Introduction and Benefits of the Project Management Oversight (PMO) Concept for CCR Closure Projects

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Overview
Coal Combustion Residual (CCR) closure projects (i.e., impoundments and landfills) are typically complex, multi-phase remediation projects with extensive inherent risks. These risks include, but are not limited to:

- Construction-related health and safety concerns;
- Schedule and cost overruns;
- Construction issues, including Quality Control / Quality Assurance items; and,
- Environmental challenges.

Proper management and continuous oversight of these risks are necessary for the successful completion of these projects.

To that end, this technical paper presents the proof of concept to develop, deploy and maintain an enterprise-level Project Management Oversight (PMO) system. The remainder of this document provides an overview on the PMO system, including concept, process and primary elements.

PMO Concept
The concept, or premise of the PMO system is to develop an enterprise-level, “Fit for Purpose” tool to identify, mitigate and transparently communicate project risks to decision-making end users. The PMO system equips the end user(s) with critical decision insight (CDI) by focusing on the following key project components:

- Project Budget and Schedule, including EVMS
- Pre-construction evaluation of the following:
  - Constructability;
  - Dewatering;
  - Embankment Stability;
  - Material Management; and,
  - Water Management
- Construction Management
- Construction Quality Assurance (CQA)
- Defensible Data Collection
- Predictive Analysis (i.e., forecasting to identify future project risks and solutions)
Understanding the CDI and its use is one of the key benefits of the PMO System. As stated previously, not only does it identify and mitigate risks, it allows the end user(s) to apply predictive analysis to forecast future project risks and resolve such risks prior to their occurrence.

The PMO end goal is to provide the end user(s) with the ability to deliver a safe and high-quality project, embedded with legally defensible data, within a measurable and transparent budget and schedule.

**The PMO Process**

The PMO process is a multi-prong, logic-driven approach which initiates with the identification of at least one of the following project risks:

- Health and Safety Concerns
- Schedule and Cost Overruns
- Construction Challenges
- Environmental Concerns

By identifying risks associated with above, the PMO Process will:

- Confirm project construction estimate prior to initiating work;
- Provide comprehensive cost and schedule tools to measure and track project progress;
- Evaluate construction sequence and unique construction and environmental challenges, such as dewatering, water management, etc.;
- Address site-specific Health and Safety concerns;
- Provide necessary project-related documentation to meet the requirements of the Public Service Commission / Public Utility Commission, etc.;
- Address shareholders concerns;
- Provide readily available information to respond to outside pressures; and,
- Provide defensible construction and environmental data.

Once the end user has identified one or more project risks exists, the PMO screening process is initiated.

**The PMO Elements**

The PMO System is developed around three primary PMO elements. Holistically, these elements address the aforementioned PMO project risks. These elements are:

1. Project Controls
2. Construction Oversight
3. Defensible Data Collection

A detailed description of each element is provided below.

**Project Controls**

The Project Controls System (PCS) addresses risks associated with schedule and cost overruns. The PCS is comprised of an integrated set of policies, procedures, practices, guidelines, reports, and information systems that enhance effective planning and control of work plan scope, cost, and schedule. This system allows visibility of cost, schedule, and technical progress to effectively measure and manage performance to meet project objectives.

![Diagram of Project Controls System Integration for Work Plan Management and Reporting](image)

Key components of the PCS are:
- Earned Value Management System
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- Baseline PCS Data
- Cost Processor
- Reporting

Details pertaining to each component are provided below.

**Earned Value Management System**

The foundation of the PCS is the EVMS. The EVMS provides the PCS with the following:

- **Plan** all work scope for the work plan to completion. This includes establishing performance metrics for Tier 1 subcontractors and integrating the performance metrics into procurement specifications (e.g. pay item table).

- **Break Down** the work plan scope into finite pieces that can be assigned to a responsible person or organization for execution and control of technical, schedule, and cost objectives. The Work Breakdown Structure (WBS) establishes the physical work packages or elements to completely define a project into levels that can be summarized upward. The WBS is developed taking into consideration engineering and procurement activities that will transpire during the execution of the work plan. The Organizational Breakdown Structure (OBS) identifies the organization responsible for each segment of work, including subcontracted and intra-organizational effort.

- **Integrate** project work scope, schedule, and cost objectives into a baseline plan against which accomplishments can be measured and controlled. This is accomplished through the integration of business systems (e.g. financial, schedule software, and cost processor) with the use of a common WBS.

- **Use** Actual Costs incurred (including actual and accrued as defined by the financial organization) and recorded to compare against work performed.

- **Assess** work accomplishments at the level work is performed.

- **Analyze** significant performance variances (cost, schedule, performance metrics) from the baseline, forecast impacts and develop recovery plans, and prepare Estimate at Completion (EAC) based on performance to date and work to be performed.

- **Deploy** Earned Value Management (EVM) information in management decision making processes.

**Baseline PCS Data:**

1. **Estimate Data**

The estimate, time-phased with the schedule, is an integral component of the developing the performance measurement baseline (PMB) which is the basis for implementing the PCS. The body of the estimate will be assembled by addressing such items as labor, materials, subcontracts, and indirect costs and their associated risks and contingencies. These items will be included in the final estimate and utilized to develop a final Work Breakdown Structure (WBS).
2. Schedule Data
The PMO System will integrate the WBS into Primavera P6 Professional Project Management software to develop and Final Project Schedule. The Project schedule provides the basis for the time-phased Budgeted Cost of Work Scheduled (BCWS), Budgeted Cost of Work Performed (BCWP), and Estimate to Complete (ETC). All work is structured with Control Accounts, Work Packages, and Planning Packages, and managed by the BCC-TRC Project Manager.

