



- 3.1.4.4 Treatment System Operation
- 3.1.4.5 Operating Parameters Affecting Treatment Cost or Performance
- 3.1.5 Treatment System Performance
  - 3.1.5.1 Treatment Performance Data
  - 3.1.5.2 Data Assessment and Deviations from Standard Performance
  - 3.1.5.3 Material Balances
  - 3.1.5.4 Target Contaminant and Operating Conditions
  - 3.1.5.5 Target Contaminant and Removal Efficiencies
  - 3.1.5.6 Characteristics of Treated Material
- 3.1.6 Performance Data Quality
- 3.1.7 Treatment System Cost
  - 3.1.7.1 HTRW - Remedial Action Work Breakdown Structure
  - 3.1.7.2 Pre-Treatment Costs
  - 3.1.7.3 Costs Directly Associated with Treatment
  - 3.1.7.4 Post-Treatment Costs
- 3.1.8 Regulatory/Institutional Issues
- 3.1.9 Observations and Lessons Learned
  - 3.1.9.1 Cost Observations and Lessons Learned
  - 3.1.9.2 Performance Observations and Lessons Learned
  - 3.1.9.3 Other Observations and Lessons Learned

-- End of Section Table of Contents --



the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 1110-1-19 (2001) A Guide to Preparing and Reviewing Remedial Action Reports of Cost and Performance

ER 1110-3-1301 (1999) Cost Engineering Policy Requirements for Hazardous, Toxic Radioactive Waste (HTRW) Remedial Action Cost Estimate

U.S. ARMY ENVIRONMENTAL CENTER (USAEC)

USAEC SFIM-AEC-ET-CR-97053 (1997) Federal Remediation Technologies Screening Matrix and Reference Guide, Third Edition (NTIS PB98-108590)

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 542-B-98-007 (1998) Guide to Documenting and Managing Cost and Performance Information for Remediation Projects

1.2 DESCRIPTION OF WORK

The work shall consist of the preparation of a report containing cost and performance data from the [\_\_\_\_\_] environmental remediation project. A [partial] [draft] [\_\_\_\_\_] Cost and Performance report [is attached to this specification] [is included in EP 1110-1-19, Appendix A] [\_\_\_\_\_] and shall be utilized to comply with this specification.

1.2.1 Report Format

The report shall be prepared in accordance with EPA 542-B-98-007. The presentation requirements of the report shall be: 1) Word processing format: MS Word, [12] [\_\_\_\_\_] point font size, typeface. 2) Page layout: 215 x 280 mm 8-1/2 x 11 inch size paper; [25] [\_\_\_\_\_] mm [1] [\_\_\_\_\_] inch margins; portrait or landscape orientation; bold headings, footnotes, page

numbering. 3) Tables and charts software: spreadsheets, groundwater modeling. 4) Computer file: the document shall also be presented in Hypertext Mark-up Language (HTML 2.0) saved as an ASCII file; postscript drawings shall be linked to document text.

#### 1.2.2 Drawing Format

Drawings shall follow the same format, including software, as that used in the investigative and design phases of the project. Drawings shall be in post script [[\_\_\_\_].ps] [[\_\_\_\_].eps] [or] [[\_\_\_\_].gif] format.

#### 1.2.3 Quality Control

A project-specific quality control program shall be developed to detail the procedures for preparation of the report and for correction of deficiencies. The Contractor shall arrange for conferences to coordinate the work or to sequence related work for sensitive and complex items as needed and as requested by the Contracting Officer.

#### 1.3 SUBMITTALS

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NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for [Contractor Quality Control approval.] [information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the

Government.] The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Report Outline[; G][; G, [\_\_\_\_\_]]

[Three] [\_\_\_\_\_] copies of the report upon completion of each of the following stages: Outline, Draft Report, and Final Report. The report shall be provided to [Contracting Officer] [\_\_\_\_\_]. ASCII file of report shall be provided to [Contracting Officer] [HTRW CX] [\_\_\_\_\_].

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 REPORT OUTLINE

The report outline shall be in accordance with EP 1110-1-19.

3.1.1 Executive Summary

The Executive Summary shall contain a brief overview of the Cost and Performance Report. It shall include [a brief description of the historical activities that generated the need for environmental restoration,] [a brief summary of the appropriate regulatory framework under which the cleanup is to occur,] [the remedial technology specified,] [the date, number and title of decision document,] [any special sequencing and scheduling milestones,] [definitions for standard terminology used in the preparation of the report,] [average characteristics of the contaminated media pre- and post-treatment,] [and] [the cost breakdown for the complete remediation].

3.1.2 Site Information

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**NOTE: Site information data will be provided by  
USACE and/or design contractor.**  
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Information developed prior to remediation is [included] [\_\_\_\_\_].

