

<p>CEMP-EE/ CEMP-RT</p> <p>Engineer Regulation 1110-3-1301</p>	<p>Department of the Army U.S. Army Corps of Engineers Washington, DC 20314-1000</p>	<p>ER 1110-3-1301</p> <p>10 March 1999</p>
	<p>Engineer and Design</p> <p>HAZARDOUS, TOXIC AND RADIOACTIVE WASTE (HTRW) COST ENGINEERING</p>	
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CEMP-EE
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DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
Washington, D.C. 20314-1000

ER 1110-3-1301

Regulation
No. 1110-3-1301

10 March 1999

Engineering and Design
HAZARDOUS, TOXIC AND RADIOACTIVE WASTE (HTRW)
COST ENGINEERING

1. Purpose. This regulation provides specific policy and guidance for the development of remedial action and operation and maintenance cost estimates for all HTRW projects assigned to the U.S. Army Corps of Engineers (USACE). This regulation complements the general cost engineering policies and guidance published in ER 1110-1-1300.
2. Applicability. This regulation is applicable to all Headquarters, U.S. Army Corps of Engineers (HQUSACE) elements and all USACE commands developing remedial action and operation and maintenance cost estimates for HTRW projects assigned to USACE.
3. References. See Appendix A.
4. Distribution. Approved for public release; distribution is unlimited.
5. Policy. The cost expertise, cost data bases, estimating programs, and responsibility and accountability for HTRW Cost Engineering will be centralized in the Cost Engineering office per ER 1110-1-1300, paragraph 6a. All HTRW remedial action and operation and maintenance cost estimates shall be prepared in accordance with the listed references and this regulation. Refer to the Program and Project Management office or Engineer Regulation (ER) 5-1-11, Program and Project Management, for further policy and guidance on HTRW cost estimates for all costs including, in addition to remedial action costs and operation and maintenance costs, the following: preliminary assessment costs, site inspection costs, remedial investigation costs, feasibility study costs, remedial design costs, and costs for any other work during any phase of the project.

This regulation supersedes ER 1110-3-1301, dated 15 April 1994.

6. General.

a. HTRW project cost estimates shall comply with environmental laws, such as the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA), that require extensive Federal, state and public coordination. USACE customers such as the Department of Energy (DOE) and the Environmental Protection Agency (EPA) have developed unique program procedures for implementing public laws that apply specifically to their projects.

b. HTRW projects use a variety of contract methods including both Fixed Price and Cost Reimbursable contracts. Examples of Cost Reimbursable contracts include, but are not limited to, Total Environmental Restoration Contracts (TERC), Preplaced Remedial Action Contracts (PRAC), and Rapid Response. HTRW cleanup work is increasingly contracted on a Cost Reimbursable basis.

c. HTRW estimates, compared with estimates for other types of USACE projects such as building construction, have special characteristics which require the attention of the cost engineer, such as: probability of unforeseen conditions and contingencies is usually greater; production rates are generally lower due to stringent health and safety requirements; and indirect costs and contractor risk are typically higher for HTRW projects.

7. HTRW Project Phases.

a. Most existing HTRW sites are remediated under CERCLA, which has distinct and legally required phases. A comparison of CERCLA and RCRA terminology is in Appendix B of this ER. Additional HTRW project phases exist which are not specifically addressed in CERCLA, such as Interim Removal Action (IRA), etc. CERCLA project phases include the following.

(1) Preliminary Assessment (PA). The Preliminary Assessment is the initial evaluation of a potential HTRW site. The purpose of the PA is to determine if a hazardous condition exists; whether there is risk to human health and the environment; if there is a need for immediate removal; and if there is a need for additional study. The PA is completed with readily available information gained from visual site inspection, reviews of records, interviews with site personnel, etc.

(2) Site Inspection (SI). If the PA indicates the existence or possible existence of contamination, a site inspection is initiated to perform a more detailed investigation to include sampling and testing. The SI is concluded with one of three decisions: (a) the site does not require HTRW remedial action; (b) an immediate corrective action is required; and/or (c) additional study is needed.

