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COST ESTIMATE CLASSIFICATION SYSTEM – AS APPLIED IN ENGINEERING, PROCUREMENT, AND CONSTRUCTION FOR THE ENVIRONMENTAL REMEDIATION INDUSTRIES
AACE® International Recommended Practice No. 107R-19

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TCM Framework: 7.3 – Cost Estimating and Budgeting

Rev. February 27, 2020

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PURPOSE

As a recommended practice (RP) of AACE International, the Cost Estimate Classification System provides guidelines for applying the general principles of estimate classification to project cost estimates (i.e., cost estimates that are used to evaluate, approve, and fund projects). The Cost Estimate Classification System maps the phases and stages of environmental remediation project cost estimating together with a generic project scope definition maturity and quality matrix, which can be applied across a wide variety of environmental remediation industries. [32]

This recommended practice provides guidelines for applying the principles of estimate classification specifically to project estimates for engineering, procurement, and construction (EPC) work for environmental remediation industries. It supplements the generic cost estimate classification RP 17R-97 [3] by providing:

- A section that further defines classification concepts as they apply to environmental remediation industries.
- A chart that maps the extent and maturity of estimate input information (project definition deliverables) against the class of estimate.

As with the generic RP, the intent of this document is to provide common terms to improve communications among all the stakeholders involved with preparing, evaluating, and using project cost estimates specifically for the environmental remediation industries.

The purpose of this recommended practice is to provide the environmental remediation industry with a project definition deliverable maturity matrix in addition to the general information provided in RP 17R-97.
This RP focuses on Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)\(^1\) remedial projects and United States Resource Conservation and Recovery Act (RCRA)\(^2\) corrective action projects, as well as decontamination and demolition (D&D), ordnance and explosives cleanups, and other environmental cleanup work. This RP includes estimates for work encompassing the entire environmental remediation life cycle and thus could be applied to cost estimates for closure/post-closure of regulated facilities (e.g., hazardous waste facilities under RCRA); mine reclamation; asbestos abatement prior to demolition of a building. In addition, this legislative framework can be applied towards both local as well as international laws and regulations that follow similar processes for contaminated site characterization, cleanup and closure.\(^3\)

This regulatory framework also provides a general representation of the relationship between specific release site characterization and other design input data and design deliverable maturity to the estimate accuracy and methodology used to produce the cost estimate. The estimate accuracy range is driven by many other variables and risks, so the maturity and quality of the scope definition available at the time of the estimate is not the sole determinate of accuracy; risk analysis is required for that purpose. The project maturity is indicated by percentage completion or the extent and types of input information available that includes project scope definition, requirements documents, specifications, project plans, drawings, calculations, learnings from past projects, and other information that must be developed to define the project. The set of deliverables become more definitive and complete as the degree of project definition progresses. This is listed in detail in Table 3 (see below).

This document is intended to provide a guideline, not a standard. It is understood that each enterprise may have its own project and estimating environmental remediation terminology and may classify estimates in other ways. This guideline provides a generic and generally acceptable classification system for the environmental remediation industries that can be used as a basis for comparison. This recommended practice should allow each user to better assess, define, and communicate their own processes and standards in the light of generally-accepted cost engineering practice.

**INTRODUCTION**

For the purposes of this recommended practice, the term *environmental remediation* refers to the process of bringing contaminated properties into environmental compliance under the U.S. Resource Conservation and Recovery Act (RCRA) and the U.S. Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Typically, CERCLA addresses cleaning up the release of toxic and hazardous substances from soil, groundwater, and facilities. RCRA is focused on the safe and protective management of wastes from currently operating facilities as well as facilities where hazardous waste is stored. It is also applicable to certain wastes generated by CERCLA cleanups and in some instances serves as the regulatory basis for the entire site cleanup. These U.S. federal acts provide well understood frameworks for environmental remediation, and they can serve as a proxy for other regulations at the state and local level. In addition, this legislative framework can apply towards similar international laws and regulations. RCRA and CERCLA follow very similar site closure processes, which require liability owners to assess the extent of environmental contamination and the associated environmental risks, receive public/stakeholder input, and submit preferred alternative proposals to regulatory agencies or a magistrate for approval; and then, upon approval, carry out an executable project(s) to achieve contaminated site closure. Although CERCLA is the predominant legislation for regulating cleanup, if the wastes associated with the cleanup site are listed on the RCRA hazardous waste list then that legislation is applicable.

