LCLS Project Management Document # 1.1-015	Project Management	Revision 3.0

Earned Value Management System Description

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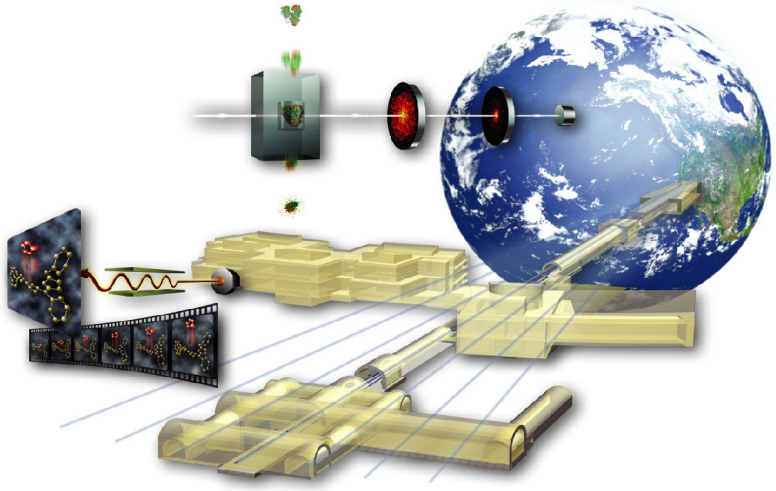
Change History Log

Rev Number	Revision Date	Sections Affected	Description of Change
0.0	01/18/2006	All	Initial version released.
1.0	03/09/2006	All	Complete rewrite and reformat
2.0	10/03/2007	1.3.8, App. B	MR, Contingency definition update
3.0	11/13/2007	All	Changed text to make the System Description for all SLAC projects, not just LCLS.

Stanford Linear Accelerator Center (SLAC



Earned Value Management System Description

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Introduction

The Stanford Linear Accelerator Center (SLAC) uses an Earned Value Management System (EVMS) to integrate project management elements required to effectively organize, plan, and control complex projects. This Earned Value Management System (EVMS) Description document provides a comprehensive exposition of processes and guidance for cost, schedule, and technical performance management and reporting as well as for effective project execution using earned value management.

SLAC project activities are primarily conducted to support the mission needs and national security requirements of the U.S. DOE, Office of Science (SC). In support of DOE projects, SLAC follows the requirements in DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*, and generally follows the accompanying guidance in manual (DOE M 413.3), which delineates earned value requirements. The SLAC EVMS also fulfills the requirements of the Office of Management and Budget Circular No. A–11, Part 7, Section 300, *Planning, Budgeting, Acquisition, and Management of Capital Assets* which also delineates earned value requirements. The SLAC EVMS process and organization are designed to comply with the *American National Standards Institute (ANSI) and Electronic Industries Alliance (EIA) Standard for Earned Value Management Systems* (ANSI/EIA-748-A, January, 2006). The ANSI/EIA-748-A standard is an industry best practice as well as the official DOE and federal government standard for EVMS. Appendix A provides a crosswalk between the 32 ANSI/EIA-748-A guidelines and the SLAC EVMS.

The SLAC EVMS is a key component of the organization, methods, and procedures adopted by the SLAC projects to ensure that their missions and functions are properly executed. It addresses the seven principles of EVMS as defined by the ANSI standard:

- Plan all work scope for the project to completion.
- Break down the project work scope into finite pieces that can be assigned to a responsible person or organization for control of the technical, schedule, and cost objectives.
- Integrate the project work scope, schedule, and cost objectives into a performance measurement baseline against which accomplishments may be measured. Control changes to the baseline.
- Use actual costs incurred and recorded in accomplishing the work performed.
- Objectively assess accomplishments at the work performance level.
- Analyze significant variances from the plans, forecast impacts, and prepare an estimate at completion based on performance to date and work to be performed.
- Use EVMS information in management processes.

These principles are integrated into a comprehensive system that develops and maintains the baseline; tracks project cost, schedule, and scope; and provides for the generation of timely performance measurement data and reports. Performance measurement reports provide management with objective

project information critical to monitoring progress, identifying significant issues, and implementing corrective actions as needed.

The SLAC EVMS is designed to provide project managers with a tool to promote optimal planning, accurate reporting, and effective control through the standardization of processes used in project scope, schedule, and budget management.

This document is organized into six (6) sections and four (4) appendices. The details of the EVMS, as it relates to the 32 ANSI/EIA-748-A guidelines, are discussed in these core chapters.