(3) Remedial Investigation (RI)/Feasibility Study (FS). The RI/FS is a combined study process to characterize the contamination and develop approaches to remediate the site. The RI will identify the source and extent of the contamination; the possible pathways for migration or release to the environment; and will assess the risk to human health and the environment. The FS will yield a number of specific engineering or remedial action alternatives. The FS will also provide a comparative analysis of the remedial cost, engineering feasibility, health risk, and environmental impact of each major alternative.

(4) Record of Decision (ROD). The ROD is the formal agreement on the method of remedial action that documents the selection of the best alternative studied in the FS phase. This process results in a signed and legally binding document that details responsibilities, remedial action method, and anticipated cost, schedules, cost sharing plans, and penalties for noncompliance.

(5) Remedial Design (RD). Remedial design is the engineering design process that results in work plans, drawings, and/or specifications. From the design documents, a remedial action and operation and maintenance cost estimate is developed.

(6) Remedial Action (RA). Remedial action is the actual site cleanup. Typically, this is the construction phase. The RA phase also includes any operation and maintenance (short term) during construction.

(7) Long-Term Operation and Maintenance (O&M). Long-term operation and maintenance occurs after completion of construction.

b. HTRW projects not covered by CERCLA may fall under other applicable public laws such as RCRA. In general, the RCRA identification, study, decision, design, and remedial action processes are similar to CERCLA and have similar cost engineering implications (see Appendix B).

8. Roles of the Cost Engineering office.

a. The Cost Engineering office has an important team role in determining the remedial action and operation and maintenance cost and schedule of HTRW projects assigned to USACE, as well as any other cost support to the Project Manager (PM).

b. The Cost Engineering office shall coordinate with the HTRW Program and Project Management office to ensure representation on the HTRW project team from project inception to completion. The Cost Engineering office shall keep the Program and Project Management office informed as to its cost engineering capabilities. An office interface shall be coordinated as described in Paragraph 14 of this regulation.

c. The Cost Engineering office shall be involved in the team's partnering and decision-making process with the contractor and customer in development of project scope and assumptions, which become the basis for the government's estimate of cost and the contractor's proposal target contract cost. For Cost Reimbursable and Fixed Price contracts, the Cost Engineering office shall support the field office and project team in developing estimating instructions to the contractor or Architect-Engineer (A-E), baseline estimates, target contract costs, evaluation of the reasonableness of contractors' proposals, and evaluation of the different alternatives for selecting the least cost method to execute the work.

d. The Cost Engineering office shall use the activity-based latest Corps approved HTRW Remedial Action Work Breakdown Structure (RA WBS) and Operation and Maintenance Work Breakdown Structure (O&M WBS), which standardize historical cost data for input into the Historical Cost Analysis System (HCAS). The RA WBS and O&M WBS use the structure of the Corps' product-based Project Management Information System (PROMIS) HTRW Work Breakdown Structure, which is for the primary purpose of project life cycle cost tracking, control, and upward reporting. The Cost Engineering office shall coordinate with the project team to require the contractor or A-E to use the HTRW RA WBS and the HTRW O&M WBS. This standard WBS shall be required in addition to any other project-specific cost breakdown as may be required by the project team. The Cost Engineering office shall prepare or review cost data for upward reporting for HCAS and Cost and Performance Reports. Refer to Appendix C for the HTRW RA WBS and Appendix D for the HTRW O&M WBS.

e. The Cost Engineering office shall also be actively involved in development of task/delivery order target remedial action and operation and maintenance costs for establishment of contractor fees.

f. The Cost Engineering office shall participate on the government's team to prepare the technical analysis and negotiation objectives and to assist in negotiations with the contractor, relative to cost issues.

g. The Cost Engineering office shall provide specific written instructions for the contractor regarding estimating requirements for the project.

h. The Cost Engineering office shall prepare and/or review all HTRW remedial action and operation and maintenance cost estimates.

i. The Cost Engineering office shall follow the procedures appropriate to the specific customer and also understand and account for all factors that affect the cost of HTRW projects.

j. The Cost Engineering office shall coordinate with the HTRW Project Manager and technical design personnel as necessary to fully identify all project cost issues and impacts.

k. The Cost Engineering office duties shall include Quality Control, Quality Assurance, Technical Assistance and Technical Review of cost engineering products.

