DOE/RL-95-09

Remedial Action Workplan for the 1100-EM-1 Operable Unit: Stockpiling of Contaminated Soils and Confirmatory Testing, Hanford Reservation, Richland, Washington

January 1995

United States
Department of Energy
P.O. Box 550
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Approved for Public Release

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MISCELLANEOUS ARCHITECT ENGINEER SERVICES FOR HAZARDOUS, TOXIC, AND RADIOLOGICAL WASTE (HTRW) PROJECTS FOR U.S. ARMY CORPS OF ENGINEERS WALLA WALLA DISTRICT

REMEDIAL ACTION WORK PLAN

DELIVERY ORDER NO. 015

REMOVAL AND STOCKPILING OF CONTAMINATED SOIL,
EM-1 OPERABLE UNIT
HANFORD 1100 AREA, WASHINGTON

CONTRACT NO. DACW68-94-D-0001

January 20, 1995

Prepared by:

CDM Federal Program Corporation
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Approved by: Ken Black for Date: 1/18/95
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REMOVAL AND STOCKPILING OF CONTAMINATED SOILS,
1100-EM-1 OPERABLE UNIT

REMEDIAL ACTION WORK PLAN
DELIVERY ORDER NO. 15
HANFORD RESERVATION, RICHLAND, WASHINGTON

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LIST OF ABBREVIATIONS AND ACRONYMS

ARARs	Applicable or Relevant and Appropriate Requirements
BEHP	Bis(2-ethylhexyl)phthalate
BETA-HCH	Beta-Hexachlorocyclohexane
bgs	below ground surface
CDM Federal	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Contaminant of Potential Concern
DOE	U.S. Department of Energy
DQCR	Daily Quality Control Report
DQOs	Data Quality Objectives
EPA	U.S. Environmental Protection Agency
ESE	Environmental Science and Engineering, Inc.
°F	degrees Fahrenheit
FSP	Field Sampling Plan
HEIS	Hanford Environmental Information System
IDW	Investigation-Derived Waste
NEPA	National Environmental Protection Act
NPL	National Priorities List
mg/kg	milligrams per kilogram
MTCA	Model Toxics Control Act
OU	Operable Unit
PCBs	Polychlorinated Biphenyls
PID	Photoionization Detector
PPE	Personal Protective Equipment
QA/QC	Quality Assurance/Quality Control
QAPjP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act

RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SSHP	Site Safety and Health Plan
SOP	Standard Operating Procedure
SOW	Statement of Work
TCLP	Toxicity Characteristic Leaching Procedure
TPA	Tri-Party Agreement
µg/kg	microgram(s) per kilogram
USACE	U.S. Army Corps of Engineers
UTL	Upper Tolerance Limit
WAC	Washington Administrative Code

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1.0 INTRODUCTION

CDM Federal Programs Corporation (CDM Federal) has prepared this Remedial Action Work Plan for Removal and Stockpiling of Contaminated Soil, Hanford 1100 Area, EM-1, Hanford Reservation, Richland, Washington, (Work Plan) for the U.S. Army Corps of Engineers Walla Walla District (USACE) under Contract No. DACW68-94-D-0001. Activities described in this Work Plan are being conducted as part of the remedial action for the EM-1 Operable Unit (OU) of the 1100 Area National Priorities List (NPL) Site. This Work Plan was developed in accordance with the USACE Statement of Work (SOW) dated September 26, 1994.

This Work Plan is organized into five sections. Introduction and site background are presented in Section 1.0. Previous investigation results are summarized in Section 2.0. The specific approach to site remediation is outlined in Section 3.0. Section 4.0 comprises the Field Sampling Plan (FSP) for this project. The FSP includes discussion of sampling procedures, analytical methods, equipment decontamination, Quality Assurance/Quality Control (QA/QC), and investigation-derived waste (IDW) procedures. Section 5.0 contains references cited.

Appendices to this Work Plan include a Quality Assurance Project Plan (QAPjP) and a Site Safety and Health Plan (SSHP), analytical results from previous investigations, field forms, and Standard Operating Procedures (SOPs). A description of the purpose and content of the QAPjP and SSHP is presented later in Section 1.0.

1.1 BACKGROUND

The 1100 Area was placed on the NPL in July 1989. The 1100 Area has been divided into four OUs based on geographic area and common waste sources. The four OUs are identified as 1100-EM-1 (EM-1), 1100-EM-2 (EM-2), 1100-EM-3 (EM-3), and 1100-IU-1 (IU-1). The location of the Hanford Site and the 1100 Area are depicted on Figure 1-1. During the course of performing Remedial Investigation/Feasibility Study (RI/FS) activities at the 1100 Area, the highest priority was placed on the 1100-EM-1 OU which underwent a full-scale RI/FS to determine the nature and extent of contamination and to identify preferred remedial alternatives.

The EM-1 OU encompasses an area on the southeast side of the Hanford Site and west of the town of Richland. Due to the close proximity of the EM-1 OU to the North Richland wellfield which constitutes the water supply for the town of Richland, EM-1 was assigned the highest priority of the Hanford 1100 Area OUs. EM-1 contains the central warehousing, vehicle maintenance, and transportation distribution center for the entire Hanford Site. Additionally, the Horn Rapids Landfill is located in the northern portion of EM-1. Operations at EM-1 have included the use of solvents, fuels, oils, and polychlorinated biphenyls (PCBs).

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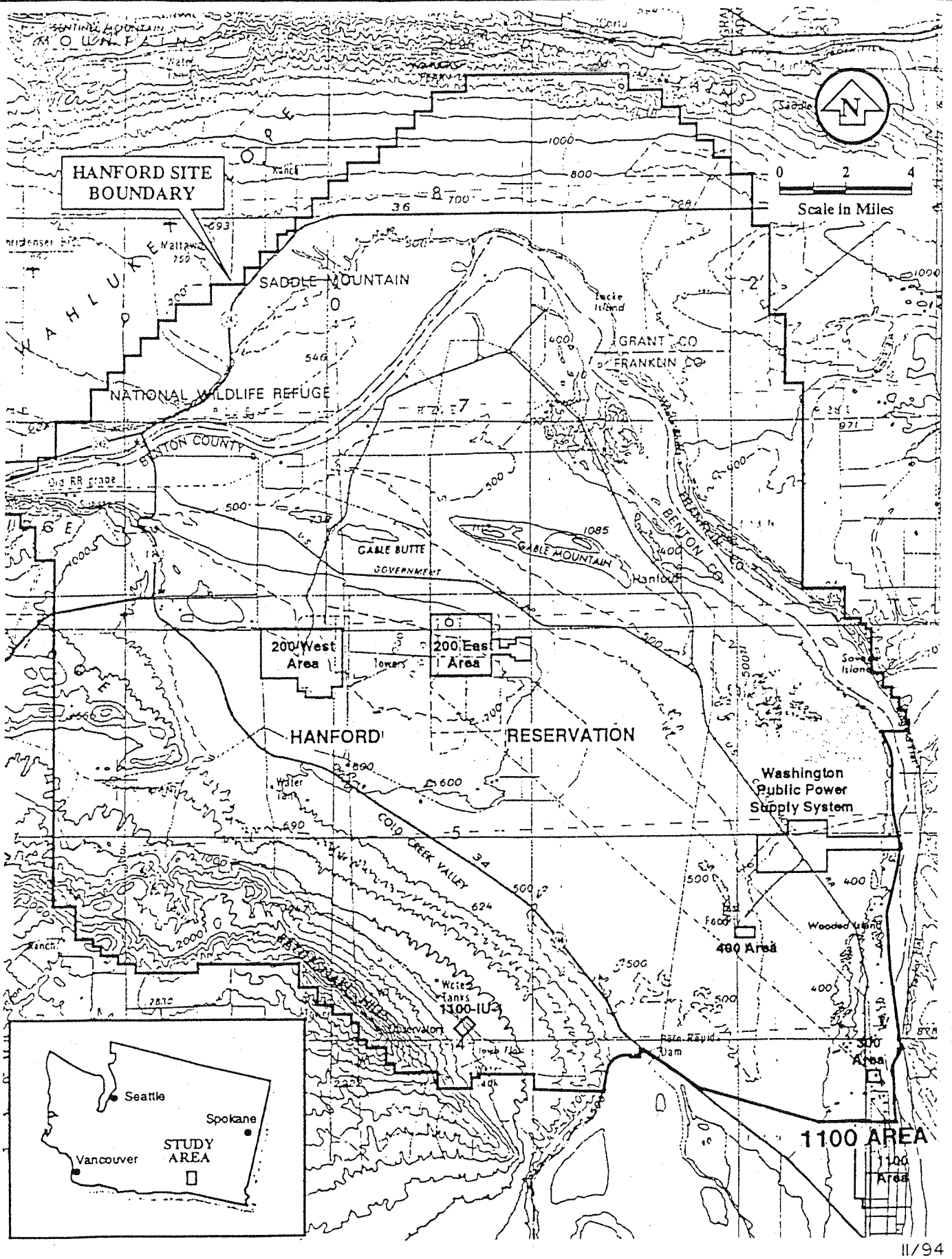

11/94

LOCATION OF THE HANFORD SITE AND THE 1100 AREA (MODIFIED FROM USACE 1994a)

CDM FEDERAL PROGRAMS CORPORATION

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During the RI/FS, three areas within EM-1 were determined to contain contaminants at levels that may pose potential long-term risks to human health. These areas of concern include a former landfill, an area of discolored soil (Discolored Soil Site), and a runoff collection pool (Ephemeral Pool). The location of each of these three areas are depicted in Figure 1-2.

1.1.1 DISCOLORED SOIL SITE

The Discolored Soil Site lies approximately 609 m (2000 ft) northwest of Building 1171 and encompasses an east-west trending depression. Previous investigations identified visibly stained soil covering an area of about 1.8 m (6 ft) by 3.0 m (10 ft) at the eastern end of the depression. The stained soil was determined to be the result of a spill of bis(2-ethylhexyl)phthalate (BEHP) resulting in a known contamination of approximately 99 cubic meters (130 cubic yards) of soil and potentially up to 336 cubic meters (440 cubic yards). Samples collected from surface soils at this site contained BEHP at a maximum concentration of 25,000 milligrams per kilogram (mg/kg) (DOE 1993). The remedial objective for this site is to remove and incinerate all soil with BEHP concentrations in excess of 71 mg/kg. This Work Plan addresses the excavation, sampling, and stockpiling of these materials.

1.1.2 EPHEMERAL POOL

The Ephemeral Pool is a 6.1 m (20 ft) by 213 m (700 ft) manmade depression on the western side of the Building 1171 parking lot where runoff water collects and evaporates. Previous investigations have identified the presence of PCB contamination from an unknown release at this site to a maximum concentration of 42 mg/kg. It is estimated that 126 to 260 cubic meters (165 to 340 cubic yards) of soil may be contaminated with PCBs (DOE 1993). The remedial objective for this site is to excavate and landfill all soil with a PCB concentration greater than 1 mg/kg. This Work Plan addresses the excavation, sampling, and stockpiling of these materials.

1.1.3 HORN RAPIDS LANDFILL

The Horn Rapids Landfill covers approximately 20.25 hectares (50 acres) northeast of the Siemens Power Corporation facility and north of Horn Rapids Road. The landfill was operated as an uncontrolled landfill from the late 1940s until the 1970s. Disposal of office and construction waste, asbestos wastes, sewage sludge, and fly ash is known to have occurred at the landfill. Previous investigations have identified asbestos contamination and an area contaminated by PCBs (maximum concentration 100 mg/kg) (DOE 1993). The remedial objective for this site is to excavate all soil containing a PCB concentration over 5 mg/kg (approximately 229 cubic meters or 300 cubic yards) and to cap the entire landfill. This Work Plan addresses the excavation, sampling, and stockpiling of PCB-contaminated materials.

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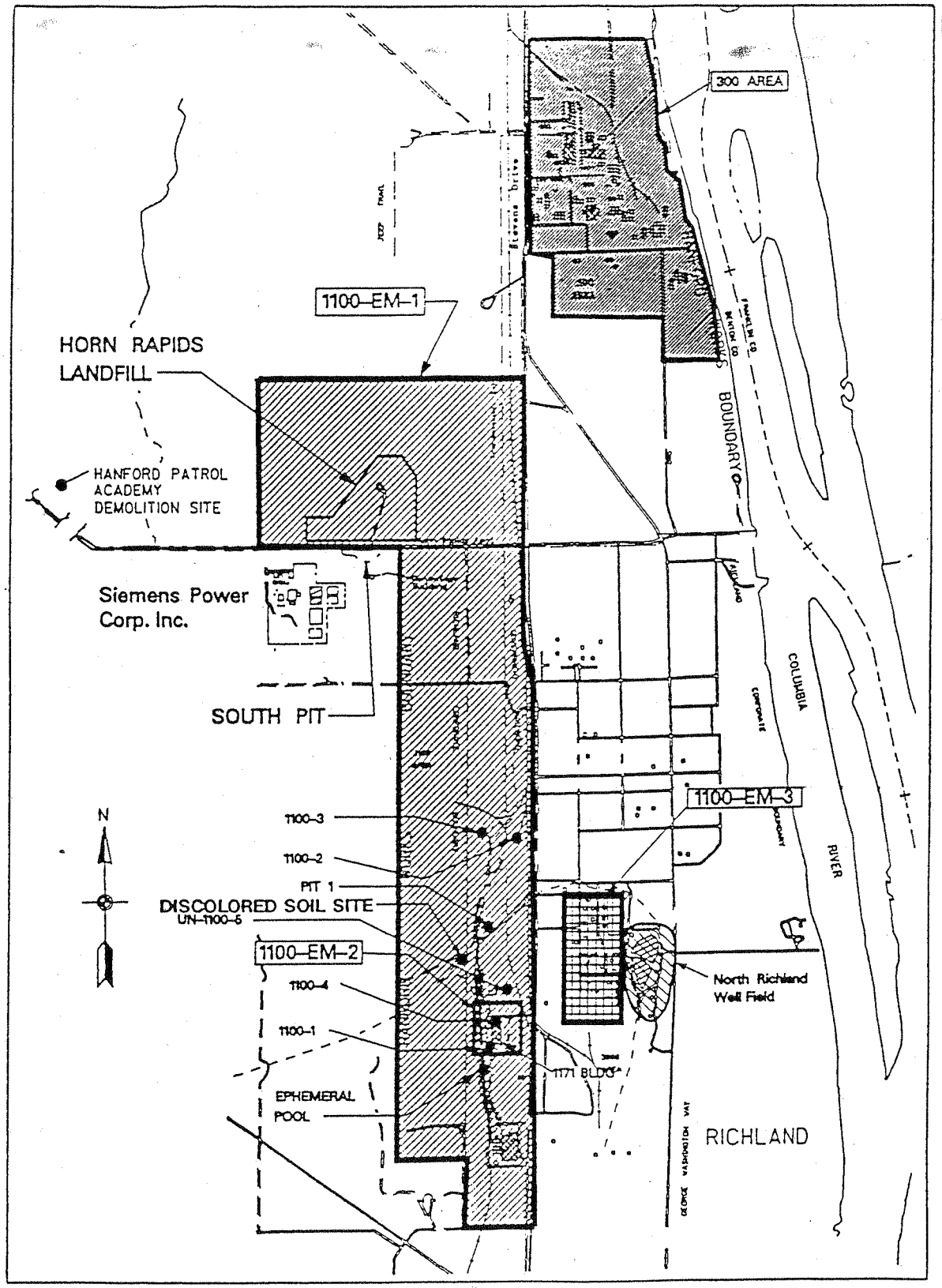

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LOCATION OF THE
1100 AREA OPERABLE UNITS AND SITES
(MODIFIED FROM DOE 1993)

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1.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

This soil excavation and stockpiling will be conducted in accordance with the following Applicable or Relevant and Appropriate Requirements (ARARs):

- The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA);
- 40 CFR 262-263;
- The State of Washington Model Toxics Control Act of 1989, Amended 1991, (MTCA, Chapter 173-340 WAC);
- National Historic Preservation Act (16 CFR 470, *et seq.*)
- The State of Washington Dangerous Waste Regulations, revised March 7, 1991, (Chapter 173-303 WAC).
- Endangered Species Act (40 CFR 402).