The Appendices include:

- A – ANSI/EIA-748-A Guideline Crosswalk;
- B – Abbreviations, Acronyms, and Glossary of Terms;
- C – Roles and Responsibilities of the SLAC project team members;
- D – References.

Whereas the SLAC EVMS is considered applicable for use on all SLAC projects, this document has been tailored for the LCLS Project. Therefore configuration management of this EVMS document is the responsibility of the LCLS Project Control Manager and is maintained through the use of project configuration control. Proposed revisions to the LCLS EVMS description are submitted to the LCLS Project Management Office to ensure the proper coordination, review, and incorporation of appropriate changes.

Worth noting here is LCLS's use of the term *management reserve/contingency* throughout this document. The Office of Engineering and Construction Management's (OECM) lexicon calls this *management reserve*. SLAC uses the term *contingency* to describe the management reserve for total estimated cost (TEC) and the term *management reserve* to describe the management reserve for other project costs (OPC).

Throughout this document, cross references are made to the ANSI/EIA-748-A EVMS guidelines using a section number reference and a guideline number. The section references correspond to the content in Section 2 of the ANSI/EIA-748-A standard titled *EVMS Guidelines*. The guideline numbers correspond to the numbers assigned to the standard guidelines in the *National Defense Industrial Association (NDIA) Program Management Systems Committee (PMSC) ANSI/EIA-748-A Standard for Earned Value Management Systems Intent Guide*. For example, the NDIA Intent Guideline number 12 corresponds to the ANSI/EIA-748-A standard Section 2.2g. This will be referred to in this document as Guide 12 {2.2g}.

Section 1

Project Organization and Preliminary Planning

1.1 PROJECT STRUCTURE

1.1.1 Objective [Guide 1, 2, 3 {2.1a, b, c}]

The projects has developed a Project Execution Plan (PEP) to organize and manage the project's scope of work. Key project organization components of the PEP associated with EVMS are the Work Breakdown Structure (WBS), the Organizational Breakdown Structure (OBS), and the Responsibility Assignment Matrix (RAM).

1.1.2 Project Execution Plan [Guide 3 {2.1c}]

The Project Execution Plan (PEP) is the primary vehicle that correlates project objectives with a plan for accomplishment. It also serves as the agreement between DOE and the project director/deputy project director on how the project will proceed.

Among the principle elements, a project execution plan describes the responsibilities of the project and DOE organizations involved in the project, defines roles and restates the mission need, provides a general overview of the project, and outlines cost and schedule data. The major elements required in a DOE project's Project Execution Plan are stated in DOE Order 413.3 and DOE Manual 413.3-1.

The Project Execution Plan is developed by the Federal Project Director, with input from the project director/deputy project director. After obtaining concurrence from the Stanford Site Office (SSO), the PEP is formally approved by DOE headquarters. The Project Execution Plan is under configuration control.

1.1.3 Work Breakdown Structure [Guide 1 {2.1a}]

The Work Breakdown Structure (WBS) is a product-oriented, hierarchical depiction of all work elements required to accomplish the entire work scope of the project. Each descending level is a subdivision of the work above, with increasingly detailed definition/division of the work. The WBS is the structure for integrating the scope, schedule, and budget for all project work. It is used as a framework for assigning and defining work, schedule development, estimating and budgeting, managing funds, and controlling changes. The WBS is used by management throughout the lifecycle of a project to identify, assign, and track the project's total work scope. Each element is assigned a

unique code to identify it in all project documents. The WBS is detailed in the PEP, or attached as an appendix.

1.1.4 Work Breakdown Structure Dictionary [Guide 1 {2.1a}]

The project has developed a WBS dictionary. The WBS dictionary is a set of specific definitions that describe the scope of each work element identified in the WBS. It defines each element to at least the control account level in terms of the content of the work to be performed.

1.1.5 Organizational Breakdown Structure [Guide 2 {2.1b}]

The Organizational Breakdown Structure (OBS) is a project organization framework for identification of accountability, responsibility, management, and approvals of all authorized work scope. It is a direct representation and description of the hierarchy and organizations that will provide resources to plan and perform work identified in the WBS. The OBS helps management focus on establishing the most efficient organization, by taking into consideration availability and capability of management and technical staff, including subcontractors, to achieve project objectives. The organizational breakdown structure for each project is found in the PEP.