(1) The district Cost Engineering office shall be responsible for Quality Control (QC) of the HTRW cost estimates prepared in-house and Quality Assurance (QA) for those prepared by Architect-Engineers (A-E), contractors, or others. The district is responsible to the customer for all cost estimates. In the district's QA role, some of the requirements of the cost engineering office are to insure that the A-E's cost engineers are qualified to prepare the HTRW cost estimate; to insure that the cost estimate is prepared in accordance with the A-E's Quality Control Plan; and, that the A-E accomplishes and documents a thorough Independent Technical Review (ITR) of the cost estimate. The district's QA audit may resemble an ITR except that it is not as detailed as a typical QC ITR. To assure contract compliance, the district performs QA on all remedial

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action and operation and maintenance cost estimates developed by A-Es.

(2) The division Cost Engineering office shall be responsible for quality assurance of districts' HTRW cost estimates prepared in-house and for auditing the districts' quality control/quality assurance program.

(3) The HTRW Center of Expertise (CX) Cost Engineering office shall provide technical assistance and review of any HTRW project upon request from the district, division, or Headquarters regarding HTRW cost estimates. The HTRW CX Cost Engineering office shall provide mandatory review of HTRW cost estimates for Category B projects as defined by CEMP-RT memorandum subject **Technical Roles and Responsibilities for the USACE HTRW Program.** A Category B project in the RI or FS phases is defined as a project on a National Priorities List (NPL) site or a Base Realignment and Closure (BRAC) project. A Category B project in the RD or RA phases is defined as a project using innovative technology or a project with a construction estimate above \$5,000,000. The HTRW CX Cost Engineering office can provide support to the divisions in quality assurance oversight of district quality control processes for HTRW cost estimates.

1. The Cost Engineering office shall provide support to the Program and Project Management office by participating, being actively involved, and providing technical assistance for scope, schedule, and cost issues. This could include, in addition to estimates for remedial action and operation and maintenance, estimates for such work as the following: preliminary assessment, site inspection, remedial investigation, feasibility study, remedial design and any other type of work during any phase of the project. Specific local procedures shall be developed in accordance with Paragraph 14 of this regulation for appropriate Cost Engineering office involvement in all HTRW projects.

m. Additional roles of the Cost Engineering office, by project phase, shall include the following.

(1) Preliminary Assessment. A site requiring a PA may not require further action, and a significant time period typically occurs between the PA and the FS. Thus, a limited involvement of the Cost Engineering office during the PA is typical. There is no detailed remediation cost estimate typically required for this

phase. However, for fast track projects, the Project Manager may involve the Cost Engineering office during the PA. In this case, the role of the Cost Engineering office during the PA is preparation or review of estimates for any immediate removal actions necessary during the PA phase. This involvement will enhance the preparation or review of the remedial action and O&M estimates in subsequent phases and will ensure that cost engineers have a historical knowledge of the project to assist them in preparation of quality cost estimates.

(2) Site Inspection. A site requiring a SI may not require further action, and a significant time period typically occurs between the SI and the FS. Thus, a limited involvement of the Cost Engineering office during the SI is typical. There is generally no detailed remediation cost estimate required for this phase. However, for fast track projects, the Project Manager may involve the Cost Engineering office during the SI. The role of the Cost Engineering office during the SI is analogous to the role during the PA; preparation or review of cost estimates for any immediate removal action required at the site. To do this, the Cost Engineering office should gain an understanding of the history of the site.