1.3 OBJECTIVES AND SCOPE

The objectives of the tasks governed by this Work Plan are to excavate and stockpile, for treatment and/or disposal, soils contaminated with hazardous materials that have been shown to present potential long-term risks to human health. These objectives will be accomplished through the excavation of suspected contaminated soils, concurrent determination of the vertical and lateral extent of contamination above the cleanup criteria, and segregation of confirmed contaminated materials. Determination of the concentration of contaminants of potential concern (COPC) in soils excavated from the three sites will be made using onsite laboratory capabilities and confirmed by offsite laboratory analyses. Following excavation, additional sampling will be performed to verify that remaining soils are below the remediation criteria specified in the DOE Hanford 1100 Area Record of Decision (ROD) (EPA 1993).

The scope of this project includes the removal and stockpiling of soils from areas of the three EM-1 OU sites where previous investigations (DOE 1993) have demonstrated the presence of contaminants exceeding remediation criteria. Soils which contain contaminants in excess of these criteria will be stockpiled on and covered with minimum 10 mil plastic sheeting pending transportation and disposal by others.

1.4 PROJECT ACTIVITIES AND DELIVERABLES

The 1100 Area EM-1 OU technical approach was developed from the USACE SOW (September 1994), and includes the preparation of planning documents, implementation of the field program, preparation of data reports, and quality assurance activities. The following sections summarize these activities. Table 1-1 presents a schedule of activities and deliverables.

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TABLE 1-1

SCHEDULE OF ACTIVITIES AND DELIVERABLES

DESCRIPTION	DATE
Submit Draft Work Plan	14 November, 1994
Regulatory Review/Comments Due	16 December 1994
Submit Revised Work Plan	06 January 1995
Begin Field Work	23 January 1995
Complete Field Work	10 February 1995
Submit Draft Close-out Report	10 March 1995
Review Comments Due	14 April 1995
Submit Final Close-Out Report	12 May 1995

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1.4.1 PLANNING DOCUMENTS

The planning documents for the removal and stockpiling of contaminated soil include a Work Plan (with Field Sampling Plan), QAPjP, and SSHP. A summary of the information presented in each of the documents is presented in the following paragraphs.

1.4.1.1 Work Plan

This Work Plan includes a description of the site location, background of the site and extent of the problem, and the overall project objectives. The Work Plan also describes the technical approach to characterization and confirmation sampling.

1.4.1.2 Quality Assurance Project Plan

The QAPjP describes CDM Federal's QA/QC objectives and protocols. Specifically, the QAPjP includes project organization and responsibilities; document control procedures; quality assurance objectives for measurement data; a summary of proposed sampling activities and procedures; sample custody requirements; equipment operation, maintenance, calibration, and standardization procedures; analytical procedures; data quality management guidelines and goals; required QA/QC samples; and quality assurance oversight activities.

1.4.1.3 Site Safety and Health Plan

The SSHP includes the following:

- Description of known hazards and risks associated with the site and with each activity conducted;
- Organization and personnel responsible for site safety;
- Delineation of work areas, levels of personnel protection, procedure for site access, and decontamination procedures for personnel; and
- Health and safety work precautions, accident prevention, first aid, and emergency response procedures.

1.4.2 FIELD ACTIVITIES

The field program will involve the performance of several tasks related to the excavation and stockpiling of contaminated soil at the three 1100 Area EM-1 sites. CDM Federal will provide trained personnel for the field program including: a field team leader for site management, a hazardous waste specialist for sampling, a chemist to perform onsite analyses of soil samples, and heavy equipment operators and laborers. Training requirements for field

staff are outlined in the SSHP. The details of the field program are presented in Sections 3.0 and 4.0. The following is a list of the field tasks to be accomplished:

- Mobilization of field program.
- Excavation and stockpiling of suspected contaminated materials.
- Soil sampling.
- Onsite analysis of samples.
- Packing and shipping of samples for offsite laboratory analysis.
- Demobilization of field program.

1.4.3 CDM FEDERAL DELIVERABLES

The reports to be generated as a part of this project include Daily Quality Control Reports (DQCRs), and a Draft and Final Close-Out Report.

1.4.3.1 Daily Quality Control Reports

DQCRs will be generated daily during field activities and submitted at the end of each week (Fridays) to the USACE. The DQCRs will include a description of the subcontractors and equipment on site; work performed (including samples collected and shipped); quality control activities; health and safety levels and activities; problems encountered and corrective actions taken; and anticipated activities for the next day. A copy of the DQCR form is included in Appendix D.

1.4.3.2 Draft and Final Close-Out Reports

Upon completion of the field work and receipt of all analytical results, CDM Federal will prepare the Draft Close-Out Report. The Draft Close-Out Report will be submitted to the USACE approximately 28 days after demobilization from the field and will include the following information:

- A brief narrative which summarizes the site location, background, and objectives of the project.
- Discussion of the field activities performed including sampling techniques.
- A description of the numbers and types of samples collected, including the dates of collection. Included with this will be a table which lists the sample numbers and any corresponding laboratory numbers required to identify

analytical results for each sample. The table will also describe which samples are designated field QA/QC samples.

- A map showing the areal limits of excavated areas, location of all samples collected, and limits of geophysical surveys. The location information presented on this map will not be surveyed to confirm exact locations but will be plotted in the field with respect to site features.

- An inventory of contaminated soils removed from each of the three 1100-EM-1 sites.

- A brief discussion of all sample analysis results.

- The analytical sample data package from the laboratory will include detection limits for all analytes, dilution factors, and appropriate data flags; laboratory QC results including instrument blank, method blank, surrogate spike, matrix spike, laboratory duplicate and/or matrix spike duplicate pair samples; and completed chain-of-custody forms showing sample shipment and sample preservation.

Following receipt of comments from the USACE and other applicable agencies, CDM Federal will revise the draft report and submit a Final Close-Out Report.

1.4.4 QUALITY ASSURANCE

All work performed on this project will be in accordance with CDM Federal QA requirements as described in the QAPjP and in the CDM Federal QA Manual Part One, Revision 1, January 15, 1993, and Part Two, Revision 5, October 15, 1993. All USACE and CDM Federal QA/QC requirements applicable to remedial actions implemented by CDM Federal at the Hanford North Slope sites will also apply to the work described herein. No additional QA/QC requirements will be imposed for work at the 1100-EM-1 OU sites.

This Work Plan has been reviewed for QA/QC requirements by George DeLullo, CDM Federal QA Specialist who will maintain QA oversight for the duration of the project. The following deliverables produced during this investigation will be subject to technical and QA review by CDM Federal technical and QA specialists:

- Draft and Final Remedial Action Work Plan (including QAPjP)

- Draft and Final Close-Out Report

In accordance with CDM Federal's audit policy, a certain percentage of projects may be subject to an internal QA system audit conducted by the CDM Federal QA staff. If this project is audited, a written report will be distributed to the audited group and CDM Federal

management. The Project Manager will be responsible for maintaining the project files in the CDM Federal Golden, Colorado office. A working copy of the files will also be maintained in the Richland, Washington office. Additional information regarding QA requirements for this characterization and remediation project are presented in the QAPjP.

All USACE Walla Walla and CDM Federal QA/QC requirements that have been used in work conducted at the Hanford North Slope sites will also apply to this work conducted at the Hanford Reservation. No additional QA/QC measures are required to conduct work at these three EM-1 sites.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS

This section presents a brief summary of the findings of previous investigations which are germane to the removal and stockpiling of contaminated soils at the three previously described EM-1 OU sites. Data from these investigations will be used in the field to identify those areas where contaminated soils must be excavated. The 1100-EM-1 OU RI/FS Report (DOE 1993) served as the source for the information presented in this section and provides a more detailed description of the methods and results of the investigations. The investigation results for the three sites are presented separately.

Contaminant investigations at the three EM-1 OU sites involved one or more of the following techniques: geophysical surveys, the collection and analysis of soil gas, surface [0 to 0.7 m (0 to 2.0 ft)] and subsurface soil samples, and disposal trench characterization (excavation). The analytical results from soil samples were compared to Upper Tolerance Limits (UTLs) for each analyte detected. The UTLs are essentially project-specific background levels calculated under an earlier study, the Phase I 1100-EM-1 OU Report (DOE 1990). Further explanation and the method UTL calculations are provided in Appendix K of the 1100-EM-1 OU RI/FS Report (DOE 1993) and in the Phase I Report (DOE 1990). Any analyte found to be present at a site at a concentration exceeding the UTL was considered to be a COPC.

Potential risks to human health and the environment posed by the COPCs identified at each site were assessed. Contaminants present at concentrations believed to present an unacceptable potential health risk are those which have been targeted for cleanup under the current project. No contaminants were found to present an unacceptable potential risk to environmental receptors.

2.1 DISCOLORED SOIL SITE

Three COPCs were determined to be present in surface soils of the Discolored Soil Site at concentrations exceeding UTLs. These contaminants and their maximum detected concentrations include the following: bis(2-ethylhexyl)phthalate (BEHP) (25,000 mg/kg); chlordane (1.86 mg/kg); and heptachlor (0.065 mg/kg). The risk assessment conducted as part of the RI/FS (DOE 1993) demonstrated that BEHP was the only contaminant detected at a concentration which presents an unacceptable potential health risk. All surface soil contamination appears to be limited to the top 25.4 cm (10 in) of soil and in the eastern end of a triangular depression which defines the site. Figure 2-1 depicts the distribution of BEHP in surface soils at concentrations exceeding the UTL of 690 micrograms per kilogram (µg/kg). The cleanup criteria established in the 1100 Area ROD (EPA 1993) for BEHP is 71 mg/kg. The approximate volume of contaminated soil to be removed is 99 to 336 cubic meters (130 to 440 cubic yards) assuming an excavation depth of 0.46 m (1.5 ft) (USACE 1994a). Figure 2-2 illustrates the estimated area of soils requiring removal.

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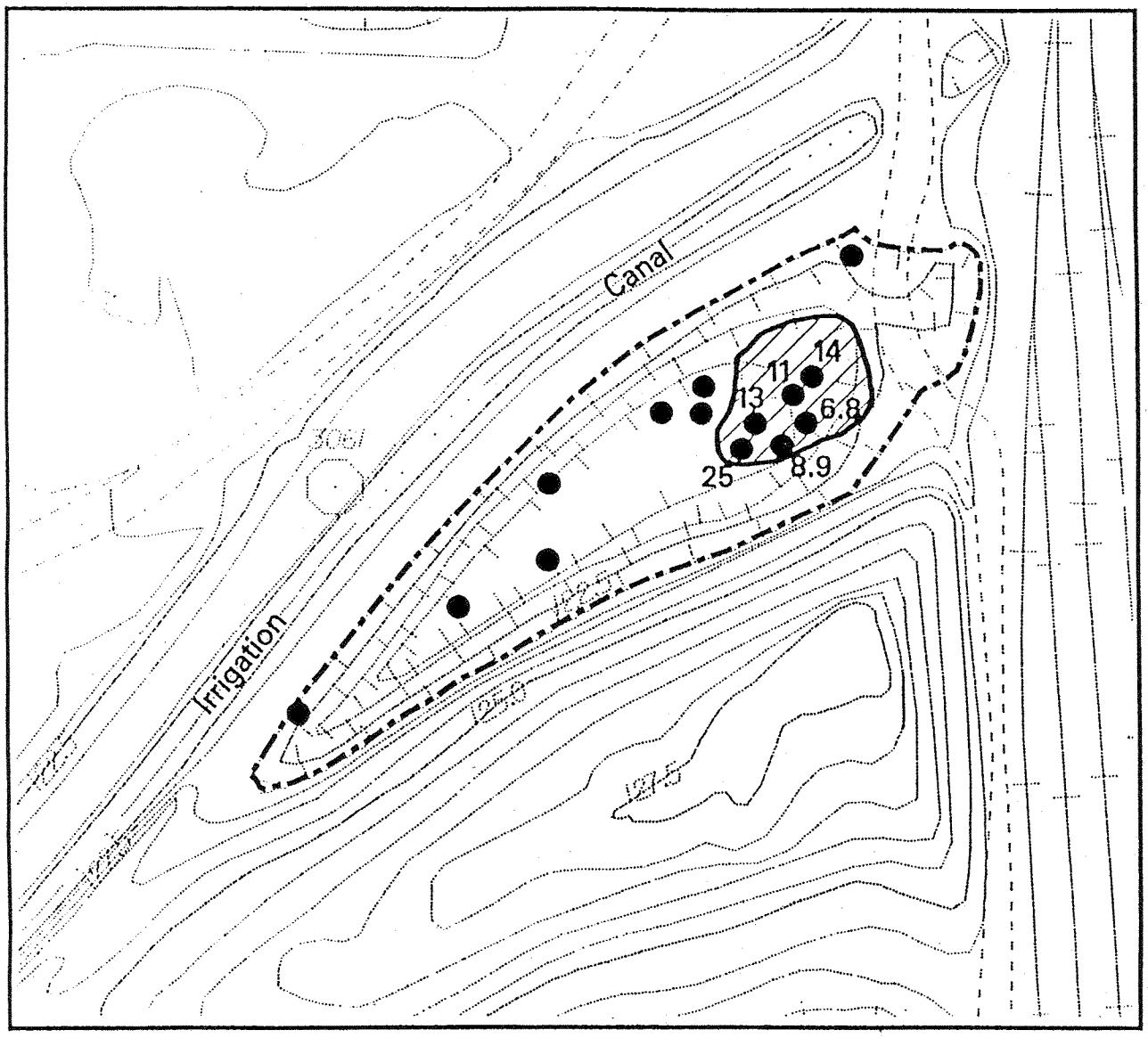

LEGEND :

- Soil Sampling Location and BEHP concentration x 10^{6} (micro–g/kg).
- Surface Soil with BEHP concentration above Screening Criterion. (690 micro–g/kg)
- UN–1100–6 Operable Sub–unit Boundary. (Estimated)

N

0 20 40 METERS

0 80 120 FEET

Contour Interval is 0.5 meter.

UN–1100–6, Discolored Soil Site – BEHP Distribution in Surface Soils at Concentrations above a UTL of 690 micro–g/kg.