1.1.6 Responsibility Assignment Matrix [Guide 3, 5 {2.1c, e}]

The Responsibility Assignment Matrix (RAM) is an element of the project that integrates the organizational breakdown structure with the work breakdown structure. This integration identifies key control points at the intersections of the WBS and OBS. Control accounts are then created at these key control points and they facilitate the linkage between the planning, scheduling, budgeting, work authorization, cost accumulation, and performance measurement processes. The control accounts are determined by the scope of the management tasks. A single control account manager (CAM) is assigned to one or more these control accounts and is responsible for the planning and control within their control account(s) and the identification, analysis, and reporting of significant variances that may occur during project execution. Using the RAM and OBS, the project is able to identify the person/organization responsible and accountable for every element of the WBS and Statement of Work (SOW).

1.2 PROJECT SCHEDULE

1.2.1 Objective [Guide 6, 7 {2.2a, b}]

The project schedule is used to plan and control the interdependencies of all the activities needed to execute the project. The project employs a scheduling tool that maintains the target schedule, supporting control milestones in the baseline, and the current schedule used to accumulate and report current schedule status.

1.2.2 Schedule Development [Guide 6, 7 {2.2a, b}]

The development of the project schedule is the responsibility of the entire project team and may involve multiple iterations in order to reach a workable plan for accomplishing the work scope. Technical leads from the various disciplines participate in these early iterations to identify the constraints and interfaces. The control account managers expand these schedules into the detail needed to identify the activities that will be performed in executing their assigned control account responsibilities. Project schedule details may evolve over time in a "rolling wave." At the project outset, the details of the future schedule are generalized and the associated activities are of longer durations, but in sufficient enough detail to allow the definition of the project critical path. As the project moves through time and as activities are more clearly defined, new activities with shorter durations are added. The scheduling system consists of baseline, current, and supplemental schedules.

BASELINE

The baseline schedule contains the list of *control milestones* that are generally negotiated with the DOE and are identified in the Project Execution Plan. The project director/deputy project director has supplemented these milestones with other events in a hierarchical structure deemed sufficiently important to be in the baseline. The logic and activity relationships are established in the baseline schedule such that they support the timely accomplishment of the control milestones. The baseline schedule is assembled by the project management team. The project director/deputy project director has the responsibility to ensure that all parts of the baseline schedule properly mesh and phase with each other. The baseline schedule should be consistent with constraints imposed externally, internally, by resource limitations or in the context of other projects at SLAC.

The baseline schedule is approved and fixed consistent with DOE Order 413.3. The baseline schedule constitutes the official plan against which schedule performance is measured and reported to DOE, SLAC management, and project management. The baseline schedule is maintained under configuration management and may not be revised without proper authorization as detailed in the Baseline Change Control Thresholds table documented in the PEP.

CURRENT

The current schedule is used to manage all project activities and is developed by logically networking the project activities. The schedule is an integrated, network-logic-based schedule. This network approach provides the ability to relate the project's time-phased activities in their logical sequence using predecessor-successor relationships and timing. The current schedule also enables the determination of the critical path and an evaluation of the effects of the current schedule performance status on activities and milestones scheduled to be accomplished in the future. The current schedule includes detailed input from all control account managers, and provides the ability to relate activities and milestones between different levels of schedules. The current schedule includes all project milestones identified in the baseline schedule.

The current schedule employs the approved baseline schedule to relate progress. The current schedule shows the actual status of the project or program at the current point in time by reflecting the work performed and the milestones accomplished. It is used by the project management team for analysis, including issue identification and resolution.

SUPPLEMENTAL

The project team may employ supplemental schedules that are not part of the baseline schedule hierarchy. They are often used for day-to-day operational planning and management, and as the name suggests, supplement the baseline and current schedules, but are not under configuration control.

1.3 PLANNING AND BUDGETING

1.3.1 Objective [Guide 8, 9, 15 {2.2c, d, j}]

Planning and budgeting establish the time-phased budget used to measure project performance.

1.3.2 Performance Measurement Baseline [Guide 8, 9, 15{2.2c, d, j}]

The performance measurement baseline (PMB) is the time-phased budget plan used to measure project performance. In earned value management, the assignment or allocation of budgets to scheduled segments of work produces a plan against which actual performance is compared.

The performance measurement baseline is finalized with Critical Decision-2 (CD2), Approve Performance Baseline. Figure 1-1 presents the DOE acquisition management development cycle. The relationship of individual work tasks to the time-phased resources necessary to accomplish them is established at the control account level. As practical and meaningful, all control accounts and related work packages should be planned, at least at a summary level, to the end of the project. It is anticipated that planning packages will be used in areas of the project where necessary. Any control accounts that cannot be established in the initial planning effort should identify the approach by which planning packages are detailed into work packages.