(3) Remedial Investigation/Feasibility Study. The Cost Engineering office shall be involved during the RI/FS phase in preparation or review of the cost estimates for the specific remedial action alternatives and the comparative life cycle cost analysis of each alternative. If the Cost Engineering office has not participated during the PA or SI process, time must also be allotted for Cost Engineering to gain an understanding of what contamination has occurred at the site; become familiar with the site geography, constraints, etc. The role of the Cost Engineering office during the RI is similar to the role during the PA and SI, as described in the paragraphs above. During the FS phase, the Life Cycle Cost (LCC) software and/or other life cycle cost techniques may be useful. The Cost Engineering office must insure that a complete project cost estimate for remedial action and operation and maintenance is developed for each alternative. The discount rate and estimated life cycle duration of each alternative are important considerations to develop the Present Worth cost of each alternative for comparative purposes. The complete project cost estimate includes all capital remedial action costs including short-term O&M during RA, and all operation and maintenance (long-term after RA) costs. HTRW CX

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Report, ~~A~~Example Feasibility Study Cost Estimate for HTRW Projects,[@] (Appendix A) illustrates the use of various software (Excel, MCACES, RACER, HAZRISK, LCC) in preparing estimates used in Feasibility Studies.

(4) Record of Decision. The Cost Engineering office shall be involved during the ROD to verify that the cost information developed in the RI/FS for the selected alternative is included, has undergone quality control, and has been updated if necessary to include all costs required for the selected alternative.

(5) Remedial Design. The Cost Engineering office, during the RD, shall prepare or review the remedial action and operation and maintenance cost estimate with the design information provided such as work plans, drawings, and specifications. At the end of this phase, the Government Estimate for procurement must be prepared.

(6) Remedial Action. The Cost Engineering office shall be involved during the RA to prepare or review cost estimates for modifications, or other contractual documents during construction. The Cost Engineering office should also provide Construction Division with the latest cost data to use for estimates made in the field.

(7) Operation and Maintenance. The Cost Engineering office shall be involved during O&M to prepare or review cost estimates for modifications, or other contractual documents during long-term operation and maintenance.

9. Types of Cost Estimates.

a. Preliminary Budget Estimates. All available databases and software such as HTRW historical information from the HTRW Historical Cost Analysis System (HCAS) or other sources, and parametric estimating procedures may be used to develop a preliminary budget estimate of costs. Cost to Complete (CTC) estimates are preliminary budget estimates which can be prepared at any phase of the project to estimate the remaining costs of the project to completion. CTC estimates may include the cost of preliminary assessment, site inspection, remedial investigation, feasibility study, and remedial design as well as remedial action and O&M costs. All assumptions and limitations shall be clearly documented.

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b. Feasibility Study Comparison Estimates. The Feasibility Studies (FS) phase of an HTRW project compares the technical merits of alternative remedial action methods. Project adjusted historical data from HCAS or other sources, parametric estimating, detailed quantity take-off estimating and Life Cycle Cost (LCC) techniques may be used to compare the Present Worth costs of competing technologies. Capital Remedial Action (RA, including short-term O&M) and long-term Operation and Maintenance (O&M) costs shall be included in all LCC comparisons. Feasibility Study estimates for remediation shall include the estimated capital remedial action contract cost priced currently for the year the study is done; design and construction contingencies; construction management supervision and administration (S&A); remedial design cost; and other appropriate costs. The estimate shall also include the estimated yearly long-term operation and maintenance contract cost; contingencies; management supervision and administration (S&A); and other annual recurring costs. Escalation is not applied to capital remedial action or long-term O&M costs. However, long-term O&M costs are discounted for the Present Worth analysis. Capital (remedial action) costs should be discounted if construction is expected to take more than one year. Present Worth cost based on the capital cost, annual O&M cost, latest discount rate, and estimated life cycle duration shall be developed for each alternative. The discount rate and estimated life-cycle duration of each alternative are important considerations to develop the Present Worth cost of each alternative for comparative purposes. All assumptions and limitations shall be clearly documented.

c. ROD Estimates. The ROD estimate shall include all RA and O&M costs as discounted to Present Worth cost. Cost estimates reflected in the ROD shall be based on the selected alternative from the Feasibility Study and be detailed similarly to the FS estimate, as stated in the above paragraph. All assumptions and limitations shall be clearly documented.