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

DISTRIBUTION OF BEHP IN SURFACE SOILS
OF THE DISCOLORED SOIL SITE AT CONCENTRATIONS
EXCEEDING THE UTL OF 690 Mg/Kg
(MODIFIED FROM DOE 1993)

11/94

Figure No. 2-1

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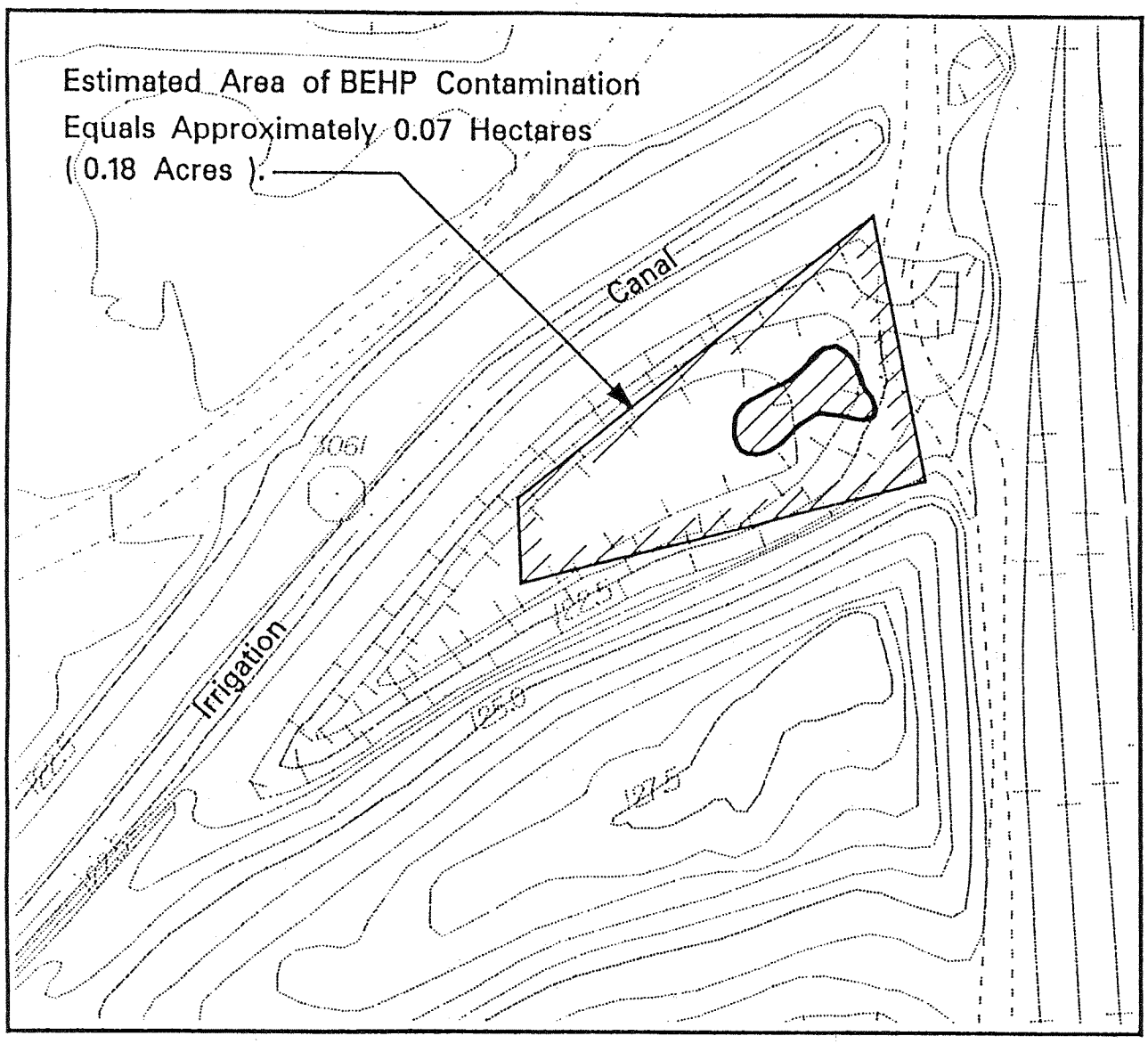

LEGEND :

Approximate Area of Soil Discoloration.

Estimated Area of BEHP Contamination.

N

0 20 40 METERS

0 80 120 FEET

Estimated Area of BEHP Contamination at the UN – 1100 – 6 Operable Unit.

CDM FEDERAL PROGRAMS CORPORATION
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ESTIMATED AREA OF SOIL
REQUIRING REMOVAL AT THE DISCOLORED SOIL SITE
(MODIFIED FROM DOE 1993)

11/94

Figure No. 2-2

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2.2 EPHEMERAL POOL SITE

The COPCs identified in surface soils at the Ephemeral Pool Site and their maximum detected concentrations consist of chlordane (2.8 mg/kg), heptachlor (0.029 mg/kg), and polychlorinated biphenyls (PCBs), specifically Aroclor 1248, (42 mg/kg). Of these contaminants, only Aroclor 1248 was determined to present an unacceptable potential human health risk. The distribution of Aroclor 1248 (and chlordane) in surface soils of the Ephemeral Pool Site is illustrated in Figure 2-3. The UTL for Aroclor 1248 is 170 µg/kg. The cleanup level for PCBs at the Ephemeral Pool Site is 1 mg/kg (EPA 1993). Soil containing Aroclor 1248 at concentrations greater than this level are confined to the northern portion of the elongate depression which defines the site. The areal extent of soil requiring excavation is shown in Figure 2-4. Based on an estimated depth of contamination of 0.46 m (1.5 ft), the volume of contaminated soils to be removed from this site is between 126 to 260 cubic meters (165 to 340 cubic yards) (USACE 1994a).

2.3 HORN RAPIDS LANDFILL

Thirteen COPCs were identified in surface soils during investigation of the Horn Rapids Landfill site. These contaminants and their maximum detected concentrations include the following: arsenic (6.6 mg/kg); barium (1320 mg/kg); chromium (1250 mg/kg); copper (1280 mg/kg); manganese (501 mg/kg); nickel (557 mg/kg); thallium (3.1 mg/kg); vanadium (101 mg/kg); zinc (3160 mg/kg); beta-hexachlorocyclohexane (HCH) (0.094 mg/kg); DDT (1.98 mg/kg); heptachlor (0.02 mg/kg); and PCBs (102 mg/kg). PCBs were also detected in two subsurface soil samples. The risk assessment demonstrated that PCBs represent the only contaminant detected at concentrations which present an unacceptable human health risk (DOE 1993). These soils are limited to the south-central portion of the Horn Rapids Landfill site. Figure 2-5 depicts the distribution of PCB contamination in surface soils at concentrations exceeding the UTL of 170 µg/kg. Other COPCs which were found to be approximately coincident with (i.e., detected in the same area as) the PCB contamination include the following: heptachlor, DDT, DDE, beta-HCH, and vanadium. The 1100 Area ROD (EPA 1993) established a cleanup level of 5 mg/kg for PCB-contaminated soil at the Horn Rapids Landfill site. Figure 2-6 illustrates the approximate area of PCB-contaminated soils requiring removal. Assuming a maximum depth of contamination of 1.52 m (5 ft), the volume of contaminated soils is approximately 230 to 460 cubic meters (300 to 600 cubic yards) (DOE 1993).

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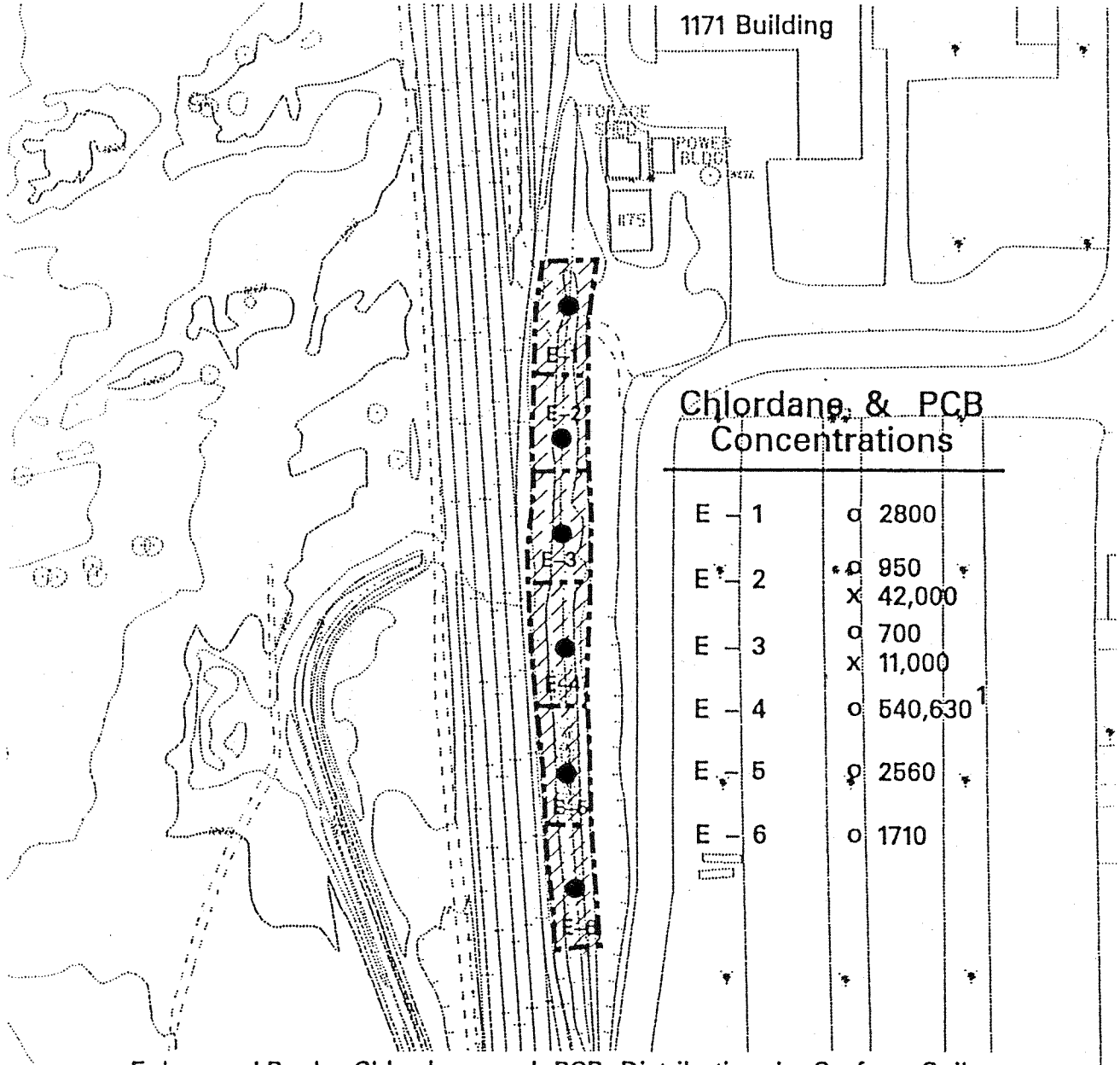

Chlordane & PCB Concentrations

E – 1	o	2800
E – 2	o	950
	x	42,000
E – 3	o	700
	x	11,000
E – 4	o	540,630 [1]
E – 5	o	2560
E – 6	o	1710

LEGEND :

Surface Soil Sampling Location and Number.

x PCB Concentration (micro–g/kg).

o Chlordane Concentration (micro–g/kg).

1 Duplicate

N

0 30 60 METERS

0 100 200 FEET

Contour Interval is 0.5 meter.

Ephemeral Pool – Chlordane and PCB Distribution in Surface Soils.

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

DISTRIBUTION OF PCBs AND CHLORDANE
IN SURFACE SOILS OF
THE EPHEMERAL POOL SITE
(MODIFIED FROM DOE 1993)

11/94

Figure No. 2-3

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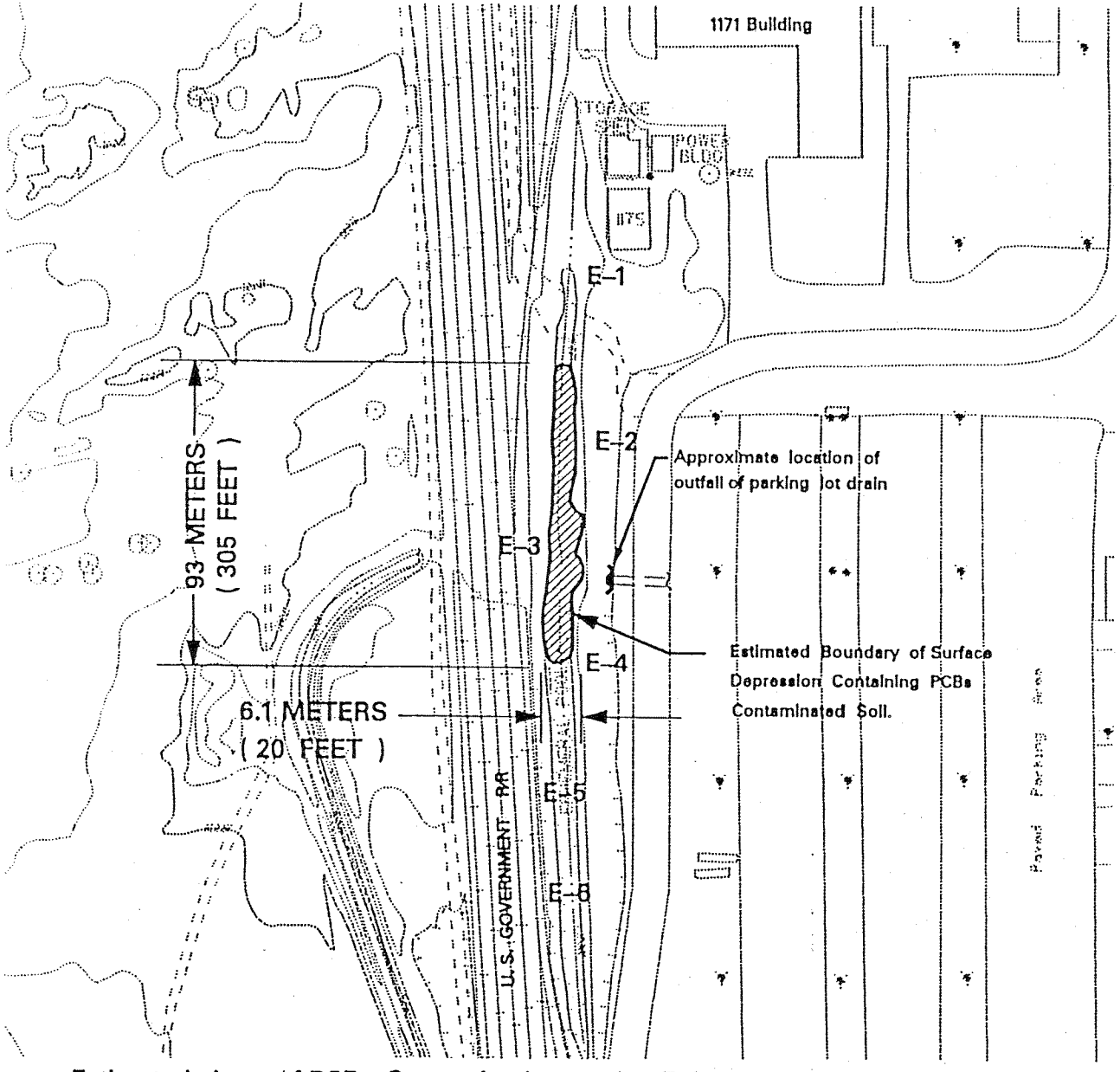

LEGEND :

E-2 Soil Sampling Location and Number.

Estimated Area of PCBs Contamination.

N

0 30 60 METERS

0 100 200 FEET

Estimated Area of PCBs Contamination at the Ephemeral Pool Operable Subunit.