The performance measurement baseline is the summation of the time-phased budgets for all of the control accounts and summary-level planning packages, plus applicable indirect budgets and any undistributed budget. The performance measurement baseline is a representation of current program plans. Proper maintenance of the baseline will prevent performance measurement against an outdated or unauthorized plan.

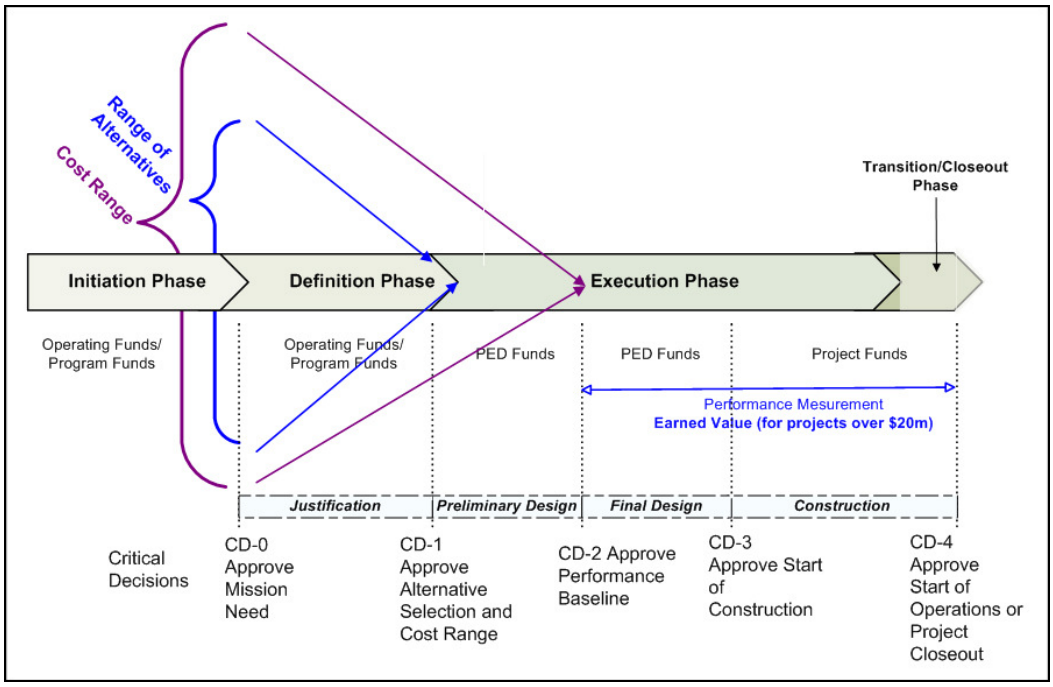

Figure 1-1. DOE Acquisition Management System

1.3.3 Control Accounts [Guide 3, 5, 18 {2.1c, e, 2.3c}]

A control account is 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 for one WBS element.

Within the financial accounting system, cost collection is performed at the control account level. Control accounts roll up into summary level accounts, which in turn roll up to an overall project summary account. No charges are directly charged or recorded at any summary level account. Accounts are called project IDs in the SLAC accounting system and are commonly referred to as charge numbers. Multiple charge numbers, representing individual work packages, may feed into a summary charge number, which is the control account. While multiple charge numbers may roll up into a summary control account charge number, a charge number is never divided among multiple control accounts. In all cases, the control account has a unique charge numbers that matches its WBS activity identifier.

1.3.4 Control Account Planning [Guide: 3, 5, 8, 9, 10, 11, 30 {2.1c, e, 2.2c, d, e, f, 2.5c}]

Control account planning consists of those efforts needed to establish time-phased budgets for each control account identified for project execution. The control account managers have the primary responsibility for developing and managing the control account budgets. The project provides control

account managers with budget guidance and a common planning capability to perform resource costing, indirect rate applications, and other calculations.

Control accounts are generally budgeted in dollars. The Project Director and the control account manager come to agreement on the work scope to be accomplished, and the accompanying budget and schedule necessary to support the required effort. Once these budgets have been developed, the amount of budget associated with each monthly accounting period is referred to as the Planned Value (PV) or the Budgeted Cost of Work Scheduled (BCWS). The total budget with respect to any given grouping of work is called Budget at Completion (BAC).

Although records can be kept at lower levels of detail, the lowest required level of detail for maintaining the PV and the BAC is by resource within the planning package, or work package subsets, of the control account.

