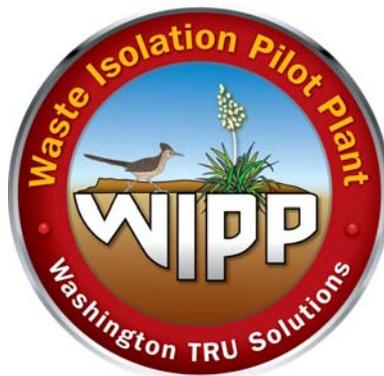


WP 15-2  
Revision 13

# Washington TRU Solutions LLC Management Control System Description

Cognizant Section: Project Analysis and Control

Approved by: Keith Nelson



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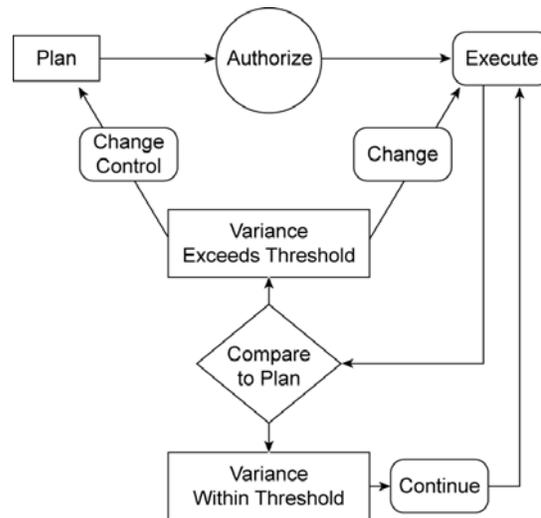
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## 1.0 INTRODUCTION

This system description describes the management control system (MCS) employed by Washington TRU Solutions LLC (WTS) to meet the requirements as specified by the Customer and is intended for use by WTS only. The system meets the internal needs of WTS and complies with DOE O 413.3, *Program and Project Management for the Acquisition of Capital Assets*; DOE M 413.3-1, *Program and Project Management for the Acquisition of Capital Assets*; and American National Standards Institute/ Electronic Industries Alliance (ANSI/EIA) 748-A, *Earned Value Management Systems (EVMS)* which is the industry standard for management.

The MCS (Figure 1) is responsive to management requirements and provides increased cost and schedule performance visibility into the accomplishment of project objectives. In addition to providing a formal integrated schedule and resource plan, the MCS provides visibility of planned versus actual performance and early detection or prediction of problems that require management attention.



**Figure 1 – The WIPP Management Control System**

This description document is supplemented by detailed instructions, a project work breakdown structure (WBS), a WBS dictionary through Level 4, a series of hierarchical schedules, and detailed control accounts that segregate specific work elements with assigned, time-phased expenditures of resources.

In summary, the MCS provides for:

- Organization – Contractual efforts are established, responsibilities assigned, and the work is formally authorized.
- Planning, Scheduling and Budgeting – Work is formally planned, scheduled, and budgeted.

- Accounting Considerations – Costs of work and material are accumulated.
- Analysis and Management Reports – Planned and actual performance is compared and variances analyzed.
- Revisions and Data Management – A process is provided for approval and incorporation of baseline changes.
- Surveillance – Describes the application of the independent assessment program to the operation of the MCS.

### **1.1 Policy Statement**

This WTS Management Control System Description provides guidance for those responsible for project management activities. The WTS policy for management control focuses on an integrated MCS with principles and policies that require projects do the following:

- Plan all project scope through completion.
- Break down the project scope into manageable pieces that can be assigned to a responsible person or organization for control of scope, schedule and cost objectives.
- Integrate project scope, schedule, and cost objectives into a baseline plan against which accomplishments may be measured.
- Collect and record actual costs in the same manner as planned, and compare those costs to the performance baseline in the same manner as planned.
- Objectively measure project performance.
- Analyze significant variances and implement management actions to mitigate risks and manage cost and schedule performance.
- Incorporate authorized changes to the baseline in a controlled and timely manner.

System records and supporting documents are available to the Customer and duly authorized representatives, as well as government review teams and surveillance personnel. Detailed reviews of indirect costs and disclosure statements are restricted to government authorized personnel.

The Project Analysis and Control (PAC) organization is responsible for interpreting the requirements of this document as they apply to a particular program situation and for maintaining and updating this document when appropriate. It is the responsibility of WTS management to ensure that all personnel whose responsibilities include

development, execution, or revision of a portion of the cost, schedule or scope baselines become familiar with the contents of the WTS MCS Description and associated procedures and guidelines. The PAC organization ensures that appropriate training and required reading are available to assure that the project team understands the management control process.

## **1.2 System Purpose and Objectives**

The MCS is an integrated scope, schedule, and cost control system comprising policies, procedures, workflow processes, reports, and data management systems. The MCS defines the planning and control processes for accomplishing project scope in an orderly and cost-effective manner. This system is the primary cost and schedule management tool used to meet both external and internal project management objectives. It also meets the internal needs for performance monitoring and management of the project. Appendix 1 provides a listing of applicable acronyms and a glossary of definitions.

The MCS provides the structure for ensuring conformance to the 32 criteria requirements found in ANSI/EIA 748-A - current version. Appendix 2 contains the entire 32 criteria, which have been summarized below in the standard five functional groups.

**Organization** Using a hierarchal WBS and organizational breakdown structure (OBS) for projects will ensure seamless and complete ownership of the work across all aspects of budgeting, scheduling, cost accumulation and statusing progress that:

- Defines and organizes the authorized project scope in a WBS.
- Identifies which organizations are authorized and responsible for work on the project in an OBS.
- Provides for the integration of the projects planning, scheduling, budgeting, work authorization, and cost accumulation process.
- Provides for the integration of the WBS and OBS, as identified in the responsibility assignment matrix (RAM), to facilitate the performance measurement of both cost and schedule.
- Documents the process and organization responsible for the management and control of indirect costs.

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### **Planning, Scheduling and Budgeting**

Using proven project controls processes and procedures to ensure integration of scope, cost, schedule, and technical performance that:

- Establishes an integrated, time-phased schedule and corresponding budget baseline, at the control account level, against which work may be authorized and project performance objectively measured.
- Identifies and sequences authorized work in a manner that provides visibility of the task interdependencies.
- Clearly defines project deliverables, milestones, and performance goals.
- Focuses on cost/schedule management and ensures management visibility for work authorization and control of scope, schedule, and cost components.
- Provides timely, valid, and traceable baseline performance and trend data.
- Ensures that the budget of the Work Packages and Planning Packages sum to the control accounts and WBS, thereby preventing duplication of budget and cost baselines.
- Assesses progress achieved versus progress planned, measured in terms of physical work accomplished.

### **Accounting**

Ensuring the consistent and accurate collection and reporting of the received costs and accruals associated with each Control Account that:

- Establishes consistent and accurate project cost collection against the final cost objectives without allocation to more than one single Control Account.
- Adheres to accepted accounting principles and control accounting standards (CASs).
- Allocates indirect costs, in accordance with the CAS disclosure statement.
- Ensures that actual costs are collected and compared to the performance in the same manner as planned.

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### Analysis and Management Reports

Reflecting a forward looking approach to cost control that:

- Provides timely visibility into technical, cost and schedule progress for both WTS and the government.
- Generates planning and performance data at the appropriate level to be used by management in the decision making process and provides a sound basis for projecting final costs and future funding requirements.
- Develops meaningful performance indicators to provide early warning of potential project problems.

### Revisions and Data Maintenance

Providing necessary and accurate data that can be used as a key element in change management processes that:

- Ensures cost effective, accurate, timely, and properly controlled baseline changes at appropriate levels within the project.
- Ensures all budget revisions are reconcilable and traceable to authorized targets and control account budgets.
- Prevents modifications to the baseline unless authorized per the Change Control process that formally documents all approved baseline changes.

### 1.3 Applicability

The WTS MCS Description has been organized using the five functional groupings of the 32 EVMS criteria given in ANSI/EIA 748. The correlation of the WTS MCS Description sections against the 32 criteria within the five functional groups is depicted in Figure 2. Criterion 20 is not applicable to WIPP as it applies to a manufacturing accounting system that is capable of isolating unit and lot costs in a production environment, which is not part of the way WTS does business.

Note: In the interest of instilling sound business practices and providing continuity within the WTS EVMS process, the following sections are included in the WTS Management Control System Description sections, even though they are not specifically required within the 32 criteria within ANSI/EIA 748.

- 4.6 Funds Management
- 5.3.2 Variance Thresholds
- 7.0 Surveillance



## **1.4 Work Performed as Subcontractor**

When WTS is required to perform work as a subcontractor on other projects, WTS will abide by any requirements required by the prime contractor to comply with its EVMS and will apply the MCS as described herein when compliance with ANSI/EIA 748 (latest version) is required.

## **2.0 ORGANIZATION**

In the MCS, all work is defined, identified to responsible organizations, and formally authorized. This ensures that all required tasks are planned and that accountability exists for performance of those tasks. It also ensures work is performed only on authorized activities.

### **2.1 Work Breakdown Structure**

WTS uses hierarchical coding structures to define all authorized contract work at the appropriate level needed for management insight and control. The WBS is a product-oriented integration tool used as the common project reference point for planning, budgeting, estimating, work authorization, cost accumulation, and performance reporting. Comprised of end products, support, services, facilities, and any other effort required to accomplish the contractually authorized work. The WBS graphically displays elements representing work to be accomplished in logical relationships. Each descending level represents an increasingly detailed definition of a WBS component. Additionally, it provides a common framework for identifying and authorizing effort, establishing schedules and assigning resources, collecting of costs, and measuring cost and schedule performance. The WBS is cross-linked to an OBS to develop a RAM that aligns the scope with personnel responsible for performing the scope. Project resources are then linked and traceable to the scope and the responsible organizations both vertically and horizontally throughout the entire WBS.

Initially the Customer develops the WBS at summary levels down to Level 4. The Customer oversees and approves the overall project/program WBS whose summary elements are the basis for WTS to extend the summary WBS to levels appropriate to identify the work to be accomplished and for management control purposes (Figure 3). Normally, the WBS is extended from Level 4 to Level 5 or Level 6, depending on the size and complexity of the effort. The resulting WBS includes all authorized scope. The resulting WBS possesses the following characteristics.

All contract work is included in the WBS.

- The WBS identifies all contractually authorized work.
- It permits and facilitates the further detailing of each lowest level WBS element into control accounts and work packages to be assigned to performing departments.

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- It is the framework for the integration of work scope, related budgets and schedules.
- It provides for the summarization and reporting of actual data and facilitates measuring performance against planned work, budgets, and schedules at lower levels.
- Only one WBS is established and used in the performance of the contract.

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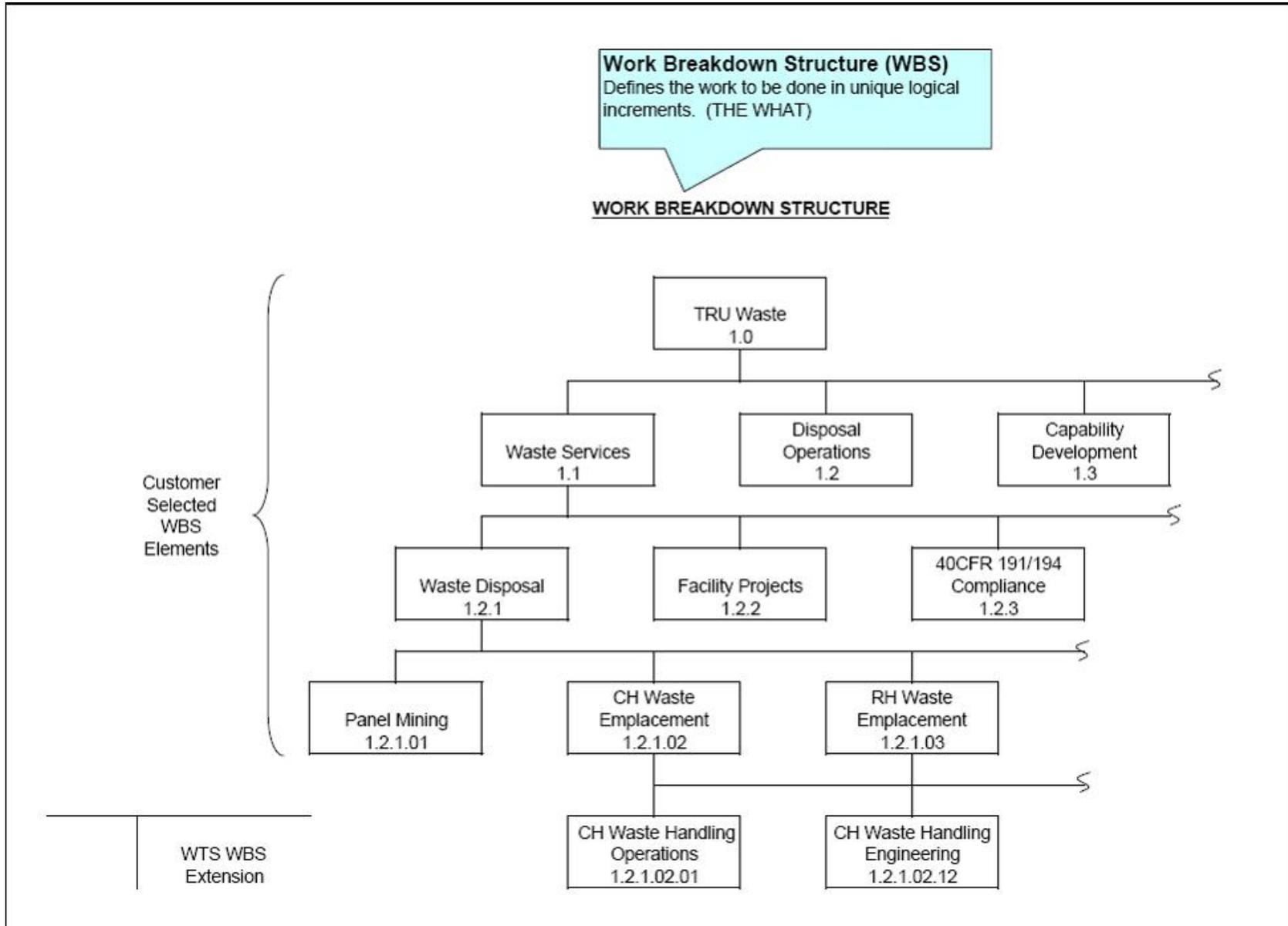


Figure 3 – Work Breakdown Structure Example

Changes to the approved WBS are authorized through the change control process prior to implementation. Changes to Levels 1-4 are submitted for approval to the Customer with an explanation for the requested change as well as an assessment of the impact that the change may have on other WBS elements.