3. Financial Data
The Financial System is an integrated financial accounting system that provides for collection and posting of costs mapped to the WBS structure. Accounting codes are established to collect costs at the lowest level of the WBS to ensure that the costs can be directly summarized from the Work Package level upward to the Control Account and to the total work plan level without allocation to multiple control accounts or multiple higher level WBS elements. Accounting transactions are mapped to distinct cost types (labor, other direct costs, travel, materials, etc.) utilized in the budgets. Accounting codes ensure costs are collected in a manner consistent with how the applicable budget(s) are planned. Invoices developed from this data will be compliant to SCS Standards prior to invoice submittal.

Cost Processor
The PMO System will use a cost processor to integrate project estimate, schedule, and financial data to support the business functions of planning, performing, monitoring work, and reporting. The cost processor also provides the capability for controlling changes to the project PMB.

Reporting
The PMO System will use Earned Value to evaluate performance and provide management insight into decision making resulting from that performance; therefore, the objective measurement of work accomplished must yield an accurate performance assessment. The key components for Earned Value [BCWS, Actual Cost of Work Performed (ACWP), and BCWP] are expressed in the unit rates, prior to conversion to dollars for billing purposes. These components not only reflect current and past performance; they are the basis for all performance-based forecasting for the project.

Construction Oversight
At a high level, the Construction Oversight function is phased into three elements:

1. Pre-Construction Evaluation
2. Construction Management
3. Construction Quality Assurance

An overview of each element is provided below.

Pre-Construction Evaluation
CCR projects, specifically “wet” CCR projects, provide a unique set of complexities which require a firm understanding to unique health and safety factors, construction methodology, dewatering, water management, material management and environmental factors. During this phase, careful consideration should be placed on the following to safely and successfully complete the project:

- Constructability, including conducting constructability reviews, sequence analysis and recommendations, and providing third party cost estimates for comparative analyses, if warranted;
• **Dewatering**, including understanding water and groundwater quality, methodology, evaluating drawdown rates and water treatment, if warranted;

• **Embankment Stability**, including defining slope stability, porewater pressure, designing real-time monitoring networks, and action levels to ensure safe work along embankments;

• **Material Management**, including confirming site quantities of CCR and non-CCR material, handling of CCR and non-CCR material, reviewing production rates, confirming equipment selection and evaluating workflow within CCR and non-CCR areas; and,

• **Water Management**, including managing contact and non-contact water, evaluating/providing stormwater diversion techniques, and calculating water transport rates (i.e., pump flows)

**Construction Management (CM)**

Construction management includes the following activities:

- Manage construction, demolition, and remediation activities
- Ensure compliance with drawings, specifications, and contract documents
- Direct and manage material testing and oversee liner/closure material installations
- Ensure compliance with state and federal laws and regulations
- Minimize costs due to unforeseen problems

In this PMO Concept, the CM provides oversight of the Prime Contractor, as the client’s representative. The CM acts in the client’s best interest on all aspects of the project. The client may choose to transfer day-to-day administrative responsibility of the construction contract to the CM as its agent. The client maintains control over crucial monetary and scheduling decisions, which the client executes directly with the Prime Contractor.

In this role, the CM and the “PMO Team” may be responsible for following:

- Bid solicitation, evaluation, and technical bid assistance
- Engineering review of Prime Contractor’s submittals
- On-site construction management (typically full-time construction professional)
- Management of requests for information (RFIs)
- Detailed schedule review and monitoring
- Environmental compliance monitoring
- Observation and documentation of construction quality and conformance with requirements
- Procurement of owner-supplied equipment (e.g., tracking deliveries)
- Participation in Plan-of-the-Day (POD) weekly and monthly meetings
- Review of payment applications and change order requests

**Construction Quality Assurance (CQA)**

In this PMO Concept, CQA services are performed by the PMO Team on behalf of the client to guard against potential defects and deficiencies in the work of the contractor. The PMO Team documents construction activities are performed in substantial compliance with the contract documents (e.g., plans and specifications), and advises the client on technical construction issues, as appropriate.
The CQA element may consists of the following services:

- Testing services (material and installed advanced engineering methods testing)
- Engineering review of contractor submittals
- On-site observation and documentation (typically periodic)
- Technical advice

**Defensible Data Collection**

CCR Projects require voluminous data collection to ensure safe and quality project completion, address shareholders concerns and, in some instances, documentation for litigation actions.

To accomplish this third and final PMO element, The PMO Team can develop, deploy and maintain an Environmental Information Management System using Mobile Data Solution Platform. Mobile Data Solutions (MDS) Platform will record site conditions during construction activities and any downstream operation and maintenance of remediation systems, if warranted. The MDS Platform is also capable of performing environmental audits, and daily inspection oversight during construction.

The PMO Team leverages multiple data collection and presentation platforms to manage data and can provide results to the end user(s) in real-time using internet-based interactive mapping. Data, including photographs and geolocation information, are captured in the field via tablets and smartphones and are merged with existing site information such as laboratory analytical results. The functionality and connectivity of the mobile devices increases accuracy and coverage and allows the end user(s) to automate reporting workflows. Information collected in the field is automatically uploaded to a cloud-based data management system, which enables The PMO to seamlessly and safely store, analyze, and report information effectively and in real-time. The PMO powerful data collection, management and reporting tools let us spend less time organizing field and laboratory data and more time analyzing information to provide the end user(s) with innovative solutions. The proactive, collaborative and data-driven approach to resolution of construction, environmental compliance, and regulatory issues streamlines data flow from the field to program managers, allowing the end user(s) to resolve problems more effectively.