Control account budgets may be further subdivided into one or more work packages and planning packages in the project schedule. The control account manager selects the earned value measurement technique – the method for measuring the work performed. Only a single technique may be used on an individual work package. Planning packages have no associated earned value technique, as they always represent future work that requires detailed planning and estimation. Control account budgets in the EVMS are governed by the following guidelines:

- The sum of budgets for work packages and planning packages equals the control account BAC value.
- The control account manager must be able to provide the basis for the budgets of all planned work packages and planning packages.
- The start and completion dates for all tasks, including planning packages, fall within the scheduled start and completion dates of the control account.
- Retroactive changes to budgets for completed efforts are prohibited except for the explicit correction of errors.
- Replanning future portions of open and unopened work packages and planning packages requires formal change approval, consistent with the PEP change management requirements.

1.3.5 Work Packages [Guide 3, 7, 9, 10, 11, 12 {2.1c, 2.2b, d, e, f, g}]

Work packages are a subdivision of a control account and consist of a discrete or level of effort task that has been planned and budgeted in detail. The budget for each is segregated into elements of cost. Work packages constitute the basic building blocks used in planning, measuring accomplishment, and controlling project work. A work package has the following characteristics:

- Represents units of work at levels where work is performed.
- Is clearly distinguishable from all other work packages by a descriptive title.
- Is assignable to a single organizational element responsible for performing the work.
- Has scheduled start and completion dates and, as applicable, interim milestones – all of which represent physical accomplishment.

- Has a budget or an assigned value expressed in terms of dollars. Indirect costs are allocated based on the applicable base per the applicable financial practices disclosures.
- Uses a single earned value method.
- Has a limited duration within a reasonably short time span.
- Can be integrated with project schedules.
- Reflects the way in which work is planned and has meaningful products, or is a management-oriented subdivision of a higher-level element of work.
- Uses objective indicators/milestones as much as possible to minimize in-process work evaluation and to provide an accurate assessment of progress.
- Contains time-phased budgets that are used for planning, reporting, and control. When learning curves are used, time-phased budgets and schedules reflect this learning.
- Level of effort should only be used on a work package where no definable deliverable or work products exist as a consequence of the work package.

1.3.6 Planning Packages [Guide 3, 7, 9, 10, 11 {2.1c, 2.2b, d, e, f}]

Planning packages are created to describe work within a control account that will occur in the future. Planning packages must have a work scope, schedule, and time-phased budget. Planning packages are normally larger (scope, schedule, and budget) than individual detailed work packages, but planning packages must still relate to a specific work scope. Individual planning packages do not require the detail found in work packages. When planning packages are converted into work packages, they are defined in greater detail.

1.3.7 Acquisition Planning [Guide 2, 9, 10, {2.1b, 2.2d, e}]

The project often subcontracts with external suppliers, contractors, and collaborators for much of the work associated with the project. Examples include architecture/engineering (A/E) firms, general and specialty contractors, other national laboratories, research institutions, and consultants. Typically, these subcontracts are executed through Firm-Fixed Price (FFP), Time and Material, or Level of Effort (LOE) support type contracts. The contracting vehicle type is determined based on the nature of the work to be subcontracted as well as its complexity, risk, and cost. All acquisitions are made in accordance with the requirements of the project's prime contract with DOE and, where applicable, SLAC policies, and California state law. Uniform policies and procedures for Federal and University project acquisitions provide for a fair and competitive environment.

1.3.8 Management Reserve/Contingency and Undistributed Budget [Guide14 {2.2i}]

The management reserve/contingency is an amount of the approved Project Budget Base that the project director/deputy project director sets aside at the start of the project. This allocation is referred to as "Contingency" for the portion allocated to the Total Estimated Costs (TEC) and as "Management Reserve" for the portion allocated to the Other Project Costs (OPC). The management reserve/contingency is established to provide budget coverage for future uncertainties (risks) that are

within the scope of the project but are not funded in the control account budgets. The management reserve/contingency is not assigned to specific segments of work.

The project change control procedure provides the process for control of management reserve/contingency. The project director/deputy project director establishes the management reserve/contingency based on a risk analysis of the project work scope. The factors affecting the amount of management reserve/contingency established are: technical risk, schedule issues, and/or possible shortages in a critical resource area (i.e., labor, material, timely appropriations, or support services), direct and indirect rate changes, etc. As the level of risk is reassessed on the project, the budget for management reserve/contingency can change.

Management reserve/contingency is released to provide a budget for risk mitigation within the project work scope. Conversely, budget from the control accounts is returned to the management reserve/contingency whenever the work scope, and therefore the allocated budget, is decreased. Management reserve/contingency transactions are documented in the project baseline change control log. These transactions are identified in the EVMS reports to DOE.