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

ESTIMATED AREA OF SOIL REQUIRING REMOVAL AT THE EPHEMERAL POOL SITE (MODIFIED FROM DOE 1993)

11/94

Figure No. 2-4

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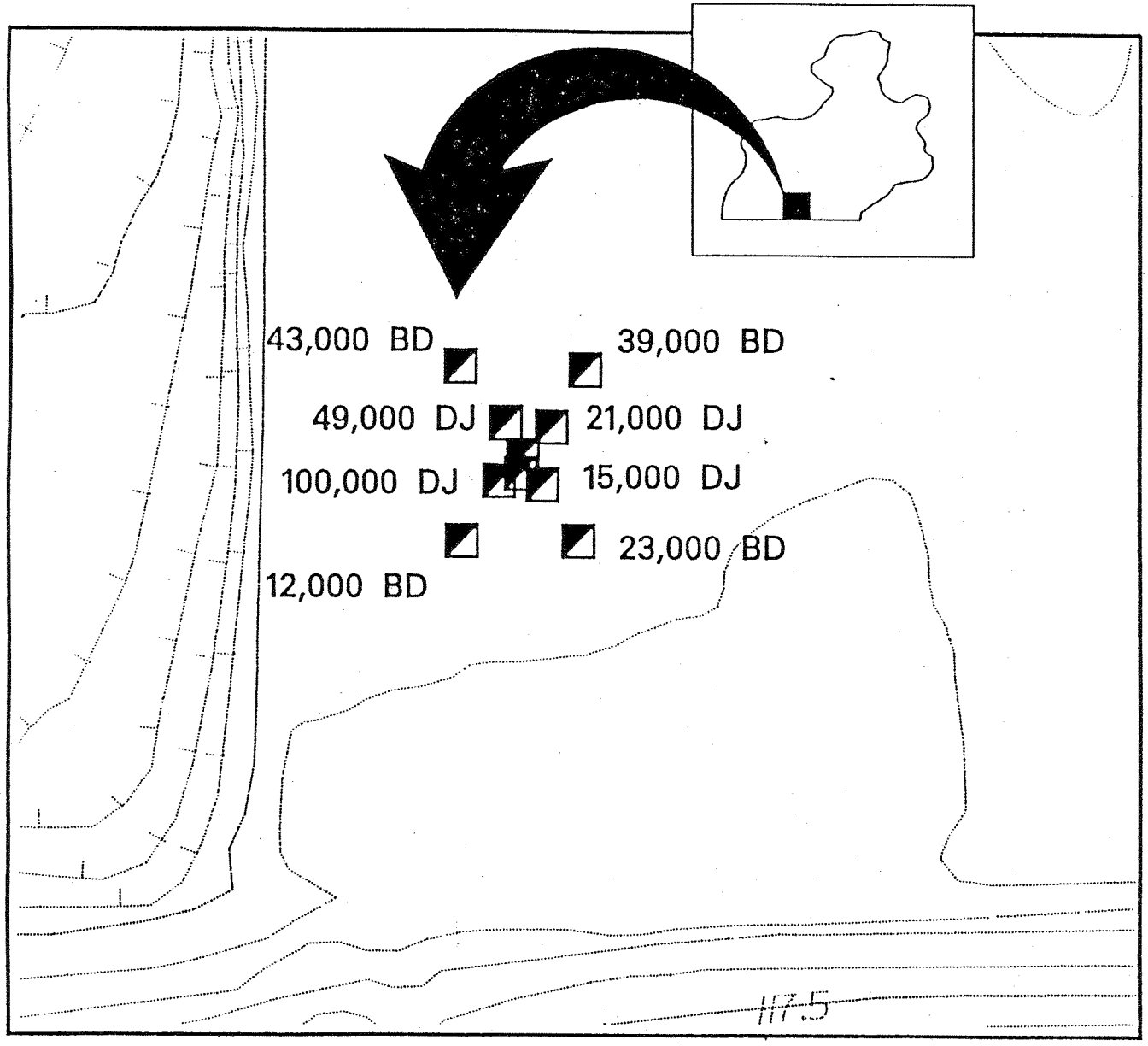

LEGEND :

Soil Sampling Location

PCB Isomer Anchor 1248 only one detected.

Aroclor 1248 Concentrations (micro-g/kg) for values exceeding UTL of 170 micro-g/kg. Maximum concentration shown for the depth interval 0 – 1.5 ft.

N

Contour Interval is 0.5 meter.

0 10 20 METERS

0 32.5 65 FEET

NOTE :

B – Laboratory analysis qualifier indicating analyte was found in associated blank as well as in sample.

D – Laboratory analysis qualifier indicating compound identified at a secondary dilution factor.

J – Laboratory analysis qualifier indicating an estimated quanity.

Horn Rapids Landfill – PCB Distribution in Surface Soils.

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

DISTRIBUTION OF PCBs IN SURFACE SOILS
OF THE HORN RAPIDS LANDFILL SITE AT CONCENTRATIONS
EXCEEDING THE UTL OF 170 Mg/Kg
(MODIFIED FROM DOE 1993)

11/94

Figure No. 2-5

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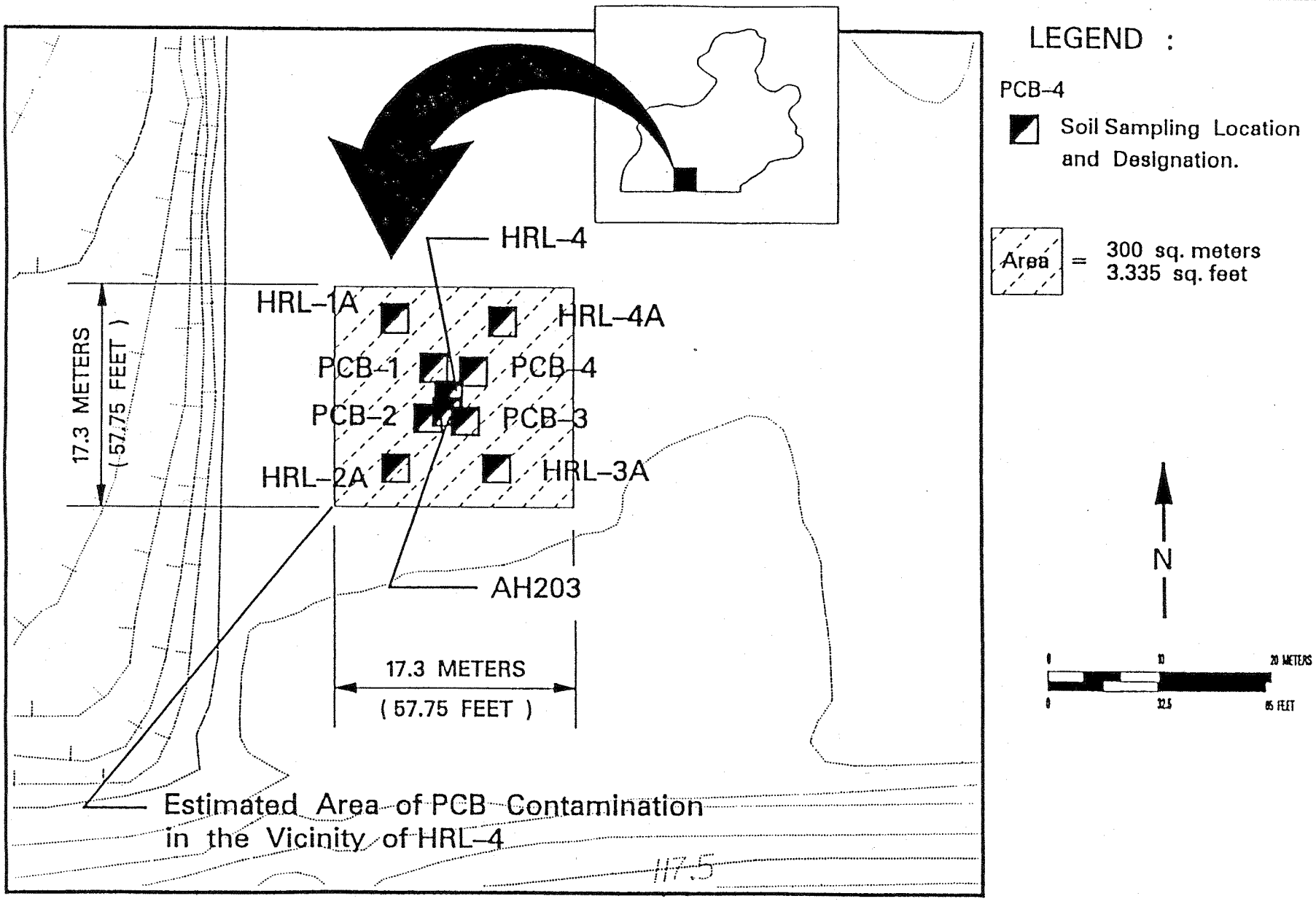

Estimated Area of PCBs Contamination in the Vicinity of HRL-4.

CDM FEDERAL PROGRAMS CORPORATION
a subsidiary of Camp Dresser & McKee Inc.

ESTIMATED AREA OF SOIL
REQUIRING REMOVAL AT
THE HORN RAPIDS LANDFILL SITE
(MODIFIED FROM DOE 1993)

11/94

Figure No. 2-6

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3.0 WORK PLAN RATIONALE

Design of the soil removal and sampling approach is driven by contaminant types and distribution, site conditions, and the goals and objectives of the project. These aspects of the three EM-1 OU sites were presented in previous sections. This section describes the approach to be implemented to achieve project goals and objectives.

3.1 PROFILING SAMPLE COLLECTION

At the start of removal and stockpiling activities, a waste profiling sample will be collected from each of the three sites for landfill or incinerator characterization. This sample will be collected as a composite of several aliquots from within the known contaminated areas at each site. One profiling sample will be collected from each site representing a depth of approximately 15 cm (6 in) at the Discolored Soil Site and the Ephemeral Pool Site and a depth of 15 cm (6 in) to 61 cm (2 ft) at the Horn Rapids Landfill Site. The Discolored Soil Site profile sample will be forwarded to an incineration facility designated by the USACE for treatment characterization. Profile samples for the Ephemeral Pool Site and Horn Rapids Landfill Site will be forwarded to a landfill facility designated by the USACE.

3.2 REMOVAL AND SEGREGATION OF CONTAMINATED SOILS

Prior to the excavation of contaminated soils from the Discolored Soil Site, the Ephemeral Pool Site, and the Horn Rapids Landfill Site, the locations of previously documented contaminated soils will be staked in the field by the USACE. Excavation will be by track hoe to minimize the entry of earth-moving equipment into contaminated areas. Contaminated soils will be excavated and segregated based on the results of previous investigations, visual evidence of contamination witnessed in the field and the results of field analyses. All suspect contaminated materials will be placed on minimum 10 mil plastic sheeting and will be covered with plastic sheeting at the end of each day. Demarcation of hazardous material staging areas will be accomplished with barrier tape at the Horn Rapids Landfill Site and with temporary construction fencing at the Discolored Soil and Ephemeral Pool Sites. Excavations are expected to be less than 1.25 m (4 ft) deep and will not require any fencing or other warning markings. During excavation, water will be used as necessary to minimize the generation of fugitive dust. Transportation and disposal of contaminated soils and other investigation-derived wastes will be accomplished under separate delivery order or contract. Regrading and revegetation of sites, if required, will be accomplished by others.

3.3 SOIL SAMPLING AND ANALYSIS

Once all suspect contaminated materials have been removed from an excavation based on previous investigation data and visual evidence, samples will be collected from the base and walls of the excavation to confirm the absence of contaminants above the cleanup levels established in the 1100 Area ROD (EPA 1993). At least two samples will also be collected from the suspect contaminated soils stockpiled at each site to quantify the concentration of

target contaminants. These samples will be analyzed in an onsite laboratory facility which will provide rapid turnaround EPA QC Level II analytical results. If any sample results indicate the presence of contaminants above cleanup levels, excavation will resume in those areas. Excavation will cease when onsite analyses demonstrate the absence of contaminants above cleanup levels. Finally, confirmation samples will be collected from the base and walls of the excavation for offsite laboratory analyses. Offsite analyses will meet EPA QC Level III data requirements (with 10% meeting EPA QC Level IV equivalent data requirements). Additional detail regarding the onsite and offsite analyses is provided in Section 4.0 of this document and in the QAPjP (Appendix A).

- Hazardous materials encountered will be disposed of under separate delivery order or contract.

- No backfilling, seeding or reclamation will be performed under this delivery order. Requirements for final restoration of these disturbed areas will be determined by the USACE and DOE.

- The track hoe will be decontaminated following the complete excavation of contaminated materials at each of the 1100-EM-1 sites. Decontamination will consist of removing the majority of the dirt on the bucket with a shovel, followed by brushing and wet swabbing of the bucket. No decontamination wastewater will be generated.

4.3 FIELD SAMPLING

This section details criteria for sample collection, identification of samples, documentation, sample labeling, packaging, and shipping, decontamination, onsite and offsite laboratory analytical procedures, and handling of IDW.

4.3.1 SAMPLE COLLECTION

At the direction of the USACE, CDM Federal will collect soil samples during excavation. Samples will be collected to confirm the completion of contaminated soil removal and to characterize excavated materials. Rinsate samples will be collected to evaluate the potential for cross-contamination due to incomplete decontamination of sampling equipment. No background soil samples will be collected. Table 4-1 summarizes the samples to be collected during field work at the three EM-1 OU sites. The samples will be handled in accordance with approved SOPs. CDM Federal's field team leader will be present during all excavation work and sampling.

A total of 20 confirmation samples will be collected from the Ephemeral Pool Site and ten each from the Discolored Soil Site and the Horn Rapids Landfill Site. A 5 ft by 5 ft grid will be established at each site following excavation of the suspected contaminated materials. Ten percent of the samples (two at the Ephemeral Pool Site and one each from the Discolored Soil Site and Horn Rapids Landfill Site) will be discrete grab samples collected from a single node to be selected by representatives of the regulatory agencies. These samples will be analyzed and data packages prepared to EPA QC Level IV data requirements. The remaining samples will be composites of aliquots collected at randomly selected nodes and the four nodes closest to each (i.e., the four nodes surrounding the central node along common grid lines, not those diagonal from the central node). This method dictates that the randomly selected nodes will not be located along one of the outermost grid lines at a site. All composite samples will be homogenized using decontaminated stainless steel utensils prior to filling sample containers. In excavations less than 1.2m (4ft) deep, samples will be collected directly from undisturbed soils in the excavation floor. If deeper excavations are required,

samples will be collected directly from the track hoe bucket. As the samples will be collected from the floor of the excavation, sampling procedures will follow CDM Federal SOP 1-3, Surface Soil Sampling (Appendix E). Offsite laboratory analytical data for the randomly selected composite samples will be reported in sample data packages conforming to EPA QC Level III data requirements.

Six waste characterization samples—two from each site—will be collected and sent offsite for laboratory analysis and sample data package preparation meeting the EPA QC Level III data requirements. Analytical results from the waste characterization samples will be used to determine waste codes for proper transportation and disposal of the contaminated soil stockpiles. Waste characterization samples will be analyzed for the VOCs, SVOCs, Pesticides/PCBs, RCRA Metals, and RCRA TCLP (Toxicity Characteristic Leaching Procedure) for chlordane only. Samples will be composited from several aliquots determined to be representative of the soil stockpiles.

4.3.2 SAMPLE IDENTIFICATION

Samples will be identified through the use of a coding system to identify sample locations and type. The coding system will ensure that samples are uniquely identified and provide a tracking procedure to facilitate data retrieval. Details of the sample numbering system are described in Section 4.0 of the *Remedial Design Field Sampling Plan for the 1100 Area Hanford Site* (USACE 1994).

4.3.3 SAMPLE LABELING, PACKAGING, AND SHIPPING

Sample labeling, packaging and shipping will follow procedures in CDM Federal SOP 2-5 (Appendix E). In contrast to procedures discussed in the Remedial Design Field Sampling Plan (USACE 1994), Offsite Property Control Forms will not be required prior to sample shipment. The point-of-contact for issues regarding samples is Paul Karas (509-943-5828) or George DeLullo (303-232-0131).