d. Current Working Estimates (CWE). The CWE is the detailed remedial action and operation and maintenance cost estimate developed during the engineering remedial design phase of a project. The CWE shall include the estimated contract cost, design and construction contingencies, construction management supervision and administration (S&A), remedial design cost, other applicable costs, escalation of construction costs to the midpoint of construction, and escalation of long-term operation

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and maintenance costs. All assumptions and limitations shall be clearly documented.

e. Government Estimate (GE). All contracts for amounts greater than \$100,000 require Government estimates of Fair and reasonable cost. The GE is the official signed bid (or proposal) form summary of costs. Backup to the GE includes the detailed estimate for remedial action and operation and maintenance contract costs to be used to negotiate with the contractor or to evaluate contractor bids. The estimate shall include estimated contract cost, design contingencies if design is not 100% complete, escalation of construction costs to the midpoint of construction, and escalation of long-term operation and maintenance costs. Profit shall be included in the GE for an HTRW project, unless the funds are appropriated from the Corps Civil Works program. Although a GE is not required for contract amounts less than \$100,000, preparation of an informal, independent cost estimate, which does not require formal approval, is recommended to determine the reasonableness of contractor's bid or cost proposal. When it is not feasible to prepare a GE or an informal cost estimate, the contractor's cost proposal shall be reviewed by the government and revised as necessary to develop the fair and reasonable cost. All assumptions and limitations shall be clearly documented.

10. Preparation of the Estimate.

a. Preparation, documentation and approval of the HTRW remedial action and operation and maintenance cost estimates shall be in accordance with ER 1110-1-1300 and this regulation. For more detailed estimating ~~How to~~ information, refer to Engineering Instruction EI 01D010, ~~Construction Cost Estimates~~ manual.

b. Capital Remedial Action (construction) costs, including costs of short term O&M during remedial action. A standardized Work Breakdown Structure (WBS) is critical for tracking the remedial action costs throughout the life of the project and for the effective collection of historical cost data. Cost estimates for HTRW remedial action, throughout the various phases of the project, shall use the latest Corps approved HTRW Remedial Action WBS (HTRW RA WBS). As a minimum, all remedial action estimates shall be summarized to the third (subsystem) level of the HTRW RA

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WBS for all items. The HTRW portion of civil works or military construction projects, involving other non-HTRW work, shall be segregated. The portion of the estimate prepared for the HTRW work shall use the HTRW RA WBS. The remedial action total project cost estimate shall include all contractors= direct and indirect costs and shall also include any Government-furnished material, labor, and equipment. The Cost Engineering office shall include, as appropriate, the cost of all unique HTRW requirements such as (but not limited to): pollution liability insurance, disposal permits, transportation permits, and short-term operation and maintenance during construction. The Cost Engineering office shall also account for the productivity impacts of (but not limited to): health and safety requirements; personnel and equipment decontamination; and security requirements. Escalation to the midpoint of construction shall be included.

c. Long-Term Operation and Maintenance (O&M) Cost. HTRW projects may include long-term operation and maintenance of the facility over a period of time that could range from months to years. Wage rates, escalation rates, and other costs may be different between construction and long-term operation and maintenance. Therefore, the Cost Engineering office shall separate construction and long-term O&M costs and ensure proper application of construction and service rates. Cost estimates for long-term HTRW operation and maintenance shall use the latest Corps approved HTRW Operation and Maintenance WBS (HTRW O&M WBS). As a minimum, all long-term operation and maintenance estimates shall be summarized to the third (subsystem) level of the HTRW O&M WBS for all items. Escalation of long-term operation and maintenance costs shall also be included.

d. Contingency Costs and Risk Analysis.

(1) Contingencies included in the total project construction (remedial action) cost estimate are for unknown or unforeseen conditions and shall be based on a documented cost risk (cost realism) analysis. Contingencies shall be applied to the remedial action estimates, regardless of what phase (PA, SI, RI, FS, RD, or RA) of the project the RA estimates were prepared. The cost risk analysis shall be developed by the use of sound engineering judgement and application of HAZRISK, Cost Risk, and/or other HQUSACE (CEMP-EE) approved software. Contingencies shall be applied at the second (system) level of the HTRW RA WBS.