3.1.2.1 Type of Action

It shall be stated whether the cleanup to be performed is an entire site remediation or intermediate remedial project.

3.1.2.2 Period of Operation

The dates of start-up, shut-down, periods of retreatment, partial operation, inactivity and operation of the treatment system shall be indicated in the report.

3.1.2.3 Quantity of Material Treated During Application

The estimated quantity of material treated during the remedial or removal action shall be indicated. For ex-situ or in-situ treatment, the estimated volume of material treated shall be determined as specified in the

respective technical specification section and shall be noted in the report.

#### 3.1.2.4 Performance Objectives

The clean-up goals associated with this project shall be shown in a bulletized format.

#### 3.1.2.5 Site Logistics/Contacts

The addresses and telephone numbers shall be listed for the [Project Manager,] [Regulatory Agency Contacts,] [and] [Vendors] involved in the cleanup activities.

#### 3.1.3 Matrix and Contaminant Description

##### 3.1.3.1 Matrix Identification

The type of matrix treated shall be reported using the standard terminology contained in EP 1110-1-19.

##### 3.1.3.2 Site Geology/Stratigraphy

The site geology/stratigraphy narrative shall provide a description of the site soils and geology. This description shall include the areal and vertical (stratigraphy) variability in the soils, soil classifications and particle-size distributions. Depth to groundwater, depth to bedrock, and thickness of overburden soil shall be included.

##### 3.1.3.3 Contaminant Characterization

The primary contaminant and the extent of vertical and areal contamination shall be identified in this section. Other contaminants which may affect treatment shall be noted.

##### 3.1.3.4 Contaminant Properties

The properties of contaminants present at the remediation site shall be reported as a summary of the results from the Sampling and Analysis Plan.

##### 3.1.3.5 Nature and Extent of the Contaminants

Descriptions of location, nature, and extent of contamination by text and/or appropriate contract drawings shall be provided.

##### 3.1.3.6 Matrix Characteristics Affecting Treatment Cost or Performance

The measurement procedure used for each parameter shall be identified. Provide the measurement, the procedure to obtain the measurement, and the effect on cost and performance for each parameter as shown in Tables 1 and 3 of EP 1110-1-19.

#### 3.1.4 Treatment System Description

Treatment technologies shall be described using terminology from USAEC SFIM-AEC-ET-CR-97053 and EPA 542-B-98-007 or other approved similar terminology in areas where those documents are incomplete.

#### 3.1.4.1 Primary Treatment Technology Types

Primary treatment technology types shall be listed for each contaminant matrix using standard terminology and the listing of primary treatment technologies in EP 1110-1-19.

#### 3.1.4.2 Supplemental Treatment Technology Types

Pre-treatment and Post-treatment technology types shall be listed for each matrix using standard terminology and the listing of supplemental treatment technologies in EP 1110-1-19.

#### 3.1.4.3 Time Line

A tabular or Gantt chart form specifying the major tasks associated with the remediation shall be provided. This time line shall include key milestones such as treatability testing; design completion; site preparation; site mobilization; excavation; treatment start date; adjustment dates; submittal dates, and demobilization. The time line shall initiate at the onset of remedial investigations and terminate at completion of demobilization from the site. The projects critical path shall be designated on the time line.

#### 3.1.4.4 Treatment System Operation

A completion Process Flow Diagram shall be provided in the report and shall include an overall schematic of the treatment system and each treatment unit process. A description of system operations shall include personnel requirements for operating the system, the approach used to operate the system over the course of the remediation, and the health and safety requirements including level of personal protective equipment required.

#### 3.1.4.5 Operating Parameters Affecting Treatment Cost or Performance

A table presenting the major operating parameters affecting cost and performance for the primary treatment technologies and the values measured for each parameter shall be provided. Site-specific items such as number of samples, number of wells, and other specific parameters that may affect the cost of operation shall be included in the report in accordance with Table 4 of EP 1110-1-19.

#### 3.1.5 Treatment System Performance

##### 3.1.5.1 Treatment Performance Data

The pre-treatment and post-treatment contaminant concentrations in the soil or groundwater shall be reported. The number and type of samples collected, management or reduction of sampling results, and the method number of the laboratory analysis shall be presented in a table. For in-situ technologies, information shall be provided for separate locations using cross-referenced site plans and tables. Analytical results shall be presented in tabular format using the following conventions for reporting data: mass/volume for contaminant levels in off-gas; mass/mass for solids; mass/volume for contaminant levels in water, and ND (DL) with footnote saying: not detected at levels above the detection limit (reported laboratory detection limit shown in parentheses).