4.3.4 DOCUMENTATION

Documentation consists of all paperwork used to both track the samples through the analytical process and create a permanent record of field activities associated with the sampling effort. All activities at the site will be documented in a designated field logbook. Logbooks will be used to record the specific field information collected for each activity. All logbooks will be bound, hard-cover books, with sequentially numbered water-resistant pages. Ring binders or similar types of binders do not constitute a bound logbook. Procedures for field logbook use, content, and control are given in CDM Federal SOP 4-1 (Appendix E).

4.3.5 SAMPLE CUSTODY

Sample custody, including the completion of custody forms, is described in CDM Federal SOP 1-2 (Appendix E). An example of a custody form is included in Appendix D.

4.3.6 EQUIPMENT DECONTAMINATION

All reusable equipment used to collect, handle, or measure samples will be decontaminated before coming into contact with any sample. Decontamination will follow CDM Federal SOP 4-5 (Appendix E) and will match the degree of contamination on the sampling tool. Decontamination of sampling equipment will occur at portable decontamination stations set up at sampling locations. Decontamination of excavation equipment will occur at contaminated soil stockpiles. All items that will come into contact with potentially contaminated media will be decontaminated prior to use. If decontaminated items (other than the track hoe bucket and shovels) are not immediately used, they will be covered either with plastic or aluminum foil, depending on the size of the item. All decontamination episodes, and the procedures used, will be recorded in the field logbook. The general decontamination procedures for the equipment being used are listed below:

- Decontamination of the track hoe will consist of knocking off the majority of the dirt on the bucket with a shovel, followed by brushing and wet swabbing of the bucket. No decontamination wastewater will be generated. This "dry decontamination" method represents an approved modification from CDM Federal SOP 4-5.

- Stainless steel bowls, spoons and other sampling equipment will be cleaned with alconox and tap water, rinsed thoroughly with tap water, rinsed with methanol, rinsed again with tap water, and then rinsed with deionized water. The items will be completely air dried prior to use. Items not immediately used will be either wrapped in aluminum foil (small items) or in sheet plastic (larger items).

- Decontamination waste water generated from the decontamination of sampling equipment will be applied to contaminated material soil stockpiles for dust control. No containerization or sampling of the decontamination waste water will be performed. Waste methanol and methanol-contaminated rinse water will be containerized and disposed in accordance with the approved waste management plan.

4.3.7 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

The field QC samples being sent to the offsite laboratory will include blind duplicates, and equipment rinsates. QC sample frequency and protocol are discussed in the QAPjP (Appendix A). QA samples will be sent to a designated USACE QA laboratory. These QA

samples will be collected as field duplicates of environmental samples submitted to CDM Federal's offsite laboratory. The addresses for laboratories to be used during this project are:

Analytical Laboratory Subcontracted to CDM Federal:
Environmental Science & Engineering, Inc.
14220 W. Newberry Rd.
Gainesville, FL 32607
POC: Ed Mansfield
(904) 332-3318 Fax: (904) 332-0507

USACE QA Laboratory:
U.S. Army Corps of Engineers
North Pacific Division Laboratory
1401 N.W. Graham Avenue
Troutdale, OR 97060-0503
POC: Pam Hertzberg
(503) 665-4166 Fax: (503) 665-0371

All laboratories will be notified ahead of time if Saturday delivery is required.

QA and QC samples will be prepared in accordance with the procedures in the QAPjP and will be used as a check of laboratory and field sampling procedures. Matrix spike/matrix spike duplicate samples will be analyzed as required by SW-846 Methods. Extra sample volume for matrix spike/matrix spike duplicate samples will be submitted by CDM Federal if requested by the offsite laboratory.

4.3.8 OFFSITE LABORATORY ANALYSES

A portion of the soil samples collected during this project will be sent to the subcontract offsite laboratory (ESE). The analyses to be performed and sample data packages provided by the offsite laboratory will reflect EPA QC Level III, except for 10% "CLP-type" analyses which will reflect EPA QC Level IV. Analysis of samples from the Horn Rapids Landfill Site and the Ephemeral Pool Site will be by SW-846 Method 8080 for PCBs. BEHP analyses for the Discolored Soil Site will be by SW-846 Method 8060. Container and preservative requirements, and maximum holding times for each matrix and analyte to be sampled are described in Section 6.0 of the *Remedial Design Field Sampling Plan* (USACE 1994).

4.3.9 INVESTIGATION-DERIVED WASTE PLAN

All potential hazardous materials shall be stockpiled at a staging area (adjacent to the excavation) consisting of minimum 10 mil plastic sheets measuring approximately 6 m (20 ft) by 30.5 m (100 ft) in size. Incidental investigation-derived wastes (e.g., personal protective equipment), generated during field sampling activities, will be placed into drums and left on plastic sheets. Decontamination fluids generated from decontamination of sampling

equipment will be returned to the contaminated soil stockpile from which the sampling event originated for the purpose of dust control.

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5.0 REFERENCES

CDM Federal Programs Corporation (CDM Federal). January 1993. Quality Assurance Manual, Parts One and Two; CDM Federal, Fairfax, Virginia.

U.S. Army Corps of Engineers (USACE). 1994a. Remediation Design and Remedial Action Plan for the 1100 Area, Hanford Site; USACE, Walla Walla, Washington.

U.S. Army Corps of Engineers (USACE). 1994b. Remedial Design Field Sampling Plan for the 1100 Area, Hanford Site; USACE, Walla Walla, Washington.

U.S. Army Corps of Engineers (USACE). 1994c. Quality Assurance Project Plan for Field Investigations Supporting Remedial Design/Remedial Action Activities in the 1100 Area; USACE, Walla Walla, Washington.

U.S. Department of Energy (DOE). 1990. Phase I Remedial Investigation Report for the Hanford Site 1100-EM-1 Operable Unit; DOE, Richland, Washington.

U.S. Department of Energy (DOE). 1993. Draft Remedial Investigation/Feasibility Study for the 1100-EM-1 Operable Unit, Hanford; DOE, Richland, Washington.

U.S. Environmental Protection Agency (EPA). 1993. Record of Decision, USDOE Hanford 1100 Area; EPA, Richland, Washington.

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APPENDIX A

QUALITY ASSURANCE PROJECT PLAN, REMOVAL AND STOCKPILING OF CONTAMINATED SOIL, EM-1 OPERABLE UNIT HANFORD 1100 AREA, WASHINGTON

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MISCELLANEOUS ARCHITECT ENGINEER SERVICES
FOR HAZARDOUS, TOXIC, AND
RADIOLOGICAL WASTE (HTRW) PROJECTS
FOR
U.S. ARMY CORPS OF ENGINEERS
WALLA WALLA DISTRICT

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

REMOVAL AND STOCKPILING OF CONTAMINATED SOIL
EM-1 OPERABLE UNIT
HANFORD 1100 AREA, WASHINGTON

CONTRACT NO. DACW68-94-D-0001

Approved by: Ken Black for _____ Date: 1/18/95
Paul A. Karas, P.G.
Project Manager

Approved by: _____ Date: 1/19/95
RoseMary Ellersick
CDM Federal QA Director

Approved by: Charles J. Schick _____ Date: 1/18/95
Charles J. Schick, P.E.
Program Manager

CEQAPP 1.1 REQUIREMENT LOCATOR

Quality Assurance (QA) requirements established in the U. S. Army Corps of Engineers (USACE) Quality Assurance Program Plan (CEQAPP) 1.1 Revision 2 dated June 15, 1993 and in the U.S. Environmental Protection Agency (EPA) Quality Assurance Management Staff (QAMS) interim guidelines and specifications for preparing Quality Assurance Project Plans are relevant to this project. This locator section indicates the appropriate portions of this plan and the supporting documents which address each of the sixteen elements described in CEQAPP 1.1 and in QAMS 005/80.

CEQAPP 1.1 AND QAMS 005/80	REMOVAL AND STOCKPILING OF CONTAMINATED SOIL, 1100 AREA EM-1 OPERABLE UNIT
• Title /Title Page With Approval Signatures	Title Page/Approval Page
• Table of Contents	Table of Contents
• Project Description	Section 2.0
• Project Organization & Responsibility	Section 3.0
• QA Objectives	Section 5.0
• Sampling Procedures	Section 6.0
• Sample Custody	Section 7.0
• Calibration Procedures & Frequency	Section 8.0
• Analytical Procedures	Section 9.0
• Data Reduction, Validation, and Reporting	Section 10.0
• Internal Quality Control Checks	Section 11.0
• Performance and System Audits	Section 12.0
• Preventive Maintenance	Section 8.0
• Specific Routine Procedures to Assess Data Precision, Accuracy, and Completeness	Section 5.0
• Corrective Action	Section 12.0
• Quality Assurance Reports to Management	Section 12.0

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LIST OF ABBREVIATIONS AND ACRONYMS

BEHP	Bis(2-ethylhexyl)phthalate
CDM Federal	CDM Federal Programs Corporation
CLP	Contract Laboratory Program
COC	Chain-of-Custody
DOE	U.S. Department of Energy
DQCR	Daily Quality Control Report
DQOs	Data Quality Objectives
EPA	U.S. Environmental Protection Agency
ERA	Expedited Response Action
ESE	Environmental Science and Engineering, Inc.
FSP	Field Sampling Plan
GC	Gas Chromatography
HEIS	Hanford Environmental Information System
MS/MSD	Matrix Spike/Matrix Spike Duplicate
OU	Operable Unit
PARCC	Precision, Accuracy, Representativeness, Comparability and Completeness
PID	Photoionization Detector
PPE	Personal Protective Equipment
PPM	Parts per Million
QA	Quality Assurance
QC	Quality Control
QAPjP	Quality Assurance Project Plan
QAMS	Quality Assurance Management Staff
ROD	Record of Decision
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SOP	Standard Operating Procedure
SOW	Statement of Work

TPA	Tri-Party Agreement
USACE	U.S. Army Corps of Engineers
µg/kg	microgram(s) per kilogram
WED	West Division
WHC	Westinghouse Hanford Company

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1.0 INTRODUCTION

CDM Federal Programs Corporation (CDM Federal) has prepared this Quality Assurance Project Plan (QAPjP), for the U.S. Army Corps of Engineers Walla Walla District (USACE) under Contract No. DACW68-94-D-0001. This QAPjP governs activities being conducted during the removal and stockpiling of contaminated soil activities in the 1100 Area, EM-1 Operable Unit (OU) of the Hanford Site, Washington. These activities are being conducted as part of the remedial action for the 1100-EM-1 OU (EM-1) specified by the Record of Decision (ROD) (EPA 1993). This QAPjP presents the organizational structure and policies, functional activities, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the project goals and objectives. The field sampling activities presented in this QAPjP are described in more detail in the Project Work Plan, Section 4.0-Field Sampling Plan. QA/QC activities presented in this QAPjP were developed in accordance with requirements in the USACE Statement of Work (SOW) dated September 26, 1994 and subsequent modifications.

Quality assurance is defined as the integrated program designed for assuring reliability of monitoring and measurement data. QA procedures are implemented, as necessary, to ensure that all project work is performed in accordance with professional standards and USACE, U.S. Environment Protection Agency (EPA), U.S. Department of Energy (DOE) and other applicable governmental requirements and guidelines. Quality control is defined as the routine application of procedures for obtaining prescribed standards of performance in the monitoring and measuring process. All personnel generating data have the responsibility to implement procedures that assure the precision, accuracy, representativeness, comparability, and completeness of generated data are known and documented. In addition, the data quality levels (i.e. EPA Levels I, II, III, etc.) established should be consistent with the anticipated uses of the data and the project objectives. This QAPjP has been prepared to ensure that this responsibility is met uniformly throughout the duration of this project.

The following sections of the QAPjP include a discussion of project objectives and site background information; project organization and responsibility; document control; QA objectives for measurement data; proposed sampling activities and procedures; sample custody requirements; equipment operation, maintenance, calibration, and standardization procedures; analytical laboratory procedures; data quality management; QC checks and samples; and QA oversight.

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2.0 PROJECT DESCRIPTION

2.1 BACKGROUND

The 1100 Area of the DOE Hanford Reservation was placed on the National Priority List (NPL) in July 1989. The 1100 Area has been divided into four OUs based on geographic area and common waste sources. EM-1 OU encompasses an area on the southeast side of the Hanford site and lies west of Richland, Washington. The EM-1 OU contains the central warehousing, vehicle maintenance, and transportation distribution center for the entire Hanford site. The EM-1 OU underwent full-scale RI/FS studies that culminated in a September 1993 ROD. Three contaminated soil sites associated with EM-1 were targeted for remedial action by the ROD (EPA 1993). Operations at EM-1 OU have included the use of solvents, fuels, oils, and polychlorinated biphenyl (PCBs).

During the Remedial Investigation/Feasibility Study (RI/FS), three areas within EM-1 OU were determined to contain contaminants at levels that may pose potential long-term risks to human health. These areas of concern include the Discolored Soil Site, the Ephemeral Pool, and the Horn Rapids Landfill. A description of each of these areas is provided below.

Previous investigations at the Discolored Soil Site identified an area of visibly stained soil. The stained soil was determined to be the result of a spill of bis(2-ethylhexyl)phthalate (BEHP), contaminating between 99 and 336 cubic meters (130 and 440 cubic yards) of soil.

The Ephemeral Pool is a manmade depression used to collect and evaporate parking lot runoff. Previous investigations have identified the presence of PCB contamination from an unknown release at the site. It is estimated that 165 to 340 cubic yards of soil may be contaminated with PCBs.

The Horn Rapids Landfill covers approximately 50 acres and was operated as an uncontrolled landfill from the late 1940s until the 1970s. Disposal of office and construction waste, asbestos wastes, sewage sludge, and fly ash is known to have occurred at the landfill. Previous investigations have identified an area of waste material and soil contaminated with PCBs. It is believed that the PCB contamination is confined to a 58-foot square area to a depth of 2.5 feet. The expected extent of contaminated soil is 229 cubic meters (300 to 640 cubic yards).

2.2 PROJECT OBJECTIVES AND SCOPE

The characterization and remediation activities for EM-1 OU include preparing planning documents, implementing a field program, and preparing data reports. These proposed activities were developed from the USACE SOW (September 26, 1994). The objectives of the investigation are to:

- Prepare a task-specific work plan including, Sampling Plan, Health and Safety Plan and Quality Assurance Project Plan for each of the three 1100 Area sites.
- Excavate contaminated soils based on findings of previous investigations (conducted by others).
- Collect and analyze screening samples to guide the excavation process.
- Collect and analyze (in offsite laboratory) samples intended to confirm completion of the removal of contaminated materials.
- Stage and secure contaminated materials onsite.
- Prepare and submit draft and final "Technical" reports.

2.3 PROJECT SCHEDULE

The project schedule for remediation at the three EM-1 on sites anticipates a start date of January 23, 1995 for field activities, and a final technical report completion date of May 12, 1995. A more detailed project schedule is presented in the Work Plan.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITY

3.1 MANAGEMENT ORGANIZATION

CDM Federal's project management organization for this project is presented in Figure 3-1. Figure 3-2 illustrates the organization and interfaces for Washington Department of Ecology, EPA, DOE, USACE, CDM Federal and subcontractors for field activities at the 1100 Area.