At the present time, the project does not employ undistributed budget as described in the NDIA Intent Guide.

1.4 WORK AUTHORIZATION

1.4.1 Objective [Guide 3 {2.1c}]

Work authorization ensures that all work performed on the project has been contractually authorized and properly planned prior to its execution.

1.4.2 Contractual Authorization [Guide 3 {2.1c}]

A work authorization cannot be officially initiated until the formal work authorization and funding is received from DOE. The project director/ deputy project director will request and the SLAC Office of the CFO will authorize the allocation of a block of project IDs (generally known as charge numbers) in the SLAC accounting system. The opening of these blocks of charge numbers officially initiates the project and allows project setup to begin.

1.4.3 Work Authorization Document [Guide 3 {2.1c}]

With the completion of the control account planning process for each control account, the total authorized work is released to the responsible organizations based on the approved control accounts. The project director delegates work down to the control account managers within the authority provided in the work authorization statement. The work authorization provided in each control account includes the relationship to the WBS element or elements, responsible organization

identification, control account task description, schedule, and time-phased budget in dollars. The approved control account can only be changed with appropriate change approval.

The approved control account is the project director's vehicle to delegate responsibility for budget, schedule, and scope requirements to the control account manager. The signing of a work authorization document by all parties represents a multilateral commitment to authorize and manage the work within the budget and agreed-upon schedule.

Section 2

Earned Value Analysis and Progress Reporting

2.1 EARNED VALUE

The comparison of actual costs and the work accomplished with baseline plans generated during the planning and budgeting phase is included in internal and external reports. Forecasts of future costs and schedule dates are made, and corrective actions are initiated when problems are identified.

2.1.1 Requirements for Employing Earned Value Methodology [Guide 7, 12 {2.2b, g}]

Work packages are established and opened when the Planned Value (PV), or Budgeted Cost of Work Scheduled (BCWS), is planned. Each work package uses one earned value methodology to track work progress. Discrete work packages (i.e., tangible/measurable work) use a Percent Complete of Weighted Milestone technique. Non-discrete work packages, such as for project management and general support – work that cannot be readily measured – is tracked using the Level of Effort (LOE) technique. Other earned value techniques are available for use if requested. The earned value technique is selected consistent with the following:

- *Stability* – One earned value technique is chosen for each work package. The selected technique and milestone(s) will not be changed after the work package is opened.
- *Objectivity* – Completion of an event (for discrete work) is based upon predetermined criteria or tangible product.
- *Ability to audit* – The procedure and criteria for evaluation will facilitate audit of the Earned Value (EV), or Budgeted Cost of Work Performed (BCWP) reported.

2.1.2 EV Measurement Techniques [Guide 7, 12 {2.2b, g}]

(Excerpted from the Project Management Institute Practice Standard for Earned Value Management, 2005.)

Earned Value is a measure of work performed. Techniques for measuring work performed are selected during project planning and are the basis for performance measurement during project execution and control. Earned value techniques are selected based on key attributes of the work, primarily the duration of the effort and the tangibility of its product.

The performance of work that results in distinct, tangible products can be measured directly. This work is called *discrete effort*. Other work is measured indirectly as a function of either discrete efforts or elapsed time. Work that is ….based on elapsed time is referred to as *level of effort*.

2.1.2.1 Discrete Effort

Work performance is measured monthly. The EV technique selected for measuring the performance of discrete effort is the Percent Complete of Weighted Milestone method. The percent complete of weighted milestone technique is applied to the discrete tasks in the project schedule. At each measurement period, the responsible worker or manager makes an assessment of the percentage of work complete on that task. If there are objective indicators that can be used to arrive at the percent complete (for example, number of units of product completed divided by the total number of units to be completed), then they should be used.

2.1.2.2 Level of Effort (LOE)

Some project activities do not produce tangible outcomes that can be measured objectively. Examples include project management, operating a project technical library, and the like. These activities consume project resources and should be included in EVMS planning and measurement. In these cases, the level of effort (LOE) technique is used for determining *earned value*. A *planned value* is assigned to each LOE task for each measurement period. This *planned value* is automatically credited as the earned value at the end of the measurement period.

LOE activities will never show a schedule variance. Consequently, the technique always biases the project data toward an on-schedule condition. LOE should be used conservatively and should be considered *only* when the task does not lend itself to a more objective measurement technique.