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Two types of contingencies may be applied to an HTRW project:
design contingency and construction contingency:

(a) Design contingency is an estimate of the construction costs that are needed to account for unknowns during the project planning and design process. For example, design contingency may be added to the construction cost estimate during the RI/FS phase to account for the fact that design is less than 100% complete, uncertainty in types and quantities of contaminants, and uncertainty regarding the remediation process. Design contingency will decrease as information becomes known during the planning and design process, and will be reduced to zero at design completion.

(b) Construction contingency is a reserve to provide for costs of unforeseen construction condition changes, beyond interpretation at the time of contract award. Construction contingency reserve is not to be included in official Government Estimates used for the purpose of comparison to a construction contractor's bid or proposal.

(2) Contingency is included in the long-term operation and maintenance cost estimate for unknown or unforeseen conditions. Contingencies shall be applied at the second (system) level of the HTRW O&M WBS.

e. Construction Supervision and Administration (S&A). Costs shall be in accordance with ER 415-1-16. This is also termed Construction Management, or Supervision, Inspection, and Overhead (SIOH).

f. Other Costs. Examples of other costs that may be needed in the estimate include, As-Builts, O&M Manuals, Laboratory Quality Assurance, design costs, etc.

11. Automation Software.

HTRW remedial action and operation and maintenance cost estimates may be developed using the latest version of MCACES, RACER, HAZRISK, Cost Risk, LCC, HCAS, and/or other HQUSACE (CEMP-EE) approved cost engineering software.

12. Collection and Reporting of Historical Cost Data.

a. Cost data on awarded projects are essential for the development of cost guidance to assist cost engineers, planners, managers, and decision makers to effectively develop budget estimates, check reasonableness of the contractor's proposal, evaluate technology costs, adjust parametric cost models, prepare HCAS reports, prepare the remediation cost and performance documentation report, and prepare the project close out remedial action report.

b. Cost data from HTRW remedial action or operation and maintenance projects shall be summarized per the structure of the latest Corps approved HTRW RA WBS and HTRW O&M WBS, and reported using the latest HTRW Historical Cost Analysis System (HCAS) software program. Cost data shall be reported per the HTRW RA WBS and HTRW O&M WBS to the third (subsystem) level, as a minimum, for all items.

c. The Cost Engineering office shall prepare (or review, if the HCAS reports are prepared by the construction contractor, A-E, or others) and submit HCAS construction remedial action and operation and maintenance cost and project information on all HTRW projects or portions of projects. Examples of portions of projects are: operable units, solid waste management units, task orders on reimbursable cost contracts, HTRW portions of civil works-funded or military-funded projects, and other situations representing a portion of a project.

d. The estimate and award cost data shall be submitted electronically to the HTRW CX (CENWO-HX-T) using HCAS not later than 30 days after award of the remedial action or operation and maintenance project.

e. The actual cost data shall be submitted electronically to the HTRW CX (CENWO-HX-T) using HCAS upon substantial completion of the remedial action or operation and maintenance project. For completed actual cost data, additional cost reporting is required per Engineer Pamphlet EP 1110-1-19, **A**Technical Requirements for Specifications to Report HTRW Environmental Restoration Cost and Performance,**@** and Corps of Engineers Guide Specification CECS 01240, **A**Cost and Performance Report.**@**

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f. All HCAS cost data shall be carefully reviewed by the various district elements responsible for the design and execution of the project before submission or release. A copy of the HCAS cost data shall be furnished to the division office for Quality Assurance review.

g. The HTRW CX (CENWO-HX-T) shall review, analyze, assemble, consolidate, and manage the input USACE HCAS cost data for the entire database. The data will then be furnished by the HTRW CX to a central collection repository for statistical analysis, normalization, other data processing, and distribution. The processed data shall be available to all USACE elements as well as other governmental agencies.

