis of benzidine).

15. If 1,2-Diphenylhydrazine is likely to be present, adjust the pH of the sample to 4.0 ± 0.2 to prevent rearrangement to benzidine.

16. Extracts for benzidines may be stored up to 7 days before analysis if storage is conducted under an inert (oxidant-free) atmosphere.

17. For the analysis of diphenylnitrosamine, add 0.008% $Na_2S_2O_3$ and adjust pH to 7-10 with NaOH within 24 hours of sampling.

18. The pH adjustment may be performed upon receipt at the laboratory and may be omitted if the samples are extracted within 72 hours of collection. For the analysis of aldrin, add 0.008% $Na_2S_2O_3$.

SECTION 7.0

7.0 Sample Custody

7.1 Introduction

The maintenance of sample chain of custody is part of the laboratory QA program. Where samples and analytical results may be needed for legal purposes, it is imperative that the laboratory, client and everyone else involved in such proceedings be able to unequivocally demonstrate that analytical results were obtained from analysis of specified samples.

A sample is in someone's "custody" if:

1. It is in their actual physical possession, or
2. It is in their view, after being in their physical possession, or
3. It is in their physical possession and locked up so that no one could tamper with it, or
4. It is kept in a secured area restricted to authorized personnel only.

7.2 Facilities and Sample Security

EMS Heritage laboratory facilities are protected with an access control system. In this way, access to all samples at all times remains controlled and documented.

Visitors to the facilities are prohibited from entering the cooler and laboratory areas unescorted. Special viewing areas have been provided to facilitate laboratory "tours".

Rules regarding custody have been established and must be followed as outlined below:

1. Samples must never be left unattended in the delivery/receiving area. If the receiving area is to be left unattended, the sample receiving door must be closed and locked.
2. All samples must be returned to their storage area/cooler at the end of the final shift.
3. All sample extracts and digestates must be placed in their respective laboratories.

7.3 Sample Custody Records

Sample custody will be supported by records which trace a sample from its point of origin to include container storage and shipment through disposal after analysis. These records will include, but are not limited to:

1. Field notebooks;
2. Field sample I.D. tags, labels;
3. Laboratory (transmittal forms), Task Orders, Request Forms;
4. Chain of Custody forms;
5. Sample extraction/preparation logs or worksheets;
6. Analytical (instrument) logs or worksheets;
7. Calibration and quality control data associated with a sample set;
8. Instrument maintenance logs;
9. Sample disposition logs; and,
10. Final reports.

Item numbers 1, 3 and 4 above are generally the responsibility of the client unless EMS Heritage performs the sampling.

7.4 Legal Chain of Custody

The laboratory will only be responsible for maintaining the records of the activities it performs. Sampling documentation for samples not collected or sub-contracted for collection by EMS Heritage will be the responsibility of the sample collector.

EMS Heritage will follow special procedures when strict Legal Chain of Custody is required. Legal Chain of Custody is a special type of sample custody in which all events associated with a specific sample must be documented in writing. In addition to the records described above, chain of custody records must include the following:

1. Sample transmittal forms or tags that have adequate space for the dated, original signatures of all individuals who handle the sample (or empty containers) from time of collection (or container receipt) through laboratory delivery.
2. Custody seals.
3. Laboratory sample storage logs that identify date, time, and individuals who remove samples from storage.
4. Secure, limited access storage areas.
5. Errors in all documentation are deleted by drawing one line through the error, writing the correction, placing the initials of the person

making the change, the date of the change and the reason for the change. All documentation is recorded in indelible black ink (no other colors allowed).

7.5 Sample Labels, Seals and Chain of Custody

All sample containers will have a sample container label attached. An example of this label is shown in Figure 7.1. Those samples requiring Legal Chain of Custody will have a custody seal placed on the closure mechanism on the sample such that any attempt to remove the seal will be obvious. An example of this seal is shown in Figure 7.2. All samples will be accompanied by a Chain of Custody as shown in Figure 7.3 when provided by EMS Heritage. Clients may substitute Chain of Custody forms of their own when desired. Labels and seals may utilize alternate forms containing identical information.

7.6 Field Sampling/Custody

When Legal Chain of Custody is required, the custody documentation will begin with the preparation and/or shipment of sample containers to the sampler(s). Sampling performed by EMS Heritage will utilize the following procedure for identifying and labeling samples in the field:

Sample Prefixes

RW	=	Residential Well
MW	=	Monitoring Well
WA	=	Water, Non-Specific
SW	=	Surface Water
SD	=	Sediment (lake, ditch, river)
SL	=	Sludge
LE	=	Leachate
SS	=	Soil Sample

Sample Suffixes

DP	=	Duplicate
FB	=	Field Blank
TB	=	Trip Blank
EB	=	Equipment Blank
BG	=	Background

When samples are already sufficiently identified by type and exact location without the need of assigning an arbitrary identification, that pre-established

Figure 7.1

CONTAINER LABEL

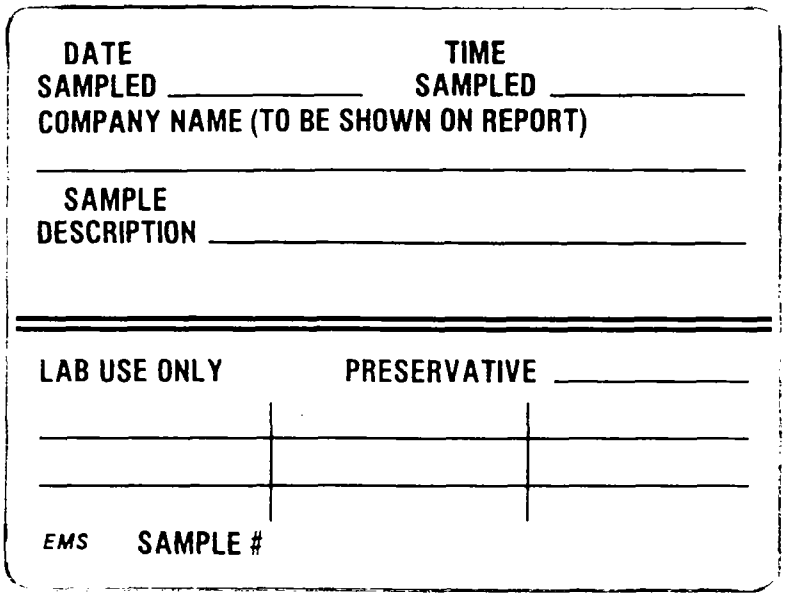


Figure 7.2

CUSTODY SEAL

Figure 7.3

CHAIN OF CUSTODY

TO ENSURE PROPER HANDLING OF SAMPLES PLEASE COMPLETE THIS ENTIRE FORM

EMS HERITAGE LABORATORIES, INC.
7901 West Morris Street
Indianapolis, Indiana 46231 (317) 243-0811 Fax (317) 243-0360

Co. Name:

Project Name:

Quote No.: PO No.:

ENVIRONMENTAL PROGRAM:

CWA NPDES_____ IWP _____SLUDGE_____

RCRA MW_____ SW _____ DISPOSAL_____

SDWA_____CERCLA/SUPERFUND_____OTHER _____

Sampled by:

Analyses Requested
(Note special detection limits or methods)

Report To:
Co:
Add:
Attn:
Phone:

Accelerated Turnaround Requested _____
(Subject to Additional Charge)

Result Request by: ____/____/____
Mo Day Yr
(Date must be Accepted and Approved by Lab.)

Sample ID:	Date:	Time:	Comp	Grab	Sample Description:	No. of Containers	Remarks:	EMS Sample

Relinquished by: (Signature)	Date /Time /	Received by: (Signature)	Relinquished by: (Signature)	Date /Time /	Received by: (Signature)
Relinquished by: (Signature)	Date /Time /	Received by: (Signature)	Relinquished by: (Signature)	Date /Time /	Received by: (Signature)
Relinquished by: (Signature)	Date /Time /	Received for Lab by: (Signature)	Remarks:		

Distribution: Original and yellow copies accompany sample shipment to laboratory;
Yellow copy returned to client.

identification will be used. Samples requiring arbitrary field number assignments will be given consecutive numbers in the following manner:

Examples:

Soil Sample #1	=	SS0001
Background Soil Sample #1	=	SS0001BG
Surface Water Sample #3	=	SW0003
Trip Blank Sample #1	=	0001TB
Surface Water Sample #3 Duplicate	=	SW0003DP

EMS Heritage field samplers will use the appropriate field data sheets as given in Figures 7.4 through 7.8 for sampling. Field records will be stored, filed and maintained by submitter (client) and project number at EMS Heritage.

7.7 Sample Dispatch

Samples to be shipped by common carrier will be properly preserved and placed in a secure shipping container. All transmittal documents including the chain of custody form will be placed inside the shipping container in water-tight plastic bags, taped to the inside lid. The container will be sealed with custody tape such that any tampering between shipment and receipt at the laboratory will be obvious to receiving personnel.

When samples are delivered by common carrier it is only necessary to sign the documents that are required by the carrier service at the time of delivery, i.e., airbills, shipping invoices, etc. After the shipping papers have been signed, the packages are entered into the Parcels Received log book. This log book contains:

1. Date package received
2. Carrier Service delivering
3. Client/Company shipped from
4. Destination
5. Type of package (i.e. samples, stock, instruments)

The next steps in laboratory custody will be the same regardless of whether samples arrive via common carrier, or are hand delivered.

Figure 7.4

EMS HERITAGE LABORATORIES, INC.

SAMPLING PROJECT SUMMARY

Submitter: _____
Site Contact: _____
Site Identification: _____
Project Number: _____ Z Numbers: _____
Samplers: _____
Sampling Date: _____
Weather Conditions: _____
Sample Iced? YES NO
Preservative Used? YES NO If Yes, Preservative Used Lot #

_____ _____

_____ _____

Sample Types (circle):				
	Lagoon	Ash	Indus Waste	Ditch
	Leachate	Soil	Waste Pile	Creek
	Sludge	Solvent	Solid	Liquid
	Oil	Sand	Drummed Waste	Truck
	Res. Well	other _____		

Sample Plan Review: grab/composite statistical/random/judgmental
Information on equipment used, facility type, products made, etc.

_____
_____
_____

Decontamination Procedures Used: _____
_____
_____

Equipment is (dedicated/decontaminated) Source of decon. water _____
Source of blank reagent water _____

Miscellaneous:
Photos taken? YES NO

Environmental Program:				
	RCRA	CERCLA	SOLID WASTE	UST
	NPDES	IWP	SURFACE WATER	
	DISPOSAL	SDWA	CWA	
	OTHER _____			

EMS HERITAGE LABORATORIES, INC.

SAMPLE DETAIL

Sample ID _____

Field Test Performed	Result
_____	_____
_____	_____

Sample Types (circle all applicable)

Mon. Well	Lagoon	Ash	Indus. Waste
Res. Well	Leachate	Soil	Waste Pile
Creek	Oil	Sludge	Solid
Ditch	Solvent	Sand	Liquid
Truck	Drum	other_____	
Blank (Equip./Trip)		Duplicate (of_____)	
Background			

Sample Date: __-__-__ Time: __:__ AM/PM

Containers	#
1 L plastic	_____
1 L glass	_____
500 ml glass	_____
40 ml vial	_____
_____	_____

Preservatives Added	
H_2SO_4	_____
HNO_3	_____
NaOH	_____
Zn-Acetate	_____
HCl	_____
Sample Iced	
No preservatives used for non-aqueous samples	_____

Additional Sample Location Information:_____

_____

Additional Sample Type Information/Observations: (depth taken, color, odor, size, clarity, density, suspended solids, colloidal, etc.)_____

_____

Deviations From Sampling Plan:_____

_____

Sampling Equipment Used:_____

_____

Sampler Signature _____

Date _____

Figure 7.6

EMS HERITAGE LABORATORIES, INC. Page ___ of ___

Monitoring Well Sampling - Project Summary

Submitter: _____ Address: _____
Site Contact: _____ County: _____
Site Identification: _____
Project Number: _____ Z Numbers: _____
Samplers: _____
Sampling Date: _____
Weather Conditions: _____

Preservative Used	Lot #
_____	_____
_____	_____
_____	_____
_____	_____

Environmental Program:
RCRA CERCLA SDWA
UST SOLID WASTE
OTHER _____

Pumping Information

Purged by: (facility / consultant / EMS) personnel Date:_____Time:_____
Pump Type: _____ size_____
make: _____ tubing_____
Bailer: (PVC / SS / Teflon / _____) rope material_____
diameter _____ length_____ capacity_____

Filtration Information

Sample Fractions Filtered:_____
Filtered by: (facility / consultant / EMS) personnel
Filtration Method: (gravity / vacuum / pressure); Devise Type_____
Filter type: (cartridge / paper), size_____, pore_____

Field Instruments Used

pH Meter _____
S.C. Meter _____
Thermometer _____

SAMPLE DETAIL

Sample I.D. _____

Field Tests		Sample type	Preservatives Added
Test	Result	Mon. well	Hcl _____
		Res. well	HNO_3 _____
Temperature _____°C		Duplicate of _____	H_2SO_4 _____
pH ___.___		Split	NAOH _____
Spec. Cond. _____umhos		Blank (field/trip/equip.)	Zn-Acetate _____
_____	_____	_____	_____
_____	_____	_____	_____

Sample Date ___/___/___ ___:___ AM PM

Containers Used	#
1 liter plastic	_____
1 liter glass	_____
40 ml vials	_____
250 ml glass	_____
500 ml glass	_____
_____	_____
_____	_____

Monitoring Well Data
Well I.D. _____
Reference point on (steel / plastic) casing top
Casing Stick-up _____
Depth to Water _____
Well Material (PVC / SS / Teflon)
Total Well Depth _____
Inside Diameter (1 2 4 6) inch
Time to recharge one well volume -
within 1 4 8 24 48 or G.T. 48 hrs

Were METALS filtered prior to preservation? (Yes / No)_____
Color of water subsequent to filtration_____

Deviations from Sampling Plan_____
_____
_____

Other Observations

Water Appearance (clear slightly / very turbid) (color: gray / brown)
Well purged (less / greater) than (1 2 4 6 12 24 48) hours prior to sampling
Purged approx. (to dryness) / (1 2 3 4 5 8 10 G.T. 10 well volumes)
Reaction upon addition of preservatives? (YES / NO) (explain) _____
_____
_____

Figure 7.8

Equipment Decontamination Procedures

Specific Procedures Utilized to Decontaminate Equipment for this Event:

7.8 Laboratory Custody/Receiving

The following steps are taken when samples are received.

1. Examination of the shipping container. Note the presence or absence of custody seals, locks, evidence tape, etc.

2. Generating any log books applicable (i.e. recording all information into a central case file, if client requests such).

3. Removal of samples from shipping containers and inspection of any traffic reports, chain of custody documents, etc. If no chain of custody is received the lab creates a chain of custody from that point forward.

4. If a chain of custody is received, it is inspected to determine the accuracy of the document (i.e. relinquishing signatures, date and time sampled, sample locations, etc.). If any discrepancies exist, they are noted on the chain of custody and in the case or client file if applicable.

5. Inspect sample containers for any damage. If damage has occurred it is to be noted directly on the chain of custody or a sample integrity form attached to the chain of custody, and in the case file if applicable. Notify the project manager immediately to determine corrective action required. All corrective actions are recorded on the chain of custody and in the case file.

6. Examine sample bottles for their agreement with the chain of custody.

7. Sample containers are inspected for proper containers and preservation. Preservation is checked according to the following protocol:

    a. If EMS Heritage containers were supplied and used, the pH is checked on one out of 10 samples by using a disposable pipet and litmus paper.

    b. All samples that are not received in EMS-supplied containers are checked for pH, with the exception of volatile organic sample vials. VOC vials are not opened until the time of analysis, but are checked for the presence of air bubbles. Samples are also checked for proper preservation at the time of analysis.

c. If an analysis requires a specific type of preserved container and the container was not received, it is noted on the chain of custody or sample integrity form, and in the case file if applicable.

d. All preservations, if needed, should be performed under a fume hood and are performed one at a time to avoid cross contamination.

8. The analyses requested are compared to the quote for the project, the containers provided and the preservation. If the analyses to be performed are not fully specified or if the condition of the test substance does not conform to the description provided or is different from what was expected, the Project Manager is immediately notified. The Project Manager will contact the client for further instructions before proceeding.

9. The laboratory will establish whether the test substance has received all necessary preparation, or whether the client requires preparation to be undertaken or arranged by EMS Heritage.

7.9 Sample Log-In

Samples are logged into the LIMS system with the following information:

1. A computer assigned EMS Heritage sample number. If another sample is copied or a specific quote "Z sample" is used to log in a sample, this template sample number is recorded in addition to the unique sample number;

2. Project number. This project number defines a discreet project for a given set of samples;

3. Quote number. An EMS Heritage quotation;

4. Purchase Order number. A client provided billing reference number;

5. Submitter number. This is computer shorthand for the EMS Heritage client;*

*Mandatory Entry

6. Regulation. This field describes the environmental program area under which the sample is submitted;*

7. Matrix of the sample;*

8. Received identification. This entry identifies the staff receiving the sample;*

9. Lab Days. This entry states the number of days targeted for analysis;

10. Due Date. This entry gives the report due date;

11. Status. This describes the status of the sample with regard to analysis and reporting;

12. Entered. This entry identifies the staff entering the sample into LIMS;*

13. Project Manager. This is the assigned staff person for this sample/project;

14. Modified. This entry shows the last person to modify a sample record;

15. Complete. This field shows the date that all tests and tasks show completed in the computer system;

16. Date sampled. Taken from the chain of custody;

17. Time sampled. Taken from the chain of custody;

18. Sample received within holding time? - yes or no;

19. Sample properly preserved? - yes or no;

20. Sample chilled to 4°C? - yes or no;

21. Sample received in proper container? - yes or no;

22. Chain of custody received? - yes or no;

*Mandatory Entry

23. Chain of custody number, if applicable;

24. Method of disposal;

25. Client sample description;

26. Client reporting address;

27. Sample comments to the laboratory. This field displays any information pertinent to the sample;

28. Sample comments to appear on final report;

29. Tasks assigned. Tasks are any activity or service performed not inherent in the act of sample analysis, i.e. a special reporting package, etc.;

30. Protocol. A pre-defined grouping of tests routinely requested together;

31. Tests assigned. All tests are assigned in the order they are to appear on the final report. Those tests requiring a preparation step are linked together indicating such. The location where analysis will be performed, the priority of analysis and the final discounted price for the analysis also appear here. All test documentation includes the names of the analyst, reviewer, data entry person, all associated dates, run numbers, QC and results;

32. All information relating to each test assigned is contained in the next two blocks of the LIMS system, including the actual results;

33. Any comments relating to the individual test performed are contained in the next two blocks of the LIMS system.

The key point to the EMS Heritage Lab ID number is linking that number to the client's sample description. After the computer has assigned the Lab ID number, that number is to be written on the cap and the label of all containers.

7.10 Sample Storage

Samples are to be placed in their appropriate storage area which is specific to the analysis to be performed. Analysts will be notified immediately of

samples received with extremely short or sensitive holding times, so that analysis may be performed immediately. All sample storage areas are accessible only to EMS Heritage staff. Sample digestates and extracts will be stored separately from samples or standards and are accessible only to EMS Heritage staff. These digestates and extracts will also be signed in and out when Legal Chain of Custody is required (see Section 7.4). Standards are stored separately from all samples and VOC samples are segregated from other samples.

7.11 Log-In Accuracy

As a cross check for data entry, all paperwork is reviewed against the information entered into the LIMS system either by an assisting data entry operator, their supervisor or a Project Manager. This paperwork is retained on file. Project paperwork is forwarded to the project manager for the samples received as a further check on accuracy and as a means for project management. A log audit report from the LIMS system is checked daily by the appropriate Project Manager.

7.12 Project Schedules

Incoming samples are scheduled by sales and/or project management staff. The sample quotes, requests to send containers, "Z" template samples, etc. are forwarded to the sample shipping/receiving area, where they are matched with incoming samples/projects. Once samples are logged into the LIMS system the work assignments will appear on an analyst's worklist according to a pre-assigned list of tests per work group. These work lists are generated and distributed daily. Analysts receive worklists as needed (bi-weekly at a minimum) which lists the samples due, sorted by their maximum allowable holding time from the date sampled. This helps to insure that all samples are analyzed within holding time. Analysis within holding time takes precedence over RUSH analysis requests. As work assignments are completed, they are sent to data entry and given the status of complete in LIMS upon completion of data entry.

7.13 Inter and Intra-Lab Shipping

When it is necessary or desirable to sub-contract to another laboratory, it is crucial that the sub-contract laboratory be given complete instructions and information regarding the sample and analysis. The information required includes the list of analytes and the methods required for analysis. Sample shipments between EMS Heritage laboratory divisions will present no problem in this area, since all share a common data base which describes the

information for all samples. Chain of custody procedures will be used for all sample shipments. All shipments of samples are recorded in a logbook containing:

1. shipping date;
2. EMS sample ID numbers;
3. field sample ID numbers
4. collection date and time
5. requested analyses
6. date of sample preparation (if any)
7. location from which the samples were sent;
5. the carrier ID and shipping paper ID.

Subcontracting is permitted only when certifications, client Data Quality Objectives and/or contractual requirements are not prohibitive (e.g. CLP). Any sub-contract laboratory must be approved by the QA Officer or the QA Unit.

7.14 Documentation of Sample Disposition

All samples and laboratory waste are disposed of in adherence with all environmental regulations. Sample disposition is documented in the LIMS system by the sample custodian or his/her designee. Sample disposition is not routinely documented as to the precise fate but only for the fact that EMS Heritage no longer has the sample. Clients requiring more elaborate documentation may request this service on a case by case basis. Refer to Section 8.0, Analytical Procedures for further details of Sample and Waste Disposal.

7.15 Electronic Data Records (LIMS)

EMS Heritage Laboratories utilizes a computerized LIMS to track samples, temporarily store data for the purpose of integrated and/or electronic reporting, and to perform calculations as part of data reduction.

This LIMS system (hardware and software) is maintained and operated by a professional staff of computer programmers, analysts and operators under the direction of a data processing manager. All LIMS policies, procedures and operations are approved by laboratory management.

7.15.1 Security System

LIMS security is maintained on three levels; system resource access, information access and information manipulation access. The security

system is maintained by the data base administrator (DBA). All security policies and procedures are approved by Management. Access to information is given on a need to know basis only, and is granted according to job function. Inactive or terminated users are immediately removed from the system. All system users receive training appropriate to their job function prior to gaining access to the information.

Access to computer system resources is restricted through the assignment of a user specific login id and a confidential password to each user. No system resources are available to a user without the appropriate login id and password. This information is kept confidential and periodically modified.

Users are classified according to job function. This limits the users' access to information not specific or required for the performance of their duties. Once a user gains access to system resources as described above, the user is presented with a restricted view of all of the information available according to his/her user classification.

Data manipulation is also controlled by the user classification. For specific job functions, users may have the ability to view only, create, modify, and/or delete specific information. Users may have multiple capabilities custom tailored to their job function. As with system access, information access and manipulation is maintained by the DBA.

Once all tests on a sample are completed, the sample status becomes "released". This "released" status will not allow any data manipulation except by laboratory QA staff.

7.15.2 Analytical Records Management

All raw analytical data is stored as the original hard copy. Hard copy information includes:

1. Chain of Custody and/or Sample Submission Forms
2. Analytical Bench Sheets and Log Books
3. Instrument Printouts and Chromatograms

All hard copy information is uniquely identified for control purposes. Sample preparation procedures and final results are documented on forms containing all pertinent information and comments, including

analyst and reviewer initials. Those forms are specific to the test being performed. Tests which are directly down-loaded into the LIMS system from the instrument are reviewed and approved before release to LIMS; the hardcopy instrument readout is filed for reference.

Analytical records maintained in the LIMS are only temporarily stored for the purpose of integrated or electronic reporting. Information may be entered into LIMS in two ways, direct computer to computer transfer and manual data entry. Both data entry procedures are quality assured by checking the computerized information against the original hard copy or the electronic output from the other computer.

7.15.3 Electronic Data Transfer

Electronic Data Transfer (EDT) may be utilized to facilitate the integration of the laboratory information with a client's own data management system. All hard copy information (i.e. Certificate of Analysis, QAQC report) is distributed to the client to provide source documentation for validation of information electronically transferred. A data transfer log is maintained of all electronic transfers indicating the client, date and time of transfer and the file id and contents description. Electronic (floppy disk) copies of all information transferred are also maintained on file.

7.15.4 Software Documentation

LIMS software is documented as necessary for the proper development and maintenance of the programs. Software modifications, problems and/or failures are documented using a System Support Request (SSR) form submitted to the data processing department. All SSR's are managed by the programming staff on a priority basis. Original program documentation and modifications are documented within the program logic or data structure itself. Summaries of modifications are communicated to the users using Software Maintenance Bulletins (SMB).

7.15.5 Data Entry Validation

Data entry is validated by manually comparing hard copy documentation (Chain of Custody, Lab Bench Sheets, etc.) to LIMS reports of the information entered. At least 5% of all data entry is validated routinely in this manner. Errors found during review are corrected and re-reported if necessary. A log book and print-out of

data entry validation is kept indicating the run, date and auditor of the information and a notation of any records found in error.

7.15.6 Software/Hardware Validation

All software is functionally validated before use by the programming staff. Once software is put into production, it has essentially passed all preliminary validation criteria. Validation criteria include manual validation of calculations and manual validation of translation from data storage to report. All software is re-validated following modification.

Hardware validation is accomplished using the hardware vendors own internal checking mechanisms. No additional hardware validations are performed.

SECTION 8.0

8.0 Analytical Procedures

8.1 Introduction

EMS Heritage uses EPA approved analytical methods appropriate for the regulatory program, sample type and DQO's. The analytical methods used and their analyte lists are given in Table 5.1, QA Targets for Precision, Accuracy and Method Detection Limits, and Table 6.3, Sample Requirements, Tables 8.1 and 8.2 list the approved methods and references for the various types of matrices commonly encountered. If a client requests a method not listed in these tables, a full method validation package must be prepared, including Method Detection Limit (MDL) studies, before any analyses are reported for that method to be in compliance with this QAP. Instrument Detection Limit studies may replace the MDL studies in some situations if matrix spike/matrix spike duplicates are analyzed and approval is obtained from the Corporate QA Officer.

If applicable, alternative, modified or proposed new methods covered under this QAP must be summarized and a detailed description with method validation package must be submitted as an appendix to this QA Plan.

Many of the USEPA Contract Lab Program (CLP) methods are very similar if not identical to RCRA methods with the exception of the reporting forms and the QA protocols required. Commercial clients requesting a particular CLP SOW may opt upon consultation with EMS Heritage to accept different analytical reporting and QA protocols which do not compromise the data produced, but may not include all of the CLP forms, documentation and QA protocols. Samples analyzed under contract will be fully compliant with all contract requirements.

8.2 Standard Operating Procedures

In order to obtain reliable results, adherence to prescribed analytical methodology is required at all EMS Heritage laboratory divisions. In any operation that is performed on a repetitive basis, reproducibility is best accomplished through the use of Standard Operating Procedures (SOPs). An SOP is a written document which provides directions for the step-by-step execution of an operation, analysis or action which is commonly accepted as the method for performing certain routine or repetitive tasks. It is necessary that every aspect of an analysis or study (every step in the sample trail) be linked by one or more SOPs. EMS Heritage has adopted a formal written SOP program for all procedures. Every SOP is to be written according to the

Table 8.1

EPA APPROVED ANALYTICAL METHODS AND REFERENCES FOR WATER ANALYSES

DRINKING WATER

1. 40 CFR Part 141, Subpart C and Subpart E - Monitoring and Analytical Requirements.

2. "Methods for the Determination of Organic Compounds in Drinking Water", EPA/600/4-88/039, December 1988.

3. "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, Revised March 1983.

4. Standard Methods for the Examination of Water and Wastewater, 16th Edition, 1985.

5. "Manual for Certification of Laboratories Analyzing Drinking Water", EPA 570/9-90/008, April 1990.

6. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA-600/4-80/032, August 1980.

Note: "500" series methods shall be used for drinking water related analyses unless client requirements dictate low detection limits achieved by those methods and analyses require no dilutions. Regulatory approval may be required for use in other matrices. Application of drinking water QC procedures may be inappropriate for some sample matrices.

SURFACE WATER, GROUNDWATER AND WASTEWATER EFFLUENTS

1. 40 CFR Part 136, Tables IA, IB, IC, ID, and IE, July 1989.

2. Methods for Chemical Analysis of Water and Wastes, revised March 1983.

3. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition (EPA SW-846), 1986 and Revision I dated December 1987.*

*USEPA notes that, for guidance purposes, the Third Edition and its Revision I supersede the Second Edition and its Updates I and II. However, for regulatory purposes, the Second Edition and Updates I and II remain in effect together with 47 methods of the Third Edition and its Revision I cited above.

4. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Second Edition (EPA SW-846), 1982 as amended by Update I (April 1984), and Update II (April 1985).

5. Methods listed in 40 CFR Part 261, Appendix II, Appendix III and Appendix X, 1990.

WATER SOURCES (SURFACE WATER AND GROUNDWATER) ANALYZED PURSUANT TO 40 CFR PART 261 (Resource Conservation and Recovery Act) and the DER Chapter 17-700 Series Rules

1. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition (EPA SW-846), 1986 and its Revision I dated December 1987.[1]

2. Methods listed in 40 CFR Part 261, Appendix II, Appendix III and Appendix X, 1990.

3. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Second Edition (EPA SW-846), 1982 as amended by Update I (April 1984), and Update II (April 1985).

4. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analyses", Multi-Media, Multi-Concentration EPA SOW 7/88, July 1988.

5. "USEPA Contract Laboratory Program Statement of Work for Organic Analyses", Multi-Media, Multi-Concentration EPA SOW 2/88, February 1988.

6. "Prescribed Procedures for Measurement of Radioactivity in Drinking Water", EPA-600/4-80/032, August 1980.

7. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, Document Number ILM01."

8. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, Document Number OLM01".

Table 8.2

EPA APPROVED ANALYTICAL METHODS AND REFERENCES FOR SEDIMENTS, SOILS, RESIDUALS AND SOLID AND HAZARDOUS WASTES

1. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition (EPA SW-846), 1986 and its Revision I dated December 1987.*

2. "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Second Edition (EPA SW-846), 1982 as amended by Update I (April 1984), and Update II (April 1985).

3. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analyses", Multi-Media, Multi-Concentration, EPA SOW 7/88, July 1988.

4. "USEPA Contract Laboratory Program Statement of Work for Organics Analyses", Multi-Media, Multi-Concentration, EPA SOW 2/88, February 1988.

5. "USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, Document Number ILM01."

6. "USEPA Contract Laboratory Program Statement of Work for Organic Analysis, Multi-Media, Multi-Concentration, Document Number OLM01."

7. Methods listed in 40 CFR Part 261, Appendix II, Appendix III and Appendix X, 1990.

8. American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia, PA 19103.

*USEPA notes that, for guidance purposes, the Third Edition and its Revision I supersede the Second Edition and its Updates I and II. However, for regulatory purposes, the Second Edition and Update I and II remain in effect together with 47 methods of the Third Edition and its Revision I cited above.

guidelines given in the EMS Heritage "Standard Operating Procedure for the Development and Maintenance of Standard Operating Procedures".

All SOPs must be approved by management and distribution is strictly controlled, which precludes the use of outdated or inappropriate SOPs. Copies of all SOPs which have been replaced and retired are collected upon the retirement. Copies of all SOPs will be maintained at each division; a master copy will be maintained at the Indianapolis Division.

This procedure will assure standardization among all locations. As new SOPs are developed, they must be coordinated through the Vice President of operations to avoid overlap or duplication of existing SOPs.

SOPs prepared by EMS Heritage will be clear, comprehensive, up-to-date, and sufficiently detailed to permit duplication of results by qualified analysts. In addition, all SOPs will be:

1. Consistent with current EPA regulations, guidelines and contract requirements;

2. Consistent with instrument manufacturer's specific instruction manuals;

3. Available to clients and regulatory personnel during On-Site Laboratory Evaluations. A complete set of SOPs shall be bound together and available for inspection at such evaluations;

4. Capable of providing for the development of documentation that is sufficiently complete to record the performance of all tasks required by the protocol;

5. Capable of demonstrating the validity of data reported;

6. Capable of describing the corrective measures and feedback mechanism utilized when analytical results do not meet protocol requirements;

7. Reviewed regularly and updated as necessary when contracts, facility, or procedural modifications are made;

8. Archived for future reference in usability or evidentiary situations; and,

9. Available at specific work stations as appropriate.

8.2.1 Documented Sampling Techniques

SOP's must be in place and followed for sampling techniques and methodology as well as for sample control (including chain of custody).

8.2.2 Documented Analytical Methods

Routine analytical methods must be documented in an Analytical Methods Manual. Reference can be made to published methods, but are not a substitute for methods written specific to EMS Heritage.

Modifications to methods or non-standard methods must be approved by the QA Officer, Laboratory Director, QA Unit or Chief Chemist before use. Analytical methods in use must have a method detection limit established, determined and documented. All concerned staff will be notified of any method modifications or non-standard methods.

8.2.3 Equipment Calibration

Calibration or USEPA standards and their verification standards shall be traceable to NIST wherever possible or to another reliable source which may be determined by the QA Unit.

Calibration must be documented and this documentation will include:

1. Date(s) of calibration
2. Identification of standards used.
3. Results of calibration (raw data and summary statistics).
4. Corrective actions taken.

8.2.4 Training and Training Documentation

EMS Heritage must have an SOP for training and training documentation. Training shall continue, according to written procedures, to keep all personnel aware of new methods and technologies. Attendance at symposia, training courses, and further formal education is encouraged. Training which has been completed must be documented for each employee and kept as a part of the training records. Refer to Appendix H, Training Forms for "example" training documentation forms.

8.3 Laboratory Glassware Cleaning

8.3.1 Metals Analyses

Glassware may be segregated in the metals section according to the following categories as required to avoid cross contamination:

1. ICP/FAA water samples
2. GFAA water samples
3. Solid samples and/or non-water matrices
4. Mercury samples

Acid baths may also be segregated as required to avoid cross contamination according to the above categories. Only designated acid baths will be used. All glassware is air-dried on adsorbent covered laboratory bench tops and stored in labelled drawers adjacent to the preparation areas.

The glassware cleaning procedure for metals analysis is summarized below.

1. After preps are completed, glassware is to be rinsed with tap water and placed in a soak bath of mildly acidic water.

2. Wash with warm tap water and micro-soap. Scrub each piece thoroughly and inspect for cracks or chips while rinsing.

3. Rinse with warm tap water to remove all soap residue.

4. Rinse twice with deionized (DI) water.

5. Rinse once with 1+1 Nitric Acid.

6. Rinse three times with DI water.

7. Soak in an acid bath (approximately 30 percent Nitric Acid) for a minimum of 2 hours. Glassware must be completely submerged with no air bubbles.

8. Remove from acid bath and rinse 3 times with DI water.

9. Check pH of random pieces with pH paper. Re-rinse if pH<2 on any piece.

10. Allow to air dry on adsorbent covered lab bench.

11. Place in appropriate adsorbent lined lab drawer.

12. Final rinse of all GFAA waters glassware should be done with Milli-Q (or equivalent) water. Analysts must rinse glassware with 1+1 Nitric Acid and Milli-Q (or equivalent) DI water (three times) just prior to using for preps.

Mercury Bottles

1. Cold water rinse when test is complete.
2. Rinse three times with hot tap water.
3. Rinse 3 times with DI water.
4. Rinse 2 times with concentrated Nitric Acid.
5. Rinse 3 times with Milli-Q (or equivalent)(DI) water.
6. Check pH of random pieces with pH paper. Re-rinse if pH <2 on any piece.

EPTOX, TCLP and Other Large Glassware

Large pieces of glassware (filtering flask, etc.) do not need to be soaked in an acid bath. Large glassware must be thoroughly rinsed with 1+1 Nitric Acid and rinsed two times with DI water, followed by another rinse with 1+1 Nitric Acid and rinsing 3 times with Milli-Q (or equivalent)(DI) water.

8.3.2 Extractable Organics

1. Wash with hot soapy water, taking care to not scratch w/brush.

2. Sonicate small pieces if necessary to remove all residues.

3. Rinse with hot tap water.

4. Rinse three times with DI water.

5. Air dry, or rinse with ACS Reagent Grade Acetone.

6. Rinse with Pesticide grade Methylene Chloride.

7. Store with clean glassware in a dust free environment or cap with aluminum foil.

8. Rinse with the solvent used for analysis immediately before use.

Note: Keep all plastics away from glassware.

8.3.3 Volatile/Purgeable Organics

Purge vessels are washed in hot soapy water and rinsed with hot tap water and DI water after each use unless there are no detectable analytes. Purge vessels are replaced in the same positions after cleaning, therefore carryover from high concentration samples can be easily detected.

Volumetric glassware, syringes, etc. (i.e. used in standard preparation) are cleaned according to the following protocol:

1. Rinsed three times with tap water

2. Rinse three times with Milli-Q (or equivalent)(DI) water.

3. Syringes rinsed five times with methanol.

4. Placed in storage at room temperature until use.

8.3.4 Classics/Nutrients (General Chemistry)

1. Wash with a hot micro-soap solution, taking care not to scratch with the brush.

2. Rinse three times with hot tap water.

3. If glassware is to be used for TKN or Total Phosphorus, rinse with 1+1 HCl

4. Rinse three times with DI water.

5. Air dry.

6. Store with clean glassware in a dust free environment or cap with aluminum foil.

7. Rinse with the solvent used for analysis, if applicable.

8. Refer to specific SOPs for special decontamination procedures for distillation apparatuses, etc.

8.4 Reagent and Standard Storage

All reagents and analytical standards received into the laboratory will be labelled with the date received and the expiration date. The label will also contain a space for "first opened". All reagents and analytical standards will be delivered to the appropriate group, who will store them as appropriate.

Some bulk reagents such as acids and solvents will be delivered in large cases which may be stored until use in the storeroom. The laboratory Receiving Department will be responsible for labelling the date of receipt on the outside of the un-opened case of bulk reagents. Any containers that have been opened may no longer remain in the store room on open shelves, and must be moved to the designated storage as identified in Table 8.3, Reagent and Standard Storage. All chemicals will be stored under temperature and humidity controlled conditions. Compatibility of chemicals will be considered for storage.

8.5 Sample and Waste Disposal

It is the policy of EMS Heritage to comply with all regulations concerning proper disposal and safe handling of laboratory samples, chemicals and waste products. Documentation will consist of manifesting of all sample and chemical analysis waste products.

8.5.1 **Sample Disposal**: It is the policy of EMS Heritage Labs to hold samples for fifteen days after analysis has been complete. EMS may store samples for an extended amount of time upon request, but an additional storage fee may apply. Once a sample is ready for disposal, it may be disposed of in two ways: Internal Sample Disposal or Return to Generator.

8.5.1.1 Return to Generator: A generator may request that a sample be returned after analysis is complete. Samples will be returned by common carrier or picked up by the generator.

REAGENT AND STANDARD STORAGE

CHEMICAL	METHOD OF STORAGE
Acetic Acid	Stored in original containers in cabinets designated for liquid reagent acid storage.
pH Standards	see above
Acetone	Stored in original containers in cabinets designated for flammable chemicals.
Pyridine	
Hexane	
Methanol	
Acetonitrile	
Carbon disulfide	
Methyltertbutyl ether	
Sodium hydroxide	Stored in original containers in cabinet designated for base storage.
Freon 113	Stored in original containers in cabinet designated for solvent storage.
Dimethyl sulfoxide	
Dimethyl formamide	
Phenylarsine oxide	Stored in original containers in cabinet designated for reagents.
Methylene chloride	
Sodium sulfate anhydrous	Stored in original containers in a cabinet designated for standard and reagent storage.
Ether (anhydrous)	Stored in original containers inside a vented flammable solvent storage cabinet.
Cadmium metal	Stored in original container in a cabinet designated for standard and reagent storage.
Mercuric thiocyanate	
Ammonium chloride	
Sulfanilimide	
Ferric nitrate	

Table 8.3

CHEMICAL	METHOD OF STORAGE
EDTA	Stored in original containers on benchtop.
Sodium sulfide	
Potassium Bi-Iodate	
Iodine	
Nitric acid	Stored in original containers in cabinet designated for acid storage.
Sulfuric acid	
Hydrochloric acid	
Hydrogen peroxide	
Phosphoric acid	
Hypophosphorus acid	
85% O-phosphoric acid	
Sodium hydroxide	Stored in original containers in cabinets designated for dry chemical storage.
Hydroxylamine hydrochloride	
Stannous chloride	
Potassium persulfate	
Barbituric acid	
Sodium phosphate dibasic	
Potassium ferricyanide	
4-Aminoantipyrine	
Brij 35	
Sulfamic acid	
Calcium hypochlorite	
Boric acid	
Potassium chloride	
Chloramine-T	
L-Ascorbic acid	
Magnesium chloride	
Potassium cyanide	
Potassium permanganate	Stored in original containers in a cabinet designated for standard and reagent storage.

8.5.1.2 Internal Sample Disposal (solids/others): After the proper holding time beyond analysis completion, samples may be disposed of internally. Samples ready for disposal are taken from their storage area and segregated by type of waste. The type of waste is determined by examining information available on the sample such as client descriptions and analytical results. Once the type of waste is determined, the sample bottle is clearly marked and placed in the Sample Disposal Storage Area. Samples are stored until a contracted company removes the waste, generally on a monthly or as-needed basis. The contractor packs the waste which is then sent to the Heritage Treatment Center's Lab-Depacking Program or, depending on the type of waste, sent to an incinerator.

8.5.1.3 Internal Sample Disposal (waters): After the proper holding time beyond analysis completion, water samples are disposed of internally. Samples ready for disposal are taken from their storage area and reviewed for their method of disposal. The method of disposal is determined by examining information available on the sample such as client descriptions and analytical results. All waters that are nonhazardous can be poured down the drain. If a water sample has any contaminants which would preclude disposal to a POTW (e.g. Dioxins, PCBs) it is segregated in the same fashion as solids/others. After determining the type of waste, these samples are placed in the appropriate area in Sample Disposal Storage. The samples are stored until a contracted company removes the waste according to the waste type.

8.5.1.4 Internal Sample Disposal (waste approval samples): Waste approval samples are received and entered into the computer by the QA/QC Laboratory of Heritage Treatment Center. Therefore, after a waste approval sample has been completed for at least fifteen days, the samples are returned to QA/QC lab for disposal.

8.5.2 **Lab Waste Disposal**: There are 7 different types of lab generated waste - Lab Prep Waste, Auto Sampler Vials, Extraction Waste, Sulfuric Acid Waste, Nitric Acid Waste, and Waste Solvents. This

waste is accumulated on a daily basis and is handled according to it's type of waste.

8.5.2.1 Lab Prep Waste: Wastes generated by sample preparation and spill clean up are placed in this category. This would include used pipets, absorbent materials and gloves or towels that have come in contact with hazardous materials. The waste is segregated by determining the type of spill, or the laboratory that generated the waste. For example, if the waste is from a nitric acid spill, the absorbent used to clean the spill will be collected and placed in the Nitric Acid Section in the Sample Disposal Area, whereas waste pipets from the prep lab for PCB's would be collected and placed in the Disposal Area for incineration along with all other PCB waste.

8.5.2.2 Auto-Sampler Vials: Vials are generated by the organics labs containing solvents from sample extracts. The vials are accumulated in storage containers in the laboratory then are placed in the Sample Disposal Area for incineration.

8.5.2.3 Extraction Waste: Extraction waste is generated from the extraction of samples containing of a mixture of soils, solids, and oils in solvents. These containers are accumulated in the laboratory, then are placed in the Sample Storage Area for incineration. Note that the area is designated for flammables because of the waste.

8.5.2.4 Sulfuric Acid Waste: Sulfuric acid waste is generated in all areas of the lab and in the General Laboratory from COD analysis. This waste acid is accumulated in Carboys and stored in acid cabinets until full. The waste acid is then placed in the sulfuric acid section of the Sample Disposal Area. It is stored in the disposal area until several Carboys are accumulated, then sent to Heritage Treatment Center (as a Small Quantity Generator) who manifests and picks up the waste upon request.

8.5.2.5 Nitric Acid Waste: The inorganics (metals) section of the laboratory generates nitric acid waste which is stored

in Carboys in acid cabinets until full. The Carboys are then placed in the nitric acid section of the Sample Disposal Area. It is stored until several Carboys are accumulated then sent to Heritage Treatment Center (as a Small Quantity Generator) who manifests it along with the sulfuric waste.

8.5.2.6 Waste Solvents: Solvents used to rinse glassware, solvents reclaimed during sample extractions, or expired solvents are accumulated in the laboratory. Bottles containing waste solvents are clearly marked and are placed in the flammable section of the Sample Disposal Area for incineration.

Samples and sample derived waste products are not routinely tracked with regard to their precise fate. If clients desire this precise tracking of the fate of their sample, this can be accommodated on a project or client specific basis with adequate advance notice and agreement on procedures.

SECTION 9.0

9.0 Calibration Procedures and Frequency

9.1 Laboratory Instrumentation

A list of laboratory instrumentation is found in Table 9.1, Instrument List.

9.2 Standards Receipt and Traceability

The Material Safety Data Sheet (MSDS) must be on file or sent with a substance before acceptance into the lab. MSDS's included with the shipping container should be in an external envelope so that it can be read and all precautions followed before opening the container.

All chemicals delivered to the lab will be accepted in the shipping and receiving area. Bulk reagents such as acids and solvents will be delivered in large cases which may be stored in the store room until use. The shipping and receiving department will label the date of receipt on the outside of the unopened case and of bulk reagents. All other reagents and analytical standards will be delivered (unopened) immediately to the appropriate Study Manager or Group Leader. The containers will be inspected to check for damage, leakage, etc. If the reagents, standards and bulk reagents taken from the store room are acceptable they will be entered into a logbook with the following information:

1. Identification of compound (CAS number, if possible)
2. Source of Standard or reagent
3. Date of receipt
4. Date first opened
5. Purity
6. Batch or Lot number
7. Stability - expiration date
8. Approximate amount

For ease and/or confidentiality, chemicals or reagents can be assigned (and all bottles labelled with) a sequential laboratory compound (project specific) identification number based on the protocol or contract number. This information is logged in the project specific logbook. Solutions and dilutions of this compound will be tracked through this number.

All manufacturer's certification and traceability statements are maintained on file. The statements will be marked with the date received and the identification of the logbook where they are referenced. When logbooks are

Table 9.1
INSTRUMENT LIST

Division	Instr. Code	Name	Manufacturer	Model
Indianapolis	16	Auto Analyzer II	Technicon	CN, N-NO_3, Phenol
	7	FTIR 1	Biorad	FTS-7
	5	GC/ECD #5 Channel 1	Hewlett Packard	5880A
	9	GC/ECD #9 Channel 1	Hewlett Packard	5880A
	24	GC/ECD #24 Channel 1	Hewlett Packard	5890
	25	GC/ECD #25 Channel 1	Hewlett Packard	5890 Series II
	5	GC/ECD #5 Channel 2	Hewlett Packard	5880A
	9	GC/ECD #9 Channel 2	Hewlett Packard	5880A
	24	GC/ECD #24 Channel 2	Hewlett Packard	5890
	25	GC/ECD #25 Channel 2	Hewlett Packard	5890 Series II
	41	GC/FID/NPD	Hewlett Packard	5890
	106	GC/FID (Dual Channel)	Hewlett Packard	5890 Series II
	104	GC/FID/PID/ELCD w/Purge & Trap	Varian	3400
	35	GC/MS 1 w/Purge & Trap	Hewlett Packard	5985 w/5840 GC
	36	GC/MS 2	Hewlett Packard	5987A w/5880 GC
	37	GC/MS 3 w/Heated Purge & Trap	Hewlett Packard	5970 w/5890 GC
	38	GC/MS 4 w/Purge & Trap	Hewlett Packard	5970 w/5890 GC
	39	GC/MS 5 w/Purge & Trap	Hewlett Packard	5970 w/5890 Series II
	40	GC/MS 6	Hewlett Packard	5970 w/5890 GC
	107	GC/MS 7 w/Purge & Trap	Hewlett Packard	5890 w/5890 GC
	160	GC/MS 8	Hewlett Packard	5971 MSD
	19	GC/PID/ELCD w/Purge & Trap	Hewlett Packard	5890
		GC/PID/FID - Portable	HNu	
	101	Gas Flow Proportional Counter	Canberra	2405
	96	HPLC 1 w/Photodiode Array Detector and Fluorescence Detector	Waters	600E
	100	HPLC 2 w/Multi-Wave Length Detector, Scanning Fluorescence Detector and Pickering Post-Column Derivitization	Waters	600E
	32	ICP, Simultaneous	Thermo Jarrell Ash	61
	29	FAA	Instrumentation Laboratories	S12

Table 9.1
INSTRUMENT LIST

Division	Instr. Code	Name	Manufacturer	Model
Indianapolis	46	ISE Meter 1 (Gen)	Beckman	PHI 34
	47	ISE Meter 2 (Metals)	Beckman	PHI 34
		Digital Ion Analyzer (Gen)	Orion	601A
	98	Auto Analyzer (Lachat)	Lachat Instr.	2300
	33	FAA (CVAA, PE2380)	Perkin Elmer	2380
	34	GFAA (PE3030)	Perkin Elmer	3030/Zeeman
	30	GFAA (PE5100-A)	Perkin Elmer	5100/Zeeman
	31	GFAA (PE5100-B)	Perkin Elmer	5100/Zeeman
	45	Spectrophotometer	Sequoia-Turner	690
	110	TOC (Combustion IR)	Rosemount Analytical/ Dohrman	DC-190
	26	TOX I	Envirotech/ Dohrman	MC-1
	27	TOX II	Xertex/Dohrman	MC-1(DX-20)
	44	Turbidimeter	Hach	2100A
	63	GC/ECD 3 (1 of 2 CH)	Hewlett Packard	5890
	63	GC/FID 1 (2 of 2 CH)	Hewlett Packard	5890
	114	Conductivity Meter	Yellow Springs Instruments	35
	125	Dissolved Oxygen meter	Yellow Springs Instruments	59
	126	Balance 1 (to 0.0001g)	Sartorius	1601 MP8
	127	Balance 2 (to 0.0001g)	American Scientific	SP180
	128	Balance 3 (Top Loading to 0.001g)	Ohaus	B300D
	129	Balance 4 (Top Loading to 0.01g)	Fisher	7240DA
	130	Balance 5 (Top Loading to 0.01g)	Mettler	PM4000
	131	Balance 6 (Top Loading to 0.01g)	Ohaus	300
	132	Balance 7 (Top Loading to 0.01g)	Fisher	S-400
	133	Balance 8 (to 0.0001g)	Mettler	AE200
	134	Balance 9 (Top Loading to 0.001g)	Ohaus	E400D
	135	Balance 10 (Top Loading to 0.001g)	Ohaus	E400D
	136	Balance 11 (Top Loading to 0.01g)	Fisher	LX500
	137	Balance 12 (microBalance to 0.00001)	Mettler	M3

Table 9.1
INSTRUMENT LIST

Division	Instr. Code	Name	Manufacturer	Model
Charlotte	92	FAA (CVAA, PE360)	Perkin Elmer	360
	91	FAA	Perkin Elmer	3030
	90	GC/NPD/FPD	Hewlett Packard	5890 Series II
	87	GC/ECD	Hewlett Packard	5890
	89	GC/FID/PID/ELCD	Hewlett Packard	5890
	88	GC/FID/ECD	Hewlett Packard	5730
	85	GC/MS 1	Hewlett Packard	5970 w/5890 GC
	86	GC/MS 2	Hewlett Packard	5970 w/5890 GC
	103	GC/MS 3	Hewlett Packard	5970 w/5890 GC
	108	GC/PID/FID	Varian	3400
	93	GFAA 1	Perkin Elmer	3030/Zeeman
	94	GFAA 2	Perkin Elmer	3030/Zeeman
	84	Auto Analyzer, Traacs	Bran & Luebbe	800 AA
	138	Conductivity Meter	Myron	EP
	139	Spectrophotometer	Milton Roy	21DV
	140	Dissolved Oxygen Meter	Yellow Springs Instruments	54A
	141	Bomb Calorimeter	Parr	1241
	142	ISE Meter #2	Orion	920A
	144	ISE Meter #1	Cole Parmer	5986.50
	145	Turbidimeter	Hach	2100A
	149	Analytical Balance, Top Loading	Ohaus	B300D
	150	Analytical Balance	Mettler	H30
Kansas City	77	Bomb Calorimeter	Parr	1241
	76	ISE 1	Fisher Scientific	Accummet 925
	72	Balance 1 (to 0.0001g)	Mettler	AE620
	73	Balance 2 (Top Loading to 0.001g)	American Scientific Products	
	74	Balance 3 (to 0.0001g)	American Scientific Products	SP 120
		Balance 4 (Top Loading to 0.001)	Denver Instrument Company	XE Model 3000D
		Balance 5 (Triple Beam to 0.1g)	Fisher	711

Table 9.1
INSTRUMENT LIST

Division	Instr. Code	Name	Manufacturer	Model
Kansas City		Digital Thermometer	Fisher	Serial #L064041
	65	GC/ECD 1 (1 of 2 CH)	Hewlett Packard	5890
	65	GC/ECD 2 (2 of 2 CH)	Hewlett Packard	5890
	115	GC/MS w/Purge & Trap	Hewlett Packard	5970 w/5890 GC
	116	GC/MS	Hewlett Packard	5970 w/5890 GC
	117	IR Spectrophotometer	Perkin Elmer	1310
	70	FAA (PE2380) w/CVAA	Perkin Elmer	2380
	71	GFAA (PE3030)	Perkin Elmer	3030/Zeeman
	28	TOC 1	Beckman	915B Tocamaster
	118	Dissolved Oxygen Meter	Yellow Springs Instruments	54A
	119	Conductivity Meter	Orion	124
Romeoville (Chicago)	120	Balance 5 (to 0.01g)	Mettler	BB300
	121	Balance 6 (to 0.001g)	Ohaus	E400
	60	Balance 2 (to 0.0001g)	Mettler	AE260-S
	99	Balance 3 (to 0.0001g)	Mettler	AF100
	61	Bomb Calorimeter	Parr	1241 Ea
	54	Conductivity meter	Cole/Parmer	1484-20
	50	GC/ECD/FID	Hewlett Packard	5890A
	51	GC/ECD/FID	Hewlett Packard	5890A
	102	GC/MS 1	Hewlett Packard	5970 w/5890 GC
	49	GC/MS w/Heated Purge & Trap	Hewlett Packard	5970 w/5890 GC
	20	FAA, CVAA, GFAA	Instrumentation Laboratories	V12E
	58	Balance 4, Top Loading	Ohaus	E300D
	57	Dissolved Oxygen Meter	Yellow Springs Instruments	54ABP
	97	FAA (CVAA, PE2380)	Perkin Elmer	2380
	105	ICP, Sequential	Perkin Elmer	P40
	22	GFAA (PE5100)	Perkin Elmer	5100/Zeeman
	55	ISE Meter 1	American Scientific Products	
	56	ISE Meter 2	Orion	SA520

Table 9.1
INSTRUMENT LIST

Division	Instr. Code	Name	Manufacturer	Model
Romeoville (Chicago)	59	Analytical Balance	American Scientific	B1240-2
	159	pH Meter	Orion	520A
	95	ISE Meter 3	Orion	520
	52	Spectrophotometer 1	Milton Roy	SPEC 21
	53	Spectrophotometer 2	Milton Roy	SPEC 21
	122	GC/MS A w/Purge and Trap	Hewlett Packard	5970 w/5890 GC
	123	GC/MS B	Hewlett Packard	5970 w/5890 GC
	124	FTIR	Matheson	Galaxy 2020
	161	Spectrophotometer 3	Milton Roy	SPEC 21

Abbreviations/Acronyms:

GC	=	Gas Chromatograph	MS	=	Mass Spectrometer
ECD	=	Electron Capture Detector	NPD	=	Nitrogen-Phosphorus Detector
FTIR	=	Fourier Transform Infra-Red	PID	=	Photoionization Detector
ELCD	=	Electrolytic Conductivity Detector	ICP	=	Inductively Coupled Argon-Plasma
FAA	=	Flame Atomic Absorption	CVAA	=	Cold Vapor Atomic Absorption
GFAA	=	Graphite Furnace Atomic Absorption	TOC	=	Total Organic Carbon
TOX	=	Total Organic Halides	FPD	=	Flame Photometric Detector
ISE	=	Ion Selective Electrode	CH	=	Channel(s)
IR	=	Infra-Red, Dispersive	FID	=	Flame Ionization Detector

archived, the associated certification file documentation is archived with the logbook.

Only standard sources approved by the QA Unit may be used. Standards will be traceable to NIST when possible.

9.3 Standard Sources and Preparation

Stock solutions are prepared by the Group Leader or their designee for the purpose of making standards and performing analyses. There must be no handling of the reagents directly from the reagent bottles. Instead, minimal amounts are to be placed in interim holding containers. Unused stock solutions must not be poured back into original containers. The possible toxicity of the reagents must be noted and respected. Stock solutions are to be made using analytical reagent grade or other appropriate grade solvents. Storage precautions must be noted and observed with regard to heat and light sensitive compounds. Solutions must be kept in the proper container tightly sealed (amber glass where necessary) with Teflon lined lids in an appropriate refrigerator. No mouth pipetting is permitted.

When preparing stock solutions, at least 0.1000 grams or 1.00 ml of reagent is to be used, when possible or practical. Direct delivery into a volumetric flask is required. Stock solution preparation noting lot numbers of reagents and solvents in addition to date and initials of person preparing the solutions must be noted and recorded on the label and in the appropriate standards logs.

Stock solutions under proper storage (refrigerated if necessary) may be kept for a period not to exceed the maximum recommended storage time. Standard solutions are prepared from the stocks by the analyst on a daily, weekly, or monthly basis as necessary.

Standard sources and preparation protocols are listed in Table 9.2, STANDARD SOURCES AND PREPARATION. This table includes the following information:

1. Instrument group

2. Source and traceability of primary standards

3. Frequency of preparation

4. How primary and working standards are stored.

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
GC/MS - Volatile						
Methods 624, 824Ø	Supelco or equivalent	200ppm	frozen	1:10 dilution in methanol[1]	Refrig.	Weekly or as needed
Method 524	Supelco or equivalent	2000ppm	frozen	Stock solution 1:20 in methanol[1] Working solution 1:10 in methanol[1]	Refrig.	Quarterly, Every 2 weeks or as needed
CLP OLMØ1	Ultra or equivalent	100ppm	frozen	1:5 dilution in methanol[1]	Refrig.	Weekly or as needed
Appendix IX	AccuStandard or equivalent	Available 100-500 ppm	frozen	Dilute to 20ppm[1]	Refrig.	As needed
GC/MS - Semi-Volatile						
Methods 625, 8270	Supelco, Restek or equivalent	2000ppm	frozen	Make dilution to 160 ppm[1]	Refrig.	Every 2 weeks
Method 525	AccuStandard or equivalent	100ppm	frozen	Stock solution - 1:10 in methanol[1]	Refrig.	As needed
CLP OLMØ1	Ultra or equivalent	2000ppm	frozen	Stock solution - 160ppm[1]	Refrig.	As needed
Appendix IX	AccuStandard or equivalent	available from 100-250ppm	frozen	Run as received or dilute to 160ppm[1]	Refrig.	As needed

[1]Daily calibration standards are made from stock solutions at method specified concentrations.