Mr. Charles Schick will serve as Program Manager, having ultimate responsibility for all QA matters. The CDM Federal Project Manager, Mr. Paul Karas, is responsible for the day-to-day management and coordination of project activities. His specific responsibilities include:

- Overseeing the execution of the project and coordinating and implementing directives from the USACE.
- Coordinating all planning work, field work, and data reporting work performed as part of the remediation activities for the 1100 Area sites with the USACE.
- Maintaining a record of all pertinent discussions related to the execution of the remediation activities. This record will be entitled "Confirmation Notices." Each entry will be assigned a number, and a copy of the Confirmation Notices will be supplied to the USACE every month.
- Developing and updating (weekly) a schedule of the remediation activities. The weekly update will include changes and delays to the existing schedule, as well as rationale for the schedule modifications.
- Preparation, review, and approval of deliverables, including the QAPjP, the Work Plan, Site Safety and Health Plan, and the Draft and Final Technical Report.
- Implementing QC procedures specified in the Work Plan, QAPjP, and other project documents.
- Managing subcontractor efforts for field support activities, and coordinating laboratory needs for this task.
- Identifying and implementing necessary corrective actions.

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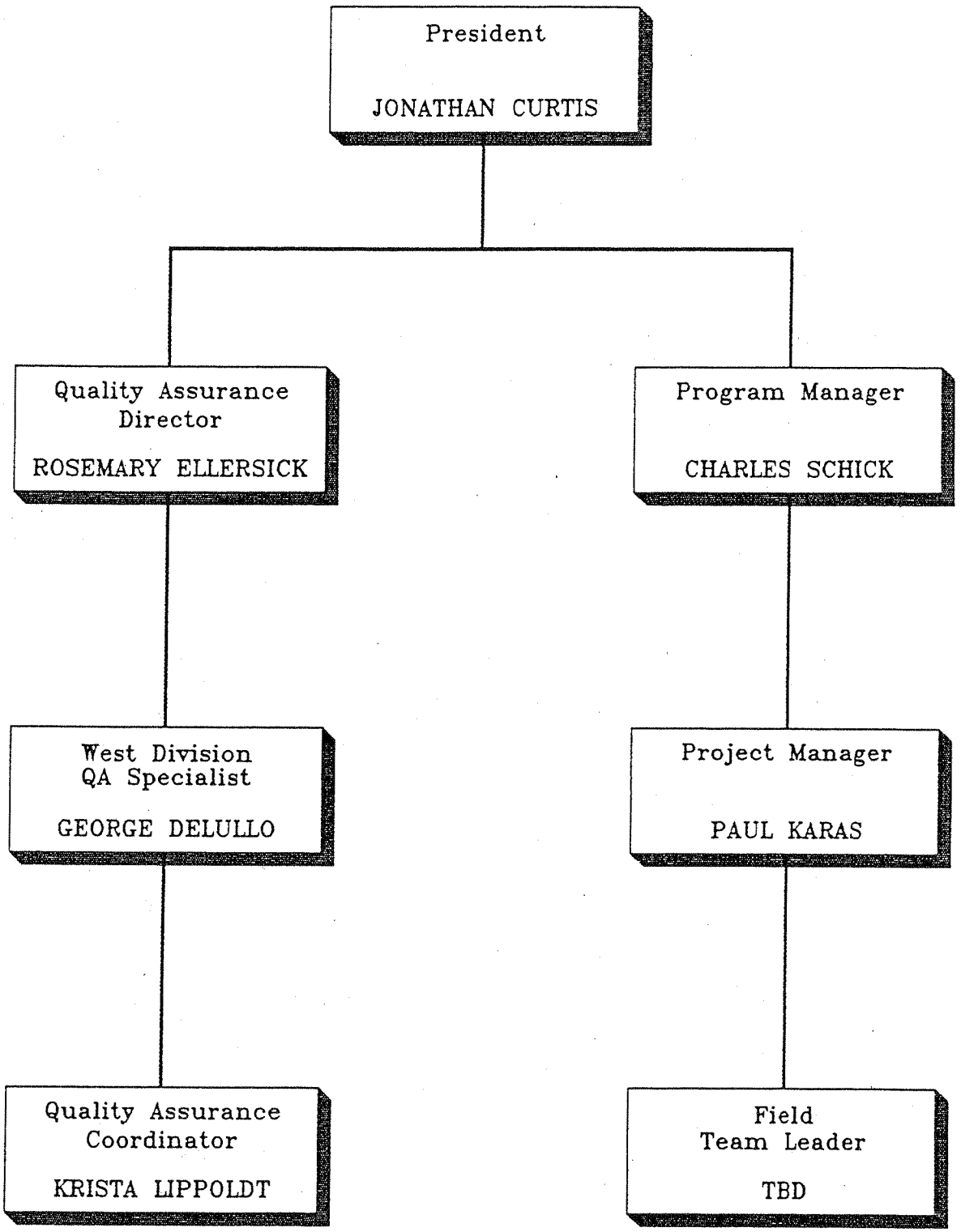

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CDM FEDERAL PROGRAMS CORPORATION

1100 AREA EM-1 OPERABLE UNIT
HANFORD
CDM PROJECT ORGANIZATION

Figure No. 7-1

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As Project Manager, Mr. Karas will also serve the role of Site Manager, as identified in the SOPs included with the Work Plan.

Other CDM Federal project staff will include the Site Safety and Health Officer and Field Team Leader.

The Field Team Leader is responsible for overseeing field operations. Specific responsibilities include:

- Implementing the field aspects of the Work Plan, QAPjP, and other project documents.
- Ensuring that all necessary information is recorded in the field logbooks.
- Communicating with the Project or Program Manager regarding resource and scheduling considerations.
- Implementing the QC measures specified in this QAPjP.
- Notifying the Project or Program Manager of significant field changes to the Work Plan, QAPjP, or other task documents on a daily basis.
- Notifying the CDM Federal QA Director or Project QA Coordinator immediately of significant problems affecting the quality of data or the ability to meet project objectives.
- Notifying the subcontractor laboratory of scheduled sample shipments.

The Site Safety and Health Officer has the following duties and responsibilities:

- Implementation and enforcement of the Site Safety and Health Plan.
- Conducting site safety checks.
- Performing air monitoring in support of site activities.
- Enforcing the Site Safety and Health Plan for subcontractor tasks.
- Assisting in the training of employees assigned to the site.
- Conducting onsite "tailgate" safety meetings.
- Enforcing the use of proper personal protective equipment (PPE) for each appropriate work zone and work task.

- Designating and enforcing the observance of support, contamination reduction and exclusion zones.

- Performing first aid and notifying appropriate authorities in emergencies.

- Performing additional tasks as necessary to ensure the health and safety of assigned project employees and subcontractors.

Project personnel will be adequately trained and will have the appropriate experience for the positions to which they are appointed. All site personnel will have the required health and safety training, as specified in the Site Safety and Health Plan. The Project Manager will consult with the USACE to ensure that all site personnel receive the required Hanford site-specific training.

3.2 QUALITY ASSURANCE ORGANIZATION

The QA Program is implemented by the CDM Federal corporate QA Director, R.M. Ellersick. The CDM Federal corporate QA Director is independent of the technical staff and reports directory to the President of CDM Federal on QA matters. The QA Director thus has the authority to objectively review projects and identify problems, and the authority to bring corporate resources to bear in solving problems, if necessary. The QA Director is responsible for directing the overall QA program for the project. Mr. George Delullo is CDM Federal's West Division (WED) QA Specialist and will review all project documents prior to submittal. Ms. Krista Lippoldt will serve as regional QA coordinator for this project. She will report to the CDM Federal WED QA Specialist on quality matters affecting this project. The CDM Federal QA organization for this project is shown in Figure 3-1.

The CDM Federal WED QA Specialist and QA Coordinator are responsible for:

- Maintaining QA oversight for the project.

- Reviewing QA sections in task reports.

- Reviewing QA/QC procedures applicable to this investigation.

- Auditing selected field and reporting activities performed by CDM Federal and subcontractors.

- Verifying any corrective actions assigned to project activities at the three EM-1 OU sites.

3.3 SUBCONTRACTORS

During the remediation activities, subcontractors will be used to assist in the implementation of removal, stockpiling and sampling activities. These subcontractors include the excavation subcontractor, the onsite analytical laboratory, and the offsite analytical laboratory. Subcontractors will report directly to the CDM Federal Project Manager.

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4.0 DOCUMENT AND RECORDS CONTROL

Document and Records Control requirements have been established in order to ensure that:

- Documents and revisions are distributed and released in a controlled manner and in accordance with USACE policy and contract requirements.
- Documents and records are kept secure, under custody where necessary, without unauthorized reproduction and/or alteration, to provide for physical accountability.
- Records are properly archived at the end of the project.

The official project files will be maintained in the CDM Federal Golden Colorado office. A working copy of the files will also be maintained in the Richland, Washington office of CDM Federal. Control of document distribution and release will be maintained by the Project Manager throughout the project. A record of distribution (date, individual, affiliation, document title, and revision) will be maintained by the Project Manager. Additional copying and distribution will not be performed without the authorization of the USACE and the CDM Federal Project Manager with the exception of internal distribution copies. Under no circumstances will any documents be released to the public without USACE, Office of Counsel, approval.

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5.0 QUALITY ASSURANCE OBJECTIVES FOR MEASUREMENT DATA

The overall QA objective for measurement data is to ensure that data of documented quality, acceptable for specified uses, are generated. QA objectives for measurement data are usually expressed in terms of precision, accuracy, representativeness, completeness and comparability. In general, data collected should be:

- Representative of actual site physical and chemical conditions.
- Comparable to previous and subsequent data and other studies.
- Complete to the extent that necessary conclusions may be reached.
- Of known quantitative statistical significance in terms of precision and accuracy, at levels appropriate for each stated data use for the project.

The following sections present information related to project and specific sampling data quality objectives; anticipated data uses and associated levels of data quality, and QA objectives.

5.1 DATA QUALITY OBJECTIVES

Data quality objectives (DQOs) are qualitative and quantitative criteria used to establish requirements for sample collection and analysis, and are based on the needs and intended uses of the data. The overall intent of DQOs is to ensure that data of appropriate type and quality are collected to support the decision-making process for a site. DQOs also establish QC limits for activities involving measurement, and they direct the level of QC performed during field activities.

The DQOs have been developed for removal and stockpiling of contaminated and associated soil activities at the three EM-1 OU sites to ensure that all soil contaminated with bis(2-ethylhexyl)phthalate (BEHP) (at the Discolored Soil Site) and polychlorinated biphenyls (PCBs) (at the Ephemeral Pool and Horn Rapids Landfill Sites) above specified action levels has been properly excavated and secured on site. Sampling DQOs have also been identified for waste characterization analyses to assure transportation and disposal requirements are met. Specific DQOs are described below.

5.2 APPROPRIATE ANALYTICAL LEVELS

Field and analytical data can be used for a number of purposes ranging from determination of the presence or absence of a potential contaminant to precise quantification of concentrations for comparison to regulatory standards or health-based criteria. To ensure that data will be usable for the intended purposes, analytical levels have been established which define data

uses and limitations for field and laboratory data. This section defines analytical levels and indicates the levels appropriate to different data uses for the planned remedial actions.

Data quality has been defined by the EPA in terms of five levels of analytical quality control. Sampling will involve the use of EPA quality Levels II, III, and IV. Only these levels are described below.

- **Level II:** Data at this level are generally obtained from field laboratories and may be sufficient for characterizing whether bulk contamination is present, determining which samples will be selected for offsite analysis, and placement of additional sampling locations. During this project, Level II data will consist of BEPH and PCB analyses (EPA SW-846 methods) on soil samples to determine the extent of excavation.

- **Level III:** Comprises all analyses performed at an offsite analytical laboratory. Level III analyses may or may not use Contract Laboratory Program (CLP) procedures, but are minimally required to use EPA-approved methods. They do not usually utilize the strict validation or documentation procedures required of CLP Level IV analysis. During this project, confirmational subsurface soil samples sent to the offsite laboratory will be analyzed for BEHP and PCBs (using EPA SW-846 Methods) at EPA QC Level III.

- **Level IV:** CLP routine analytical services generate data of Level IV quality. All analyses are performed at an offsite CLP approved laboratory following CLP protocols. Level IV is characterized by rigorous QA/QC protocols and documentation. During this project, 10-percent of all subsurface soils samples sent to the offsite laboratory will be duplicated and validated using EPA CLP protocols at EPA Quality Level IV.

5.3 OBJECTIVES FOR PRECISION, ACCURACY, COMPLETENESS, REPRESENTATIVENESS, AND COMPARABILITY

QA objectives for measurement data are usually expressed in terms of precision, accuracy, representativeness, completeness, and comparability (PARCC). The following sections define each of these terms.

5.3.1 PRECISION

Precision refers to the level of agreement among repeated measurement of the same characteristics, usually under a given set of conditions. Precision is expressed quantitatively as a measure of variability of a group of measurements compared to their average value. Precision is usually stated in terms of standard deviation or relative percent difference between measurements of the same parameter. For this project, the precision of the analytical and instrument measurement system will be assessed through the collection and analysis of

field duplicate samples and the performance of laboratory analytical replicates and matrix spike/matrix spike duplicates.

Precision will be estimated by the analysis of replicate samples and will be expressed (if three or more values are determined) as the standard deviation, which is determined according to the following equation:

$$S = \left[\Sigma \frac{(X_1 - X)^2}{n - 1} \right]^{1/2}$$

where S = standard deviation
X_1 = individual measurement result
n = number of measurements, and
X = arithmetic mean of replicate measurements.

Relative standard deviation may also be reported. If so, it will be calculated as follows:

$$RSD = 100 \frac{S}{X}$$

where RSD = relative standard deviation, expressed in percent
S = standard deviation, and
X = arithmetic mean of replicate measurement.

Precision will be estimated by calculation of relative percent difference (RPD) if only two values are determined using the following equation:

$$RPD = \frac{100 (D_1 - D_2)}{(D_1 + D_2)/2}$$

where: RPD = relative percent difference
D_1 = the larger of the two observed values
D_2 = the smaller of the two observed values

5.3.2 ACCURACY

Accuracy refers to the degree of agreement of measurement with an accepted reference or true value. Accuracy is a measure of bias in a measurement system. Sources of error that introduce bias are the sampling process, field contamination, sample preservation, sample handling, matrix, sample preparation, analysis techniques, and data reduction.

Analytical accuracy will be assessed using standard reference materials, matrix spikes, and surrogate spikes.

For QC samples and surrogate spikes:

$$Percent\ Recovery = 100\ \frac{(Measured\ Value)}{(True\ Value)}$$

For matrix spikes:

$$Percent\ Recovery = 100\ \frac{(C_1 - C_0)}{C_t}$$

where: C_o = value of the unspiked aliquot
C_1 = value of spiked aliquot, and
C_t = value for spike added.

Computer programs are used to report and store analytical data. These programs do not perform calculations. CDM Federal personnel check entry accuracy by proof-reading all output and comparing against the original laboratory data reports.

5.3.3 COMPLETENESS

Completeness is a measure of the amount of usable data (based on evaluation of field and laboratory QC information) obtained from a measurement system compared to the amount that was expected under normal conditions. A certain amount of data must be collected in order for conclusions based on that data to be deemed valid. A completeness goal of 90 percent has been established for this project.

5.3.4 REPRESENTATIVENESS

Representativeness is defined as the degree to which data accurately and precisely represent the true value of a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition intended to be characterized. Representativeness of reported results depends upon a number of considerations including, but not limited to, proper monitoring design, selection of appropriate field methodology, proper sample preparation, preservation and handling, selection and execution of appropriate analytical methodology, and proper sample identification and reporting of results.

5.3.5 COMPARABILITY

Comparability is defined as the confidence with which one data set can be compared to another. Comparability may be assessed by comparing sampling methodology, analytical methodology, and units of reported data. Comparability will be ensured through the use of standard operating procedures (SOPs) for sampling and field operations as presented in the Field Sampling Plan (FSP) section of the Work Plan. All data in a particular data set will be collected by the same methods. Data will be grouped and evaluated according to similar sampling methods, sampling media, and laboratory analytical methods. Data will be reported in comparable units. Soil concentrations will be reported in milligrams per kilogram (mg/kg) for PCBs and BEHP. The analytical laboratories will use SOPs as described in their laboratory QA Plan, which are attached as Attachment A. EPA approved methods will be used for all analyses.