13. HTRW Work for Others.

a. Preparation of Cost Estimates for Others. USACE regulations and procedures shall be followed when preparing cost engineering work for other agencies, unless the changes in guidance are formally agreed to between agencies and incorporated into interagency agreements or task orders. All changes that deviate from standard USACE cost engineering guidance shall be fully documented in the scope of work and in any product developed for the other agency, such as in the Project Notes of the estimate. Other government agency's contracting procedures, contract administration, and allowable costs for contractors may differ from standard USACE practices. The Cost Engineering office shall have a clear understanding of another agency's procedures, based on the interagency agreements or task orders, and that understanding shall be apparent in any cost estimate.

b. Review of Cost Estimates prepared by Others. Significant USACE HTRW work for others involves assisting other federal government agencies in the review of contractor prepared cost estimates. The USACE review of project costs shall be consistent with the client agency procedures that affect project costs such as contracting procedures. The USACE Cost Engineering office shall thoroughly document the review process to include a pre-agreed narrative report that addresses how the review was accomplished. For example, were the estimate assumptions, factors, and quantities independently verified or were they assumed to be correct; what percentage of line items were checked; what contracting method was assumed; what costs were considered to be indirect versus direct costs, etc. The Cost

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Engineering office shall document and provide alternative cost estimates for individual items or sections of the cost estimate that are in question, if agreed to in advance by the other paying agency.

14. Project Manager/Cost Engineering Office Interface.

a. The Cost Engineering office shall assist on all project scope, schedule, and cost issues.

b. The Chief of the Cost Engineering office at each division and district shall work through the appropriate chain of command to establish local procedures with the HTRW Program and Project Management office and the Construction Management office to ensure appropriate and effective Cost Engineering actively involvement in HTRW projects assigned to that division or district.

c. Upon assignment to a project from the Program and Project Management office to Cost Engineering office, the selected Cost Engineering team member shall coordinate with the Project Manager to determine the project requirements and scope which will affect the cost estimating procedure, the cost documents required for the project, and the cost and schedule of the project.

FOR THE COMMANDER:



ALBERT J. GENETTI, JR.
Major General, USA
Chief of Staff

- 4 Appendices
- APP A - References
- APP B - CERCLA vs RCRA
- APP C - HTRW RA WBS
- APP D - HTRW O&M WBS

APPENDIX A

References

- a. Public Law (PL) 96-510, Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended by PL 99-499, the Superfund Amendments and Reauthorization Act of 1986.
- b. PL 94-580, Resource Conservation and Recovery Act (RCRA) of 1976 as amended by PL 98-616, the Hazardous and Solid Waste Amendments of 1984.
- c. ER 5-1-11, Program and Project Management.
- d. ER 37-345-10, Accounting and Reporting - Military Activities.
- e. ER 385-1-92, Safety and Occupational Health Document Requirements for HTRW Activities.
- f. ER 415-1-16, Fiscal Management.
- g. ER 1110-1-1300, Cost Engineering Policy and General Requirements.
- h. ER 1110-2-1302, Civil Works Cost Engineering.
- i. ER 1110-3-1300, Military Programs Cost Engineering.
- j. ER 1165-2-132, HTRW Guidance for Civil Works Projects.
- k. EP 1110-1-19, Technical Requirements for Specifications to Report HTRW Environmental Restoration Cost and Performance.
- l. EI 01D010, Construction Cost Estimates.
- m. CEMP-RT Memorandum, Technical Roles and Responsibilities for the USACE HTRW Program, 24 July 1996.
- n. HTRW CX Report, Example Feasibility Study Cost Estimate for HTRW Projects, April 1998.
- o. HTRW CX Report, Productivity Study for HTRW Remedial Action Projects, October 1994.