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
HPLC	Supelco Polynuclear Aromatic Hydrocarbon Mix Supelcopreme-HC or equivalent	Solutions of 2000μg/mL	Refrig.	Working stocks prepared from source stock	NA	Spiking solution extract with each sample set
	Supelco Polynuclear Aromatic Hydrocarbons Mixture 610-M or equivalent	Solutions of 100 to 2000 g/ml μ	Refrig.	Working stocks prepared from source stock	Refrig.	Semi-annual
	NIST-1647a PNA's	Solutions of 0.771 to 19.9 μg/mL	Refrig.	Working solutions prepared from source	NA	Per sequence
	AccuStandard PAH Additions to Method 610-M or equivalent	Solution of 0.1 mg/mL in CH_2Cl_2	Refrig.	Working solution prepared from source	Refrig.	Semi-annual
	USEPA QC Sample PNA I WP 485	Solution of 5 to 100 μg/mL	Refrig. if seal is broken	Working solution prepared from source	Refrig.	2 months

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
HPLC	AccuStandard N-Methyl Carbamoyl Oximes and N-Methyl Carbamates in Drinking Water or equivalent	0.1 mg/mL in ACN	Refrig.	Working solution prepared from source	Room temp. protect from light	2 months
	Aldrich 4-Bromo-3,5-Dimethyl-Phenyl N-Methyl-Carbamate (BDMC) ISTD or equivalent	98% neat	Room temp.	Primary stocks ~1000 mg/L Intermediate stock ~100 mg/L Working - 5μL of Int. → 50 mL	Room Temp. protect from light	2 months 2 months Working-Daily
	AccuStandard Methiocarb (for LCS) or equivalent	Neat	Room temp.	Primary stock ~1000 mg/L Intermediate stock ~2 mg/L Working solution ~2PPB	Room temp. protect from light	2 months 2 months Working - Daily
	AccuStandard Aldicarb-Sulfoxide (for LCS) or equivalent	Neat	Room temp.	Primary stock ~1000 mg/L Intermediate stock ~100 mg/L Working solution ~100PPB	Room temp. protect from light	2 months 2 months Working - Daily

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
GC/PID/ELCD	AccuStandard or equivalent	Stock solution 2000 µg/mL	Freezer 0°C	Working solutions 20µg/mL	Freezer (with minimal headspace)	4 weeks,Gaseous stds. 1 week unless validity proven
	Supelco or equivalent	Stock solution 200 - 2000 µg/mL	Freezer 0°C	Working solutions 20µg/mL	Freezer (with minimal headspace)	4 weeks,Gaseous stds. 1 week unless validity proven
	Chem Service or equivalent	Neat compounds	Refrig.	Stock solutions ~ 10,000 µg/mL Working solution ~ 20 µg/mL	Freezer (minimal headspace	As needed for special analyte lists. 4 weeks unless validity proven.
FTIR	USEPA - API reference oil, #2 fuel oil	Neat compound	Refrig.	<u>Stock solutions:</u> Calibration Std. ~ 7500 Spiking soln ~ 20,000	Refrig.	6 month exp.
				Working calibration std. from stock soln. L-1 ~ 8 mg/l L-2 ~ 15 L-3 ~ 77 L-4 ~ 380 L-5 ~ 770 L-6 ~ 2300	NA	with every calibration
				Daily verification std. L-3 ~ 77	NA	Daily

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
ICP (LCS, ICV)	3 solutions SPEX multi-element or equivalent	50-10,000ppm multi-element mixes	Room temp.	Dil. 1:10 from source for LCS or as required	1%HNO_3	Bi-weekly or as needed
ICP (Cal. Std's)	3 solutions - SPEX multi-element or equiv.	100-5,000ppm Multi-element mixes	Room temp.	Dil. 1:50 from source or as required	5% HCl 1%HNO_3	Weekly
ICP	Perkin Elmer CLP Calibration Stds. or equiv.	1-1,000ppm	Room temp.	Intermediate solutions prepared from stock	1% HNO_3	Weekly
ICP	EPA ref. materials	1-5ppm	Room temp.	Working solution prepared from source	1% HNO_3	As needed
FAA (Cal. Stds.)	Fisher, RICCA or equiv.	1,000ppm	Room temp.	Working stock prepared from source 0.1 to 50 ppm	1% HNO_3	Monthly or as needed
FAA (LCS, ICV)	Spex multi-element or equiv.	50-2000ppm mix	Room temp.	1:500 dil. for LCS or as needed	1% HNO_3	Biweekly or as needed
FAA (Cal. Std's)	JM Specpure or equiv.	1000ppm	Room temp.	Ba, Pb-1:10 from source. Others - 1:10 intermed. from source then: 0.1-5ppm working from intermediate	2.5% HNO_3	Weekly or as needed
FAA	EPA ref. materials	1-5ppm	Room temp.	Working solution prepared from source	1% HNO_3	As needed

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group	Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
ICP, FAA, GFAA (LCS)	Conostan S-21 or equiv.	Metals in oil matrix As, Se = 100 mg/L Al, Ca, Fe, K, Mg, Na = 1,000 mg/L All other metals = 400 mg/L	Room temp.	Working solution prepared from source	NA	As needed
CVAA (LCS, ICV)	NIST 1641B	1.52ppm	Room temp.		0.2% $KMnO_4$	Daily
CVAA (Cal. Std's)	Fisher, RICCA or equiv.	1000ppm	Room temp.	250ml → 25mL from source = 10ppm intermediate std. 1mL → 100mL = 0.1ppm working std.	5% HNO_3 0.2% $KMnO_4$	Daily
CVAA	EPA ref. materials	As provided	Room temp.	Working solution prepared from source	1% HNO_3	As needed
GFAA (Cal. Stds.)	Fisher, RICCA, SPEX, Specpure or equiv.	1,000ppm	Room temp.	Working solution prepared from intermediate	1% HNO_3 & 5% HNO_3	Weekly or as needed
GFAA (ICV, LCS)	EPA ref. materials	1-5ppm, As provided	Room temp.	Working solution prepared from source	1% HNO_3	As needed
GFAA (LCS)	PE pure Inorganic Ventures or equiv.	1,000ppm	Room temp.	Stock prepared from source	5% HNO_3	Semi-annually or as needed

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
Conductivity Meters	CAL	Fisher or equiv.	Potassium hydrogen phthalate (KHP) granular	Room temp.	0.3g/1000mls DI (168μmhos)	.Refrig. 4°C	6 mos. or as needed
	ICV	Fisher or equiv.	Potassium chloride granules	Room temp.	0.7456g/1000ml DI (1413μmhos)	.Refrig. 4°C	6 mos. or as needed
ISE Meters	(PH)	Commercial Lab Supplies	pH, 7, 4 & 10	Room temp.	None	Room temp.	NA
Chloride	CAL	Fisher or equiv.	NaCl granules	Room temp.	1.6480g/1000mls (500ppm)(CAL)	Room temp.	6 mos. or as needed, exp. date on bottle
	ICV	Ricca or equiv.	Chloride Standard (3540ppm)	Room temp.	premade (3540ppm)(ICV)		
Fluoride	CAL	Mallinckrodt or equiv.	NaF granules (CAL)	Room temp.	0.221g/11 DI (100ppm)(CAL)	Room temp.	6 mos. or as needed, exp. date on bottle
	ICV	Ricca or equiv.	Fluoride 100ppm (ICV)	Room temp.	premade (ICV)		
Ammonia	CAL	Mallinckrodt or equiv.	Ammonium chloride granules (CAL)	Room temp.	3.819g/1c DI (1000ppm)(CAL)	Room temp.	exp. date on bottle
	ICV	Ricca or equiv.	Ammonia (ICV)	Room temp.	premade (ICV)		
Spectrometers Phenols	CAL	Chem Service or equiv.	Phenol crystals (CAL)	Room temp.	0.1g/100mls of boiled DI (CAL)	Room temp.	6 mos or as needed, exp. date on bottle
	ICV	RICCA/Mallinc-krodt or equiv.	Phenol 1000ppm (ICV)	Room temp.	Premade (ICV)		

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
Nitrite	CAL	Fisher or equiv.	KNO_2 granules (CAL)	Room temp.	3.351g/500mls w/2mls $CHCl_3$ (CAL)		3 mos. or as needed, exp. date on bottle
	ICV	Red Bird or equiv.	premade (ICV)	Room temp.	premade (100ppm) (ICV)		
Nitrate	ICV	Red Bird or equiv.	Nitrate 1000ppm (ICV)	Room temp.	premade (100ppm) (ICV)	Room temp.	exp. date on bottle, semi-annually
	CAL	Fisher or equiv.	KNO_3 granules (CAL)	Room temp.	3.609g/500mls DI (CAL)		
Sulfate	ICV	Fisher or equiv.	$NaSO_4$ granules	Room temp.	1.479g/1c DI 100ppm (ICV)	Room temp.	6 mos. or as needed
	CAL	Red Bird or equiv.	1000 ppm SO_4	Room temp.	Premade 1000 ppm (CAL)		
Cyanide	ICV	Mallinckrodt or equiv.	KCN granules (ICV)	Room temp.	.251g/100, 1000ppm (ICV)	Room temp.	6 mos. or as needed
	CAL	Kodak or equiv.	KCN granules (CAL)	Room temp.	.251g/100mls, 1000ppm (CAL)		
PO_4	ICV	RICCA or equiv.	Phosphorus 1000ppm (ICV)	Room temp.	premade	Room temp.	6 mos. or as needed
	CAL	Fisher or equiv.	KH_2PO_4 granules (CAL)	Room temp.	0.1099g/500mls		

Table 9.2
STANDARD SOURCES AND PREPARATION

Instrument Group		Standard Sources/ Traceability	Concentrations Received	Source Storage	Preparation from Source[1]	Lab Stock Storage	Prep Frequency
COD Reactor	CAL	Fisher or equiv.	$K_2Cr_2O_7$ crystals (CAL)	Refrig. 4°C	12.259g/L	Refrig. 4°C	every other month
	ICV	Fisher or equiv.	KHP (ICV)	Refrig. 4°C	0.4250g/L (500ppm)		
Hexavalent Chromium	CAL	Fisher or equiv.	$K_2Cr_2O_7$ crystals 50ppm (CAL)	Room temp.	0.1414g/1000mls 50ppm	Room temp.	6 mos. or as needed, exp. date on bottle
	ICV	Hach or equiv.	premade (ICV)	Room temp.	premade 50ppm		
Alkalinity	ICV	Hach or equiv.	Sodium Bicarbonate	Room temp.	0.673g/1000mls	.Refrig. 4°C	6 mos.
TDS		Fisher or equiv.	KHP granules	Room temp.	0.3g/1000mls	.Refrig. 4°C	3 mos.
Bomb Calorimeter	Soils	Fisher or equiv.	Ethylene glycol	Flammable cabinet premade	N.A. premade	Flammable cabinet (room temp.)	as needed
	Liquids	Parr	Benzoic Acid	premade	.25 (1 tablet)	Room temp.	purchased as new
TKN Digestor	ICV	Hach	glycine p-toluenesulfonate granules	Room temp.	1.7652g/L 100ppm	Room temp.	6 mos. or as needed
Oxygen Meter	CAL	Fisher (CAL) or equiv.	glutamic acid and dextrose	Room temp.	.15g/L	Room temp.	once a month or as needed
	ICV	Fisher (ICV)	KHP	Room temp.	.15g/L		

1 Daily calibration standards are made from stock solutions at method specified concentrations. Exact dilutions and final concentrations may vary depending on the source available and the final concentrations required.

All stock and standard solutions are to be labeled with:

- Contents and level of concentration
- Discrete identifying ID
- Solvent
- Date of preparation
- Manufacturer's Lot number
- Initials of preparer
- Expiration date
- Other information which may be appropriate
- This information must also be entered into the group's standards log book

9.4 Standardization of Titrating Solutions

The laboratory uses purchased pre-standardized reagents when possible for all those solutions and methods requiring standardization. Refer to Table 9.3, Standardization Of Titrating Solutions for solutions that require standardization, the source of the primary standards used to standardize, and the frequency of standardization. Standardization must be documented in some manner.

9.5 Calibration of Thermometers

All thermometers are labelled and calibrated with a NIST certified thermometer. A logbook documents this calibration. Thermometers are calibrated every two years or more frequently as needed.

9.6 Calibration of Balances

All analytical balances except top loading balances will be checked daily (or each day of use) using a "class S" certified weight. The QA Unit will perform a weekly 5 point check of all balances in the laboratory. Logbooks will be used to document this calibration.

Table 9.3
STANDARDIZATION OF TITRATING SOLUTIONS

Solution (N)	Source of Primary Standard	Frequency of Standardization	Methods Utilized
EDTA (0.2N)	$CaCO_3$ NIST	Daily	130.2
NaOH (0.02N)	$KHC_8H_4O_4$ NIST	As Needed (Each new soln.)	305.2
H_2SO_4 (0.1N)	Na_2CO_3 NIST	As Needed (Each new soln.)	375.4, 310.1, 350.2
HCl (0.1N)	Na_2CO_3 NIST	As Needed (Each new soln.)	310.1
Phenylarsine Oxide (0.0375N)	$KH(IO_3)_2$ Fisher	Daily	345.1, 320.1
$Na_2S_2O_3$ (0.75N)	$KH(IO_3)_2$ Fisher	Daily	320.1
$Hg(NO_3)_2$ (0.141N)	NaCl NIST	Daily	325.3
$Hg(NO_3)_2$ (0.025N)	NaCl NIST	Daily	325.3
$Hg(NO_3)_2$ (0.0141N)	NaCl NIST	Daily	325.3
Phenylarsine Oxide (0.00564N)	$KH(IO_3)_2$ Fisher	Daily	330.2
KI (0.1N)	PAO Red Bird Service	Daily	330.2
KI (0.0282N)	PAO Red Bird Service	Daily	330.2
$Fe(NH_4)_2(SO_4)_2$ (N)	$K_2Cr_2O_7$ NIST	Monthly	330.4
KCN (0.0192N)	$AgNO_3$ Red Bird Service	Monthly	335.2
$Na_2S_2O_3$ (0.0375N)	$KH(IO_3)_2$ Fisher	Daily	345.1
KI (0.0225N)	PAO, $Na_2S_2O_3$	Daily	376.1
Methylene Blue	KI	Daily	376.2
$Fe(NH_4)_2(SO_4)_2$(0.25N)	$K_2Cr_2O_7$ NIST	Daily	410.1, 440.3
$Fe(NH_4)_2(SO_4)_2$(0.025N)	$K_2Cr_2O_7$ NIST	Daily	410.2
I_2	$Na_2S_2O_3$	Bi-Weekly	

9.7 Calibration of Eppendorfs/Pipettors

All pipettors required to deliver precise volumes are calibrated weekly. This calibration is documented in a logbook which identifies the specific pipettor.

9.8 Instrument Performance Parameters - Start-up QC

Performance parameters are checked at the beginning of each analytical run and are used as a check to determine acceptable instrument performance. The operating conditions are documented in a bound log book.

9.8.1 Metals Analysis Instrument Performance Parameters

Performance parameters are checked at the beginning of each analytical run. The operating conditions are documented in a bound instrument log book, one for each instrument. The following information is recorded:

GFAA, FAA:	Date, element, analyst, standard concentration, standard absorbance, comments.
CVAA:	Date, element, analyst, standard concentration, standard absorbance, blank absorbance, comments.
ICP:	Date, analyst, emission "counts" for calibration standard and blank for Ba, Cd and Sb, Ar flow, Hg (or Cd or Mn) profile, comments.
Hydride AA:	Date, element, analyst, standard concentration, standard absorbance, blank absorbance, comments.

The following minimum criteria must be met before proceeding with the analytical run, unless approval is obtained from the appropriate supervisor.

ICP:	Emission count criteria for Mn is 30,000; data is being accumulated for other elements. The Hg (or Cd) profile must be ± 0.20.
CVAA:	The 3 ug/L calibration standard must be greater than or equal to 0.080 abs. The blank must have

an absorbance of less than 0.005. The calibration correlation coefficient must be at least 0.995.

FAA: The highest calibration standard (designated in log book) must have an absorbance of at least 80% of the instrument manual value (Ba and Cr require 70%). This value is found on the chart by the instrument and in the instrument manual. The correlation coefficient must be at least 0.995.

GFAA: A mid-range standard (designated in the log book; at the level of the analytical spike) must have an absorbance of at least the value in Table 9.4, GFAA Minimum Absorbance Criteria. The correlation coefficient must be at least 0.995.

Hydride AA: The 3 ug/L calibration standard must be greater than or equal to 0.080 abs. The blank must have an absorbance of less than 0.005. The calibration correlation coefficient must be at least 0.995.

9.8.2 Mass Spectrometry Performance Parameters

Each system used for the analysis of volatile compounds must be tuned to meet the abundance criteria listed below for BFB.

	Method 624/8240	Method 524
Mass	Target Value	Target Value
50	15%-40%	15%-40%
75	30%-60%	30%-80%
95	100%	100%
96	5%-9%	5%-9%
173	< 2% of 174	< 2% of 174
174	> 50%	> 50%
175	5%-9% of 174	5%-9% of 174
176	95%-101% of 174	95%-101% of 174
177	5%-9% of 176	5%-9% of 176

Table 9.4
GFAA MINIMUM ABSORBANCE CRITERIA

Element	Standard (ug/L)	Min. Abs.
As	10	0.035
Be	2.0	0.025
Cd	2.0	0.050
Cu	10	0.050
Cr	10	0.100
Pb	10	0.050
Ni	10	0.035
Sb	10	0.035
Ag	2.0	0.025
Se	10	0.025
Tl	10	0.040

These criteria cannot (routinely) be met using the AUTOTUNE file. It may be necessary to adjust the various lenses. The ratios of 69/219/502 should be around 100%/40%/4% for the MS's and 100%/25%-30%/2% on the MSD's. Run mass axis and width calibration and look at a profile scan before storing the tune and exiting the program.

The mass spectrometers are considered to be in tuning compliance for 12 hours after the injection (and passing the criteria) of the tuning compound for SW846 methods and for 8 hours for EPA 524. EPA method 624 has no time limitation on the tune or continuing calibration check, but sequences are not run for greater than 24 hours. Any analytical run which lasts longer than the method allows must include a tune check at or before the time period expires. Background correction may only be used to eliminate column bleed or instrument background ions. A hardcopy report of each tune check (spectrum and mass listing) is kept in the run folder. Background correction technique must be recorded.

Each system used for the analysis of semi-volatile compounds must be tuned to meet the abundance criteria listed below for DFTPP.

	Method 625/8270	Method 525
Mass	Target Value	Target Value
51	30%-60% of 198	10%-80% of 198
68	< 2% of 69	< 2% of 69
70	< 2% of 69	< 2% of 69
127	40%-60% of 198	10%-80% of 198
197	< 1% of 198	< 2% of 198
198	100%, Base Peak Relative Abund.	100% or > 50% of 442
199	5%-9% of 198	5%-9% of 198
275	10%-30% of 198	10%-60% of 198
365	> 1% of 198	> 1% of 198
441	present and < 443	present and < 443
442	> 40% of 198	100% or > 50% of 442
443	17%-23% of 442	15%-24% of 442

These criteria cannot (routinely) be met using the AUTOTUNE file. It may be necessary to adjust the various lenses. Run mass axis and width calibration and look at a profile scan before storing the tune and exiting the program.

The mass spectrometers are considered to be in tuning compliance for 12 hours after the injection (and passing the criteria) of the tuning compound for SW846 methods and for 8 hours for EPA 525. EPA method 625 has no time limitation on the tune or continuing calibration check, but sequences are not run for greater than 24 hours (sample capacity limitation). Any analytical run which lasts longer than the method allows from the injection of DFTPP, must include a tune check at or before the time expires. Background correction may only be used to eliminate column bleed or instrument background ions. A hardcopy report of each tune check (spectrum and mass listing) is kept in the run folder. Background correction technique must be recorded in the log book.

9.8.3 Gas Chromatography and Liquid Chromatography (HPLC) Performance Parameters

Gas Chromatography (GC) and High Performance Liquid Chromatography (HPLC) techniques require three basic checks used to evaluate the system upon start-up.

1. Column efficiency

2. Resolution (resolution and column eff.)

3. Detector efficiency

9.8.3.1 Column efficiency is measured by an artificial concept called theoretical plates. In order to compare column efficiencies one must utilize identical conditions for the following:

1. Solvent

2. Solute

3. Temperature

4. Flow Rate

5. Sample size

Broadening of the peaks (under identical instrument and method conditions, see above) indicates a decrease in the number of theoretical plates and therefore less desirable chromatography. A representative compound for the method being utilized will be chosen and a theoretical number of plates will be calculated from the calibration standard(s) run at the beginning of each sequence. The number of theoretical plates will be documented in a log book and will be used to assist in the determination of column acceptability.

Tangents are drawn to the peak at the points of inflection. The number of theoretical plates n, is given by:

$$\frac{n}{cm} = \frac{5.545\left(\frac{RT}{W_h}\right)^2}{L}$$

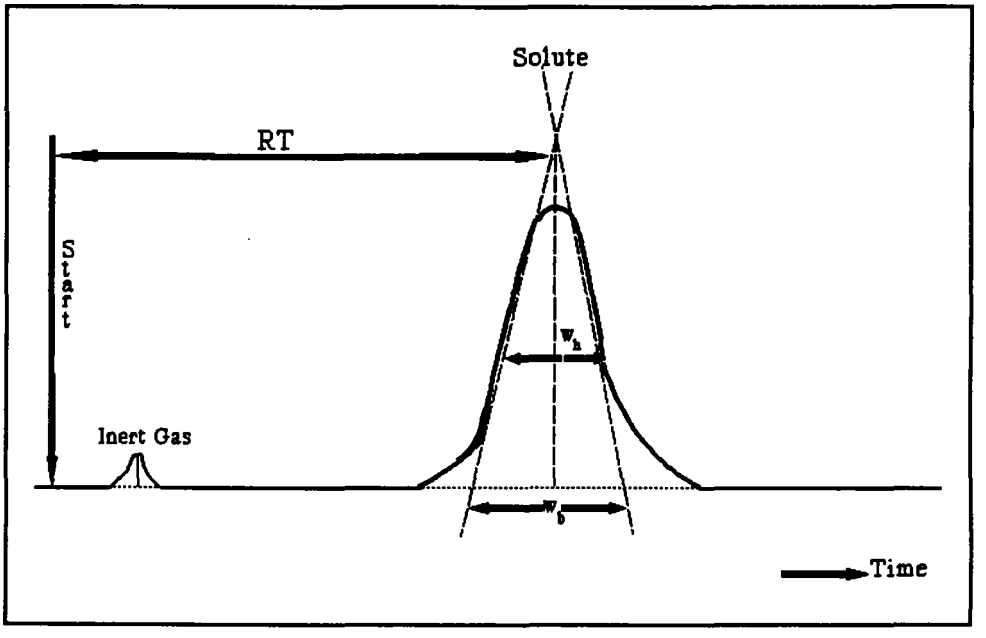
Where: RT = distance from injection to peak maximum in centimeters
W_h = peak width at half height in centimeters
L = column length in centimeters

See Figure 9.1, Calculation of Theoretical Plates.

The peak gaussian factor (PGF) will be calculated when required as per the method specified analyte and must meet the method specified criteria. The PGF will be documented in a log book. The PGF calculation is required by some drinking water methods.

Figure 9.1

CALCULATION OF THEORETICAL PLATES



$$\frac{n}{cm} = \frac{5.545\left(\frac{RT}{Wh}\right)^2}{L}$$

n = # theoretical plates
RT = distance from injection to peak maximum (retention time in centimeters)
W_h = peak width at half height
L - column length in centimeters

or;

$$n = \frac{16\left(\frac{RT}{W_b}\right)^2}{L}$$

ıere: W_b = Width of peak at base

$$PGF = \frac{1.83(W_h)}{W_{1/10}}$$

Where: W_h = peak width at half height
$W_{1/10}$ = peak width at one-tenth height

9.8.3.2 Resolution is a measure of both the column and solvent efficiencies. It indicates both the separation of peak maxima (retention times) and the narrowness of peaks. Representative or method specified compounds will be utilized to calculate resolution at the beginning of the analytical run. The formula for resolution (R) is:

$$R = \frac{2d}{W_1 + W_2}$$

Where: d = difference in elution times between two peaks
W_1 = peak width for analyte 1.
W_2 = peak width for analyte 2.

See Figure 9.2, Calculation of Resolution.

Retention time windows will be established for all GC methods each time a new column is installed. The concentration of each analyte will be such that the response is approximately half scale. The standard deviation (SD) from 3 injections shall be used to establish the retention time windows. For multi-response analytes, one major peak will be chosen for the calculation.

The performance criterion is:

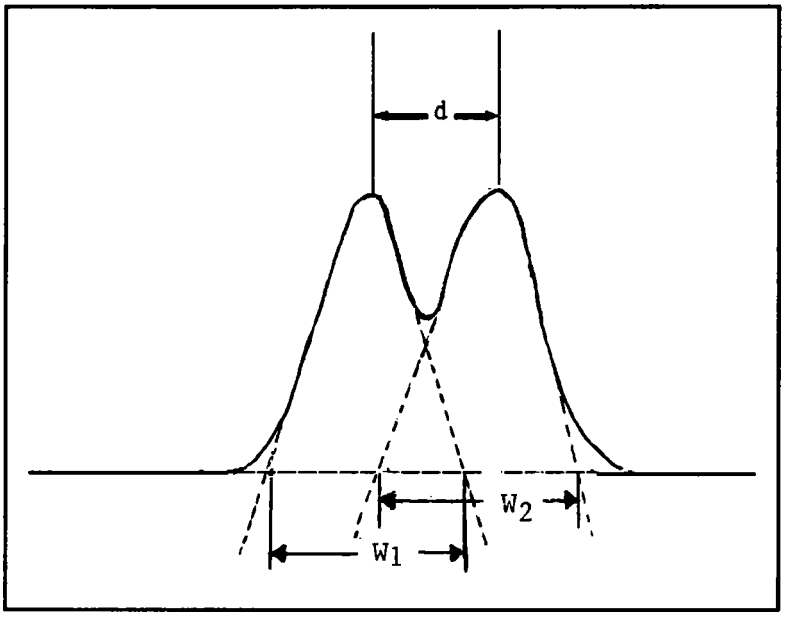
$$RetentionTime: \pm 3(SD)$$

For multi-response analytes the analyst should utilize the retention time window, but will primarily rely on pattern recognition.

9.8.3.3 Detector efficiency will be monitored from the analysis of method specified and/or representative compounds

Figure 9.2

CALCULATION OF RESOLUTION



$$R = \frac{2d}{W_1 + W_2}$$

Where d = difference in elution times between two peaks.
W_1 = peak width for analyte 1.
W_2 = peak width for analyte 2.

chosen such that their response will indicate the optimum minimum acceptable response from the detector. Many methods (i.e.GC/MS) specify compounds called System Performance Check Compounds (SPCC's). SPCC's must meet the minimum RF required by the method for both initial and continuing calibrations. Specifically, USEPA CLP lists minimum RF requirements for each analyte which must be met for both initial and continuing calibrations.

Methods that do not list minimum RF's (detectors other than mass spectrometers) will monitor a chosen analyte or analytes and compare that response to a mean RF ($\overline{RF}$).

$$\textit{Minimum RF: } \pm \frac{\textit{20\% Difference of}}{\textit{the established mean}}$$

9.8.4 Miscellaneous equipment and instrumentation performance requirements are listed below:

Analytical Balance : ± 0.5% of class "S" weight true value

Spectrophotometer : ± 5% of NIST or other standard glass filters intensity

Ovens : ± 3°C of set point

Furnaces : ± 20°C of set point

Conductivity Meter : ± 1% of cell constant's established mean

Refrigerators/Coolers : ± 2°C of set point

Freezers : ± 3°C of set point

Incubators : ± 1°C of set point

D.I. Water System : Conductivity ≤ 1.0 μmhos/cm (or 1.0 MΩ·cm)

Zero Headspace Extractors : Maintain 50 PSI for 1 hour

EP, TCLP Extractors : ± 2 RPMs of specified RPM

9.9 Instrument Calibration Criteria

Instrument Calibration frequency and criteria are detailed in Table 9.5, Instrument Calibration. All linear calibration curves will be fitted by the least squares linear regression technique. This procedure will also be used for calibration curves that require log transforms or similar transforms. The formula for calculation of the regression line is given in Section 12.0, Data Reduction, Validation and Reporting.

Each item of equipment shall, when appropriate, be labeled, marked or otherwise identified to indicate its calibration status, except for those items of equipment which are calibrated more frequently than every 6 months.

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
FAA	SW-846	4	Correlation coefficient must be ≥ 0.995	At least daily, or as required (when CCV fails acceptance criteria)	Every calibration	90-110%R	Every 10 analytical samples	90-110%R
	EPA600/4-79/080	4				90-110%R		90-110%R
	CLP	4				90-110%R		90-110%R
CVAA	SW-846	4				80-120%R		80-120%R
	EPA600/4-79/080	4				80-120%R		80-120%R
	CLP	4				80-120%R		80-120%R
ICP	SW-846	1				90-110%R		90-110%R
	EPA600/4-79/080	1				90-110%R		90-110%R
	CLP	1				90-110%R		90-110%R
GFAA	SW-846	4				85-115%R		85-115%R
	EPA600/4-79/080	4				85-115%R		85-115%R
	CLP	4				90-110%R		90-110%R
pH Meter	SW-846	3	±0.1 STD units of true value			± 0.1 STD units of true value		± 0.1 STD unit of true value
	CLP	3						

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS-volatiles	SW-846 (8240,8260)	5	%RSD<30% (CCC) 1,1-dichloroethene; chloroform 1,2-dichloropropene; toluene ethyl benzene; vinyl chloride RF>0.30(SPCC) chloromethane; 1,1-dichloroethane; bromoform (0.25); 1,1,2,2-tetrachloroethene; chlorobenzene	As needed	As needed	± 20%	daily 12 hr.	CCC %D <25% same SPCC criteria as initial calibration
	40CFR136, 624	5	all cmpds %RSD <35% or use calibration curve	As needed	As needed	± 20%R	daily 24 hr.	Compare w/Table 9.5 "Q" (attached)
	CLP SOW 2/88	5	same as SW846	As needed	As needed, usually w/PE's	± 20%R	daily 12 hr.	same as SW-846

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS-volatiles	CLP SOW OLMO1.5	5	min RF Bromoform 0.10 Vinyl Chloride 0.10 1,1-dichloroethene 0.10 1,1-dichloroethane 0.20 Chloroform 0.20 1,2-dichloroethane 0.10 1,1,1-trichloroethane 0.10 carbon tetrachloride 0.10 bromodichloromethane 0.20 cis-1,3-dichloropropene 0.20 trichloroethene 0.30 dibromochloromethane 0.10 1,1,2-trichloroethane 0.10 benzene 0.50 trans-1,3-dichloropropene 0.10 bromoform 0.10 tetrachloroethene 0.20 1,1,2,2-tetrachloroethane 0.50 toluene 0.40 chlorobenzene 0.50 ethylbenzene 0.10 styrene 0.30 xylene (total) 0.30 bromofluorobenzene 0.20 all % RSD <20.5 Other target compounds must meet minimum RF of 0.10 No %RSD criteria	As needed	As needed, usually w/PE's	± 20%R	Daily every 12 hours	RF criteria same as initial cal. %D <25.0
	EPA 524.2	5	% RSD <20% or use cal curve - all target compounds	As needed	As needed	± 20%R	Daily, every 8 hours	All compounds RF%D <30% ISTD areas >30%, <150% of initial cal.

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS - semi-volatiles	SW846-8270	5	%RSD < 30% (CCC) acenaphthene 1,4-dichlorobenzene hexachlorobutadiene N-nitroso-diphenylamine di-octylphthalate fluoranthene benzo(a)pyrene 4-chloro-3-methylphenol 2,4-dichlorophenol 2-nitrophenol phenol pentachlorophenol 2,4,6-trichlorophenol RF >0.05(SPCC) N-nitrosodipropylamine hexachlorocyclopentadiene 2,4-dinitrophenol 4-nitrophenol	As needed	As needed	± 20%R	Daily, every 12 hours	CCC % D < 25% same SPCC criteria as initial cal.
	40CFR136 625	5	%RSD < 35% or cal. curve all compounds	As needed	As needed	± 20%R	Daily every 24 hours	% D < 20%
	CLP SOW 2/88	5	Same as SW846-8270	As needed	As needed w/PE's	± 20%R	Daily every 12 hours	Same as SW846-8270

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS - semi-volatiles	CLP SOW OLMO1.5	5	min. RF phenol 0.80 bis(2-chloroethyl)ether 0.70 2-chlorophenol 0.80 1,3-dichlorobenzene 0.60 1,4-dichlorobenzene 0.50 1,2-dichlorobenzene 0.40 2-methylphenol 0.70 4-methylphenol 0.60 N-nitrosodipropylamine 0.50 hexachloroethane 0.30 nitrobenzene 0.20 isophorone 0.40 2-nitrophenol 0.10 2,4-dimethylphenol 0.20 bis(2-chloroethoxy)methane 0.30 2,4-dichlorophenol 0.20 1,2,4-trichlorobenzene 0.20 naphthalene 0.70 4-chloro-3-methylphenol 0.20 2-methylnaphthalene 0.50 2,4,6-trichlorophenol 0.20 2,4,5-trichlorophenol 0.20 2-chloronaphthalene 0.80 acenaphthylene 1.30 2,6-dinitrotoluene 0.20 acenaphthene 0.80 dibenzofuran 0.80 2,4-dinitrotoluene 0.20 4-chlorophenylphenylether 0.40 fluorene 0.90 4-bromophenylphenylether 0.10 hexachlorobenzene 0.80					%D < 25 RF criteria same as initial calibration

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/MS - semi-volatiles	CLP SOW OLMO1.5		pentachlorophenol 0.05 phenanthrene 0.70 anthracene 0.70 fluoranthene 0.60 pyrene 0.60 benz(a)anthracene 0.80 chrysene 0.70 benzo(b)fluoranthene 0.70 benzo(k)fluoranthene 0.70 benzo(a)pyrene 0.70 indeno(1,2,3,cd)pyrene 0.50 dibenz(a,h)anthracene 0.40 benzo(ghi)perylene 0.50 nitrobenzene d5 0.20 2-fluorobiphenyl 0.70 terphenyl-d_{14} 0.50 phenol-d_5 0.80 2-fluorophenol 0.60 2-chlorophenol-d_4 0.80 1,2-dichlorobenzene-d_4 0.40 %RSD < 20.5%. Other target compounds have no %RSD but must have RF > 0.01					
	EPA525	6	%RSD < 30% all compounds. Chromatographic separation of isomers	As needed	As needed	± 20%R	daily, every eight hours	RF %D < 30% ISTD areas > 30% < 150% from initial cal.

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC/NPD	N-P containing pesticides EPA 507	3	RF < 20% RSD or single point (single point must be within 20% of sample concentration)	As needed when CCV > 20% diff., upon detection of analyte after running low level single point to demonstrate detectability[2]	quarterly	20%D	2 times daily, beginning and end of day	20%D
	Organophosphorus pesticides SW-846 8141	5	RF < 20% RSD or cal. curve		quarterly	15%D	Daily	15%D
	Simetryn & Terbutryn EPA 619	3	RF < 10% RSD or cal. curve	Daily	As needed and with the prep of new std.	10%D	Each working shift	10%D
	Nitrosamines EPA 607	3	RF < 10% RSD or cal. curve	Daily	As needed and with the prep of new std.	15%D	Each working day	15%D
GC/FID	SW-846 8015	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	Quarterly	15%D	Daily	15%D
	SW-846 8100	5	RF < 20% RSD or cal. curve	With each analytical sequence	As needed, with prep of new std.	15%D	Daily	15%D
	SW-846 8030	5	RF < 20% RSD or cal. curve	As needed when CCV > 15% D	As needed with prep of new standard	15%D	Daily, 10%, ending	15%D

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
HPLC	EPA 531.1	3-5	RF < 20% RSD or single point or calibration curve	As needed, when CCV > 20%D	Quarterly	20%D	Min. of 2 1 beg, 1 end	20%D
	SW-846 8310	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D or every 6 months	As needed, with prep of new std.	15%D	Daily, 10%	15%D
	EPA 610	3	RF < 10% RSD or cal. curve	When CCV > 15%D	As needed, with prep of new std.	15%D CCV vs. cal. curve	Daily 10%	15%D
GC-PID/ ELCD	EPA 502.2	3-5	RF < 10% RSD or cal. curve or single point cal.	When CCV > 20%D	As needed, with prep of new std. or quarterly	20%D	Daily	20%D
	EPA 601	3	RF < 10% RSD or cal. curve	As needed, when ICV or CCV > Table 2 criteria	As needed, with prep of new std.	See method 601 Table 2 criteria ~ 30%D (Q Value)	Daily Note: ICV = CCV in this case (different source than calibration stds.)	For % Rec. see method 601 Table 2 (Q Value)
	EPA 602	3	RF < 10% RSD or cal. curve	As needed, when ICV or CCV > Table 2 criteria		See method 602 Table 2 Criteria ~ 25%D (Q Value)		For % Rec. see method Table 2 (Q Value)
	SW-846 8010	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	As needed, with prep of new std.	15%D	Daily 10%, ending	15%D
	SW-846 8020					15%D		15%D

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-PID/ ELCD	SW-846 8021	5	RF < 20% RSD or cal. curve	As needed, when CCV > 15%D	As needed with prep of new std.	15%D	Daily 10%, ending	15%D
FTIR	EPA 418.1	5	20%D Correlation Coeff. (r) ≥ 0.995	When CCV is > 20%D	As needed, with prep of new std.	20%D	Beg. and end of each sequence	20%D
	Standard Methods 503	5	20%D Correlation Coeff. (r) ≥ 0.995	When CCV is > 20%D	As needed, with prep of new std.	20%D	Beg. and end of each sequence	20%D
GC-ECD	EPA 548.1 (Endothall)	3	Linearity < 20% RSD	Each Run	As needed with each new std. quarterly at a minimum	80-110%	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5%
	CLP-SOW 2/88	3	Linearity <20% RSD Generate calibration curve for all single analytes detected in samples where the % RSD ≥ 10% Retention time windows: Wide Bore capp. column: ± 0.75% Narrow Bore Capp. column: ± 0.15%	Each run or every 72 hours	As needed with each new std. quarterly at a minimum	80-110%	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-ECD	EPA 508	3	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum.	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20%
	EPA 504	5	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5%
	APHA 509A (Standard Methods)	3	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-ECD	EPA 608	3	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%
	SW-846 8080 SW-846 8150	5	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5% Breakdown criteria: DDT <20% Endrin <20% Combined <30%

Table 9.5
INSTRUMENT CALIBRATION

Instrument	Method Reference	# Standards Initial Calibration	Acceptance/ Rejection Criteria - Initial Calibration	Frequency of Calibration	Frequency of Initial Calibration Verification[1]	Acceptance/ Rejection Criteria - Initial Calibration Verification	Frequency of Continuing Calibration Verification[1]	Acceptance/ Rejection Criteria - Continuing Calibration Verification
GC-ECD	EPA 515.1	3	Linearity <20% RSD	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every fifth injection and beginning and end of run.	Primary column %D <15. Conf. column %D <20. R.T. Shift, Capp. columns <0.3%. RT Shift Mega-Bore Columns <1.5%
	EPA OLM01.3	3+Instr. Blank Multi-Comp. Targets Calib. as single point	All peaks 100% resolved. Performance evaluation mixtures (PEMs) ≤ 25.0 RPD. 1 Chromatogram from each of 2 indiv. A&B must yield peak highs of 50-100% of full scale. Resolution of midpoint std. mixes A&B ≥ 90% linearity ≤ 20% RSD except: Surrogates ≤ 30% Any 2 targets ≤ 30% Resolution check mix ≥ 60% Breakdown of DDT & Endrin ≤20%, Combined < 30%	Each Run	As needed. With each new std. Quarterly at a minimum	80-110%R	Every 12 hours (PEM or indiv. A&B)	PEMs and Indiv. A&B within RT windows of init. calibration. PEMs RPD ≤ 25.0. Resolution of PEM must be 100%. Resolution of indiv. A&B ≥ 90% Breakdown of DDT & Endrin ≤ 20% Combined ≤ 30%

1 Number of Standards Run is 1, unless noted otherwise

2 Only when an unusually large analyte list requires analysis of more than one standard mix for injection by GC/NPD.

Table 9.5 - Attachment
GC/MS - Volatiles
Continuing Calibration Check - EPA Method 624

	Range for "Q" in ug/L
Benzene	12.8-27.2
Bromoform	14.2-25.8
Carbon tetrachloride	14.6-25.4
Chlorobenzene	13.2-26.8
Chloroethane	7.6-32.4
2-Chloroethylvinyl-ether	D-44.8
Chloroform	13.5-26.5
Dibromochloromethane	13.5-26.5
Bromodichloromethane	13.1-26.9
1,4-Dichlorobenzene	12.6-27.4
1,1-Dichloroethane	14.5-25.5
1,2-Dichloroethane	13.6-26.4
1,1-Dichloroethene	10.1-29.9
1,2-Dichloropropane	6.8-33.2
trans-1,3-Dichloropropene	10.0-30.0
Ethylbenzene	11.8-28.2
Bromomethane	2.8-37.2
Chloromethane	D-40.8
Methylene Chloride	12.1-27.9
1,1,2,2-Tetrachloroethane	12.1-27.9
Tetrachloroethene	14.7-25.3
Toluene	14.9-25.1
trans-1,2-Dichloroethene	13.9-26.1
1,1,1-Trichloroethane	15.0-25.0
1,1,2-Trichloroethane	14.2-25.8
Trichloroethene	13.3-26.7
Trichlorofluoromethane	9.6-30.4
Vinyl Chloride	0.8-39.2

10.0 Preventive Maintenance

10.1 Wherever practical, maintenance agreements have been executed with instrument manufacturers. Such is the case with the following major lab instrumentation:

GC Equipment

GC/MS Equipment

HPLC Equipment

FTIR Equipment

Atomic Spectroscopy Equipment

Lab Data Management Systems

For those instruments for which no maintenance agreements are available, an attempt has been made to maintain at least 2 functional instruments (eg. TOX, pH Meters, EP Extractors, DO Meters, Conductivity Meters, Balances, etc.). If adequate in-house expertise exists, maintenance agreements may be cancelled upon approval of the Lab Director.

10.2 A log for each instrument is maintained by the appropriate group leader and/or analyst. Information maintained in this log must include, but is not necessarily limited to:

1. Name of the item or equipment
2. Manufacturer's name, type identification, and serial number or other unique identification.
3. Date received and date placed in service.
4. Current location, where appropriate.
5. Condition when received (e.g., new, used, reconditioned).
6. A daily "response check" or "sensitivity check" (curve verification data).
7. A record of problems and their solutions.

8. A record of maintenance and preventive maintenance service calls noting what was done each time.

9. Initials of analyst and dates.

10.3 Group leaders are required to maintain a supply of items critical to the performance of their instruments (eg. electron multipliers for GC/MS, D_2 lamps for AA, key circuit boards). Blanket purchase authority is given to group leaders for any item valued at less than $1,000.00 for each item to a maximum of $5,000.00 per group; the Lab Director must approve more costly items and/or higher maximums per group.

10.4 Logbooks are also maintained for all equipment/instrumentation monitoring activities, such as:

1. Balances - accuracy checks

2. Ovens - temperature monitoring

3. Refrigerators - temperature monitoring

4. Incubators - temperature monitoring

5. Deionized Water Systems - resistivity conductivity checks

6. Zero Headspace Extractors - leak tests

7. Hot Plates - surface temperature monitoring

8. Fume Hoods - air flow

9. Extractors (EP, TCLP) - RPM checks

10. Gas Tanks - changes

10.5 Table 10.1, Routine Preventive Maintenance provides the following information:

1. Instrument/Equipment type

2. Specific activity

3. Frequency

All routine maintenance is documented in a logbook specific to the instrument or equipment. Service calls and all repairs will also be documented in this same logbook.

To minimize the impact of major equipment failures, sufficient equipment redundancy has been established within each laboratory and throughout the network. Where there is no such redundancy, samples are shipped to other EMS locations for analysis (certifications and contracts permitting). Flame atomic absorption may be a suitable replacement technique for ICP.

Preventive maintenance procedures to be employed are described in detail in instrument manuals.

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Gas Chromatography/Mass Spectrometry (Volatiles)	Changing transfer lines	As needed
	Changing septa	Every 20-30 injections*
	Clean source	As needed
	Change trap (purge & trap)	As needed
	Change column	Every 3-4 months or as needed
	Flush sample lines with methanol* (P & Trap)	As needed
	Replace gas filters and traps	Every other carrier gas cylinder
Gas Chromatography/Mass Spectrometry (Semi-Volatiles)	Change injection liner	Daily or each day of use
	Change septum	Daily or each day of use
	Trim head of column	Daily or each day of use
	Bake the source	When response to DFTPP initial standards decrease below acceptable levels
	Clean the source	When baking fails
	Replace gas filters and traps	Every other carrier gas cylinder
	Check syringe/replace	Daily or each day of use
Gas Chromatography/ECD	Change port liners	Twice per week or after 3 days use
	Clean detectors	As needed
	Remove front 6" of column	As needed
Gas Chromatography/ECD	Change septa	Twice per week or after 3 days use

*or when criteria can't be met

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Gas Chromatography/ECD	Replace gas filters and traps	Every other carrier gas cylinder
	Check syringe/replace	Daily (minimum) or each day of use
	ECD leak test (swipe)	Every 6 months
Gas Chromatography/PID, ELCD, NPD, FPD, FID	Change port liners	As needed
	Clean detectors	As needed
	Remove front 6" of column	As needed
	Change septa	As needed
	Replace gas filters and traps	Every other carrier gas cylinder
	Check syringe/replace	As needed
	Change/Add Solvent (ELCD)	As needed or as per Mfg'r Guidelines
	Clean window (PID, FPD)	As needed
	Change resin (ELCD)	As needed or as per Mfg'rs Guidelines
	Change trap (purge and trap)	As needed
High Performance Liquid Chromatograph (HPLC)	Change seals	As needed
	Replace pre-column	As needed
	Change lamps	As needed
Fourier Transform-Infra-Red (FTIR)	Purge System w/Nitrogen	Each use

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Flame Atomic Absorption	Check gas supply pressure	Daily or each day of use
	Empty drain container	Daily or each day of use
	Inspect capillary tube	Daily or each day of use
	Clean burner heads (acid soak)	Daily or each day of use
	Aspirate DI water for 15 minutes to flush nebulizer and premix chamber	Daily or each day of use
	Check nebulizer uptake rate	Weekly
	Clean premix chamber	Weekly
	Inspect windows	Weekly
	Inspect glass bead	Monthly
	Inspect O-rings	Monthly
	Inspect nebulizer	Monthly
	Inspect frangible diaphragm (where applicable)	Monthly
Graphite Furnace Atomic Absorption	Check Argon supply pressure	Daily or each day of use
	Inspect furnace windows	Daily or each day of use
	Inspect graphite tube and platform	Daily or each day of use
	Check rinse solution and drain container	Daily or each day of use
	Inspect autosampler tip alignment and condition	Daily or each day of use
	Inspect contact cylinders	Weekly

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Graphite Furnace Atomic Absorption	Clean and refill cooling water recirculators	Quarterly
	Check exhaust system	Weekly
	Clean computer cooling fans	Yearly
Inductively Coupled Plasma (ICP)	Check argon supply pressure	Daily or each day of use
	Clean nebulizer	Daily or each day of use
	Change peristaltic pump tubing	Weekly
	Clean entrance slit	Monthly
	Change torch	Quarterly
	Inspect focusing mirror (simultaneous ICP)	Quarterly
	Check oil in vacuum pump (simultaneous ICP)	Twice per year
	Clean filters on instrument	Yearly
Total Organic Carbon (TOC)	Change catalyst	Bi-monthly or as needed
	Re-charge acid	Weekly
Total Organic Halogens (TOX)	Clean inlet tube	Weekly
	Clean filtration cell and electrodes	Each use
	Recondition filtration cell reference sidearm	Monthly
	Clean pyrolysis and quartz exit tubes	Each use
Balances	Check with an external class "S" weight	Each use or daily
	Change desiccants	Weekly

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Balances	Clean pans and compartments	Each use
	Check alignment (leveling)	Each use
	Service Engineer visit	Every 6 months
Auto Analyzer	Change tubing	Quarterly
	Clean tubing w/10% HCl	Monthly
	Oil pump	Monthly
	Change Cadmium reduction column	Quarterly
Gas Flow Proportional Counter (Gross Alpha Beta)	Change gases	As needed
	Change gas line filters	Every other carrier gas cylinder
Spectrophotometer	Check wavelength with standard filter	Quarterly
Turbidimer	Clean optics	As needed
Conductivity Meter	Clean electrodes	As needed
Dissolved Oxygen Probe	Replace membrane	As needed
Recorder	Dust and clean	As needed
	Clean the carriage rod for smooth operation	As needed
	Lubricate the servomotor with two drops of light oil	Quarterly
Deionized Water System	Conductivity Check, in-line meter	Daily
	Ion exchange beds replaced	As needed
	Conductivity check by lab S.C. meter	Weekly (Daily if no in-line meter)

Table 10.1
ROUTINE PREVENTIVE MAINTENANCE

Instrument/Equipment Type	Specific Activity	Frequency
Milli-Q D.I. Water System	Conductivity Check, in-line meter	Daily
	Replace cartridges	As needed
	Conductivity check with lab S.C. meter	Weekly
Oven	Check temperature	Each use
	Oil Motor	Quarterly
Refrigerators/Coolers/Freezers	check temperature	Daily
	Clean cooling coils	Annually
Vacuum pumps & air compressors	Lubricate	As needed
	Check belts, etc.	As needed
Zero Headspace Extractors	Leak test	Each use
Rotary Extractors (TCLP, EP)	RPM check	Daily or each day of use
Hot Plates	Surface temperature checks	Semi-annually
Incubators	Temperature monitoring	Daily or each day of use
Fume Hoods	Check air flow	Monthly
	Replace charcoal filters if applicable	As needed

SECTION 11.0

11.0 Quality Control Checks, Routines to Assess Precision and Accuracy and Calculation of Method Detection Limits

11.1 Quality Control Checks - Field QC

The laboratory has little to no control over what type of Field QC is collected and submitted for analysis by clients, unless the sampling is performed by EMS Heritage and the client agrees to the increased costs associated with Field QC sample analysis. The implementation of proposed (January 23, 1989) mandatory field and laboratory QC requirements by EPA in the RCRA program will further the EPA goal of providing more reliable analytical data and help assure that this Quality Assurance Plan (QAP) is followed for Field QC sample collection and submission. The proposed mandatory Field QC samples are as follows:

1. Field Duplicate
2. Field Blank
3. Equipment Blank
4. Trip Blank

The following types of QC checks and the stated frequency are the basic minimum requirements of this QAP. Deviations from these minimum requirements (i.e. less than 5 samples in a set, weekly or daily monitoring, etc.) are the responsibility and decision of the client and shall be proposed in a site specific QC plan (if required) with appropriate justification. See Appendix D for definition of all terms and QC types.

11.1.1 Sampling events with 10 or more samples of a similar matrix will require the following Field QC:

1. Equipment Blanks: At lease one equipment blank on clean sampling equipment will be submitted and analyzed for every 20 samples in each analyte group for water matrices. This blank will be prepared in the field before sampling begins by filling or rinsing the precleaned equipment with analyte free water, filling the appropriate container(s) and preserving and documenting the sample in the same manner as the other collected samples. Suitable blanks for analyte groups of interest

will be collected and analyzed for each type of equipment set (i.e., bailer, filtration system; or cover, stainless steel pan and spatula, etc.) to be used in sampling. EMS Heritage does not believe it is appropriate to use an aqueous equipment blank for non-aqueous (solid) matrices because different analytical procedures are utilized which have different detection levels at unnecessary expense to the client. The USEPA does not generally require collection of field blanks for solid matrices, however, if their collection is required the use of acid washed beach sand is a recommended blank matrix in place of the rinsing with analyte free water cited above. The use of this solid matrix will be interference free, will generally allow the use of identical methods and will provide similar if not lower detection limits.

If equipment is cleaned on site, then additional equipment blanks will be collected and analyzed for each equipment group at a rate of one blank or 5% of the equipment sets that must be cleaned, whichever is greater. These blanks will be collected and analyzed as described in the preceding paragraph.

If no equipment is involved in sampling (i.e., grab samples using sample container) or passage of blank matrix through the sampling device is not possible (i.e., dedicated well pumps) then a Field Blank will be collected in place of an Equipment Blank.

2. Trip Blanks: At least one trip blank for each proposed volatile organic method (601, 624, 8020, 8021, 8240, etc.) shall be prepared and analyzed for each cooler to be used for storage and transport of volatile samples. This type of blank will require the submission of two or more 40mL vials per blank. Trip blanks will generally only be collected for water samples. Trip blanks are prepared in the laboratory, placed in the cooler before shipment to the field and are returned unopened to the lab.

3. Field Duplicate: During each independent sampling event, at least one sample or 10% of the samples, whichever is greater, shall be collected in duplicate for analysis. This requirement shall apply to each and all parameter groups and matrices that are sampled.

11.1.2 Sampling events involving 5 to 10 samples of a similar matrix will require the following Field QC:

1. Equipment Blanks: If equipment is cleaned in the field, one equipment blank for each parameter group shall be collected and analyzed on the field decontaminated equipment. If no equipment is cleaned, then one equipment blank that is prepared on-site on the precleaned equipment shall be collected and analyzed for each parameter group. If no equipment is involved in sampling (i.e. grab sample using sample container) or passage of blank matrix through the sampling device is not possible (i.e., dedicated well pumps) then a Field Blank will be collected in place of an Equipment Blank.

2. Field Duplicates: One field duplicate shall be collected and analyzed for all parameter groups and matrices.

11.1.3 Sampling events involving less than 5 samples of a similar matrix will require the following field QC:

1. One equipment blank on either precleaned or field decontaminated equipment (see above) will be collected and analyzed for each parameter group.

11.1.4 Additional QC types and/or submittal frequency of field quality control blanks may be required and are dependent on the methods of analysis and the Data Quality Objectives of a specific project and/or mandatory QC requirements. An example would be the collection and analysis of field blanks (see Appendix D for definition) in addition to the minimum requirements specified above.

11.1.5 QC checks on field measurements will require at least one duplicate sample analysis for every 10 field measurements. Field QC samples are treated as any other sample for analysis.

11.2 Quality Control Checks - Laboratory QC

EMS Heritage will follow the minimum quality control requirements specified by each method. Table 11.5, Analytical Run Requirement/Frequency mandates the specific requirements that will be used. Those minimum requirements may be exceeded for specific methods. Please refer to

Appendix D, Definitions and Acronyms for definitions and acronyms used by EMS Heritage for QC types.

11.2.1 If no quality control requirements are listed in the method, or if the method quality control requirements are less stringent that those listed below, the laboratory will follow the general guidelines listed below:

1. Method Reagent Blank, or Prep Blank (BLA02) - Prepared and analyzed at a rate of one per sample prep set (see definitions in Appendix D for sample set, etc.)

2. Matrix Spike (SPI02) - Prepared and analyzed at a minimum of one sample in a sample set (or 5%, whichever is greater) with similar matrices for a specified method. If a set contains samples of different matrices, matrix spikes should be prepared and analyzed for each matrix type by the specified method.

3. Reagent Water/Reagent Matrix Spikes or Laboratory Control Sample (LCS) - A control sample of known analyte concentration and source which has been processed through the entire method (digested/extracted, etc.); may be used as an additional QC check to monitor the effectiveness of the method (not subject to matrix interferences). This LCS (Laboratory Control Sample) should be of the same matrix as samples but must be spiked using a standard from a different source than the calibration standards (EPA or NBS traceable when possible). If used, these must be analyzed at a frequency of one sample in a sample set, or 5%, whichever is greater, for a specified method.

4. Quality Control Check Standards or Performance Evaluation Standards (PE) - At a minimum these blind check samples shall be analyzed in duplicate semiannually. Results of all blind performance evaluation (PE) samples will be summarized in the QA report to management and forwarded to clients upon request. EMS Heritage participates in many state certification programs requiring blind sample (PE) analysis in addition to the EPA WP (Water Pollution) and WS (Water Supply) programs and a commercial service providing monthly blind samples (Analytical Products Group). In addition, EMS

Heritage-Indianapolis participates in the USEPA Contract Laboratory Program's Quarterly Blind (QB) program.

5. Quality Control Check Standards or Initial and Continuing Calibration Check Standards (ICV01, CCV) - An Initial Calibration Verification (ICV01) standard shall be analyzed at the beginning of each run to verify the standard curve (separate source than calibration standards, traceable to EPA or NBS if possible) and/or a Continuing Calibration Verification (CCV) standard shall be analyzed at a continuing frequency of 10% of the analytical samples in the analytical set (i.e. one every 10 analytical samples in a run).

6. Duplicate Samples (DUP02) or Matrix Spike Duplicates (DPS02) - At least one or 5%, whichever is greater, of all samples in a sample set with a similar matrix shall be selected and analyzed in duplicate. If a sample set contains samples from different matrices (e.g., effluent and drinking water), then duplicates or matrix spike duplicates should be analyzed for each matrix.

7. Additional QC Checks - may be included and will be used if specified by the approved method:

   a. Reagent purity checks

   b. Internal standards

   c. Surrogate spikes

   d. Method of Standard Additions (MSA, 3 Point or 1 Point)

11.3 Determination of Frequency of QC Measurements

The required frequency of analysis of certain QC sample types stated in this QAP may be given as a percentage (i.e., 5%) or translated into a numerical ration (i.e., 1 in 20). The term "analytical sample" is defined in Appendix D, Definitions and Acronyms. As the term is used, analytical sample includes all field samples, including Performance Evaluation samples, received from an external source, but it also includes all required QA/QC samples (matrix

spikes, analytical/post digestion spikes (1-point MSA), duplicates, serial dilutions, LCS, Interference Check Samples (ICS), CDL standards, preparation blanks (BLA02) and linear range analyses) except those directly related to instrument calibration or calibration verification. A "frequency of 10%" means once every 10 analytical samples.

The following Tables and Figures specify the QC Types and their frequency of analysis for different methods/regulatory programs.

Table # or Figure #	# Pages	Subject
Table 11.1	1	ICP Run Sequence
Table 11.2	1	FAA Run Sequence
Table 11.3	1	GFAA Run Sequence
Table 11.4	1	CLP-GFAA Run Sequence
Table 11.5	1	Analytical Run Requirements/Frequency
Figure 11.1	1	Metals Analysis Scheme For Spiking (SPI 01)
Figure 11.2	1	CLP-GFAA Analysis Scheme

11.4 Routine Methods Used to Assess Precision and Accuracy

The targets listed in Section 5.0 were derived where possible from data entered into the QCTS (Quality Control Tracking System). All sample analysis runs and all QC data points are entered into the QCTS. Certain of the QC types for a particular method are not applicable and/or not used to arrive at precision and accuracy statistics; those types can be identified from Table 11.5, Analytical Run Requirements/Frequency for a particular method.