### **2.1.1 WBS Index**

The WBS Index is an indentured listing of WBS elements.

### **2.1.2 WBS Dictionary**

In conjunction with the WBS, the Customer has prepared a WBS dictionary which further defines the WBS elements down to Level 4. The dictionary is a narrative description of each WBS element describing the scope to be accomplished. While the WBS may be the table of contents for the project, the WBS dictionary is the book itself – telling what work will be accomplished.

Activity-based cost (ABC) estimate sheets are used to define work scope below Level 4. Approved changes to the project scope that affect the dictionary narratives will be incorporated in a timely manner.

## **2.2 Organizational Breakdown Structure**

The OBS identifies the functional roles and responsibilities as well as the reporting hierarchies for the performance of the contract scope. Management responsibility for the WTS work scope and reporting relationships between organizational elements is assigned by the WTS General Manager (GM) as depicted in Figure 4. The responsibilities for each WTS organization are described in their respective management charters.

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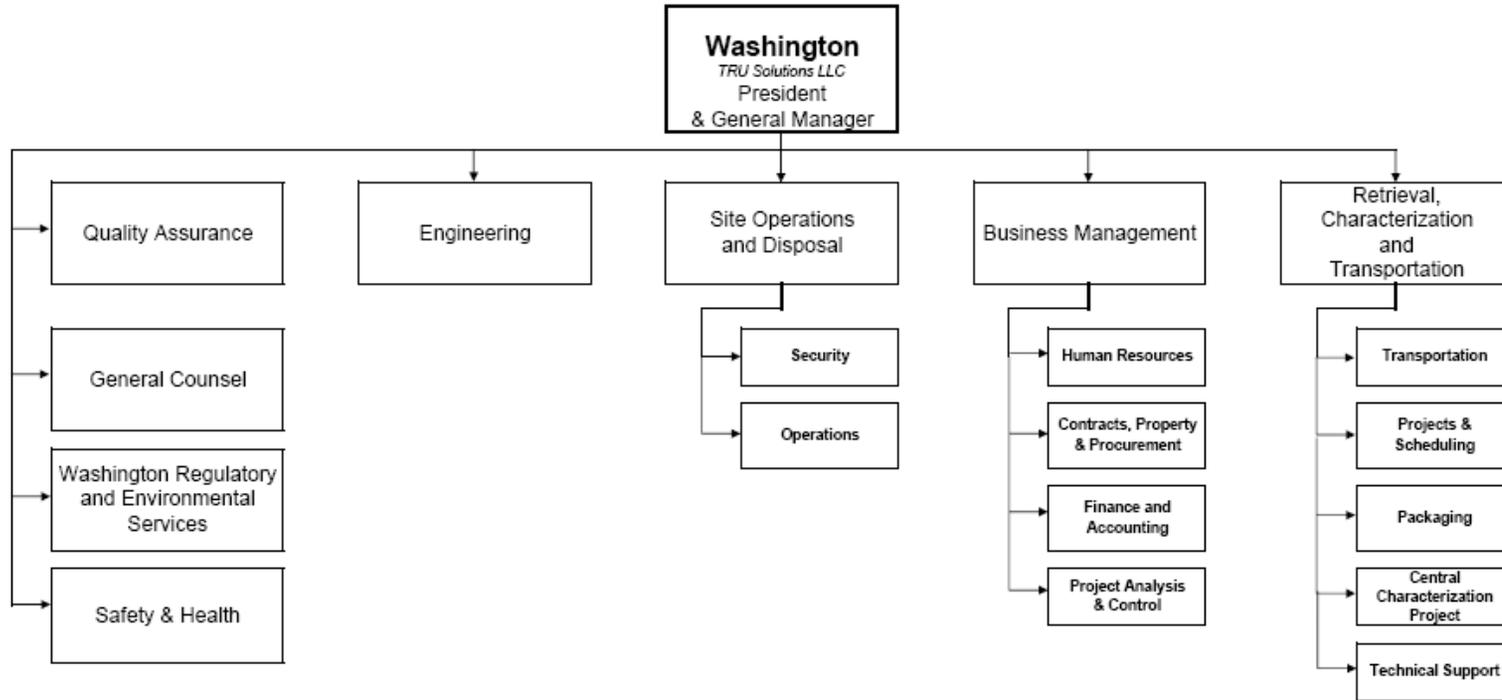


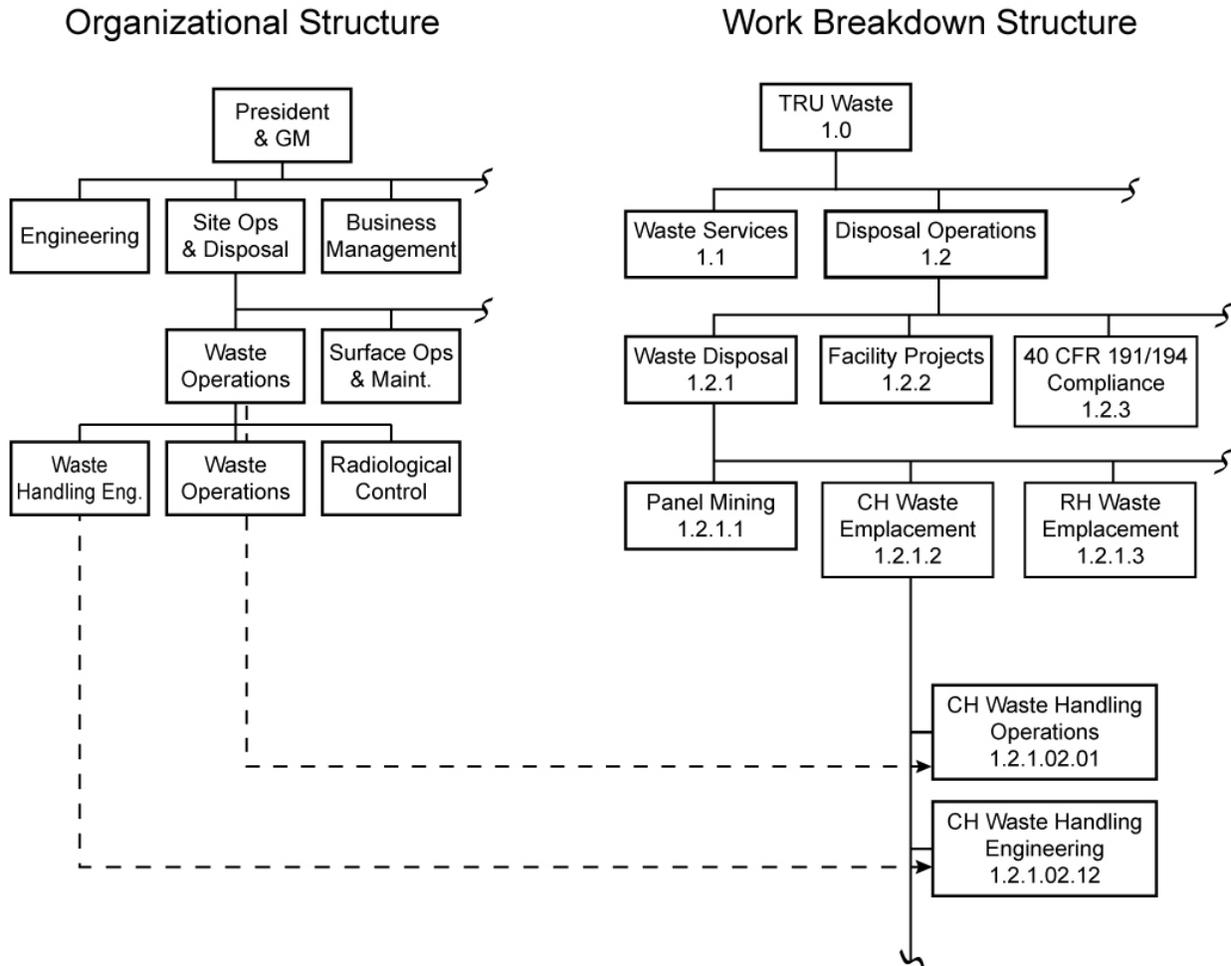
Figure 4 – WTS Organizational Breakdown Structure

### 2.3 Responsibility Assignment Matrix

The RAM is the intersection of the WBS and the OBS, and defines who has been assigned responsibility for ensuring that the scope associated with a control account is accomplished. The RAM (Figure 5) defines clear lines of responsibility and accountability for the accomplishment of all aspects of the contract scope. The RAM:

- Identifies the WBS level where control accounts are established.
- Identifies, from a single organizational element, the control account manager (CAM).

The WTS RAM relates the WTS organization structure to the WBS to ensure that each element of the contract scope of work is assigned to a responsible individual and to identify individuals responsible for carrying out the effort involved in each element.



**Figure 5 – Sample Responsibility Assignment Matrix**

## **2.4 Control Account Plan**

Assigning elements of the WBS to the manager responsible for its execution results in a single control point called a control account (Figure 6). The person assigned responsibility for a control account is called a CAM. The CAM is responsible for the scope, cost, and schedule progress in each assigned control account. These responsibilities include the planning and control of each control account and the identification, analysis, and reporting of significant variances.

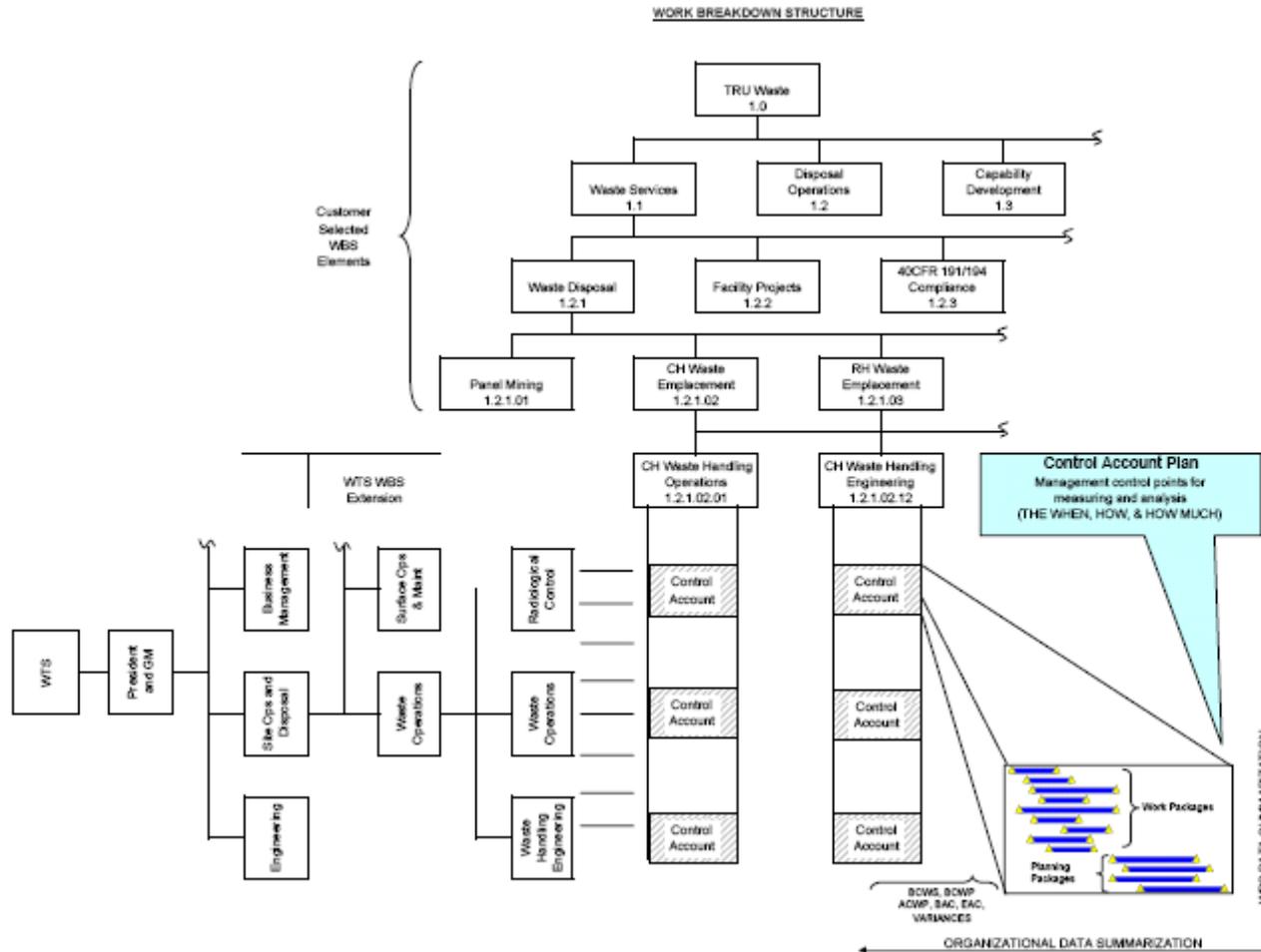
The CAM is responsible for developing the control account plan (CAP). The CAP is the document used to integrate, plan, and manage the control account's cost, schedule, and work scope requirements. The CAP also identifies any further subdivision of the control accounts into work packages or planning packages and EV techniques to be used in measuring the performance of each work package. Involvement of the responsible CAMs ensures that adequate visibility is provided to allow for planning, monitoring, and statusing of work elements.