2.2 STATUS AND EARNED VALUE CALCULATION

2.2.1 Objective

The objective of measuring schedule progress and calculating earned value is to accumulate and report the EVMS data needed to assess the project's performance for the current period and the cumulative-to-date costs based on the amount of work performed.

2.2.2 Performance Measurement Data [Guide 22, 23 {2.4a, b}]

The cost/schedule performance measurement data provides visibility concerning the project cost/schedule status as it relates to completed work and forecasted work remaining. These data elements are accumulated monthly for each control account and are summarized directly through the various elements of the WBS to obtain the cost/schedule status at any level of the structure. The primary data elements that are used to supply this information are:

- Planned Value (PV) or Budgeted Cost of Work Scheduled (BCWS). This is the time-phased budget plan approved as a result of the control account process. The PV or BCWS may be developed at a lower level of detail. The lowest level should be at least the work package or planning package level of detail within each control account.
- Earned Value (EV). A measurement of the work completed. The EV is also referred to as the Budgeted Cost of Work Performed (BCWP), and is derived by applying predetermined earned value calculations to assess the work completed for each in-process work package.
- Schedule Variance (SV). When the BCWS is subtracted from the BCWP, a measure of the SV is obtained (BCWP – BCWS = SV). Care must be exercised in drawing inferences from either favorable or unfavorable SVs because of the influence of high-value work performed out of sequence. Crosschecks must be made using the scheduling system to determine the true status of the schedule.
- Actual Cost of Work Performed (ACWP). The ACWP is the cost for work that has been completed or partially completed (actual cost plus accruals). The ACWP is compiled in the applicable financial management systems by control account. Accruals are routinely added through the applicable accounting system when the control account manager determines some accomplished work is not shown as paid in the month earned, has consulted with affected parties (usually subcontractors/vendors), and communicated with Accounts Payable. If errors are discovered later, necessary corrections are made into the earned value processor.
- Cost Variance (CV). When the ACWP is subtracted from the BCWP, a measure of the CV is obtained (BCWP – ACWP = CV). A positive CV indicates that work is being performed for fewer dollars than planned, whereas a negative variance indicates that work is being performed for more dollars than planned.
- Budget at Completion (BAC). The BAC is the total budget for a given work scope. The BAC for the total project plus management reserve/contingency equals the total project cost (TPC). The BAC for lower-level WBS elements, control accounts, and work packages equals the cumulative BCWS up to and including the last period to which it is assigned.
- Estimate to Complete (ETC). The ETC is the latest revised estimate for the remaining work scope.
- Estimate at Completion (EAC). Management's latest revised cost estimate for a given work scope (refer to Section 2.3.7).
- Variance at Completion (VAC). When the EAC is subtracted from the BAC, a measure of the VAC is obtained (BAC – EAC = VAC). The VAC is the amount of underrun or overrun forecast for the work scope being considered, without regard to the use of management reserve/contingency.

When appropriate, management judgment will supplement or supplant the ETC and EAC calculated values.

2.2.3 Evaluation of Planned Value [Guide 7, 12, 22, 23 {2.2b,g, 2.4a,b}]

The time-phased budget Planned Value (PV) represents the plan against which performance is measured. PV is also called the Budgeted Cost of Work Scheduled (BCWS). At the control account level, the baseline is the result of assigning the necessary resources to the scheduled tasks (work packages and planning packages) as part of the process of detail planning for the control account. The process includes identifying the tasks, scheduling the tasks, identifying the resources, and determining the earned value method. Work to be accomplished in a control account must be performed in a logical, consistent manner to help provide consistency in determining the baseline and accomplishing the work. To avoid unrealistic variances, the BCWS is established according to the control account manager's decision on how the work is to be accomplished, and the earned value method is chosen to ensure that EV is claimed in the same manner as the BCWS was planned.

Accuracy of determining actual performance is directly related to the ability to unambiguously determine progress and earned value within a given work package or control account. Consequently, level of effort (LOE) tasks should only be used in those work packages where no deliverables or other material means of determining actual progress exists. The earned value of LOE only documents the passage of time and not actual project progress. Consequently, within a discrete control account, the inclusion of the LOE activity should be avoided and is kept to a minimum in order to prevent any distortion of the performance measurement data. When unavoidable, and LOE work is combined with discrete work within the same control account, then segregated work packages are established for the discrete and LOE portions, as appropriate.

2.2.4 Current Schedule Progress Evaluation [Guide 22, 23 {2.4a, b}]

The baseline schedule maintains original agreed-upon milestone dates, unless altered in accordance with the Change Control Procedure. Current status of the project is compared to the baseline for progress measurement and analysis. Progress and status are maintained on the current schedule, which also reflect the current forecast of activity durations, activity start and finish dates, and milestone dates.