The criteria listed in Table 5.1, Section 5.0 are derived from matrix specific QC. Control limits for Instrumental criteria (calibration) and method performance (LCS, ICV02) are found elsewhere in this document. EMS Heritage defines most QC Types (see Definitions) with either an "01" or "02" suffix. The "01" suffix denotes that the procedure did not include a preparation step and/or a preparation step is not possibly separated from the analytical procedures. An "02" suffix denotes that the procedure was taken

TABLE 11.1
ICP Run Sequence

TYPE	DESCRIPTION/FREQUENCY
BLA00	Instrument Blank*
CAL01	Calibration Standards (Single Point Calibration)*
ICV01	Initial Calibration Verification (EPA QC or equivalent; Mid-Range Std.)*
BLA01	Calibration Blank (Beginning, Initial Calibration Blank)*
CDL01**	Detection Limit Standard (2x CRDL, beginning, 2 times/8 hrs.)
ICS	Interference Check Sample(s) (Beginning, 2 times/8 hrs.)
LRA	Linear Range Analysis (Upper limit of linear range - quarterly)
LCS	Laboratory Control Sample (ICV02 or EPA supplied LCS, 1 per 20 or prep batch)
BLA02	Preparation Blank (1 per 20 or prep batch, whichever is more frequent)
SAMPLES	6 samples, including required SPI02's, DPS02's, DUP02's and SPI01's (MSA)***
CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; mid-range std.)*
BLA01	Continuing Calibration Blank (10% frequency during run)*
SDA**	Serial Dilution Analysis (each matrix and/or each case)
SAMPLES	9 samples, including required SPI02's, DUP02's and SPI01's (MSA)***
CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
BLA01	Continuing Calibration Blank (end of run)*
	GO TO: SAMPLES OR CDL01
ICS	Interference Check Sample (End, 2 times/8 hrs)
CDL01**	Detection Limit Standard (2x CRDL, end, 2 times/8 hours)

*Does not count as an "analytical sample" for the 10% frequency requirement.

** Performed only for specific projects as required (contracts, etc.)

*** Single addition post digestion spike (1 point MSA) analysis is counted as an "analytical sample" for ICP; required immediately following unspiked analysis of that sample.

NOTE: Each full (3 point) MSA counts as two "analytical samples".

TABLE 11.2
FAA Run Sequence

TYPE	DESCRIPTION/FREQUENCY
BLA00	Instrument Blank*
CAL01	Calibration Standards (4+BLA00 Point Calibration)*
ICV01	Initial Calibration Verification (EPA QC or equivalent; Mid-Range Std.)*
BLA01	Calibration Blank (Beginning, Initial Calibration Blank)*
CDL01**	Detection Limit Standard (2x CRDL, beginning, 2 times/8 hrs.)
ICS	Interference Check Sample(s) (Beginning, 2 times/8 hrs.)
LCS	Laboratory Control Sample (ICV02 or EPA supplied LCS, 1 per 20 or prep batch)
BLA02	Preparation Blank (1 per 20 or prep batch, whichever is more frequent)
SAMPLES	7 samples, including required SPI02's, DUP02's and SPI01's (MSA)***
CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; mid-range std.)*
BLA01	Continuing Calibration Blank (end of run)*
→ SAMPLES	10 samples, including required SPI02's, DPS02's, DUP02's and SPI01's (MSA)***
CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
BLA01	Continuing Calibration Blank (end of run)*
	GO TO: SAMPLES OR CDL01
→ CDL01**	Detection Limit Standard (2x CRDL, end, 2 times/8 hrs.)

* Does not count as an "analytical sample" for the 10% frequency requirement.

** Performed only for specific projects as required (contracts, etc.)

*** Single addition post digestion spike (1 point MSA) analysis is counted as an "analytical sample" for FAA; required immediately following unspiked analysis of that sample.

NOTE: Each full (3 point) MSA counts as two "analytical samples".

TABLE 11.3
GFAA Run Sequence

# INJECTIONS	TYPE	DESCRIPTION/FREQUENCY
1	BLA00	Instrument Blank*
5	CAL01	Calibration Standards (4+Blank Point Calibration)*
1	ICV01	Initial Calibration Verification (EPA QC or equiv.; Mid-range Std.)*
1	BLA01	Calibration Blank (Beginning, Initial Calibration Blank)*
1	CDL01***	Detection Limit Standard (2x CRDL, beginning, 2 times/8 hrs.)
1	LCS	Laboratory Control Sample (ICV02 or EPA supplied LCS, 1 per 20 or prep batch)
1	BLA02	Preparation Blank (1 per 20 or prep batch, whichever is more frequent)
7	SAMPLES	7 samples, including required SPI02's, DPS02's, DUP02's
7	SAMPLES-SP*	7 sample spikes (2x CRDL, post digestion spike, one per analytical sample except SPI02's, DPS02's)**
1	CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
1	BLA01	Continuing Calibration Blank (10% frequency during run)*
10	SAMPLES	10 samples, including required SPI02's, DPS02's, DUP02's
10	SAMPLES-SP*	10 sample spikes (2x CRDL, post digestion spike, one per analytical sample except SPI02's, DPS02's)**
1	CCV	Continuing Calibration Verfication (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
1	BLA01	Continuing Calibration Blank (end of run)*
		GO TO: SAMPLES OR CDL01
1	CDL01***	Detection Limit Standard (2x CRDL), end, 2 times/8 hrs.)

* Does not count as an "analytical sample" for the 10% frequency requirement.

** Single addition post digestion spike (1 point MSA) required immediately following unspiked analysis of that sample.

*** Performed only for specific projects as required (contracts, etc.)

NOTE: Duplicate injections (burns) not performed; maximum of 20 injections between CCVs. Each full MSA (3-point) counts as 2 "analytical samples".

TABLE 11.4
CLP - GFAA Run Sequence

# INJECTIONS	TYPE	DESCRIPTION/FREQUENCY
1	BLA00	Instrument Blank*
5	CAL01	Calibration Standards (4+Blank Point Calibration)*
2	ICV01	Initial Calibration Verification (EPA QC or equiv.; Mid-range Std.)*
2	BLA01	Calibration Blank (Beginning, Initial Calibration Blank)*
2	CDL01	Detection Limit Standard (2x CRDL, beginning, 2 times/8 hrs.)
2	LCS	Laboratory Control Sample (ICV02 or EPA supplied LCS, 1 per 20 or prep batch)
2	LCS-SP	Laboratory Control Sample Spike (2x CRDL, post digestion spike, one per LCS)
2	BLA02	Preparation Blank (1 per 20 or prep batch, whichever is more frequent)
2	BLA02-SP	Preparation Blank (2x CRDL, post digestion spike, one per Prep Blank)
4	SAMPLES	2 samples, including required SPI02's, DPS02's, DUP02's
4	SAMPLES-SP	2 sample spikes (2x CRDL, post digestion spike, one per analytical sample except SPI02's, DPS02's)**
2	CCV	Continuing Calibration Verification (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
2	BLA01	Continuing Calibration Blank (10% frequency during run)*
10	SAMPLES	5 samples, including required SPI02's, DPS02's, DUP02's
10	SAMPLES-SP*	5 sample spikes (2x CRDL, post digestion spike, one per analytical sample except SPI02's, DPS02's)**
2	CCV	Continuing Calibration Verfication (May be same as ICV, 10% frequency or every 2 hours; Mid-range Std.)*
2	BLA01	Continuing Calibration Blank (end of run)*
		GO TO: SAMPLES OR CDL01
2	CDL01	Detection Limit Standard (2x CRDL), end, 2 times/8 hrs.)

* Does not count as an "analytical sample" for the 10% frequency requirement.

** Single addition post digestion spike (1 point MSA) required immediately following unspiked analysis of that sample (counts as an analytical sample).

NOTE: Duplicate injections (burns) are performed; maximum of 20 injections between CCVs. Each full MSA (3 po__, counts as 2 "analytical samples"; for analytical runs containing only MSAs, single injections can be used for QC samples during that run.

Table 11.5
ANALYTICAL RUN REQUIREMENT/FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[3]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4]	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS
Acidity	EPA	R	5%	B,E 10%	-	-	R, 10%	-	NA	-	R	-	NA	NA	NA	-
Alkalinity	EPA	NA	5%	B,E 10%	-	10%	R, 10%	10%	NA	-	R	5%	NA	NA	NA	-
Ammonia - N	EPA	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	P	-	P	-	P, 10%	P, 10%	P, 10%	-
Asbestos	NIOSH	R	R	NA	-	-	R, 10%	-	NA	NA	R, 10%	-	NA	NA	NA	-
BOD	EPA/SM	R	R	-	-	-	R, 10%	-	NA	-	R, 5%	-	NA	NA	-	-
Boron Colorimetric	EPA	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Bromide	EPA/SM	R	R, 5%	-	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
COD	EPA/SM	C	R	R, 10%	-	-	R, 10%	-	NA	NA	R, 5%	-	NA	NA	NA	-
Chloride	EPA/SM	C	R, 5%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Chlorine, Total	ASTM	R	R	NA	B	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Coliform, Fecal	SM	NA	10%	NA	-	-	R, 10%	-	NA	NA	-	-	NA	NA	NA	-
Coliform, Total	SM	NA	10%	NA	-	-	R, 10%	-	NA	NA	-	-	NA	NA	NA	-
Color	EPA	N	NA	B,E 10%	NA	-	R, 10%	NA	NA	NA	NA	-	NA	NA	NA	-
Cyanide, Amen.	EPA/SW	C	B,E 10%	B,E 10%	-	-	-	-	P, 5%	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Cyanide, Total	EPA/SW	C	B,E 10%	B,E 10%	-	-	-	-	P, 5%	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Cyanide, Total	CLP	C	B,E 10%	B,E 10%	B,E	-	-	-, N	P, 5%	-	P, 5%	-	R, 10%	-	R, 10%	-
Cyanide, T. Avail.	SW	C	B,E 10%	B,E 10%	B,E	P, 10%	P, 10%	P, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Dissolved Oxygen	EPA								NA	NA		-	NA	NA	NA	-

Table 11.5
ANALYTICAL RUN REQUIREMENT/FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[4]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4]	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS
Dissolved Solids	EPA	R, 10%	R, 5%	NA	NA	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	NA	NA	NA	5%	-
ISE Fluoride	EPA	C	B,E 10%	B,E 10%	B	P, 5%	P, 5%	P, 5%	P, 5%	-	P, 5%	-	P, 5%	P, 5%	P, 5%	-
Formaldehyde	AOAC						R, 10%				, 5%					
Gross Alpha, Beta (Radioactivity)	EPA	NA	B,E 20%	B	-	-	R, 10%	-	NA	NA	-	-	NA	NA	NA	-
Titrimetric Hardness	EPA	R	B,E 10%	NA	-	-	R, 10%	-	NA	NA	R, 5%	-	NA	NA	NA	-
Hexavalent Chromium	SM	R	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	P, 10%	-	R, 5%	-	R, 10%	R, 10%	R, 10%	-
Hexavalent Cr	SW	R	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	P, 10%	-	R, 5%	-	R, 10%	R, 10%	R, 10%	-
Iodine	SM	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
TKN	EPA	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Nitrate-N (Brucine)	EPA	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Nitrate-N (Colorimetric)	EPA	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Nitrite-N	EPA	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Nitrate-Nitrite-N	EPA	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Nuisance Dust	NIOSH	R	R	B,E 10%	NA	NA	R, 10%	NA	NA	NA	NA	NA	NA	NA	NA	-
Oil & Grease	EPA413.1	R	R	NA	-	-	R, 10%	-	NA	NA	-	-	NA	NA	NA	-
Oil & Grease	SW 9071	R	R	NA	-	-	R, 10%	-	NA	NA	R, 5%	-	NA	NA	NA	-

Table 11.5
ANALYTICAL RUN REQUIREMENT/FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[3]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4]	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS
Paint Filter	SW	NA	NA	NA	NA	NA	R, 10%	NA	NA	NA	-	NA	NA	NA	NA	-
Percent Solids	SM	R	R	NR%	NA	NA	R, 10%	NA	NA	NA	R, 5%	NA	NA	NA	NA	-
Percent Solids	ASTM	R	R	NA	NA	NA	R, 10%	NA	NA	NA	R, 5%	NA	NA	NA	NA	-
pH	EPA/SW	C	NA	B,E 10%	NA	NA	R, 10%	NA	-	-	R, 5%	-	NA	NA	NA	-
Phenols	EPA/SW	C	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	P	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Phosphorus	EPA	C	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	P	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Radium	EPA	NA	B,E 5%	B	-	-	R, 10%	-	NA	NA	-	-	NA	NA	NA	-
Radium 226	EPA	NA	B,E 5%	B	-	-	R, 10%	-	NA	NA	-	-	NA	NA	NA	-
Residual Chlorine	EPA	R	B,E 10%	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	-	R, 5%	-	NA	NA	NA	-
Saturation Index	See individual methods for this calculation															
Settleable Matter	EPA		NA	NA	-	R, 10%	R, 10%	NA	NA	-	R, 5%	-	NA	NA	NA	-
Silica, Total	EPA	R	R	10%	-	R, 10%	R, 10%	-	NA	-	R, 5%	-	NA	NA	NA	-
S. Conductance	EPA/SW	R	R	B,E 10%	-	-	R, 10%	-	NA	NA	R, 5%	NA	NA	NA	NA	-
Sulfate	EPA/SW	R	R	B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Sulfide	EPA/SW	R		B,E 10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Sulfur	ASTM	R	R	10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Surfactants	EPA	R	R	10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Temperature	EPA	N	-	-	NA	NA	R, 10%	NA	NA	NA	-	NA	NA	NA	NA	-
Thiocyanate	EPA	R	R	B,E 10%	-	R, 10%	R, 10%	R, 10%			R, 5%	-				-

Table 11.5
ANALYTICAL RUN REQUIREMENT/FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)*	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4]	(CLP) LCS/ SPI01	SPI02[5]	DPS02[3]	DUP02[3]	DLCS
Sulfide, T. Available	SW	R	R	B,E 10%	-	P, 10%	P, 10%	-	P, 10%	-	P, 5%	-	P, 10%	P, 10%	P, 10%	-
Sulfite	EPA	R	R	10%	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Total Halogen	ASTM	R	B,E 10%	NA	-	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
TOC	EPA/SW	R	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
T. Volatile Residue	EPA/SM /ASTM	-	R	-	-	NA	R, 10%	NA	NA	NA	R, 5%	-	NA	NA	NA	-
TOX	SW	R	B,E 10%	B,E 10%	B	R, 10%	R, 10%	R, 10%	NA	NA	R, 5%	-	NA	NA	NA	-
Total Recoverable Oil & Grease	SW	R	R	NA	-	-	R, 10%	-	NA	NA	R, 5%	-	NA	NA	NA	-
Total Solids	EPA	R	R, 5%	NA	-	-	R, 10%	-	NA	NA	R, 5%	-	NA	NA	NA	-
Total Suspended Solids	EPA	R	R, 5%	NA	-	-	R, 10%	-	NA	NA	R, 5%		NA	NA	NA	
Turbidity	EPA	R	R	B,E 10%	-	NA	R, 10%	NA	NA	NA	R, 5%	-	NA	NA	NA	-
Volatile Susp. Solids	EPA		R, 5%		-	NA	R, 10%	NA	NA	NA	R, 5%	-	NA	NA	NA	-
Metals-ICP	EPA	R	B,E 10%	B,E 10%	B,E,T	10%*	10%*	10%*	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-ICP	SW	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-ICP	CLP	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	-	P, 5%	-

*Only ap[illegible] in limited situations (samples not digested).

Table 11.5
ANALYTICAL RUN REQUIREMENT/FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)**	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4]	(CLP) LCS/ SPI01	SPI02[5]	DPS02[3]	DUP02[5]	DLCS
Metals-FAA	EPA	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-FAA	SW	R	B,E 10%	B, E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-FAA	CLP	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	-	P, 5%	-
Metals-GFAA	EPA	R	B,E 10%	B,E 10%	B,E,T	NA	NA	100%**	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-GFAA	SW	R	B,E 10%	B,E 10%	B,E,T	NA	NA	100%**	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Metals-GFAA	CLP	R	B,E 10%	B,E 10%	B,E,T	NA	NA	100%**	P, 10%	P, 5%	P, 10%	P, 5%	P, 5%	-	P, 5%	-
Mercury, CVAA	EPA	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Mercury, CVAA	SW	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	P, 10%	P, 10%	-
Mercury, CVAA	CLP	R	B,E 10%	B,E 10%	B,E,T	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	-	P, 5%	-
2,3,7,8-TCDD	613 EPA	N	-	R,D	-	NA	NA	NA	P, 5%	-	10%	-	P, 10%	-	-	-
2,3,7,8-TCDD	CLP	N	-	12	-	NA	NA	NA	P, 5%	-	10%	-	P, 10%	P, 10%	-	-
PCDD's & PCDF's	8280 SW	N	-	12	-	NA	NA	NA	P, 5%	-	10%	-	P, 5%	P, 5%	-	-
Organochlorine Pests/PCBs	2/88 CLP	N	-	72 Hr. Seq.	-	NA	NA	NA	P, 5%	-	P, 5%	-	SDG, 5%	SDG, 5%	-	-
Organochlorine Pests/PCBs	OLM01 CLP	N	12	12	-	NA	NA	NA	P, 5%	-	P, 5%	-	SDG, 5%	SDG, 5%	-	-

**Single Point MSA

Table 11.5
ANALYTICAL RUN REQUIREMENT/FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[4]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4]	(CLP) LCS/ SPI01	SPI02[5]	DPS02[5]	DUP02[5]	DLCS
Organochlorine Pests/PCBs	8080 SW	N	-	10%, 12	-	NA	NA	NA	P, 5%	-	P, 10%	-	P, 5%	P, 5%	-	-
Semi-volatiles GC/MS	2/88 CLP	N	-	12	-	NA	NA	NA	P, 5%	-	-	-	SDG, 5%	SDG, 5%	-	-
Semi-volatiles GC/MS	OLM01 CLP	N	-	12	-	NA	NA	NA	P, 5%	-	-	-	SDG, 5%	SDG, 5%	-	-
Semi-volatiles	625 EPA	N	-	R,D	-	NA	NA	-	P, 5%	-	R, 5%	-	P, 5%	P, 5%	-	N
Semi-volatiles	8270 SW	N	-	12	-	NA	NA	NA	P, 5%	-	N	-	P, 5%	P, 5%	-	N
Volatiles	2/88 CLP	N	12	12	-	SDG, 5%	-	SDG, 5%	NA	NA	-	-	NA	NA	NA	-
Volatiles	OLM01 CLP	N	12	12	-	SDG, 5%	-	SDG, 5%	NA	NA	-	-	NA	NA	NA	-
Volatiles	624 EPA	N	R,D	R,D	-	R, 5%	-	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Volatiles	8240/8260 SW	N	R, 12	12	-	R, 5%	-	R, 5%	NA	NA	R, 5%	-	NA	NA	NA	-
Organochlorine Pests/PCBS	608 EPA	N	-	R,D	-	NA	NA	NA	P, 5%	-	P, 10%	-	P, 10%	P, 10%	-	-
Purgeable Halocarbons	601 EPA	NA	R,D	NA	-	R, 10%	-	R, 10%	NA	NA	R, 10%	-	NA	NA	NA	-
Purgeable Halocarbons (Halogenated Volatiles)	8010 SW	N	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
Purgeable Aromatics	602 EPA	NA	R,D	NA	-	R, 10%	-	R, 10%	NA	NA	R, 10%	-	NA	NA	NA	-
Purgeable Aromatics	8020 SW	N	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
Halogenated & Aromatic Volatile Organics	601/602 EPA	NA	R,D	NA	-	R, 10%	-	R, 10%	NA	NA	R, 10%	-	NA	NA	NA	-

Table 11.5
ANALYTICAL RUN REQUIREMENT/FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[4]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4]	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS
Halogenated & Aromatic Volatile Organics	8021 SW	N	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R,10%	-	NA	NA	NA	-
Acrolein, Acrylonitrile, Acetonitrile	8030 SW	N	R,D	10%, R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
Hydrocarbon Scan (FID)	8000 SW 8015-Mod	N	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
RCRA Listed Solvents (FID)	8000 SW	N	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
Alcohols (FID)	8015 SW	Q,N	R,D	10% R,D	-	R, 5%	-	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	-
PCBs (ECD)	8080 SW	N	-	10% 12	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
PNAs (FID)	8100 SW	N	-	R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
Chlorinated Hydrocarbons	8120 SW	N	-	10% R,D	-	NA	NA	NA	P, 10%	-	10%	-	P, 5%	P, 5%	-	-
Organophos-phorus Pesticides	8141 SW	Q,N	-	10% R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
Chlorinated Herbicides	8150 SW	N	-	10% R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
PNAs (HPLC)	8310 SW	N	-	10% R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
T. Petroleum Hydrocarbons	418.1 EPA 503E SM	N	D	B,E 5%	-	R, 10%	-	R, 10%	NA	-	P, 10%	-	NA	NA	-	-
Volatiles (PID/ELCD)	502.2 EPA	N	R,D	R,D	-	-	R, 10%	-	NA	NA	R, 5%	-	NA	NA	NA	Q
EDB, DBCP	504 EPA	N,D	R,D	NA	Weekly	R, 5%	R, 5%	R, 5%	NA	NA	R, 10%	-	NA	NA	NA	Q
N & P Pesticides	507 EPA	Q,N	R,D	10% R,D	D	NA	NA	NA	P, 10%	-	P, 5%	-	P, 5%	P, 5%	-	Q

Table 11.5
ANALYTICAL RUN REQUIREMENT/FREQUENCY

Test	Method Reference	Instrumental QC							Prep. QC							
		ICV01	BLA01	CCV[2]	CDL01	DPS01[3]	DUP01[3]	SPI01 (or MSA)[3]	BLA02	(CLP) BLA02 SPI01	ICV02 or LCS[4]	(CLP) LCS/ SPI01	SPI02[3]	DPS02[3]	DUP02[3]	DLCS
Volatiles (GC/MS)	524.2 EPA	N	R, D	D, 8	-	-	R, 10%	-	NA	NA	R, 10%	-	NA	NA	NA	Q
PNAs (HPLC)	610 EPA	N	-	10% R,D	-	NA	NA	NA	P, 10%	-	P, 10%	-	P, 5%	P, 5%	-	-
Carbamates (HPLC)	531.1 EPA	Q,N	R,D	D,B,E	-	10%	-	10%	NA	NA	10%	-	NA	NA	NA	Q
Herbicides (ECD)	515.1 EPA	N	-	D,B,E 10%	N	NA	NA	NA	P, 10%	-	P, 10%	-	P, 10%	P, 10%	-	-
TCLP Regulated Analytes	SW	N	R,D	10% R,D	N	10%	10%	N	P, 10%	-	10%	-	10%	10%	10%	-
Semi-Volatiles GC/MS	525 EPA	N	NA	B	NA	NA	NA	NA	P	-	P, 5%	-	P, 5%	P, 5%	-	Q

Table Abbreviations:

B	=	Beginning of run	T	=	Twice per 8 hour shift	NA	=	Not applicable
C	=	Each calibration curve (ICV01)	SW	=	SW-846	-	=	Not routinely performed
D	=	Daily	N	=	As needed	SM	=	Standard Methods
E	=	End of run	SDG	=	Each sample delivery group	EPA	=	Methods for Chemical Analysis of Water and Wastes
P	=	Each prep batch	12	=	Once per 12 hours	AOAC	=	Association of Official Analytical Chemists
Q	=	Quarterly	8	=	Once per 8 hours	ASTM	=	American Society for Testing Materials
R	=	Each run						
S	=	2 times per 8 hour shift						

1. Number of Standards Run is 1, unless noted otherwise.

2. CCV may be the same as ICV.

3. Where preps are optional and not performed then "01" QC is used. Either MS/MSD or Spike and Dup used, not both. "01" QC will be used only when "02" QC is not applicable. An analytical spike (MSA) is not required on the predigestion spike samle (SPI02).

4. LCS can be "01" or "02".

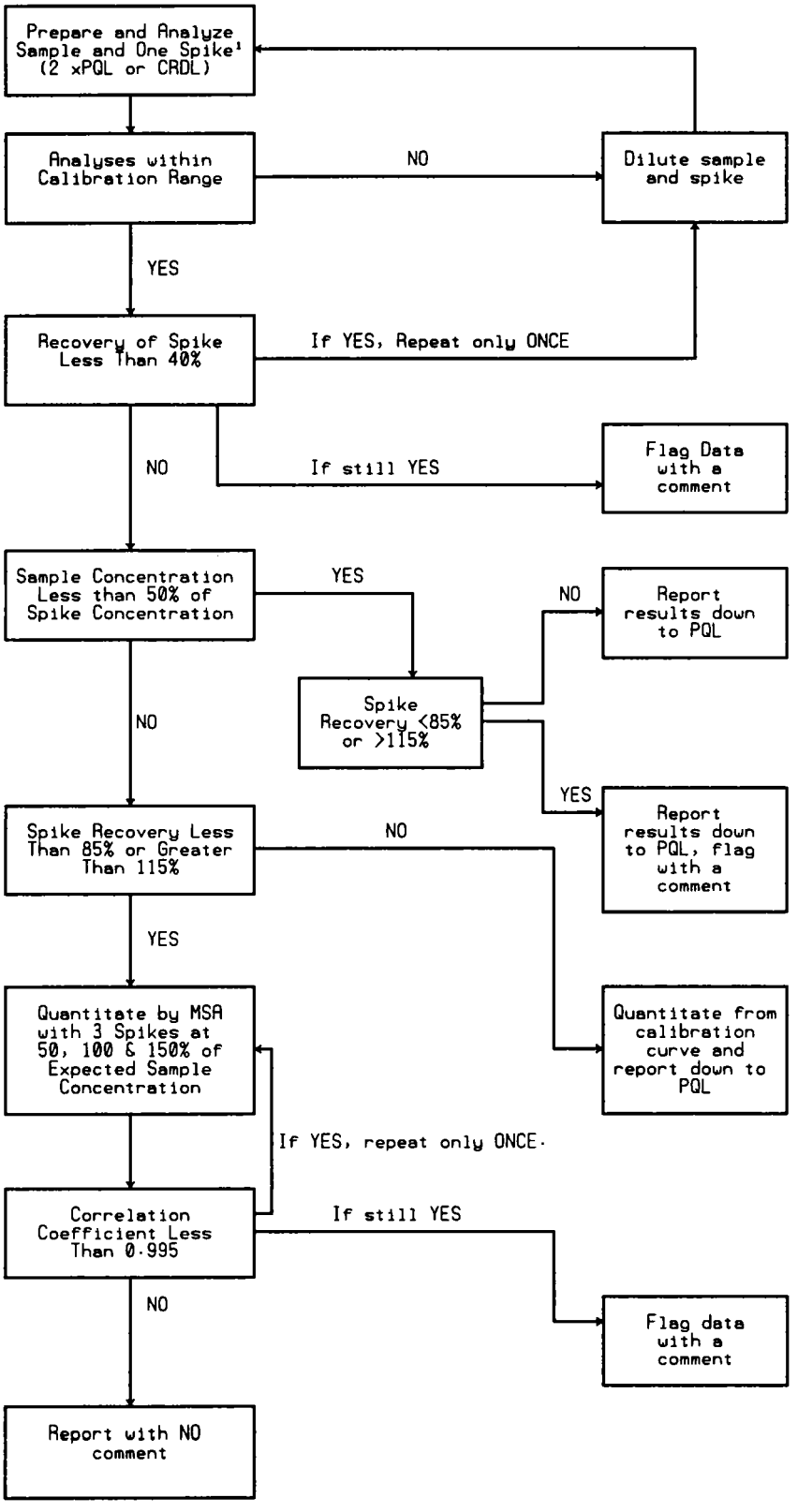
Table 11.6
METHODS USED TO GENERATE PRECISION AND ACCURACY TARGETS

QC Type (Method)	Purpose	Concentration Level	Method References*
Duplicate Matrix Spikes (DPS01, DPS02)	Precision and Accuracy	Low Level	All EPA "500"Series (Drinking Water) Organic Methods EPA "600" Series Organic Methods: 601, 602, 624 EPA: 340.2, 350.1, 350.3, 351.2, 351.3, 375.4, 410.2, 415.1, 418.1 All Furnace Metals Methods SW-846: 9020, 9038, 9060; SM: 407A
		Mid Level	EPA "600" Series Organic Methods: 607, 608, 625 All SW-846 Organic Methods ("8000" Series) All EPA SOW (CLP) Organic Methods EPA: 325.1, 325.2, 335.1, 335.2, 365.2, 376.1, 376.2, 410.4, 420.1, 420.2 All ICP & FAA metals Methods SW-846: 7196, 9010, 9012, 9030, 9065, 9066; SM: 3128, 503E
Matrix Spikes (SPI01, SPI02, DPS01, DPS02)	Accuracy	Low Level	All EPA "500" Series (Drinking Water) Organic Methods EPA "600" Series Organic Methods: 601, 602, 624 EPA: 340.2, 350.1, 350.3, 351.2, 351.3, 375.4, 410.2, 415.1, 418.1 All Furnace Metals Methods SW-846: 9020, 9038, 9060; SM: 407A
		Mid Level	EPA "600" Series Organic Methods: 607, 608, 625 All SW-846 Organic Methods ("8000" Series) All EPA SOW (CLP) Organic Methods EPA: 325.1, 325.2, 335.1, 335.2, 365.2, 376.1, 376.2, 410.4, 420.1, 420.2 All ICP and FAA Metals Methods SW-846: 7196, 9010, 9012, 9030, 9065, 9066; SM: 312B, 503E
Sample Duplicates (DUP01, DUP02)	Precision	Mid Level	All Methods
		Low Level	All Methods (Maximum RPD=20)
Sample Duplicates (DPS01, DPS02)	Precision	Mid Level	See "Duplicate Matrix Spikes"
		Low Level	See "Duplicate Matrix Spikes"

*See Table 11.5

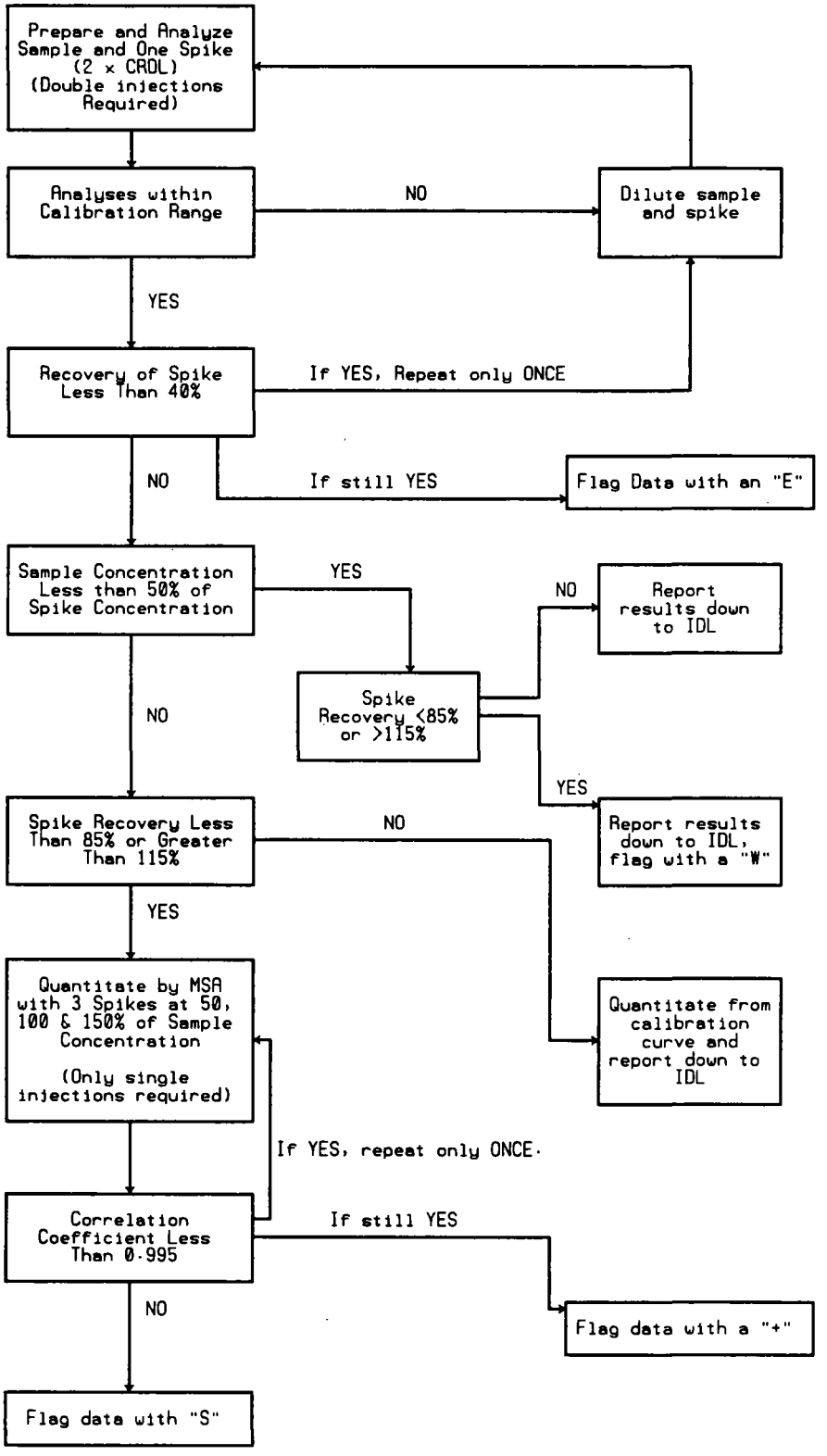
JC914704.I4E

FIGURE 11.1
METALS ANALYSIS SCHEME FOR SPIKING (SPI01)



[1] Spike required for all GFAA, optional for FAA/ICP except EPTOX or TCLP analyses.

FIGURE 11.2
CLP-GFAA ANALYSIS SCHEME



through the entire procedure, which includes a discreet or separate preparation (extraction, digestion, distillation, etc.) step.

All Table 5.1 control limits are computed from sample matrices processed through all analytical steps including any preparatory procedure ("02") if applicable.

11.4.1 Accuracy

Acceptance limits are calculated as follows, where x_i represents the individual values, $\bar{x}$ is the mean, n is the number of values and S is the Standard Deviation:

$$\begin{aligned} \textit{Upper Control Limit (UCL)} &= \bar{x} + 3S \\ \textit{Upper Warning Limit (UWL)} &= \bar{x} + 2S \\ \textit{Center Line } (\bar{x}) &= \frac{\sum x_i}{n} \\ \textit{Lower Warning Limit (LWL)} &= \bar{x} - 2S \\ \textit{Lower Control Limit (LCL)} &= \bar{x} - 3S \end{aligned}$$

11.4.2 Precision

Acceptance control limits are calculated as follows, where x_i represents the individual values, $\bar{x}$ is the mean, n is the number of values and S is the Standard Deviation:

$$\begin{aligned} \textit{Upper Control Limit (UCL)} &= \bar{x} + 3S \\ \textit{Upper Warning Limit (UWL)} &= \bar{x} + 2S \\ \textit{Center Line } (\bar{x}) &= \frac{\sum x_i}{n} \end{aligned}$$

11.4.3 Identification of Outliers

Outliers are excluded from the data used to calculate acceptance (control) limits. The procedure is described in ASTM E178-80, Section 4.

Outliers may be determined by any of the procedures referenced in ASTM E178-80 applicable, however, as a general rule the inorganic precision limits will be tested for outliers using the coefficient of kurtosis test at the 1 Percent Significance Levels (this is equivalent to a test for normality). The kurtosis formula is recommended for "two-

sided" tests (changes in level to higher and lower values) and also for changes in scale (variance). Outliers in the data sets for determining accuracy control limits in all tests and precision control limits in organic testing (from MS/MSD determinations) may use the simpler test criterion, T_n at the 1 percent significance level as follows:

$$T_n = (x_n - \bar{x})/S$$

Where:

$\bar{x}$ = arithmetic average of all n values, and
S = estimate of the population standard deviation based on the sample data
x_n = the doubtful value

11.5 Methods Used to Generate Precision and Accuracy Targets

The concentration levels used to make control limit determinations are as follows:

1. Low level - defined as concentrations from the minimum detection limit to a level 5 times the MDL or PQL.

2. Mid level - defined as the mean level between the minimum detection level and the upper end of the linear range.

3. High level - defined as the concentration at the upper end of the linear range.

Refer to Table 11.6, Methods Used to Generate Precision and Accuracy Targets, for further information.

11.5.1 The following procedures/equations are to be used to assess data:

1. Accuracy

$$\%Recovery\ of\ Standard = \frac{A}{B} \times 100\%$$

Where: A = Value Measured (Observed)
B = True Value (Reference)

$$\%Recovery\ of\ Spike = \frac{(SSR - SR)}{SA} \times 100\%$$

Where: SSR = Spiked Sample Result
SR = Sample Result, 0.0 if < MDL
SA = Spike Added

2. Precision - Replicability expressed as Relative Percent Difference (RPD)

The following formula will be used when sample precision is evaluated utilizing matrix spikes (MS) and matrix spike duplicates (MSD):

$$RPD = \frac{2|MSR - MSDR|}{(MSR + MSDR)} \times 100$$

Where: MSR = Matrix Spike Recovery (%R)
MSDR = Matrix Spike Duplicate Recovery (%R)

The following formula will be used when sample precision is evaluated from duplicate (un-spiked) sample results:

$$RPD = \frac{2|S - D|}{(S + D)} \times 100$$

Where: S = Sample Original Measured Value
D = Duplicate Sample Measured Value

3. Standard Deviation (S)

The following formula will be used for calculations by computer programs:

$$S = \sqrt{\frac{\sum_{i=1}^{n} (C_i - \overline{C})^2}{n - 1}}$$

Where: C_i = Each individual data point
$\overline{C}$ = Average value for all readings

The following form may be used when S is calculated with a calculator:

$$S = \sqrt{\frac{\sum C_i^2 - \frac{(\sum C_i)^2}{n}}{n-1}}$$

4. Relative Standard Deviation (RSD)

Relative Standard Deviation is the ratio of the standard deviation S of a set of numbers to their mean ($\overline{X}$) expressed as percent. It relates standard deviation (or precision) of a set of data to the size of the numbers; sometimes referred to as the coefficient of variation (CV).

$$CV = RSD(percent) = \frac{S}{\overline{X}} \times 100\%$$

5. Percent Difference (%D)

Instrument calibration methods require this calculation to compare initial and continuing calibration response factors.

$$\%Difference = \frac{\overline{RRF_i} - RRF_c}{\overline{RRF_i}} \times 100$$

Where: $\overline{RRF_i}$ = Average relative response factor from initial calibration
RRF_c = Relative response factor from continuing calibration standard

11.6 Significant Figures

The following rule will be used for the number of significant figures to use in calculations: For all mathematical operations (addition, subtraction, multiplication, division and exponentiation) retain the equivalent of two more places of figures than present in the single observed value. No rounding of calculated values or intermediate results should be done until the final values are obtained. No rule can be given for the number of significant places to be

retained in final values, however, most tests will be reported with two significant figures. Percent recovery (%R) data will be rounded and reported to include the first decimal place. Relative percent difference (RPD) calculations will be performed using the above rounded %R result when hand calculated, or will use all digits carried by a computer when calculated by computer. The RPD result will be reported to 2 significant figures. The rules to be used for significant figure reporting of %R and RPD are as follows:

% Recovery

# Significant Figures Reported	Magnitude of Value (x)
4	$x \geq 100$
3	$100 > x \geq 10$
2	$10 > x \geq 1$
1	$x < 1$

RPD

# Significant Figures Reported	Magnitude of Value (x)
2	$x \geq 1$
1	$x < 1$

11.6.1 The rounding procedure to be followed is:

1. If the figure following those to be retained is less than 5, the figure is dropped, and the retained figures are kept unchanged. As an example, 11.444 is rounded off to 11.44.

2. If the figure following those to be retained is greater than 5, the figure is dropped and the last retained figure is raised by 1. As an example, 11.446 is rounded off to 11.45.

3. If the figure following those to be retained is 5, and if there are no figures other than zeroes beyond the five, the figure 5 is dropped, and the last-place figure retained is increased by one if it is an odd number or it is kept unchanged if an even number. As an example, 11.435 is rounded off to 11.44, while 11.425 is rounded off to 11.42.

11.6.2 Calculations using Percent Recovery (%R of spikes, etc.) or observed result from the RPD calculation will use the rounded (reported) value in the calculation, so that reported %R and final results used in calculations (vs. using un-rounded numbers not found on final reports) will arrive at the same result.

Organic testing (GC, GC/MS, etc.) requires reporting of %RSD and Percent Difference (%D) to at least one decimal place.

11.7 Control Charts

In addition to the Quality Control Tracking System (QCTS) which establishes control limits quarterly for all QC types (in a tabular format), certain QC types will be evaluated using graphical quality control charts at the bench level.

Control charts are graphical methods for monitoring and improving analytical quality over time. They are process-control tools that can be applied to spiked sample or reference material recoveries (ICVO1, LCS) or other QC test results. They can be used to document data quality, detect the existence of quality problems (special causes, motivate better performance and improve the analytical process.

Graphical quality control charts will include at a minimum:

1. ICV01
2. LCS
3. BLA02

Any other graphical control charting required by method or contract will be performed as required.

Graphical quality control charts and their associated control and warning limits will be updated with each analytical run at the bench.

Refer to Section 11.4 and Appendix A, Selected References, for additional guidance.

11.8 Instrument Detection Limits (IDLs) and Method Detection Limits (MDLs)

Instrument Detection Limits (IDLs) and Method Detection Limits (MDLs) are a quantitative measure of capability. Determination of the IDLs and/or MDLs are mandatory at EMS Heritage Laboratories.

All operating instruments in the laboratory have documented IDLs on file with the QA unit. All newly acquired instruments will have IDLs determined and reported to the QA Unit for approval, before any samples are analyzed. Any significant manipulations/modification to any instrument will require a new determination of the IDLs, which shall be submitted to the QA Unit for approval, before any samples are analyzed. The frequency for determination of IDLs, in the absence of any major instrument manipulations/modifications, shall be determined by the QA unit. Refer to Appendix D, Definitions, under Detection Limits, for the definition of an IDL. See Figure 11.3 for the

IDL/MDL reporting form. Copies of the IDL/MDL form will be sent to the Corporate Quality Assurance Officer for formal test code location approval.

11.8.1 All analytical methods used in the laboratory will have MDLs determined and reported to the QA Unit (not required when an MDL is equivalent to an IDL) for approval, before any samples are analyzed and reported. At a minimum, MDLs may be determined on only 1 instrument of several equivalent instruments having essentially equivalent IDLs, however, they must be determined on the instrument of least sensitivity (highest IDLs). Methods requiring individual analysts' demonstration of ability may be an exception to this rule. At a minimum, the MDLs will be determined in a reagent water matrix and will represent the best achievable detection limit. These reagent water MDLs will be determined by using the procedure outlined in 40 CFR Part 136, Appendix B. This procedure is designed for applicability to a wide variety of sample types ranging from reagent (blank) water containing analyte to wastewater containing analyte. Client or regulatory program specific requirements may call for the determination of client matrix specific MDLs, in which case the lab may opt to use the MDL procedure specified in the Third Edition of SW-846 for all non Clean Water Act (CWA) testing programs (those not requiring 40 CFR Part 136).

11.8.2 <u>MDL Determination as Outlined in 40 CFR Part 136 App. B</u>

A summary of the procedure, as used by EMS Heritage, follows:

1. Make an estimate of the detection limit using one of the following:

   a. The concentration value that corresponds to an instrument signal/noise in the range of 2.5 to 5.

   b. The concentration equivalent of three times the standard deviation of replicate instrumental measurements of the analyte in reagent water.

Figure 11.3
DETECTION LIMIT STUDY

DATE:_____

INSTRUMENT:_____ ANALYST:_____

ANALYTE:_____ Std. Conc. Used:_____

METHOD:_____

PREP METHOD:_____

SAMPLE MATRIX:_____

CURVE DEVELOPMENT

	Conc.	Units
1.	_____	
2.	_____	
3.	_____	
4.	_____	
5.	_____	

6. ICV01_____TV=_____Obsv.=_____%R=_____

MEASURED CONCENTRATION

	Conc.	Units
8.	_____	
9.	_____	
10.	_____	
11.	_____	
12.	_____	
13.	_____	
14.	_____	

15. ICV01_____TV=_____Obsv.=_____%R=_____

16. BLA01_____

Mean (%) of #'s 8 through 14 values =_____

Standard Deviation (SD) =_____ x 3.143 = _____

IDL/MDL =_____

95% LCL = IDL/MDL_____x 0.64 =_____

95% UCL = IDL/MDL_____x 2.20 =_____

c. That region of the standard curve where there is a significant change in sensitivity, i.e. a break in the slope of the standard curve.

d. Instrumental limitations.

2. Prepare reagent (blank) water that is as free of analyte as possible. This reagent water must not contain analyte or interferant at concentrations at or above the MDL.

3. a. MDLs determined in reagent water will contain analyte concentrations which are at least equal to or in the same concentration range as the estimated MDL. The standard concentration will not exceed 10 times the actual MDL. EMS Heritage will set the standard concentration between 1 and 5 times the estimated detection limit.

b. MDLs required to be determined in sample matrices must first be analyzed for the background concentration. Depending on the level of analyte present in the sample a known amount of analyte may be added to bring the level of analyte between one and five times the estimated detection limit. If the level of analyte is greater than the estimated detection limit, then the option of choosing another sample with a lower analyte level or the option using that sample (if analyte does not exceed 10 times the reagent water MDL) may be chosen.

4. a. Seven aliquots of the sample will be used to calculate the MDL. All samples will be processed through the entire analytical method. If a blank measurement is required to calculate the measured level of analyte, obtain a separate blank measurement for each sample aliquot analyzed. The average blank measurement is subtracted from the respective sample measurements.

b. EMS Heritage may opt to take two aliquots of the sample to be used to calculate the MDL and process each entirely. If these measurements indicate that the sample is in the desirable range, then five additional aliquots will be analyzed, combined with the two aliquots

for a total of 7 measurements. If the sample is not in the correct range, the MDL will be re-estimated and the process repeated.

5. The variance (S^2) and standard deviation (S) of the replicate measurements will be calculated as given in the referenced procedure. The standard deviation of the 7 replicate measurements will be multiplied by 3.143 and rounded to three significant figures.

6. The 95% confidence interval estimates for the MDL will be calculated as follows:

   LCL = 0.64 MDL

   UCL = 2.20 MDL

7. EMS Heritage will generally not use the optional iterative procedure for MDL determinations.

   Where EMS Heritage opts to use the SW 846 procedure for determining the MDL, the same procedure as 40 CFR, Part 136, Appendix B will be used except for the following points:

   a. Triplicate analyses will be utilized instead of seven analyses.

   b. The standard deviation from the triplicate analyses will be multiplied by 7 to obtain the MDL.

11.8.3 EMS Heritage will report a practical quantitation limit (PQL) in place of the actual MDL where allowed. Exceptions will be made to Practical Quantitation Limit (PQL) reporting where regulatory or client DQO's push the limits of reporting close to the MDL. In no case will EMS Heritage report data lower than the MDL without the "estimated" qualifier on the result.

The PQL will be 10 times the standard deviation (S_{pooled}) that is derived from the procedures used to determine the MDL. It will be calculated to two significant figures in most cases. Alternatives to the PQL calculated in this manner will be action levels or other criteria used as the reporting detection limit as long as the reported limit is

equal to or greater than the actual MDL. The QA Officer will make the final determination for all reporting detection limits.

EMS Heritage recognizes the definition of PQL as stated in John Taylor's book Principles of Quality Assurance of Chemical Measurements, 1987, p. 79-82.

SECTION 12.0

12.0 Data Reduction, Validation and Reporting

12.1 Introduction

The laboratory analyst holds the key to the successful completion of valid and documentable analytical testing. Analysts must be provided with proper training, equipment and supervision so that they know and follow proper analytical procedures. It is management's responsibility to make available at the bench level, this QA Plan and it is the analysts' responsibility to know and to follow its' requirements. In addition to the QA Plan, pertinent EMS Heritage SOPs, EMS Heritage written methods and published (EPA, etc.) methods, the analysts must be fully aware and have easy access to any specific contract requirements and DQO's. Data validation will never result in acceptable data if the proper QC types are not analyzed as dictated by the specific project or contract.

12.2 Data Reduction

This section outlines how the raw data are reduced (calculated) into reportable values. Refer to Appendix E, Job Descriptions, for the responsibilities and specific duties of the analyst.

12.2.1 All lab analysts share some portion of the responsibility for maintaining documentation of the testing being performed. In addition to the various bound notebooks which are maintained documenting standard preparations, instrument maintenance, instrument performance, logbook of logbooks, etc., analysts must maintain some combination of bound notebooks and/or original raw data printouts with bench sheets indicating the analytical run contents, sequence and results. Some documentation requirements under various testing programs may make the use of loose bench sheets in lieu of bound sequentially numbered notebooks an unacceptable procedure, in which case bound notebooks will be utilized exclusively. Exclusive use of bound notebooks may necessitate the use of loose sheets for data entry of results and associated information into the LIMS system.

12.2.2 All analytical run notebooks must contain the following information at a minimum:

1. Analyst identification

2. Date of analysis

3. Instrument identification

4. Analytical method (Edition or Version) used and any deviations

5. Date of initial calibration

6. Computer file name if applicable

7. Concentration and source identification of all standards and spikes

8. EMS sample I.D. number

9. Reference to prep performed

10. Any comments pertinent to the analysis or sample conditions (homogeneity)

11. Any dilutions, concentrations, sample manipulations (initial and final weights/volumes, etc.)

Calculation of results from raw data if not contained in the bound lab notebook, will be maintained and filed along with the original hard copy of instrument printouts.

12.2.3 When data entry of results into LIMS is required (direct data file transfer not available), it will be necessary to summarize the final results and all information needed for data entry. A combination of the analytical run notebook, the instrument printouts/chromatograms, calculation work sheets, prep bench sheets/notebooks and summary of final results will be sufficient to re-construct the sample analysis. This simple final result summary will include at a minimum:

1. Analyst identification

2. Date of analysis

3. Instrument identification

4. Analytical method used

5. Computer file names

6. EMS sample I.D. number

7. Comment to appear on the final report

8. Any dilutions or concentrations involved

9. Final results with proper units and detection limits

10. Reviewer initials and date of review

11. Data entry operator and date of data entry

12.2.4 All instrument printouts/chromatograms must contain the following at a minimum:

1. Analysts' initials and date of review of hard copy

2. Sample or standard identification (and conc.)

3. Computer file numbers

4. Dilutions or concentrations

5. Date and time of injection or analysis

6. Units (μg/L, mg/L, mg/kg, etc.)

7. Identification of samples that are spiked or duplicated (in addition to computer assigned "Q" numbers).

8. Peaks chosen for quantitation and their identification.

12.2.5 Some testing will generate only bench sheets when no instrument printout is possible or practical and no bound notebook is maintained. The following tests are directly read from instruments:

1. pH and ISE methods

2. Manual spectrophotometric methods

3. Gravimetric methods

4. Coliform bacteria

5. Heat of combustion

6. Total organic halides

7. Temperature tests (i.e. Flash Point, Boiling Point)

8. Titrations

9. Turbidity

10. Biochemical oxygen demand (BOD)

11. Specific conductance

In those cases this bench sheet must contain all information required in the analytical run notebook previously discussed and the following at a minimum:

1. Reviewer initials and date of review

2. Data entry operator initials and date of entry

3. Page numbers

4. Calculated final results, %R of spikes, RPD of duplicates, etc.

5. Any raw data used to arrive at the final result

6. Results of the calibration curve (linear regression, log transforms, etc.)

12.2.6 All calibration curves conforming to a linear equation will be fitted by the least squares linear regression technique. This procedure will also be used for calibration curves that require log transforms or similar transforms. The formula for calculation of the regression line is as follows:

Where: $Y = mX + b$
Y = Point on the y axis
m = Slope of line
X = Point on the x axis
b = y intercept

The least squares estimate of b and m uses the following equations:

$$m = \frac{\sum XY - \frac{\sum X \sum Y}{n}}{\sum X^2 - \frac{(\sum X)^2}{n}}$$

$$b = \bar{Y} - m\bar{X}$$

Other scientifically sound procedures/data reduction techniques may be used as permitted by the Chief Chemist and the QA Officer.

12.2.7 When using the external standard calibration technique the average calibration factor (CF) can be used in place of a calibration curve (non-linear) when the %RSD is less than 20% over the working range and linearity through the origin can be assumed. The calibration factor (CF) is calculated as follows:

$$CF = \frac{Total\ Area\ of\ Peak*}{Mass\ Injected\ (in\ nanograms)}$$

or $$RF(Response\ Factor) = \frac{Mass\ injected\ (in\ nanograms)}{Total\ Area\ of\ Peak*}$$

*For multi-response pesticides/PCBs, gasoline, diesel, etc., use the total area of all peaks used for quantitation.

The concentration of each analyte in the sample may be determined by calculating the amount of standard purged or injected, from the peak response, using the calibration curve or the calibration factor (CF) above. The concentration of a specific analyte is calculated as follows:

Aqueous samples:

$$\text{Concentration (ug/L)} = [(A_x)(A)(V_t)(D)]/[(A_s)(V_i)(V_s)]$$

where:

A_x = Response for the analyte in the sample, units may be in the area counts or peak height.

A = Amount of standard injected or purged, ng.

A_s = Response for the external standard, units same as for A_x.

V_i = Volume of extract injected, μL. For purge-and-trap analysis, V_i is not applicable and therefore = 1.

D = Dilution factor, if dilution was made on the sample prior to analysis. If no dilution was made, D = 1, dimensionless.

V_t = Volume of total extract, μL. For purge-and-trap analysis, V_t is not applicable and therefore = 1.

V_s = Volume of sample extracted or purged, mL.

By inspection of the above formula one observes that the concentration in the extract is:

$$(A_x)(RF)$$

where:

$$RF(ResponseFactor)^* = \frac{A}{A_s}$$

*RF is the inverse of CF.

Nonaqueous samples:

$$\text{Concentration (ng/g)} = [(A_x)(A)(V_t)(D)]/[(A_s)(V_i)(W)]$$

where:

W = Weight of sample extracted or purged, g. The wet weight or dry weight may be used, depending upon the specific applications of the data.

A_x, A_s, A, V_t, D, and V_i have the same definition as for aqueous samples.

12.2.8 When using the internal standard technique (all GC/MS analyses) the average response factor ($\overline{RF}$) can be used in place of a calibration curve (non-linear) when the %RSD is less than 20% over the working range and linearity through the origin can be assumed. The response factor (RF)* is calculated as follows:

$$RF = (A_s C_{is})/(A_{is} C_s)$$

where:

A_s = Response for the analyte to be measured.

A_{is} = Response for the internal standard.

C_{is} = Concentration of the internal standard, μg/L.

C_s = Concentration of the analyte to be measured, μg/L.

*Also known as "Relative Response Factor" or RRF

The concentration of a specific analyte is calculated as follows:

Aqueous samples:

$$\text{Concentration } (\mu g/L) = [(A_x)(C_{is})(D)]/[(A_{is})(RF)(V_s)]$$

where:

A_x = Response of the analyte being measured, units may be in area counts or peak height.

C_{is} = Amount of internal standard added to extract or volume purged, ng.

D = Dilution factor, if a dilution was made on the sample prior to analysis. If no dilution was made, D = 1, dimensionless.

A_{is} = Response of the internal standard, units same as A_x.

RF = Response factor for analyte.

V_s = Volume of water extracted or purged, mL.

Nonaqueous samples:

$$\text{Concentration } (\mu g/kg) = [(A_s)(C_{is})(D)]/[(A_{is})(RF)(W_s)]$$

where:

W_s = Weight of sample extracted, g. Either a dry weight or wet weight may be used, depending upon the specific application of the data.

A_s, C_{is}, D, A_{is}, and RF have the same definition as for aqueous samples.

The RF from the daily standard (CCV) analysis is used to calculate the concentration in the sample unless specific methods dictate otherwise.

12.2.9 Temperature variations for pH are negated by simply allowing solutions to warm-up to room temperature or using an automatic temperature compensation probe. When testing for specific conductance, the operator may use the standard solution and the table to check accuracy of the cell's constant or to determine an unknown constant. The formula is:

$$K = \frac{k_1 + k_2}{\frac{1}{R}}$$

where,
K = cell constant in c.g.s. metric units (cm^{-1})
k1 = conductivity from Table 12.6
k2 = blank conductivity
1/R = measured conductance of KC1 standard on meter

TABLE 12.6
TEMPERATURE vs CONDUCTIVITY
0.01N KC1 SOLUTION

TEMPERATURE (°C)	CONDUCTIVITY (ABSOLUTE MICROMHOS/CM)
15	1141.5
16	1167.5
17	1193.6
18	1219.9
19	1246.4
20	1273.0
21	1299.7
22	1326.6
23	1353.6
24	1380.8
25	1408.1
26	1435.6
27	1463.2
28	1490.9
29	1518.7
30	1546.7

1/R, k1 and k2 must either be determined at the same temperature, or corrected to the same temperature to make the equation valid.

To calculate sample value, use the following equation:

$$\frac{\textit{Conductivity of Sample x Cell Constant}}{1 + 0.0191\ (t-25)}$$

Table 12.7 lists denominator values (1+0.0191 [t-25]) for temperatures ranging from 17°C to 28°C.

12.2.10 Manual data entry is the responsibility of the Data Entry Supervisor who will assure that data entry staff have knowledge of the system in order that complete analytical information is entered accurately, in the correct format and labeled consistently. Data entry staff will not perform any calculations; all data entry items will be summarized and submitted on standard forms which have been reviewed by the responsible group leader for acceptability, accuracy and completeness.

All analyses in the data system are based on the "analytical run" concept. All data (prep or analytical, is grouped in the computer, exactly in the order analyzed (as it also appears on a benchsheet). All QC is included in the analytical sequence.

Automated data transfer is the responsibility of each respective Group Leader.

12.3 Data Validation - During Collection

The principal criteria to be used to validate data integrity during collection will be the following:

1. Calibration Criteria (Linearity, RF etc.)
2. Internal Standard Areas (organics)
3. Calibration Blank Value (CAL01)
4. Method Prep Blank Value (BLA02)
5. Reagent Blank Value (BLA01)

TABLE 12.7

TEMPERATURE	Km (C) (Denominator of Sample equ.)
17°C	0.8472
18°C	0.8663
19°C	0.8854
20°C	0.9045
21°C	0.9236
22°C	0.9427
23°C	0.9618
24°C	0.9809
25°C	1.00
26°C	1.0191
27°C	1.0382
28°C	1.0573

6. Result of calibration verification standard used to verify calibration (ICV01).

7. Results of (matrix) spiked non QC samples (DPS01, SPI01, SPI02, DPS02).

8. Results of surrogate recoveries (organics).

9. Results of replicate measurements (DUP01, DUP02, DPS02).

10. Results of Continuing Calibration Verification standard (CCV).

11. Results of Laboratory Fortified Blanks and Laboratory Control Samples or QC Check Samples (LCS, DLCS, ICV02).

12.3.1 These measurements are to be made by the analyst who, using specific acceptance criteria, will either proceed with analyses or take corrective action. All QC data must be reviewed by the Group Leader to insure that all QC types have been completed and meet acceptance criteria. Group Leaders must also:

1. Check raw data entries and calculations.

2. Check extraction logs and benchsheets.

3. Check Calibration integrity.

4. Check Instrument/analytical logbooks.

The Group Leaders are responsible for assuring that all bench sheets submitted for data entry are accurate and adequate to allow for the rapid and error free recording of data into LIMS.