The CAP is developed by compiling previously planned work (ABC sheets and resource loaded schedules) into a logical executable plan and should contain the following information:

- Scope
- Baseline schedule
- Cost estimate details broken down into a time-phased budget; the BCWS
- Work package scope, cost, schedule, and EV technique
- Planning package scope, cost and schedule

The CAPs, when approved, become the baseline for measuring cost and schedule performance.

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**Figure 6 – Management and Control Points**

### **3.0 PLANNING, SCHEDULING, AND BUDGETING**

The MCS ensures the establishment and integration of scope, schedule, and cost into a single integrated baseline called the performance measurement baseline (PMB). This integrated baseline provides the basis for control and measurement of progress and performance throughout the project life.

Performance is measured against the project baseline and variations from the baseline are analyzed, reported, and controlled during the life of the project.

**Scope (Technical) Component** The scope component contains significant project technical goals and characteristics. The Contract supported by the Contract Statement of Work and other defining documentation, identifies the actual approved scope.

**Schedule Component** Durations, sequences, and interdependencies of project activities define the schedule component of the integrated baseline. The Project Master Milestone Schedule contains milestones that are controlled by the Customer. The milestones define the "targets" around which the detailed schedules are developed. The detailed Integrated Project Working Schedules are the level where the critical path method (CPM) logic that supports the master schedule exists.

**Cost Component** The cost component establishes the estimated cost of executing the project in accordance with the scope and schedule components. Authorized scope and funding levels, plus approved changes to the baseline, form the cost component.

### **3.1 Planning**

Planning is the process of determining the project's objectives and identification of the activities to be performed and resources required to carry out the tasks to be performed in accomplishing the objectives. The planning process is a systematic process that includes the development, approval, revision, and integration of project plans with budget formulation, budget execution, and program evaluation. Project planning takes place in three phases; the life-cycle baseline planning, the annual DOE Office of Energy Environmental Management (EM) budget submittal planning and the planning that takes place prior to the start of the execution year that is necessary to update the performance baseline based upon funding received.

#### **3.1.1 Life-Cycle Baseline Planning**

The life-cycle baseline planning process began with guidance from EM. The DOE Strategic Plan, and regulatory, technical, and stakeholder requirements drove EM planning. Within EM, site missions, the EM vision, and EM's budget needs drove project planning guidance and the development of baseline drivers and planning assumptions. Life-cycle baseline schedules and cost estimates were developed

consistent with EM funding targets. The life-cycle baseline planning process culminated with the approval of Critical Decision–2/3 (CD-2/3). CD-2/3 established the near term execution baseline and the planning estimate range for the out years. The WTS portion of the near term baseline is the basis for the WTS performance measurement baseline.

### **3.1.2 DOE/EM Budget Formulation**

The EM budget formulation planning process starts with the near term baseline and out year planning estimates. The baseline drivers and assumptions may be amended each year based upon the latest funding and strategic planning projections for the National TRU Waste Program. These projections may be modified by any new or specific policy, program, or stakeholder issue that results in deviations from the original planning document.

During the budget formulation process, CAMs review the near term baseline and out year planning estimates in terms of scope, schedule, and cost to comply with the latest programmatic direction. This is the time where estimating/planning documents developed using the rolling wave concept described in section 3.2 are updated, and the CAMs perform an annual bottoms up EAC analysis for each of their control accounts.

Following the update of the estimating/planning documents, the Customer conducts a review of any proposed changes. The information resulting from the planning and validation process is submitted by the Customer to EM as the basis for the EM budgeting process, and any required EM Configuration Control Board (CCB) action. This information is considered a planning scenario only and the baseline is not changed until a baseline change proposal is approved.

### **3.1.3 Execution Year Planning**

Because WIPP is an operating facility and funding is provided on an annual basis, the work to be performed is based upon annual funding constraints. Prior to each fiscal year, the Customer issues a program guidance letter identifying program direction and the WTS portion of the expected budget appropriation for the execution year. Upon receipt of the letter, CAMs refine budgets and schedules to reflect scopes of work that could be performed for the expected funding. A preliminary fiscal year execution plan is prepared and submitted to the Customer. The Customer's management evaluates the plan and finalizes the WTS program. The Customer then issues a program execution letter containing the authorized work scope and budget authority for the fiscal year. The WTS GM, or his delegate, then authorizes the CAMs to revise ABC sheets as appropriate, revise CAPs and prepare change requests (PCRs) as needed to modify the baseline to reflect the Customer's direction, and proceed with the work scope.

## **3.2 Estimating and Resource Loading of Schedules**

The estimating process requires planning and interfacing with numerous functional departments and other project participants. The estimate, associated scope of work, and execution strategy sets the expectations of achievement by the Customer. The

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estimate, time-phased with the schedule, becomes an integral component of the PMB which is the basis for implementing the EVMS.

Developing the estimate details requires defining the control accounts, work packages, and planning packages within the project WBS. The estimate is assembled by addressing such items as labor, materials, subcontracts, and indirect costs.

Estimates are developed in accordance with guidance provided by the *WIPP Cost Estimating Guide*, DOE/WIPP-04-3303. The guide defines the elements of a cost estimate package and guides preparers through a systematic process that will result in a well structured, accurate, and complete estimate. Cost estimates should:

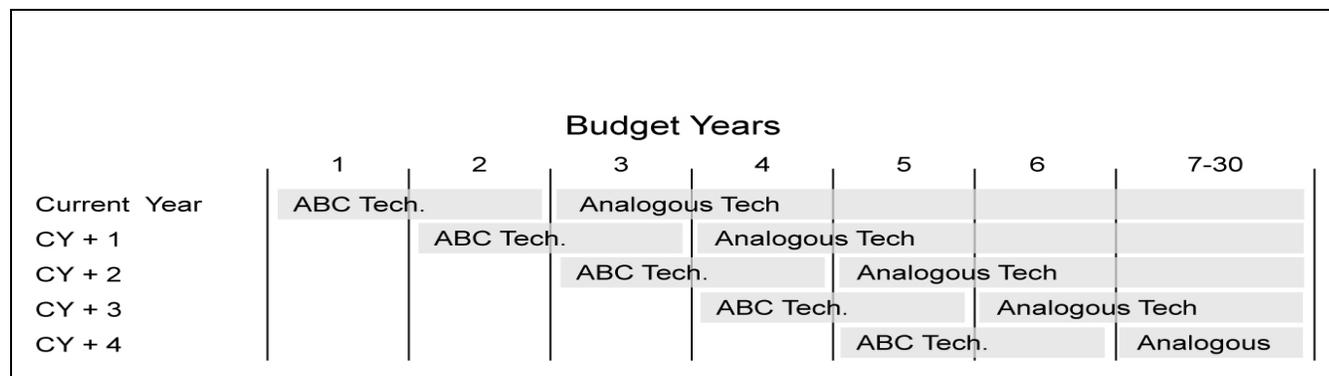
- Use appropriate techniques and sufficient detail commensurate with the defined level of scope.
- Use accepted types of estimates and methodologies for development, maintenance, and update of lifecycle baseline costs.
- Integrate scope, schedule, and cost to accurately reflect the overall execution of the lifecycle baseline during planning and execution.
- Include drivers and planning assumptions in preparing the estimate.
- Include schedule milestones, deliverables, and budget targets that are part of the estimate development process.

Risk events, whether based on past experience, or uncertainties within the defined project scope, should be taken into account during the estimating process.

The schedule is resource loaded with the project estimate to provide the basis for the budgeted cost for work scheduled (BCWS) required in an EVMS.

A rolling wave concept (Figure 7) is used where detailed estimates, using ABC estimating techniques, are developed two years into the future, with analogous factors used to develop costs beyond that. During the DOE/EM budget submittal process existing ABC sheets are updated and new sheets are prepared for the new year that is now included in the two year window.

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**Figure 7 – Rolling Wave Concept**

### 3.3 Scheduling

Scheduling facilitates effective planning, statusing, critical path management, and variance analysis, which are essential to the success of all projects. The MCS ensures that work is planned and scheduled, establishes interfaces between project participants, and provides visibility of work progress and valid schedule information necessary to make timely management decisions. The scheduling process supports the integration of the project's scope, cost and schedule objectives by documenting a logical sequence of work through the creation of relationships and interdependencies that determines total work time and the related critical path. The process ensures that the schedule supports resource planning, performance measurement, and the project objectives.

The WTS scheduling system provides for the development and maintenance of schedules that support the WIPP mission. The system is a formal, complete, and consistent system with the attributes identified in DOE M 413.3-1. It employs the CPM scheduling technique to calculate project schedules and is capable of providing current status and forecasts of completion dates for all discrete authorized work. The scheduling system contains a summary or master schedule and related subordinate schedules that provides a logical sequence from the Project Master Milestone Schedule to the Integrated Project Working Schedules. The detailed working schedules are used to status and update summary level schedules. All scheduling information is contained in the Complex-Wide Integration Tool.

All authorized work is planned out to meet the life-cycle requirements of the WIPP project using the framework of the WBS. The WBS forms the basis for planning the project schedule and together with the OBS provides the framework for both vertical and horizontal integration of scope, cost and schedule baselines.

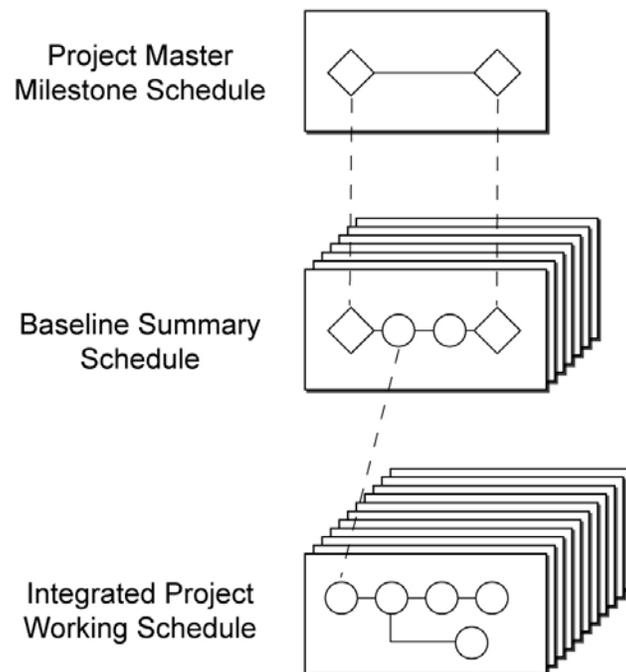
To assure consistency between all levels of schedules and schedules maintained by different organizations, schedules are integrated vertically and horizontally. Vertical integration refers to the ability to relate activities and milestones between different levels of schedules. Vertical integration ensures that milestones appearing on more than one level of the schedule hierarchy will have the same date (planned, actual, or forecast) on each level. Horizontal integration refers to the ability to relate activities and milestones to logically preceding and succeeding activities and milestones regardless of the

organization performing the work. Organizational elements responsible for accomplishing the authorized work are also identified in the system. Horizontal integration of planning and scheduling through the WBS permits schedule performance measurement for both the WBS and its organizational elements. WTS uses the Primavera Project Manager scheduling software, which allows this traceability from a single data base to be automated through all levels of the schedule hierarchy.