\(^1\) CERCLA, the United States public law also known as Superfund, which includes improvements and additions provided by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

\(^2\) The Resource Conservation and Recovery Act (RCRA) is the United States public law that creates the framework for the proper management of hazardous and non-hazardous solid waste.

\(^3\) Seek legal counsel in your jurisdiction for specific application of these principles.
This recommended practice addresses cost estimate classification solely in environmental remediation projects, programs and portfolios. It is important to note that this RP focuses on environmental remediation in response to the result of the release of toxic and hazardous substance. However, it does not include major capital construction projects such as building a wastewater treatment system for a manufacturing facility.

The cost estimates discussed in this recommended practice are for the full lifecycle costs for a remedial cleanup solution from initial investigations through site closure, including long term surveillance and long-term maintenance (SLTM) (also referred to as long term surveillance or long term stewardship) that may extend for many years. Although these costs are often easily estimated and high quality estimates can be readily performed, very often there is uncertainty as to how many years these activities will need to be performed, creating uncertainty in the estimated costs for this phase.

Also, this RP does not cover the costs associated with research and development of remedial technology, the costs associated with regulatory or community relations, or the additional liability (e.g., tort) that may be associated with contaminated properties. Also, care must be taken in using this document for accruing environmental liabilities, which are subject to specific financial accounting standards. This is described in detail in a monograph discussing using the TCM Framework for a variety of environmental cost estimates and cost estimates for accounting and financial reporting of environmental remediation liabilities may be based on engineering cost estimates. However, the user of this RP should be aware that estimates for financial accounting and reporting of environmental liabilities may require the use of different timeframes for operations and maintenance (O&M) and monitoring; assumptions; quantities; unit prices; contingency allowances; time-value of money (interest and discount factors); and other variables than would be used in cost estimates for day to day execution of the remediation project.

When applying this RP to cost estimates for environmental remediation that may or will be used for financial accounting and reporting, the estimator should consult with the entity’s financial management. Also, the Statement of Federal Financial Accounting Standards (SFAS) 5, Accounting for Liabilities of the Federal Government [5] outlines the specific requirements for stating government liabilities. However, there is guidance available where many of the challenges for the estimates supported, the environmental liabilities can be constructed to be fully aligned with best cost engineering practices [6]. There is also a standard available for state and local governments, Governmental Accounting Standards Board (GASB) Statement 49 [7]. In addition to the aforementioned cost accounting standards the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 410, Asset Retirement and Environmental Obligations, as well as ASC 410-30 (for corporations): ASC 410-30, "Asset Retirement and Environmental Obligations".

COST ESTIMATE CLASSIFICATION MATRIX FOR THE ENVIRONMENTAL REMEDIATION INDUSTRIES

Table 2 provides a summary of the characteristics of the five estimate classes. The maturity level of project definition at the point at which the estimate is being made is the sole determining (i.e., primary) characteristic of class. In Table 2, the maturity is roughly indicated by a percentage of complete definition; however, it is the maturity of the defining deliverables that is the determinant, not the percent. The other characteristics are secondary and are generally correlated with the maturity level of project definition deliverables, as discussed in the generic RP [1]. The specific deliverables, and their maturity or status are provided in Table 4. The post sanction (post funding authorization) classes (Class 1 and 2) are only indirectly covered where new funding is indicated. Again, the characteristics are typical but may vary depending on the circumstances. With minor variations in the definitions, the following phases of the environmental remediation project life-cycle generally apply to all environmental cleanup projects and programs including remediation, decontamination and decommissioning, ordnance and explosive cleanups, and other environmental work.