12.3.2 Group Leaders and the Sample Custodian are also responsible for checking and assuring that all internal chain of custody requirements and documentation of such are met.

12.3.3 In summary, Group Leaders will review all bench sheets or release computer files to LIMS after review. In addition 20% of all raw data will be reviewed by the Group Leaders to insure that the method was in-control during the analytical run. Group Leaders are responsible for initialing and submitting data for data entry upon completion of

their review. This completes the first step in review of the data integrity and data validity.

12.4 Data Validation - Post Completion

Subsequent to data entry, the Quality Assurance Unit is responsible for comparing bench sheets with actual data entered into LIMS. Such review will occur for 2-5% of all data entered. This activity will be documented and retained on file.

Refer to Figure 12.1, Data Review Protocol for the procedures used at EMS Heritage for data review and validation. The QA Officer and/or the QA Unit must also:

1. Confirm that the goals for precision and accuracy on duplicate and spiked compounds are sufficient to achieve the goal of 99% completeness.

2. Confirm that all analytical QC precision and accuracy (the measurement system, not sample (matrix) related) is 100% acceptable or that the run has been rejected and corrective action taken.

3. Confirm that all client specific or contract specific QC requirements have been met.

4. Examine at least 5% of the raw data (e.g. chromatograms, AAS recorder outputs, burn records) on a periodic basis to verify adequacy of documentation, confirm peak shape and resolution, and to assure that the instrument system is sufficiently sensitive and responsive.

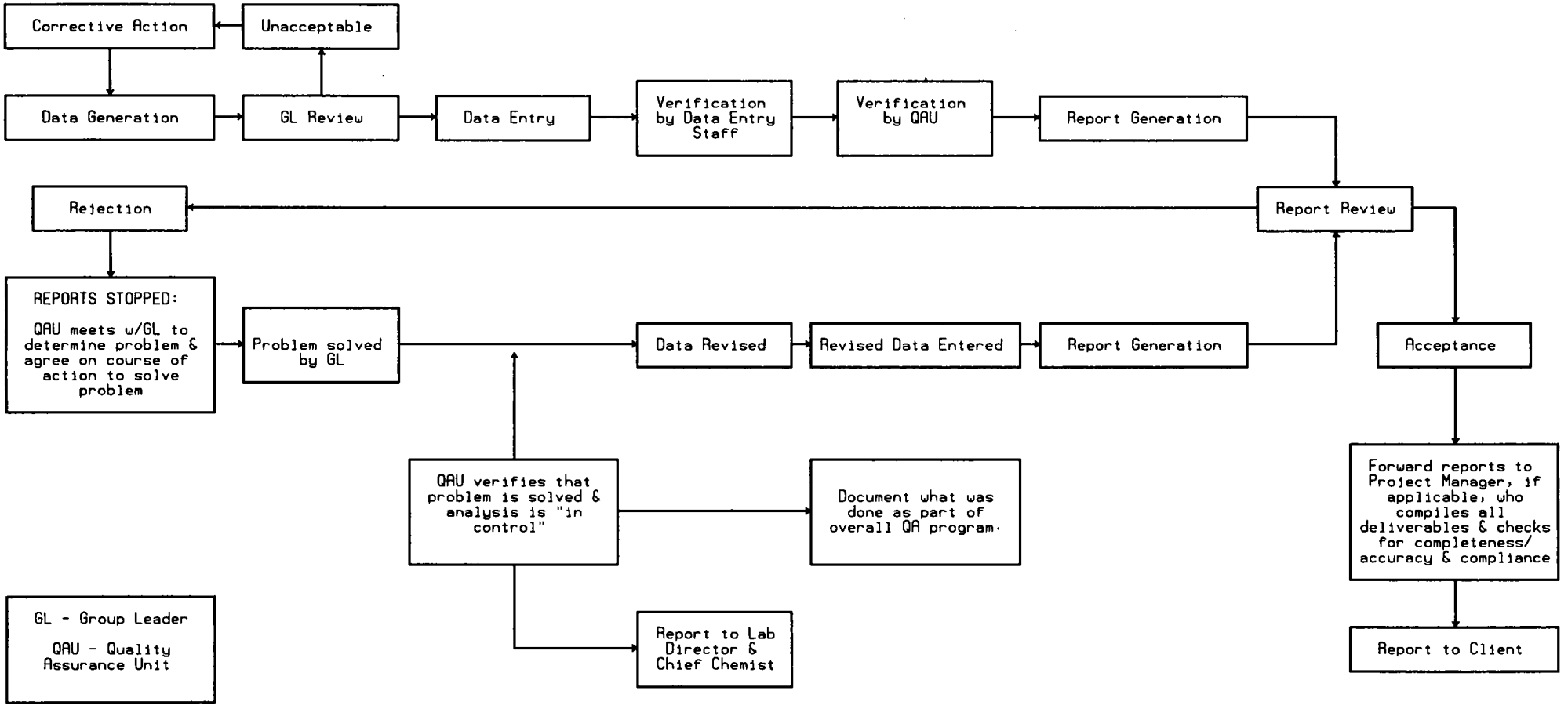
12.4.1 Internal and External Assessments

External assessment of the adherence to the QA/QC policy and procedures is the responsibility of the Quality Assurance Officer. Audit forms have been developed in the QAP and are used at all EMS Heritage Laboratories to evaluate their adherence to QA/QC Procedures. External assessments are also accomplished via third party audits.

Internal assessment of the compliance to company QA/QC policies and procedures is conducted by the Laboratory Director and the Quality Assurance Unit or their designee. Review of documentation, use of blind duplicates and standards and monthly reference materials shall be used to evaluate the performance of each laboratory. Refer

FIGURE 12.1
EMS LABORATORIES

DATA REVIEW PROTOCOL



to Section 14.0, Performance and Systems Audits for the details of internal and external assessments.

12.4.2 Quality Control Policy and Procedures

The EMS Heritage Laboratories, Inc. QAP is mandatory at all laboratories. Specific procedures are required and regular quality control audits are performed to assure compliance to company policy. Quarterly quality control reports are required from the QA Units submitted through the QA Officer. The overall quality of analysis shall be compiled and summarized by the QA Officer, who will report this summary to the President of EMS Heritage. Acceptable levels of performance are presented and monitored by the QA Officer. Refer to Section 15.0, Quality Assurance Reports for further details.

12.5 Laboratory Quality Control Checks

The types and frequency of laboratory QC Checks are presented in Table 11.5, Analytical Run Requirements/Frequency. This table presents basically three categories of QC:

1. Instrument Calibration QC

2. Instrumental Method QC (tests w/no prep. or analyzed w/o prep)

3. Analytical samples QC - processed through all steps (prepped QC).

Instrument Calibration criteria must be met before any analyses are allowed to proceed; those criteria are given in Table 9.5, Instrument Calibration. Internal QC checks not related to calibration are discussed below.

12.5.1 Preparation or Method Blanks

Blanks are identified at EMS Heritage as either BLA01 or BLA02 (calibration blanks are treated as a calibration data point, CAL01). Those methods that do not differentiate a prep from the analysis, i.e. purge and trap volatile analyses, are labeled as BLA01, which is equivalent to a BLA02 for tests that do have a separable prep and analysis. The following control limits apply for all method blanks (BLA02) and reagent blanks (BLA01):

If sample results are greater than 10 times the method blank value or the sample results are below the detectable level, the analysis is acceptable. Otherwise, the following criteria will apply.

1. Organic Analytes: Less than the Reporting Detection level (PQL)

   Exceptions to the rule will be for common lab solvents not to exceed 5 times the PQL, including but not limited to the following:

   1. Acetone
   2. Methylene Chloride
   3. Toluene
   4. Methyl Ethyl Ketone (MEK)
   5. Methyl Isobutyl Ketone (MIBK)
   6. Freon(s)
   7. Phthalates

2. Inorganic Analytes: Less than the Reporting Detection Level (PQL)

   Exceptions to the rule will be for the following metals - not to exceed 3 times the PQL:

   1. Iron
   2. Nickel
   3. Zinc
   4. Copper

12.5.2 Any target compounds in the blank will be reported. Any sample containing a similar amount of the compound outside the acceptable range will be re-analyzed when the source of the contamination is identified and removed.

Target compounds found to be BDL (Below Detection Limit) in the blank will be entered into the data base at 0.4 times the MDL.

12.5.3 Matrix Spikes

Matrix spikes are included as a routine protocol according to the frequency given Table 11.5, Analytical Run Requirements/Frequency. Matrix spikes serve only to show that an individual sample does or does not exhibit matrix interferences using the prescribed method; they do not definitively demonstrate that a given analytical method is out of control. Other QC types will be utilized to demonstrate that an analytical method is in control (QC check sample, LCS, etc.).

12.5.3.1 There are basically two types of spikes utilized and they are as follows:

1. Pre-digestion/extraction spikes

2. Post digestion spikes

Pre-digestion/extraction spikes are performed for all applicable analyses at the required (Table 11.5) frequency. The goals for accuracy are listed in Table 5.1, QA Targets for Precision, Accuracy and Method Detection Limits. Those control limits are determined from actual data entered into the QCTS when a sufficient number of observations (minimum of 7) are available to determine meaningful statistical limits.

Accuracy will be a function of the spiking level chosen. Many methods and testing programs specify the spiking levels to be used; EMS Heritage will use those spiking levels where specified. As a general rule, spiking will be performed at approximately 10 to 20 times the MDL unless other factors preclude that choice.

Several methods have established multi-laboratory performance based control limits for spike recovery of specific matrices (water and soil) through the USEPA. While Table 5.1 contains actual EMS Heritage developed control limits, the control limits used will be those determined by the USEPA for those equivalent analyses (assumes similar spiking levels used). Surrogate

matrix spikes will be treated in the same manner for organic analyses. Refer to the specific methods for further explanation.

12.5.3.2 The spike (%R) recovery QC Acceptance Criteria for those organic methods providing specific limits are as found in Table 12.1, Organic Spike Recovery Criteria:

12.5.3.3 The spike recovery (%R) QC Acceptance Criteria for those inorganic methods providing specific limits are given in Table 12.2, Inorganic Spiking Levels and Control Limits. Those criteria are the minimum acceptable criteria, stricter limits may be set by contractual requirements and/or QA Units. Analytes not listed in Table 12.2 will utilize the control limits established in Section 5.0, Table 5.1 where a sufficient number of observations exist, otherwise the control limit of 75-125% Matrix Spike Recovery will apply.

12.5.3.4 Post-digestion spikes (SPI01) are primarily used in metals analyses and are also referred to as the Method of Standard Additions (MSA). Two versions of this MSA are referenced in SW-846, Third Edition. The full method of standard additions generates a 4 point curve from which final results can be calculated. Another version of MSA is the Single-Point MSA, which essentially is a sample and matrix specific spike recovery. Section 11.0, Figures 11.1, Metals Analysis Scheme For Spiking and 11.2, CLP-GFAA Analysis Scheme define the criteria used to determine the application of those techniques.

The spike recovery criteria for a post-digestion spike is as follows:

SPI01 Criteria: 85-115% *Recovery*

Those analytical samples not meeting the above criteria will follow the procedures outlined in either Figure 11.1 and/or Figure 11.2.

TABLE 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Volatile Methods: SW-846-8240, CLP-VOA			
Parameter	Water, Range %R	Soil, Range %R	Spike Amount
Benzene	76-127	66-142	50 µg/L
Chlorobenzene	75-130	60-133	50 µg/L
1,1-Dichloroethene	61-145	59-172	50 µg/L
Toluene	76-125	59-139	50 µg/L
Trichloroethene	71-120	62-137	50 µg/L

Volatile Methods: SW-846 8240*, EPA 624	
Parameter	Water, Range %R
Benzene*	37-151
Bromodichloromethane	35-155
Bromoform	45-169
Bromomethane	D-242
Carbon tetrachloride	70-140
Chlorobenzene*	37-160
Chloroethane	14-230
2-Chloroethylvinyl ether	D-305
Chloroform	51-138
Chloromethane	D-273
Dibromochloromethane	53-149
1,2-Dichlorobenzene	18-190
1,3-Dichlorobenzene	59-156
1,4-Dichlorobenzene	18-190
1,1-Dichloroethane	59-155
1,2-Dichloroethane	49-155
1,1-Dichloroethene*	D-234
trans-1,2-Dichloroethene	54-156
1,2-Dichloropropane	D-210

TABLE 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Volatile Methods: SW-846 8240*, EPA 624	
cis-1,3-Dichloropropene	D-227
trans-1,3-Dichloropropene	17-183
Ethyl Benzene	37-162
Methylene chloride	D-221
1,1,2,2-Tetrachloroethane	46-157
Tetrachloroethene	64-148
Toluene*	47-150
1,1,1-Trichloroethane	52-162
1,1,2-Trichloroethane	52-150
Trichloroethene*	71-157
Trichlorofluoromethane	17-181
Vinyl chloride	D-251

D = Detected
*These analytes for method 8240 and CLP will use tighter limits established by RCRA and CLP: see previous limits.

Volatile Methods: EPA 601, 602; SW-846 8010, 8020	
Parameter	Water, Range %R
Bromodichloromethane	42-172
Bromoform	13-159
Bromomethane	D-144
Carbon tetrachloride	43-143
Chlorobenzene	38-150
Chloroethane	46-137
2-Chloroethylvinyl ether	14-186
Chloroform	49-133
Chloromethane	D-193
Dibromochloromethane	24-191
1,2-Dichlorobenzene	D-208

TABLE 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Volatile Methods: EPA 601, 602; SW-846 8010, 8020	
Parameter	Water, Range %R
1,3-Dichlorobenzene	7-187
1,4-Dichlorobenzene	42-143
1,1-Dichloroethane	47-132
1,2-Dichloroethane	51-147
1,1-Dichloroethene	26-167
trans-1,2-Dichloroethene	38-155
1,2-Dichloropropane	44-156
cis-1,3-Dichloropropene	22-178
trans-1,3-Dichloropropene	22-178
Methylene chloride	25-162
1,1,2,2-Tetrachloroethane	8-184
Tetrachloroethene	26-162
1,1,1-Trichloroethane	41-138
1,1,2-Trichloroethane	39-136
Trichloroethene	35-146
Trichlorofluoromethane	21-156
Vinyl chloride	28-163
Benzene	39-150
Ethylbenzene	32-160
Toluene	46-148
Chlorobenzene	55-136
1,2-Dichlorobenzene	37-154
1,3-Dichlorobenzene	50-141
1,4-Dichlorobenzene	42-143

D = Detected

TABLE 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Semi-Volatile Methods: SW-846 8270, CLP-SVOA		
Parameter	Water, Range %R	Soil, Range %R
Phenol	12-89	26-90
2-Chlorophenol	27-123	25-102
1,4-Dichlorobenzene	36-97	28-104
N-nitroso-di-n-propylamine	41-116	41-126
1,2,4-Trichlorobenzene	39-98	38-107
4-Chloro-3-methylphenol	23-97	26-103
Acenaphthene	46-118	31-137
4-Nitrophenol	10-80	11-114
2,4-Dinitrotoluene	24-96	28-89
Pentachlorophenol	9-103	17-109
Pyrene	26-127	35-142

Semi-Volatile Methods: SW-846 8270*, 625	
Parameter	Water, Range %R
Acenaphthene	47-145*
Acenaphthylene	33-145
Aldrin	D-166
Anthracene	27-133
Benzo(a)anthracene	33-143
Benzo(b)fluoranthene	24-159
Benzo(k)fluoranthene	11-162
Benzo(a)pyrene	17-163
Benzo(ghi)perylene	D-219
Benzyl butyl phthalate	D-152
δ-BHC	24-149
γ-BHC	D-110
Bis(2-chloroethyl)ether	12-158

TABLE 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Semi-Volatile Methods: SW-846 8270*, 625	
Parameter	Water, Range %R
Bis(2-chloroethoxy)methane	33-184
Bis(2-chloroisopropyl)ether	36-166
Bis(2-ethylhexyl)phthalate	8-158
4-Bromophenyl phenyl ether	53-127
2-Chloronaphthalene	60-118
4-Chlorophenyl phenyl ether	25-158
Chrysene	17-168
4,4'-DDD	D-145
4,4'-DDE	4-136
4,4'-DDT	D-203
Dibenzo(a,h)anthracene	D-227
Di-n-butyl phthalate	1-118
1,2-Dichlorobenzene	32-129
1,3-Dichlorobenzene	D-172
1,4,-Dichlorobenzene	20-124*
3,3'-Dichlorobenzidine	D-262
Dieldrin	29-136
Diethyl phthalate	D-114
Dimethyl phthalate	D-112
2,4-Dinitrotoluene	39-139
2,6-Dinitrotoluene	50-158
Di-n-octylphthalate	4-146
Endosulfan sulfate	D-107
Endrin aldehyde	D-209
Fluoranthene	26-137
Fluorene	59-121
Heptachlor	D-192

TABLE 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Semi-Volatile Methods: SW-846 8270*, 625	
Parameter	Water, Range %R
Heptachlor epoxide	26-155
Hexachlorobenzene	D-152
Hexachlorobutadiene	24-116
Hexachloroethane	40-113
Indeno(1,2,3-cd)pyrene	D-171
Isophorone	21-196
Naphthalene	21-133
Nitrobenzene	35-180
N-nitrosodi-n-propylamine	D-230*
PCB-1260	D-164
Phenanthrene	54-120
Pyrene	52-115*
1,2,4-Trichlorobenzene	44-142*
4-Chloro-3-methylphenol	22-147*
2-Chlorophenol	23-134*
2,4-Dichlorophenol	39-135
2,4-Dimethylphenol	32-119
2,4-Dinitrophenol	D-191*
2-Methyl-4,6-dinitrophenol	D-181
2-Nitrophenol	29-182
4-Nitrophenol	D-132*
Pentachlorophenol	14-176*
Phenol	5-112*
2,4,6-Trichlorophenol	37-144

D = Detected
*These analytes for method 8240 & CLP will use tighter limits established by RCRA, CLP- see previous list limits

TABLE 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Organochlorine Pesticides/PCBs: SW-846 8080, CLP-Pest		
Parameter	Water, Range %R	Soil, Range %R
gamma-BHC (Lindane)	56-123	46-127
Heptachlor	40-131	35-130
Aldrin	40-120	34-132
Dieldrin	52-126	31-134
Endrin	56-121	42-139
4,4'-DDT	38-127	23-134

Organochlorine Pesticides/PCBs: EPA 608; SW-846 8080	
Parameter	Water, Range %R
Aldrin	42-122*
α-BHC	37-134
β-BHC	17-147
δ-BHC	19-140
γ-BHC	32-127*
Chlordane	45-119
4,4'-DDD	31-141
4,4'-DDE	30-145
4,4'-DDT	25-160*
Dieldrin	36-146*
Endosulfan I	45-153
Endosulfan II	D-202
Endosulfan Sulfate	26-144
Endrin	30-147*
Heptachlor	34-111*
Heptachlor epoxide	37-142
Toxaphene	41-126

TABLE 12.1
ORGANIC SPIKE RECOVERY CRITERIA

Organochlorine Pesticides/PCBs: EPA 608; SW-846 8080	
Parameter	Water, Range %R
PCB-1016	50-114
PCB-122	15-178
PCB-1232	10-215
PCB-1242	39-150
PCB-1248	38-158
PCB-1254	29-131
PCB-1260	8-127

D = Detected
*These analytes for method 8240 & CLP will use tighter limits established by RCRA, CLP- see previous list limits

TABLE 12.2
INORGANIC SPIKING LEVELS AND CONTROL LIMITS

Element	For ICP/AA				For Furnace AA				Other[1] (ug/L)	Control Limits % Recovery
	Water (ug/L)	Soil[2] (mg/kg)	Soil[3] (mg/kg)	Soil[4] (mg/kg)	Water (ug/L)	Soil[2] (mg/kg)	Soil[3] (mg/kg)	Soil[4] (mg/kg)		
Aluminum	2,000	400*	400*	200*						75-125%R
Antimony[3]	500	100	100	50	100	20	20	10		75-125%R
Arsenic	2,000	400	400	200	40	8	8	4		75-125%R
Barium	2,000	400	400	200						75-125%R
Beryllium	50	10	10	5						75-125%R
Cadmium	50	10	10	5	2	0.40	0.40	0.20		75-125%R
Calcium	100,000*	20,000*	20,000*	10,000*						75-125%R
Chromium	200	40	40	20	20					75-125%R
Cobalt	500	100	100	50						75-125%R
Copper	250	50	50	25	20					75-125%R
Iron	1,000	200*	200*	100						75-125%R
Lead	500	100	100	50	20	4	4	2		75-125%R
Magnesium	100,000*	20,000*	20,000*	10,000*						75-125%R
Manganese	500	100	100	50						75-125%R
Mercury									1/s/s/s=0.25	75-125%R
Nickel	500	100	100	50						75-125%R
Potassium	100,000*	20,000*	20,000*	10,000*						75-125%R
Selenium	2,000	400	400	200	10	2	2	1		75-125%R
Silver	50	10	10	5						75-125%R
Sodium	100,000*	20,000*	20,000*	10,000*						75-125%R

TABLE 12.2
INORGANIC SPIKING LEVELS AND CONTROL LIMITS

Element	For ICP/AA				For Furnace AA				Other[1] (ug/L)	Control Limits % Recovery
	Water (ug/L)	Soil[2] (mg/kg)	Soil[3] (mg/kg)	Soil[4] (mg/kg)	Water (ug/L)	Soil[2] (mg/kg)	Soil[3] (mg/kg)	Soil[4] (mg/kg)		
Thallium	3,000	600	600	300	50	10	10	5		75-125%R
Vanadium	500	100	100	50						75-125%R
Zinc	500	100	100	50						75-125%R
Cyanide									100[5]	

•No spike required. NOTE: Elements without spike levels and not designated with an asterisk, must be spiked at appropriate levels.

[1]Cyanide spiking level reported is for both water and soil/sediment matrices.

[2]Used for USEPA CLP ILM01. The levels shown indicate concentrations in the final digestate of the spiked sample (100 mL for mercury and 200 mL for all other metals when the wet weight of 1 gram (for ICP, Furnace, and Flame AA), or 0.40 grams (for mercury) of sample is taken for analysis. Adjustment must be made to maintain these spiking levels when the weight of sample taken deviates by more than 10% of these values. Appropriate adjustment must be made for microwave digestion procedure where 0.5 grams of sample or 50.0 mL (45.0 mL of sample plus 5.0 mL of acid) of aqueous sample are required for analysis.

[3]Used for USEPA CLP SOW 7/88 or equivalent. The levels shown indicate concentrations in the final digestate of the spiked sample (100 mL for mercury and 200 mL for all other metals) when the wet weight of 1 gram (for ICP, Furnace and Flame AA), or 0.40 grams (for mercury) of sample is taken for analysis.

[4]Used for non-CLP analyses. The levels shown indicate concentrations in the final digestate of the spiked sample (100 mL for mercury and 100 mL for all other metals) when the wet weight of 1 gram (for ICP, Furnace, and Flame AA), or 0.40 grams (for mercury) of samples is taken for analysis.

[5]The level shown indicates the amount of cyanide that must be added to the original (undistilled) sample. for instance, 100 ug must be added per each Liter of aqueous sample. If the sample volume is 500 mL, then 50 ug of cyanide must be added. If the volume if 50 mL, then 5 ug of cyanide must be added.

For soil samples, 25 ug of cyanide must be added per each gram of solid sample taken for analysis. The spiking level is dependent on the weight of the sample taken and the final distillate volume. If one gram of sample is taken for analysis, and the final distillate volume is 250 mL, then the distillate must contain cyanide at a concentration of 100 ug/L. If five grams of sample are taken, then the distillate must contain cyanide at a concentration of 500 ug/L. Assuming a sample of one gram, the manual and semi-automated colorimetric methods call for a cyanide concentration of 25 ug per the 500 mL mixture of the sample, reagents and water before distillation. The final distillate, in this case, contains cyanide at a concentration of 100 ut/L. Fo the midi-distillation method, a cyanide concentration of 25 ug must be added into the 50 mL mixture of sample reagents, and water before distillation. This yields a cyanide concentration of 500 ug/L in the final distillate of 50 mL.

12.5.4 Duplicate Matrix Spikes (DPS01, DPS02)

Duplicate matrix spikes measure both accuracy (see previous section for matrix spikes) and precision. As with matrix spikes, USEPA has established control limits for precision of specified methods for waters and soils. Those control limits are given as Relative Percent Difference (RPD) and will be used as control limits by EMS Heritage when applicable. When the methods do not specify RPD control limits, Table 5.1 of this QAP will be utilized when a sufficient number of observations allow for usable statistical limits. Any method not falling into the above two categories will be allowed a maximum of 50 percent RPD for organic testing and 20 percent RPD for inorganic testing. RPD's exceeding these limits may be considered as out-of-control for Duplicate Matrix Spike analyses.

Methods Without Established Control Criteria:
RPD Inorganic Criteria: 0-20
RPD Organic Criteria: 0-50

12.5.4.1 The Precision Control Limits for those organic methods providing specific limits are given in Table 12.3, Organic Precision Control Limits.

12.5.5 Reagent Water or Reagent Matrix Spikes (LCS, DLCS)

Reagent water or reagent matrix spikes will be used as additional QC checks to monitor the effectiveness of the method. These QC types will utilize either reagent water spiked w/analyte (also known as Laboratory Fortified Blank) or a blank matrix (water, soil, sand, oil) which is known to exhibit minimal or no matrix interferences. EMS Heritage uses the acronyms of LCS (Laboratory Control Sample), DLCS (Duplicate Laboratory Control Sample) and/or ICV02 (Initial Calibration Verification - Prepped Standard) to identify the variations of these check samples. Analysis of this QC type will demonstrate that the method is in control when the Matrix Spike/Matrix Spike Duplicate (MS/MSD) recoveries are out-of-control. These QC types must be extracted/digested (if applicable) in the same preparation batch as the samples failing to meet QC criteria. Analysis may be optional for some organic tests when QC criteria for MS/MSD samples are met.

12.5.5.1 The reagent water or reagent matrix spikes (Laboratory Control Sample) are entered into the QCTS in LIMS as are all QC types. In addition, these QC samples are kept on control charts at the bench level. The minimum

TABLE 12.3
ORGANIC PRECISION CONTROL LIMITS

Volatile Methods: SW-846 8240, CLP-VOA		
Parameter	RPD, Water	RPD, Soil
Benzene	11	21
Chlorobenzene	13	21
1,1-Dichloroethene	14	22
Toluene	13	21
Trichloroethene	14	24

Semi-Volatile Methods: SW-846 8270, CLP-SVOA		
Parameter	RPD, Water	RPD, Soil
Phenol	42	35
2-Chlorophenol	40	50
1,4-Dichlorobenzene	28	27
N-Nitroso-di-n-propylamine	38	38
1,2,4-Trichlorobenzene	28	23
4-Chloro-3-methylphenol	42	33
Acenapthene	31	19
4-Nitrophenol	50	50
2,4-Dinitrotoluene	38	47
Pentachlorophenol	50	47
Pyrene	31	36

TABLE 12.3
ORGANIC PRECISION CONTROL LIMITS

Organochlorine Pesticides/PCBs: SW-846 8080, CLP-Pest		
Parameter	RPD, Water	RPD, Soil
gamma-BHC (Lindane)	15	50
Heptachlor	20	31
Aldrin	22	43
Dieldrin	18	38
Endrin	21	45
4,4'-DDT	27	50

QC criteria to be utilized for these QC types will be the same criteria as found in Table 5.1 for matrix specific precision and accuracy. More stringent criteria will be utilized where available. As a general rule the following criteria will apply for the Laboratory Control sample:

(LSC, DLCS, ICV02): 80-120% *Recovery (Accuracy)*
DLCS: 20% *RPD*

Some tests, particularly extractable organic analyses cannot meet this criteria, see Table 5.1.

12.5.6 Quality Control Check Samples - Performance Evaluation Samples (P.E. Samples)

Acceptance criteria for P.E. samples are set by the organization running the study (EPA, commercial vendors). All results of P.E. samples are summarized to management.

12.5.7 Quality Control Check Standards or Initial and Continuing Calibration Check Standards (ICV01, CCV)

Refer to Section 9.0, Table 9.5, Instrument Calibration for the acceptance criteria of the ICV01 and the CCV.

12.5.8 Duplicate Samples (DUP01, DUP02)

Control limits for duplicate samples are identical to those set for duplicate matrix spike samples (see section 12.6.4, Table 5.1 and Table 12.3) with one exception. Since duplicate precision is measured from analyte already present in the sample (no spike added) the level may not be detectable or may be very close to the detection limit. Concentrations of analyte less than 10 times the reporting detection limit (MDL, PQL, etc.) present in non-spiked (duplicate) samples will not be considered as out-of-control based on the QCTS data, but will be allowed a maximum RPD of 20 percent for inorganic analyses and 50 percent for organic analyses.

12.5.9 Methods Utilizing Internal Standards

The criteria which must be met for internal standard areas (when used) are found in Table 12.4, Internal Standard Area Criteria.

TABLE 12.4
INTERNAL STANDARD AREA CRITERIA

Instrument	Method	Criteria, χ = Absolute Area of Daily CCV
GC/MS	EPA 524.2	$-30\% > \chi < +50\%$
GC/MS	EPA 525	$-30\% > \chi < +50\%$
GC/PID/ELCD	EPA502.2	±3 SD from CAL Standards
GC/NPD	EPA 507	30% Difference from daily CCV
GC/ECD	EPA 508	30% Difference from daily CCV
GC/ECD	EPA 515.1	30% Difference from daily CCV
HPLC	EPA 531.1	30% Difference from daily CCV
GC/MS	SW-846 8240	$-50\% > \chi < +100\%$
GC/MS	SW-846 8260	$-50\% > \chi < +100\%$
GC/MS	SW-846 8270	$-50\% > \chi < +100\%$
GC/MS	CLP-VOA	$-50\% > \chi < +100\%$
GC/MS	CLP-SVOA	$-50\% > \chi < +100\%$
GC/MS	EPA 624*	$-50\% > \chi < +100\%$
GC/MS	EPA 625*	$-50\% > \chi < +100\%$
GC/ECD	SW-846 8080**	$-50\% > \chi < +100\%$

*No method criteria, EMS Heritage has adopted these criteria.
**Any correction of areas using Internal Standards will not exceed this criteria.

12.5.10 Surrogate Recovery Criteria

Control limit criteria for methods which do not specify specific control limits will be developed from in-house data. EMS Heritage will not adopt criteria less stringent than the published method criteria. "Advisory" criteria will not require corrective action. Refer to Table 12.5, Surrogate Recovery Criteria for method specific control criteria.

12.6 Review of Project Data

Project Managers are responsible for review of the overall project data before submission to the client. All laboratory "Certificates of Analysis" (Reports)and QA Summaries are reviewed and approved only by the QA Unit (see Reporting) prior to delivery to the Project Manager.

Project Managers are responsible for the following review prior to releasing the data report package to clients:

1. Review of supporting documentation including, but not limited to:

    a. Chain of Custody.

    b. Laboratory Analysis Request or Task Order Forms.

2. Review of all contract or project deliverables for completeness and accuracy including but not limited to:

    a. Reporting forms.

    b. Selected Raw data including chromatograms/ printouts.

    c. Adherence to specific DQO's.

    d. Analysis of all required QC Types at the required frequency.

3. Review of data for any obvious anomalous values, specifically those areas requiring knowledge of special project conditions possibly unknown to the QA Unit during review. Review large sets of data for comparability from one analytical batch or case

TABLE 12.5
SURROGATE RECOVERY CRITERIA

Volatiles: SW-846 8240, CLP-VOA			
Parameter	Water, Range %R	Soil, Range %R	Spike Amount
4-Bromofluorobenzene	86-115	74-113	50 μg
1,2-Dichloroethane-d_4	76-114	70-121	50 μg
Toluene-d_8	88-110	84-117	50 μg

Semi-Volatiles: SW-846 8270, CLP-SVOA			
Parameter	Water, Range %R	Soil, Range %R	Spike Amount
Nitrobenzene-d_5	35-114	23-120	50 μg
2-Fluorobiphenyl	43-116	30-115	50 μg
p-Terphenyl-d_{14}	33-141	18-137	50 μg
Phenol-d_6	10-94	24-113	100 μg
2-Fluorophenol	21-100	25-121	100 μg
2,4,6-Tribromophenol	10-123	19-122	100 μg
2-Chlorophenol-d_4	33-110 (advisory)	20-130 (advisory)	150 μg
1,2-Dichlorobenzene-d_4	16-110 (advisory)	20-130 (advisory)	100 μg

Organochlorine Pesticide/PCBs: SW-846 8080, CLP-Pest		
Parameter	Water, Range, %R	Soil, Range %R
Dibutylchlorendate (DBC)[1]	24-154 (advisory)	20-150 (advisory)
Tetrachloro-m-xylene (TCX)	60-150 (advisory)	60-150 (advisory)
Decachlorobiphenyl (DCB)	60-150 (advisory)	60-150 (advisory)

[1]DBC has been replaced by TCX & DCB for CLP-Pest OLMØ1.

to another in the project (QA Unit does not generally review an entire case at one time).

4. Adherence to reporting deadlines and shipment/delivery of report packages by the best means available to meet those deadlines.

12.7 Data Reporting

The Data Entry Supervisor is responsible for supervision of all data entry operators. The Data Entry (D.E.) Supervisor (or designee other than the original data entry operator) will verify 5 percent of all data entered into LIMS. Locations having only one D.E. person will not check data in this manner; this responsibility will fall solely upon the QA Unit of that location.

Validation of data entry is performed for all data at a 2-5 percent frequency and is the responsibility of the QA Unit. The QA Unit may delegate this task to the QA Assistant or other staff person trained to perform that function.

The QA Unit is responsible for reviewing all final reports prior to release to clients. Reports are to be reviewed for:

1. Completeness - All parameters, detection limits, units, dates, descriptions, etc. must be complete and correct.

2. Consistency - All parameters must be internally consistent (CrVI $\leq$ Cr Total; TKN $\geq$ NH_3 - N, TS $\geq$ TDS, etc.)

3. Comparability - All parameters and units must be reported in such a way that data sets can be evaluated relative to each other as necessary.

12.7.1 All modifications to samples in the LIMS system must be documented on the Sample Modification Form, Figure 12.2. Original entries or additions (comments, etc.) to original entries will not utilize this form unless the sample is a "status 8" (released) category. All modifications to test codes must be approved by the Project Manager or the QA Unit. Modifications to samples that are completed and released (LIMS status 8) are possible only by the QA Unit staff. Any report that has been sent to a client and subsequently modified in any way by the QA Unit must be identified as an "amended report" and the date of amendment and the initials of the person making the amendment will be given on the certificate of analysis.

FIGURE 12.2

REQUEST FROM:_____DATE_____

SAMPLE STATUS:_____

SAMPLE NUMBERS:_____

_____

CLIENT:_____

TEST CODE ADDED/CANCELLED:_____

TEST CODE CHANGED FROM _____ TO _____

RESULTS MODIFICATIONS:_____

_____

_____

_____

REASON FOR ADDITION OR CHANGE:_____

_____

_____

_____

MODIFIED BY:_____ DATE _____

PROJECT MANAGER'S APPROVAL INITIALS:_____ DATE _____

ACCOUNT MANAGER'S APPROVAL INITIALS:_____ DATE _____

OLD PRICE:_____ NEW PRICE:_____

12.7.2 Samples of final reports and computer (LIMS) QC summaries are contained in Appendix F, Final Report Examples.

12.7.3 Special Reporting Requirements

Sample analysis failing QC criteria due to matrix related interferences or samples requiring dilutions, etc. may have been analyzed 2 or more times. EMS Heritage will report a maximum of two analyses in those cases, or each analysis if client desires.

If a re-analysis of the sample fails the same criteria a second time and all other instrument criteria are in control, a matrix interference is assumed and both analyses may be reported. If only the reanalysis is in control, only the reanalysis will be reported.

Exceptions to this policy will be made for contract requirements and/or different client DQO's.

12.8 Data Storage

The following data is maintained for long term storage.

- bench sheets
- strip charts
- chromatograms, print-outs
- magnetic media used to store results
- invoices and financial statements
- project files
- customer data
- various raw data
- lab related periodicals

12.8.1 The records, hard copy and magnetic media, are kept on site for a period of six months to a year. As necessary, records may be transferred to an off-site records storage facility. The records storage

facility must provide secure, access controlled and environmentally controlled storage of records. For all GLP (40 CFR, part 160) projects, records will be kept on-site.

After the completion of the requested work, records of the raw data, quality assurance data and reports will be kept by EMS for at least five (5) years unless otherwise required by law or regulations. Magnetic tapes are maintained, however, magnetic tapes have a storage life expectancy of less than ten (10) years.

12.8.2 The following is an overview of how records are stored and retrieved at EMS Heritage.

12.8.2.1 Storing Records

To send a box off site to a records storage facility the following three steps will be followed.

1. A box is filled with material of a related nature. The box is then marked to show the contents and the related service group and destruction date.

2. The box is then taken to the off-site storage coordinator where the box is given a unique number. The unique number, the contents, the associated service group, and the date stored are recorded in a ledger. Once the box is entered into the ledger it is scheduled to be picked up or delivered to the off-site records storage facility.

3. The off-site records storage facility stores the box and gives it a unique location code. Once the location code is assigned off-site records storage facility contacts the off-site storage coordinator, who enters the location code into the box's ledger entry. This allows for the recall of individual boxes.

12.8.2.2 Recalling Records

To recall records from off-site storage requires the EMS box number and the records storage facility location code, both of which are kept in a records storage ledger.

A copy of the ledger is kept by the off-site storage coordinator, who can also recall the box from storage.

12.8.3 The LIMS system located in Indianapolis is backed up on a three cycle program. Every week a backup of the system is done. Weekly backup tape sets are rotated every week. So, if the computer is backed-up with tapes set "A" this week tape set "B" is used the next week. The tape sets are rotated back and forth every other week, except the last week of the month. For the last week of the month tape set "C" is used. By using this method it is possible to restore the computer from as far back as one month. The tape sets are held at off-site storage, except when called back to do the backup. EMS Heritage also maintains over a month of "redo's" on tape that are backed up each day. "Redo's" are copies of the transactions needed to apply to an old backup of the database to bring it up to date. EMS Heritage also maintains a two week rotation of backups for the software. The software is backed up each day as well.

12.8.4 Data is not stored or organized per specific project unless contract or other client requirements dictate such. If storage by project is required, all raw data and final reports are copied and stored in a "central project file".

All original raw data and benchsheets are organized and stored in folders chronologically according to analytical batch and date of analysis.

SECTION 13.0

13.0 Corrective Action

13.1 Introduction

Criteria levels which designate in or out of control status are specified in the applicable sections of this QA Plan. The corrective actions recommended, that will return the analysis to an "in control" status, are summarized in Table 13.1, Corrective Actions.

Corrective action must be undertaken whenever any number of unacceptable conditions exist.

13.2 Warning Limits

A first condition requiring corrective action occurs when external standards or otherwise specified quality control check samples are analyzed and results found to be outside established warning limits, upper or lower (UWL, LWL). Data may be acquired if the upper and lower control limits (UCL, LCL) are not exceeded in this condition, but corrective action must be undertaken. See Trends Analysis, Section 13.4.

Two successive readings outside of warning limits (but inside of control limits) are considered out of control. The analysis must be stopped and immediate corrective action is undertaken (see all Trends Analysis, below).

13.3 Control Limits

Another condition is one in which either of the control limits have been violated. In this case, all analyses stop and immediate corrective action is undertaken.

13.4 Trends Analysis

Analyses are out of control whenever any of the following occurs:

- 1 point is outside the control limit
- 2 consecutive points are outside the warning limits
- 7 consecutive points are on one side of the center line
- 7 consecutive points increase or decrease
- An obvious trend is observed in the distribution of points

13.5 Notification

In both of the above conditions, the determination is to be made by the analyst if the procedure is in control. If it is in control, analyses proceed; if it is out of control, all analyses are stopped and the following information is compiled immediately and in writing.

1. Test which is out of control.

2. Analyst.

3. Instrument.

4. A brief description of the problem.

At a minimum the problems will be written on the runs (bench sheets) and the QA Unit will be notified and consulted. When the seriousness of the problem warrants a more formal report, the following information will be supplied on the form in Figure 13.1.

The report is given immediately to the Group Leader, Lab Director and Quality Assurance Unit, The goal at this point is to return the analysis status to IN-CONTROL as soon as possible.

The Group Leader is responsible for returning the analysis status to in control and he or she may draw upon any or all of the resources at EMS Heritage to accomplish this in a timely fashion.

13.6 Specific Corrective Actions

The nature of the corrective actions which may be required at the bench are too numerous to document within a manual such as this one. However, there are some common procedures which are generally appropriate to a number of trouble-shooting protocols including:

1. Review of analytical history: Is there a sudden problem or has an analysis slowly "drifted" out of control?

2. Prepare fresh standards: Have the standard or stock or working solutions expired or degraded?

3. Prepare fresh reagents: Have any reagents expired or degraded?

4. Review the method - ask for assistance: Has an analyst introduced an un-noticed, methodical error into the procedure?

Refer to Table 13.1, Corrective Actions for detailed procedures.

EMS will subscribe to any reasonable corrective action deemed necessary by regulatory personnel. Corrective actions will also be initiated as needed as a result of systems or performance audits, split samples or data validation reviews. Exceptions to this policy must be approved by the President of the laboratory or the QAO for the purpose of negotiating a corrective action.

Following corrective action, any sample analyzed during the out of control period must be reanalyzed.

13.7 Corrective Action Documentation

Upon returning the analysis to an "in-control" status, the Group Leader is responsible for filing the following information in the method file:

1. Test which was out of control.
2. Analyst/Date.
3. Instrument I.D.
4. Brief description of the problem.
5. Corrective actions taken.
6. Current Status.
7. Date analysis returned to "in-control" status.
8. Person responsible for remedy.

Figure 13.1, Analytical Control Notification is the form that will be used for out of control and return to "in control" status reports.

FIGURE 13.1
ANALYTICAL CONTROL NOTIFICATION

1. Test_____

2. Analyst_____

   Date_____

3. Instrument_____

4. Brief Description of Problem_____

5. Corrective Actions Taken_____

6. Current Status_____

7. Date Returned to In-Control_____

8. Persons Responsible For Remedy_____

TABLE 13.1
CORRECTIVE ACTIONS

QC Type	Recommended Corrective Actions
Instrument Blanks	Prepare another blank, if same response, determine cause of contamination: reagents, environment, instrument equipment failure, etc. Re-analyze any samples associated with unacceptable blanks.
Calibration Standards	Reanalyze standards. If still unacceptable, then remake standards. If still unacceptable try an alternate source or prepare from neat standards.
Continuing Calibration Standards	Reanalyze standard. If still unacceptable, then recalibrate and rerun samples from the last unacceptable CCV standard.
Internal Standards	Inspect the chromatographic system for malfunctions and make corrections as required. Reanalyze affected samples. If reanalysis does not solve the problem and the system is not malfunctioning, report both analyses with comments, as required by some clients. Report only 1 analysis with comments for those clients not requiring replicate reporting.
Surrogates	Check for errors in calculations, formulation of spiking solution, internal standard responses and instrument performance. Reanalyze the samples if none of the above reveals a problem. If an undiluted analysis with acceptable surrogate recoveries is being reported, do not reanalyze diluted samples if the surrogates are outside limits. MS/MSDs outside of control limits for surrogates are never reanalyzed except for specific contractual or DQO requirements. If the sample and its associated MS/MSD show the same surrogate recovery pattern, document this in a case narrative or analysis comments. If reanalysis does not solve the problem and the system is not malfunctioning, report both analyses with comments, as required by some clients. Report only 1 analysis with comments for those clients not requiring replicate reporting. Corrective actions are not required for advisory surrogate limits. For procedures involving extraction, when surrogates are outside the limits and require corrective actions reanalyze the extract first, to determine if the problem was with the analysis. If reanalysis does not solve the problem then re-extract and analyze the second extract. If surrogate recoveries in an extracted blank do not meet specifications upon re-analysis, re-extract and reanalyze all samples and a blank. Specifically for GC/MS semi-volatile analysis, if two base/neutral or two acid surrogates are out of limits or if recovery of any one base/neutral or acid surrogate is below 10% corrective actions are required as described herein.

TABLE 13.1
CORRECTIVE ACTIONS

Method Blanks	Reanalyze blank. If still positive, determine source of contamination. If sample results are greater than 10 times the method blank value or the sample results are below the detectable level, the analysis is acceptable. If necessary, reprocess (i.e. digest or extract) the sample set.
Initial Calibration Verification Standards (ICV)	Reanalyze ICV standards. If still unacceptable, then remake ICV standards and reanalyze. If still unacceptable, then recalibrate and reanalyze ICV. If still unacceptable evaluate source and validity of all standards as appropriate.
Post Digestion/Extraction Spike (MSA)	Check for error. Refer to Figures 11.1 or 11.2 for actions regarding the Method of Standard Additions for Metals analysis. For all other post digestion spikes, reanalyze. If reanalysis does not meet the criteria, flag the results with a comment and include in the case narrative.
Pre Digestion/Extraction Matrix Spike (MS/MSD)	For %R criteria only: Check for error. If extracted standard (LCS, lab Fortified Blank, QC check sample, etc.) meets criteria, then poor recovery is considered to be a matrix interference. Extracted standard or check standard must be prepared in same prep batch where applicable. Report results with a comment and include in the case narrative. If extracted standard fails, reprep and reanalyze all affected samples. CLP protocol testing will not require reanalysis for organics testing unless a trend develops for poor accuracy.
Extracted Standards	Check for errors in preparation and analysis. Reanalyze and reprep all affected samples.
Duplicates and Duplicate Spikes	For RPD criteria only: Check for error. If extracted standard (DLCS) meets criteria, then report the result. Poor precision may be due to sample inhomogeneity; check sample appearance. If obvious sample inhomogeneity is the problem, do not enter the outlier into the QCTS, but report results with a comment and include in the case narrative. Sample RPD's exceeding 20 percent for inorganic analyses or 50 percent for organic analyses or the method specific criteria (RCRA, CLP) with no obvious sample inhomogeneity problem must be reprepped and reanalyzed for all affected samples. CLP protocol testing will not require reanalysis unless a trend develops for poor precision.

SECTION 14.0

14.0 Performance and Systems Audits

14.1 Performance Audits

A performance audit is an independent check to evaluate the data produced by a laboratory's analytical system, and may be categorized as a quantitative appraisal of quality. There are several ways that this is done:

1. Worksheet review
2. Oral worksheet review
3. On-site analyst work review
4. Independent or check sample review
5. Intra and interlaboratory check sample, or proficiency test (performance evaluation) sample analysis review

14.1.1 Internal Performance Audits

Internal performance audit worksheet reviews are conducted by the QA Officer and/or the QA Unit. These reviews must be conducted at a frequency necessary to assure the accuracy of either the total measurement system or its component parts. Worksheet reviews by the QAO and/or QAU will be on-going but will occur at a minimum frequency of semi-annually for selected tests. This will be in addition to (or will be a more in-depth review of all data records) the 2-5 percent frequency of data entry validation performed by the QAU.

Internal performance audit worksheet reviews will consist of evaluations of all data and related supporting documentation to assure that all required QC checks are being made and evaluation criteria followed. Reports relating to internal performance audit worksheet reviews are confidential and will be released only upon approval from the President of EMS Heritage.

14.1.2 Performance Audit-Proficiency Test Samples

Performance Audits at EMS Heritage also consist of analysis of independent or commercial check samples and participation in performance evaluation sample programs.

Refer to Table 14.1, Reference Materials and Performance Evaluation Participation for the sources of reference materials used and the on-going performance audit participation.

All information generated from Performance Evaluation (P.E.) sample programs will be made available during systems audits or upon request. Blind samples and split samples may be submitted as deemed necessary by the QAO or the QAU.

14.2 Systems Audits

A systems audit is an on-site inspection and review of a laboratory's quality control system and may be categorized as a qualitative appraisal of quality. It will cover any or all of the operational quality control elements of the quality assurance program. Systems audits include but are not limited to the following:

1. Sample handling: receiving, custody, log-in, storage
2. Sample analysis: written SOPs and analytical methods, protocols
3. Records control
4. Documentation: bound notebooks where required; records of all sample handling and analytical procedures
5. Preventative maintenance: adequate records, procedures.
6. Proficiency testing
7. Personnel practices
8. Training
9. Workload
10. Instrumentation and facilities

14.2.1 External Systems Audits

Systems audits are performed frequently at EMS Heritage by State and Federal agencies as part of the participation in sample analyses for governmental organizations. In addition, many of our commercial clients perform routine audits of EMS Heritage. Evaluation by other appropriate

outside experts is to be performed in the event that regulatory personnel are not available. At a minimum, systems audits will occur annually. EMS Heritage Laboratories will welcome any external audit from an organization which currently or proposes to submit samples for analysis.

14.2.2 Internal Systems Audits

In order to verify that each laboratory division is performing according to the standards established by EMS Heritage Laboratories, Inc., an internal audit system has been established. Internal systems audits will be conducted no less frequently than annually. The auditor will be appointed by and directly responsible to the President of the corporation.

The President may appoint for any given audit the following staff:

1. Quality Assurance Officer

2. Quality Assurance Unit

3. Outside (Contracted) Auditor

EMS Heritage also encourages the individual groups at each division to perform a self-audit at periodic intervals to assess their overall operation.

These audits will be scheduled by the auditor and each laboratory director. All reports relating to internal systems audits will be treated as an internal document only; release to any outside entity will be only upon approval of the President of EMS Heritage.

To facilitate the procedure and make it consistent from division to division, a set of audit procedures and protocols has been developed and will be used consistently throughout the corporation. These forms will be used as a guideline and a tool for documentation of problems and to assure that all important areas are covered. The forms are not an end in themselves and will be subject to change/improvement by the QAO at his discretion in order to facilitate and improve the auditing process. Refer to Appendix G, Internal Systems Audit Forms.

14.2.3 Internal Systems Audits - Procedures and Protocols

Not all areas (service groups) will necessarily be audited during each visit. During each audit, at least one analytical run will be randomly selected from the service group(s) chosen. This run will be thoroughly checked using the audit checklist forms and any other pertinent audit questions.

Upon completion of the audit, the auditor will conduct an exit interview with the QA Unit and the Laboratory Director and any other personnel deemed appropriate. A copy of the completed audit forms as well as any supporting narrative will be given to the QA Unit and the Laboratory Director at that time or immediately upon completion. A copy of all of these materials will also be sent to the President, Vice President of Operations, Quality Assurance Officer and all QA Units of all EMS Divisions. This sharing of audit information with all divisions is to provide not only a report of findings but will also serve to point out potential deficiencies which may exist at the respective divisions not audited. The auditor will retain a copy of the materials to use in the next audit. The QAO will confer with the President to prioritize items for the next audit.

Generally the audit will consist of the auditor reviewing with the group leader and the analyst all the steps involved in generating a run of reportable data. It will also include an overview of the entire lab, address issues relevant to the operation as a whole (i.e. cooler logs, log-in procedures, oven logs, etc.) Any deficiencies will be noted on the forms. Deficiencies will be discussed at the time they are noted and the auditor will explain what will be required to correct this deficiency.

Form 1 will always be completed. It addresses general laboratory practices. Form 2 will be completed during each audit for each service group audited. Forms 3-5 will be used on a service group specific basis only.

14.0 Performance and Systems Audits

14.1 Performance Audits

A performance audit is an independent check to evaluate the data produced by a laboratory's analytical system, and may be categorized as a quantitative appraisal of quality. There are several ways that this is done:

1. Worksheet review
2. Oral worksheet review
3. On-site analyst work review
4. Independent or check sample review
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Internal performance audit worksheet reviews will consist of evaluations of all data and related supporting documentation to assure that all required QC checks are being made and evaluation criteria followed. Reports relating to internal performance audit worksheet reviews are confidential and will be released only upon approval from the President of EMS Heritage.

14.1.2 Performance Audit-Proficiency Test Samples

Performance Audits at EMS Heritage also consist of analysis of independent or commercial check samples and participation in performance evaluation sample programs.

Refer to Table 14.1, Reference Materials and Performance Evaluation Participation for the sources of reference materials used and the on-going performance audit participation.

All information generated from Performance Evaluation (P.E.) sample programs will be made available during systems audits or upon request. Blind samples and split samples may be submitted as deemed necessary by the QAO or the QAU.

14.2 Systems Audits

A systems audit is an on-site inspection and review of a laboratory's quality control system and may be categorized as a qualitative appraisal of quality. It will cover any or all of the operational quality control elements of the quality assurance program. Systems audits include but are not limited to the following:

1. Sample handling: receiving, custody, log-in, storage
2. Sample analysis: written SOPs and analytical methods, protocols
3. Records control
4. Documentation: bound notebooks where required; records of all sample handling and analytical procedures
5. Preventative maintenance: adequate records, procedures.
6. Proficiency testing
7. Personnel practices
8. Training
9. Workload
10. Instrumentation and facilities

14.2.1 External Systems Audits

Systems audits are performed frequently at EMS Heritage by State and Federal agencies as part of the participation in sample analyses for governmental organizations. In addition, many of our commercial clients perform routine audits of EMS Heritage. Evaluation by other appropriate

TABLE 14.1
REFERENCE MATERIALS AND PERFORMANCE EVALUATION PARTICIPATION

Source	Type	Frequency	Parameters	Division
APG	Unknowns	Monthly	All	All
EPA-WP	Unknowns	Semi-Annually	All	All
EPA-WS	Unknowns	Semi-Annually	All	All
North Carolina-Wastewater	Unknowns	Semi-Annually	Metals, General Chemistries	Charlotte
State of New York	Unknown	Quarterly	All	Indianapolis
State of New Jersey	Unknown	Semi-Annually	All	Indianapolis
EPA Reference	Known	On-Going	All	All
APG	Known	On-Going	All	All
NIST	Known	On-Going		All
EPA QB-Inorganics	Unknown	Quarterly	Metals	Indianapolis
EPA QB-Organics	Unknown	Quarterly	Organics	Indianapolis
Chemical Waste Management	Unknown	Quarterly	All	Indianapolis, Chicago
State of Illinois	Unknown	Yearly	All	Chicago

15.0 Quality Assurance Reports

For each division, by the last day of the month following the completion of each fiscal quarter the Quality Assurance Unit (QAU) will provide information as required to the Quality Assurance Officer (QAO), who will, in turn, compile and summarize the information to the President, the Vice President of Operations and the Laboratory Directors. QA reports will consist of but not be limited to the following points:

15.1 QCTS Review

A statement that the QAO has reviewed the precision, accuracy and method detection limits data for the previous quarter in the QCTS data base. Included in this statement will be:

1. A listing of outliers - Parameters for which data quality objectives have not been met. Parameters for which MDLs must be evaluated.

2. A brief narrative discussing the course of action to be taken to correct deficiencies identified above.

15.2 Correction of Deficiencies

A statement that the laboratory has corrected or has begun to correct deficiencies identified in the previous quarter's QA report. Included in this statement will be:

1. A brief narrative describing what was done.

2. A brief narrative describing what is yet to be done.

15.3 Performance and Systems Audits Summary

In addition, on a monthly basis the President, Vice President of Operations and the Lab Directors will be supplied with the results of all performance and systems audits most recently completed. Results of EPA WS and WP series samples will be provided to the President, the Vice-President of Operations and Lab Directors as they are received. The forms in Figures 15.1 and 15.2 to this part will be used.

15.4 Significant Problems and Solutions

Significant QA/QC problems and recommended solutions will be reported to the President on a timely basis.

15.5 Outside Reporting

Whenever regulatory authorities require submission of QA reports, such reports will be submitted to the appropriate QA officers of those agencies at a frequency prescribed by those agencies (e.g. quarterly).

FIGURE 15.1
APG RESULTS SUMMARY

Month _____

Year _____

Deviation from Means of Reporting Labs	Chemistries	General	Metals	GC	GC/MS
0 - 1.0Σ					
1.01 - 2.00					
2.01 - 3.00					
>3.00					
Total					

Values with deviation > 2.00							
Analyte	Value Rptd.	True Val.	% Recovery	Analyte	Value Rptd.	True Val.	% Recovery

N = _____

Deviation	N	%	Prev. Mo %	This Mo %
0 - 1.00				
1.01 - 2.00				
2.01 - 3.00				
3.01 - Outlier				
# of Outliers				

FIGURE 15.2
EPA PERFORMANCE EVALUATION SUMMARY

Study # _____

Date Performed _____

Date Reported _____

% Acceptance/Group	Metals	General	GC/MS	GC
% Analytes Correct				
% Test Results Correct				
Number of Analytes				
Number of Tests				

List Unacceptable Results:

Analyte	Reported Value	True Value	% Recovery

SECTION 16.0

KEY RESUMES

List of Key Resumes

Name	Page #
Curtis Beck	7
Anne C. Bradburn	7
Susan Brotherton	5
Gregory Busch	4
Susan Bussey	14
Mel Carroll	13
J. Coplen	2
Jack Corpuz	6
David Czerny	8
Jan Dillow	18
Deborah Edwards	16
Steve Endersen	5
C. Steven Gohmann	1
Steve Guptill	21
Helmuth Janssen	21
Lisa Julian	8
Carla Keever	23
Horst Kehl	19
Gary Klingler	4
Malgorzata Kraska	23
J.T. Kurek	3
Kurt Maines	6
Scott Meeks	18
Kevin Miller	20
Linda Osborn	9
D.L. Peterson	2
Michael Piwowar	23
Margarita Rozenfeld	20
Roger Rowan	19
Michele Sakwa	21
Chris Sarkan	14
Jennifer Schott	15
Susan Sharp	15
Barbara Shrake	10
Dawn Siekerman	16
Adam West	3
Janet Williams	24
Fred Winter	13
Pen Winters	24
Ronald F. Wukasch	1

C. Steven Gohmann, President
EMS-Heritage Laboratories, Inc.

Experience: 1974 - Present, EMS Heritage Laboratories, Inc.
6 years with Other Firms

Education: Bachelors Degree, Chemistry/1973/Analytical Chemistry, Indiana University, Bloomington, IN

Memberships: American Chemical Society
American Society for Testing Materials
Water Pollution Control Federation

C. Steven Gohmann has been Laboratory Director for EMS-Heritage Laboratories, Inc. (formerly Environmental Monitoring Service) since its founding in 1974 and is responsible for all activities of the lab. These duties include the purchase of equipment and major instrumentation, establishment and maintenance of quality control/assurance program to comply with EPA recommendations; the establishment and maintenance of a fulltime professional staff; laboratory cost control; and many other duties associated with the organization. Prior to this affiliation with EMS-Heritage, Mr. Gohmann was employed by a testing laboratory near Louisville, KY as an analytical chemist for the analyses of water and wastewater. Before his association with the Louisville firm, Mr. Gohmann served as a research associate at Indiana University where he assisted in the development of gas chromatographic techniques for the analyses of lunar samples for the Apollo program. He also, served as an associate instructor of chemistry while at Indiana University. He is a member of ACS, ASTM and WPCF.