### 3.3.1 Schedule Hierarchy

The WIPP scheduling system employs a hierarchy of schedules generated from a single integrated schedule, beginning with program level controlled milestones and ending with detailed working schedules in a descending, integrated, and tiered methodology. The scheduling system integrates the authorized work in a manner that describes any required sequence of work, and any significant task interdependencies required for proper coordination, and identifies the critical path. The system has the ability to relate activities and milestones between different levels of schedules (vertical integration) and to logically link preceding and succeeding activities and milestones (horizontal integration).

Detailed plans resulting from the planning and budgeting process support the schedule hierarchy. A typical schedule hierarchy is shown in Figure 8.



**Figure 8 – Schedule Hierarchy**

- The Project Master Milestone Schedule contains the Customer's controlled milestones. Controlled milestones are key milestones assigned by the Customer for effective management control. They are generated from lower level schedule activities where logic relationships are contained.

- The Baseline Summary Schedule is a summary level schedule that summarizes the detailed working schedule activities that drive the controlled milestones and fully supports the master schedule. It depicts summary activities for monitoring progress.
- The Integrated Project Working Schedules are the lowest level of the scheduling system. It is the level where necessary CPM logic exists, resources are loaded, and performance is measured. It is also the level where activities are coded to enable sorting by WBS and OBS. The detailed schedules are used to status and update the summary schedules.

The system provides for management appraisal, review, and decision making at the hierarchical schedule level corresponding to the appropriate organizational level. This approach ensures that the system will be managed by the responsible organization held accountable, and further provides the next higher level of management concurrence prior to any schedule revisions affecting higher tier documents.

### **3.3.2 Critical Path**

Since WIPP is an ongoing operating facility without a near term completion date, the critical path is identified by applying hard constraints on Customer-controlled milestones. Therefore, the critical path is the schedule path leading to a controlled milestone with the least amount of float. Each activity on the critical path becomes a critical activity, and represents the schedule path with the highest risk and least margin for error. Based on schedule progress and performance, the critical path can change. Therefore the critical path is identified, analyzed, and evaluated on a regular basis.

### **3.3.3 Schedule Revisions**

The system accommodates revisions to scheduling documentation at any level of the hierarchy and provides for organizational authorization prior to revision. The system also provides for revisions to other affected schedules to ensure that integration, both vertical and horizontal, is preserved. Only changes authorized through the baseline change control process are incorporated into the baseline schedule.

### **3.3.4 Schedule System Integration with Cost Systems**

The schedule system is an integral component of control account development. (The three components are scope, schedule, and budget.) The schedule component is used in conjunction with the other components to develop an integrated cost and schedule baseline. The system is integrated with the WTS financial management system.

### **3.3.5 Schedule Status and Forecasting**

The system provides for timely statusing of progress and accurate forecasting of scheduled work on an interactive basis by use of a real time project management software system. Physical products, milestones or other objective measures are used

to measure progress for discrete activities. Statusing occurs monthly to coincide with the end of the month.

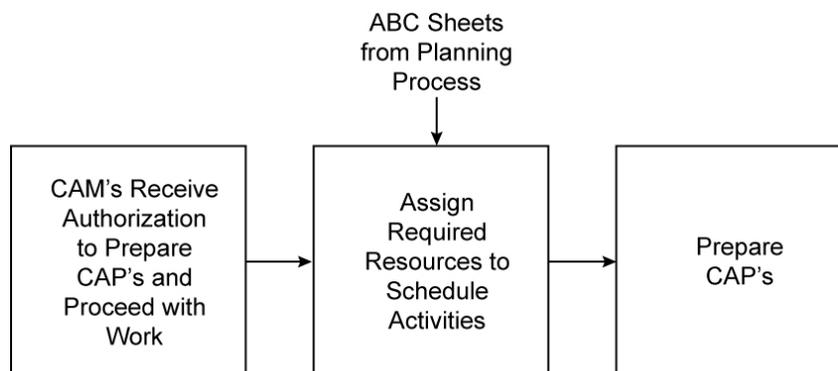
### 3.3.6 Schedule Reporting

The system reports accurate progress on a monthly basis using CPM techniques and provides variance analysis and reporting for critical milestones, at all appropriate levels of the hierarchy. Out-of-cycle scheduling reports are provided as required.

## 3.4 Budgeting

The budgeting process allocates the estimated cost of resources into control accounts, establishing the time phased scope and budget against which cost and schedule performance is measured.

Following the authorization to proceed, ABC estimating sheets are used to resource load the detailed working schedules, producing CAPs that result in time-phased budgets that are summarized to various levels of WBS and functional organizations to provide a performance plan against which work accomplished can be measured. Performance is measured to provide indicators of project cost and schedule performance. At any level within the PMB, a given work segment has a described scope of work, a schedule of performance, and a budget value; thus, the PMB integrates authorized work scope, schedule, and budget (see Figure 9).



**Figure 9 – Budget Process**

### 3.4.1 Performance Measurement Baseline

The PMB is the time phased budget plan against which cost and schedule performance are measured. The resource loaded schedule activities contained in the WTS scheduling system form the basis of the PMB.

The PMB represents all work within the contract scope, represented by time-phased budgets in control accounts. The PMB is equal to the sum of the BCWS for all control accounts. At each level from the detailed work package to the total contract, BCWS reflects the dollarized performance plan against which work accomplished can be measured. This BCWS, or PMB, becomes the key component for comparison of work

accomplished with work scheduled; and actual cost with the value of the work performed.

The baseline evolved from the initial definition of scope requirements, milestones and schedules, and development of cost estimates during the life-cycle planning process and modified during subsequent EM budget formulation and fiscal year planning processes.

The PMB does not include management reserve (MR).

### **3.4.2 Undistributed Budget**

The undistributed budget (UB) includes known scope and applies to authorized efforts not yet identified to low level WBS or OBS elements, a control account, or summary level planning package. UB is generally kept to a minimum and is distributed in a timely manner. All UB transactions are incorporated via change control.

### **3.4.3 Management Reserve**

MR, is an amount of the total allocated budget withheld for management control purposes but not designated for the accomplishment of specific tasks. MR provides the flexibility to adjust for uncertainty in the schedule, cost estimate, technical scope, or other aspects of the project. The amount of MR was established via the risk management process, using Monte Carlo analysis, described in DOE/CBFO-03-3292, *CBFO Risk Management Plan*, and is identified in the approved Near Term Baseline. MR is controlled and accounted for at the total contract budget level.

Requests for application of MR are documented on a PCR as described in WP 15-FC.01, WTS Programmatic Change Control Process. MR is not included in the PMB until it is applied as BCWS for unanticipated activity within the scope of the baseline. MR is not used to cover overruns or reduce underruns and is not used to provide budget for out of contract scope. MR is tracked by the Budget Baseline Status Report.

### **3.4.4 Control Account**

The control account is the point where the WBS tasks and OBS responsibility intersect. It is the point where a single functional organization has responsibility for work defined to a single WBS element. Control accounts are the level for assignment of responsibility, definition of work, establishment of schedules and time-phased budgets, cost accumulation and performance measurement. The control account identifies the plan for work task accomplishment, includes a description of the effort required, identifies elements of cost (labor, material, etc.) and identifies the resources required to do the job. Each control account is assigned a CAM who is responsible for planning and ensuring the accomplishment of work in the account and is the focal point for management control. Additionally, the control account provides the source for summarization of performance data through higher level WBS and organization levels. Control accounts are subdivided into work packages and or planning packages when all

work cannot be adequately defined and performance objectively measured at the control account level. The hierarchical WBS and OBS structures ensure that lower level costs cannot be allocated to more than one higher level WBS or OBS element.

Indirect work scope is assigned to control accounts in the same manner as direct work scope for assignment of responsibility, definition of work, establishment of budgets, cost accumulation, performance measurement and reporting purposes.

As CAMs plan the control accounts, they determine both the total resources required for each task and when, over the span of each task, these resources will be expended. Time-phased budgets approximate the way resources will be expended in performance of effort.

The control account WBS number acts as the control account's charge number in the WTS accounting system code of accounts, which ensures that all project costs are accumulated against the proper WBS scope. The appropriate elements for control accounting and work authorization can be traced and summarized from the lower WBS elements up to the total project level.

### **3.4.5 Work Packages**

Work may be subdivided into manageable groups of activities within a control account and assigned to a work package. Work packages are an element of work within control accounts. A work package represents a manageable scope of work, usually a short time-span task, assigned to one responsible organizational element. It is integrated in the schedule with start and completion dates and employs an EV method that is representative of physical accomplishment. Work package descriptions must clearly distinguish one work package from another and incorporate frequent, objective indicators of progress. If performance measurement is to be performed at the work package level, then the work package level is the management control point where actual costs are accumulated and performance measurement comparisons are made prior to rolling performance up at the control account level.

Budget established at the work package level identifies specific resource requirements. Resources required to complete a project may fall into the following categories:

- Labor
- Subcontracts
- Material and services
- Temporary labor
- Automated data processing equipment
- Training
- Travel
- New Mexico Gross Receipts Tax

The number, content, size and duration of work packages needed in an account will vary based on the size and complexity of the work scope.

### **3.4.6 Planning Packages**

A planning package is a logical aggregation of work (within a control account), usually future work that can be identified and budgeted, but is not yet practicable to plan in detail at the work package level. The planning package budget is time-phased in accordance with known schedule requirements for resource planning, and the plans are refined as detail requirements become clearer and the time to begin work draws nearer. Work should not commence until a detailed plan is put in place.

Planning packages differ from work packages in that the time phasing of the budget may be spread over the assumed duration of the planning package or may be a non-linear value that is spread by the CAM. Although planning packages represent a less concise definition of the task, they must:

- Have an organizational identity.
- Have an associated scope of work.
- Be assigned to a control account.
- Be defined in terms of start and stop dates.
- Have specific assigned budgets.

The use of planning packages prevents budgets allocated to future work from being applied to current work. These budgets are time-phased and summarized to the control account total to ensure that the total BCWS for the control account (the sum of all work packages and planning packages) agrees with the budget released to the control account.

### **3.4.7 Budget Reconciliation**

The PMB contains all budgets assigned to specific segments of project effort. Reconciliation of budgets occurs at each summary level. The sum of detail activity budgets in a control account must equal the authorized control account total budget; the sum of all control account budgets within a WBS Level 4 element must equal the WBS element total budget; the sum of all budgets within a functional organization must equal the organization's total budget.

## **3.5 Work Authorization**

The objective of work authorization is to ensure the Customer's approval of project resource expenditures to accomplish a specified scope. The program execution letter from the Customer serves as the official authorizing document for WTS to proceed with the work scope for the next fiscal year. Because WIPP is an operating facility, funding is provided on an annual basis. As a result, the work authorization process is based on annual funding constraints.

Upon receipt of the program execution letter, the WTS GM formally transmits the Customer's direction to the CAMs and authorizes them to prepare control account plans for performance of the work scope. Draft CAPs, reflecting approved baseline changes, are submitted to the GM, or delegate, for review and approval. CAP approval signifies

the GM's authorization to the CAM to proceed with the scope of work contained in the CAP.

In fiscal years that start with a continuing resolution, or where EM has not provided final fiscal year funding from the appropriation, interim guidance will be provided to WTS by the Customer. This interim guidance will serve as the authorizing document for WTS to proceed with the work scope and will be transmitted by the WTS GM to the CAMs, authorizing them to prepare CAPs. After the final execution year guidance is provided, a change request will be prepared as necessary to update the baseline.

### **3.6 Performance Measurement/Earned Value**

WTS has implemented an MCS, in compliance with ANSI/EIA 748, as the method used for defining, planning, authorizing, measuring and monitoring all project performance. This is the evaluation and feedback loop of the MCS. Earned value (EV) measurement is used to evaluate performance for all work packages. Meaningful performance metrics enable better management insight and decision making; therefore, the objective measurement of work accomplished must yield an accurate performance assessment. To ensure these objectives are satisfied, WTS has implemented an MCS that uses the following methods and processes.

#### **3.6.1 Earned Value Methods/Techniques**

The CAM selects the appropriate type of EV measurement depending on the end product or service to be measured. All EV methods will include the following characteristics:

- **Stability** – The EV method chosen for a work package will not change after the work has begun.
- **Objectivity** – For discrete work, completion of an event will be based upon predetermined criteria or a tangible product.
- **Ability to audit** – The criteria used for evaluating physical accomplishment will be auditable.

There are three basic methods used for measuring performance. Application of these methods and their various techniques depends on the end product or service to be measured. As the CAMs plan assigned work, they determine the most appropriate EV technique to measure accomplishment of the work. The goal in choosing an EV technique is to provide for objective measurement on a monthly basis of work being performed or planned to be performed. Earned value techniques are assigned at the work package level. It is WTS policy that discrete EV techniques be used as much as possible. Each activity will use one of the following EV methods to track work progress:

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- **Discrete Effort** – Discrete tasks are those work packages which are quantifiable to individual work products or predetermined tangible measurement. Techniques used for discrete efforts are:
  - a) **Fixed Formula** – 0/100, 50/50, 25/75, etc.  
In the 50/50 technique half of the total activity budget is earned when the work package is started; the remaining 50 percent is earned when the work package is completed. This technique is used only for short-duration scope, preferably when the start and completion dates fall within two consecutive months and generally not used when the work package has more than three months total duration. Other percentage splits (e.g., 20/80, 70/30) can be used instead of 50/50.  
  