5.3.6 PARCC GOALS

The proposed project specific PARCC goals for sample analysis are presented in Tables 5-1 and 5-2. These goals are based on information provided in the USACE Delivery Order Statement of Work dated September 26, 1994, and are consistent with SW-846. The detection limits presented in Tables 5-1 and 5-2 are goals for all samples collected for this project. Actual analytical detection limits for each sample analyzed may vary with analytical method, matrix type and concentration of interfering contaminants.

TABLE 5-1

DATA QUALITY OBJECTIVES FOR OFFSITE ANALYSES

Constituent	Analytical Method (SW-846)	Practical Quantitation Goals		Accuracy* (%R)	Precision* (RPD)	Completeness (%)
		Soil (mg/kg)	Water (μg/l)			
BEHP						
bis(2-Ethylhexyl)phthalate	8060	13	10	10-137	0-66	90
PCB						
Aroclor 1016	8080	0.033	1.0	69-107	0-21	90
Aroclor 1221	8080	0.033	2.0	15-178	0-20	90
Aroclor 1232	8080	0.067	1.0	10-215	0-20	90
Aroclor 1242	8080	0.044	1.0	39-150	0-20	90
Aroclor 1248	8080	0.033	1.0	38-158	0-20	90
Aroclor 1254	8080	0.033	1.0	66-122	0-23	90
Aroclor 1260	8080	0.033	1.0	58-122	0-20	90
METALS						
Arsenic	7060	0.30		68-126	±35	90
Barium	6010	1.4		58-149	±35	90
Cadmium	6010	0.34		75-137	±35	90
Chromium	6010	0.68		73-137	±35	90
Lead	6010	8.2		68-133	±35	90
Mercury	7471	0.02		93-141	±35	90
Selenium	7740	0.78			±35	90
Silver	6010	0.46			±35	90
VOLATILE ORGANIC COMPOUNDS						
Chloromethane	8240	0.010				90
Bromomethane	8240	0.010				90
Vinyl Chloride	8240	0.010				90
Chloroethane	8240	0.010				90
Methylene Chloride	8240	0.005				90
Acetone	8240	0.100				90
Carbon Disulfide	8240	0.005				90
1,1-Dichloroethene	8240	0.005		59-172	±22	90
1,1-Dichloroethane (Total)	8240	0.005				90

TABLE 5-1 (Continued)

DATA QUALITY OBJECTIVES FOR OFFSITE ANALYSES

Constituent	Analytical Method (SW-846)	Practical Quantitation Goals		Accuracy* (%R)	Precision* (RPD)	Completeness (%)
		Soil (mg/kg)	Water (μg/l)			
Trans-1,2-Dichloroethene	8240	0.005				90
Chloroform	8240	0.005				90
1,2-Dichloroethane	8240	0.005				90
2-Butanone	8240	0.100				90
1,1,1-Trichloroethane	8240	0.005				90
Carbon Tetrachloride	8240	0.005				90
Vinyl Acetate	8240	0.050				90
Bromodichloromethane	8240	0.005		62-137	±24	90
1,1,2,2-Tetrachloroethane	8240	0.005				90
1,2-Dichloropropane	8240	0.005				90
Trans-1,2-Dichloropropene	8240	0.005				90
Trichloroethene	8240	0.005				90
Dibromochloromethane	8240	0.005				90
1,1,2-Trichloroethane	8240	0.005				90
Benzene	8240	0.005		66-142	±21	90
trans-1,3-Dichloropropene	8240	0.005				90
2-Chloroethyl vinyl ether	8240	0.010				90
Bromoform	8240	0.005				90
2-Hexanone	8240	0.050				90
4-Methyl-2-pentanone	8240	0.050				90
Tetrachloroethene	8240	0.005				90
Toluene	8240	0.005		59-139	±21	90
1,1,2,2-Tetrachloroethane	8240	0.005				90
Chlorobenzene	8240	0.005		60-133	±21	90
Ethylbenzene	8240	0.005				90
Styrene	8240	0.005				90
Total Xylenes	8240	0.005				90
SEMI-VOLATILE ORGANIC COMPOUNDS						
Phenol	8270	0.660		26-90	±35	90
bis(2-Chloroethyl) ether	8270	0.660				90
2-Chlorophenol	8270	0.660		25-102	±50	90
1,3-Dichlorobenzene	8270	0.660				90
1,4-Dichlorobenzene	8270	0.660		28-104	±27	90
Benzyl Alcohol	8270	1.300				90

TABLE 5-1 (Continued)

DATA QUALITY OBJECTIVES FOR OFFSITE ANALYSES

Constituent	Analytical Method (SW-846)	Practical Quantitation Goals		Accuracy* (%R)	Precision* (RPD)	Completeness (%)
		Soil (mg/kg)	Water (µg/l)			
1,2-Dichlorobenzene	8270	0.660				90
2-Methylphenol	8270	0.660				90
bis(2-Chloroisopropyl) ether	8270	0.660				90
4-Methylphenol	8270	0.660				90
1-Nitroso-di-n-propylamine	8270	0.660		41-126	±38	90
Hexachloroethane	8270	0.660				90
Nitrobenzene	8270	0.660				90
Isophorone	8270	0.660				90
2-Nitrophenol	8270	0.660				90
2,4-Dimethylphenol	8270	0.660				90
Benzoic Acid	8270	3.300				90
bis(2-Chloroethoxy) methane	8270	0.660				90
2,4-Dichlorophenol	8270	0.660				90
1,2,4-Trichlorobenzene	8270	0.660		38-107	±23	90
Naphthalene	8270	0.660				90
4-Chloroaniline	8270	1.300				90
Hexachlorobutadiene	8270	0.660				90
4-Chloro-3-Methylphenol (para-chloro-meta-cresol)	8270	1.300		26-103	±33	90 90
2-Methylnaphthalene	8270	0.660				90
Hexachlorocyclopentadiene	8270	0.660				90
2,4,6-Trichlorophenol	8270	0.660				90
2,4,5-Trichlorophenol	8270	3.300				90
2-Chloronaphthalene	8270	0.660				90
2-Nitroaniline	8270	3.300				90
Dimethyl phthalate	8270	0.660				90
Acenapthylene	8270	0.660				90
2,6-Dinitrotoluene	8270	0.660				90
3-Nitroaniline	8270	3.300				90
Acenaphthene	8270	0.660		31-137	±39	90
2,4-Dinitrophenol	8270	3.300				90
4-Nitrophenol	8270	3.300		11-114	±50	90
Dibenzofuran	8270	0.660				90
2,4-Dinitrotoluene	8270	0.660		28-89	±47	90
Diethylphthalate	8270	0.660				90
4-Chlorophenyl-phenyl ether	8270	0.660				90

TABLE 5-1 (Continued)

DATA QUALITY OBJECTIVES FOR OFFSITE ANALYSES

Constituent	Analytical Method (SW-846)	Practical Quantitation Goals		Accuracy* (%R)	Precision* (RPD)	Completeness (%)
		Soil (mg/kg)	Water (μg/l)			
Flourene	8270	0.660				90
4-Nitroaniline	8270	3.300				90
4,6-Dinitro-2-methylphenol	8270	3.300				90
N-Nitrosodiphenylamine	8270	0.660				90
4-Bromophenol-1-phenol ether	8270	0.660				90
Hexachlorobenzene	8270	0.660				90
Pentachlorophenol	8270	3.600		17-109	±47	90
Phenánthrene	8270	0.660				90
Anthracene	8270	0.660				90
Di-n-Butylphthalate	8270	0.660				90
Fluoranthene	8270	0.660				90
Pyrene	8270	0.660		35-142	±36	90
Butylbenzylphthalate	8270	0.660				90
3,3-Dichlorobenzidine	8270	1.300				90
Benzo(a)anthracene	8270	0.660				90
bis(2-Ethylhexyl) Phthalate	8270	0.660				90
Chrysene	8270	0.660				90
Di-n-octyl phthalate	8270	0.660				90
Benzo(b)fluoranthene	8270	0.660				90
Benzo(k)fluoranthene	8270	0.660				90
Benzo(a)pyrene	8270	0.660				90
Indeno(1,2,3-cd)pyrene	8270	0.660				90
Dibenzo(a,h)anthracene	8270	0.660				90
Benzo(g,h,i)perylene	8270	0.660				90
PESTICIDES		Soil (mg/kg)	Water (mg/l)			
Alpha-BHC	8080	0.002				90
Beta-BHC	8080	0.004				90
Delta-BHC	8080	0.006				90
Gamma-BHC (Lindane)	8080	0.0027		46-127	±50	90
Heptachlor	8080	0.002		35-130	±31	90
Aldrin	8080	0.0027		34-132	±43	90
Heptachlor Expoxide	8080	0.0556				90
Endosulfan I	8080	0.0094				90

TABLE 5-1 (Continued)

DATA QUALITY OBJECTIVES FOR OFFSITE ANALYSES

Constituent	Analytical Method (SW-846)	Practical Quantitation Goals		Accuracy* (%R)	Precision* (RPD)	Completeness (%)
		Soil (mg/kg)	Water (mg/l)			
Dieldrin	8080	0.0013		31-134	±38	90
4,4-DDE	8080	0.0027				90
Endosulfan II	8080	0.0027				90
4,4-DDD	8080	0.0075				90
Endrin	8080	0.0040		42-139	±45	90
Endosulfan Sulfate	8080	0.0442		42-139	±45	90
4,4-DDT	8080	0.0080		23-134	±50	90
Methoxychlor	8080	0.1179				90
Endrin Aldehyde	8080	0.0154				90
Chlordane	8080	0.0094				90
Toxaphene	8080	0.1608				90
TCLP						
Chlordane	8080	0.0094				90

* Accuracy and precision requirements are the same for water and soil analyses.

TABLE 5-2

DATA QUALITY OBJECTIVES FOR ONSITE ANALYSES

Constituent	Analytical Method (SW-846)	Practical Quantitation Goals Soil (mg/kg)	Accuracy (%R)	Precision (RPD)	Completeness (%)
bis(2-ethylhexyl)phthalate	8060	13	10-131	0-66	90
PCB					
Aroclor 1016	8080	.033	69-107	0-30	90
Aroclor 1221	8080	.033	15-178	0-30	90
Aroclor 1232	8080	.067	10-215	0-30	90
Aroclor 1242	8080	.044	39-150	0-30	90
Aroclor 1248	8080	.033	38-158	0-30	90
Aroclor 1254	8080	.033	66-122	0-30	90
Aroclor 1260	8080	.033	58-122	0-30	90

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6.0 PROPOSED SAMPLING ACTIVITIES AND PROCEDURES

6.1 SUMMARY OF PROPOSED FIELD ACTIVITIES

The remediation activities at the 1100 Area EM-1 site will consist of excavation within previously identified areas, soil sampling and field analysis, and confirmational sampling and offsite analyses. Soil contaminant data are needed to guide the excavation of the three EM-1 OU sites. Confirmational samples of subsurface soils will be collected and analyzed offsite.

The proposed sampling locations will be from excavations within the previously identified areas. The areas selected for excavation will be field staked prior to starting the work.

Excavations will be performed by track hoe. Excavated materials will be screened visually. Any potentially contaminated materials will be placed on 10 mil thick visqueen sheets. Contaminated soil stockpiles will be covered and secured to minimize fugitive dust.

At the direction of the USACE, soil samples will be collected and analyzed by an onsite laboratory. Excavation and field testing will continue until contaminates have been removed to below action levels. The number of soil samples to be collected will be determined in the field.

6.2 SAMPLING PROCEDURES

Sampling and measurement procedures to be used for this project are in accordance with CDM Federal's SOPs. These procedures are presented in Appendix E of the Work Plan. Appendix E of the Work Plan includes procedures for the following field operations:

- Soil sampling.
- Equipment decontamination.
- Field logbook content and control.
- Sample labeling, packaging, and shipping.
- Sample custody.
- Documentation.
- Use of field equipment.

A copy of the following documents will be available to personnel in the field:

- This QAPjP.

- Work Plan.
- CDM Federal SOPs.
- Site Safety and Health Plan.
- Equipment Operation and Calibration Instructions.

Sample container types, preservation requirements, preparation requirements, and special handling requirements are defined in Table 6-1 of *Remedial Design Field Sampling Plan for the 1100 Area, Hanford Site* (USACE 1994). Contained in Section 4.0 of the same document are the sample identification protocols to be used in this investigation.

6.2 PROCEDURE CHANGES

Field changes in the requirements established by any of the planning documents may be permitted in response to unforeseen field conditions, provided they are documented, justified, reviewed, and approved as described in Section 4.3.2 of the *Quality Assurance Project Plan for Field Investigations Supporting Remedial Design/Remedial Action Activities in the 1100 Area* (USACE 1994).

7.0 SAMPLE CUSTODY

7.1 CHAIN-OF-CUSTODY REQUIREMENTS

A required part of any sampling and analytical program is ensuring the integrity of the sample from collection to final disposition. This includes the ability to trace the possession and handling of samples from the time of collection, through analysis and reporting of results, and final disposition. This documentation of sample history constitutes "chain-of-custody". Components of the chain-of-custody (COC) records include the field documentation (sample labels, custody seals, a field logbook, and COC records) and laboratory documentation (COC record, laboratory sample sign-in/sign-out logbook, laboratory sample storage records, and laboratory sample disposal records).

A sample is considered to be under a person's custody if it is: (1) in a person's physical possession; (2) in view of the person after he/she has taken possession; or, (3) secured by that person so that no one can tamper with the sample. All samples, including field screening and confirmational samples will be subject to the COC requirements.

7.1.1 SAMPLE IDENTIFICATION

Samples will be identified through the use of a coding system to identify sample locations and sample replicates (duplicates). The coding system will ensure that samples are uniquely identified, and will provide a tracking procedure to facilitate data retrieval. The sample coding system is described in Section 4.0 of the *Remedial Design Field Sampling Plan for the 1100 Area, Hanford Site* (USACE 1994). Each sample will also be labeled with a Hanford Environmental Information System (HEIS) number to be provided by the USACE.

7.1.2 SAMPLE LABELS

Sample labels are necessary to prevent misidentification of samples. All samples will be labeled in accordance with CDM Federal's SOPs presented in Appendix E of the Work Plan.

7.1.3 CHAIN-OF-CUSTODY

To establish the documentation necessary to trace sample possession from the time of collection, a chain-of-custody record will be completed for every sample and accompany every sample to the laboratory (onsite and offsite). CDM Federal's Chain-of-Custody SOP is presented in Appendix E of the Work Plan.

7.1.4 CUSTODY SEALS

Custody seals are used to detect unauthorized tampering with samples following sample collection up to the time of analysis. Custody seals will be prepared and used in accordance with CDM Federal's SOPs contained in Appendix E of the Work Plan

7.1.5 FIELD LOGBOOK

All information pertinent to a field survey or sampling effort will be recorded in a field logbook. Field logbook requirements are presented in CDM Federal's SOPs in Appendix E of the Work Plan.