Dr. Ronald F. Wukasch, Vice President
EMS-Heritage Laboratories, Inc.

Experience: 1974 - Present, EMS Heritage Laboratories
20 years with Other Firms

Education: Ph.D/1966 Environmental Engineering
MS 1955 Environmental Engineering
BSCE

Active Registration: PE, Indiana 1973, Environmental Engineering
PE, Michigan 1969

Dr. Wukasch was responsible for the technical direction and overall management of the City of Indianapolis' wastewater treatment facilities improvement program. He also worked as consultant and advisor to the City-Department of Public Works on advanced wastewater treatment and resource recovery from solid waste. In addition, he has been principal investigator on numerous research projects dealing with pollutants in municipal sludge and wastewater.

Dr. David L. Peterson, Quality Assurance Officer
EMS-Heritage Laboratories, Inc.

Experience: 1985 - present, EMS Heritage Laboratories, Inc.
9 years with Other Firms

Education: Bachelors Degree/1966/Chemistry, Manchester College
Masters Degree/1969/Biochemistry, Ball State University
Doctorate/1972/Biochemistry, Purdue/Ball State University

Memberships: American Chemical Society
Indiana Academy of Science
American Society for Quality Control

Dr. Peterson serves as the Quality Assurance Officer to monitor all analytical testing. Prior to his employment with EMS-Heritage, he served as the Senior Environmental Chemist for a major engine company. Activities there included all types of analysis on water, industrial hygiene, hazardous waste, and special wastes. In addition he set up Quality control programs to fulfill requirements for laboratory accreditation by the American Industrial Hygiene Association. Dr. Peterson served six years with the Air pollution and Industrial Hygiene/Hazardous Waste laboratories at the Indiana State Board of Health. He has utilized Gas Chromatographs since 1969 and uses Atomic Absorption and GC/MS routinely. Dr. Peterson is a member of the American Chemical Society and the Indiana Academy of Science.

James Coplen, Vice President Operations
EMS-Heritage Laboratories, Inc.

Experience: 1981 - present, EMS Heritage Laboratories, Inc.
1 year with Other Firms

Education: Bachelors Degree/1981/Environmental Science, Purdue University, West Lafayette, Indiana
Masters Degree/1983/Aquatic Toxicology, Purdue University, West Lafayette, IN

Memberships:

Mr. Coplen is responsible for coordinating resources among EMS Heritage Laboratories. He has lectured and published on laboratory operations and environmental information management. Mr. Coplen was manager of the Heritage Systems and Data Management group. His earlier work at EMS Heritage included managing the aquatic toxicity testing program and conducting acute and chromic bioassays. Mr. Coplen's graduate work included developing a model to predict the toxicity of complex wastewaters.

Dr. Joseph T. Kurek, Chief Chemist
EMS-Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1988-present, EMS Heritage Laboratories, Inc.
15 years with other firms

Education: Bachelors Degree/1967/Chemistry, Boston College
PH.D./1974/Organic Chemistry, Purdue University, West Lafayette, IN

Memberships: American Chemical Society

Dr. Kurek was on the chemistry faculty at Franklin College from 1974 to 1989, teaching mainly organic, analytical and biochemistry. Since 1976 he has been adjunct professor of chemistry at the University of Indianapolis, teaching organic and analytical chemistry. During the Fall 1982 term, he was visiting assoc. prof. of chemistry at Purdue University, W. Lafayette. He has also been a consultant to a number of corporations and government agencies in the fields of environmental and forensic analysis.

Adam West, Programmer/Systems Analyst
EMS-Heritage Laboratories, Inc.

Experience: 1986 - present, EMS Heritage Laboratories, Inc.
2 years with Other Firms

Education: 3 years toward Bachelors Degree, Computer Science

Memberships: NA

Adam West's duties include systems programming, maintenance of interactive software, laboratory information management, reporting, and programming custom software for specific use with EMS-Heritage. Assignments have included sample log-in and sample modify routines, accounting and invoicing programs and the scheduling of data security backups and data archives. He is also involved in trouble-shooting and maintaining the user environment. Prior to his work at EMS-Heritage, Mr. West was employed by a petroleum and land management company where he established and maintained tracking, accounting and payroll computing systems. He has also designed and commercially marketed programs for microcomputers.

Gary Klingler, Indianapolis Laboratory Director
EMS-Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1975 - present, EMS Heritage Laboratories, Inc.
3 years with Other Firms

Education: Bachelors Degree/1975/Analytical Chemistry, Marian College, Indianapolis, IN

Memberships: American Chemical Society
American Association for the Advancement of Science

Gary Klingler received a BS Degree in Chemistry from Marian College and has contributed significantly to research projects related to waste oil treatment while employed by an oil reprocessing facility. Mr. Klingler's duties have also included the design of water testing programs, implementation of quality control programs and the development of new treatment conditions for biological waste treatment plants. Mr. Klingler has four years experience in waste water analysis and currently serves as Laboratory Director at EMS-Heritage.

Gregory A. Busch, Quality Assurance Unit Director
EMS-Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1988 - present, EMS Heritage Laboratories, Inc.
4½ years with Indiana Department of Environmental Management
3½ years with other firms

Education: Bachelors Degree/Chemistry & Biology/1980, Indiana University, Bloomington, IN
Masters Degree, Chemistry/in progress, Butler University

Memberships: American Chemical Society

Mr. Busch wrote the EMS Heritage Comprehensive Quality Assurance Plan and several SOP's related to his duties as QA Coordinator. Mr. Busch performs Internal Systems and Performance Audits at EMS Heritage. Duties include examination of 5% of the raw data on a periodic basis to verify adequacy of documentation and accuracy of reported results. Responsible for keeping up with changing environmental regulations impacting laboratory analysis and providing support and consultation on specific environmental projects. Prior to his employment with EMS, Mr. Busch was a Chemist II-Working Group Leader with the Indiana Department of Environmental Management, Office of Solid & Hazardous Waste Management and served as the RCRA QA Officer. He served as contract laboratory liaison, coordinating sampling efforts, and maintaining quality control criteria. Major responsibilities included review of lab analyses for completeness and quality, maintaining a laboratory tracking program, performing on-site lab audits, writing state laboratory contracts and writing/revising the State RCRA Quality Assurance Project Plan (QAPP). Previous experience includes work at private and state laboratories in areas of sampling and testing water, wastewater, solid & hazardous wastes utilizing wet chemistry analyses, and GC/MS.

Susan Brotherton, Senior Chemist
EMS-Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1983 - present, EMS Heritage Laboratories, Inc.
6 years with Other Firms

Education: BS/1977/Chemistry, Michigan Technological University
MS/1983/Analytical Chemistry, Michigan Technological University

Memberships: American Society for Mass Spectrometry

Since joining EMS-Heritage, Mrs. Brotherton has been responsible for initiation and automation of EPA Methods 624 and 625, SW-846 Methods 8240 and 8270 and EPA-CLP protocols for organic analysis by GC/MS. Her responsibilities also include implementing the Quality Control and Quality Assurance Programs associated with these methods as well as utilizing computer capabilities in identification and quantitation of these compounds. While employed by Michigan Technological University, she served as Laboratory Manager of the Analytical Services Lab and was involved with organic and inorganic analyses of environmental samples. She has experience with Wet Chemical Methods, AA, IC, and LC in addition to GC and GC/MS. Her graduate thesis work was on The Analysis of Polycyclic Aromatic Hydrocarbons by Chemical Ionization GC/MS.

Steven J. Endersen, Senior Chemist
EMS-Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1986 - present, EMS Heritage Laboratories, Inc.
3 years with Other Firms

Education: Masters Degree, Analytical Chemistry, 1983, University of New Hampshire, Durham, NH
Bachelors Degree, Analytical Chemistry, 1980, Allegheny College, Meadville, PA

Memberships: NA

Steven Endersen is responsible for technical assistance and training in the Metals group at EMS-Heritage Laboratories, Inc. Duties include training new personnel on Atomic Absorption Spectrophotometers and the ICP, as well as being an analyst on these instruments. He serves as a technical specialist involved in method development, instrument maintenance, and quality control. Previously, Mr. Enderson was employed by the State of Vermont as a chemist. His duties were similar to those at EMS-Heritage. In addition, he had experience in GC/MS, GC, Microscopy, and Microbiological techniques. He is a member of Sigma Xi.

Jack Corpuz, Senior Project Chemist
EMS-Heritage, Laboratories, Inc.

Division: Indianapolis

Experience: 1989 - present, EMS Heritage Laboratories, Inc.
17 years with State of Indiana
2 years with other firms

Education: BS Chemistry 1973, Purdue University, West Lafayette, Indiana

Memberships American Chemical Society
Health Physics Society
Conference of Radiation Control Directors

Jack Corpuz' duties as a Project Chemist include customer contact, sales, consulting and technical assistance. Previous experience includes regulator for State of Indiana programs: RCRA, CERCLA, OSHA, CWA & SDWA. Mr. Corpuz has seven years bench experience in Radiochemistry support of the U.S. Department of Energy, U.S. Nuclear Regulatory Commission, and the U.S. EPA Environmental Radiation Protection Programs. Supervisory experience in OSHA, Radiological Health and RCRA.

Kurt Maines, Senior Project Chemist
EMS-Heritage, Laboratories, Inc.

Division: Indianapolis

Experience: 1989 - present, EMS Heritage Laboratories, Inc.
4 years with Indiana Department of Environmental Management
3½ years with other industrial/consulting firms

Education: BS Chemistry 1984, Purdue University, West Lafayette, IN

Memberships: American Chemical Society
Indiana Society of Hazardous Material Managers
Wastewater Treatment Operator Certification

Among Kurt's responsibilities are price quotations, bid specification review, client-laboratory interface with regard to DQOs, TAT, lab capacity and regulatory compliance, and initiation of groundwater monitoring services. Previous experience includes data review and validation under RCRA and CERCLA, groundwater monitoring, hazardous waste sampling, sample collection training and coordination, wastewater treatment system start-up consulting, gas, arc furnace and foundry operations analysis. Instrumentation experience includes GC, UV/VIS, particle size analyzer, AA, arc spectrophotometer, and wet chemistry.

Curtis Beck, Project Chemist/QA Assistant
EMS Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1989 - present, EMS Heritage Laboratories, Inc.
2 years with University of Florida

Education: BS Environmental Studies/Biology 1985, Bemidji State University, Bemidji, MN

Memberships: Indiana Society of Hazardous Materials Managers

Curtis Beck's duties as Project Chemist include client contact for price quotations, data quality objectives, lab capacity, turn around time, and regulatory compliance. As Quality Assurance Assistant, he is responsible for maintaining the LIMS database of test codes, parameters and methods and reviewing data for completeness and accuracy.

Anne C. Bradburn, GC/MS Group Leader
EMS-Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1985 - present, EMS Heritage Laboratories, Inc.

Education: Masters, Analytical Chemistry/1990, Butler University, Indianapolis, IN
Bachelors Degree, Chemistry/1985, Indiana University, Bloomington, IN

Memberships: American Chemical Society
American Society for Mass Spectrometry

Anne Bradburn's primary duty as GC/MS group leader is supervision and coordination of the personnel in the group. This includes training, ensuring analyses are completed efficiently with proper quality control and general problem solving. Her other duties include instrument maintenance and sample analysis.

David Czerny, Metals Group Leader
EMS-Heritage, Laboratories, Inc.

Division: Indianapolis

Experience: 1989 - present, EMS Heritage Laboratories, Inc.
8 years with Other Firms

Education: BS, Biology/1979, Wabash College, Crawfordsville, IN
M.S.E.S., Indiana University, Bloomington, IN, SPEA/1982

Memberships/Active
Registration: Class III Wastewater Operator
American Chemical Society
Society for Applied Spectroscopy
Water Pollution Control Federation
Indiana Water Pollution Association

Mr.Czerny has been with EMS as the Metals Group Leader since December, 1989. He has a broad background in water pollution control, environmental monitoring and testing, and field work. Mr. Czerny holds a Class III Wastewater Operators Certification. Prior to coming to EMS, he was the Chief Chemist/Metals Section at the Indianapolis Dept. of Public Works (DPW). While at DPW Mr. Czerny (1983 to 1987) performed metals analyses utilizing flame and graphite furnace atomic absorption and plasma emission spectroscopy.

Lisa A. Julian, GC Group Leader
EMS-Heritage, Laboratories, Inc.

Division: Indianapolis

Experience: 1986 - present, EMS Heritage Laboratories, Inc.

Education: BS Chemistry/Biology 1976, Anderson University
MS Analytical Chemistry 1989, Purdue University (IUPUI), Indianapolis, IN

Memberships: American Chemical Society

Lisa joined EMS in January 1987 as part of the Masters Co-op program at Indiana-Purdue University at Indianapolis. Her initial duties included preparation of samples, analysis and calculation for PCB's, pesticides and herbicides. She was assigned and completed the task of interfacing the GC/ECD instruments to an HP Chromatography Software system and in September 1989, was promoted to group leader. Her duties include keeping the computer running efficiently, routine GB maintenance, training and supervising the technicians in the group and coordinating the regular and rush analyses.

Linda V. Osborn, General Organic Group Leader
EMS-Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1984 - present, EMS Heritage Laboratories, Inc.
6 years with Other Firm

Education: Bachelor of Science Degree, Physical Education & Health, Secondary Education Certification/1977, Marian College, Indianapolis, IN.
Chemistry major in progress (University of Indianapolis)

Memberships: American Chemical Society

Linda Osborn has been the group leader of the General Organic Group at EMS-Heritage since April of 1989. The responsibilities include the coordination of the analyses required on the following instruments:

HPLC (with fluorescence and UV Photodiode detectors)
Purge & Trap PID/ELCD GC (in series)
GC-FID and NPD

Responsibilities also include supervision and training of personnel, familiarity with methods used, facilitating the output of quality data on a timely basis, and performing analyses when needed.

Prior to this assignment, Ms. Osborn was the Group Leader of the Gas Chromatography Group (ECD section) since February of 1985.

Specifically Ms. Osborn has HPLC experience, GC experience with emphasis on ECD (PCB/Pesticides) but including PID/ELCD, FID and NPD experience, and experience with extraction techniques including the following: liquid-liquid, sonication, soxhlet, solid phase and micro-extractions, with experience in the calculation and interpretation of the corresponding data.

In 1985, Ms. Osborn received certification from Hewlett Packard's Gas Chromatography 5880 training course. When first employed by EMS, Ms. Osborn performed general laboratory analyses including TOX, TOC, Oil and Grease, Surfactant, COD, Conductivity, EP Toxicity Leachates, and some AAS (for plant tanks). Prior to EMS, she was employed by D.A. Lubricant Co. in the Quality Control Department performing the oil and grease analyses including Emission Spectrophotometry, some Atomic Absorption, viscosity determinations, cold-cranking simulations, penetration points, freezing and melting points, flash points and other miscellaneous testing.

Barbara A. Shrake, General Inorganic Chemistry, Group Leader
EMS-Heritage Laboratories, Inc.

Division: Indianapolis

Experience: 1986 - present, EMS Heritage Laboratories, Inc.

Education: Bachelors Degree, Chemistry, 1985, Purdue University (IUPUI), Indianapolis, IN

Memberships: American Chemical Society

Mrs. Shrake has been a Group Leader at EMS Heritage, Inc. for three years and is responsible for ensuring analyses are completed efficiently and properly according to quality control criteria. Previously, she has served as an analyst in the General Inorganic Chemistry and Gas Chromatography groups at EMS Heritage.

Reserved

Reserved

Frederic J. Winter, Laboratory Director, Chicago
EMS-Heritage, Laboratories, Inc.

Division: Chicago

Experience: 1987 - present, EMS Heritage Laboratories, Inc.
1979 - present College of Lake County
19 years with other firms

Education: AAS Mathematics 1974, Moraine Valley College
BA Environmental Chemistry 1978, Governors State University
MA Environmental Chemistry in progress

Memberships: American Chemical Society
American Society for Testing and Materials
Water Pollution Control Federation
Central States Water Pollution Control Association
Illinois Association of Wastewater Agencies.

Mr. Winter has been with EMS Heritage Laboratories, Inc. in the position of Laboratory Director since June 1987. He has a diversified background in the environmental sciences with specialization in the fields of water/wastewater, soils and atmospheric analyses, along with specialization in organo-metallic chemistry. Prior to joining EMS Heritage Laboratories, Inc. he held the position of Laboratory Supervisor, Operations Laboratories, and Laboratory Director at the North Shore Sanitary District in Gurnee, Illinois, and Quality Control Chemist with Witco Chemical Corporation in Chicago, Illinois. Mr. Winter has also taught courses in Environmental Chemistry at the College of Lake County in Grayslake, Illinois since 1979.

Melody Carroll, Assistant Lab Director
EMS-Heritage Laboratories, Inc.

Division: Chicago

Experience: 1985 - present, EMS Heritage Laboratories, Inc.
2 years with other firms

Education: M.B.A., 1991, Lewis University
B.A. Geography, 1983, University of Delaware
Perkin Elmer Flame/Furnace Training Course

Memberships/Active
Registration: ACS, SAS

Melody Carroll's duties as Assistant Laboratory Director include analyst training and supervision, personnel coordination, purchasing and customer maintenance. Previous experience at EMS includes Metals Group Leader and Metals analyst with experience in ICP, Flame, Furnace and Cold Vapor. Additional experience with other firms includes microbiological and wet chemical analyses, sampling, sample log-in, training and supervision.

Christine Sarkan, Quality Assurance Unit Director
EMS-Heritage Laboratories, Inc.

Division: Chicago

Experience: 1987 - present, EMS Heritage Laboratories, Inc.
3 years with an Environmental Laboratory

Education: M.B.A. in process, Keller Graduate School
B.A. Biology, 1984, Knox College

Memberships: NA

Christine Sarkan's duties as Quality Assurance Unit Director include data review and validation, method development and verification, laboratory audits, coordination of performance standards and certifications and final review of all analytical reports. Previous experience with another environmental lab includes Wet Chemistry Group Leader and Training Officer; and general chemistry and Flame AA analyses.

Susan Bussey, Group Leader, Semi-Volatiles, Mass Spectroscopy and Gas Chromatography
EMS-Heritage Laboratories, Inc.

Division: Chicago

Experience: 1989-present, EMS Heritage Laboratories, Inc.
2 years with Argonne National Laboratories
1 year with other firms

Education: B.S. Chemistry, 1986
Hewlett Packard 5890 & RTE 1000 Training Course

Memberships: American Chemical Society

Susan Bussey's duties at EMS include instrument calibration, tuning and maintenance; sample analysis, data reduction and reporting for Volatile Organic Compounds. Previous experience at Argonne includes CLP analyses and data package preparation for Volatiles. Other experience includes chemical research and development using HPLC.

Jennifer Schott, Metals Group Leader
EMS Heritage Laboratories, Inc.

Division: Chicago

Experience: 1991-present, EMS Heritage Laboratories, Inc.
6 years with other firms

Education: BS Biology, Minor Chemistry, 1989, Northern Illinois University

Memberships: NA

Jennifer Schott's duties at EMS include supervision of metals preparations and analyses by flame, graphite furnace and ICP. She is responsible for production scheduling, data production and review and instrument maintenance and scheduling. Previous experience includes development of SOP's, ensuring compliance of a TSD facility to EPA regulations, biodegradation of wastewaters and anaerobic degradation of hexavalent chromium insulation.

Susan Sharp, GC/MS Volatiles Group Leader
EMS Heritage Laboratories, Inc.

Division: Chicago

Experience: 1989-present, EMS Heritage Laboratories, Inc.
2 years experience with other firms

Education: BS Biology, Minor Chemistry, 1986, Illinois State University

Memerships: NA

Susan Sharp's duties at EMS include supervising analyticals on ground water and soil on a packed column and a capillary column GC/MSD's. She also tests APG's and USEPA Water Pollution Studies samples.

Dawn Siekerman, Group Leader, General Chemistry
EMS-Heritage Laboratories, Inc.

Division: Chicago

Experience: 1988-present, EMS Heritage Laboratories, Inc.
5 months with other firms

Education: B.S. Biology, 1985, Illinois Benedictine College, Lisle, IL

Memberships: American Chemical Society
Northern Illinois Technicians Association Group

Dawn Siekerman's duties as Chemist include wet chemical analyses and training and supervision of summer and part time employees. Additional experience at EMS includes Metals extractions and preparations, and PCB extractions. Experience with other firms includes Quality Control testing of foods and products.

Deborah Edwards, Project Coordinator, Chicago
EMS-Heritage Laboratories, Inc.

Division: Chicago

Experience: 1989 - present, EMS Heritage Laboratories, Inc.
5 years with other firms

Education: 2 years undergraduate study in business

Memberships: NA

Deborah Edward's duties as Project Coordinator include client contact, price quoting, and project coordination from sampling through reporting. Project management requires ensuring regulatory compliance and appropriate methods and detection limits are reported. Previous experience includes clerical, word processing in customer service and complaints departments.

Reserved

Jan Dillow, Laboratory Director
EMS Heritage Laboratories, Inc.

Division: Kansas City

Experience: 1990 - present, EMS Heritage Laboratories, Inc.
10 years with other firms

Education: BS Biology and Sociology, 1969, William Woods College

Memberships: National Water Pollution Control Federation
Missouri Wastewater Control Coalition
Kansas City Chamber of Commerce
University of Missouri, Engineering Division Continuing Education Committee
National Association for Female Executives

Jan Dillow administered an office in Kansas City for six years. After completion of the present facility, she has managed the complex for four years. Mrs. Dillow currently serves as Laboratory Director at EMS Heritage.

Scott Meeks, Facility Chief Chemist
EMS-Heritage, Laboratories, Inc.

Division: Kansas City

Experience: 1990 - present, EMS Heritage Laboratories, Inc.
9 years with Other Firms 2 years with EMS

Education: BS Chemistry 1978, Bridgewater State College

Memberships: American Chemical Society
American Society for Mass Spectrometry

Mr. Meeks is responsible for the technical aspects of the daily operation of the laboratory. He interfaces with production, quality control and project management staff to assure the proper and timely conduct of analyses for clients. Prior to his position as Facility Chief Chemist, Mr. Meeks supervised all organic analytical work and was responsible for the performance of GC and GC/MS analyses.

Horst Kehl, Quality Assurance Unit Director
EMS-Heritage, Laboratories, Inc.

Division: Kansas City

Experience: 1990 - present, EMS Heritage Laboratories, Inc.

Education: BS Chemistry, 1959, NE Missouri State University, Kirksville, MO
MS Organic Chemistry, 1963, University of Idaho, Moscow, ID
PhD Biomedical Science, 1990, Eurotechnical Research University, South Hampton, England

Memberships: American Chemical Society
Sigma X
American Society for Pharmacology and Experimental Theraupetics (elected)
American Assoc. for the Advancement of Science

Dr. Kehl is responsible for coordinating Quality Assurance and Quality Control activities. He interfaces with production staff and management to assure the generation of superior quality data. Prior to his work at EMS, Dr. Kehl held several positions in research and teaching both in the United States and abroad. He has served as an abstractor for Chemical Abstracts and holds two US patents. Dr. Kehl has been a visiting professor at the University of Zagrub, the Toxicology Institute at the University of Munich, Germany, the University of San Marcos, Lima, Peru and the University of Autonma, Mexico City, Mexico.

Roger Rowan, GC Group Leader
EMS-Heritage, Laboratories, Inc.

Division: Kansas City

Experience: 1989 - present, EMS Heritage Laboratories, Inc.

Education: BS Chemistry 1989, Southern Illinois University

Memberships: NA

Mr. Rowan serves as the primary supervisor in the Gas Chromatography group. He is responsible for the timely production of quality analytical data. He reviews all raw data to insure accuracy. Mr. Rowan also served previously as the General Chemistry Group Leader, where he performed several conventional pollutant general chemistry procedures as well as metals analysis and preparation.

Margarita Rozenfeld, Inorganic Chemistry, Group Leader
EMS-Heritage Laboratories, Inc.

Division: Kansas City

Experience: 1990 - present, EMS Heritage Laboratories, Inc.
9.5 years with other firms

Education: MS Chemical Engineering 1980, Moscow, USSR

Memberships: NA

Ms. Rozenfeld serves as the primary supervisor in the general chemistry and metals groups. She is responsible for the timely production of quality analytical data. Prior to this position she managed a laboratory with the Biochemicae Company, USSR.

Kevin Miller, GC/MS Group Leader
EMS-Heritage Laboratories, Inc.

Division: Kansas City

Experience: 1990 - present, EMS Heritage Laboratories, Inc.
9 years with Other Firms

Education: BS Chemistry 1980, Kearney State College, Kearney, NE

Memberships: NA

Mr. Miller serves as the primary supervisor/analyst in the Gas Chromatography/Mass Spectrometry group. He is responsible for the timely production of quality analytical data. He reviews all raw data to insure accuracy. Mr. Miller worked as a GC/MS operator at another environmental laboratory for 2½ years. Prior to that, he worked as a chemist in an environmental lab in the areas of Atomic Absorption, Gas Chromatography, BOD/COD, and ASTM physical tsting. Other prior positions include an oil well drilling Fluids Engineer and a Chemical Technician.

Michele Sakwa, Laboratory Director
EMS-Heritage Laboratories, Inc.

Division: Charlotte

Experience: 1987 - present, EMS Heritage Laboratories, Inc.
9 years with Other Firms

Education: BA Chemistry/Physics 1980, Kean College

Memberships: American Chemical Society

Ms. Sakwa serves as Lab Director and is responsible for overall operations of the laboratory. Prior to coming to EMS Heritage, she held positions as Technical Marketing Representative, Project Manager, Technical Field Engineer, and Research Scientist. She has published a technical paper and is a member of ACS. She has also received training in GLP's, OSHA Hazcom, RCRA/SDWA/CWA regulations and compliance.

Helmuth M.B. Janssen, Quality Assurance Unit Director
EMS-Heritage, Laboratories, Inc.

Division: Charlotte

Experience: 1988 - present, EMS Heritage Laboratories, Inc.

Education: BS Chemistry 1973, Hehgelo Institute of Technology (The Netherlands)

Memberships: American Chemical Society

Mr. Janssen is responsible for coordinating Quality Assurance and Quality Control activities. He interfaces with production staff and management to assure the generation of superior quality data. Prior to his work at EMS Heritage, he served as a Research Chemist and Laboratory Supervisor involved in data review, methods development, marketing and QA/QC protocol development.

Steven H. Guptill, Senior Chemist
EMS-Heritage, Laboratories, Inc.

Division: Charlotte

Experience: 1986 - present, EMS Heritage Laboratories, Inc.
1 year with other firms

Education: BS Chemistry 1985, Manhattan College, Riverdale, NY

Memberships: American Chemical Society

Mr. Guptill serves as senior chemist for EMS Heritage. He is responsible for providing technical analytical support for all groups. Prior to this position Mr. Guptill held positions as Project Manager, Organic Section Manager and a GC/MS chemist.

RESERVED

Carla Keever
EMS-Heritage, Laboratories, Inc.

Project Assignment: Project Manager, Charlotte

Experience: 1987 - present
4 years with other firms

Education: BS Chemistry 1985, University of Kentucky, Lexington, KY

Memberships: NA

Ms. Keever serves as Project Manager in the Technical Services Group. She is responsible for coordinating all facets of laboratory testing with the client. She has considerable experience in environmental monitoring and testing. Prior to coming to EMS, she was a GC/MS section leader. She has also performed flame, graphite furnace and ICP metals analyses as well as volatile and semivolatile organics analyses using GC, GC/MS and a variety of detectors.

Malgorzata Kraska, Metals Group Leader
EMS-Heritage, Laboratories, Inc.

Division: Charlotte

Experience: 1988 - present, EMS Heritage Laboratories, Inc.
11 years with other firms

Education: BS Chemistry 1974, Technikum Chemiczne, Kjelce, Poland

Memberships: N.A.

Ms. Kraska serves as the primary supervisor in the Metals Group. She is responsible for the timely production of quality analytical results. She has also been an analyst in the General Chemistry Group.

Michael Piwowar, GC/MS Group Leader
EMS-Heritage, Laboratories, Inc.

Division: Charlotte

Experience: 1990 - present, EMS Heritage Laboratories, Inc.
2 years with other firms

Education: BS Biology 1988, BS Chemistry 1988, University of South Carolina, Columbia, SC

Memberships: NA

Mr. Piwowar serves as the primary supervisor in the GC/MS Group. He is responsible for the timely production of quality analytical data in this group. He has over 3 years of experience in volatile and semivolatile analyses on various manufacturers' instrumentation.

Janet Williams, General Chemistry Group Leader
EMS-Heritage, Laboratories, Inc.

Division: Charlotte

Experience: 1987 - present, EMS Heritage Laboratories, Inc.
1 year with other firms

Education: BA Chemistry 1985, BS Biology 1985, University of North Carolina, Charlotte, NC

Memberships: NA

Ms. Williams serves as the primary supervisor in the general chemistry group. She is responsible for the timely production of quality analytical data. Prior to her group leader position she worked as an analyst.

Pen Winters, GC Group Leader
EMS-Heritage, Laboratories, Inc.

Division: Charlotte

Experience: 1988 - present, EMS Heritage Laboratories, Inc.
3 years with other firms

Education: BS Medical Technology 1984, Medical College of Virginia, Virginia Commonwealth University, Richmond, VA

Memberships: American Chemical Society
American Society of Clinical Pathologists

Ms. Winters serves as the primary supervisor in the GC Group. She is responsible fo the timely production of quality analytical data in this group. Prior to coming to EMS Heritage she held positions as a Medical Technician, Mass Spectroscopist, and Clinical Microbiologist.

RESERVED

APPENDIX A

APPENDIX A
Selected References

Quality Control/Quality Assurance

1. Handbook for Analytical Quality Control in Radioanalytical Laboratories. EPA 600/7-77-088. 1977.

2. Handbook for Analytical Quality Control in Water and Wastewater. EPA 600/4-79-019. March 1979.

3. Manual for Analytical Quality Control for Pesticides and Related Compounds in Human and Environmental Samples. EPA 600/1-79-009. 1979.

4. Taylor, John K. Principles of Quality Assurance of Chemical Measurements, U.S. Department of commerce. 1987.

5. Choosing Cost-Effective QA/QC Programs for Chemical Analysis. EPA/600/4-85/056. 1985.

6. Practical Statistics for Analytical Chemists. R.L. Anderson, Van Nostrand Reinhold, 1987.

7. Annual Book of ASTM Standards. Vol. 11.01 and 11.02 (Water I and II). American Society for Testing and Materials. 1989.

8. Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual. U.S. EPA Regions IV Environmental Services Division. April 1986.

9. Manual for Certification of Laboratories Analyzing Drinking Water. EPA 570/9-90-008. April 1990.

10. Microbiological Methods for Monitoring the Environment. EPA 600/8-78-017. 1978.

11. Methods for Chemical Analysis of Water and Wastes. EPA 600/4-79-020. Revised March 1983.

12. Methods for Collection and Analysis of Aquatic Biological and Microbiological Samples. Book 5, Chapter A4. U.S. Geological Survey. 1977.

13. Methods for Determination of Inorganic Substances in Water and Fluvial Sediments. Book 5, Chapter Al. U.S. Geological Survey. 1979.

14. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Third Edition. EPA/600/4-85/019, 1985.

15. Methods for the Determination of Organic Compounds in Drinking Water. EPA 600/4-88/039, December 1988.

16. Methods for the Determination of Organic Substances in Water and Fluvial Sediments. Book 5, Chapter A3. U.S. Geological Survey. 1983.

17. Methods of Soil Analysis. Part 2, Chemical and Microbiological Properties. A.L. Page, ed., 2nd edition. 1982.

18. Official Methods of Analysis of the Association of Official Analytical Chemists. 2nd edition. AOAC. 1989.

19. Procedures for Handling and Chemical Analysis of Sediments and Water Samples. EPA/Corps of Engineers CE-81-1. March 1981.

20. RCRA Ground-water Monitoring Technical Enforcement Guidance Document, (TEGD). EPA OSWER-9950.1. September 1986.

21. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001. 1989.

22. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-87/028. 1988

23. Standard Methods for the Examination of Water and Wastewater. 16th Edition. 1985.

24. Test Methods for Evaluating Solid Waste - Physical/Chemical Methods. EPA/SW 846. 3rd Edition, 1986 and its Revision I Dated December 1987.

25. USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis. EPA. SOW No. 7/88. July 1988.

26. USEPA Contract Laboratory Program Statement of Work for Organic Analysis. EPA. SOW No. 2/88. February 1988.

27. USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis. EPA. ILM01. 1990.

28. USEPA Contract Laboratory Program Statement of Work for Organic Analysis. EPA. OLM01. 1990.

29. Quality Assurance Program Requirements for Environmental Programs. ANSI/ASQC-E4-19xx, September 1991.

APPENDIX B

APPENDIX C

APPENDIX C
SAFETY ISSUES

MANDATORY SAFETY PROCEDURES & PRACTICES

This section is not meant as a comprehensive manual of safety practices, but only as a indicator of some of the important ones and how they are specifically applied at EMS. The Safety Officer is responsible for responding to any questions concerning safety procedures and policies.

SAFETY GLASSES

Approved protective eyewear must be worn by all EMS Heritage Personnel at all times in all laboratory areas. Laboratory areas include all areas with quarry tile flooring and all working areas in front of fume hoods and lab benches. Non-prescription safety glasses and goggles are available free of charge to all employees. Contact lenses are not recommended for use in the laboratory and are not considered protective. All visitors should be advised to wear eye protection and should be offered a pair of safety glasses to use during their tour of designated lab areas.

Failure of an individual to wear protective eye wear in a designated area will result in the forfeiture of the next payable QA bonus to that individual.

INSPECTIONS

Periodic inspections of all laboratory areas will be performed by the Safety Officer. Inspections will assess current operating procedures and practices. Recommendations for improvement may be made or immediate remedial action may be necessary. Results of these inspections will be discussed with the Group Leaders, the Chief Chemist and the personnel directly involved with the area of inspection.

SMOKING

No smoking is allowed in any marked laboratory area, the loading dock, common hallways or the restrooms. Smoking is permitted only in the conference room, in the breakroom at designated tables, and in a private office or office area. This policy applies to visitors as well. Any individual observed smoking in a restricted area will forfeit their next payable QC bonus.

FUME HOODS

Fume hoods must be used for all procedures involving concentrated acids, bases, and solvents. Fume hoods are maintained to deliver a face velocity of 100 fpm. When an individual is not working at the hood, the face glass should be closed. The glass curtain

should be raised only to the extent necessary for easy access. Protective eye wear must be used when working at or near a fume hood. Each hood is marked to indicate a maximum sash level for safe operation.

PROTECTIVE CLOTHING

Lab coats, gloves, and shoe covers are available for use by all EMS employees. Protective clothing should not be worn into non-laboratory areas since it may transfer hazardous material onto surfaces otherwise assumed to be clean.

It is recommended that a lab coat be worn in all laboratory areas to protect not only the individual but their clothing. Shoe covers are also recommended for procedures where splashing hazardous samples, or chemicals is probable.

Protective gloves should be used for procedures involving: handling hazardous waste samples; handling hot or cold materials; handling acids, solvents, or bases. Gloves should be made of a material which is impervious to the hazardous nature of the substance being handled.

General Lab Work - Natural Latex (Surgeons) Gloves.
Hot/Cold Work - Zetex, Leather or other non-flammable insulating material.
Acids - Nitrile, Neoprene
Bases - Neoprene, Nitrile
Solvents - Neoprene, Nitrile, Viton
Alcohol - Neoprene, Nitrile

Long hair must be tied back to avoid hazards such as fire and chemical contact.

FIRE/FIRE EXTINGUISHERS

Fire extinguishers are highly visible and located at all EMS Heritage locations. All extinguishers are type ABC or Halon. ABC extinguishers may be used on paper trash and wood, burning liquids, and electrical equipment. It is recommended however, that Halon be used on electrical fires particularly in computers or instruments. A commercial safety service checks and maintains the fire extinguishers. Powder for extinguishing flammable metal fires is available in the safety cabinet. (See Evacuation Memo)

CLEANLINESS

A very important part of safety is good housekeeping. This includes:

1. Maintaining an organized work area.
2. Cleaning up every spill immediately, even water.

3. Keeping small objects off the floor and large objects out of traffic paths, particularly exit ways.
4. Returning unused chemicals, glassware, or equipment to its proper storage area.
5. Disposing of waste (chemicals, napkins, tongue blades, pipets) in the proper container.
6. Disposing of broken glassware immediately in the proper containers.
7. Do not place contaminated chemical transfer utensils on the bare countertop.

SPILL CLEANUP

Spills must be cleaned up immediately after they happen. Even a water spill should be removed. Special kits are available for neutralizing and absorbing various liquid spills for disposal. These kits are located in the safety cabinet. If in doubt as to the type of spill, inform the Safety Officer; always assume the worst. Ask the Safety Officer when in doubt as to the proper method for cleanup or disposal. Chemicals should never be reused following a spill. Dry chemicals should be treated with as much caution as liquids. Many times, special equipment may be necessary (i.e. respirators, splash suit, caution signs, etc.) and should be used. If in doubt as to the safety equipment required for a particular spill, consult the Safety Officer.

REPORTING ACCIDENTS

All accidents no matter how small must be reported to the Safety Officer and the Group Leader. In some cases a form may need to be filled out describing the situation and result. If medical attention is indicated, the Safety Officer may direct the individual to the emergency care center or to a hospital.

COMPRESSED GASES

All gas cylinders must be affixed to an immobile surface when in use. All cylinders must be transported with the protective valve cap in place. Cylinders in storage must be chained to the wall or placed in the protective cage. Empty cylinders should be segregated from full cylinders for easy access during exchange. Flammable gases must be segregated from oxidizers and non-flammable gases (this includes 'empty' tanks). Empty cylinders should be marked as such.

COMMON PROCEDURES

1. Always add acid to water, never water to acid.
2. Never pipet by mouth, use a suction bulb.

3. Never store food or drink in a sample cooler
4. Never eat in the laboratory, use the breakroom.
5. Always lubricate glass tubing before inserting in stopper.
6. Always dispose of waste properly, consider the janitor.
7. Keep balance and balance area clean.
8. Always read the label and MSDS.
9. Always report accidents to the Safety Officer.
10. When in doubt about an element of Safety - ASK QUESTIONS
11. All sample and chemical containers are to be closed overnight.

SAFETY SHOWERS/EYE WASH

Safety showers should always be used in instances of gross contamination of clothing or skin. The eye wash should always be used when foreign matter is introduced into or around the eye. The safety shower and eye wash stations are periodically checked and maintained. Operation of the safety shower includes disrobing from the contaminated clothing and rinsing for at least 15 minutes. The eye wash should be used at least 15 minutes and contact lenses should be removed as soon as possible.

CHEMICAL HANDLING/STORAGE

Read the label and MSDS on each and every chemical used. The safety related item which should be understood are: Fire Hazard, Health Hazard, Reactivity Hazard, Protective Equipment, Disposal, Storage, and First Aid. If the chemical is used in making a stock solution, clearly label the new container with the date, analysts initials, expiration date, contents and any other pertinent information. Never use anything from an unlabeled container. Follow the storage recommendations. Flammables always go in an approved container and storage cabinet. Acids always go in an acid storage cabinet. Incompatible chemicals should not be stored together. Large quantities of chemicals should not be 'pigeon holed' at work locations. Properly dispose of and reorder chemicals found to be past their expiration date. Transport chemicals in protective containers if breakage is a possibility. Keep chemical containers clean with tight fitting lids and readable labels. In disposing of chemicals, samples, damaged equipment or expendable materials consider the potentialities of the action (eg. incompatible waste, exposure to the janitor).

FIRST AID

First aid kits are maintained by a commercial first aid company. Any of the materials in these kits may be used to self treat minor accidents or common ailments. All accidents, no matter how small, must be reported to the Group Leader and the Safety Officer. The instructions and labels on all medications and materials should be read and understood by the user prior to application or use. A Red Cross first aid manual is available for reference in the safety cabinet.

SAFETY CABINET

All safety related supplies are maintained in a dedicated cabinet centrally located in the laboratory. The contents includes; fire extinguishers; respirators; spill clean up kits; gloves; splash suits; shoe covers; safety manuals; and material safety data sheets (MSDS).

These items are regularly inventoried, however, all destructive uses of these items should come to the attention of the Safety Officer. All items should be replaced after use and not stored elsewhere in the laboratory. Any items routinely necessary for specific procedures should be obtained and stored separately near the area in which they are used.

EATING/DRINKING IN LAB

No eating is allowed in any laboratory area. Drinking is not recommended. Never store food or beverages in a cooler/refrigerator used for incubation, chemical or sample storage.

ALCOHOL/DRUG USE

No person under the influence of alcohol or drugs will be allowed to work in any laboratory area. Such an individual may be subject to disciplinary action which may include termination. Any individual who is required to take a prescribed medication which might affect his/her judgement should inform the Safety Officer so that non-laboratory work can be assigned.

VISITOR AREAS

We want to show off the lab in a safe and efficient manner. In general, visitors should be restricted to the hallways and non-quarry tile areas. Viewing windows are available and should be used. Anyone wishing to tour inside the lab should make prior arrangements with the Chief Chemist or the Safety Officer. Visitors should always be supplied with safety glasses/goggles. Visitors must be accompanied on tours, not only for their safety but to maintain confidentiality.

EVACUATION PROCEDURES

In case evacuation of the building is necessary, because of fire, chemical spill, or other emergency, the person discovering the accident should page "70" and inform all occupants to evacuate the building and the source or location of the accident. The Chief Chemist or designee will make an accounting of all personnel outside while the Safety Officer or designee will assure the proper authorities are notified.

MATERIAL SAFETY DATA SHEETS

Material safety data sheets are maintained for each chemical used in the lab. These sheets provide information on handling, disposal, spill cleanup, health hazards, physical/chemical data and safety measures. The MSDS should be consulted by the analyst prior to using any new or unfamiliar chemical. Each analyst should be familiar with the major hazards of each

chemical they work with (flash point, contact hazard, etc.) The MSDS manual is kept in the safety cabinet and should be returned after each use. Each chemical supplier is required to provide a MSDS with each chemical shipped.

WORKING AFTER HOURS

Employees working after business hours or on weekends must inform their Group Leaders of when and for how long they will work. Procedures requiring the use of concentrated acids, bases or solvents should be avoided by individuals working alone.

CONTAMINATION CONTROL

All sample and chemical containers must be closed using screw top lids, ground glass stoppers, or a similar device and not allowed to stand open overnight. Before disposal all materials (rags, towels, etc.) used to clean up volatile solvent spills should be kept in an open container in a working fume hood until all traces of the solvent have evaporated. All utensils (spoons, spatulas, pipets, etc.) used to transfer materials should be cleaned weekly or as needed. All reasonable measures should be taken to avoid environmental contamination.

Soiled lab coats should be exchanged for clean coats frequently and once used should not leave the laboratory area. Soiled lab coats should be stored in the proper hamper. Personal items (coats, etc.) should not be taken into the lab areas.

APPENDIX D

APPENDIX D
DEFINITIONS AND ACRONYMS

ABSORBANCE - a measure of the decrease in incident light passing through a sample into the detector. It is defined mathematically as:

$$A = \frac{I(solvent)}{I(solution)} = \log\frac{Io}{I}$$

Where, I = radiation intensity

ACCURACY - The closeness of agreement between an observed value and an accepted reference value. When applied to a set of observed values, accuracy will be a combination of a random component and of a common systematic error (or bias) component.

ALIQUOT - a measured portion of a field sample taken for analysis.

ANALYSIS - a specific test applied to a specific sample.

ANALYSIS DATE/TIME - the date and military time (24-hour clock) of the introduction of the sample, standard, or blank into the analysis system.

ANALYTE - the element or ion an analysis seeks to determine; the element of interest.

ANALYTICAL SAMPLE - Any solution or media introduced into an instrument on which an analysis is performed excluding instrument calibration, initial calibration verification, initial calibration blank, continuing calibration verification and continuing calibration blank. Note the following are all defined as analytical samples: undiluted and diluted samples (EPA and non-EPA), predigestion spike samples, duplicate samples, serial dilution samples, analytical spike samples, post-digestion spike samples, interference check samples (ICS), CRDL standard for AA (CRA), CRDL standard for ICP (CRI), laboratory control sample (LCS), preparation blank (PB) and linear range analysis sample (LRS).

ANALYTICAL SET - the basic unit for analytical quality control. Also known as sample set or analytical batch. The analytical set is defined as samples which are analyzed (or sampled together) with the same method sequence, the same lots of reagents and with the same treatment common to all samples. The samples must have been analyzed (or collected) within the same specified time period or in continuous sequential time periods. Samples in each set should be of similar composition (same matrix).

ANALYTICAL SPIKE - a post-digestion spike. The addition of a known amount of standard after digestion/extraction.

AUDITS - A systematic check to determine the quality of the operation of some function or activity.

> Performance Audits: Quantitative data are independently obtained for comparison with routinely obtained data in a measurement system. Examples of these audits are EPA performance evaluation programs, commercial performance evaluation programs, split sampling program involving at least two laboratories, blind spike samples.
> Systems Audit: These are qualitative in nature and consist of an on-site review and evaluation of a laboratory or field operations quality assurance system and physical facilities for sampling calibration and measurements.

AUTOZERO - zeroing the instrument at the proper wavelength. It is equivalent to running a standard blank with the absorbance set at zero.

AVERAGE INTENSITY - the average of two different injections (exposures).

BACKGROUND CORRECTION - a technique to compensate for variable background contribution to the instrument signal in the determination of trace elements.

BAR GRAPH SPECTRUM - a plot of the mass-to-charge ratio (m/e) versus relative intensity of the ion current.

BATCH - a group of samples which behave similarly with respect to the procedures being employed and which are processed as a unit from a specific client that are submitted on the same day and are of the same matrix. For QC purposes, if the number of samples in a group is greater than 20, then each group of 20 samples or less will all be handled as a separate batch. Also known as a "case".

BIAS - the deviation due to matrix effects of the measured value (x_s - x_u) from a known spiked amount. Bias can be assessed by comparing a measured value to an accepted reference value in a sample of known concentration or by determining the recovery of a known amount of contaminant spiked into a sample (matrix spike). Thus, the bias (B) due to matrix effects based on a matrix spike is calculated as:

$$B = (x_s - x_u) - K$$

where:

x_s = measured value for spiked sample
x_u = measured value for unspiked sample, and
K = known value of the spike in the sample.

Using the following equations yields the percent recovery (%R). The value of %R may be used to correct the measured values for that batch of data. Thus,

$$\%R = 100\ (x_s - x_u)/\ K$$

and

$$x_c = 100\ (x_u/\%R)$$

where x_c = corrected value.

Correction for bias may be applicable except when the recovery of the analyte is between 80% to 120%, when using bias correcting methods (e.g. isotope dilution), or when recovery is greater than 100%. In some cases, when the uncorrected concentration is above a regulatory threshold bias correction is not needed. The measured value will be considered the minimum amount present. In all other cases correction for bias may be used. Bias correction will only be applied when required by regulation.

BLANKS - an artificial sample of an analytical matrix designed to monitor the introduction of artifacts into the system.

a. Field Quality Control Blanks

1. Field Blanks: Blanks of analyte free water that are prepared on-site by filling appropriate sample containers with the water, adding appropriate preservatives, sealing the containers, and completing the appropriate documentation. These blanks should be prepared during the middle to end of a sampling event by filling sample containers with water from the equipment decontamination water transport containers. They are to be treated, stored, transported, and analyzed in a same manner as the sample group for which it was intended. These blanks may be submitted for all water parameter groups.

2. Equipment Blank: Blanks of analyte-free water that are prepared on-site by pouring the equipment decontamination water through decontaminated field equipment. Appropriate sample containers, for each analyte group must

be used, preservatives added, if required, and appropriate documentation must be completed. These blanks are to be stored, transported and analyzed with the intended parameter groups. At least one equipment blank is required for each water and solid matrix analytical group, and must be collected at the beginning of the sampling episode. If field decontamination is performed on-site, additional equipment blanks must be submitted for all water and solid matrix analytical groups.

3. Trip Blank: These blanks are required only for water samples for VOCs. Blanks of volatile organic free water are prepared by the organization that is providing the sample containers. These are transported to the site with the empty VOC sample containers, and shipped to the analyzing laboratory in the same containers as the VOC samples. They remain unopened for the entire trip. Proper labeling and documentation must be completed. A trip blank must be submitted for each cooler that transports VOC samples.

b. Laboratory

1. Method Blank: A blank of an appropriate analyte-free matrix that is processed (digested, extracted, etc.) and analyzed with a specified sample set (See BLA02, BLA01).

2. Reagent Blank: An aliquot of analyte-free water or solvent that is analyzed with a sample set. (See BLA01).

CALIBRATION - process by which the correlation between instrument response and actual value of a measured parameter is determined.

a. Calibration Curve: a curve which plots the concentration of known analyte standards against the instrument response to the analyte. Also known as a Standard Curve.

b. Calibration Standard: Solutions or dilutions of a substance or material with a verifiable accuracy which are used to evaluate the sample property of an unknown sample. In analytical terms, these standards are used to establish a calibration curve or standard instrument response factors.

c. Continuing Calibration Standard: Standards that are analyzed during an analytical set to verify the accuracy of the calibration curve.

d. Internal Standard: a compound having similar chemical characteristics to the compounds of interest but which is not normally found in the environment or does not interfere with the compounds of interest. A known and specified concentration

of the standard is added to each sample prior to analyses. The concentration in the sample is based on the response of the internal standard relative to that of the calibration standard and the compound in the standard.

CASE - a finite, usually predetermined number of samples collected over a given time period from a particular site. Case numbers are assigned by the Sample Management Office. A case consists of one or more Sample Delivery Groups.

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act ("Superfund").

CLP - Contract Laboratory Program (USEPA).

CHARACTERIZATION - a determination of the approximate concentration range of compounds of interest used to choose the appropriate analytical protocol.

COEFFICIENT OF VARIATION (CV) - the standard deviation as a percent of the arithmetic mean.

CONCENTRATION LEVEL (low or medium) - characterization of soil samples or sample fractions as low concentration or medium concentration is made on the basis of the laboratory's preliminary screen, if performed or the client's designation.

CONTINUING CALIBRATION - analytical standard run at a specified frequency to verify the calibration of the system.

CONTINUOUS LIQUID-LIQUID EXTRACTION - used herein synonymously with the terms continuous extraction, continuous liquid extraction, and liquid extraction. This extraction technique involves boiling the extraction solvent in a flask and condensing the solvent above the aqueous sample. The condensed solvent drips through the sample, extracting the compounds of interest from the aqueous phase.

CONTRACT REQUIRED DETECTION LIMIT (CRDL) - minimum level of detection acceptable under a contract Statement of Work. Equivalent to Contract Required Quantitation Limit (CRQL).

CONTROL LIMITS - a range within specified measurement results must fall to be compliant. Control limits may be mandatory, requiring corrective action if exceeded, or advisory, requiring that noncompliant data be flagged.

CONTROL SAMPLE - a QC sample introduced into a process to monitor the performance of the system.

CONFIDENCE LEVEL - the statistical probability associated with an interval of precision (or accuracy) values in a QC chart. The values of confidence intervals are generally expressed as percent probability. It is a commonly accepted convention that the result being tested is significant if the calculated probability is greater than 90 percent, and is highly significant if the probability is greater than 99 percent.

CORRELATION COEFFICIENT - a number (r) which indicates the degree of dependence between two variables (concentration - absorbance). The more dependent they are the closer the value to one. Determined on the basis of the least squares line.

CWA - Clean Water Act.

DATA QUALITY - the totality of features and characteristics of data that bears on its ability to satisfy a given purpose. The characteristics of major importance are accuracy, precision, completeness, representativeness, and comparability. These characteristics are defined as follows:

a. Accuracy - the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T, usually expressed as the difference between the two values, X-5, or the difference as a percentage of the reference or true value, 100 (X-T)/T, and sometimes expressed as a ratio, X/T. Accuracy is a measure of the bias in a system.

b. Precision - a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions. Precision is best expressed in terms of the standard deviation. Various measures of precision exist depending upon the "prescribed similar conditions."

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

d. Comparability - expresses the confidence with which one data set can be compared to another.

DATA QUALITY OBJECTIVES - a set of specifications that the environmental data must meet in order to be acceptable for its intended use in a program area. DQOs are commonly established for limits of detection and quality of data (precision, accuracy, representativeness and comparability).

DETECTION LIMITS - The smallest concentration/amount of an analyte of interest that can be measured with a stated probability of significance. Detection limits must be further defined as:

a. Method Detection Limit - the smallest concentration of an analyte of interest that can be measured and reported with 99 percent confidence that the concentration is greater than zero. The MDLs are determined from the analysis of a sample in a given matrix containing the analyte at a specified level. Determination of MDLs must be done by procedures determined in Appendix B of 40 CFR, part 136. Equivalent procedures to determine MDLs must be approved by the applicable regulatory agencies. Note: Reporting results at the MDL may result in a relative uncertainty of the result of greater than ± 100%.

b. Practical Quantitation Limit - the smallest concentration of an analyte of interest that can be reported with a specific degree of confidence. PQLs shall be determined in the same way as MDLs by using the procedures outlined in Appendix B of 40 CFR, Part 136. The standard deviation (sd) derived from the procedures will be used to calculate the PQL: PQL = 10 sd which corresponds to an uncertainty of ± 30 percent in the measured value at the 99 percent confidence level. Also known as the "Reporting Detection Limit" or the Limit of Quantitation (LOQ).

INSTRUMENT DETECTION LIMIT - the smallest amount of an analyte of interest that generates an instrument response (signal) under prescribed conditions such that the magnitude of the signal is larger than the absolute uncertainty (error) associated with it. IDLs are determined by multiplying by 3.143 (3.0 for CLP) the average standard deviation obtained for the analysis of a standard solution (each analyte in reagent water) at a concentration of 3x-5x the estimate of the IDL on three nonconsecutive days with seven consecutive measurements per day (compute the standard deviation for each day, then average the standard deviations).

DAY - unless otherwise specified, day shall mean calendar day.

DIGESTION LOG - an official record of the sample preparation (digestion).

DISSOLVED METALS - analyte elements which have not been digested prior to analysis and which will pass through a 0.45 um filter.

DRY WEIGHT - the weight of a sample based on percent solids. The weight after drying in an oven.

$$Dry\ Weight = Wet\ Weight\ Basis \times \frac{100}{D}$$

$$Where\ D = Total\ Solids,\ \%.$$

DUPLICATE (LAB) - a second aliquot of a sample that is treated the same as the original sample in order to determine the precision of the method. Also known as a laboratory

replicate (See DUP01 and DUP02, Replicate Sample, Matrix Spike Duplicate, Field Duplicate).

ENVIRONMENTAL SAMPLE - any sample from a natural source or sources that reasonably may be expected to contribute pollution to or receive pollution from ground waters or surface waters. This includes, but is not limited to: receiving waters; waters used to define natural background conditions; soils; sediments; industrial, domestic or municipal discharge effluents; chemical storage or handling facilities; waste disposal facilities or areas; industrial or agricultural chemical handling or application areas; surface water run-off; and facilities for handling or applying of chemicals for weed or insect control

EPA - Environmental Protection Agency (USEPA)

EQUIPMENT BLANK - see Equipment Rinsate.

EQUIPMENT RINSATE - a sample of the media which has been used to rinse the sampling equipment. The media used for rinsing is acceptable if the concentration of any analyte of concern in the media is no higher than the highest of either:

a. the detection limit, or

b. five percent of the regulatory limit for that

c. five percent of the measured concentration in that

It is collected after completion of decontamination and prior to sampling. This blank is useful in documenting adequate decontamination of sampling equipment.

EXTRACTABLE - a compound that can be partitioned into an organic solvent from the sample matrix and is amenable to gas chromatography. Extractables include semivolatile (BNA) and pesticide/Aroclor compounds.

FIELD DUPLICATES - independent samples which are collected as close as possible to the same point in space and time. They are two separate samples taken from the same source, stored in separate containers, and analyzed independently. These duplicates are useful in documenting the precision of the sampling process.

FIFRA - Federal Insecticide, Fungicide, and Rodenticide Act.

FLAME ATOMIC ABSORPTION (AA) - atomic absorption which utilizes flame for excitation.

GRAPHITE FURNACE ATOMIC ABSORPTION (GFAA) - atomic absorption which utilizes a graphite cell for excitation.

HOMOGENEITY - the degree to which a property or substance is randomly distributed throughout a material. Homogeneity depends on the size of the units under consideration. Thus, a mixture of two minerals may be inhomogeneous at the molecular or atomic level, but homogeneous at the particulate level.

INDEPENDENT STANDARD - a Contractor-prepared standard solution that is composed of analytes from a different source than those used in the standards for the initial calibration.

INDUCTIVELY COUPLED PLASMA (ICP) - a technique for the simultaneous or sequential multi-element determination of elements in solution. The basis of the method is the measurement of atomic emission by an optical spectroscopic technique. Characteristic atomic line emission spectra are produced by excitation of the sample in a radio frequency inductively coupled plasma.

IN-HOUSE - at an EMS Heritage laboratory facility.

INITIAL CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the instrument to the target compounds.

INJECTION - introduction of the analytical sample into the instrument excitation system for the purpose of measuring absorbance, emission or concentration of an analyte. May also be referred to as exposure.

INSTRUMENT CALIBRATION - analysis of analytical standards for a series of different specified concentrations; used to define the quantitative response, linearity, and dynamic range of the instrument to target analytes.

INTERFERENTS - substances which affect the analysis for the element of interest.

INTERNAL STANDARDS - in-house compounds added at a known concentration.

LABORATORY - synonymous with Contractor as used herein.

LABORATORY CONTROL SAMPLE (LCS) - a control sample of known composition. Aqueous and solid laboratory control samples are analyzed using the same sample preparation, reagents, and analytical methods employed for the samples received.

LABORATORY RECEIPT DATE - the date on which a sample is received at the inventory's facility, as recorded on the shipper's delivery receipt and sample Traffic Report. Also referred to as VTSR (validated time of sample receipt).

LABORATORY SAMPLE - a sample, intended for testing or analysis, prepared from a gross sample or otherwise obtained. The laboratory sample must retain the composition of the gross sample. Often reduction in particle size is necessary in the course of reducing the quantity.

LINEAR RANGE, LINEAR DYNAMIC RANGE - the concentration range over which the analytical curve remains linear.

LOT - a quantity of bulk material of similar composition whose properties are under study.

MATRIX - the predominant material of which the sample to be analyzed is composed. Matrix is not synonymous with phase (liquid or solid).

MATRIX DUPLICATE - an intralaboratory split sample which is used to document the precision of a method in a given sample matrix.

MATRIX MODIFIER - salts used in AA to lessen the effects of chemical interferents, viscosity, and surface tension.

MATRIX SPIKE - an aliquot of sample spiked with a known concentration of target analyte(s). The spiking occurs prior to sample preparation and analysis. A matrix spike is used to document the bias of a method in a given sample matrix.

MATRIX SPIKE DUPLICATES - Intralaboratory split samples spiked with identical concentrations of target analyte(s). The spiking occurs prior to sample preparation and analysis. They are used to document the precision and bias of a method in a given sample matrix.

MCL - Maximum Contaminant Level (regulatory level).