#### 3.1.5.2 Data Assessment and Deviations from Standard Performance

The available performance data shall be described and discussed in terms of whether cleanup goals were met and whether treatment performance varied during the course of the remediation. An evaluation of the performance of the treatment system shall be included in the report. The information contained in the following paragraphs shall be included.

#### 3.1.5.3 Material Balances

Material balances shall be performed around the treatment unit; the data shall be linked to specific operating conditions. It shall be stated whether balances are required for a specific process unit, the complete train of processes or both.

#### 3.1.5.4 Target Contaminant and Operating Conditions

Target contamination concentrations prior to treatment shall be matched with concentrations in treated material. These data shall be linked to specific operating conditions.

#### 3.1.5.5 Target Contaminant and Removal Efficiencies

Target contaminant concentrations prior to treatment shall be compared with concentrations in treated material, to determine removal efficiencies and average concentrations.

#### 3.1.5.6 Characteristics of Treated Material

The physical and chemical state of the treated material shall be assessed using methods appropriate for the material.

#### 3.1.6 Performance Data Quality

The narrative shall provide an overall assessment of the quality control of the available performance data. A brief description of the Quality Assurance Project Plan (QAPP) for the remediation effort shall include how checks were made on the sample analysis and interpretation, and a discussion of the use of statistics in sampling program design and data interpretation.

#### 3.1.7 Treatment System Cost

The Contractor shall use the work breakdown structure specified in ER 1110-3-1301 to the third (subsystem) level, in conjunction with the standard descriptions, to document costs for activities directly attributed to the treatment system; however, utilizing lower levels for each work breakdown structure is optional. The third (subsystem) level of detail shall be used for capturing the primary treatment technology costs. Documentation of costs for before treatment activities shall be identified separately in the appropriate third-level remedial action work breakdown structure categories, i.e. Monitoring, Sampling, Testing, and Analysis. Post construction operation and maintenance shall be identified separately using the O&M work breakdown structure. The documentation shall identify unit costs and number of units for each cost element, as specified in ER 1110-3-1301. Cost for activities directly attributed to the treatment shall be shown as a total cost and as a calculated cost on a per unit of media treated basis, and on a per unit of contaminant removed basis, as indicated. The second (system) and the third (subsystem) level cost

elements for activities directly associated with the project are shown in the same referenced documents.

#### 3.1.7.1 HTRW - Remedial Action Work Breakdown Structure

The Contractor shall appropriately allocate invoices for materials, labor, supplies, services, and other costs. These costs shall be allocated to pretreatment, treatment, and post-treatment activities. These cost allocations shall include the sub-breakdown of cost elements. Costs should be further allocated between capital and operating costs.

#### 3.1.7.2 Pre-Treatment Costs

The pre-treatment costs reported shall include preparation costs (i.e. Sampling Plans, Treatability Plans, [\_\_\_\_]) management and other distributive costs, mobilization, sampling and analysis, site work, excavation, [\_\_\_\_].

#### 3.1.7.3 Costs Directly Associated with Treatment

The costs directly associated with the treatment shall include solids, liquid, vapor preparation and handling; mobilization, spill control, testing, permits, training, and O&M costs.

#### 3.1.7.4 Post-Treatment Costs

The post-treatment costs shall include decontamination and decommissioning, disposal, site restoration, and demobilization.

#### 3.1.8 Regulatory/Institutional Issues

Approvals, licenses and permits required for remediation shall be listed along with the direct cost and time lines associated with obtaining them.

#### 3.1.9 Observations and Lessons Learned

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**NOTE: Delete any of the following paragraphs when  
not applicable.**  
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##### 3.1.9.1 Cost Observations and Lessons Learned

Observations or lessons learned concerning cost for each treatment system shall be summarized. Key factors that affected project costs, and major items that caused final costs to differ from initial Contractor's bid shall be considered. Issues that are to be discussed shall include change orders, reclarifications, liquidated damages, variations in quantities, and unforeseen conditions. The narrative shall include recommendations for cost savings in future procurements of each treatment technology.

##### 3.1.9.2 Performance Observations and Lessons Learned

Observations or lessons learned concerning performance of each treatment system for this contract shall be summarized. Key factors that caused performance variations from contract requirements/cleanup standards shall be considered. The narrative shall describe lessons learned from scaling-up treatability studies to full-scale activities. The description shall discuss the accuracy of such treatability studies in predicting the

full-scale application cost and performance. Recommendations for improved performance in future applications, including information from each treatment vendor shall be discussed.

#### 3.1.9.3 Other Observations and Lessons Learned

Observations or lessons learned from each treatment unit not directly related to cost or performance shall be summarized.

-- End of Section --