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APPENDIX A (Continued)

p. HTRW CX Report, Report on Treatment, Storage, & Disposal Facilities for HTRW, March 1998.

q. CEMP-EC Memorandum, Implementation of Revised Interagency Hazardous, Toxic, and Radioactive (HTRW) Remedial Action (RA) Work Breakdown Structure (WBS) and HTRW Operation & Maintenance (O&M) WBS (Post Construction) for HTRW Projects, 25 April 1996.

r. Guide Specification CEGS 01240, ACost and Performance Report.®

APPENDIX B

CERCLA vs RCRA

<u>CERCLA</u>	<u>RCRA</u>
Preliminary Assessment/ Site Inspection	RCRA Facility Assessment
PA/SI	RFA
Remedial Investigation	RCRA Facility Investigation
RI	RFI
Feasibility Study	Corrective Measures Study
FS	CMS
Record of Decision	Statement of Basis & Permit Modification
ROD	
Remedial Design/Remedial Action (including short-term O&M)	Corrective Measures Implementation (including short-term O&M)
RD/RA	CMI
Operation & Maintenance (long-term)	Operation & Maintenance (long-term)
O&M	O&M

CERCLA typically covers abandoned waste sites.

RCRA typically covers current operating facilities.

APPENDIX C

**HTRW Remedial Action Work Breakdown Structure (RA WBS)
To Second Level**

<u>WBS NUMBER</u>	<u>DESCRIPTION</u>
33XXX	HTRW CONSTRUCTION ACTIVITIES
331XX	HTRW REMEDIAL ACTION (CONSTRUCTION)
01	MOBILIZATION AND PREPARATORY WORK
02	MONITORING, SAMPLING, TESTING, AND ANALYSIS
03	SITE WORK
04	ORDNANCE & EXPLOSIVE - CHEMICAL WARFARE MATERIAL (OE-CWM) REMOVAL AND DESTRUCTION
05	SURFACE WATER COLLECTION AND CONTROL
06	GROUNDWATER COLLECTION AND CONTROL
07	AIR POLLUTION/GAS COLLECTION AND CONTROL
08	SOLIDS COLLECTION AND CONTAINMENT
09	LIQUIDS/SEDIMENTS/SLUDGES COLLECTION AND CONTAINMENT
10	DRUMS/TANKS/STRUCTURES/MISCELLANEOUS DEMOLITION AND REMOVAL
11	BIOLOGICAL TREATMENT
12	CHEMICAL TREATMENT
13	PHYSICAL TREATMENT
14	THERMAL TREATMENT
15	STABILIZATION/FIXATION/ENCAPSULATION
16	(RESERVED FOR FUTURE USE)
17	DECONTAMINATION AND DECOMMISSIONING (D&D)
18	DISPOSAL (OTHER THAN COMMERCIAL)
19	DISPOSAL (COMMERCIAL)
20	SITE RESTORATION
21	DEMOBILIZATION
22	GENERAL REQUIREMENTS (OPTIONAL BREAKOUT)
9X	OTHER (Use Numbers 90-99)
332XX	ENGINEERING DURING CONSTRUCTION (EDC)
333XX	SUPERVISION & ADMINISTRATION (S&A) (CONSTRUCTION MANAGEMENT)

APPENDIX D

**HTRW Operation and Maintenance Work Breakdown Structure
(O&M WBS)
To Second Level**

<u>WBS NUMBER</u>	<u>DESCRIPTION</u>
34XXX	HTRW POST CONSTRUCTION AND FINANCIAL CLOSEOUT ACTIVITIES
341XX	FISCAL/FINANCIAL CLOSEOUT ACTIVITIES
342XX	HTRW OPERATION AND MAINTENANCE (POST CONSTRUCTION)
02	MONITORING, SAMPLING, TESTING, AND ANALYSIS
03	SITE WORK
05	SURFACE WATER COLLECTION AND CONTROL
06	GROUNDWATER COLLECTION AND CONTROL
07	AIR POLLUTION/GAS COLLECTION AND CONTROL
08	SOLIDS COLLECTION AND CONTAINMENT
09	LIQUIDS/SEDIMENTS/SLUDGES COLLECTION AND CONTAINMENT
11	BIOLOGICAL TREATMENT
12	CHEMICAL TREATMENT
13	PHYSICAL TREATMENT
14	THERMAL TREATMENT
15	STABILIZATION/FIXATION/ENCAPSULATION
18	DISPOSAL (OTHER THAN COMMERCIAL)
22	GENERAL REQUIREMENTS (OPTIONAL BREAKOUT)
9X	OTHER (Use Numbers 90-99)