METHOD BLANK (previously termed reagent blank) - an analytical control consisting of all reagents, internal standards and surrogate standards, that is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background and reagent contamination.

METHOD DETECTION LIMIT (MDL) - The minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix type containing the analyte. See Detection Limits.

For operational purposes, when it is necessary to determine the MDL in the matrix, the MDL shall be determined by multiplying the appropriate one-sided 99% t-statistic by the standard deviation obtained from a minimum of three analyses of a matrix spike containing the analyte of interest at a concentration three to five times the estimated MDL, where the t-statistic is obtained from standard references or the table below.

No. of samples:	t-statistic
3	6.96
4	4.54
5	3.75
6	3.36
7	3.14
8	3.00
9	2.90
10	2.82

METHOD OF STANDARD ADDITIONS (MSA) - the addition of 3 increments of a standard solution (spikes) to sample aliquots of the same size. measurements are made on the original and after each addition. The slope, x-intercept and y-intercept are determined by least-square analysis. The analyte concentration is determined by the absolute value of the x-intercept. Ideally, the spike volume is low relative to the sample volume (approximately 10% of the volume). Standard addition may counteract matrix effects; it will not counteract spectral effects. Also referred to as Full Method of Standard Additions (3-Point MSA).

METHOD OF STANDARD ADDITIONS, SINGLE ADDITIONS - the simplest version of MSA is the single-addition method, in which two identical aliquots of the sample solution, each of Volume V_x, are taken. To the first (labeled A) is added a small volume V_s of a standard analyte solution of concentration c_s. To the second (labeled B) is added the same volume V_s of the solvent. The analytical signals of A and B are measured and corrected for nonanalyte signals. The unknown sample concentration c_x may be calculated as follows:

$$c_x = \frac{S_B V_s c_s}{(S_A - S_B) V_x}$$

where S_A and S_B are the analytical signals (corrected for the blank) of solutions A and B, respectively. V_s and c_s should be chosen so that S_A is roughly twice S_B on the average. It is best if V_s is made much less than V_x, and thus c_s is much greater than c_x, to avoid excess dilution of the sample matrix. If a separation or concentration step is used, the additions are best made first and carried through the entire procedure.

m/z - Mass to charge ratio, synonymous with "m/e", used in mass spectrometry

NARRATIVE (SDG Case Narrative) - a portion of a data package which includes laboratory, contract, Case and sample number identification, and descriptive documentation of any problems encountered in processing the samples, along with corrective action taken and problem resolution.

NPDES - National Pollutant Discharge Elimination System (regulated under the CWA).

ORGANIC-FREE REAGENT WATER - For volatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of inters. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water. Organic-free reagent water may also be prepared by boiling water for 15 minutes and, subsequently, while maintaining the temperature at 90°C, bubbling a contaminant-free inert gas through the water for 1 hour.

For semivolatiles and nonvolatiles, all references to water in the methods refer to water in which an interferant is not observed at the method detection limit of the compounds of interest. Organic-free reagent water can be generated by passing tap water through a carbon filter bed containing about 1 pound of activated carbon. A water purification system may be used to generate organic-free deionized water.

PARAMETER GROUP - Is defined as a group of samples that have been preserved in the same manner, prepared by similar protocols and analyzed using instruments of similar technology (also known as analyte group). Examples of parameter groups are:

Volatiles (EPA methods 601, 602, and 624)
Pesticides (EPA methods 608, 614, 622)
Trace Metals (All metals except mercury)
Nutrients (Total Kjeldahl Nitrogen, Nitrate ± Nitrite, Total Phosphorous)

PERCENT SOLIDS - the proportion of solid in a sample determined by drying an aliquot of the sample.

PERCENT DIFFERENCE (%D) - As used in this QAP and elsewhere to compare two values, the percent difference indicates both the direction and the magnitude of the comparison, i.e., the percent difference may be either negative, positive, or zero. (In contrast, see relative percent difference below).

PERCENT MOISTURE - an approximation of the amount of water in a soil/sediment sample made by drying an aliquot of the sample at 105°C. The percent moisture determined in this manner also includes contributions from all compounds that may

volatilize at or below 105°C, including water. Percent moisture may be determined from decanted samples and from samples that are not decanted.

PERFORMANCE EVALUATION SAMPLES - A sample submitted for analysis whose composition and concentration are known to the submitter but unknown to the analyst. Also known as a Blind Sample.

PRECISION - the agreement among a set of replicate measurements without assumption of knowledge of the true value. Precision is estimated by means of duplicate/replicate analyses. These samples should contain concentrations of analyte above the MDL, and may involve the use of matrix spikes. The most commonly used estimates of precision are the relative standard deviation (RSD) or the coefficient of variation (CV),

$$RSD = CV = 100\ S/\bar{x},$$

where $\bar{x}$ = the arithmetic mean of the x_j measurements, and s = variance; and the relative percent difference (RPD) when only two samples are available.

$$RPD = 100\ [(x_1 - x_2)/(s_1 + x_2)/2].$$

PREPARATION BLANK (regent blank, method blank) - an analytical control that contains distilled, deionized water and reagents, which is carried through the entire analytical procedure (digested and analyzed). An aqueous method blank is treated with the same reagents as a sample with a water matrix; a solid method blank is treated with the same reagents as a soil sample.

PROJECT - single or multiple data collection activities that are related through the same planning sequence.

PROTOCOL - a compilation of the procedures to be followed with respect to sample receipt and handling, analytical methods, data reporting and deliverables, and document control. Used synonymously with Statement of Work (SOW).

PURGE AND TRAP (device) - analytical technique (device) used to isolate volatile (purgeable) organics by stripping the compounds from water or soil by a stream of inert gas, trapping the compounds on an adsorbent such as a porous polymer trap, and thermally desorbing the trapped compounds onto the gas chromatographic column.

QUALITY ASSURANCE - a system of activities whose purpose is to provide the producer or user of environmental data the assurance that it meets defined standards of quality with a stated level of confidence.

QUALITY ASSURANCE PLANS (QAP) - an orderly assembly of detailed and specific procedures which delineates how data of a known and accepted quality is produced.

a. Comprehensive Quality Assurance Plan (CompQAP) - a QA plan that outlines all the capabilities of the specified organization, the routinely used quality control measures, the routine QA targets for precision and accuracy, and all documentation, calibration and maintenance activities that are necessary to produce data of a known and acceptable quality.

b. Quality Assurance Project Plans (QAPP) - a QA plan that is written for a specific project outlining specific QA targets and data quality objectives as well as all protocols and QC measures needed to meet the project specific objectives.

c. Research Quality Assurance Plans (RQAP) - a special type of Quality Assurance Project Plan that is generally written as a requirement of a direct contract with the Florida DER for research activities. The specific activities are defined in section 6.0 of the guidelines. The content and format requirements are different from those of any other QAP.

QUALITY CONTROL - the overall system of activities whose purpose is to document and control the quality of environmental data so that it meets the needs of the users.

A. Quality Control Checks - standards of samples from an independent source that are analyzed at a specified frequency.

1. Quality Control Check Standards - standard solutions from a source other than normal calibration standards that are certified and traceable. These standards are used to check the accuracy of a calibration curve.

2. Quality Control Check Sample (also known as Reference Materials) - samples obtained from an independent source for which the level(s) of analytes have been validated. These samples are prepared and analyzed with a sample set of similar matrix. If these samples have been obtained from the National Institute of Standards and Testing (formerly National Bureau of Standards), these are referred to as Standard Reference Materials.

B. QCTS - Quality Control Tracking System - the computerized system at EMS Heritage Laboratories, Inc. utilized to contain, compile and report quality control data.

1. Quality Control Types

a. BLA01 - Reagent blank, calibration blank.

An aliquot of de-ionized (DI) water containing the same reagents as the sample but is NOT taken through preparation. This sample is used as the calibration zero concentration for initial calibration purposes. The BLA01 is analyzed as a sample as frequently as required in the QAP. The BLA01 can be used to re-zero only after it has been analyzed as a sample. Instrument response is entered on bench sheets. If the instrument response is above the Control Limit when the BLA01 is run as a sample and calculated as a concentration, the samples back to the last acceptable BLA01 must be re-analyzed. If BLA01 is 0.5-0.99 of IDL, the concentration may be entered into the data base. Otherwise, enter less than 0.4X IDL. Entries into the data base MUST BE CONSISTENT, e.g., either instrument response OR concentration -NOT both, and must have units reported.

b. BLA02 - Method Blank or Preparation Blank.

Same as above but is carried through the complete steps of analysis from digestion/extraction/etc. in the exact same manner (e.g., same glassware, reagents, storage bottle) as the sample. BLA02 is matrix specific and must be run with each matrix and each prep run. A prep run consists of only 1 analyst on 1 day, utilizing the same reagents and glassware. Subtraction of the method blank is addressed by each method. A general rule applies to the BLA02: If the BLA02 is equal to or exceeds the method detection limit (MDL), samples in that group must be re-prepped. Therefore a BLA02 must be run with each sample set. Instrument response is recorded on bench sheets, but concentration is entered into the QC data base in all cases. If BDL, entered <0.4X IDL into the QC data base.

c. CAL01 - Calibration Standard.

Calibration standards (the number and frequency of which are specified in each method) are used to establish an analytical curve for that analyte based on absorbance, emission intensity, area or other type of measurable response for known standards. CAL01, CAL02, CAL03, etc., are prepared using exactly the same reagents used in the analysis of the sample. Note that some methods require a CDL standard be included as a CAL standard.

d. CCV - Continuing Calibration Verifications.

Analytical standard that is run with a frequency specified in the QAP - at a minimum frequency of 10% BUT may be alternated with ICV01

to meet the frequency requirements. The CCV may be from the same source as calibration standards or a different source depending on the method used. All runs must culminate with this sample's analysis except for GC/MS.

e. CDL01 - Contract Detection Limit Standard.

A reagent sample to verify analytes are quantifiable at the detection limit stated. The amount of analyte in this sample may be specified by a method, project, or client. In general, twice the analyte concentration of the regulatory detection line or CRDL is a good CDL01 amount. (Required weekly for drinking water organic analyses). Some methods mandate use of this standard for inclusion into the calibration curve.

f. DLCS - Duplicate Laboratory Control Sample (ICV02 or EPA supplied LCS).

Duplicate control sample of known analyte concentration and source analyzed by exactly the same method as the samples. DLCS must be of the same matrix as the samples but must be from a different source than the calibration standards (EPA or NIST traceable when possible). Results are expressed as % recovery and RPD. Also known as a "Laboratory Fortified Blank" when analytes are spiked into reagent water.

g. DLCS1 - Duplicate Laboratory Control Sample (ICV01 or EPA supplied LCS).

Duplicate control sample of known analyte concentration and source analyzed by exactly the same method as the samples. DLCS must be of the same matrix as the samples but must be from a different source than the calibration standards (EPA or NIST traceable when possible). Results are expressed as % recovery and RPD. Also known as a "Laboratory Fortified Blank" when analytes are spiked into reagent water. This "1" designation is a programming device used to indicate that no separable prep exists for the method.

h. DPS01 - Reagent Duplicate, Matrix Spike.

An aliquot of sample (water, oil, S/S/S) spiked with a known quantity of the analyte of interest - but added after preparation or if no preparation is involved in analysis of sample. The sample is split and

spiked with exactly the same amount of analyte. Results are expressed as Relative Percent Difference (RPD) or as required.

i. DPS02 - Duplicate Spike (Prepped).

Same as DPS01 but the sample is split in as representative a way as possible, spiked with equal amounts of the analyte, and carried through the preparation step(s). Results are expressed as RPD or as required.

j. DUP01 - Duplicate Sample Analysis (Non-prepped).

For samples not requiring digestion/extraction/etc., a homogeneous, representative aliquot (water, oil, S/S/S) is split and carried through the analytical steps to quantitation. Results are expressed as RPD.

k. DUP02 - Duplicate Sample Analysis (Prepped).

Same as DUP01 but split before any required preparation and carried through to quantitation exactly as its counterpart. Results are expressed as RPD.

l. ICV01 - Initial Calibration Verification.

This standard verifies the calibration curve, and this analyte must be from a different source as the calibration standards (EPA or NIST traceable when possible).

m. ICV02 - Initial Calibration Verification.

Same as ICV01 but added to the sample before any required preparation. May be equivalent to an LCS when reagent water is utilized as the spiking medium.

n. LCS - Laboratory Control Sample (ICV02 or EPA supplied LCS).

Control sample of known analyte concentration and source analyzed by exactly the same method as the samples. LCS should be of same matrix as samples (must utilize the same procedures) but must be from a different source that the calibration standards (EPA or NIST

traceable when possible). The LCS may be called a "QC Check Sample" or is also known as "Laboratory Fortified Blank" when analytes are spiked into reagent water.

o. LCS01 - Laboratory Control Sample (ICV01 or EPA supplied LCS).

Control sample of known analyte concentration and source analyzed by exactly the same method as the samples. LCS should be of the same matrix as samples (must utilize the same procedures) but must be from a different source than the calibration standards (EPA or NIST traceable when possible). Also known as a "Laboratory Fortified Blank" when analytes are spiked into reagent water. This "01" designation is a programming device used to indicate that no separable prep exists for the method.

p. SPI01 - Matrix Spike (Standard Addition).

A post digestion/extraction spike, or a method with no separable prep. An aliquot of homogeneous sample (water, oil, S/S/S) fortified (spiked) with a known quantity of specific compound(s) and carried through the analysis and quantitation steps. At least one spike per matrix and concentration must be analyzed per run or frequency specified by QAP or SOW.

q. SPI02 - Matrix Spike (Pre-digestion/extraction; prepped).

Same as a SPI01 but is used when preparations are required. Calculate as a percent recovery, unless a method or client specifies differently.

r. SUR01 - Surrogate Spike (Organic analyses only).

Surrogate standards are added to every blank, sample, LCS, MS, MSD, and standard to evaluate analytical efficiency by measuring percent recovery (unless specified to report recoveries differently). A representative sample is taken, surrogates added, analyzed, and quantitated. A SUR01 would not require preparation, or no separable prep exists for the method.

s. SUR02 - Surrogate Spike (Organic analyses only).

Same as SUR01 but surrogates are added before any preparation. Surrogates are unique compounds not normally detected in environmental samples.

RCRA - the Resource Conservation and Recovery Act.

REAGENT BLANK - see Method Blank.

REAGENT GRADE - analytical reagent (AR) grade, ACS reagent grade, and reagent grade are synonymous terms for reagents which conform to the current specifications of the Committee on Analytical Reagents of the American Chemical Society.

REAGENT WATER - water that has been generated by any method which would achieve the performance specifications for ASTM Type II water, and in which an interferant is not observed at or above the minimum quantitation limit of the parameters of interest.

RECONSTRUCTED ION CHROMATOGRAM (RIC) - a mass spectral graphical representation of the separation achieved by a gas chromatograph; a plot of total ion current versus retention time.

RELATIVE PERCENT DIFFERENCE (RPD) - as used in this QAP and elsewhere to compare two values, the relative percent difference is based on the mean of the two values, and is reported as an absolute value, i.e., always expressed as a positive number or zero. (In contrast, see percent difference above).

RELATIVE RESPONSE FACTOR (RRF) - a measure of the relative mass spectral response of an analyte compared to its internal standard. Relative Response Factors are determined by analysis of standards and are used in the calculation of concentrations of analytes in samples. RRF is determined by the following equation:

Where

$$RRF = \frac{A_x}{A_{is}} \times \frac{C_{is}}{C_x}$$

A = area of the characteristic ion measured

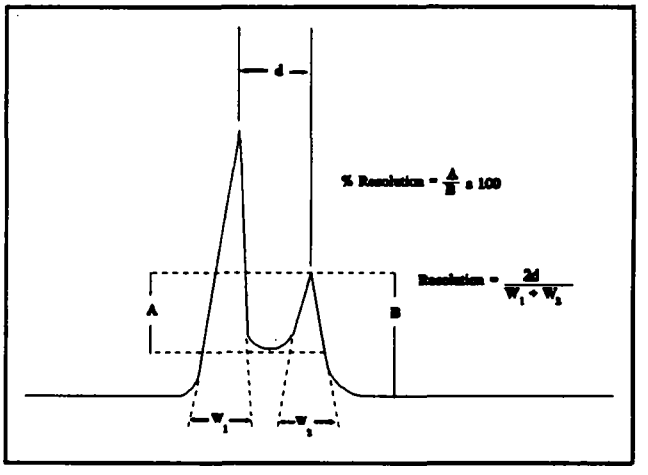
C = concentration

is = internal standard

x = analyte of interest

REPLICATE SAMPLE - samples that have been collected at the same time from the same source (field replicates) or aliquots of the same sample that are prepared and analyzed at the same time (laboratory replicates). Duplicate samples are one type of replicate sample. The analytical results from replicates are used to determine the precision of a system. If the concentration of analytes in the sample are below detectable limits, Duplicate Spike Samples may be used to determine precision. Blind Replicates (Duplicates) are replicates that have been collected (field replicate) or prepared (laboratory replicate) and are submitted and analyzed as separate samples (analyst does not know they are replicates).

RESOLUTION - percent resolution is the separation between peaks on a chromatogram, calculated by dividing the depth of the valley between the peaks by the peak height of the smaller peak being resolved, multiplied by 100. Resolution is determine taking 2 times the difference in elution times between two peaks and dividing that by the sum of the baseline peak widths of the two peaks.



RUN - a continuous analytical sequence consisting of prepared samples and all associated quality assurance measurements as required by the QAP.

SAMPLE - a portion of material to be analyzed that is contained in single or multiple containers and identified by a unique sample number.

a. Sample Custody - all records and documentation that is required to trace a sample from point of origin through disposal after analysis. These records must include, but are not limited to:

1. Field notebooks;

2. Field sample ID tags;

3. Laboratory transmittal forms (if applicable);

4. Laboratory sample receipt logs;

5. Sample extraction/preparation logs or worksheets;

6. Analytical (instrument) logs or worksheets;

7. Calibration and quality control data associated with a sample set;

8. Instrument maintenance logs;

9. Sample disposition logs; and

10. Final reports.

b. Legal Chain of Custody - is a special type of sample custody in which all events associated with a specific sample must be documented in writing. In addition to the records described above, chain of custody records must include the follows:

1. Sample transmittal forms or tags that have adequate spaces for the dated, original signatures of all individuals who handle the sample (or cleaned the sample containers if obtained from a contracted laboratory) from time of collection (or container receipt) through laboratory delivery.

2. Laboratory sample storage logs that identify date, time, and individuals who remove samples from storage.

3. Secure, limited access storage areas.

SAMPLE DELIVERY GROUP (SDG) - a unit within a sample Case that is used to identify a group of samples for delivery. An SDG is a group of 20 or fewer samples within a Case, received over a period of up to 14 calendar days. Data from all samples in an SDG are due concurrently. A Sample Delivery Group is defined by one of the following, whichever occurs first:

a. Case; or

b. Each 20 samples within a Case; or

c. Each 14-day calendar period during which samples in a Case are received, beginning with receipt of the first sample in the Case or SDG.

Samples may be assigned to Sample Delivery Groups by matrix (i.e., all soils in one SDG, all waters in another), at the discretion of the laboratory.

SAMPLE MATRIX - means that characteristic of an environmental or laboratory sample, associated with its physical and chemical properties, which defines how such a sample is handled when subjected to the intended analytical process. The following samples matrices (major matrix groups), as defined below, should be used in QA plans whenever specifying data quality objectives:

a. Reagent Water: A sample of water which conforms to ASTM grades II, III or IV.

b. Drinking Water: Includes finished (treated) or raw source water designated as potable water. Such sources may be from surface or groundwater.

c. Surface Water: Includes fresh or saline waters from streams, canals, rivers, lakes, ponds, bays and estuaries (natural or manmade).

d. Groundwater: Includes all waters found below ground in confined or unconfined aquifers.

e. Wastewater: Includes any influent or effluent associated with domestic or industrial waste treatment facilities.

f. Chemical Waste: Includes sludges and residuals from domestic or industrial wastewater processing, and liquid or solid chemicals that are no longer used for its intended purpose.

g. Soil/Sediment: Surface or subsurface soils and sediments of fresh or salt water origin.

h. Biological Tissue: Includes tissues of plant or animal origin. The most common of these are shellfish, finfish and aquatic plants.

i. Oils: Includes any oily matrix.

j. Solvents: Includes waste solvents.

SAMPLE NUMBER (Client Sample Number) - a unique identification number designated by the client for each sample. The Sample Number appears on the sample Chain of Custody which documents information on that sample.

SDWA - Safe Drinking Water Act.

SEMIVOLATILE COMPOUNDS - compounds amenable to analysis by extraction of the sample with an organic solvent. Used synonymously with Base/Neutral/Acid (BNA) compounds.

SERIAL DILUTION - the dilution of a sample by a factor of five. When corrected by the dilution factor, the diluted sample must agree with the original undiluted sample within specified limits. Serial dilution may reflect the influence of interferents.

SOIL - synonymous with soil/sediment or sediment as used herein.

SPLIT SAMPLES - aliquots of sample taken from the same container and analyzed independently. In cases where aliquots of samples are impossible to obtain, field duplicate samples must be taken for the matrix duplicate analysis. These are usually taken after mixing or compositing and are used to document intra-or interlaboratory precision, recognizing their limitations.

SPIKED SAMPLES - samples fortified to a known and validated concentration of analyte. Percent recoveries are calculated for each compound in the spike.

a. Field: An environmental sample fortified to a known and validated concentration in the field. These may be submitted as blind spike (laboratory does not know they are spiked) or as identified field spikes. The use of this QC check is not recommended.

b. Laboratory:

1. Reagent Spikes: Samples of an appropriate analyte-free matrix (deionized water, sand, soil, etc.) that are fortified to a known and validated concentration of analyte(s) before sample preparation (See LCS).

2. Sample (Matrix Spikes): Environmental sample selected from a set (not blanks) that are fortified to a known and validated concentration of analyte(s) before sample preparation. The concentration of each analyte in the spiking solution should be approximately 3-5 times the level expected in the sample (see SPI02, DPS02).

3. Surrogate Spikes: A compound having similar chemical characteristics to the compounds of interest, but which is not normally found in environmental samples. Known concentrations of these compounds are added to all samples in the set before sample preparation (see SUR01, SUR02).

STANDARD ADDITION - the practice of adding a known amount of an analyte to a sample immediately prior to analysis. It is typically used to evaluate interferences. See Method of Standard Additions.

STANDARD ANALYSIS - an analytical determination made with known quantities of target compounds; used to determine response factors.

STANDARD CURVE - a plot of concentrations of known analyte standards versus the instrument response to the analyte. Calibration standards are prepared by successively diluting a standard solution to produce working standards which cover the working range of the instrument. Standards should be prepared at the frequency specified in the appropriate section. The calibration standards must be prepared using the same type of acid or solvent and at the same concentration as will result in the samples following sample preparation. This is applicable to organic and inorganic chemical analyses.

STOCK SOLUTION - a standard solution which can be diluted to derive other standards.

SUBSAMPLE - a portion taken from a sample. A laboratory sample may be a subsample of a gross sample; similarly, a test portion may be a subsample of a laboratory SVOA sample.

SURROGATES (Surrogate Standard) - for semivolatiles and pesticides/Aroclors, compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard; used to evaluate analytical efficiency by measuring recovery. Surrogates are brominated, fluorinated, or isotopically labelled compounds not expected to be detected in environmental media (see SUR01, SUR02).

SYSTEM MONITORING COMPOUNDS - compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard for volatile analysis, and used to evaluate the performance of the entire purge and trap-gas chromatograph-mass spectrometer system. These compounds are brominated or deuterated compounds not expected to be detected in environmental media. Could also be known as surrogates.

TARGET COMPOUND LIST (TCL) - a list of compounds designated at the primary targets for analysis.

TENTATIVELY IDENTIFIED COMPOUNDS (TIC) - compounds detected in samples that are not target compounds, internal standards, system monitoring compounds, or surrogates. Up to 30 peaks (those greater than 10% of peak areas or heights of nearest internal standards) are subjected to mass spectral library searches for tentative identification.

TEST PORTION (also called specimen, test specimen, test unit, aliquot) - that quantity of a material of proper size for measurement of the property of interest. Test portions may be taken from the gross sample directly, but often preliminary operations, such as mixing or further reduction in particle size, are necessary.

TIME - when required to record time on any deliverable item, time shall be expressed as Military Time, i.e., a 24-hour clock.

TRAFFIC REPORT (TR) - an EPA sample identification form filled out by the sampler, which accompanies the sample during shipment to the laboratory and which is used for documenting sample condition and receipt by the laboratory.

TRIP BLANK - a sample of media taken from the laboratory to the sampling site and returned to the laboratory unopened. The media used for the trip blank is acceptable if the concentration of any analyte of concern in the media is no higher than the highest of either:

a. The detection limit, or

b. Five percent of the regulatory limit for that analyte, or

c. Five percent of the measured concentration in the sample.

A trip blank is used to document contamination attributable to shipping and field handling procedures. This type of blank is useful in documenting contamination of volatile organics samples.

TWELVE-HOUR TIME PERIOD - the twelve (12) hour time period (when applicable) for GC/MS system instrument performance check, standards calibration (initial or continuing calibration), and method blank analysis begins at the moment of injection of the DFTPP or BFB analysis that the laboratory submits as documentation of instrument performance. The time period ends after 12 hours have elapsed according to the system clock. For pesticide/Aroclor analyses performed by GC/EC, the twelve hour time period in the analytical sequence begins at the moment of injection of the instrument blank that precedes sample analyses, and ends after twelve hours have elapsed according to the system clock.

VALIDATED TIME OF SAMPLE RECEIPT (VTSR) - the date on which a sample is received at the Contractor's facility, as recorded on the shipper's delivery receipt and Sample Traffic Report.

VOLATILE COMPOUNDS - compounds amenable to analysis by the purge and trap technique. Used synonymously with purgeable compounds.

WET WEIGHT - the weight of a sample aliquot including moisture (undried).

WIDE BORE CAPILLARY COLUMN - a gas chromatographic column with an internal diameter (ID) that is greater than 0.32mm. Columns with lesser diameters are classified as narrow bore capillaries.

COMMON LABORATORY ACRONYMS AND ABBREVIATIONS

AA	Atomic Absorption
BDL	Below Detection Limit
BED	Below Estimated Limit of Detection
BTU	British Thermal Unit
CCC	Calibration Check Compound
CVAA	Cold Vapor Atomic Absorption
DL	Detection Limit
ECD	Electron Capture Detector (GC)
ELCD	Electrolytic Conductivity Detector
EP	Extraction Procedure
FAA	Flame Atomic Absorption
FID	Flame Ionization Detector (GC)
FPD	Flame Photometric Detector
FTIR	Fourier Transform Infra-Red
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
GFAA	Graphite Furnace Atomic Absorption
HOC	Halogenated Organic Compounds (Appendix III of 40 CFR Part 268)
ICP	Inductively Couple Plasma Atomic Emission Spectroscopy
IDL	Instrument Detection Limit
LIMS	Laboratory Information Management System
MDL	Method Detection Limit
mg/kg	Milligrams per Kilogram (ppm)
mg/L	Milligrams per Liter (ppm)
ND	Not Detected
NPD	Nitrogen Phosphorus Detector
OVA	Organic Vapor Analyzer
PCB	Polychlorinated Biphenyls
PID	Photoionization Detector
ppb	Parts per Billion
ppm	Parts per Million
PQL	Practical Quantitation Limits
QA/QC	Quality Assurance/Quality Control
SPCC	System Performance Check Compound
S/S/S	Soil/Sediment/Sludge

SVOC	Semivolatile Organic Compound
SVOA	Semivolatile Organic Analysis
SW-846	"Test Methods for Evaluating Solid Waste: Physical/Chemical Methods"
TCLP	Toxicity Characteristic Leaching Procedure
TOC	Total Organic Carbon
TOX	Total Organic Halogen
TSS	Total Suspended Solids
TTO	Total Toxic Organics
TX	Total Halogen
ug/kg	Micrograms per Kilogram (ppb)
ug/L	Micrograms per Liter (ppb)
VOA	Volatile Organic Analysis
VOC	Volatile Organic Compound

APPENDIX E

Job Description

PRESIDENT

QUALIFICATIONS

Position	Education	Experience
President	BS/BA Science	10 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Designate a Laboratory Director at each facility and replace as necessary.

Designate a Quality Assurance Officer and replace as necessary.

Assure that the VPO, QAO and Lab Directors clearly understand their functions and responsibilities.

Establish and revise company policies and operating procedures as necessary.

Approve the Quality Assurance Program (QAP) and the Chemical Hygiene Plan (CHP).

Job Description

VICE PRESIDENT OPERATIONS

Position	Education	Experience
VP Operations	BS/BA Science	7 years

DUTIES/RESPONSIBILITIES

Coordinate resources among locations to assure that personnel, facilities, equipment, and materials are known and available as required to produce data on time according to methods, SOP's, the QAP and client data quality objectives.

Coordinate resources among locations to assure that methods, SOP's, the QAP and the CHP are approved and followed. Assure that corrective action is taken in response to deviations when necessary.

Coordinate resources among locations to assure that appropriate and adequate training is provided and that training records are maintained.

Coordinate resources among locations to assure that laboratory waste is properly disposed.

Assure that all Laboratory Directors know, understand, and carry out their responsibilities. Communicate any deviations from policy to the President and assure any required corrective actions are taken.

Perform other duties as required or as needed.

Job Description

LAB DIRECTOR/ASSISTANT LAB DIRECTOR

QUALIFICATIONS

Position	Education	Experience
Lab Director	BS/BA Science	7 years
Asst. Lab Director	BS/BA Science	5 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Assure that personnel, resources, facilities, equipment, and materials are known and available as required to produce data on time according to methods, SOP's, the QAP and client data quality objectives.

Assure that methods, SOP's, the QAP and the CHP are approved and followed. Assure that corrective action is taken in response to deviations when necessary.

Assure that analytical methods are as specified in the work plan. Maintain working knowledge of local, state and federal regulations as they relate to services performed by the lab.

Assure that appropriate and adequate training is provided and that training records are maintained.

Assure that raw data is appropriately archived.

Assure that laboratory waste is properly disposed.

Nominate a Quality Assurance Unit Director for approval by the QAO and the President.

Assure that the Quality Assurance Unit clearly understands their duties.

Assure that all laboratory personnel know, understand, and carry out their responsibilities.

Perform other duties as required or as needed.

Job Description

QUALITY ASSURANCE OFFICER

QUALIFICATIONS

Position	Education	Experience
QA Officer	BS/BA Science	7 years

Other experience, advanced eduction and/or proven aptitude and performance may count for eduction or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Assure the inspection of systems and operations for conformance to methods, SOP's, the QAP, regulations and client data quality objectives at all locations. Document and report the results of the inspections and any deviations from methods, SOP's, and the QAP quarterly to the President along with corrective actions taken.

Perform follow-up inspections, etc. to assure that corrective actions have been taken. Coordinate development and revision of the Quality Assurance Plan (QAP) as required.

Coordinate and document certifications by local, state, and federal regulatory authorities at all locations.

Provide technical support and training to Quality Assurance Units and staff on methods, SOP's, regulations and the QAP. Maintain working knowledge of local, state and federal regulations and quality technology as they relate to services performed by the lab and quality control.

Coordinate and supervise all Quality Assurance Units. Assure that the Quality Assurance Units know and understand their responsibilities at each location.

Assure that all QAP, method and SOP requirements are met prior to initiation of a new procedure.

Final authority to terminate or alter any incorrect or improper analytical or measurement procedure in order to conform to requirements of the QA Plan.

QUALITY ASSURANCE OFFICER (continued)

Assure coordination and documentation of internal and external audits and performance evaluation programs. Assure the coordination of responses to external QA audits or performance evaluations. Assure the development of responses to other QA questions.

Advise purchasing on the quality of materials, supplies and equipment.

Perform other duties as required or as needed.

Job Description

QUALITY ASSURANCE UNIT

QUALIFICATIONS

Position	Education	Experience
QA Unit	BS/BA Science	4 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Inspect systems and operations adequately and perform performance evaluation studies to assure conformance to methods, SOP's, the QAP, regulations and client data quality objectives. Audit data entry and other data management systems to assure accuracy and completeness.

Document and report to the Quality Assurance Officer and Lab Director results of inspections and any deviations from methods, SOP's, and the QAP along with suggested corrective action.

Review and accept or reject client specific QAP's. Maintain documentation trail of all methods, SOP's and QAP's.

Provide technical support and training to staff on methods, SOP's and the QAP. Maintain working knowledge of local, state and federal regulations and quality technology as they relate to services performed by the lab and the related quality assurance issues.

Document that all QAP, method and SOP requirements are met prior to initiation of a new procedure. Maintain records of detection limit studies.

Review the Certificate of Analysis and other data deliverables for conformance with methods, SOP's, client data quality objectives and the QAP. Respond to QA questions on Certificate of Analysis and other deliverables.

Coordinate and document internal and external audits and performance evaluation programs. Host and respond to QA audits or external performance evaluation studies.

Advise purchasing on the quality of materials, supplies and equipment.

Job Description

QUALITY ASSURANCE UNIT (continued)

Function as QA Unit for GLP projects.

Perform other duties as required or as needed.

Job Description

CHIEF CHEMIST/SENIOR SCIENTIST

QUALIFICATIONS

Position	Education	Experience
Chief Chemist	BS/BA Science	5 years
Senior Chemist	BS/BA Science	3 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Provide technical support and training on instruments, methodologies, regulations and the QAP to staff. Assist in troubleshooting analytical problems.

Plan and assist in the implementation of new methods, instruments and equipment to meet changing regulatory or production requirements. Assure compliance with methods, SOP's, the QAP and CHP prior to startup.

Perform and manage special or non-routine projects requiring new or unique methods, SOP's or data quality objectives.

Maintain working knowledge regulations and new developments in analytical and environmental chemistry as they relate to services performed by the lab.

Write and revise SOP's and methods as necessary.

Perform other duties as required or as needed.

Job Description

PROJECT MANAGER/PROJECT COORDINATOR

QUALIFICATIONS

Position	Education	Experience
Project Manager	BS/BA Science	2 years
Project Coordinator	HS	3 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Provide primary interface between the customer and the lab. Assure that the customers regulatory and data quality objectives, schedule and workload volume are known to the lab. Maintain contact and document correspondence with customers through all phases of project.

Prepare quotations, proposals and work plans to match the clients regulatory and data quality objectives. Assure that the lab's methods, pricing and capacity are known to the client. Obtain all appropriate business related information.

Maintain working knowledge of local, state and federal regulations as they relate to services performed by the lab.

Review sample submission documentation and appropriate LIMS reports to insure correctness prior to initiation of work. Review data deliverables for completeness and conformance to customer requirements.

Perform other duties as required or as needed.

Job Description

GROUP LEADER/ASSISTANT GROUP LEADER

QUALIFICATIONS

Position	Education	Experience
Group Leader	BS/BA Science	3 years
Asst. Group Leader	BS/BA Science	2 years

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Schedule personnel, equipment and resources to produce data which complies with methods, SOP's, the QAP and customer data quality objectives and customer due dates.

Insure training of analysts on methods, SOP's, the CHP and the QAP prior to performing procedures. Document training and maintain training files. Maintain methods, SOP's, the QAP and the CHP on file and ensure document control.

Assure instruments and equipment are inspected, cleaned, maintained and as applicable, calibrated and standardized.

Review raw data for conformance with methods, SOP's, the QAP and client data quality objectives. Document all deviations from methods, SOP's and the QAP. Provide case narratives and supporting analytical documentation for data packages when necessary. Forward data to Data Management Group. Archive raw data files following data entry.

Inform the Lab Director immediately of any personnel, instrument, equipment or materials problems. Inform the Lab Director, Project Managers and QA Unit(s) of any deviations from schedule, methods, SOP's or the QAP.

Respond to and undertake corrective action to external and internal audits.

Perform other duties as required or as needed.

Job Description

LAB ANALYST/LAB TECHNICIAN/FIELD TECHNICIAN

QUALIFICATIONS

Position	Education
Lab Analyst	Degree Preferred
Field Technician	Degree Preferred

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Perform sample collection, preparation and analysis in conformance with methods, SOP's and the QAP to meet client due dates and data quality objectives.

Obtain training on and read and understand all methods, SOP's and the QAP prior to performing new procedures.

Inspect, clean, calibrate, standardize and maintain sampling, analysis and measurement equipment, glassware and instrumentation. Document these activities as required by SOP's, methods and the QAP.

Accurately and neatly document all calculations, observations and deviations as required by methods, SOP's and the QAP and forward raw data to Group Leader.

Handle lab chemicals and samples per custody requirements, SOP's, QAP and the CHP. Properly dispose of laboratory waste. Maintain organized work area.

Inform the Group Leader or Lab Director immediately of any personnel, instrument, equipment or material problems or shortages. Inform the Group Leader or Lab Director of any deviations from schedule, methods, SOP's or the QAP.

Perform other duties as required or as needed.

Job Description

SAMPLE CUSTODIAN/SHIPPING COORDINATOR

QUALIFICATIONS

Position	Education
Sample Custodian	BS/BA Science
Shipping Coordinator	HS

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Receive, handle, ship, store and dispose of samples and sample containers in conformance with methods, SOP's, the CHP, the QAP and shipping regulations to meet client due dates and data quality objectives. Coordinate shipping and receiving with client and Project Manager.

Maintain inventory of all supplies.

Validate and maintain legal chain of custody of samples and necessary documentation. Document and inform Project Managers immediately of any deviations from anticipated work volume or schedule, methods, SOP's or the QAP.

Obtain training on and read and understand all methods, SOP's and the QAP prior to performing new procedures.

Maintain organization of sample and waste storage areas. Coordinate disposal of samples and lab waste.

Assure that samples are logged into the LIMS timely and accurately.

Perform other duties as required or as needed.

DATA PACKAGE COORDINATOR/DATA ENTRY TECHNICIAN/DOCUMENT CONTROL OFFICER

QUALIFICATIONS

Position	Education
Data Package Coordinator	HS
Document Control Officer	HS
Data Entry Technician	HS

Other experience, advanced education and/or proven aptitude and performance may count for education or experience. Experience may include laboratory, regulatory or other related environmental or management experience.

DUTIES/RESPONSIBILITIES

Accurately and expediently record all required analytical, sample, and accounting data in LIMS in conformance with methods, SOP's and the QAP.

Obtain training on and read and understand all relevant methods, SOP's and the QAP prior to performing new procedures.

Assemble, copy and distribute to the Project Manager, data packages and data deliverables per client specified requests, SOP's and the QAP to meet clients' due dates.

Coordinate archiving of raw data for GLP, CLP and other client specified projects.

Inform the Lab Director immediately of any personnel or equipment problems. Inform the Lab Director of any deviations from schedule, methods, SOP's or the QAP.

Perform other duties as required or as needed.

APPENDIX F

Appendix F
Revision 0
Nov. 1, 1991

FINAL REPORT EXAMPLES

CERTIFICATE OF ANALYSIS

Service Location	Received	Lab ID
EMS HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	23-APR-91	A228370
	Complete 05-JUN-91	PO Number 90607684-59A
	Printed 13-JUN-91	Sampled

Report To	Bill To

Sample Description

FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Analyst: J. CARSON Analysis Date: 30-APR-91 Test: P130.4. 0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

BARIUM ICP SW846-6010

Analyst: M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M104.3. 0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Parameter	Result	Det. Limit	Units
BARIUM	0.049	0.010	mg/L

CADMIUM ICP SW846-6010

Analyst: M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M108.3. 0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Parameter	Result	Det. Limit	Units
CADMIUM	BDL	0.0050	mg/L

CHROMIUM ICP SW846-6010

Analyst: M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M110.3. 0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Parameter	Result	Det. Limit	Units
CHROMIUM	BDL	0.010	mg/L

NICKEL ICP SW846-6010

Analyst: M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M122.3. 0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Parameter	Result	Det. Limit	Units
NICKEL	BDL	0.010	mg/L

SILVER ICP SW846-6010

Analyst: M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M130.3. 0

Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Parameter	Result	Det. Limit	Unit
SILVER	BDL	0.010	mg/L

IRON ICP SW846-6010
Analyst: M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M115.3. 0
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Parameter	Result	Det. Limit	Units
IRON	BDL	0.020	mg/L

SODIUM ICP SW846-6010
Analyst: M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M131.3. 0
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Parameter	Result	Det. Limit	Units
SODIUM	6.7	0.20	mg/L

MANGANESE ICP SW846-6010
Analyst: M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M119.3. 0
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

Parameter	Result	Det. Limit	Units
MANGANESE	BDL	0.010	mg/L

GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020
Analyst: K. HACK Analysis Date: 04-MAY-91 Test: P130.6. 0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	50		mL
FINAL WEIGHT OR VOLUME	50		mL

ARSENIC GFAA SW846-7060
Analyst: K. KEHOE Analysis Date: 10-MAY-91 Instrument: GFAA Test: M103.2. 0
Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020

Parameter	Result	Det. Limit	Units
ENIC	BDL	0.0050	mg/L

LEAD GFAA SW846-7421
Analyst: M. BAUER Analysis Date: 09-MAY-91 Instrument: GFAA Test: M116.2. 0
Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020

Parameter	Result	Det. Limit	Units
LEAD	BDL	0.0050	mg/L

SELENIUM GFAA SW846-7740
Analyst: K. KEHOE Analysis Date: 07-MAY-91 Instrument: GFAA Test: M128.2. 0
Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020

Parameter	Result	Det. Limit	Units
SELENIUM	BDL	0.0050	mg/L

MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470
Analyst: J. WARE Analysis Date: 08-MAY-91 Test: P131.6. 0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

MERCURY CVAA SW846-7470
Analyst: J. WARE Analysis Date: 08-MAY-91 Instrument: CVAA Test: M120.1. 0
Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470

Parameter	Result	Det. Limit	Units
MERCURY	BDL	0.00020	mg/L

CHLORIDE (COLORIMETRIC, AUTOMATED) EPA 325.1

Analyst: C. BRODERICK | Analysis Date: 15-MAY-91 | Instrument: AUTO-ANALYZER | Test: G102.9. 0

Parameter	Result	Det. Limit	Units
CHLORIDE	2	1.0	mg/L

PHENOLS DISTILLATION SW846-9065

Analyst: D. JOSEPH | Analysis Date: 24-APR-91 | Test: P405.7. 0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	100		mL
FINAL VOLUME	100		mL

PHENOLS 4AAP (AUTOMATED) SW846-9066

Analyst: J. GRIFFIN | Analysis Date: 25-APR-91 | Instrument: AUTO-ANALYZER | Test: 0405.7. 0

Prep: PHENOLS DISTILLATION SW846-9065

Parameter	Result	Det. Limit	Units
PHENOLS	BDL	0.01	mg/L

SULFATE TURBIDIMETRIC METHOD SW846-9038

Analyst: K. RILEY | Analysis Date: 16-MAY-91 | Test: G108.6. 0

Parameter	Result	Det. Limit	Units
SULFATE	200	125	mg/L

PH (AQUEOUS) SW846-9040

Analyst: M. BAUER | Analysis Date: 23-APR-91 | Test: G607.5. 0

Parameter	Result	Det. Limit	Units
PH	7.2	0.1	Std. Units

SPECIFIC CONDUCTANCE SW846-9050

Analyst: L. MATTINGLY | Analysis Date: 24-APR-91 | Test: G604.4. 0

Parameter	Result	Det. Limit	Units
CONDUCTIVITY	870	1.0	umHOS/cm

TOTAL ORGANIC CARBON SW846-9060

Analyst: L. BUTLER | Analysis Date: 25-APR-91 | Instrument: TOC | Test: 0401.0. 0

Parameter	Result	Det. Limit	Units
TOTAL ORGANIC CARBON (TOC)	BDL	3	mg/L

TOTAL ORGANIC HALIDES SW846-9020

Analyst: S. HALLORAN | Analysis Date: 25-APR-91 | Instrument: TOX | Test: 0404.0. 0

Parameter	Result	Det. Limit	Units
TOTAL ORGANIC HALOGEN (TOX)	BDL	0.04	mg/L

DISSOLVED SOLIDS EPA 160.1

Analyst: P. ANDERSON | Analysis Date: 24-APR-91 | Test: G402.7. 0

Parameter	Result	Det. Limit	Units
SOLIDS	570	10	mg/L

TOTAL SOLIDS EPA 160.3

Analyst: P. ANDERSON | Analysis Date: 30-APR-91 | Test: G401.7. 0

Parameter	Result	Det. Limit	Units
SOLIDS	570	10	mg/L

CYANIDE DISTILLATION SW846-9010

Analyst: D. JOSEPH | Analysis Date: 24-APR-91 | Test: P101.4. 0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	250		mL
FINAL VOLUME	250		mL

CYANIDE, TOTAL (AUTOMATED) SW846-9012

Analyst: J. GRIFFIN Analysis Date: 24-APR-91 Instrument: AUTO-ANALYZER Test: G101.4. 0

Prep: CYANIDE DISTILLATION SW846-9010

Parameter	Result	Det. Limit	Units
CYANIDE	BDL	0.01	mg/L

SULFIDE SW846-9030

Analyst: L. HETTICH Analysis Date: 30-APR-91 Test: G110.4. 0

Parameter	Result	Det. Limit	Units
SULFIDE	BDL	1.0	mg/L

VOLATILE ORGANICS TARGET COMPOUND LIST SW846-8240

Analyst: H. WILLIAMS Analysis Date: 02-MAY-91 Instrument: GC/MS VOA Test: 0530.1. 0

Parameter	Result	Det. Limit	Units
ACETONE	BDL	20	ug/L
ACROLEIN	BDL	50	ug/L
ACRYLONITRILE	BDL	70	ug/L
BENZENE	BDL	5	ug/L
BROMODICHLOROMETHANE	BDL	5	ug/L
BROMOFORM	BDL	5	ug/L
BROMOMETHANE	BDL	10	ug/L
CARBON DISULFIDE	BDL	5	ug/L
CARBON TETRACHLORIDE	BDL	5	ug/L
CHLOROBENZENE	BDL	5	ug/L
CHLOROETHANE	BDL	10	ug/L
CHLOROFORM	BDL	5	ug/L
CHLOROMETHANE	BDL	10	ug/L
[illegible]BROMOCHLOROMETHANE	BDL	5	ug/L
[illegible]-1,3-DICHLOROPROPENE	BDL	5	ug/L
DICHLORODIFLUOROMETHANE	BDL	5	ug/L
1,1-DICHLOROETHANE	BDL	5	ug/L
1,2-DICHLOROETHANE	BDL	5	ug/L
1,1-DICHLOROETHENE	BDL	5	ug/L
1,2-DICHLOROPROPANE	BDL	5	ug/L
ETHYLBENZENE	BDL	5	ug/L
FLUOROTRICHLOROMETHANE	BDL	5	ug/L
2-HEXANONE	BDL	10	ug/L
METHYLENE CHLORIDE	BDL	5	ug/L
METHYL ETHYL KETONE	BDL	10	ug/L
4-METHYL-2-PENTANONE	BDL	10	ug/L
STYRENE	BDL	5	ug/L
1,1,2,2-TETRACHLOROETHANE	BDL	5	ug/L
TETRACHLOROETHENE	BDL	5	ug/L
TETRAHYDROFURAN	BDL	25	ug/L
TOLUENE	BDL	5	ug/L
1,2-DICHLOROETHENE (TOTAL)	BDL	5	ug/L
TRANS-1,3-DICHLOROPROPENE	BDL	5	ug/L
1,1,1-TRICHLOROETHANE	BDL	5	ug/L
1,1,2-TRICHLOROETHANE	BDL	5	ug/L
TRICHLOROETHENE	BDL	5	ug/L
VINYL ACETATE	BDL	10	ug/L
VINYL CHLORIDE	BDL	10	ug/L
[illegible]ENE (TOTAL)	BDL	5	ug/L
[illegible]HLOROETHYLVINYLETHER	BDL	10	ug/L
DIETHYLETHER	BDL	5	ug/L
1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE	BDL	5	ug/L
ETHYL ACETATE	BDL	5	ug/L

Parameter	Result	Det. Limit	Units
METHYL-T-BUTYL ETHER	BDL	5	ug/L
SURROGATE RECOVERY			
DICHLOROETHANE-D4	93		% Rec
TOLUENE-D8	101		% Rec
BROMOFLUOROBENZENE	101		% Rec

GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510

Analyst: M. FRANK Analysis Date: 27-APR-91 Test: P233.4. 0

Parameter	Result	Det. Limit	Units
INITIAL WEIGHT OR VOLUME	1		Liters
FINAL VOLUME	1		mL

SEMI-VOLATILE TARGET COMPOUND LIST SW846-8270

Analyst: K. STONER Analysis Date: 21-MAY-91 Instrument: GC/MS SVOA Test: 0531.1. 0

Prep: GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510

Parameter	Result	Det. Limit	Units
ACENAPHTHENE	BDL	10	ug/L
ACENAPHTHYLENE	BDL	10	ug/L
ANTHRACENE	BDL	10	ug/L
BENZ(A)ANTHRACENE	BDL	10	ug/L
BENZO(A)PYRENE	BDL	10	ug/L
BENZO(B)FLUORANTHENE	BDL	10	ug/L
BENZO(G,H,I)PERYLENE	BDL	10	ug/L
BENZO(K)FLUORANTHENE	BDL	10	ug/L
BENZYL ALCOHOL	BDL	10	ug/L
BENZYLBUTYLPHTHALATE	BDL	10	ug/L
BIS(2-CHLOROETHOXY)METHANE	BDL	10	ug/L
BIS(2-CHLOROETHYL)ETHER	BDL	10	ug/L
BIS(2-CHLOROISOPROPYL)ETHER	BDL	10	ug/L
BIS(2-ETHYLHEXYL)PHTHALATE	13	10	ug/L
4-BROMOPHENYLPHENYLETHER	BDL	10	ug/L
CARBAZOLE	BDL	10	ug/L
4-CHLOROANILINE	BDL	10	ug/L
2-CHLORONAPHTHALENE	BDL	10	ug/L
4-CHLOROPHENYLPHENYLETHER	BDL	10	ug/L
CHRYSENE	BDL	10	ug/L
DIBENZ(A,H)ANTHRACENE	BDL	10	ug/L
DIBENZOFURAN	BDL	10	ug/L
1,2-DICHLOROBENZENE	BDL	10	ug/L
1,3-DICHLOROBENZENE	BDL	10	ug/L
1,4-DICHLOROBENZENE	BDL	10	ug/L
3,3'-DICHLOROBENZIDINE	BDL	20	ug/L
DIETHYLPHTHALATE	BDL	10	ug/L
DIMETHYLPHTHALATE	BDL	10	ug/L
DI-N-BUTYLPHTHALATE	BDL	10	ug/L
DINITROBENZENES	BDL	50	ug/L
2,4-DINITROTOLUENE	BDL	10	ug/L
2,6-DINITROTOLUENE	BDL	10	ug/L
DI-N-OCTYLPHTHALATE	BDL	10	ug/L
FLUORANTHENE	BDL	10	ug/L
FLUORENE	BDL	10	ug/L
HEXACHLOROBENZENE	BDL	10	ug/L
HEXACHLOROBUTADIENE	BDL	10	ug/L
HEXACHLOROCYCLOPENTADIENE	BDL	10	ug/L
HEXACHLOROETHANE	BDL	10	ug/L

EMS HERITAGE LABORATORIES, INC. **Lab Sample ID: A228370**

Parameter	Result	Det. Limit	Units
INDENO(1,2,3-CD)PYRENE	BDL	10	ug/L
ISOPHORONE	BDL	10	ug/L
METHYLNAPHTHALENE	BDL	10	ug/L
NAPHTHALENE	BDL	10	ug/L
2-NITROANILINE	BDL	50	ug/L
3-NITROANILINE	BDL	50	ug/L
4-NITROANILINE	BDL	50	ug/L
NITROBENZENE	BDL	10	ug/L
N-NITROSO-DIPHENYLAMINE	BDL	10	ug/L
N-NITROSO-DI-N-PROPYLAMINE	BDL	10	ug/L
PHENANTHRENE	BDL	10	ug/L
2-PICOLINE	BDL	50	ug/L
PYRENE	BDL	10	ug/L
PYRIDINE	BDL	50	ug/L
TETRACHLOROBENZENES	BDL	10	ug/L
TOLUENEDIAMINE	BDL	50	ug/L
1,2,4-TRICHLOROBENZENE	BDL	10	ug/L
BENZOIC ACID	BDL	50	ug/L
4-CHLORO-3-METHYLPHENOL	BDL	10	ug/L
2-CHLOROPHENOL	BDL	10	ug/L
2,4-DICHLOROPHENOL	BDL	10	ug/L
2,4-DIMETHYLPHENOL	BDL	10	ug/L
4,6-DINITRO-2-METHYLPHENOL	BDL	50	ug/L
2,4-DINITROPHENOL	BDL	50	ug/L
2-METHYLPHENOL	BDL	10	ug/L
4-METHYLPHENOL	BDL	10	ug/L
2-NITROPHENOL	BDL	10	ug/L
4-NITROPHENOL	BDL	50	ug/L
PENTACHLOROPHENOL	BDL	50	ug/L
PHENOL	BDL	10	ug/L
TETRACHLOROPHENOL	BDL	10	ug/L
2,4,5-TRICHLOROPHENOL	BDL	10	ug/L
2,4,6-TRICHLOROPHENOL	BDL	10	ug/L
1,2-DIPHENYLHYDRAZINE	BDL	10	ug/L
N-NITROSODIMETHYLAMINE	BDL	10	ug/L
1,2,3,4-TETRACHLOROBENZENE	BDL	10	ug/L
1,2,4,5-TETRACHLOROBENZENE	BDL	10	ug/L
SURROGATE RECOVERY			
2-FLUOROPHENOL	52		% Rec
PHENOL-D5	32		% Rec
NITROBENZENE-D5	94		% Rec
2-FLUOROBIPHENYL	78		% Rec
2,4,6-TRIBROMOPHENOL	78		% Rec
TERPHENYL-D14	82		% Rec

Sample Comments

BDL Below Detection Limit

Quality Assurance Officer: _____

QUALITY ASSURANCE REPORT

Service Location	Received	Lab ID
EMS HERITAGE LABORATORIES, INC. 7901 W. MORRIS ST. INDIANAPOLIS, IN 46231 (317)243-8305	23-APR-91	A228370
	Complete 05-JUN-91	PO Number 90607684-59A
	Printed 13-JUN-91	Sampled

Sample Description

BARIUM ICP SW846-6010

Analyst : M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M104.3.0
Reviewer: S. ENDERSEN Review Date: 02-MAY-91 File ID: Run: R119838
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q239253	WP1083	BARIUM	2.00		2.06	mg/L	103	
DPS02	Q231974	A228372	BARIUM	0	2.00	1.92	mg/L	96	4
SPI02	Q231973	A228372	BARIUM	0	2.00	1.84	mg/L	92	
CCV	Q239277	INORGANIC	BARIUM	5.00		4.52	mg/L	90	
BLA01	Q239276	NA	BARIUM			< 0.004	mg/L		
LCS	Q231971	NA	BARIUM	20.0		18.9	mg/L	94	
BLA02	Q231972	NA	BARIUM			< 0.004	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q239275	INORGANIC	BARIUM	5.00		4.81	mg/L	96	
BLA01	Q239274	NA	BARIUM			< 0.004	mg/L		

CADMIUM ICP SW846-6010

Analyst : M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M108.3.0
Reviewer: S. ENDERSEN Review Date: 02-MAY-91 File ID: Run: R119838
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q239254	WP1083	CADMIUM	0.400		0.425	mg/L	106	
ICV01	Q239259	WP1083	CADMIUM	0.400		0.407	mg/L	102	
DPS02	Q231974	A228372	CADMIUM	0	0.050	0.0415	mg/L	83	4
SPI02	Q231973	A228372	CADMIUM	0	0.050	0.0398	mg/L	80	
CDL01	Q239279	NA	CADMIUM	0.0100		0.0116	mg/L	116	
CCV	Q239277	INORGANIC	CADMIUM	5.00		4.48	mg/L	90	
BLA01	Q239276	NA	CADMIUM			< 0.002	mg/L		
LCS	Q231971	NA	CADMIUM	0.500		0.407	mg/L	81	
BLA02	Q231972	NA	CADMIUM			< 0.002	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q239275	INORGANIC	CADMIUM	5.00		4.80	mg/L	96	
BLA01	Q239274	NA	CADMIUM			< 0.002	mg/L		
CDL01	Q239270	NA	CADMIUM	0.0100		0.0122	mg/L	122	

CHROMIUM ICP SW846-6010

Analyst : M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M110.3.0
Reviewer: S. ENDERSEN Review Date: 02-MAY-91 File ID: Run: R119838
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q239254	WP1083	CHROMIUM	0.400		0.421	mg/L	105	
ICV01	Q239259	WP1083	CHROMIUM	0.400		0.400	mg/L	100	
DPS02	Q231974	A228372	CHROMIUM	0	0.200	0.193	mg/L	97	3
SPI02	Q231973	A228372	CHROMIUM	0	0.200	0.188	mg/L	94	
CDL01	Q239279	NA	CHROMIUM	0.0200		0.0260	mg/L	130	

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CCV	Q239277	INORGANIC	CHROMIUM	5.00		4.54	mg/L	91	
BLA01	Q239276	NA	CHROMIUM			< 0.004	mg/L		
	Q231971	NA	CHROMIUM	2.00		1.85	mg/L	92	
BLA02	Q231972	NA	CHROMIUM			< 0.004	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q239275	INORGANIC	CHROMIUM	5.00		4.83	mg/L	97	
BLA01	Q239274	NA	CHROMIUM			< 0.004	mg/L		
CDL01	Q239270	NA	CHROMIUM	0.0200		0.0210	mg/L	105	

NICKEL ICP SW846-6010

Analyst : M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M122.3.0
Reviewer: S. ENDERSEN Review Date: 02-MAY-91 File ID: Run: R119838
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q239254	WP1083	NICKEL	0.400		0.419	mg/L	105	
ICV01	Q239259	WP1083	NICKEL	0.400		0.408	mg/L	102	
DPS02	Q231974	A228372	NICKEL	0	0.500	0.468	mg/L	94	3
SPI02	Q231973	A228372	NICKEL	0	0.500	0.457	mg/L	91	
CDL01	Q239279	NA	NICKEL	0.0200		0.0229	mg/L	115	
CCV	Q239277	INORGANIC	NICKEL	5.00		4.50	mg/L	90	
BLA01	Q239276	NA	NICKEL			< 0.004	mg/L		
LCS	Q231971	NA	NICKEL	5.00		4.62	mg/L	92	
BLA02	Q231972	NA	NICKEL			< 0.004	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q239275	INORGANIC	NICKEL	5.00		4.79	mg/L	96	
BLA01	Q239274	NA	NICKEL			< 0.004	mg/L		
CDL01	Q239270	NA	NICKEL	0.0200		0.0199	mg/L	99	