In the 0/100 technique, no budget is claimed until all the work has been completed. This technique is used only when the start and end dates of a work package both occur in a single month. This technique is generally limited to procurement oriented activities.
  - b) **Percent Complete** – In this method, value is earned based on a percent complete in relation to predetermined steps necessary to complete the task.
  - c) **Units Complete** – This method is used for work packages which contain a series of like units with repetitive operations, with planning based on unit standards. Value is earned based on the number of units completed.
  - d) **Milestone** – Predetermined percent complete based on internal milestones within the Work Package for activities containing units of effort, the accomplishment of which can be measured by discrete units of output (i.e., drawings, design, documents, permit issued). The milestone technique is preferred by WTS. The accomplishment of the final and interim milestones constitutes the basis for gaining BCWP. Each of the interim milestones is assigned a budget (as a percentage of the total budget) such that, upon completion of all milestones, the total work package budget is earned.
- **Apportioned Effort** – This method involves the BCWP for a work package being based upon the progress and performance of a related work package(s) from which progress is measured objectively.
- **Level of Effort** – Where activity output is not discretely measurable, as in some operational and support areas, a LOE technique is used. LOE activities are general or supportive in nature and do not produce definite end products. In some instances (e.g., safety and engineering) significant planning and analysis of the work required to perform baseline requirements is done to establish staffing levels which are then portrayed as LOE. LOE is characterized by a reasonably uniform rate of activity over a specific period of time. LOE tasks are

measured through the passage of time rather than through application of discrete EV methods.

Material or subcontract items must use an effective performance measurement technique that allows for BCWP to be claimed in the same accounting period as actual costs. The EV techniques will be documented in the CAP, but in general performance will be earned in the following manner:

- **Engineered Equipment and Material** – Engineered equipment and materials are budgeted and costed for performance measurement reporting purposes when the item is received and accepted, or is based on a verifiable progress payment schedule.
- **Subcontracts** – The request for proposal shall include any subcontractor requirements for supporting the WTS MCS. The CAM balances this request by assessing the subcontract risk and management visibility requirements versus the subcontractor cost to generate the EVMS reporting.

#### **4.0 ACCOUNTING CONSIDERATIONS**

The WTS commitment to financial stewardship and its accounting system is based on accepted accounting principles and control accounting standards which comply with DOE regulations and requirements, including the ANSI/EIA guidelines.

As a contract requirement, WTS complies with the Control Accounting Standards (CASs) in its accounting and charging practices. A CAS disclosure statement is developed and submitted to the Customer when changes are identified. The disclosure statement provides a general description of WTS accounting practices, including the criteria for classifying direct and indirect costs and the basis for allocating indirect costs.

#### **4.1 Accounting System**

The WTS financial accounting system provides the mechanism for recording project cost information. It ensures the collection and reporting of the incurred costs and accruals within the accounting period and provides management with the tools and information needed to manage cost collection activities against the final cost objectives. The control accounting system is integrated with financial accounting records. Control accounts are reconcilable monthly to the general ledger accounts in accordance with financial procedures.

In order to maintain reporting integrity, the retroactive change of accounting records is not allowed. Prior period adjustments and corrections for mischarges, rate adjustments, and accounting errors are made to the current period and classified as a prior period cost. Accounting adjustments and cost transfers from one charge code to another are processed by the WTS Accounting organization in accordance with formal procedures.

Once the work scope contained in a control account is completed and all charges have been incurred, the control account charge number is closed to prevent any inappropriate charges. The process for de-activating charge numbers is the following:

- CAM notifies analyst that all work is complete, there are no further charges, and that the charge number should be closed.
- The analyst verifies that all charges have been entered into the WTS financial accounting system, all charge number change requests have been processed, and there are no outstanding purchase order balances to that account.
- The analyst notifies Accounting to close the charge number.
- Accounting deactivates the charge number and deletes speed type from the system.
- Accounting notifies payroll to delete the charge number from electronic timesheet program.

If a closed charge number needs to be reactivated, the following process is followed:

- CAM notifies analyst of need to reactivate charge number.
- Analyst evaluates the need to reactivate and notifies project entry personnel in Accounting.
- Accounting sets up a speed type.
- Accounting notifies Payroll to set up the charge number in the electronic timesheet program.

#### **4.2 Cost Collection**

The cost accumulation process provides for timely and accurate collection of project costs. Accounting for project costs is performed at the level in which resources are expended in the performance of work. All costs are collected within the WBS. All costs are collected in a manner consistent with the CAS Disclosure Statement, at the terminal WBS level through the use of unique activity codes. This allows all cost elements within a project to be "rolled-up" within the WBS of the project.

The hierarchical WBS ensures cost and performance measurement data integrity and that lower level costs cannot be allocated to more than one higher-level WBS element.

### **4.3 Direct Costs**

A direct cost is any cost that is specifically identifiable with or attributable to a particular final cost objective. Direct costs may include labor, material, subcontracts, or any other costs directly associated with a specific activity.

Direct costs are collected by means of direct charge numbers. Charge numbers are defined such that costs may be summarized by WBS element. OBS codes are assigned to each control account to allow costs to be summarized by functional organization. The hierarchical WBS and OBS structures ensure that lower level costs cannot be allocated to more than one higher level WBS or OBS element. All direct costs (labor, subcontracts, equipment, travel, training and material) are processed through the WTS accounting system.

### **4.4 Indirect Costs**

Indirect costs are planned, estimated and collected in accordance with the WTS Disclosure Statement. Indirect costs associated with major functions such as General Management, Procurement, Human Resources, Finance and Accounting, and Contract Administration are planned, budgeted and analyzed in control accounts. OBS codes are assigned to each control account to allow costs to be summarized by functional organization. Indirect costs are collected by means of charge numbers in the same manner as direct costs; and not allocated as a percent adder to direct charge numbers. Only the New Mexico gross receipts tax is added to each control account for costs incurred within the state of New Mexico.

### **4.5 Material and Subcontract Accounting**

Material and subcontract costs are charged to the appropriate control account in a manner consistent with the budget. Purchased materials and subcontract costs are charged to the control account at the time an invoice is processed, or accrued at the point at which the material becomes the property of WIPP or a task has been performed. Large material orders containing progress payment provisions are charged to the control account as milestones are completed and when invoices are processed for payment.

### **4.6 Funds Management**

Funding and budgeting are two concepts that are often confused. Budget equates to the plan (i.e., the performance measurement baseline that represents the performance plan against which a contractor is measured and the work is performed). Budget can be planned or earned but cannot be spent. Funding is a monetary resource provided to execute the plan. Funds management includes expenditure tracking to ensure the authority to expend has not been exceeded and thereby prevent an anti-deficiency act violation.

Financial guidelines are developed and implemented covering the collection, monitoring and reporting of data on the authorization, obligation, commitment and expenditure (actual and forecasted) of funds and budget by type of fund, and budget and reporting (B&R) control points. These internal guidelines are consistent with the Customer's guidance provided each year. Funds and budgets are closely monitored to prevent exceeding authorized limits and to avoid exceeding available funding.

Funds management data (both actual and forecasted costs, commitments and projected funds available to the contract) are integrated with the performance measurement and accounting systems at the terminal level WBS. The forecast of total funds required is the sum of actual and accrued costs to date and the forecast to complete costs (including outstanding commitments) for the remainder of the appropriation period.

Evaluations of fiscal year end spending forecasts, as developed through analysis of past performance trends and projections of future expenditures, provides early warnings when obligated funding limits may be exceeded. Appropriate management actions are taken to remain within the current authorization or acquire additional funds if these cost estimates indicate an overrun.

Periodic analysis of uncosted and uncosted/unencumbered obligation balances is required to ensure proper funds management and avoid exceeding available funding. Baseline changes resulting from these situations are managed in accordance with the WIPP Change Control Process.

The impact of all scope and schedule changes is evaluated against the budget and availability of funds. Conversely, the impact of changes to the amount of available funds is assessed against required funds to accomplish the acceleration of scope and schedule.

## **5.0 ANALYSIS AND MANAGEMENT REPORTS**

Section 3.0 discussed developing the PMB. Section 5.0 discusses how cost and schedule status are measured and analyzed. The monthly management reporting cycle identifies project performance based on earned value metrics and variance analyses. The reports also recommend corrective actions as appropriate.

The objective of performance analysis and reporting is to provide WTS and the Customer with objective, timely, and accurate performance data to assure that all cost, schedule, and technical objectives are managed to their successful completion. These objectives are met by providing progress reports that highlight the following:

- Monthly analysis of the cost, schedule, and technical progress as measured against the baseline
- Identification of cost, schedule, and at-completion variances that exceed established thresholds

The monthly status report summarizes progress and statuses the overall program performance. It provides an overview of the major accomplishments and problems experienced by the project.

## **5.1 Project Status**

Visibility into project performance helps the management team to focus on those areas in need of attention and corrective action. Accurate and reliable data is essential for proper analysis and management control of the project. The performance reporting process is integrated with the WBS, the baselines, and the OBS to ensure that progress, performance data, and performance measurement are provided at the appropriate WBS and OBS levels. This is accomplished by adhering to a monthly data gathering and statusing process, and identifying the minimum requirements that must be followed in developing timely and accurate performance data for management use and for incorporation into the monthly report. The following minimum requirements must be adhered to in meeting the objectives for the analysis and reporting process:

- Status the project schedule beginning with the lowest level of detail, and summarize as appropriate.
- Collect costs by each of the budget elements of cost for each control account.
- Record costs using acceptable costing techniques that are consistent with schedules and budgets and that provide cost information in a timely manner.
- Quantify the following data elements at the appropriate level:
  - BCWS
  - BCWP
  - ACWP
  - EAC
  - Cost, schedule, and at completion variances in terms of dollars, with reasons for the variances, including an assessment of the problems
- Summarize the data elements itemized above through the WBS and OBS to the designated reporting levels for the monthly progress report.

Figure 10 depicts the gathering of status information as described in the following sections.

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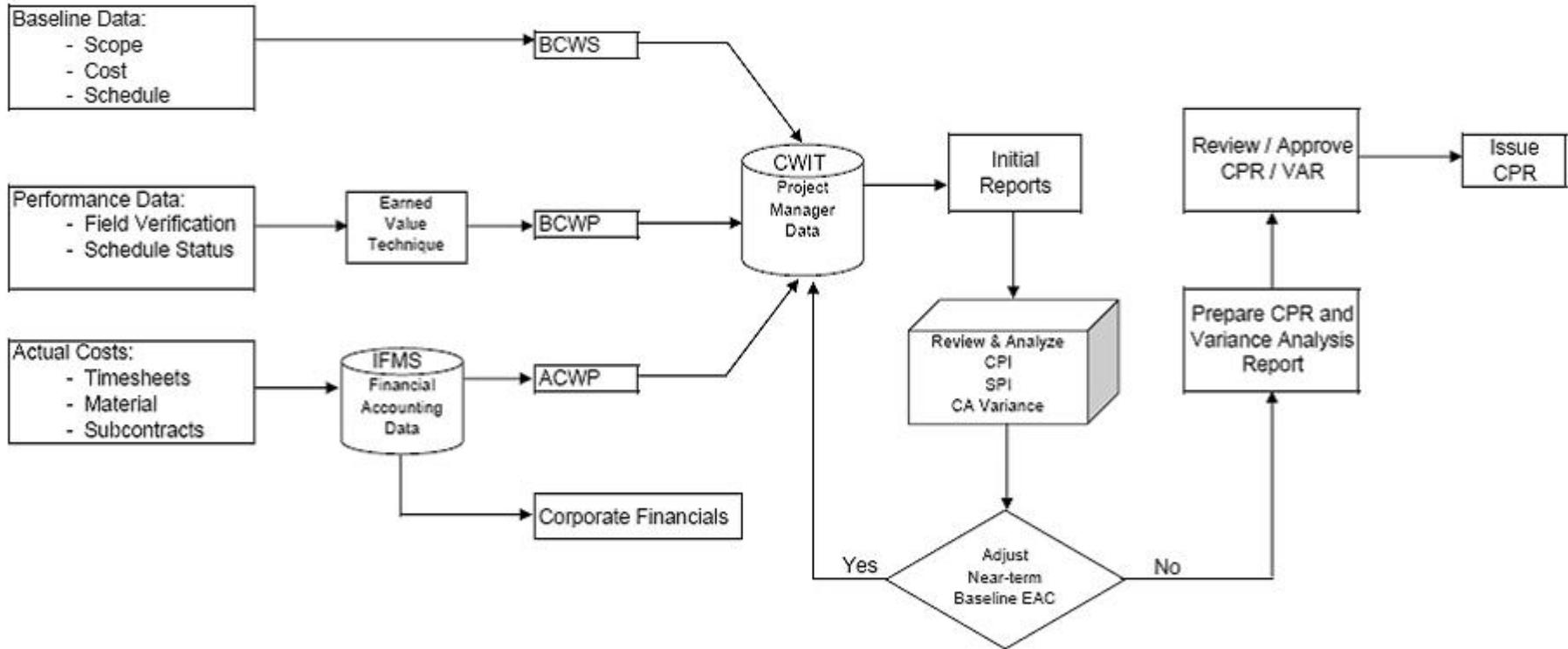


Figure 10 – Status and Reporting

### **5.1.1 Schedule Status**

The project schedule activities are statused monthly. The CAMs provide status based on:

- Physical work accomplished or completed
- Remaining duration of open activities
- Actual start and finish dates
- Review of schedule logic, constraints, and critical paths

The schedule status is updated and BCWP is calculated based on the selected earned value technique.