7.1.6 LABORATORY CUSTODY PROCEDURES

Samples will be transported to both an onsite field laboratory and shipped to an offsite laboratory for analysis. All samples will be accompanied by a chain-of-custody record. Samples will be received by the laboratory sample custodian. Upon receipt by the laboratory, each sample shipment will be inspected to assess the condition of the shipping container and the individual samples. The enclosed chain-of-custody records will be cross-referenced with all the samples in the shipment; the chain-of-custody record will then be signed and placed in the project file. A unique laboratory number will be assigned to each sample upon receipt. This number identifies the sample through all further handling. It is the laboratory's responsibility to maintain internal log books and records that maintain the chain-of-custody throughout sample preparation and analysis and data reporting.

7.2 SAMPLE SHIPMENT

Each sample shipped to an offsite laboratory will be packaged in accordance with CDM Federal's SOPs presented in Appendix E of the Work Plan. Field personnel will telephone the laboratory following shipment and provide the following information:

- The number and types of samples collected.
- Air carrier and airbill number(s).
- Estimated date and time of arrival.
- Other pertinent information, including special handling instructions, changes in scheduled sampling activity, or deviations from established sampling procedures.

8.0 EQUIPMENT OPERATION, MAINTENANCE, CALIBRATION, AND STANDARDIZATION

All field equipment used during this project will be operated, maintained, calibrated and standardized in accordance with manufacturer's specifications and CDM Federal's SOPs.

Each piece of field equipment will have a protocol package that contains:

- Operating Procedure.
- Routine preventative maintenance procedures including a list of critical spare parts to be available in the field.
- Calibration methods, frequency and description of calibration solutions.
- Standardization procedures (traceability of standards to nationally recognized samples).
- Precision and accuracy assessment procedures.

At present, the only measurement and test equipment which is expected to be used onsite is a dust monitor. This instrument is necessary for health and safety monitoring purposes.

Operating procedures for this equipment are included in Appendix E of the Work Plan and will be available onsite.

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9.0 ANALYTICAL PROCEDURES

The purpose of the contracted project laboratories is to provide analytical data of consistent, known, and documented quality which can be used to determine the nature and extent of contamination. Project protocols and methodologies are designed to provide data of known quality in strict accordance with approved quality assurance procedures.

During the characterization and remediation of EM-1, samples will be analyzed by both an onsite laboratory and an offsite laboratory. Data from the field screening will be EPA QC Level II data. Based on the results of the field screening, confirmation samples will be collected and analyzed by Environmental Science and Engineering Inc. (ESE), located in Gainesville, Florida, using EPA QC Level III data requirements. In addition, ten percent of all confirmation samples will be analyzed and validated using equivalents EPA Contract Laboratory Program Protocol (EPA QA/QC Level IV).

The USACE North Pacific Division Laboratory in Troutdale, Oregon, is the QA laboratory designated for this project. Addresses for both laboratories are provided in the Work Plan.

The subcontractor laboratories will adhere to EPA methods as described in their laboratory QA Plans. All specified procedures will be followed exactly without deviation, unless modifications are specifically authorized by CDM Federal and the USACE.

The following sections discuss the field analytical parameters, offsite analytical procedures, and general laboratory requirements to be followed.

9.1 FIELD ANALYTICAL PARAMETERS

Both onsite and offsite analytical laboratories will analyze soil samples for the following parameters:

- Bis(2-ethylhexyl)phthalate (BEHP) by SW-846 Method 8060.
- Polychlorinated Biphenyls (PCBs) by SW-846 Method 8080.

In addition, the offsite laboratory will analyze QC water samples (equipment rinsate) and waste soil samples.

9.2 LABORATORY ANALYTICAL PROCEDURES

Soil samples will be sent to an offsite laboratory as part of this field program. The analyses to be performed by the offsite laboratory will reflect EPA QC Level III quality, except for 10 percent which will reflect EPA QC Level IV equivalent quality. The laboratory results will be evaluated against the goals and objectives set forth in Section 5.0. Additional information is detailed in the Laboratory QA Plan.

QC water samples will be analyzed for the same parameters as onsite soil samples (BEHP and PCBs). Waste soils will be analyzed for RCRA metals, volatile organic compounds, semi-volatile organic compounds, PCBs/Pesticides and TCLP-chlordane only. Table 9-1 summarizes the anticipated samples and analytical methods.

9.3 LABORATORY QC CHECKS

The following laboratory QC check samples will be performed, as appropriate:

- Method blanks
- Blank/spikes
- Surrogates
- Matrix spikes and matrix spike duplicates
- Laboratory duplicates
- Initial and continuing calibration checks.

If the laboratory QC procedures indicate a problem with an analysis, the laboratory will notify CDM Federal immediately to determine what type of corrective action will be required. CDM Federal will in turn notify USACE personnel.

9.4 LABORATORY EQUIPMENT CALIBRATION

Laboratory calibration procedures are specified in the EPA-approved analytical methods and in the laboratory's QA Plan.

9.5 LABORATORY CUSTODY

The following laboratory custody procedures will be followed:

- Designation of a sample custodian.
- Correct completion by the sample custodian of the chain-of-custody record, including documentation of sample condition upon receipt.
- Laboratory sample tracking and documentation procedures.
- Secure sample storage (in the appropriate environment-refrigerated, dry, etc.), maintenance of sample storage records, maintenance of intra-laboratory sample custody records, documentation of proper sample disposal and disposal date.

- Proper data logging and documentation procedures including custody of all original laboratory records.

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TABLE 9-1

ANTICIPATED SAMPLING AND OFFSITE ANALYSES

Site	Sample Type	QC Level	Matrix	Quantity	Analyses (SW-846)
Discolored Soil Site	Confirmation Sample	III IV	Soil Soil	8 1	BEHP (8060) BEHP (8060)
	Confirmation Sample (QC)	III	Soil	1	BEHP (8060)
	Equipment Rinsate	III	Water	1	BEHP (8060)
	Waste Soil	III	Soil	2	RCRA Metals (6000/7000), Volatile organic compounds (8240), Semi-volatile organic compounds (8270), Pesticides/PCBs (8080), TCLP-Chlordane only (8080).
Ephemeral Pool Site	Confirmation Sample	III IV	Soil Soil	16 2	PCB (8080) PCB (8080)
	Confirmation Sample (QC)	III	Soil	2	PCB (8080)
	Equipment Rinsate	III	Water	2	PCB (8080)
	Waste Soil	III	Soil	2	RCRA Metals (6000/7000), Volatile organic compounds (8240), Semi-volatile organic compounds (8270), Pesticides/PCBs (8080), TCLP-Chlordane Only (8080).

TABLE 9-1 (continued)

ANTICIPATED SAMPLING AND OFFSITE ANALYSES

Site	Sample Type	QC Level	Matrix	Quantity	Analyses (SW-846)
Horn Rapids Landfill	Confirmation Sample Confirmation Sample	III IV	Soil Soil	8 1	PCB (8080) PCB (8080)
	Confirmation Sample (QC)	III	Soil	1	PCB (8080)
	Equipment Rinsate	III	Water	1	PCB (8080)
	Waste Soil	III	Soil	2	RCRA Metals (6000/7000), Volatile organic compounds (8240), Semi-volatile organic compounds (8270), Pesticides/PCBs (8080), TCLP-Chlordane only (8080).

10.0 DATA QUALITY MANAGEMENT

To ensure that data management activities provide an accurate and controlled flow of data, it is important that data handling and reporting steps be defined and implemented. Data management procedures are applicable to field and laboratory-generated data. The following sections present a description of field and laboratory data recording, validation, reduction, and reporting for this project.

10.1 DATA RECORDING AND REDUCTION

Sampling data will be produced through visual observations, and performance of chemical analyses. All field activities, direct reading instruments, and measuring devices will be used in accordance with SOPs in the Work Plan and specifications in equipment manufacturers' operations and maintenance manuals, as appropriate.

Field observations, direct reading instrument responses, and other measurements will be recorded in field logbooks. The Field Team Leader will be responsible for ensuring that all necessary data and information are incorporated into the logbooks while field activities are occurring. All sample identification designations will be cross referenced to their HEIS number in the logbook.

The data recorded in logbooks and forms will be transferred by CDM Federal staff to tables, figures, or logs. Some data will be entered onto spread sheets to facilitate data analysis. The Project Manager will be responsible for data transfer activities including instituting QC measures to ensure that data transfers have been performed accurately. The Project Manager will also check the analytical laboratory data for completeness and reasonableness. Raw laboratory data will be reconciled with field identifiers and transferred from the laboratory reports to spread sheets. All data transferred will be checked by the CDM Federal project staff at least once for completeness and accuracy of transfer.

10.2 PROCEDURE FOR OUTLIERS

All data collected, whether analytical, field measurement, or observation, will be reviewed by the Project Manager to look for values or other conditions that do not reflect what is expected or known for the site. Analytical data outliers will be discussed with the analytical laboratory to determine if the outlier is a result of laboratory error. Field measurements and observations will be checked versus the field log and records and discussed with the individuals who collected the data to determine the possibility of error. If the outlier cannot be confirmed, it will be flagged and reported as such.

10.3 ANALYTICAL DATA REPORTING

For samples subject to equivalent Level IV QC reporting requirements, analytical data reporting will be the full CLP equivalent data package. This will include results from initial

and continuing calibration, matrix spikes, matrix spike duplicates, blanks, laboratory duplicates, surrogate recoveries, sample chromatograms, mass spectra, and tuning data. For EPA methods not defined by the CLP, the data report will include calibration information, results from method blanks, blank/spikes, matrix spikes, and matrix spike duplicates. Sample chromatograms and plotted control charts associated with the blank/spikes will be presented with the data.

For samples subject to Level III QC reporting requirements, analytical reporting will include results from initial and continuing calibration, matrix spikes, matrix spike duplicates, blanks, laboratory duplicates, and surrogate recoveries.

For samples subject to Level II QC reporting requirements, analytical reporting will include results from initial and continuing calibration, matrix spikes, blanks, laboratory duplicates, and surrogate recoveries.

10.4 TECHNICAL REPORTING

Technical reporting will be in the form of Daily Quality Control Reports (DQCRs) and Draft and Final Close-Out Reports. Format and content of these reports are described in Section 1.4.3 of the Work Plan.

10.5 DATA VALIDATION

Laboratory analytical data will not be formally validated during this investigation. However, laboratory information necessary to perform validation will be included in laboratory sample data packages. In addition, the analytical laboratory will be required to flag data that does not meet QC requirements for the EPA methods used.

11.0 QUALITY CONTROL CHECKS AND SAMPLES

The QC samples being sent to the offsite laboratory will include field duplicates and rinsate blanks. The QC samples sent to the onsite laboratory will include field duplicates. Additional QA samples will be sent to the North Pacific Division USACE designated laboratory. Field duplicate samples will be used as a check of laboratory and field sampling procedures. The following paragraphs present information on these QC samples.

Field Duplicates: Duplicate samples will be collected at a frequency of approximately 10 percent, thus a minimum of one sample out of the ten to be collected will be a field duplicate. The North Pacific Division QA laboratory will also receive duplicates at a frequency of approximately 10 percent. Duplicates will be collected, numbered, packaged, and sealed in the same manner as the other samples. The samples will not be identified as duplicates on the sample labels to the offsite laboratory. The identity of the sample as a duplicate will therefore be unknown to the laboratory personnel performing the analyses. Duplicate samples will be noted in the field logbook for documentation and verification purposes.

Rinsate Blanks: Equipment rinsate blanks will be comprised of the final analyte-free rinse water from decontamination of sampling equipment. These blanks are a check to verify the effectiveness of decontamination procedures. Rinsate samples will be collected at a minimum frequency of one in 20 samples.

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12.0 QUALITY ASSURANCE OVERSIGHT

12.1 AUDITS

Requirements for audits are the decision and responsibility of the CDM Federal QA Director. Audits are scheduled on a quarterly basis by the CDM Federal QA Director. All audits will meet the requirements stated in the CDM Federal Quality Assurance Manual, Part One, Revision Number 1, January 15, 1993 and Part Two, Revision Number 5, October 15, 1993 and will conform to the USACE CEQAPP 1.1 dated June 15, 1993. System audits are qualitative reviews of project activity and QC measure implementation to check that the overall QA program is functioning. These may include field, laboratory, and office audits. No performance or system audits are currently planned for this delivery order.

Following an audit, the QA Director or designated audit staff will develop an audit report that summarizes the audit findings, including those areas found to be in non-conformance (if any). This report will be submitted to the CDM Federal Project Manager to identify appropriate corrective actions. Resolution of corrective action requests is addressed in the CDM Federal QA Manual, Part Two (1993).

12.2 CORRECTIVE ACTION REQUIREMENTS

Throughout this QAPjP, various control limits have been specified that, if exceeded, require corrective action. These limits include target levels for precision, accuracy, completeness, QC sample types, and criteria for representativeness and comparability. The need for corrective action may also result from performance or system audits. USACE will be notified immediately if data do not meet the DQOs.

Responsibility and procedures for identifying and reporting nonconformances are described in the CDM Federal QA Manual Parts One and Two. Nonconformances with the established quality control procedures will be identified and no additional work (which is dependent upon the nonconforming activity) will be performed until the nonconformance is corrected. In all cases, corrective action procedures will be implemented to the satisfaction of the USACE.

If a nonconformance or deficiency is identified during routine work or during a CDM Federal audit, the USACE will be notified, and corrective action will be initiated by CDM Federal and its subcontractors, as applicable. The corrective action steps include:

- Identify and define the problem;
- Assign responsibility for investigating the problem;
- Determine corrective action to eliminate the problem;
- Assign responsibility for implementation of the corrective action;

- Implement the corrective action;
- Verify that the corrective action has eliminated the problem; and
- Document the problem identified, the corrective action taken, and its effectiveness in eliminating the problem.

The person identifying a deficiency or nonconformance initiates a corrective action request and submits it to the CDM Federal QA Director, who assigns responsibility for responding to the request. The project QA Coordinator is responsible for following up on the request and monitoring the implementation of appropriate corrective actions.

Corrective action procedures that might be implemented from audit results or detection of unacceptable data are developed on a case-by-case basis. Such actions may include altering procedures in the field, re-sampling and/or retesting, obtaining new equipment or supplies, or providing additional staff training.

12.3 QA REPORTS TO MANAGEMENT

Periodic reporting keeps CDM Federal management, project management, and clients informed of QA implementation. Monthly reports prepared by the QA staff will summarize the following:

- Activities conducted during the reporting period.
- Audits conducted.
- Quality problems found.
- Corrective actions taken.
- QA project plans reviewed and approved during the reporting period.

13.0 REFERENCES

CDM Federal Programs Corp. 1993. Quality Assurance Manual.
Part One - Quality Assurance Program, Revision 1 , January 15, 1993.
Part Two - Quality Procedures, Revision 5, October 15, 1993.

U.S. Army Corps of Engineers (USACE). Quality Assurance Program Plan (CEQAPP) 1.1, Revision 2, June 15, 1993.

U.S. Army Corps of Engineers (USACE). 1994a. Remedial Design Field Sampling Plan for the 1100 Area Hanford Site.

U.S. Army Corps of Engineers (USACE). 1994b. Quality Assurance Project Plan for Field Investigations Supporting Remedial Design/Remedial Action Activities in the 1100 Area.

U.S. Department of Energy (DOE). 1993. Draft Remedial Investigation/Feasibility Study for the 1100-EM-1 Operable Unit, Hanford.

U.S. Environmental Protection Agency (EPA). 1993. Record of Decision, USDOE Hanford 1100 Area.

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ATTACHMENT A
LABORATORY
QUALITY ASSURANCE MANUAL

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LCQAP August 1993

Laboratory Comprehensive Quality Assurance Plan

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ESE, 1994

APPROVALS

This Quality Assurance/Quality Control (QA/QC) Manual has been read and understood and approved for use in the Gainesville Laboratory of Environmental Science and Engineering, Inc. (ESE), Southeast Region.

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