ILVER ICP SW846-6010

Analyst : M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M130.3.0
Reviewer: S. ENDERSEN Review Date: 02-MAY-91 File ID: Run: R119838
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q239253	WP1083	SILVER	2.00		2.05	mg/L	102	
DPS02	Q231974	A228372	SILVER	0	0.050	0.0492	mg/L	98	2
SPI02	Q231973	A228372	SILVER	0	0.050	0.0479	mg/L	96	
CDL01	Q239252	NA	SILVER	0.0200		0.0200	mg/L	100	
CCV	Q239277	INORGANIC	SILVER	1.00		0.912	mg/L	91	
BLA01	Q239276	NA	SILVER			< 0.004	mg/L		
LCS	Q231971	NA	SILVER	0.500		0.468	mg/L	94	
BLA02	Q231972	NA	SILVER			< 0.004	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q239275	INORGANIC	SILVER	1.00		0.950	mg/L	95	
BLA01	Q239274	NA	SILVER			< 0.004	mg/L		
CDL01	Q239271	NA	SILVER	0.0200		0.0208	mg/L	104	

IRON ICP SW846-6010

Analyst : M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M115.3.0
Reviewer: S. ENDERSEN Review Date: 02-MAY-91 File ID: Run: R119838
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q239254	WP1083	IRON	0.400		0.425	mg/L	106	
1	Q239259	WP1083	IRON	0.400		0.413	mg/L	103	
2	Q231974	A228372	IRON	0	1.00	0.968	mg/L	97	3
SPI02	Q231973	A228372	IRON	0	1.00	0.942	mg/L	94	
CDL01	Q239279	NA	IRON	0.0400		0.0407	mg/L	102	
CCV	Q239277	INORGANIC	IRON	5.00		4.59	mg/L	92	

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
BLA01	Q239276	NA	IRON			< 0.008	mg/L		
LCS	Q231971	NA	IRON	10.0		9.40	mg/L	94	
BLA02	Q231972	NA	IRON			< 0.008	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q239275	INORGANIC	IRON	5.00		4.89	mg/L	98	
BLA01	Q239274	NA	IRON			< 0.008	mg/L		
CDL01	Q239270	NA	IRON	0.0400		0.0453	mg/L	113	

SODIUM ICP SW846-6010

Analyst : M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M131.3.0
Reviewer: S. ENDERSEN Review Date: 02-MAY-91 File ID: Run: R119838
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
DPS02	Q231974	A228372	SODIUM	0.202	100	94.7	mg/L	94	4
SPI02	Q231973	A228372	SODIUM	0.202	100	91.5	mg/L	91	
CCV	Q239277	INORGANIC	SODIUM	50.0		45.2	mg/L	90	
BLA01	Q239276	NA	SODIUM			< 0.08	mg/L		
LCS	Q231971	NA	SODIUM	100		95.7	mg/L	96	
BLA02	Q231972	NA	SODIUM			< 0.08	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q239275	INORGANIC	SODIUM	50.0		47.6	mg/L	95	
BLA01	Q239274	NA	SODIUM			< 0.08	mg/L		

MANGANESE ICP SW846-6010

Analyst : M. JAO Analysis Date: 01-MAY-91 Instrument: ICP Test: M119.3.0
Reviewer: S. ENDERSEN Review Date: 02-MAY-91 File ID: Run: R119838
Prep: FAA OR ICP ACID DIGESTION OF AQUEOUS SAMPLES SW846-3005

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	
ICV01	Q239254	WP1083	MANGANESE	0.400		0.423	mg/L	106	
ICV01	Q239259	WP1083	MANGANESE	0.400		0.414	mg/L	103	
DPS02	Q231974	A228372	MANGANESE	0	0.500	0.485	mg/L	97	2
SPI02	Q231973	A228372	MANGANESE	0	0.500	0.473	mg/L	95	
CDL01	Q239279	NA	MANGANESE	0.0200		0.0211	mg/L	105	
CCV	Q239277	INORGANIC	MANGANESE	5.00		4.54	mg/L	91	
BLA01	Q239276	NA	MANGANESE			< 0.004	mg/L		
LCS	Q231971	NA	MANGANESE	5.00		4.79	mg/L	96	
BLA02	Q231972	NA	MANGANESE			< 0.004	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q239275	INORGANIC	MANGANESE	5.00		4.82	mg/L	96	
BLA01	Q239274	NA	MANGANESE			< 0.004	mg/L		
CDL01	Q239270	NA	MANGANESE	0.0200		0.0211	mg/L	105	

ARSENIC GFAA SW846-7060

Analyst : K. KEHOE Analysis Date: 10-MAY-91 Instrument: GFAA Test: M103.2.0
Reviewer: S. ENDERSEN Review Date: 13-MAY-91 File ID: 020782 Run: R120843
Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q245956		ARSENIC	0.000		0.000	mg/L		
CAL01	Q245957		ARSENIC	0.0050		0.034	mg/L		
CAL01	Q245958		ARSENIC	0.0100		0.059	mg/L		
CAL01	Q245959		ARSENIC	0.0200		0.111	mg/L		
CAL01	Q245960		ARSENIC	0.0400		0.219	mg/L		
ICV01	Q245962		ARSENIC	0.0100		0.0104	mg/L	104	
DPS02	Q239846	A228368	ARSENIC	0.00	0.0400	0.0357	mg/L	89	
SPI02	Q239845	A228368	ARSENIC	0.00	0.0400	0.0359	mg/L	90	
BLA01	Q245961		ARSENIC			< 0.0020	mg/L		
CCV	Q245963		ARSENIC	0.0200		0.0201	mg/L	101	

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CDL01	Q245964		ARSENIC	0.0100		0.0101	mg/L	101	
	Q239843		ARSENIC	0.0200		0.0183	mg/L	92	
2	Q239844		ARSENIC			< 0.0020	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
BLA01	Q245965		ARSENIC			< 0.0020	mg/L		
CCV	Q245966		ARSENIC	0.0200		0.0196	mg/L	98	
CDL01	Q245969		ARSENIC	0.0100		0.0087	mg/L	87	

LEAD GFAA SW846-7421

Analyst : M. BAUER Analysis Date: 09-MAY-91 Instrument: GFAA Test: M116.2.0
Reviewer: S. O'NEAL Review Date: 10-MAY-91 File ID: 020779 Run: R120734

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q245452		LEAD	0.000		0.000	mg/L		
CAL01	Q245453		LEAD	0.0050		0.026	mg/L		
CAL01	Q245454		LEAD	0.010		0.068	mg/L		
CAL01	Q245455		LEAD	0.020		0.122	mg/L		
CAL01	Q245456		LEAD	0.030		0.174	mg/L		
ICV01	Q245457		LEAD	0.0100		0.0095	mg/L	95	
DPS02	Q239846	A228368	LEAD	0.00	0.0200	0.0224	mg/L	112	9.35
SPI02	Q239845	A228368	LEAD	0.00	0.0200	0.0204	mg/L	102	
BLA01	Q245458		LEAD			< 0.0020	mg/L		
CCV	Q245459		LEAD	0.0200		0.0190	mg/L	95	
CDL01	Q245460		LEAD	0.0100		0.0095	mg/L	95	
LCS	Q239843		LEAD	0.0200		0.0189	mg/L	95	
BLA02	Q239844		LEAD			0.0021	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
	Q245461		LEAD	0.0200		0.0201	mg/L	101	
1	Q245462		LEAD			< 0.0020	mg/L		
CDL01	Q245463		LEAD	0.0100		0.0103	mg/L	103	

SELENIUM GFAA SW846-7740

Analyst : K. KEHOE Analysis Date: 07-MAY-91 Instrument: GFAA Test: M128.2.0
Reviewer: S. ENDERSEN Review Date: 08-MAY-91 File ID: 020760 Run: R120361

Prep: GFAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-3020

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q243258		SELENIUM	0.000		0.000	mg/L		
CAL01	Q243259		SELENIUM	0.0050		0.016	mg/L		
CAL01	Q243260		SELENIUM	0.0100		0.031	mg/L		
CAL01	Q243261		SELENIUM	0.0200		0.063	mg/L		
CAL01	Q243262		SELENIUM	0.0400		0.119	mg/L		
ICV01	Q243264		SELENIUM	0.0100		0.0103	mg/L	103	
DPS02	Q239846	A228368	SELENIUM	0.0033	0.0100	0.0135	mg/L	102	3.8
SPI02	Q239845	A228368	SELENIUM	0.0033	0.0100	0.0139	mg/L	106	
CDL01	Q243266		SELENIUM	0.0100		0.0110	mg/L	110	
BLA01	Q243271		SELENIUM			< 0.0020	mg/L		
CCV	Q243272		SELENIUM	0.0200		0.0205	mg/L	103	
LCS	Q239843		SELENIUM	0.0200		0.0200	mg/L	100	
BLA02	Q239844		SELENIUM			< 0.0020	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
BLA01	Q243273		SELENIUM			0.0021	mg/L		
CCV	Q243274		SELENIUM	0.0200		0.0212	mg/L	106	
C 1	Q243279		SELENIUM	0.0100		0.0124	mg/L	124	

MERCURY CVAA SW846-7470

Analyst : J. WARE Analysis Date: 08-MAY-91 Instrument: CVAA Test: M120.1.0
Reviewer: S. O'NEAL Review Date: 10-MAY-91 File ID: 020776 Run: R120668
Prep: MERCURY CVAA ACID DIGESTION OF AQUEOUS SAMPLES SW846-7470

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q244981		MERCURY	0.0000		0.000	mg/L		
CAL01	Q244982		MERCURY	0.00020		0.009	mg/L		
CAL01	Q244983		MERCURY	0.00050		0.021	mg/L		
CAL01	Q244984		MERCURY	0.0010		0.039	mg/L		
CAL01	Q244985		MERCURY	0.0020		0.079	mg/L		
CAL01	Q244986		MERCURY	0.0030		0.105	mg/L		
CAL01	Q244987		MERCURY	0.0050		0.178	mg/L		
ICV01	Q244989		MERCURY	0.00200		0.00191	mg/L	96	
DPS02	Q237814	A228366	MERCURY	0.00	0.0010	0.00105	mg/L	105	21
SPI02	Q237813	A228366	MERCURY	0.00	0.0010	0.00085	mg/L	85	
BLA01	Q244991		MERCURY			< 0.000020	mg/L		
CCV	Q244992		MERCURY	0.00300		0.00290	mg/L	97	
LCS	Q237811		MERCURY	0.00300		0.00273	mg/L	91	
BLA02	Q237812		MERCURY			< 0.000020	mg/L		
SAMPLE	A228370		See Certificate of Analysis						
BLA01	Q244993		MERCURY			< 0.000020	mg/L		
CCV	Q244994		MERCURY	0.00300		0.00290	mg/L	97	

CHLORIDE (COLORIMETRIC, AUTOMATED) EPA 325.1

Analyst : C. BRODERICK Analysis Date: 15-MAY-91 Instrument: AUTO-ANALYZER Test: G102.9.0
Reviewer: B. SHRAKE Review Date: 16-MAY-91 File ID: 91051501 Run: R121362

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q249487		CHLORIDE	100		99.75	mg/L	100	
CAL01	Q249488		CHLORIDE	80		81.01	mg/L	101	
CAL01	Q249489		CHLORIDE	60		59.57	mg/L	99	
CAL01	Q249490		CHLORIDE	40		41.71	mg/L	104	
CAL01	Q249491		CHLORIDE	20		19.96	mg/L	100	
CAL01	Q249492		CHLORIDE	8		8.27		103	
CAL01	Q249493		CHLORIDE	4		3.898	mg/L	97	
ICV01	Q249495		CHLORIDE	34.4		36.5	mg/L	106	
ICV01	Q249504		CHLORIDE	34.4		35.6	mg/L	103	
ICV01	Q249521		CHLORIDE	34.4		38.0	mg/L	110	
SPI01	Q249501	A228357	CHLORIDE	15	20	36	mg/L	105	
DPS01	Q249502	A228357	CHLORIDE	15	20	36	mg/L	105	0
BLA01	Q249494		CHLORIDE			-0.529	mg/L		
CCV	Q249496		CHLORIDE	40		40.68	mg/L	102	
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q249503		CHLORIDE	40		40.62	mg/L	101	

PHENOLS 4AAP (AUTOMATED) SW846-9066

Analyst : J. GRIFFIN Analysis Date: 25-APR-91 Instrument: AUTO-ANALYZER Test: 0405.7.0
Reviewer: B. SHRAKE Review Date: 29-APR-91 File ID: 356 Run: R119428
Prep: PHENOLS DISTILLATION SW846-9065

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q236757		PHENOL	0.90		0.90	mg/L	100	
CAL01	Q236758		PHENOL	0.70		0.70	mg/L	100	
CAL01	Q236759		PHENOL	0.50		0.50	mg/L	100	
CAL01	Q236760		PHENOL	0.30		0.30	mg/L	100	
CAL01	Q236761		PHENOL	0.10		0.10	mg/L	100	
CAL01	Q236762		PHENOL	0.00		-0.001	mg/L		
ICV01	Q236765		PHENOL	0.400		0.382	mg/L	96	
ICV01	Q236782		PHENOL	0.40		0.390	mg/L	98	
ICV01	Q236793		PHENOL	0.400		0.384	mg/L	96	

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q236797		PHENOL	0.40		0.410	mg/L	103	
ICV02	Q236767		PHENOL	0.40		0.37	mg/L	93	
1	Q236779	A228361	PHENOL	0.00		0.00	mg/L		0
SPI01	Q236780	A228362	PHENOL	0.00	0.40	0.40	mg/L	100	
DPS02	Q236790	A228370	PHENOL	0.00	0.20	0.18	mg/L	90	5
SPI02	Q236783	A228370	PHENOL	0.00	0.20	0.19	mg/L	95	
DUP02	Q236777	A228356	PHENOL	0.00		0.00	mg/L		0
BLA01	Q236763		PHENOL			-0.001	mg/L		
CDL01	Q236764		PHENOL	0.01		0.01	mg/L	100	
CCV	Q236781		PHENOL	0.30		0.30	mg/L	100	
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q236785		PHENOL	0.30		0.28	mg/L	93	
BLA01	Q236798		PHENOL			-0.001	mg/L		
BLA02	Q236766		PHENOL			0.001	mg/L		

SULFATE TURBIDIMETRIC METHOD SW846-9038

Analyst : K. RILEY Analysis Date: 16-MAY-91 Test: G108.6.0
Reviewer: B. SHRAKE Review Date: 17-MAY-91 File ID: 801-803 Run: R121440

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q250109		SULFATE	0.00		0.51	mg/L		
CAL01	Q250110		SULFATE	5		4.3	mg/L	86	
CAL01	Q250111		SULFATE	10		9.7	mg/L	97	
CAL01	Q250112		SULFATE	20		20.8	mg/L	104	
CAL01	Q250113		SULFATE	30		29.7	mg/L	99	
ICV01	Q250117		SULFATE	16.8		16.7	mg/L	99	
ICV01	Q250125		SULFATE	16.8		18.3	mg/L	109	
SPI01	Q250122	A228360	SULFATE	7.9	10	17.6	mg/L	97	
01	Q250132	A228360	SULFATE	7.9	10	17	mg/L	91	3.5
1	Q250116		SULFATE			0.505	mg/L		
CCV	Q250120		SULFATE	20		21.1	mg/L	106	
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q250124		SULFATE	20		20.48	mg/L	102	

PH (AQUEOUS) SW846-9040

Analyst : M. BAUER Analysis Date: 23-APR-91 Test: G607.5.0
Reviewer: A. DATTILO Review Date: 24-APR-91 File ID: Run: R119190

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q235059		PH	10.0		9.99	Std. Units		
CAL01	Q235060		PH	7.0		7.03	Std. Units		
CAL01	Q235061		PH	4.0		4.02	Std. Units		
ICV01	Q235062		PH	7.80		7.87	Std. Units	101	
DUP01	Q235068	A228356	PH	6.9		6.9	Std. Units		0
CCV	Q235071		PH	7.00		7.08	Std. Units	101	
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q235073		PH	7.00		7.00	Std. Units	100	

SPECIFIC CONDUCTANCE SW846-9050

Analyst : L. MATTINGLY Analysis Date: 24-APR-91 Test: G604.4.0
Reviewer: B. SHRAKE Review Date: 26-APR-91 File ID: 0856-0858 Run: R119306

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q235845		CONDUCTIVITY	340		314	umHOS/cm	92	
DUP01	Q235846	A228363	CONDUCTIVITY	750		730	umHOS/cm		2.7
B 1	Q235844		CONDUCTIVITY			1.14	umHOS/cm		
E	A228370		See Certificate of Analysis						

TOTAL ORGANIC CARBON SW846-9060

Analyst : L. BUTLER Analysis Date: 25-APR-91 Instrument: TOC Test: 0401.0.0
Reviewer: B. SHRAKE Review Date: 26-APR-91 File ID: 1059 Run: R119531

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	
CAL01	Q237419		TOTAL ORGANIC CARBON (TOC)	1000		1005	mg/L	100	
ICV01	Q237420		TOTAL ORGANIC CARBON (TOC)	100		104.5	mg/L	105	
ICV01	Q237432		TOTAL ORGANIC CARBON (TOC)	100		107.8	mg/L	108	
DUP01	Q237429	C129570	TOTAL ORGANIC CARBON (TOC)	18		18	mg/L		0
SPI01	Q237421	A228359	TOTAL ORGANIC CARBON (TOC)	4	10	14	mg/L	100	
DPS01	Q237422	A228359	TOTAL ORGANIC CARBON (TOC)	4	10	14	mg/L	100	0
BLA01	Q237418		TOTAL ORGANIC CARBON (TOC)			1.544	mg/L		
CCV	Q237424		TOTAL ORGANIC CARBON (TOC)	200		211.2	mg/L	106	
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q237431		TOTAL ORGANIC CARBON (TOC)	200		212.6	mg/L	106	

TOTAL ORGANIC HALIDES SW846-9020

Analyst : S. HALLORAN Analysis Date: 25-APR-91 Instrument: TOX Test: 0404.0.0
Reviewer: B. SHRAKE Review Date: 30-APR-91 File ID: 1434 Run: R119944

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q240124		TOTAL ORGANIC HALOGEN (TOX)	30.00		34.63	mg/L	115	
ICV01	Q240125		TOTAL ORGANIC HALOGEN (TOX)	0.15		0.175	mg/L	117	
ICV01	Q240141		TOTAL ORGANIC HALOGEN (TOX)	0.15		0.165	mg/L	111	
ICV01	Q240196		TOTAL ORGANIC HALOGEN (TOX)	0.15		0.1607	mg/L	107	
ICV01	Q240197		TOTAL ORGANIC HALOGEN (TOX)	0.15		0.1619	mg/L	108	
DUP01	Q240175	A228370	TOTAL ORGANIC HALOGEN (TOX)	0.00		0.00	mg/L		0
DPS01	Q240169	A228366	TOTAL ORGANIC HALOGEN (TOX)	0.00	0.025	0.0269	mg/L	108	0.93
SPI01	Q240168	A228366	TOTAL ORGANIC HALOGEN (TOX)	0.00	0.025	0.0268	mg/L	107	
CCV	Q240166		TOTAL ORGANIC HALOGEN (TOX)	30.00		31.69	mg/L	107	
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q240193		TOTAL ORGANIC HALOGEN (TOX)	31.00		35.08	mg/L	113	

DISSOLVED SOLIDS EPA 160.1

Analyst : P. ANDERSON Analysis Date: 24-APR-91 Test: G402.7.0
Reviewer: B. SHRAKE Review Date: 29-APR-91 File ID: 1071-1073 Run: R119463

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q236961		SOLIDS	131.2		145	mg/L	111	
DUP01	Q236963	A228357	SOLIDS	1300		1300	mg/L		0
BLA01	Q236960		SOLIDS			0.0006	mg/L		
SAMPLE	A228370		See Certificate of Analysis						

TOTAL SOLIDS EPA 160.3

Analyst : P. ANDERSON Analysis Date: 30-APR-91 Test: G401.7.0
Reviewer: B. SHRAKE Review Date: 01-MAY-91 File ID: 1541 Run: R119879

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q239627		SOLIDS	10.0794		10.0784	mg/L	100	
ICV01	Q239630		SOLIDS	12.4845		12.4832	mg/L	100	
DUP01	Q239628	A228356	SOLIDS	7800		7900	mg/L		1
SAMPLE	A228370		See Certificate of Analysis						

CYANIDE, TOTAL (AUTOMATED) SW846-9012

Analyst : J. GRIFFIN Analysis Date: 24-APR-91 Instrument: AUTO-ANALYZER Test: G101.4.0
Reviewer: B. SHRAKE Review Date: 29-APR-91 File ID: 667 Run: R119513
Prep: CYANIDE DISTILLATION SW846-9010

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	
CAL01	Q237268		CYANIDE	0.45		0.44	mg/L	98	
CAL01	Q237269		CYANIDE	0.30		0.31	mg/L	103	
CAL01	Q237270		CYANIDE	0.20		0.21	mg/L	105	
CAL01	Q237271		CYANIDE	0.10		0.098	mg/L	98	

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CAL01	Q237272		CYANIDE	0.00		-0.006	mg/L		
ICV01	Q237274		CYANIDE	2.40		2.05	mg/L	85	
1	Q237275		CYANIDE	0.40		0.40	mg/L	100	
ICV01	Q237306		CYANIDE	2.40		2.10	mg/L	88	
ICV01	Q237308		CYANIDE	2.40		2.06	mg/L	86	
ICV01	Q237338		CYANIDE	2.40		2.18	mg/L	91	
ICV02	Q237320		CYANIDE	0.30		0.31	mg/L	103	
ICV02	Q237332		CYANIDE	0.30		0.32	mg/L	107	
ICV02	Q237426		CYANIDE	0.30		0.29	mg/L	97	
DUP01	Q237296	A228062	CYANIDE	0.00		0.00	mg/L		0
SPI01	Q237301	A228068	CYANIDE	0.00	0.40	0.39	mg/L	98	
DPS02	Q237327	A228358	CYANIDE	0.00	0.10	0.10	mg/L	100	9.5
SPI02	Q237325	A228358	CYANIDE	0.00	0.10	0.11	mg/L	110	
DUP02	Q237324	A228331	CYANIDE	0.02		0.02	mg/L		0
BLA01	Q237273		CYANIDE			-0.006	mg/L		
CCV	Q237330		CYANIDE	0.30		0.33	mg/L	110	
SAMPLE	A228370		See Certificate of Analysis						
CCV	Q237337		CYANIDE	0.30		0.29	mg/L	97	
BLA01	Q237339		CYANIDE			-0.006	mg/L		
BLA02	Q237321		CYANIDE			-0.003	mg/L		

SULFIDE SW846-9030

Analyst : L. HETTICH Analysis Date: 30-APR-91 Test: G110.4.0

Reviewer: B. SHRAKE Review Date: 01-MAY-91 File ID: 673 Run: R119834

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
ICV01	Q239227		SULFIDE	46.8		47.1	mg/L	101	
DUP01	Q239242	A228320	SULFIDE	0.00		0.00	mg/L		0
[illegible]1	Q239237	A228362	SULFIDE	0.00	23.4	22	mg/L	94	5
1	Q239235	A228362	SULFIDE	0.00	23.4	21	mg/L	90	
BLA01	Q239226		SULFIDE			0.23	mg/L		
SAMPLE	A228370		See Certificate of Analysis						

VOLATILE ORGANICS TARGET COMPOUND LIST SW846-8240

Analyst : H. WILLIAMS Analysis Date: 02-MAY-91 Instrument: GC/MS VOA Test: 0530.1.0

Reviewer: C. KOLANOWSKI Review Date: 07-MAY-91 File ID: >4713C Run: R120316

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
CCV	Q242750		See Attached Report g4710c.ind						
BLA01	Q242764		See Attached Report g4712c.ind						
SAMPLE	A228370		See Certificate of Analysis						

SEMI-VOLATILE TARGET COMPOUND LIST SW846-8270

Analyst : K. STONER Analysis Date: 21-MAY-91 Instrument: GC/MS SVOA Test: 0531.1.0

Reviewer: S. BROTHERTON Review Date: 23-MAY-91 File ID: >1448B Run: R121927

Prep: GC/MS SEPARATORY FUNNEL LIQUID-LIQUID EXTRACTION SW846-3510

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
DPS02	Q229907	A228362	PHENOL	0.00	200	58	ug/L	29	0
DPS02	Q229907	A228362	2-CHLOROPHENOL	0.00	200	170	ug/L	85	6
DPS02	Q229907	A228362	1,4-DICHLOROBENZENE (P-DICHLOROBENZE	0.00	100	71	ug/L	71	4
DPS02	Q229907	A228362	N-NITROSO-DI-N-PROPYLAMINE	0.00	100	110	ug/L	110	10
DPS02	Q229907	A228362	1,2,4-TRICHLOROBENZENE	0.00	100	74	ug/L	74	7
DPS02	Q229907	A228362	4-CHLORO-3-METHYLPHENOL	0.00	200	170	ug/L	85	0
DPS02	Q229907	A228362	ACENAPHTHENE	0.00	100	98	ug/L	98	2
DP[illegible]2	Q229907	A228362	4-NITROPHENOL	0.00	200	110	ug/L	55	15
1	Q229907	A228362	2,4-DINITROTOLUENE	0.00	100	* 120	ug/L	120	6
DPS02	Q229907	A228362	PENTACHLOROPHENOL	0.00	200	170	ug/L	85	13
DPS02	Q229907	A228362	PYRENE	0.00	100	74	ug/L	74	4
SPI02	Q229906	A228362	PHENOL	0.00	200	58	ug/L	29	

QC Type	Identifier	Source	Parameter	True/Sampl	Spike Val	Observed	Units	% Rec	RPD
SPIO2	Q229906	A228362	2-CHLOROPHENOL	0.00	200	160	ug/L	80	
SPIO2	Q229906	A228362	1,4-DICHLOROBENZENE (P-DICHLOROBENZE	0.00	100	68	ug/L	68	
SPIO2	Q229906	A228362	N-NITROSO-DI-N-PROPYLAMINE	0.00	100	100	ug/L	100	
SPIO2	Q229906	A228362	1,2,4-TRICHLOROBENZENE	0.00	100	68	ug/L	68	
SPIO2	Q229906	A228362	4-CHLORO-3-METHYLPHENOL	0.00	200	170	ug/L	85	
SPIO2	Q229906	A228362	ACENAPHTHENE	0.00	100	96	ug/L	96	
SPIO2	Q229906	A228362	4-NITROPHENOL	0.00	200	85	ug/L	43	
SPIO2	Q229906	A228362	2,4-DINITROTOLUENE	0.00	100	* 110	ug/L	110	
SPIO2	Q229906	A228362	PENTACHLOROPHENOL	0.00	200	150	ug/L	75	
SPIO2	Q229906	A228362	PYRENE	0.00	100	77	ug/L	77	
CCV	Q253419		See Attached Report g1442b.ind						
BLA01	Q253420		See Attached Report g1452b.ind						
BLA02	Q229904		See Attached Report g1454b.ind						
SAMPLE	A228370		See Certificate of Analysis						

Comments

*Q229907 NOTE: * OUT OF QC LIMITS.*
*Q229906 NOTE: * OUT OF QC LIMITS*

Notes

< *Less Than Lower Detection Limit*
* *See Note for Parameter*

Quality Assurance Officer: _____

Continuing Calibration Check
HSL Compounds

Case No:
Calibration Date: 05/02/91
Contractor: EMSIN
Time: 09:04
Contract No:
Laboratory ID: >4710C
Instrument ID: GCMS#3
Initial Calibration Date: 03/11/91

Minimum $\overline{RF}$ for SPCC is .30 Maximum % Diff for CCC is 25%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
Acrolein	.11587	.10133	12.55			(Conc=1250.00)
Acrylonitrile	.29668	.33265	12.12			(Conc=1750.00)
Chloromethane	.63154	.58524	7.33		**	(Conc=50.00)
Bromomethane	.65134	.87492	34.33			(Conc=50.00)
Vinyl Chloride	.75090	.92693	23.44	*		(Conc=50.00)
Dichlorodifluoromethane	1.01974	.54595	46.46			(Conc=50.00)
Chloroethane	.63228	.62693	.85			(Conc=50.00)
Methylene Chloride	1.61904	1.49554	7.63			(Conc=50.00)
Acetone	.33471	.40335	20.51			(Conc=50.00)
Carbon Disulfide	3.29353	3.28110	.38			(Conc=50.00)
Trichlorofluoromethane	1.93412	.51768	73.23			(Conc=50.00)
1,1-Dichloroethene	1.18569	1.25511	5.85	*		(Conc=50.00)
1,1-Dichloroethane	1.72263	1.84894	7.33		**	(Conc=50.00)
[Tetrahydrofuran]	.26479	.35856	35.41			(Conc=125.00)
1,2-Dichloroethene (total)	1.29508	1.35569	4.68			
Diethyl Ether	.75636	.81135	7.27			(Conc=50.00)
Chloroform	2.32848	2.68099	15.14	*		(Conc=50.00)
Trichloro-trifluoroethane	2.33924	2.29346	1.96			(Conc=50.00)
1,2-Dichloroethane-d4	1.36023	1.40512	3.30			(Conc=50.00)
2-Butanone	.63507	.75060	18.19			
1,2-Dichloroethane	1.69415	1.60860	5.05			(Conc=50.00)
Methyl-t-butyl ether	.71056	.72126	1.51			(Conc=50.00)
1,1,1-Trichloroethane	.60935	.54319	10.86			(Conc=50.00)
Carbon Tetrachloride	.64329	.55867	13.15			(Conc=50.00)
Vinyl Acetate	.01637	.01512	7.67			(Conc=50.00)
Bromodichloromethane	.74434	.69331	6.86			(Conc=50.00)
1,2-Dichloropropane	.37629	.42102	11.89	*		(Conc=50.00)
cis-1,3-Dichloropropene	.80279	.88405	10.12			(Conc=50.00)
Trichloroethene	.45850	.47329	3.22			(Conc=50.00)
Diisopropyl Ether	1.10339	1.26629	14.76			(Conc=50.00)
2-Chloroethyl Vinyl Ether	.21128	.23324	10.39			(Conc=50.00)
Dibromochloromethane	.65723	.67803	3.16			(Conc=50.00)

RF - Response Factor from daily standard file at 50.00 ug/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI
%Diff - % Difference from original average or curve
CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 05/02/91

Contractor: EMSIN Time: 09:04

Contract No: Laboratory ID: >4710C

Instrument ID: GCMS#3 Initial Calibration Date: 03/11/91

Minimum $\overline{RF}$ for SPCC is .30 Maximum % Diff for CCC is 25%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
1,1,2-Trichloroethane	.34707	.40198	15.82			(Conc=50.00)
Benzene	.80989	.91181	12.58			(Conc=50.00)
trans-1,3-Dichloropropene	.24801	.25932	4.56			(Conc=50.00)
Bromoform	.59242	.58411	1.40		**	(Conc=50.00)
4-Methyl-2-Pentanone	.43460	.55971	28.79			(Conc=50.00)
2-Hexanone	.32002	.01998	93.76			(Conc=50.00)
Tetrachloroethene	.46675	.47916	2.66			(Conc=50.00)
1,1,2,2-Tetrachloroethane	.67351	.81681	21.28		**	(Conc=50.00)
Toluene-d8	.87905	1.10181	25.34			(Conc=50.00)
Toluene	.59101	.67996	15.05	*		(Conc=50.00)
Chlorobenzene	.85636	.99806	16.55		**	(Conc=50.00)
Ethylbenzene	.41045	.46285	12.77	*		(Conc=50.00)
Bromofluorobenzene	.75389	.82421	9.33			(Conc=50.00)
Styrene	.84683	.99194	17.14			(Conc=50.00)
Xylene (total)	.49361	.56280	14.02			(Conc=100.00)
1,3-Dichlorobenzene	-	-	-			(Conc=50.00)
1,2-Dichlorobenzene	-	-	-			(Conc=50.00)
1,4-Dichlorobenzene	-	-	-			(Conc=50.00)

RF - Response Factor from daily standard file at 50.00 ug/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI
%Diff - % Difference from original average or curve
CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (

EMS LABORATORIES, INC
VOLATILES ANALYSIS-WATER METHOD BLANK
ANALYSIS METHOD: SW846-8240

MASS SPEC FILE: >4712C
ANALYSIS DATE/TIME: 5/2/91 11:31

TARGET COMPOUND LIST	RESULT	UNITS	DET. LIMIT
Acetone	BDL	uG/L	20
Acrolein	BDL	uG/L	50
Acrylonitrile	BDL	uG/L	70
Benzene	BDL	uG/L	5
Bromodichloromethane	BDL	uG/L	5
Bromoform	BDL	uG/L	5
Bromomethane	BDL	uG/L	10
Carbon disulfide	BDL	uG/L	5
Carbon tetrachloride	BDL	uG/L	5
Chlorobenzene	BDL	uG/L	5
Chloroethane	BDL	uG/L	10
Chloroform	BDL	uG/L	5
Chloromethane	BDL	uG/L	10
Dibromochloromethane	BDL	uG/L	5
cis-1,3-Dichloropropene	BDL	uG/L	5
Dichlorodifluoromethane	BDL	uG/L	5
1,1-Dichloroethane	BDL	uG/L	5
1,2-Dichloroethane	BDL	uG/L	5
1,1-Dichloroethene	BDL	uG/L	5
1,2-Dichloropropane	BDL	uG/L	5
Ethylbenzene	BDL	uG/L	5
Fluorotrichloromethane	BDL	uG/L	5
2-Hexanone	BDL	uG/L	10
Methylene chloride	BDL	uG/L	5
Methyl ethyl ketone	15	uG/L	10
4-Methyl-2-pentanone	BDL	uG/L	10
Styrene	BDL	uG/L	5
1,1,2,2-Tetrachloroethane	BDL	uG/L	5
Tetrachloroethene	BDL	uG/L	5
Tetrahydrofuran	BDL	uG/L	25
Toluene	BDL	uG/L	5
1,2-Dichloroethene (total)	BDL	uG/L	5
trans-1,3-Dichloropropene	BDL	uG/L	5
1,1,1-Trichloroethane	BDL	uG/L	5
1,1,2-Trichloroethane	BDL	uG/L	5
Trichloroethene	BDL	uG/L	5
Vinyl acetate	BDL	uG/L	10
Vinyl chloride	BDL	uG/L	10
Xylenes (total)	BDL	uG/L	5

SURROGATE LIST			(spike conc)
Dichloroethane-d4	95	% Rec	(50)
Toluene-d8	100	% Rec	(50)
Bromofluorobenzene	104	% Rec	(50)

( ) = ESTIMATED CONCENTRATION

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 05/21/91

Contractor: EMSIN Time: 10:15

Contract No: Laboratory ID: >1442B

Instrument ID: 8702 Initial Calibration Date: 05/17/91

Minimum $\overline{RF}$ for SPCC is 0.05 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Pyridine	1.40716	1.48479	5.52		
2-Picoline	1.12030	1.20043	7.15		
2-Fluorophenol	1.00770	1.08768	7.94		
Phenol	1.07453	1.15241	7.25	*	
bis(2-chloroethyl)ether	.96355	1.04985	8.96		
2-Chlorophenol	1.09656	1.20328	9.73		
1,3-Dichlorobenzene	1.25708	1.46410	16.47		
1,4-Dichlorobenzene	1.27960	1.47382	15.18	*	
Phenol-d6	1.10952	1.12745	1.62		
Benzyl alcohol	.53476	.61047	14.16		
1,2-Dichlorobenzene	1.21605	1.37808	13.33		
2-Methylphenol	.87910	.89638	1.97		
bis(2-chloroisopropyl)ether	.37546	.54768	45.87		
4-Methylphenol	.87388	.88904	1.73		
N-Nitroso-di-n-propylamine	.48043	.52000	8.24		**
Hexachloroethane	.49557	.57938	16.91		
Nitrobenzene	.23870	.24652	3.28		
Isophorone	.46888	.54378	15.97		
2-Nitrophenol	.18165	.20085	10.57	*	
Nitrobenzene-d5	.25501	.28795	12.92		
2,4-Dimethylphenol	.26185	.28206	7.72		
Benzoic acid	.12175	.14259	17.11		
bis(2-Chloroethoxy)methane	.33428	.38039	13.79		
2,4-Dichlorophenol	.28626	.30624	6.98	*	
1,2,4-Trichlorobenzene	.30170	.34484	14.30		
Naphthalene	.88128	1.01269	14.91		
4-Chloroaniline	.36021	.37813	4.97		
Hexachlorobutadiene	.16956	.20393	20.26	*	
4-Chloro-3-methylphenol	.19495	.20068	2.93	*	
2-Methylnaphthalene	.55158	.62951	14.13		
Toluenediamine	.10407	.06917	33.53		
Hexachlorocyclopentadiene	.38031	.44859	17.95		**

RF - Response Factor from daily standard file at 50.00 UG/KG

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI
%Diff - % Difference from original average or curve
CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 05/21/91

Contractor: EMSIN Time: 10:15

Contract No: Laboratory ID: >1442B

Instrument ID: 8702 Initial Calibration Date: 05/17/91

Minimum $\overline{RF}$ for SPCC is 0.05 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
2-Fluorobiphenyl	1.23839	1.44046	16.32		
2,4,6-Trichlorophenol	.35678	.38323	7.42	*	
2,4,5-Trichlorophenol	.30380	.38614	27.10		
2-Chloronaphthalene	1.02258	1.19625	16.98		
2-Nitroaniline	.15123	.16983	12.30		
1,2,4,5-Tetrachlorobenzene	.42329	.50075	18.30		
Dimethylphthalate	.98965	1.15999	17.21		
Acenaphthylene	1.57083	1.73013	10.14		
2,6-Dinitrotoluene	.26521	.29451	11.05		
3-Nitroaniline	.25231	.27629	9.51		
Acenaphthene	.93021	1.04910	12.78	*	
1,3-Dinitrobenzene	.19259	.23346	21.22		
2,4-Dinitrophenol	.13419	.16626	23.90		**
4-Nitrophenol	.08508	.09787	15.03		**
Dibenzofuran	1.28132	1.43937	12.33		
2,4-Dinitrotoluene	.27927	.32557	16.58		
Diethylphthalate	.90502	1.00344	10.87		
4-Chlorophenyl-phenylether	.47746	.54894	14.97		
Fluorene	.93687	1.07397	14.63		
4-Nitroaniline	.21400	.23937	11.85		
2,4,6-Tribromophenol	.12392	.13984	12.85		
4,6-Dinitro-2-methylphenol	.12689	.14420	13.65		
Carbazole	.76787	.84763	10.39		
N-Nitrosodiphenylamine (1)	.46498	.52084	12.01	*	
1,2-Diphenylhydrazine	.55044	.59770	8.59		
4-Bromophenyl-phenylether	.21997	.23207	5.50		
Hexachlorobenzene	.24896	.24990	.38		
Pentachlorophenol	.12693	.13953	9.92	*	
Phenanthrene	.95001	1.01674	7.02		
Anthracene	.92119	1.02705	11.49		
Di-n-butylphthalate	1.05195	1.19282	13.39		
Fluoranthene	.86757	.96555	11.29	*	

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$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI
%Diff - % Difference from original average or curve
CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 05/21/91

Contractor: EMSIN Time: 10:15

Contract No: Laboratory ID: >1442B

Instrument ID: 8702 Initial Calibration Date: 05/17/91

Minimum $\overline{RF}$ for SPCC is 0.05 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
Pyrene	1.48723	2.27924	53.25		
Butylbenzylphthalate	.56314	.80726	43.35		
3,3'-Dichlorobenzidine	.25126	.28365	12.89		
Benzo(a)anthracene	.98093	1.21182	23.54		
Chrysene	.84411	1.09577	29.81		
bis(2-Ethylhexyl)phthalate	.70335	.89543	27.31		
Terphenyl-d14	1.03844	1.50580	45.01		
Di-n-octylphthalate	1.74984	1.88885	7.94	*	
Benzo(b)fluoranthene	1.21802	1.32625	8.89		
Benzo(k)fluoranthene	1.07580	1.22572	13.94		
Benzo(a)pyrene	.95949	1.14897	19.75	*	
Indeno(1,2,3-cd)pyrene	.53019	.64396	21.46		
Dibenz(a,h)anthracene	.57317	.69495	21.25		
Benzo(g,h,i)perylene	.54625	.66448	21.64		

RF - Response Factor from daily standard file at 50.00 UG/KG
RF - Average Response Factor from Initial Calibration Form VI
%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (*

EMS LABORATORIES, INC
SEMI-VOLATILES ANALYSIS-INSTRUMENT BLANK
ANALYSIS METHOD: SW846-8270

MASS SPEC FILE: >1452B

ANALYSIS DATE/TIME: 5/21/91 12:09

TARGET COMPOUND LIST	RESULT	UNITS	DET. LIMIT
Acenaphthene	BDL	mG/L	10
Acenapthylene	BDL	mG/L	10
Anthracene	BDL	mG/L	10
Benz(a)anthracene	BDL	mG/L	10
Benzo(a)pyrene	BDL	mG/L	10
Benzo(b)fluoranthene	BDL	mG/L	10
Benzo(ghi)perylene	BDL	mG/L	10
Benzo(k)fluoranthene	BDL	mG/L	10
Benzyl Alcohol	BDL	mG/L	10
Benzylbutylphthalate	BDL	mG/L	10
Bis(2-chloroethoxy)methane	BDL	mG/L	10
Bis(2-chloroethyl)ether	BDL	mG/L	10
Bis(2-chloroisopropyl)ether	BDL	mG/L	10
Bis(2-ethylhexyl)phthalate	BDL	mG/L	10
4-Bromophenylphenylether	BDL	mG/L	10
Carbazole	BDL	mG/L	10
4-Chloroaniline	BDL	mG/L	10
2-Chloronaphthalene	BDL	mG/L	10
4-Chlorophenylphenylether	BDL	mG/L	10
Chrysene	BDL	mG/L	10
Dibenz(a,h)anthracene	BDL	mG/L	10
Dibenzofuran	BDL	mG/L	10
1,2-Dichlorobenzene	BDL	mG/L	10
1,3-Dichlorobenzene	BDL	mG/L	10
1,4-Dichlorobenzene	BDL	mG/L	10
3,3' -Dichlorobenzidine	BDL	mG/L	20
Diethylphthalate	BDL	mG/L	10
Dimethylphthalate	BDL	mG/L	10
Di-n-butylphthalate	BDL	mG/L	10
Dinitrobenzenes	BDL	mG/L	50
2,4-Dinitrotoluene	BDL	mG/L	10
2,6-Dinitrotoluene	BDL	mG/L	10
Di-n-octylphthalate	BDL	mG/L	10
Fluoranthene	BDL	mG/L	10
Fluorene	BDL	mG/L	10
Hexachlorobenzene	BDL	mG/L	10
Hexachlorobutadiene	BDL	mG/L	10
Hexachlorocyclopentadiene	BDL	mG/L	10
Hexachloroethane	BDL	mG/L	10
Indeno(1,2,3-cd)pyrene	BDL	mG/L	10
Isophorone	BDL	mG/L	10
2-Methylnaphthalene	BDL	mG/L	10
Naphthalene	BDL	mG/L	10

MASS SPEC FILE: >1452B

2-Nitroaniline	BDL	mG/L	50
3-Nitroaniline	BDL	mG/L	50
4-Nitroaniline	BDL	mG/L	50
Nitrobenzene	BDL	mG/L	10
N-Nitroso-diphenylamine	BDL	mG/L	10
N-Nitroso-di-n-propylamine	BDL	mG/L	10
Phenanthrene	BDL	mG/L	10
2-Picoline	BDL	mG/L	50
Pyrene	BDL	mG/L	10
Pyridine	BDL	mG/L	50
Tetrachlorobenzenes	BDL	mG/L	10
Toluenediamine	BDL	mG/L	50
1,2,4-Trichlorobenzene	BDL	mG/L	10
Benzoic Acid	BDL	mG/L	50
4-Chloro-3-methylphenol	BDL	mG/L	10
2-Chlorophenol	BDL	mG/L	10
2,4-Dichlorophenol	BDL	mG/L	10
2,4-Dimethylphenol	BDL	mG/L	10
4,6-Dinitro-2-methylphenol	BDL	mG/L	50
2,4-Dinitrophenol	BDL	mG/L	50
2-Methylphenol	BDL	mG/L	10
4-Methylphenol	BDL	mG/L	10
2-Nitrophenol	BDL	mG/L	10
4-Nitrophenol	BDL	mG/L	50
Pentachlorophenol	BDL	mG/L	50
Phenol	BDL	mG/L	10
Tetrachlorophenol	BDL	mG/L	10
2,4,5-Trichlorophenol	BDL	mG/L	50
2,4,6-Trichlorophenol	BDL	mG/L	10

( ) = ESTIMATED CONCENTRATION

EMS LABORATORIES, INC
SEMI-VOLATILES ANALYSIS-WATER METHOD BLANK
ANALYSIS METHOD: SW846-8270

MASS SPEC FILE: >1454B QC#- A229904

ANALYSIS DATE/TIME: 5/21/91 13:57

PREP DATE: 4/27/91

TARGET COMPOUND LIST	RESULT	UNITS	DET. LIMIT
Acenaphthene	BDL	uG/L	10
Acenapthylene	BDL	uG/L	10
Anthracene	BDL	uG/L	10
Benz(a)anthracene	BDL	uG/L	10
Benzo(a)pyrene	BDL	uG/L	10
Benzo(b)fluoranthene	BDL	uG/L	10
Benzo(ghi)perylene	BDL	uG/L	10
Benzo(k)fluoranthene	BDL	uG/L	10
Benzyl Alcohol	BDL	uG/L	10
Benzylbutylphthalate	BDL	uG/L	10
Bis(2-chloroethoxy)methane	BDL	uG/L	10
Bis(2-chloroethyl)ether	BDL	uG/L	10
Bis(2-chloroisopropyl)ether	BDL	uG/L	10
Bis(2-ethylhexyl)phthalate	BDL	uG/L	10
4-Bromophenylphenylether	BDL	uG/L	10
Carbazole	BDL	uG/L	10
4-Chloroaniline	BDL	uG/L	10
2-Chloronaphthalene	BDL	uG/L	10
4-Chlorophenylphenylether	BDL	uG/L	10
Chrysene	BDL	uG/L	10
Dibenz(a,h)anthracene	BDL	uG/L	10
Dibenzofuran	BDL	uG/L	10
1,2-Dichlorobenzene	BDL	uG/L	10
1,3-Dichlorobenzene	BDL	uG/L	10
1,4-Dichlorobenzene	BDL	uG/L	10
3,3' -Dichlorobenzidine	BDL	uG/L	20
Diethylphthalate	BDL	uG/L	10
Dimethylphthalate	BDL	uG/L	10
Di-n-butylphthalate	BDL	uG/L	10
Dinitrobenzenes	BDL	uG/L	50
2,4-Dinitrotoluene	BDL	uG/L	10
2,6-Dinitrotoluene	BDL	uG/L	10
Di-n-octylphthalate	BDL	uG/L	10
Fluoranthene	BDL	uG/L	10
Fluorene	BDL	uG/L	10
Hexachlorobenzene	BDL	uG/L	10
Hexachlorobutadiene	BDL	uG/L	10
Hexachlorocyclopentadiene	BDL	uG/L	10
Hexachloroethane	BDL	uG/L	10
Indeno(1,2,3-cd)pyrene	BDL	uG/L	10
Isophorone	BDL	uG/L	10
2-Methylnaphthalene	BDL	uG/L	10
Naphthalene	BDL	uG/L	10

MASS SPEC FILE: >1454B

2-Nitroaniline	BDL	uG/L	50
3-Nitroaniline	BDL	uG/L	50
4-Nitroaniline	BDL	uG/L	50
Nitrobenzene	BDL	uG/L	10
N-Nitroso-diphenylamine	BDL	uG/L	10
N-Nitroso-di-n-propylamine	BDL	uG/L	10
Phenanthrene	BDL	uG/L	10
2-Picoline	BDL	uG/L	50
Pyrene	BDL	uG/L	10
Pyridine	BDL	uG/L	50
Tetrachlorobenzenes	BDL	uG/L	10
Toluenediamine	BDL	uG/L	50
1,2,4-Trichlorobenzene	BDL	uG/L	10
Benzoic Acid	BDL	uG/L	50
4-Chloro-3-methylphenol	BDL	uG/L	10
2-Chlorophenol	BDL	uG/L	10
2,4-Dichlorophenol	BDL	uG/L	10
2,4-Dimethylphenol	BDL	uG/L	10
4,6-Dinitro-2-methylphenol	BDL	uG/L	50
2,4-Dinitrophenol	BDL	uG/L	50
2-Methylphenol	BDL	uG/L	10
4-Methylphenol	BDL	uG/L	10
2-Nitrophenol	BDL	uG/L	10
4-Nitrophenol	BDL	uG/L	50
Pentachlorophenol	BDL	uG/L	50
Phenol	BDL	uG/L	10
Tetrachlorophenol	BDL	uG/L	10
2,4,5-Trichlorophenol	BDL	uG/L	50
2,4,6-Trichlorophenol	BDL	uG/L	10

SURROGATE LIST			(spike conc)
2-Fluorophenol	62	% Rec	(100)
Phenol-d5	39	% Rec	(100)
Nitrobenzene-d5	91	% Rec	(50)
2-Fluorobiphenyl	88	% Rec	(50)
2,4,6-Tribromophenol	91	% Rec	(100)
Terphenyl-d14	76	% Rec	(50)

( ) = ESTIMATED CONCENTRATION

APPENDIX G

FORM 1

DATE _____

LOCATION _____

AUDITOR _____

GENERAL INFORMATION

		YES	NO	COMMENTS
1)	Does the laboratory have copies of SOPs/methods manuals and QA Plans available to all personnel?			
2)	Are training records maintained and up to date? Is training by group leader or above?			
3)	Is a Sample Custodian designated?			
4)	Are written Standard Operating Procedures (SOPs) developed for receipt and storage of samples?			
5)	Are samples stored in such a way that their preservation is maintained?			
6)	Are refrigerator/freezer logs maintained, checked daily and up to date?			
7)	Are excursions in cooler temperature noted and appropriate actions taken as required?			
8)	Are volatiles stored separately from semi-vols?			
9)	Does someone responsible review and initial the sample log and log sheets daily?			
10)	Are contamination free areas provided for trace level analytical work?			
11)	Does the facility appear clean and safe?			
12)	Are toxics handled in fume hoods? Are fume hoods checked & documented quarterly?			
13)	Are the toxic chemical handling areas either a stainless steel bench or an impervious material covered with absorbent material?			

PAGE 2 OF FORM 1

		YES	NO	COMMENTS
14)	Is there documented "trace-free" water available for preparing standards and blanks?			
15)	Is the conductivity of "trace-free" water routinely checked and recorded?			
16)	Is (Are) the analytical balance(s) correctly located (free from drafts and rapid temperature changes) and checked semi-annually by a certified technician and documented?			
17)	Are the balances checked with class S weights and documented at least weekly?			
18)	Are solvent storage cabinets properly vented in order to prevent possible laboratory contamination?			
19)	Are reagent grade (or higher purity) chemicals used to prepare standards and reagents?			
20)	Are reagents dated upon receipt and upon opening? Is First-in, First-out method used?			
21)	Are reagents standardized before use?			
22)	Generally, are reference materials properly labeled with concentrations, preparation date, solvent, preservative expiration date and name of person preparing?			
23)	Are spike/calibration stock standards preparation and tracking logbook(s) maintained?			
24)	Are the primary standards approved by the EMS QAP?			
25)	Are bench sheets filed so that they are readily accessible?			
26)	Are standards and samples (& extracts) stored separately?			
27)	Are samples checked for proper preservation upon arrival? Is this noted within LIMS?			
28)	Are logs maintained for all ovens and incubators?			
29)	Is an NBS thermometer available?			

PAGE 3 OF FORM 1

		YES	NO	COMMENTS
30)	Are copies of EPA - PEs and others such as APG on file?			
31)	Is the distilled/deionized water system functioning properly? Is it checked daily and noted in a logbook?			
32)	Are samples requiring chain of custody documentation properly checked before signing chain of custody papers?			
33)	What is done with lab waste? _____ _____ _____			
34)	Are chemical waste disposal policies/procedures adequate?			
35)	Are blind samples introduced into the lab by the QAO?			
36)	Are corrections on bench sheets, lab books, etc. made in such a way that initial entries are legible?			
37)	Are such corrections initialed and dated?			

FORM 2

DATE_____

SERVICE GROUP _____ AUDITOR _____

LOCATION _____ ANALYST _____

TEST	YES	NO	COMMENTS
1) Are methods manuals & QAP's available to the analysts?			
2) Is the SOP for glassware washing posted at the cleaning stations?			
3) Are the types and numbers of required Blanks being checked? Bla 01? Bla 02? Cal 00?			
4) Are blank data logged to the QA sheet and transferred to LIMS?			
4a) Does blank data appear to be "in control"?			
4b) Do original instrument outputs agree with what was reported?			
5) Are calibration curves maintained for all analytes?			
6) Are calibrations verified (1 point) or performed (5 points) prior to the analysis of samples CAL01 + CAL00? Comment: _____			
7) Is an EPA, NIST or other approved external reference used to check and verify concentrations of CAL standards and is the result recorded on the QA sheet?			
7a) Are the results recorded in LIMS?			
8) Do the analysts record bench data in a neat and accurate manner?			

PAGE 2 OF FORM 2

		YES	NO	COMMENTS
8a)	**Is all quality assurance data correctly transferred from the Bench/QA sheets into LIMS?**			
9)	Is a calibration verification performed at the correct frequency?			
9a)	Documented to LIMS?			
10)	Is a prepped performance check (LCS) analyzed once per run or as required by the QAP? (eg one per set of 10)			
11)	Is a prepped sample spike (SPI02) analyzed with each run or as required by the QAP? (eg one per set of 10)			
12)	Is a prepped sample replicate analyzed (or a duplicate spike?) at the appropriate frequency according to the QAP? (eg one per set of 10)			
13)	If any problems occur, has corrective action been taken and documented?			
	Comments: _____			
14)	Is a calibration verification solution analyzed at the end of each run?			
15)	Is the method of internal standards used for GC/MS?			
16)	List internal standards used for VOA. (Attach copy of report)			
	Are these correct for the method?			
17)	List internal standards used for SVOA's. (attach copy of report)			
	Are these correct for the method?			
18)	Are surrogates properly analyzed and reported? Are surrogates within CLP acceptance ranges?			

PAGE 3 OF FORM 2

		YES	NO	COMMENTS
19)	Are standard recoveries correctly calculated? Are spike recoveries correctly calculated? Are duplicate recoveries correctly calculated? Are they all documented in LIMS?			
20)	Does a manual recalculation agree with concentrations otherwise calculated and/or reported? (ie verify electronic integrator performing and correct peaks were chosen for GC, GC/MS)			
21)	For GC/MS, are unknowns (non-target compounds) correctly searched in the NBS library and documented as present with an estimated concentration?			
22)	For ICP, are interelement interference check solutions properly analyzed and documented prior to each run?			
23)	Have detection limits been empirically determined according to 40CFR136 for the analytes determined?			
24)	Are standards correctly Labelled? Logged & documented?			
25)	Are instrument operating manuals readily available?			
26)	Are data acceptance criteria developed and used for Blanks? Duplicates? Verification standards? Spikes?			
27)	Are instrument maintenance logs in place and maintained?			
28)	Is the mercury analyzer operational and well maintained (i.e. properly vented)?			
29)	Is preventive maintenance applied and documented?			
30)	Are data calculations spot-checked by a second person? Does this person initial these checked calculations?			

PAGE 4 OF FORM 2

		YES	NO	COMMENTS
31)	Do supervisory personnel review bench sheets and initial them?			
32)	Do records indicate that corrective action was taken as necessary?			
33)	Has a cooperative attitude been displayed?			
34)	Has corrective action indicated during previous visits been implemented?			
35)	Are extractions/digestion performed within holding times?			
36)	Are analyses performed within holding times?			
37)	Are sample preparation methods correct?			
38)	Is a background corrector properly used? (AA, GFAA, ICP)			
39)	Is an approved methodology used for the runs being examined?			
40)	Have acceptance criteria for start-up QC been met?			
41)	Do instrument outputs (strip charts, print-outs, bench sheets, etc.) agree with what is in the final report?			
42)	Are labs data validation procedures adequate?			
43)	Based upon blank, standard, spike and duplicate data, are goals of data accuracy and precision being met?			
44)	Is the method of standard additions being used correctly for HGA analyses?			
45)	Is analytical sensitivity adequate?			
46)	Are instrument guidelines and/or acceptance criteria used at the bench and at data review which determine the acceptability and reportability of data?			
47)	Are Blanks carried through entire process?			
48)	Are desiccants changed and documented?			

PAGE 5 OF FORM 2

		YES	NO	COMMENTS
49)	Are TOC, TOX and BTU instrument logs current?			
50)	Are normalities of titrants routinely checked?			
51)	Are sufficient cyanide distillation apparatus available to routinely analyze all samples within the required holding period?			

FORM 3

LAB _____

DATE _____

AUDITOR _____

METALS GROUPS

		YES	NO	COMMENTS
1)	Are samples for mercury analysis collected in glass and preserved with HNO_3 and Permanganate?			
2)	Are mercury determinations performed within 28 days of sample collection?			
3)	Are proper sample digestion techniques used and documented?			
4)	Is background correction used a) For all HGA work? b) As required for flame AA work?			
5)	Are correct matrix modifiers used for HGA?			
6)	Is an ionization suppressor used as needed for flame AA?			
7)	For ICP are interelement corrections checked?			
8)	Do prep sets of 10 include proper QA and acceptance criteria?			
9)	Are wavelengths used recorded on bench sheets?			
10)	Are flame/furnace/ICP programs adequate? a) Integration times adequate? b) Furnace temperature programs correct? c) Sample aliquot or deposition times adequate?			
11)	Are sensitivity guidelines available at instruments?			

FORM 4

LAB _____

DATE _____

AUDITOR _____

GAS CHROMATOGRAPHY

		YES	NO	COMMENTS
1)	Are samples collected in amber glass bottle with teflon-lined lids?			
2)	Are samples kept at 4°C			
3)	Are samples extracted within 7 days?			
3a)	Analyzed within 40 days?			
4)	Are standards properly documented?			
5)	Are standards prepared fresh regularly?			
6)	Is there a well maintained log, documenting stability of all detectors?			
7)	Are Arochlor 1221 and 1232 standards run at the proper frequency and the data maintained for on-site inspection?			

FORM 5

LAB _____

DATE _____

AUDITOR _____

GC/MS

		YES	NO	COMMENTS
1)	Are samples extracted and/or analyzed within all required holding times?			
2)	Are control limits established and used for CCC and SPCC samples?			
3)	Is QA data properly transferred to LIMS?			
4)	Are Blanks, Spikes and Standards analyzed at the appropriate frequency?			
5)	Is Spike/spike duplicate data being generated?			
6)	Are surrogates properly analyzed with all samples?			
7)	Are surrogate results tabulated?			
8)	Are both 5 and 25 ml purge vessels available and properly used?			
9)	Are correct internal standards being used?			
10)	Is data reviewed prior to issuing final report?			
11)	Has QAO reviewed 2-5% of the runs?			
12)	Are reviewed bench sheets initialed?			
13)	Are all tuning criteria met?			
14)	Is the trap for the purge and trap filled with the proper adsorbent?			

PAGE 2 OF FORM 5

		YES	NO	COMMENTS
15)	Is raw data being archived and documented properly (i.e magnetic tape)?			
16)	Is a split/splitless capillary injector in place?			

APPENDIX H

STANDARD OPERATING PROCEDURE AND DOCUMENTATION OF LABORATORY PERSONNEL TRAINING

It is the responsibility of the Group Leader or designee to conduct preliminary training to insure assimilation of the new employee into the mainstream of analytical methodology at EMS-Heritage.