### **5.1.2 Cost Status**

The cost and scheduling system is used to calculate the cost and schedule performances, cost and schedule variances, and variance at completion. The system is the integration point for BCWS, ACWP, and BCWP.

The cost and scheduling system maintains the time-phased dollar baseline at the work package, or control account level, summarizing to the various WBS levels and the total project. This BCWS represents the PMB for reporting.

The physical work completed (through the current reporting period) is updated in the cost and scheduling system using information from the CAM. The cost and scheduling system calculates the BCWP which is the budgeted value of the physical work accomplished in terms of the dollar budget assigned to that work.

Actual costs are obtained from the WTS accounting system. Actual costs include both actual costs and accruals. Accruals are submitted by the CAMs on a monthly basis to cover subcontract work performed or material received but not yet billed. Section 3.2.0 of the Finance & Accounting Manual specifically addresses the procedures for the accrual process. Actual costs are entered into the cost and scheduling system for performance measurement calculations.

### **5.1.3 Subcontract Status**

The subcontract planning and control process requires the CAM to properly integrate subcontractor performance measurement information into the MCS. Subcontracted effort is related to the appropriate WBS element and organization charged with acquiring the subcontracted item. The CAM ensures that the BCWP reported for subcontractor performance reconciles to actual physical progress reflected in subcontractor progress payments. Subcontractor reports, such as statused schedules, technical reports, labor and equipment daily reports, and invoices are used to determine and/or verify BCWP and ACWP.

#### **5.1.4 Engineered Equipment and Material Status**

Engineered equipment and material are budgeted and costed for performance measurement reporting purposes when material is received and accepted or based on progress payments.

### **5.2 Analysis**

Providing timely and accurate project performance and analysis is essential to the successful management of the project. Earned value data, along with critical path analysis, are used by all levels of management for effective project execution. Data produced by the MCS are timely and of sufficient quality to provide an effective foundation for management decisions. In the control accounts, several specific budget values are monitored as discussed below. They are the budgeted cost for work scheduled (BCWS), budgeted cost for work performed (BCWP), actual cost of work performed (ACWP), and estimate at completion (EAC).

#### **5.2.1 Budgeted Cost for Work Scheduled**

BCWS is defined as the time-phased budget baseline that represents the work plan. At the total contract level, BCWS is equal to the sum of all control account (direct and indirect) budgets (i.e., the PMB). As the CAMs plan assigned work, they also time-phase resources required to support the planned performance. Thus, BCWS is the total budget for the work package as established on the CAP. Following in this time-phasing process, the CAM selects the appropriate EV technique to measure performance against the plan.

#### **5.2.2 Budgeted Cost for Work Performed**

BCWP is the key to cost and schedule performance measurement. BCWP is defined as the budgeted value of the "Work" actually accomplished during any given period. Budget is "earned" as work is accomplished according to the predetermined EV technique. EV is determined in a manner that is consistent with the way BCWS is planned and can not exceed the total BCWS planned for any element of work. The CAM is responsible for demonstrating, on a monthly basis, how much of the work has actually been accomplished. BCWP is determined by statusing each activity and applying the pre-identified EV technique.

#### **5.2.3 Actual Cost of Work Performed**

ACWP is defined as the sum of all costs incurred in actually performing the work. The accumulation of ACWP is independent of the time-phased budget (BCWS) and the budgeted value of the work performed (BCWP). ACWP is accumulated at the activity level through a charge number. All costs are recorded in the WTS accounting system and are transmitted to the cost and scheduling system for reporting purposes.

### 5.2.4 Estimate to Complete

The estimate to complete (ETC) is the estimated cost to complete all authorized work from a point in time to the end of the Near Term Baseline or to when the work is completed. Each CAM, as part of the monthly statusing process, must review the ETC for the control accounts they oversee.

In performing this assessment, the CAM considers cumulative costs and all known factors that will impact future work (engineering changes, cost and schedule variances, performance trends, overtime usage, future conditions, etc.). It is important for the CAM to focus on what work has been accomplished rather than just what money has been spent.

### 5.2.5 Estimate at Completion

Each CAM, as part of the monthly statusing process, must review the EAC for the control accounts for which they are responsible. The EAC is the estimated total cost for the control account. It equals actual costs at a point in time plus the estimated costs to complete or to the end of the Near Term Baseline (ETC).

$$EAC = ACWP + ETC$$

When comparing the EAC to the total budget in the Near Term Baseline for a control account it is determined that there will be an impact, the impact is assessed and cost and schedule results forecasted.

Due to specific funding limitations, an EAC that exceeds available funding indicates immediate corrective action must be enacted as necessary such that funding limitations in specific control points are not exceeded at the end of the fiscal year.

### 5.2.6 Independent Estimates at Completion

Statistical forecasting is a method to calculate EACs, but should only be used for comparison purposes. Use of statistical forecasting will allow the CAM to check the validity of his EAC.

The following calculations can be used for statistical forecasting:

1. Cumulative CPI. This is the most commonly used method and is viewed as the most likely case. It is based on cost performance to date.

$$EAC = \text{Actual Costs} + \frac{(BAC - EV)}{\text{Cumulative CPI}}$$

2. Cumulative CPI x SPI. This is typically used to forecast high end cost requirements or when a project insists on getting back on schedule. It takes cost

and schedule performance to date into consideration. Usually "worst case" scenario.

$$EAC = \text{Actual Costs} + \frac{(BAC - EV)}{\text{Cumulative CPI} \times SPI}$$

3. Rolling average for CPI. This method of calculation is predicated on recent experience. It is based on the average CPI for the previous three months.

$$EAC = \text{Actual Costs} + \frac{(BAC - EV)}{3 \text{ month average CPI}}$$

### 5.3 Variance Analysis and Reporting

Variance analysis is the process by which cost, schedule and at-completion variances are analyzed monthly. CAMs are required to identify the root cause of the variances, identify impacts to the project and develop corrective actions. The process of accumulating and comparing planned performance to actual performance results in the identification of both positive and negative variances. The cost performance reports issued from the MCS provide the CAM(s) the information to assess the performance of their assigned control accounts. Effective variance analysis and reporting will provide management the ability to:

- Assess actual progress, costs incurred, and their comparison to baseline plans.
- Identify and analyze significant variances between planned and actual performance for initiation of corrective action.
- Monitor if corrective actions are having the desired effect.
- Assemble and present the information monthly in a compliant and Customer-approved format.

#### 5.3.1 Variance Analysis

Variance analysis reporting provides the means for the CAM to communicate cost, schedule, and at completion variances to WTS management and the Customer. The CAM has primary responsibility for performing the variance analysis for both current period and cumulative variances. Monthly, the MCS calculates cost, schedule, and at completion variances, which are reported to the CAM. CAMs are required to review, analyze, and report on all control accounts with variances exceeding Customer-established thresholds for cost, schedule, or at completion.

The variance analysis should identify problems, causes, impacts, corrective actions and effects on EAC. After identifying the problem, the next question to answer is why did the variance occur. What is the root cause of the problem? Impacts should describe what has already been affected or what will happen if something is not done soon. The corrective action should describe what actions are/should be taken about the cause of

the variance, who is responsible, what is the expected outcome of the action, and what are the cost trade-offs.

The formulas for determining variances are as follows:

$$SV = BCWP - BCWS$$

Schedule variance (SV) is defined as the difference, expressed in units of dollars, between the value of the work actually performed (BCWP) and the value of the work scheduled to be performed (BCWS) during that period. The SV shows whether more or less work was performed than planned. Out-of-sequence progress (BCWP) can give a false indicator of schedule health. A positive SV does not necessarily mean that the project is ahead of schedule; it means that more work was performed earlier than planned. Variances may not indicate whether the scheduled milestones are being met, whether a completed activity is a critical event, or if delays in an activity's completion will affect the completion date of the project. The primary source of information for schedule analysis is the scheduling system. Schedule analysis includes a review of the critical path and total float.

$$CV = BCWP - ACWP$$

Cost variance (CV) is defined as the difference between the value of work performed and the actual cost incurred for the performance of the work. A negative CV indicates the potential for a cost problem.

$$\text{Variance at Completion (VAC)} = BAC - EAC$$

The VAC is the difference between the total budget for accomplishing the scope of work, as contained in the Near Term Baseline (BAC), and the EAC.

A milestone variance analysis report (VAR) is created when the forecast date for a controlled milestone varies from the scheduled baseline date. The responsible CAM completes the VAR by describing the cause of the variance, identifying any cost or schedule impacts and providing the corrective action plan.

Information from the completed VARs is included in the monthly reporting process.

### **5.3.2 Variance Thresholds**

Schedule, cost and end-of-year variances, whether positive or negative, that are equal to or greater than 10 percent and \$50,000 at WBS Level 5 will require the CAM to complete a VAR. A controlled milestone that has a variance from the schedule baseline also requires a VAR. Controlled milestones are key milestones assigned by the Customer for effective management control.

Any variances equal to or greater than 10 percent and \$100,000 or \$250,000 at WBS Level 4 are reported by WTS to the Customer.

### 5.3.3 Performance Indices

The most commonly used performance indices used are:

- **Schedule Performance Index (SPI)** – The ratio of work performed (BCWP) to work scheduled (BCWS) for a period of time.  $SPI = BCWP/BCWS$ . It is used to indicate the efficiency of schedule performance. A value less than one indicates that less work was performed than was scheduled. For example, an SPI of .89 indicates that for every \$1.00 worth of work that was planned, \$.89 worth of work was accomplished.
- **Cost Performance Index (CPI)** – The ratio of work performed (BCWP) to actual cost for a period of time.  $CPI = BCWP/ACWP$ . CPI is used to indicate the efficiency of cost performance. A value less than one indicates that actual costs have exceeded the value of work performed. A CPI of 0.95 means only \$.95 of value is being earned for each \$1.00 of cost.

## 5.4 Project Reporting

Communication of project information and status is key to the successful management of the project. The routine internal communication tools used by WTS are the monthly progress status report and monthly progress review meeting. The progress report provides the requisite EV data for measuring cost and schedule performance, performance indicators, variance analysis, and major milestone status. The progress review meeting is used to convey project status and discuss variance corrective actions and other issues of high interest.

The reporting systems for the project are structured (Figure 11) to gather project status information for all management levels (i.e., CAMs through senior WTS management). Data integrity is maintained to accommodate different focus areas and cross-cuts. The statusing and data collection process provides the mechanism to:

- Gather performance data on a formal basis
- Status key project documentation
- Develop summary reports for review, analysis, and development of CAPs

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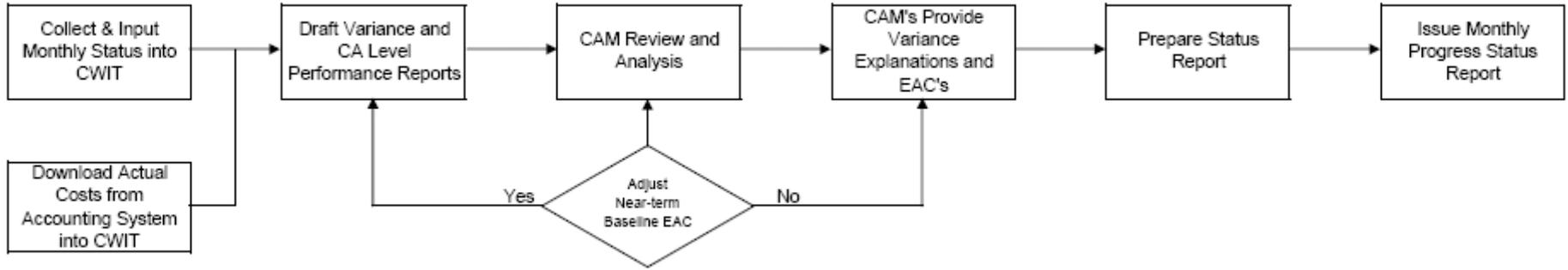


Figure 11 – Analysis and Reporting Process

Performance analysis is a continuous activity. The integrated project scope, schedule, and cost data are gathered and interpreted into project status information. Significant current or potential problems are identified and root causes determined. Alternative courses of action are assessed and corrective action is taken if necessary. Status information from the MCS is used to report cost, schedule, financial, funding, and milestone information to the Customer on a monthly basis.

## **6.0 CHANGE CONTROL**

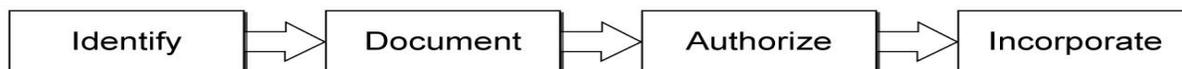
This section applies to project changes that have an impact on the approved scope, schedule and cost components of the PMB in accordance with DOE Order 413.3 and ANSI/EIA-748 criteria. Changes to the baseline are reviewed for acceptability and approved in accordance with the change control process defined in WP 15-FC.01, WTS Baseline Change Control Process. Baseline changes are not done simply to eliminate cost or schedule variances.

The integrity of the MCS and the assessment of project performance are dependent on maintaining the validity of the PMB throughout the performance period. To ensure that the PMB remains valid, the MCS includes a process which provides for a timely, formal, and documented process that:

- Defines conditions under which baseline documents and the PMB may be changed in a controlled manner.
- Identifies the controlling authority for baseline changes, based on formal thresholds and limits of authority. Provide accountability and traceability throughout the approval/decision making process when changes are made to the baseline. Ensure that baseline changes are clearly defined, well documented, and approved through a process that clearly delineates the management level required for review or approval.
- Establishes a process for managing and documenting changes to project scope, cost, and schedule baseline documents and/or the PMB. The PMB will include only authorized scope for the project.
- Accommodates emergency changes.
- Controls retroactive changes and ensures that no retroactive changes are made to the BCWS, the BCWP, or the ACWP except for correction of errors or routine accounting adjustments.
- Maintains a record log of all programmatic change request (PCR) actions in process, approved or declined. Provide an orderly and disciplined method for incorporating approved baseline change control actions into the baseline.

During the performance of a contract, numerous changes occur with respect to scope, schedule and cost of the effort. These changes occur both as a result of Customer

direction and internal management needs. The MCS allows for incorporation of various changes while ensuring the performance measurement baseline continues to provide accurate program status. This is accomplished through a system of formal documentation, review, and approval of all changes prior to their incorporation.



BEFORE work begins

Timely incorporation of authorized changes is essential to ensure accurate reporting of the PMB. At a minimum, performance reporting on approved changes will be implemented during the next month's reporting cycle. The PMB should reflect the initial baseline plus all the approved baseline changes for accomplishing the work.

Changes to prior period baseline performance data (retroactive changes) should be limited to accounting adjustments, to correct data errors, or to incorporate Customer (DOE) Directed Changes and can be made only through an approved Change Control action.

Emergency or urgent changes that cannot wait to be processed through the normally scheduled change control board meetings are processed as described in the WTS Baseline Change Control Process. In these types of situations, special change control board meetings are held as needed and change requests requiring Customer approval will be submitted for processing through their change control system on an expedited basis.

## 6.1 Types of Changes

The approval levels are established, following the guidelines listed in the WTS Baseline Change Control Process. There are three kinds of changes listed below and discussed in the subsequent sections.

- Baseline changes directed by the Customer or requested by WTS, which change the scope, budget or schedule of the existing contract in excess of approved change thresholds.
- Internal Replanning - Replanning actions within the scope of the authorized contract.
- Changes to baseline documents.

**6.1.1 Out-of-Scope Changes – Directed by the Customer or Requested by WTS**

These are changes to the contract, annual Program Execution Guidance, or Project Master Milestone Schedule that are either directed by the Customer or requested via a change proposal by WTS. A PCR is processed requesting a baseline change that must be approved by WTS management and the Customer before the change can be implemented and baseline document(s) amended.

**6.1.2 Internal Replanning**

These are changes to schedule, budget, or scope that affect a control account or the project schedule, but do not affect the program execution guidance, the life-cycle baseline or the Project Master Milestone Schedule. These changes are initiated by the CAM to reflect modifications to the original work approach. It may be necessary to perform replanning actions within the scope of the authorized contract to compensate for cost, schedule, and technical problems which have caused the original plan to become unrealistic, respond to a realized risk, require a reorganization of work or people to increase efficiency or accommodate operations, converting a planning package to a work package, or require different engineering, maintenance or operations approaches. Such changes are acceptable provided changes to the Integrated Project Working Schedule do not affect the Project Master Milestone Schedule, and changes within the control account are within the approved change thresholds identified in the Customer's change control process. Changes in excess of these thresholds require WTS management and Customer approval. CAMs process internal replans using the internal change control system to document and track changes.

**6.1.3 Changes to Baseline Documents**

If a desired change would affect any of the following, a PCR must be processed:

- Baseline Drivers and Assumptions
- WBS elements above Level 4
- WBS dictionary above Level 4

**6.2 Change Control Log**

The Change Control Log is a report to record the identification and status of PCRs.

**6.3 Budget Baseline Status Report**

Traceability of revised budgets to original budgets is provided by the Budget Baseline Status Report. The report is a historical record of all approved cost baseline changes and provides an audit trail from the original budget to the current budget.

## **6.4 Programmatic Change Request Form**

The PCR form includes the following information:

- Description of change – describe the scope of the change, including cost and schedule impacts, and justification for the change.
- The proposed source of budget if additional funds are required, and the impact of moving the budget from the proposed source.
- Confirmation that the change has been reviewed against Integrated Safety Management Principles.
- Detailed resource requirements and basis for estimates.
- WBS elements affected by change.
- Concurrence/approval signatures

## **7.0 SURVEILLANCE**

Surveillance is the process of assuring that the application of the MCS continues to be effective and consistent with the processes described in the MCS. The purpose of surveillance is to ensure that the MCS is effectively utilized to manage cost, schedule, and technical performance. An effective surveillance process ensures that the key elements of the process are maintained over time.

The goal of MCS surveillance is twofold. First, it ensures that WTS processes and procedures are being followed. Second, it confirms that WTS processes and procedures continue to satisfy the guidelines in the ANSI/EIA 748 standard for an EVMS.

The WTS surveillance approach is documented in management control procedure WP 15-GM1000, Management Assessments, and further described in WP 15-FC.03, EVMS Surveillance Plan. This procedure provides instructions for planning, performing, and reporting management assessments. The manager of PAC is responsible for assessment of the MCS processes to determine how well the system's performance meets Customer requirements and expectations so improvements can be made if necessary. This assessment should include participation by all levels of WTS management as well as input from the Customer to identify and resolve process and management issues.

The surveillance process shall accomplish the following goals:

- Determine the effectiveness of current programs and processes in meeting Customer and WTS management requirements and expectations.

- Identify problems for corrective action.
- Use results as input to the continuous improvement process.
- Surveillances will be done semiannually. A report will be prepared providing the results of the surveillance to management.

## **8.0 REFERENCES**

American National Standards Institute/Electronic Industries Association, ANSI/EIA 748-A-1998, *Earned Value Management Systems*.

National Defense Industrial Association, Program Management Systems Committee IPMSC, ANSI/EIA 748-A-1998, *Intent Guide, Revision 9a*.

U.S. Department of Energy, DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*.

U.S. Department of Energy, DOE Manual 413.3-1, *Program and Project Management for the Acquisition of Capital Assets*.

DOE/CBFO-04-3299, *CBFO Contractor Oversight Plan*

DOE/WIPP-04-3300, *Waste Isolation Pilot Plant Project Control System Description*

DOE/WIPP-04-3303, *WIPP Cost Estimating Guide*

WP 15-FC.01, WTS Baseline Change Control

WP 15-FC.03, EVMS Surveillance Plan

WP 15-GM1000, Management Assessments

## Appendix 1 – Glossary of Terms and Abbreviations/Acronyms

**Accrual** – Posting of costs for work performed and not paid. An estimated actual cost.

**Activity** – A unique task or function identified as an integral part of an overall objective.

**Actual Cost of Work Performed (ACWP)** – Total costs incurred (direct and indirect) in accomplishing an identified scope of work during a given time period.

**Apportioned Effort** – Effort which is not readily divisible into short-span Work Packages, but is related in direct proportion to some other measured effort.

**Authorized Work** – Effort which has been definitized and is in the project scope plus that effort for which written authorization by the DOE has been received but for which the cost has not been agreed upon and definitized into the project.

**Baseline** – A documented, quantitative expression of projected costs, schedule and technical requirements, including scope that has been formally reviewed and agreed upon, that thereafter serves as the basis for use and further development, and that can be changed only by using an approved change control process. It serves as a base or standard for measurement during the performance of an effort; the established plan against which the status of resources and the progress of a project can be measured.

**Baseline Change** – A formal modification of planned costs, schedules, and technical requirements.

**Budget** – A planned allocation of resources.

**Budgeted Cost for Work Performed (BCWP)** – The value of completed work expressed in terms of the budget (performance baseline value) assigned to such work. Also referred to as earnings or EV.

**Budgeted Cost for Work Scheduled (BCWS)** – The sum of the budgets for all work (work packages, planning packages, etc.) scheduled to be accomplished (including in-process work packages), plus the amount of level of effort and apportioned effort scheduled to be accomplished within a given time period.

**Change Control (CC)** – A document approval process applying technical, financial and management review of changes to work scope requirements, budget, or schedule baselines.

**Change Control Board (CCB)** – WTS-level board established to authorize modifications, manage costs, schedule, and scope changes to its annual operating plan, out-year plans, and authorized modifications.

**Change Level** – A classification for a proposed change to a baseline which indicates level of authority required to make final disposition on the change based on established thresholds in the Customer's baseline change control process.

**Appendix 1 – Glossary of Terms and Abbreviations/Acronyms**

**Constraint** – A directed date applied to an event in a schedule network, which supersedes the network calculations.

**Contingency** – An amount of money evaluated to cover costs which, based on past experiences, are known to be regularly encountered but difficult or impossible to estimate at the time the estimate is prepared. These costs may result from incomplete design, unforeseen and unpredictable conditions or uncertainties within the defined project scope.

**Contract Budget Base (CBB)** – The negotiated contract cost.

**Control Account** – A management control point at which budgets (resource plans) and actual costs are accumulated and compared to earned value for management control purposes. A control account is a natural management point for planning and control since it represents the work assigned to one responsible organizational element on one WBS element.

**Control Account Manager (CAM)** – The individual responsible for the management and execution of the control account scope, schedule, and cost.

**Control Account Number** – An alpha numeric code established within the WTS accounting system to identify a unique task for the purpose of collecting all costs associated with that task. This is the lowest level at which costs are accumulated and reported. Each control account number is unique and is related to a single-terminal WBS element.

**Cost Collection** – The accumulation of expenditures, accruals, for labor, materials, or services.

**Cost Estimate** – A documented statement of costs estimated to be incurred to complete the project or a defined portion of a project.

**Cost Performance Baseline** – See Cost Baseline.

**Cost Performance Index (CPI)** – The ratio of earned value to actual cost expenditures, determined by dividing the BCWP by ACWP. A value greater than 1.0 indicates that the work accomplished cost less than planned, and a value less than 1.0 indicates the work accomplished cost more than planned. The purpose of the CPI is to indicate the efficiency with which work has been accomplished.

**Cost Processor** – Cost performance measurement tracking and reporting software.

**Cost Variance (CV)** – The algebraic difference between BCWP and actual cost (Cost Variance = BCWP-ACWP). A positive value indicates a favorable position and a negative value indicates an unfavorable condition.

**Appendix 1 – Glossary of Terms and Abbreviations/Acronyms**

**Critical Path** – A logically related sequence of activities in a CPM schedule having the longest duration. Although normally calculated for the entire project, the critical path can also be determined for a milestone or subproject.

**Critical Path Method (CPM)** – A scheduling methodology used to predict project duration by analyzing which sequence of activities (which *path*) has the least amount of schedule flexibility (the least amount of *float*). Early dates are calculated by means of a forward pass using a specific start date. Late dates are calculated by means of a *backward pass* starting from specified completion date (usually the forward pass's calculated project *early finish date*).

**Direct Costs** – Resources directly related to the accomplishment of work.

**Earned Value (EV)** – A method for measuring project performance. It compares the value of work performed (BCWP) with the value of work scheduled (BCWS) and the cost of performing the work (ACWP) for the reporting period and/or cumulative to date.

**Earned Value Measurement System (EVMS)** – The integrated set of processes, which implements the standard and its criteria. EVMS is not software.

**Earned Value Management** – Earned Value Management is a methodology that allows both Government and Contractor Program Managers to have visibility into cost, schedule, and technical progress on their contracts to measure and manage performance. ANSI/EIA 748-A-1998 contains the industry guidelines, which establish the framework within which an adequate integrated cost, schedule, and technical management system will fit.

**Estimate** – See Estimated Cost.

**Estimate at Completion (EAC)** – The estimated total cost for work to be performed during the period of time covered by the approved Near Term Baseline.