To assist EMS-Heritage, the employee, and the Group Leader, various training forms are kept in each employee's file.

1. Form One contains the steps taken during the employees first days to accomplish orientation and start training.

2. Form Two contains a checklist, to be completed by each laboratory employee and their group leader to assure familiarity with basic laboratory equipment and technologies.

3. Form Three is a data review sheet containing a check list. The analyst must use during review of their own data.

4. Form Four is provided to document on-going training including in-house training seminars, group meetings, outside seminars, additional classes, accomplishments, etc.

5. The remaining forms include documentation of the employee's training on specific methodologies. At the onset of training, the employees are assigned to a trainer. The employee's trainer is the group leader or his/her designee, who is an experienced and audited chemist for that methodology.

   The first step in the employee's training is the reading of the approved method. Employees will observe and assist their trainer for a period of time dependent on the complexity of the analysis. At such time, as the trainer deems appropriate, training employees will run the analysis independently as the trainer observes and instructs. Information regarding the first run is recorded on the training document. The trainer will continue to review the employee's data and technique until the trainer considers the employee trained. The last step in the training process is the performance audit, to be given by the Group Leader, or designee. The performance audit will cover adherence to method technique, documentations and knowledge of interferences, chemistry, etc. A blind standard may also be issued at this time. Successful completion of a performance audit must occur before analyst may operate independently.

6. Retraining verification will occur formally just prior to each employees winter review, on an annual basis. The verification will occur through one or more of the following mechanisms; a Blind Performance Evaluation sample, a Written Test, or a Performance Audit.

FORM I

NEW EMPLOYEE ORIENTATION CHECK LIST

NAME:_____

DATE OF EMPLOYMENT:_____

POSITION:_____

LAB GROUP:_____

_____ Fill out all necessary forms through the Personnel Department

_____ Get fitted for lab coats through our Purchasing Department

_____ Obtain safety glasses and/or goggles. Prescription wearers should set up an eye appointment to obtain prescription safety glasses.

_____ General tour of facility and introduction to key personnel

_____ Meeting with the QA/QC Office. At this time employee should sign our Signature List and Confidentiality Agreement

_____ Introduction to the LIMS system through the Computer Department. An analyst parameter number should be issued, if appropriate.

_____ Schedule New Employee Orientation through HERITAGE Personnel Department

_____ Safety tour and orientation from Safety Team member

_____ Obtain building entry code from Lab Director with a demonstration and explanation of our security system

_____ Obtain explanation of the following:

Time Cards (How to fill out and where to keep)
Pay Day
Dress Code
Break Time Policy/Smoking Hours
Lunch Hour
Overtime Policy

_____ Obtain copy of the Personnel Manual and Standard Operating Procedures for your respective group, and a job description

Supervisor's Initials_____ Date_____

FORM TWO

NAME: _____

TRAINING CHECKLIST FOR BASIC LABORATORY EQUIPMENT AND TECHNIQUES.

_____ Analytical Balance

_____ Use of and Cleaning Procedure for Pipettes

_____ Fume Hood

_____ Operation of Centrifuge

_____ Waste Solvent Information and Disposal

_____ Use of pH paper

_____ Gas Cylinder Training

_____ Glassware Description and Cleaning S.O.P.

_____ Disposal of Broken Glassware

_____ Water Types and Usages

_____ Sampling a Sample

_____ Cooler Arrangements - Sample and Extract Storage

_____ Tour of Stock Room

_____ Standards and Reagents (Labelling and Storage)

FORM THREE

DATA REVIEW

I. Completeness

- A. Name
- B. Date
- C. Instrument
- D. Units
- E. DL
- F. QA Types
- G. % Recoveries or RSD

II. Accuracy

- A. Spot-check calculations for samples and QA
- B. Are dilutions accounted for?
- C. Are weight/volume factors accounted for?
- D. Are absorbance or results within the linear range?

III. QA

- A. Are all QA requirements met?
- B. Proper frequency and recoveries?
- C. Are QA IDs and true values recorded?
- D. Are cal. curve units, cc, y intercept and slope recorded?

FORM FOUR

ON-GOING TRAINING FORM

NAME: _____

DATE OF EMPLOYMENT: _____

POSITION: _____

LAB GROUP: _____

(Include Date, Topic, Description and Trainer):

EMS HERITAGE- INDIANAPOLIS, INDIANA

Analyst:_____ **Education:**_____

Date Employed:_____ **Prior Experience:**_____ **Page**____**of**____

General Organic Group Starting Date:_____

Analytical Method	Method Referenced	Date Trained	Trained By	Approved	EPA %Recov	Run

Analyst _____ Education _____

Date Employed _____ Prior Experience _____

Metals Group _____ _____

Analytical Method	Method Referenced	Date Trained	Trained By	Approved	EPA % Recovery	Run #
QC, Calculations, Paperwork	NA				NA	NA
General FAA	NA				NA	NA
IL S12 FAA	NA					
PE 2380 FAA	NA					
PE 5100 FAA	NA					
General GFAA	NA				NA	NA
PE 3030 GFAA	NA					
PE 5100 GFAA	NA					
General CVAA	SW846-7470 and EPA 245.1				NA	NA
PE 403 CVAA	"					
PE 2380 CVAA	"					
PE 5100 CVAA	"					
IL S12 CVAA	"					

Analytical Method	Method Referenced	Date Trained	Trained By	Approved	EPA % Recovery	Run #
General ICP IL ICAP-61	EPA 200.7 and and SW846-6010				NA	NA
E.P. Toxicity	SW846-1310				NA	NA
T.C.L.P.	Federal Register				NA	
pH - Water	SW846-9040					
pH - Soil	SW846-9045					
General Sample Prep	NA				NA	NA
ICP, FAA Water Prep	SW846-3005, 3010, EPA 200.0					
GFAA Water Prep	SW846-3020, EPA 200.0					
Extract Preparation	SW846-3010, 3020					
Solid Preparation	SW846-3050					
Oil Prep - Acid Digestion	SW846-3030					
Oil Prep - MIBK Dissolution	SW846-3040					
Hg In Soils Prep	SW846-7471, EPA 245.5					

Analytical Method	Method Referenced	Date Trained	Trained By	Approved	EPA % Recovery	Run #
Cation Exchange Capacity	SW846-9081				NA	
Paint Filter Test	SW846-9095				NA	
Mobile Metals (Oily Waste)	SW846-1330				NA	NA
Glassware	EPA 200.0				NA	NA

CONTINUED TRAINING

Type of Training	Date Completed	Location	Instructor	Comments

TRAINING CHECK LIST - EXTRACTION PREPARATION

AREA OF TRAINING	DATE	TRAINED BY
Read Methods SW846-3010, 3020, EPA 200.0	_____	_____
Sample Volumme	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - T.C.L.P.

AREA OF TRAINING	DATE	TRAINED BY
Read Method - Federal Register		
Purpose of Test		
Extraction Fluid Preparation		
Selecting Representative Sample		
Extractor		
pH Meter Calibration		
Contamination and Safety Hazards		
Filtration of Extract		
Paperwork		
Routine Maintenance		
Test Passed		

ADDITIONAL TRAINING

Troubleshooting _____

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TRAINING CHECK LIST - QC, CALCULATIONS, PAPERWORK

AREA OF TRAINING	DATE	TRAINED BY
Types and Frequency of QC Samples		
Acceptance Criteria For QC Samples		
Instrument Log Books		
Reagent Prep Log Book		
Glassware Types		
Sources of PERs		
DL Determinations		
Significant Figures		
Reporting Units		
Linear Regression		
Dilutions		
Reproducibility/Spike Recovery Calculations		
Test Code Organization		
Data Sheet Corrections		
Raw Data ID/Filing		
Rush Samples		
Test Passed		

ADDITIONAL TRAINING

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TRAINING CHECK LIST - GENERAL GFAA

AREA OF TRAINING	DATE	TRAINED BY
Theory of GFAA		
STPF System		
Tube Installation		
Inert Gas/Stop Gas		
EDL Operation		
Hazards		
Contamination Sources		
Common Interferences		
Zeeman Background Correction		
Matrix Modifiers		
Characteristic Mass		
Calibration		
Theory of Standard Additions		
GFAA Quantitation		
Peak Height vs. Peak Area		
Paperwork		
Test Passed		

ADDITIONAL TRAINING

Trouble Shooting _____

End Cone Installation _____

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TRAINING CHECK LIST - GENERAL ICP

AREA OF TRAINING	DATE	TRAINED BY
Read Method EPA 200.7		
Principles of ICP		
Simultaneous/Sequential		
Linear Range		
Interferences		
a. Chemical		
b. Physical		
c. Spectral		
Background Correction		
Interfering Element Corrections		
Multielement Standards		
Paperwork		
Test Passed		

ADDITIONAL TRAINING

TRAINING CHECK LIST - PE 5100 CVAA

AREA OF TRAINING	DATE	TRAINED BY
Computer Functions/Log In		
Recalling CVAA Program		
Instrument Set Up		
CVAA Apparatus Set Up		
Cell Alignment		
Energy Maximization		
Sample Analysis		
Leachate Analysis		
Routine Maintenance		
Instrument Shutdown		
General CVAA Test Passed		

ADDITIONAL TRAINING

TRAINING CHECK LIST - pH - WATER

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-9040		
Meter Calibration		
Sample Analysis		
Electrode Cleaning		
Electrode Storage		
Paperwork		
Test Passed		

ADDITIONAL TRAINING

Troubleshooting _____

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TRAINING CHECK LIST - GLASSWARE

AREA OF TRAINING	DATE	TRAINED BY
Read Glassware Washing Procedure		
Principles of Steps Involved		
Contamination		
Reagent Preparation		
Acid Bath Use and Cleaning		
Pipet Washing		
Hg Bottles		
Safety Hazards		
Test Passed		

ADDITIONAL TRAINING

TRAINING CHECK LIST - PE 3030 GFAA

AREA OF TRAINING	DATE	TRAINED BY
Keyboard Functions		
Instrument Settings		
Load Floppy Disks		
User Index		
File Storage		
Energy Maximization		
Premix Method		
Autosampler/Tip Alignment		
Sample Analysis		
Printer Operation		
Instrument Shutdown		
Routine Maintenance		
Test Passed		

ADDITIONAL TRAINING

Write GFAA Programs _____

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TRAINING CHECK LIST - PE 5100 FAA

AREA OF TRAINING	DATE	TRAINED BY
Computer Functions/Log In		
Recalling FAA Programs		
Energy Maximization		
D_2 Lamp Alignment		
Burner Alignment		
Gas Box/Ignition		
Absorbance Maximization		
Nitrous Oxide Procedures		
Atomic Emission Procedures		
Calibration		
Sample Analysis		
Instrument Shutdown		
Routine Maintenance		
Test Passed		

ADDITIONAL TRAINING

D_2 Lamp Replacement _____

Data File Management _____

Automated Runs _____

Multielement Runs _____

Write FAA Programs _____

_____

TRAINING CHECK LIST - PE 2380 FAA

AREA OF TRAINING	DATE	TRAINED BY
Keyboard Functions		
Instrument Settings		
Energy Maximization		
D_2 Lamp Alignment		
D_2 Energy Setting		
Burner Alignment		
Gas Box/Ignition		
Absorbance Maximization		
Nitrous Oxide Procedures		
Atomic Emission Procedures		
Calibration		
Sample Analysis		
Instrument Shutdown		
Routine Maintenance		
Test Passed		

ADDITIONAL TRAINING

D_2 Lamp Replacement _____

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TRAINING CHECK LIST - GENERAL FAA

AREA OF TRAINING	DATE	TRAINED BY
Principles of Atomic Absorption and Emission		
Single Beam/Double Beam		
Modulation		
D_2 Background Correction		
Matrix Modifiers		
Flow Spoiler/Impact Bead		
Hollow Cathode Lamps		
Sample Introduction System		
Air-Acetylene/Nitrous Oxide-Acetylene Flames		
Common Interferences		
Theory of Standard Additions		
Paperwork		
Test Passed		

ADDITIONAL TRAINING

Troubleshooting _____

TRAINING CHECK LIST - OIL PREPARATION (ACID DIGESTION)

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-3030	_____	_____
Modifications in SW846-3030	_____	_____
Sample Preparation	_____	_____
General Prep Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - Hg IN SOILS PREPARATION

AREA OF TRAINING	DATE	TRAINED BY
Read Methods SW846-7471, EPA 245.5	_____	_____
Aqua Regia Preparation	_____	_____
Sample Preparation	_____	_____
Safety Hazards	_____	_____
Sample Digestion	_____	_____
General Prep Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - CATION EXCHANGE CAPACITY

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-9081		
Reagent Preparation		
Centrifuge		
Calculations		
Paperwork		
General Prep Test Passed		

ADDITIONAL TRAINING

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TRAINING CHECK LIST - PAINT FILTER TEST

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-9095	_____	_____
Sample Size	_____	_____
Duration of Test	_____	_____
Paperwork	_____	_____
Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - MOBILE METALS (OILY WASTE)

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-1330	_____	_____
Soxhlet Extraction	_____	_____
Preparation of Solvent Phase	_____	_____
Calculations	_____	_____
Safety Hazards	_____	_____
Paperwork	_____	_____
Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - SOLID PREPARATION

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-3050	_____	_____
Sample Preparation	_____	_____
GFAA vs. ICP, FAA Prep	_____	_____
General Prep Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - GFAA WATER PREPARATION

AREA OF TRAINING	DATE	TRAINED BY
Read Methods SW846-3020, EPA 200.0	_____	_____
Sample Volume/Dilution	_____	_____
Total, Dissolved, and Suspended Metals	_____	_____
Sample Preparation	_____	_____
General Prep Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - GENERAL SAMPLE PREPARATION

AREA OF TRAINING	DATE	TRAINED BY
Principles of Sample Preparation	_____	_____
Multiphase Samples	_____	_____
Representative Samples	_____	_____
GFAA/ICP, FAA Preps	_____	_____
Glassware Types	_____	_____
Contamination Sources	_____	_____
Spikes and Duplicates	_____	_____
Safety Hazards	_____	_____
EMS Prep Codes	_____	_____
Paper Work	_____	_____
Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - pH - SOIL

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-9045		
Meter Calibration		
Sample Analysis		
Electrode Cleaning		
Electrode Storage		
Paperwork		
Test Passed		

ADDITIONAL TRAINING

Troubleshooting

TRAINING CHECK LIST - E.P. TOXICITY

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-1310		
Purpose of Test		
Selecting Representative Sample		
Extractor		
pH Meter Calibration		
Contamination and Safety Hazards		
Filtration of Extract		
Paperwork		
Routine Maintenance		
Test Passed		

ADDITIONAL TRAINING

Troubleshooting _____

TRAINING CHECK LIST - IL S12 CVAA

AREA OF TRAINING	DATE	TRAINED BY
Instrument Set Up	_____	_____
CVAA Apparatus Set Up	_____	_____
Cell Alignment	_____	_____
Energy Maximization	_____	_____
Sample Analysis	_____	_____
Leachate Analysis	_____	_____
Routine Maintenance	_____	_____
General CVAA Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - OIL PREPARATION (MIBK DISSOLUTION)

AREA OF TRAINING	DATE	TRAINED BY
Read Method SW846-3040	_____	_____
Limitations of Method	_____	_____
Sample Preparation	_____	_____
Safety Hazards	_____	_____
General Prep Test Passed	_____	_____
Dissolution Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING CHECK LIST - PE 2380 CVAA

AREA OF TRAINING	DATE	TRAINED BY
Instrument Set Up		
CVAA Apparatus Set Up		
Cell Alignment		
Energy Maximization		
Sample Analysis		
Leachate Analysis		
Routine Maintenance		
General CVAA Test Passed		

ADDITIONAL TRAINING

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TRAINING CHECK LIST - PE 403 CVAA

AREA OF TRAINING	DATE	TRAINED BY
Instrument Set Up	_____	_____
CVAA Apparatus Set Up	_____	_____
Cell Alignment	_____	_____
Energy Maximization	_____	_____
Sample Analysis	_____	_____
Leachate Analysis	_____	_____
Routine Maintenance	_____	_____
General CVAA Test Passed	_____	_____

ADDITIONAL TRAINING

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TRAINING DOCUMENT

ANALYST_____ DATE HIRED_____

TEST_____ DATE_____ TRAINER_____

METHOD READ_____ 1ST RUN_____ % RECOVERY_____

AUDIT_____ BLIND STD._____

TEST_____ DATE_____ TRAINER_____

METHOD READ_____ 1ST RUN_____ % RECOVERY_____

AUDIT_____ BLIND STD._____

TEST_____ DATE_____ TRAINER_____

METHOD READ_____ 1ST RUN_____ % RECOVERY_____

AUDIT_____ BLIND STD._____

TEST_____ DATE_____ TRAINER_____

METHOD READ_____ 1ST RUN_____ % RECOVERY_____

AUDIT_____ BLIND STD._____

MASS SPEC TRAINING CHECKLIST - SAMPLE PREP

VOLATILES

AREA OF TRAINING	DATE	TRAINED BY
Soils		
ZHE		
FID Screening		

SEMI-VOLATILES

Water		
QC		
Emulsions		
Soil-Sonication		
QC		
Soil-Soxhlet		
QC		
Oil		
Making Surrogate		
Making Spike Solution		

ADDITIONAL TRAINING

MASS SPEC TRAINING CHECKLIST - LOGBOOKS

AREA OF TRAINING	DATE	TRAINED BY
Corrections		
Class S Weights		
Soil Prep		
Standard Prep		
Instrument; Maintenance		
Instrument; Run Sequences		

ADDITIONAL TRAINING

MASS SPEC TRAINING CHECKLIST - SAMPLE ANALYSIS

AREA OF TRAINING	DATE	TRAINED BY

Methods

Read SW846-8240/8270		
Read EPA 624/625		
Read SDWA 524/525		

General

Glassware Cleaning		
Tuning		

QC Frequency, Requirements and Preparation

Tune Check		
Calibration		
Cal. Checks		
Blanks		
MS/MSD		
ISTD and Surr		

Calculations

Response Factor		
Concentration		
Dilutions		
Units		
Sig Figs & Rounding		

AREA OF TRAINING	DATE	TRAINED BY
Data Review		
IDFILE Update		
FORMS		
Cover Sheet		
Initial Calibration		
Peak Clipping		

ADDITIONAL TRAINING

MASS SPEC TRAINING CHECKLIST - GENERAL MAINTENANCE

AREA OF TRAINING	DATE	TRAINED BY
Column Replacement		
Capillary		
Packed		
Tank Changing		
Changing Septum and Liner		
Cleaning the Source- including venting and pumpdown	Initial training	
MS	solo	
MSD	solo	
Cleaning the Quadrupole		
Replacing the Multiplier		
Cleaning and/or Replacing Jet Separator		
Changing trap		
Checking Tekmar flows		

ADDITIONAL TRAINING

MASS SPEC TRAINING CHECKLIST - SYSTEM MAINTENANCE

AREA OF TRAINING	DATE	TRAINED BY
Magnetic Tape		
Changing Tapes (how and when)		
Retrieving from Tape (Present and Past Tapes)		
Archiving		
Computer		
Rebooting		
Purging Files		

ADDITIONAL TRAINING

EMS Laboratories, Indianapolis IN

Pre-Employment Resources Data

NAME:_____

DATE OF EMPLOYMENT:_____

List of previous applicable work experience:_____

List of previous applicable academic training - both institutional and work-shop:_____

List any additional information:_____

Date form completed:_____

TRAINING DOCUMENT - PAPERWORK AND LOG BOOKS

The trainer should explain where each of the following can be found. Also the use and the purpose of each should be explained.

AREA OF TRAINING	DATE	TRAINED BY
CALCULATION FORMS:		
Prep/Bench sheets		
Calculating sheets		
Cover sheets		
Surrogate Recovery forms		
Blank-QC forms		
Run sheets		
Order sheet log book		
Response factor log book		
Concentration/Dilution log		
Verbal Result log		
Report packet forms		
OTHER LOG BOOKS:		
Log of Logs		
Standards log book		
Standards verification log		
Gases log book		
Verification log for repipeters and balances		
Refrigeration temperature log		
Extract log		
Instrument maintenance log		
Power Failure log		
Report Packet log		
Computer Tape log		
Log of Vaulted data		
OTHERS:		
Worklists		
ER forms		
Over time Forms		
Methods Manuals and SOPs		
Instrument Manuals		
Computer Manuals		

The trainer should explain the use and/or the purpose of each of the following.

AREA OF TRAINING	DATE	TRAINED BY
GLASSWARE:		
Identification of glassware		
Disposal of broken glassware		
Read glassware cleaning procedure		
Washing extraction glassware		
Washing microglassware		
Pipet washing		
Washing Herbicide glassware		
Safety hazards		
PREPARATION OF FLORISIL COLUMNS:		
Read procedure		
Difference between "jumbo" and 5 1/4" columns		
Storage of florisil, pipets, silica gel and glass wool		
Preparartion of florisil columns		
PREPARATION OF ALUMINA COLUMNS:		
Read procedure		
Storage of alumina, pipets and glasswool		
Deactivation - to activity III alumina		
Alumina verification		
Preparation of Alumina columns		
PREPARATION OF SODIUM SULFATE		
Purpose for baking		
Storage of sodium sulfate		
Use of the muffle furnace		
Dessicator/desicant		
Storage of sodium sulfate after baking		
STANDARDS TRAYS:		
Use of different standards		
Storage of the standards and the standards trays		
Organization of the standards refrigerator		
Organization of the ASV trays		
Filling the ASVs		

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P229.1/P232.1	PCBs in Oil	SW846-3580

Difference between a "clean" and "waste" oil _____

Clean Oil Prep
Trainer _____ Date of training _____
Method read _____

Prep Book _____

Standard	Run	% Recovery	Appoval by:
BLA			

Waste Oil Prep
Trainer _____ Date of training _____
Method read _____
Prep Book _____

Standard	Run	% Recovery	Appoval by:
BLA			

Acetone Preps
Trainer _____ Date of training _____
Method read _____
Prep Book _____

Standard	Run	% Recovery	Appoval by:
BLA			

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P231.1	PCBs in Soils	SW846-3550

Soil Prep

Trainer _____ Date of training _____
Method read _____
Prep Book _____

Standard	Run	% Recovery	Appoval by:
BLA			

Swipe Prep

Trainer _____ Date of training _____
Method read _____
Prep Book _____

Standard	Run	% Recovery	Appoval by:
BLA			

Air Sample Prep

Trainer _____ Date of training _____
Method read _____
Prep Book _____

Standard	Run	% Recovery	Appoval by:
BLA			

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P235.1	PCBs in Soils/soxhlet	SW846-3550

Soxhlet Prep

Trainer _____ Date of training _____
Method read _____

Prep Book _____
Soxhlet Glassware storage _____
Thimble storage _____
Using the continuous extractor _____

Standard	Run	% Recovery	Appoval by:
BLA			

PREP	DESCRIPTION	Method
P230.1	PCBs in Water/sep.funnel extr	SW846-3510

Water extractions - PCB only
Trainer _____ Date of training _____
Method read _____

Prep Book _____
KD Glassware _____
Salt & filter paper filters _____
Concentrating the sample _____

Standard	Run	% Recovery	Appoval by:
BLA			

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P233.1	PCB/Pests in Water/sep. funnel extr.	SW846-3510

Water extraction - PCB/Pest

Trainer _____ Date of training _____
Method read _____

Prep Book _____
KD Glassware _____
Sodium sulfate & Glass wool filters _____
Concentrating the sample _____

Standard	Run	% Recovery	Appoval by:
BLA			

P236.1	PCB/Pests in Soil/SPP!	SW846-3550

SPP! extractions - PCB/Pests

Trainer _____ Date of training _____
Method read _____

Prep Book _____
Using the ultrasonic probe _____
Concentrating the sample _____
Splitting the extract for semi-vols _____
Dilutions for GPC clean ups _____
GPC clean up training on page 8

Standard	Run	% Recovery	Appoval by:
BLA			

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

GPC training - The trainer should explain the purpose of the GPC clean up and the principle of the clean up. The trainer should also give an explantion of the flow through the system and the purpose of the various solvents.

Trainer _____ Date of training _____
Method read _____

AREA OF TRAINING

Pre-run:

_____ Reservoirs
_____ Air supply
_____ Vacuum pump
_____ Instrument settings & Run parameters
_____ Checking sample pump flow rate

Starting the run:

_____ Filtering samples
_____ Loading input vials
_____ Loading sample extract vials - crimp cap
_____ Starting the instrument

Shut down - at completion of the run:

_____ Vacuum & sample pump - shut off automatically
_____ Reservoir switch to fill & reservoirs removed
_____ Air tank turned off

Others (put date of training):

_____ Calibration
_____ Repacking the column
_____ Back flushing the valves

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P238.1	Herbicides in Water/SPE	SW846-3590
P201.4	Diazomethane Derivitization	SW846-8150

SPE extractions - Herbicides in Water
Trainer _____ Date of training _____
Method read _____

Prep Book _____
Using the SPE manifold _____
SPE Cartridges _____
Diazomethane derivatization _____
Include all safety precations to be taken
Calibration Standard prep + log in

Standard	Run	% Recovery	Appoval by:
BLA			

Herbicides in Soils/Solids
Trainer _____ Date of training _____
Method read _____

Prep Book _____
Diazomethane derivatization _____
Include all safety precations to be taken
Calibration Std. prep + log in

Standard	Run	% Recovery	Appoval by:
BLA			

Herbicide Waters / Ether extraction

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
	Herbicides in Water	SW846-3590
P201.4	Diazomethane Derivitization	SW846-8150

Liquid/liquid extractions - Herbicides in Water
Trainer _____ Date of training _____
Method read _____

Prep Book _____
Preparation of Reagents _____
Acid washed Glassware _____
Acid washed Sodium sulfate & Glass wool _____
Concentrating the sample _____
Diazomethane derivatization _____
Include all safety precations to be taken

Standard	Run	% Recovery	Appoval by:
BLA _____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P222.1	PCB or MCB extraction	EPA 608

This test should be used for Water extractions - only! It is used for CWA regulation. On rare occasions this test may be used for a sludge that may need to pass the CWA regulation. These prep methods are similar to the SW846 methods. If the employee is approved for the SW846 method they may also be approved for the EPA method if the differences between the methods are completely understood.

Water extractions - PCB only
Trainer _____ Date of training _____
Method read _____

Prep Book _____
KD Glassware _____
Salt & filter paper filters _____
Concentrating the sample _____

Standard	Run	% Recovery	Appoval by:
BLA			

Soil extractions
Trainer _____ Date of training _____
Method read _____

Prep Book _____

Standard	Run	% Recovery	Appoval by:
BLA			

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P223.1	PCB/Pest extraction	EPA 608

This test should be used for Water extractions - only! It is used for CWA regulation. On rare occasions this test may be used for a sludge that may need to pass the CWA regulation. These prep methods are similar to the SW846 methods. If the employee is approved for the SW846 method they may also be approved for the EPA method if the differences between the methods are completely understood.

Water extraction
Prep Books _____
KD Glassware _____
Sodium sulfate & Glass wool filters _____
Concentrating the sample _____

Trainer _____ Date of training _____
Method read _____

Standard	Run	% Recovery	Appoval by:
BLA			

Soil extractions
Trainer _____ Date of training _____
Method read _____

Standard	Run	% Recovery	Appoval by:
BLA			

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P903.0	PCB/Pest extraction	CLPSOW 2/88
P903.1	PCB/Pest extraction	CLPSOW 2/88

These tests are used for extracting samples under the CLP regulation. Prep P903.0 is used for USEPA CLP work only, and should be used only by analysts approved for EPA work. Prep P903.1 is used for submitters other than the USEPA who require CLP protocol. Both of these preps must, strictly, follow the method.

Water extraction - PCB/Pest
Prep Books _____
KD Glassware _____
Sodium sulfate & Glass wool filters _____
Concentrating the sample _____

Trainer _____ Date of training _____
Method read _____

Standard	Run	% Recovery	Appoval by:
BLA			

Soil/SPP!
Prep book _____
Using the ultrasonic probe _____
Concentrating the sample _____
Splitting the extract for semi-vols _____
Dilutions for GPC clean ups _____
GPC clean up training on page 9

SPP! extractions - PCB/Pests
Trainer _____ Date of training _____
Method read _____

Standard	Run	% Recovery	Appoval by:
BLA			

TRAINING DOCUMENT - GC/ECD PREP METHODS

ANALYST _____
DATE HIRED _____

PREP	DESCRIPTION	Method
P425.1	EDB/DBCP - microextractions	EPA 504

ECB/DBCP
Prep book _____
Storage of 40 mL VOA vials _____
Storage of baked Sodium chloride _____
Preparation of the Cal. Stds. _____

Trainer _____ Date of training _____
Method read _____

Standard	Run	% Recovery	Appoval by:
BLA			

ANALYST _____
DATE HIRED _____

Computer training
Trainer _____
SOP read _____

TRAINING CHECK LIST - Each of the following should be explained by the trainer, and understood before checking off. Check off by putting date of training.

Identification of the instruments and devices:

Channel	Instrument ID	Device	LU
1	GC_ECD_1 (1)	T1	1
2	GC_ECD_2 (2)	T2	58
3	GC_ECD_3 (3)	T3	59
4	GC_ECD_4 (4)	T4	60
5	GC_ECD_5 (5)	T5	50
6	GC_ECD_6 (6)	L1	51
7	GC_ECD_7 (7)	L2	52
8	GC_ECD_8 (8)	L3	53
PID	PID_9 (9)	L5	55
ELCD	ELCD_10 (10)	L4	54
FID	FID (11)	L6	56
NPD	NPD (12)	L7	57

Logging onto the computer station
_____ logon code and working directory established
_____ password established
_____ using LDS, CI and LPLOT

Preparing a run for the instrument
_____ Selecting the instrument
_____ Preparing a new sequence
_____ Listing the sequence
_____ Assigning the sequence to the instrument

Copying files
_____ Copying a sequence
_____ Copying a method

Modifying a sequence
_____ Freeing the sequence before modifying
_____ Using the modify sequence command
_____ Modifying the assigned method
_____ Modifying the sample list
_____ Modifying the result files

ANALYST _____
DATE HIRED _____

Computer training
Trainer _____
SOP read _____

TRAINING CHECK LIST - Each of the following should be explained by the trainer, and understood before checking off. Check off by putting date of training.

Modifying a method
_____ Modifying the timed events table
_____ Modifying the run time
_____ Modifying the plot scale
_____ Modifying the output device
_____ Modifying the data input - ie: minimum area and threshold

Unlocking a locked file
_____ Running the CI mode
_____ Reseting a file
_____ Unlocking a file

Other CI commands
_____ Up a downed device
_____ Stopping the reanalysis of a sequence
_____ Checking the system status with IO listing

Archiving files
_____ When to archive
_____ Initializing storage tapes
_____ Directory listing of files
_____ Using the archive utility

Purging files
NOTE: Do <u>not</u> purge any files without asking first!!
_____ When to purge
_____ What files can be purged
_____ Using the purge utility

Note: These method and sequence files are set up for the GC/ECDs and should <u>never</u> be purged.
METHODS:
PCB1,PCB2,PCB3,PCB4,PCB5, and PCB6
CLP1,CLP2,CLP3,CLP4,CLP5, and CLP6
Sequences:
RECAL1 AND RECAL2

Approved by _____

TRAINING DOCUMENT - GC/ECD CALCULATIONS

ANALYST _____
DATE HIRED _____

PCB calculations - Daily Run
Trainer _____
SOP read _____

TRAINING CHECK LIST - Each of the following should be explained by the trainer, and understood before checking off. Check off by putting date of training.

_____ Run order & QC requirements
_____ Location of calculating forms, run forms, cover sheets & DCB recovery forms
_____ Identification of Aroclors
_____ Identification of baseline problems and baseline modifications (using the computer)
_____ Calculation of response factors
_____ Calculation of the % RSD (linearity)
_____ Calculation of the %D (between beginning & ending standards)
_____ Calculation of extract concentration
_____ Filling out the run sheets
_____ Calculation of the sample result including any dilution factors
_____ Calculation of the Standard recovery
_____ Calculation of the Spike recovery
_____ Calculation of the Dual Purpose Spike (DPS) % recovery and the % replicability
_____ Calculation of the % recovery for the RCS (ICV02)
_____ Calculation of the % recovery for the CCV (ending Medium)

First Run
Date _____
Channel _____
Run Number _____

Reviewed by _____
Comments _____
_____
_____
_____

Approved by _____

TRAINING DOCUMENT - GC/ECD CALCULATIONS

ANALYST _____
DATE HIRED _____

Herbicide calculations
Trainer _____
SOP read _____

TRAINING CHECK LIST - Each of the following should be explained by the trainer, and understood before checking off. Check off by putting date of training.

_____ Run order & QC requirements
_____ Location of calculating forms & run forms
_____ Identification of the Herbicides
_____ Calculation of the retention time windows
_____ Identification of baseline problems and baseline modifications (using the computer)
_____ Calculation of response factors
_____ Calculation of the % RSD (linearity)
_____ Calculation of the %D (between beginning & ending standards)
_____ Calculation of extract concentration
_____ Filling out the run sheets
_____ Calculation of the sample result including any dilution factors
_____ Calculation of the Standard recovery
_____ Calculation of the Spike recovery
_____ Calculation of the Dual Purpose Spike (DPS) % recovery and the % replicability
_____ Calculation of the % recovery for the RCS (ICV02)
_____ Calculation of the % recovery for the CCV (ending Medium)
_____ Second column confirmation of the herbicides
Packet + Forms if needed

First Run
Date _____
Channel _____
Run Number _____

Reviewed by _____
Comments _____
_____
_____
_____

Approved by _____

TRAINING DOCUMENT - GC/ECD CALCULATIONS

ANALYST _____
DATE HIRED _____

PCB/Pest calculations
Trainer _____
SOP read _____

TRAINING CHECK LIST - Each of the following should be explained by the trainer, and understood before checking off. Check off by putting date of training.

_____ Run order & QC requirements
_____ Location of calculating forms, run forms & QC forms
_____ Identification of Pesticides and Aroclors
_____ Calculation of the retention time windows
_____ Identification of baseline problems and baseline modifications (using the computer)
_____ Calculation of response factors
_____ Calculation of the % RSD (linearity)
_____ Calculation of the %D (between beginning & ending standards)
_____ Calculation of extract concentration - including computerized calculations for the pesticides
_____ Filling out the run sheets
_____ Calculation of the sample result including any dilution factors
_____ Calculation of the Standard recovery
_____ Calculation of the Spike recovery
_____ Calculation of the Dual Purpose Spike (DPS) % recovery and the % replicability
_____ Calculation of the % recovery for the RCS (ICV02)
_____ Calculation of the % recovery for the CCV (ending Medium)
_____ Second column confirmation of pesticides and PCBs
Packet + For_

First Run
Date _____
Channel _____
Run Number _____

Reviewed by _____
Comments _____
_____
_____
_____

Approved by _____

TRAINING DOCUMENT - GC/ECD CALCULATIONS

ANALYST _____
DATE HIRED _____

EDB/DBCP calculations
Trainer _____
SOP read _____

TRAINING CHECK LIST - Each of the following should be explained by the trainer, and understood before checking off. Check off by putting date of training.

_____ Run order & QC requirements
_____ Location of calculating forms & run forms
_____ Identification of EDB & DBCP
_____ Calculation of the retention time windows
_____ Identification of baseline problems and baseline modifications (using the computer)
_____ Calculation of the Cal Standard concentrations
_____ Calculation of response factors
_____ Calculation of the % RSD (linearity)
_____ Calculation of the %D (between beginning & ending standards)
_____ Calculation of extract concentration
_____ Filling out the run sheets
_____ Calculation of the sample result including any dilution factors
_____ Calculation of the Standard recovery
_____ Calculation of the Spike recovery
_____ Calculation of the Dual Purpose Spike (DPS) % recovery and the % replicability
_____ Calculation of the % recovery for the RCS (ICV02)
_____ Calculation of the % recovery for the CCV (ending Medium)
_____ Second column confirmation of EDB & DBCP

First Run
Date _____
Channel _____
Run Number _____

Reviewed by _____
Comments _____
_____
_____
_____

Approved by _____

TRAINING DOCUMENT - GC/ECD INSTUMETNATION

ANALYST _____
DATE HIRED _____

Trainer _____
SOP read _____

TRAINING CHECK LIST - Each of the following should be explained by the trainer, and understood before checking off. Check off by putting date of training.

Starting a Run
Trainer _____
SOP read _____

_____ Checking the paper - integrators and printers
_____ Checking the rinse bottles
_____ Loading the autosampler trays
_____ Autosampler control on the 5880 - starting the autosampler program for a single channel run
_____ Autosampler control on the 5880 - starting the autosampler program for a dual channel run
_____ Autosampler control on the 5890
_____ Starting the autosequence on the 5890

Instrument maintenance - 5880
Trainer _____ Approved by _____
SOP read _____

_____ Changing the syringe
_____ Septa and liner change
_____ Checking flows
_____ Sylonizing the injection ports
_____ Replacing a column
_____ Replacing the chemical filters
_____ Replacing the detector

Instrument maintenance - 5890
Trainer _____ Approved by _____
SOP read _____

_____ Changing the syringe
_____ Septa and liner change
_____ Checking flows
_____ Sylonizing the injection ports
_____ Replacing a column
_____ Replacing the chemical filters
_____ Replacing the detector

TRAINING DOCUMENT
Recertification on Prep Methods

ANALYST _____
DATE HIRED _____

Date of Recert.	Test Code	Test Method	Test score[1] Std. Recovery[2]	Approved by

[1]Tests are based on the procedures as listed in the method

[2]Standard are given as blind standards. These standards are to be prepared by the group leader.

EMS HERITAGE LABORATORIES, INC.
7910 West Morris Street
Indianapolis, Indiana 46231
1-317-243-0811
FAX 317/486-5095

1992 UPDATE SERVICE

for the
Comprehensive Quality Assurance Plan

EMS Heritage Laboratories, Inc. greatly appreciates an opportunity to serve your analytical needs. If you would like revision(s) and/or update(s) of the Comprehensive Quality Assurance Plan, please fill out the form below and send to Document Control Officer. You will receive any changes or updates to the material contained in the Comprehensive Quality Assurance Plan that occur in the upcoming year. Don't delay!!!

Comp. QAP No. _____
(Please use Comp. QAP Copy Number)

Title _____

Company _____

Address _____

_____

_____

Phone No. _____

Send to: Document Control Officer
EMS Heritage Laboratories, Inc.
7910 West Morris Street
Indianapolis, Indiana 46231
Attn: Ramona Eaton

HERITAGE REMEDIATION/ENGINEERING, INC.

1319 Marquette Dr.
Romeoville, IL 60441
Phone: 708/378-1600
FAX: 708/378-2200

August 10, 1994

RECEIVED
AUG 1 0 1994
OFFICE OF RCRA
Waste Management Division
U.S. EPA, REGION V

Mr. William Sinnott II
Illinois Environmental Protection Agency
Division of Land Pollution Control - # 33
Permit Section
2200 Churchill Road
P.O. Box 19276
Springfield, Illinois 62794-9276

RECEIVED
RECORD CENTER
SEP 1 2 1994

RE: 0311620007 - Cook County
Heritage Environmental Services
ILD-085349264 - RCRA Permits
Quarterly Progress Report #2
RCRA Facility Investigation
HR/E Job No.: 6702

D.2.1

Dear Mr. Sinnott:

In accordance with the Illinois Environmental Protection Agency's (IEPA) correspondence of February 2, 1994, this report is submitted to summarize the activities conducted through July 31, 1994. This report constitutes the second quarterly report required by the IEPA and encompasses the period from April 1, 1994 to July 31, 1994.

RECEIVED
AUG 1 2 1994
IEPA - BOL
PERMIT SECTION

1. An estimate of the percentage of the investigation completed.

   - 30 percent

2. Summary of activities completed during the reporting period.

   A structural integrity survey of the drum crushing area was conducted by ESCA Consultants on May 6, 1994. On May 16, 1994, HR/E mobilized to the site to conduct the sampling activities. These activities concluded on the 23rd of May 1994. On June 7, 1994, the various sampling locations were surveyed for elevation and location at the site. All samples to be submitted to the laboratory had been submitted and were being analyzed. Laboratory results were to be received by HR/E from the laboratory the week of July 25, 1994.

3. Summaries of all actual or proposed charges to the Work Plan or its implementations.

   In the course of performing the work at the site Item 14 of the IEPA's, February 2, 1994 correspondence, collecting a soil sample from the mid point along the four sides

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of the underground sanitary holding tanks, was not possible. This was due to the presence of water within the UST excavation to within 18-inches of the ground surface. HR/E, therefore, modified the sampling program by collecting a sample of the water and submitting this water sample for analysis.

4. Summaries of all actual or potential problems encountered during the reporting period.

   - Laboratory indicated that the data package would not be available until week of July 25, 1994.

5. Proposal for correcting any problems.

   - Sent letter on July 13, 1994 to IEPA requesting 30-day extension to deliver the RFI Report.

6. Projected work for the next reporting period.

   - Prepare RFI Report.

7. Other information or data as requested in writing by the Agency's DLPC.

   - None.

Should you have any questions or comments, please contact the undersigned at your earliest convenience.

Sincerely,

HERITAGE REMEDIATION/ENGINEERING, INC.

Robert J. Millman, P.E.
Senior Project Engineer

RJM/pw
pc: Robert Garcia
File

Recycled Paper

State of Illinois
ENVIRONMENTAL PROTECTION AGENCY

USEPA

Mary A. Gade, Director

2200 Churchill Road, Springfield, IL 62794-9276

217/524-3300

D.2.1

RECEIVED FEB 16 1994
WMD RCRA
RECORD CENTER

February 2, 1994

Mr. Robert D. Garcia
Heritage Environmental Services, Inc.
Post Office Box 337
Lemont, Illinois 60439

Mr. Frank E. Dalton
Metropolitan Water Reclamation
District of Greater Chicago
100 E. Erie Street
Chicago, Illinois 60611

Re: 0311620007 -- Cook County
Heritage Environmental Services
ILD085349264
Date Received: November 2, 1993
Log No. 128
RCRA Permits

Dear Messrs. Garcia and Dalton:

The RCRA Facility Investigation (RFI) Phase I Workplan for the above-referenced facility submitted by Heritage Remediation/Engineering, Inc. has been reviewed by this Agency. This workplan was submitted in accordance with Condition B.2 of Section IV of the RCRA Part B permit issued for the above-referenced facility (Log No. 128) on March 24, 1993. The workplan is hereby approved subject to the following conditions and modifications:

1. This RFI Phase I Workplan shall be carried out to investigate for possible releases from the following solid waste management units (SWMUs):

SWMU NO.	NAME
1	Truck Transfer Area
2	Outdoor Container Storage Area
3	Van Trailer Container Storage Area
4	Old Aerosol Can Crushing Unit
5	Roll-Off Box Storage Area
6	Drum Crushing Unit
7	Underground Sanitary Waste Holding Tanks
8	Barge Cleaning Transfer Paint
9	Drainage Ditch and Tiles Leading to the Chicago Sanitary and Ship Canal
10	"Other" [background areas]

As stated in Condition B.2 of Section IV of the RCRA Part B Permit issued for the above referenced facility, the purpose of the required Phase I investigation is to "demonstrate conclusively whether or not hazardous wastes or hazardous constituents have been released from the SWMUs identified above." Therefore, the review of this RFI Phase I Workplan was conducted with this goal in mind.

2. RFI Phase I activities must be completed by August 1, 1994. When Phase I is complete, the owner or operator must submit to the Agency certification both by a responsible officer of the owner or operator and by an independent registered professional engineer that the facility completed Phase I in accordance with the specifications in the approved RFI Phase I workplan. In addition, a certification statement meeting the requirements of 35 IAC 702.126 must be provided by a responsible officer of the laboratory which conducted the chemical analyses that the requirements of this letter were met during the chemical analyses of all samples. This certification must address the applicable sample collection, preservation, handling preparation and analytical requirements set forth in this letter for which the laboratory is responsible. These certifications must be received at this Agency after completing Phase I, or by October 1, 1994. These dates may be extended if Heritage submits information to the Agency indicating that it is attempting to complete the required activities in a timely manner but needs additional time to complete the investigation.

   The attached certification forms must be used. Signatures must meet the requirements of 35 Ill. Adm. Code Section 702.126. The independent engineer should be present at all critical, major points (activities) during the RFI. These might include soil sampling, soil removal, backfilling, final cover placement, etc. The frequency of inspections by the independent engineer must be sufficient to determine the adequacy of each critical activity.

   The Illinois Professional Engineering Act (Ill. Rev. Stat., Ch. 111, par. 5105 et. seq.) requires that any person who practices professional engineering in the State of Illinois or implies that he (she) is a professional engineer must be registered under the Illinois Professional Engineering Act (par. 5101, Section 1). Therefore, any certification or engineering services which are performed for a RFI workplan in the State of Illinois must be done by an Illinois P.E.

   Plans and specifications, designs, drawings, reports, and other documents rendered as professional engineering services, and revisions of the above must be sealed and signed by a professional engineer in accordance with par. 5119, Section 13.1 of the Illinois Professional Engineering Act.

   As part of the certification, to document the RFI Phase I activities at your facility, please submit a Phase I Report and Summary which includes, at a minimum:

   a. The information identified in Condition 14 below regarding the required soil sampling/analysis effort at each SWMU where such an investigation is necessary.

   b. Information which the workplan indicates will be in the report;

   c. A chronological summary of Phase I activities and the cost involved.

d. Color photo documentation of Phase I activities.

e. A description of the qualifications of personnel performing and directing the RFI activities including contractor personnel.

f. A general discussion of the activities which should be carried out as part of Phase 2 of the RCRA Facility Investigation.

The original and two (2) copies of all certifications, logs, or reports which are required to be submitted to the Agency by the facility should be mailed to the following address:

Illinois Environmental Protection Agency
Division of Land Pollution Control -- #33
Permit Section
2200 Churchill Road
Post Office Box 19276
Springfield, Illinois 62794-9276

3. If the Agency determines that implementation of this RFI Workplan fails to satisfy the requirements of Section IV of the RCRA Part B Permit (Log No. 128), the Agency reserves the right to require that additional work be completed to satisfy these requirements. Revisions of RFI Workplans are subject to the appeal provisions of Section 40 of the Illinois Environmental Protection Act.

All soil samples shall be analyzed individually (i.e., no compositing). Analytical procedures shall be conducted in accordance with Test Methods for Evaluating Solid Wastes, Third Edition (SW-846). When a SW-846 (Third Edition) analytical method is specified, all the chemicals listed in the Quantitation Limits Table for that method shall be reported unless specifically exempted in writing by the Agency. Apparent visually contaminated material within a sampling interval shall be included in the sample portion of the interval to be analyzed. To demonstrate a parameter is not present in a sample, analysis results must show a detection limit at least as low as the PQL for that parameter in the third edition of SW-846. For inorganic parameters, the detection limit achieved during the analysis of the TCLP extract must be at least as low as the RCRA Groundwater Detection Limits, as referenced in SW-846 (Third Edition) Volume 1A, pages TWO-29 and TWO-30, Table 2-15.

The following procedure must be utilized in the collection of all required soil samples:

a. The procedures used to collect the soil samples must be sufficient so that all soil encountered is classified in accordance with ASTM Method D-2488.

b. If a drill rig or similar piece of equipment is necessary to collect required soil samples, then:

1. The procedures specified in ASTM Method D-1586 (Split Spoon Sampling) or D-1587 (Shelby Tube Sampling) must be used in collecting the samples.

2. Soil samples must be collected continuously at several locations to provide information regarding the shallow geology of the area where the investigation is being conducted;

c. All soil samples which will be analyzed for volatile organic compounds (VOCs) must be collected in accordance with Attachment 7 of the Agency's RCRA closure plan instructions. If samples to be analyzed for VOCs cannot be collected using this procedure, then the collection technique utilized efforts must be made during the collection of these samples to (1) minimize agitation of the sample being collected and (2) minimize the time the sample is exposed to the air. In addition, the soil must be compacted as it is placed in the sample bottle, to minimize void space in the sample. Furthermore, the sample bottle into which the soil is placed must be filled so that there is no headspace in the top of the bottle.

d. Soil samples not collected explicitly for VOC analysis should be field-screened for the presence of VOCs at all locations where VOCs are a concern;

e. All other soil samples must be collected in accordance with the procedures set forth in SW-846; and

f. When visually discolored or contaminated material exists within an area to be sampled, horizontal placement of sampling locations shall be adjusted to include such visually discolored and/or contaminated areas. Sample size per interval shall be minimized to prevent dilution of any contamination.

4. Quality assurance/quality control procedures which meet the requirements of SW-846 must be implemented during all required sampling/analysis efforts. In addition, sample collection, handling, preservation, preparation and analysis must be conducted in accordance with the procedures set forth in SW-846 and the requirements set forth in this letter.

5. All concrete/asphalt surfaces within the Drum Crushing Unit shall be visually inspected, photographed and any residue adhering to the surface must be removed by scraping and/or brushing. After cleaning the concrete asphalt surfaces, an independent registered professional engineer shall inspect the integrity of the concrete/asphalt surfaces. These surfaces shall be inspected for cracks which penetrate through the concrete/asphalt. In addition, all construction joints must be inspected to ensure they are watertight. This inspection must be carried out in accordance with standards and recommendations of professional/technical entities such as the American Concrete Institute, the Portland Cement

Association, the American Society for Testing and Materials, the American Society of Civil Engineers, etc. which relate to the ability of concrete structures to contain liquids.

The results of this inspection shall be (1) submitted as part of the Phase I RFI report, and (2) certified in accordance with 35 Ill. Adm. Code 702.126 by the engineer. The report must include (1) the results of the inspection, (2) scaled drawings showing the location of all cracks and construction joints observed during the investigation, (3) conclusions reached regarding any cracks or construction joints observed in the areas of concern, (4) justification for the conclusions reached (e.g., information must be provided which indicates that any construction joints in the areas of concern are indeed watertight), and (5) photographs to support the conclusions reached.

If joints, cracks or other defects are found which would potentially allow hazardous waste or hazardous constituents to migrate through the base, then soil samples must be collected from beneath the joint/crack/defect to determine if hazardous waste or hazardous constituents have been released to the underlying soil. This sampling/analysis effort shall be carried out in accordance to the below listed procedures.

a. Samples must be collected from at least one location along each joint or crack that provides a potential for hazardous waste or hazardous constituents to migrate to underlying soil. If the crack/joint is more than approximately 10' long, then samples must be collected from along the crack/joint at approximately 10' intervals. Such locations shall be biased to stained areas or low-lying areas where spills would tend to accumulate.

b. Samples must be from 3"-9" below the backfill/natural soil interface at each location. Collection and analysis of each sample shall be carried out in accordance with the procedures set forth in this letter.

c. Collection and analysis of these samples shall be carried out in accordance with the procedures set forth in this letter.

6. Any equipment, including heavy earth movers or smaller tools, shall be scraped to remove any residue. Following this, the equipment must be steam cleaned and triple rinsed. All residues, wash and rinse water shall be collected and managed as a hazardous waste if analysis of the waste detects the presence of hazardous constituents or it exhibits a characteristic of hazardous waste. In any event the material must be managed as a special waste.

7. If the Agency's DLPC determines, based on the data obtained from the Phase I Workplan activities, that there has been no release of hazardous waste or hazardous constituents to the environment from a SWMU identified in Condition 1 above, then no further investigative action will be

required for that SWMU. If the Agency's DLPC determines, based on the data, that there has been a release of hazardous waste or hazardous constituents to the environment or that the data is inconclusive, the Permittee will be notified by the Agency's DLPC.

8. If Heritage conducts a Phase I investigation which differs from the described above, then it must provide adequate justification in the report required by Condition 2 above for the variances. As stated in Condition 1 above, the Agency feels that the requirements set forth in this letter are necessary to reach a conclusion that there has not been a release from a given SWMU. If the goals of Heritage are somewhat different than this, then there may be justification for varying from the requirements set forth in this letter.

9. The Health and Safety Plan contained in the subject workplan is neither approved nor disapproved. Under the provisions of 29 CFR 1910 (51 FR 15,654, December 19, 1986), cleanup operations must meet the applicable requirements of OSHA's Hazardous Waste Operations and Emergency Response standard. These requirements include hazard communication, medical surveillance, health and safety programs, air monitoring, decontamination and training. General site workers engaged in activities that expose or potentially expose them to hazardous substances must receive a minimum of 40 hours of safety and health training off site plus a minimum of three days of actual field experience under the direct supervision of a trained experienced supervisor. Managers and supervisors at the cleanup site must have at least an additional eight hours of specialized training on managing hazardous waste operations.

10. Reports must be prepared and submitted to the Agency which describe the activities completed each quarter of the calendar year while the Phase I investigation is being carried out. The quarterly reports shall contain at a minimum:

    a. An estimate of the percentage of the investigation completed;

    b. Summary of activities completed during the reporting period;

    c. Summaries of all actual or proposed changes to the Workplan or its implementation;

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

    e. Proposal for correcting any problems;

    f. Projected work for the next reporting period; and

    g. Other information or data as requested in writing by the Agency's DLPC.

11. A quarterly report for the work completed from the date of this letter to March 31, 1994 (the first quarter of the current calendar year during which the required Phase I investigation is taking place) must be submitted to the Agency by May 1, 1994. Subsequent quarterly reports must be submitted in a similar manner until the final Phase I RFI Report is submitted to the Agency.

12. The portion of the final RFI Phase I report documenting the results of the required soil sampling/analysis effort must contain the following information, for each SWMU investigated:

    a. A discussion of (1) the reason for the sampling/analysis effort conducted at each SWMU and (2) the goals of the sampling analysis effort conducted at each SWMU;

    b. A scaled drawing showing the horizontal and vertical location where all soil samples were collected at each SWMU;

    c. Justification for the locations from which soil samples were collected;

    d. A description of the procedures used for:

        1. Sample collection;

        2. Sample preservation;

        3. Chain of custody; and

        4. Decontamination of sampling equipment.

    e. Visual classification of each soil sample collected for analysis;

    f. A discussion of the results of any field screening efforts;

    g. A description of the soil types encountered during the investigation, including scaled cross-sections;

    h. A description of the procedures used to analyze the soil samples, including:

        1. The analytical procedure used, including the procedures, if any, used to prepare the sample for analysis;

        2. Any dilutions made to the original sample;

        3. Any interferences encountered during the analysis of each sample; and

        4. The practical quantitation limit achieved, including justification for reporting PQLs which are above those set forth in SW-846.

i. A description of all quality control/quality assurance analyses conducted, including the analysis of lab blanks, trip blanks and field blanks;

j. A description of all quality assurance/quality control efforts made overall;

k. A summary of all analytical data, including QA/QC results, in tabular form;

l. Copies of the final laboratory sheets which report the results of the analyses, including final sheets reporting quality assurance/quality control data;

m. Colored photographs documenting the sampling effort; and

n. A discussion of the collected data. This discussion should identify those sample locations where contaminants were detected and the concentrations of the contaminants. Conclusions which can be drawn from the information compiled should also be included in this discussion.

13. The collection of only three soil samples to evaluate background levels of contaminants may not provide sufficient data to conduct a meaningful quantitative evaluation. However, the background sampling proposed may provide for a qualitative evaluation of the data. A minimum of ten samples are necessary to conduct a meaningful quantitative evaluation.

14. Rather than collect a sample from the Underground Sanitary Waste Holding Tanks, Heritage should sample from along each of the four sides of these tanks and analyze them in accordance with the requirements of this letter. Each sample location should be the approximate midpoint of each site. The collection/analysis of samples from these four locations should conclusively demonstrate whether or not there has been a release from this SWMU.

Should you have any questions regarding this matter, please contact William T. Sinnott, II at 217/524-3300.

Sincerely,

Douglas W. Clay, P.E.
Hazardous Waste Branch Manager
Permit Section, Bureau of Land

DWC:WTS/mls/sp1030Y/1-8
JKM

Attachments: RFI Phase I Certification
RFI Phase I Laboratory Certification Statement

cc: USEPA Region V -- George Hamper

Certification Statement
Phase I of the RCRA Facility Investigation
Heritage Environmental Services, Inc.
Lemont, Illinois

Log No. B-128

Upon completion of Phase I of the RFI, this statement is to be completed by both a responsible officer of the owner or operator (as defined in 35 IAC 702.126) and by the registered professional engineer overseeing all work associated with the investigation. Submit one copy of the certification with original signatures and three additional copies.

RFI Phase I activities at the facility described in the RFI Phase I Workplan have been completed in accordance with the specifications in the approved RFI Workplan. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

USEPA ID Number	Facility Name
Signature of Owner/Operator Date	Name and Title
Signature of Registered P.E. Date	Name of Registered P.E. and Illinois Registration Number
Mailing Address of P.E.:	Registered P.E.'s Seal:

LWE:WTS/mls/sp1030Y/9

Laboratory Certification Statement
Phase I of the RCRA Facility Investigation
Heritage Environmental Services, Inc.
Lemont, Illinois
Log No. B-128

Upon completion of Phase I of the RFI, this statement is to be completed by both a responsible officer of the owner or operator (as defined in 35 IAC 702.126) and (2) a responsible officer (as defined in 35 IAC 702.126) of the laboratory which conducted the chemical analyses required as part of Phase I of the RFI. The original of this statement shall accompany the original certification statement for the overall Phase I activities and the RFI Phase I Report.

The sample collection, handling, preservation, preparation and analysis conducted as part of Phase I of the RFI at the facility described in this document has been conducted in accordance with the specifications in the approved workplan. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

USEPA ID Number	Facility Name
Signature of Owner/Operator Date	Name and Title of Owner/Operator Representative
Name of Laboratory	Signature of Laboratory Responsible Officer Date
	Name and Title of Laboratory Responsible Officer

Mailing Address of Laboratory:

LWE:WTS/mls/sp1030Y/10

B-128 cc: Maywood/USEPA

HERITAGE REMEDIATION/ENGINEERING, INC.

1319 Marquette Dr.
Romeoville, IL 60441
Phone: 708/378-1600
FAX: 708/378-2200

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October 29, 1993

Mr. Lawrence W. Eastep, P.E., Manager
Permit Section, Bureau of Land
Division of Land Pollution Control
Illinois Environmental Protection Agency
2200 Churchill Road
Springfield, Illinois 62794-9276

RE: RCRA Facility Investigation
Heritage Environmental Services
Canal Bank Road, N.E.
Lemont, Illinois 60439
ILD 085349264
DLPC 0311620007

Dear Mr. Eastep:

This transmittal constitutes the response to the items within the permit conditions of Section IV Corrective Action which were required to be implemented. In accordance with these requirements Heritage Remediation/Engineering, Inc. submits the RCRA Facility Investigative Work Plan for the agency's review and approval.

Specifically, this transmittal includes the RFI Work Plan and the following supportive documents:

Quality Assurance Project Plan
Data Management Plan
Health and Safety Plan
Phase I RFI - Project Management Plan
Field Sampling Plan

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An original and three copies are attached for your attention.

Should you have any questions or require information, please contact Mr. Robert D. Garcia at 708/739-1151 or the undersigned at 708/378-2120.

Sincerely,

HERITAGE REMEDIATION/ENGINEERING, INC.

Robert J. Millman, P.E.
Senior Project Engineer

RJM/kmt
Enclosures
pc: Robert Garcia, HTC

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