**Estimate-to-Complete (ETC)** – Estimate of costs to complete all remaining work planned to be performed.

**Estimated Cost** – An anticipated cost for a defined scope of work.

**Functional Organization** – An organization or group of organizations with a common operational orientation, such as Engineering, Operations, Quality Assurance, etc.

**Funding** – The monetary resource provided by the Customer for expenditures on programs/projects.

**Indirect Budget** – The target value established for costs to be incurred by persons and/or departments for tasks, which do not have a direct relationship to the design, testing, and/or production of the end product, or contractually specified task.

**Appendix 1 – Glossary of Terms and Abbreviations/Acronyms**

**Indirect Cost** – That portion of labor, material or other costs not directly related or specifically identifiable to an end product or service.

**Life-Cycle Costs** – The total of all costs incurred or estimated to incur throughout the life of a project from planning through acquisition, maintenance, operations and disposition.

**Level-of-Effort (LOE)** – Work scope of a general or supportive nature for which performance cannot be measured or is impracticable to measure. The EV is earned by the passage of time and is equal to the budget scheduled in each time period. It is generally characterized by a uniform rate of activity over a specific period of time.

**Management Assessment** – A process of evaluating activities and facilities to determine compliance with applicable requirements, adherence to best management practices, and effectiveness of performance in meeting objectives in the areas of environmental protection, safety and health protection, quality, management and organization.

**Management Reserve (MR)** – An amount of the total allocated budget withheld for management control purposes, but not designated for the accomplishment of specific tasks. It is intended for work scope that will arise during the course of the project, but cannot be identified in advance. MR is not used to cover overruns or underruns and is not used to provide budget for out-of-contract scope.

**Master Milestone Schedule** – A summary-level schedule that identifies the major activities and key Milestones of a project.

**Milestone (MS)** – An event in a CPM schedule representing objectives determined to be critical control points, selected by Management to monitor and control progress toward the accomplishment of approved scope of work. A Milestone has no duration assigned.

**Organizational Breakdown Structure (OBS)** – A depiction of the project organization arranged to indicate the line-reporting relationships within the project context.

**Performance Measurement** – The process of determining physical, EV progress (Budgeted Cost for Work Performed [BCWP]) on a project by comparing that to the time-phased budget baseline of work planned (Budgeted Cost of Work Scheduled [BCWS]) and also comparing it to the actual costs for that work (Actual Cost of Work Performed [ACWP]).

**Performance Measurement Baseline (PMB)** – The performance measurement baseline is the baseline that summarizes all the budgets assigned to scheduled work and planning packages and provides a measure against which actual performance can be compared.

## Appendix 1 – Glossary of Terms and Abbreviations/Acronyms

Contingencies and MR are not included in the baseline as it is not yet designated for specific work scope.

**Planning Package** – A logical aggregate of work, usually future efforts that can be identified and budgeted, but which is not yet organized in detail at the Work Package or task level.

**Programmatic Change Request (PCR)** – The instrument/document prepared to provide the description and justification of a proposed change and its resulting impacts.

**Rebaseline** – The process whereby the project's costs, time scale or resources have to be recalculated due to a change in the project's objectives, a change in the deliverables to meet requirements, or the project's original scope and plans have become untenable.

**Responsibility Assignment Matrix (RAM)** – The RAM correlates the work required by a WBS element to the functional organization responsible for accomplishing the assigned tasks. The responsibility assignment matrix is created by intersecting the WBS with the program OBS. This intersection identifies the control account.

**Schedule (Resource Loaded)** – The logical sequence of the list of activities needed to complete the project that includes duration and start and finish dates. Resources needed for each activity (man-hours and cost, and, where applicable, materials and/or services) are loaded into the schedule to determine if the resource requirements are achievable and realistic.

**Schedule Logic** – Sequential relationship between activities that establishes order of accomplishment.

**Schedule Performance Index (SPI)** – The ratio of work performed to work scheduled (BCWP/BCWS). Ratio of work accomplished versus work planned, for a specified time period. The SPI is an efficiency rating for work accomplishment, comparing work accomplished to what should have been accomplished.

**Schedule Variance ("SV")** – The difference between the budgeted cost of work performed and the budgeted cost of work scheduled at any point in time (BCWP-BCWS).

**Scope** – The work and tasks to be done in order to satisfy the project's performance requirements.

**Surveillance** – The act of monitoring or observing to verify whether an item or activity conforms to specified requirements, and to identify opportunities for improvement.

**System** – A collection of independent components integrated to perform a specific function or functions.

**Appendix 1 – Glossary of Terms and Abbreviations/Acronyms**

**Technical Scope** – All documents, including all safety documentation, used to identify, justify and demonstrate the physical, functional or operational requirements of configuration controlled structures, systems and components.

**Technical Risk** – Any technical factor, element, constraint, or course of action that introduces an uncertainty of outcome or the possibility of deficiencies, inadequate performance, schedule delays or cost overruns.

**Terminal WBS Element** – The lowest level of the WBS.

**Variance Analysis** – The comparison of the actual and forecast progress, actual costs, and the cost and schedule ranges, current phase budgets and schedules, or cost and schedule baselines established for the work in order to determine deviation from plans.

**Variance at Completion (VAC)** – The difference between the total budget for accomplishing the scope of work and the EAC.

**Work Breakdown Structure (WBS)** – The integrating tool used to organize projects and segmented tasks for planning, budgeting, estimating, scheduling, work authorization, cost accumulation, and performance reporting purposes. The WBS framework organizes and graphically displays elements representing work to be accomplished in logical relationships.

**Work Breakdown Structure (WBS) Dictionary** – A summary level description of the scope of work addressed by each WBS element.

**Work Package** – A task or set of tasks performed within a control account.

## Appendix 1 – Glossary of Terms and Abbreviations/Acronyms

**ABBREVIATIONS/ACRONYMS**

ABC	activity-based cost
ACWP	actual costs of work performed
ANSI	American National Standards Institute
B&R	budget and reporting
BCWP	budgeted cost for work performed
BCWS	budgeted cost for work scheduled
CAM	control account manager
CAP	control account plan
CAS	control accounting standards
CCB	Change Control Board
CPI	cost performance index
CPM	critical path method
CV	cost variance
DOE	U.S. Department of Energy
EAC	estimate at completion
EM	DOE Office of Environmental Management
ETC	estimate to complete
EV	earned value
EVMS	earned value measurement system
GM	General Manager
LOE	level of effort
MCS	management control system
MR	management reserve
OBS	organization breakdown structure
PAC	Project Analysis and Control
PCR	programmatic change request
PMB	performance measurement baseline
RAM	responsibility assignment matrix
SPI	schedule performance index
SV	schedule variance

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VAC	variance at completion
VAR	variance analysis report
WBS	work breakdown structure
WTS	Washington TRU Solutions LLC

The following excerpts are from the DOE Manual 413.3-1, Chapter 12.

## **12.4 INDUSTRY STANDARD**

Industry has long recognized the importance of EV in program and project management and the industry-developed ANSI/EIA 748-A-1998, Earned Value Management Systems, defines 32 criteria for implementing EV management. These 32 criteria have become the Department standard for EVMSs. The criteria are grouped into five major categories:

- Organization
- Planning, scheduling, and budgeting
- Accounting Considerations
- Analysis and Management Reports
- Revisions and Data Management

ANSI/EIA 748-A-1998 also contains a section on "Common Terminology" which provides definitions of the terms and concepts used to build and understand the application of EVMS. In addition, there is a section, "EVMS Process Discussion," to aid in the understanding and application of EV management techniques. The additional sections of the standard provide a comprehensive and practical understanding of the principles of EV management. This understanding, however, should be coupled with actual experience in the application of the principles and guidelines in a comprehensive business management system environment. The Department will publish a guide for implementing EVMS in the near future.

## **12.7 CRITERIA CONCEPT**

No single EVMS can meet every management need for performance measurement. Due to variations in organizations, projects, and working relationships, it is impractical to prescribe a universal system for cost and schedule control, relative to the scope of the contract. The criteria approach establishes the overall framework within which an adequate integrated cost/schedule/technical management system will fit.

The criteria provided in the standard provide the basis for determining whether a contractor's EVMS is acceptable. The criteria allow EVMSs to be adapted to fit the specific needs of various project and contract types. The criteria should be applied appropriately based on common sense and practicality, as well as sensitivity to the overall requirements for performance management. The procedures described in this chapter provide a basis to assist the government and the contractor in implementing an acceptable EVMS.

The criteria concept does not describe a system, nor does it purport to address all of the contractor's needs for day-to-day or week-to-week internal control, such as informal communications, internal status reports, reviews, and similar management tools. These management tools are important and should augment and be derived from the cost/schedule EVMS and should be an effective element of program and project management by both the contractor and the government.

The criteria represent the standards against which the validity of contractors EVMSs is assessed. The criteria approach continues to provide contractors the flexibility to develop and implement effective management systems tailored to meet their respective needs, while still ensuring fundamental EV management concepts are provided. The criteria are reproduced below.

***Organization***

1. Define the authorized work elements for the program. A work breakdown structure, tailored for effective internal management control, is commonly used in this process.
2. Identify the program organizational structure, including the major subcontractors responsible for accomplishing the authorized work, and define the organizational elements in which work will be planned and controlled.
3. Provide for the integration of the company's planning, scheduling, budgeting, work authorization and cost accumulation processes with each other, and as appropriate, the program work breakdown structure and the program organizational structure.
4. Identify the company organization or function responsible for controlling overhead (indirect costs).
5. Provide for integration of the program work breakdown structure and the program organizational structure in a manner that permits cost and schedule performance measurement by elements of either or both structures as needed.

***Planning and Budgeting***

6. Schedule the authorized work in a manner which describes the sequence of work and identifies significant task interdependencies required to meet the requirements of the program.
7. Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.
8. Establish and maintain a time-phased budget baseline, at the control account level, against which program performance can be measured. Budget for far-term efforts may be held in higher level accounts until an appropriate time for allocation at the control account level. Initial budgets established for performance measurement will be based on either internal management goals or the external customer negotiated target cost, including estimates for authorized but undefinitized work. On government contracts, if an over-target baseline is used for performance measurement reporting purposes, prior notification must be provided to the customer.

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9. Establish budgets for authorized work with identification of significant cost elements (labor, material, etc.) as needed for internal management and for control of subcontractors.
10. To the extent it is practical to identify the authorized work in discrete work packages, establish budgets for this work in terms of dollars, hours, or other measurable units. Where the entire control account is not subdivided into work packages, identify the far term effort in larger planning packages for budget and scheduling purposes.
11. Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.
12. Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is unmeasurable or for which measurement is impractical may be classified as level of effort.
13. Establish overhead budgets for each significant organizational component of the company for expenses which will become indirect costs. Reflect in the program budgets, at the appropriate level, the amounts in overhead pools that are planned to be allocated to the program as indirect costs.
14. Identify management reserves and undistributed budget.
15. Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.

***Accounting Considerations***

16. Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.
17. When a work breakdown structure is used, summarize direct costs from control accounts into the WBS without allocation of a single control account to two or more WBS elements.
18. Summarize direct costs from the control accounts into the contractor's organizational elements without allocation of a single control account to two or more organizational elements.
19. Record all indirect costs which will be allocated to the contract.
20. Identify unit costs, equivalent unit costs, or lot costs when needed.
21. For EVMS, the material accounting system will provide for:
  - Accurate cost accumulation and assignment of costs to control accounts in a manner consistent with the budgets using recognized, acceptable, costing techniques;

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- Cost performance measurement at the point in time most suitable for the category of material involved, but no earlier than the time of progress payments or actual receipt of material; and
- Full accountability of all material purchased for the program including the residual inventory.

***Analysis and Management Reports***

22. At least on a monthly basis, generate the following information at the control account and other levels as necessary for management control using actual cost data from, or reconcilable with, the accounting system.
  - Comparison of the amount of planned budget and the amount of budget earned for work accomplished. This comparison provides the schedule variance.
  - Comparison of the amount of the budget earned the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance.
23. Identify, at least monthly, the significant differences between both planned and actual schedule performance and planned and actual cost performance, and provide the reasons for the variances in the detail needed by program management.
24. Identify budgeted and applied (or actual) indirect costs at the level and frequency needed by management for effective control, along with the reasons for any significant variances.
25. Summarize the data elements and associated variances through the program organization and/or work breakdown structure to support management needs and any customer reporting specified in the contract.
26. Implement managerial actions taken as the result of EV information.
27. Develop revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Compare this information with the performance measurement baseline to identify variances at completion important to company management and any applicable customer reporting requirements including statements of funding requirements.

***Revisions and Data Maintenance***

28. Incorporate authorized changes in a timely manner, recording the effects of such changes in budgets and schedules. In the directed effort prior to negotiation of a change, base such revisions on the amount estimated and budgeted to the program organizations.

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29. Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal replanning in the detail needed by management for effective control.
30. Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, EV, or budgets. Adjustments should be made only for correction of errors, routine accounting adjustments, effects of customer- or management-directed changes, or to improve the baseline integrity and accuracy of performance measurement data.
31. Prevent revisions to the program budget except for authorized changes.
32. Document changes to the performance measurement baseline.