The current schedule represents the remaining work and will be archived periodically.

- The current schedules are used for internal project management and DOE reporting purposes. A comparison of the current and baseline schedules indicates the extent to which the project is ahead of or behind schedule. This comparison also identifies the specific activities and events that are the source of current SVs or impending problems.
- At the end of each accounting month, as a minimum, each control account manager will determine the status of each open activity in the current schedule for which they are responsible and update the current schedule accordingly. Various methods are used to assess the status for different kinds of activities to ensure that progress is being determined objectively.

- The status of material and equipment procurement activities is tracked through the procurement system. The procurement system tracks material purchases from receipt of a purchase request, to receipt of the material, until invoicing and payment are completed.
- Earned value flow-down subcontracts have provisions in their contracts that require the subcontractors to submit an earned value report at least monthly. Such subcontractors are required to provide quantitative data that can be used to assess the status of their work activities.
- Non-earned value flow-down subcontractors have provisions in their contracts that require them to develop a schedule that supports the details in the project. The control account managers are responsible for ensuring that the methods used to status these schedules result in an objective measurement of progress.

The status for current schedules is developed to provide the following information:

- Progress to the DOE and to project management, focusing particularly on those areas of greatest impact on, or potential risk to, key milestones and project completion.
- Progress as compared against the baseline schedule.
- Basis for forecasts of future events, milestones, activities, and project completion.

Status information, which is collected at the detail schedule level, includes the following information:

- Actual start dates for activities begun during the status period.
- Actual finish dates for activities completed during the status period.
- Actual occurrence dates for milestones accomplished during the status period.
- Percentage complete and/or remaining duration of activities started but not complete.
- Forecast completion dates for activities previously started but not yet completed.
- Forecast duration, start, and finish dates for activities – and occurrence dates for milestones – that are currently scheduled in the future and for which a change is foreseen.

The control account manager updates the schedule to reflect the current status. Status from updated current control account schedules is reflected in the current project schedule.

2.3 PERFORMANCE ANALYSIS

2.3.1 Objective

Analysis of performance measurement data will identify and document the cost, schedule, and work scope conditions that may require management attention, assess the impact of these conditions on the baseline and future work, and develop and implement corrective actions as necessary. This subsection establishes the minimum requirements and guidance for performance analysis for the project, specifically variance analysis, corrective action, and updating EACs.

2.3.2 Variance Analysis [Guide 22, 23, 25 {2.4a, b, d}]

Variance analyses provide the means for the control account manager to derive and communicate cost, schedule, and EAC divergences from the performance measurement baseline. Root-cause analysis is performed at least at the control account level. The control account structure is integral with the WBS and will accurately summarize budgets, earned value, actual costs and the associated variances up through both the WBS and the project organization. Variance analysis at levels above the control account is performed in support of internal management needs and DOE requirements.

2.3.3 Variance Thresholds [Guide 22, 23, 25 {2.4a, b, d}]

Variance analysis is conducted if any cumulative SPI or CPI is less than 0.9 or greater than 1.10 at the WBS level 3. The project director/ deputy project director may establish lower thresholds to respond to project needs.

2.3.4 Performance Indices [Guide 22, 23, 25 {2.4a, b, d}]

The control account manager(s) will apply various metrics to assess the performance of their assigned control accounts. These performance metrics will provide additional insight and a basis for the CV and SV analysis. All metrics will be updated at least monthly. The metrics employed should be both time-phased and "snapshot" in nature. Time-phased metrics include a Cost Performance Index (CPI=BCWP/ACWP) and a Schedule Performance Index (SPI=BCWP/BCWS). The control account manager will assess the time-phased metrics to look for control account performance trends. "Snapshot" metrics include CVs and SVs. Graphics are used to aid in displaying trends associated with project performance. Performance graphs are useful in communicating project performance objectives and in displaying progress toward meeting those objectives.

Figure 2-1 shows an example of a commonly used graphic for a project that illustrates EVMS metrics. The orange, blue, and green trend lines are all expressed in project dollars. The **middle** (solid) line is the PV (BCWS), the planned work as defined in the current Earned Value Management Baseline. The **top** (dotted) line, the AC (ACWP), shows a higher than estimated project cost. The **bottom** (dashed) line, the EV (BCWP), or the actual work accomplished for the given time period. As illustrated on the graph, the SV is the difference between BCWP and BCWS; the CV is the difference between BCWP and ACWP.

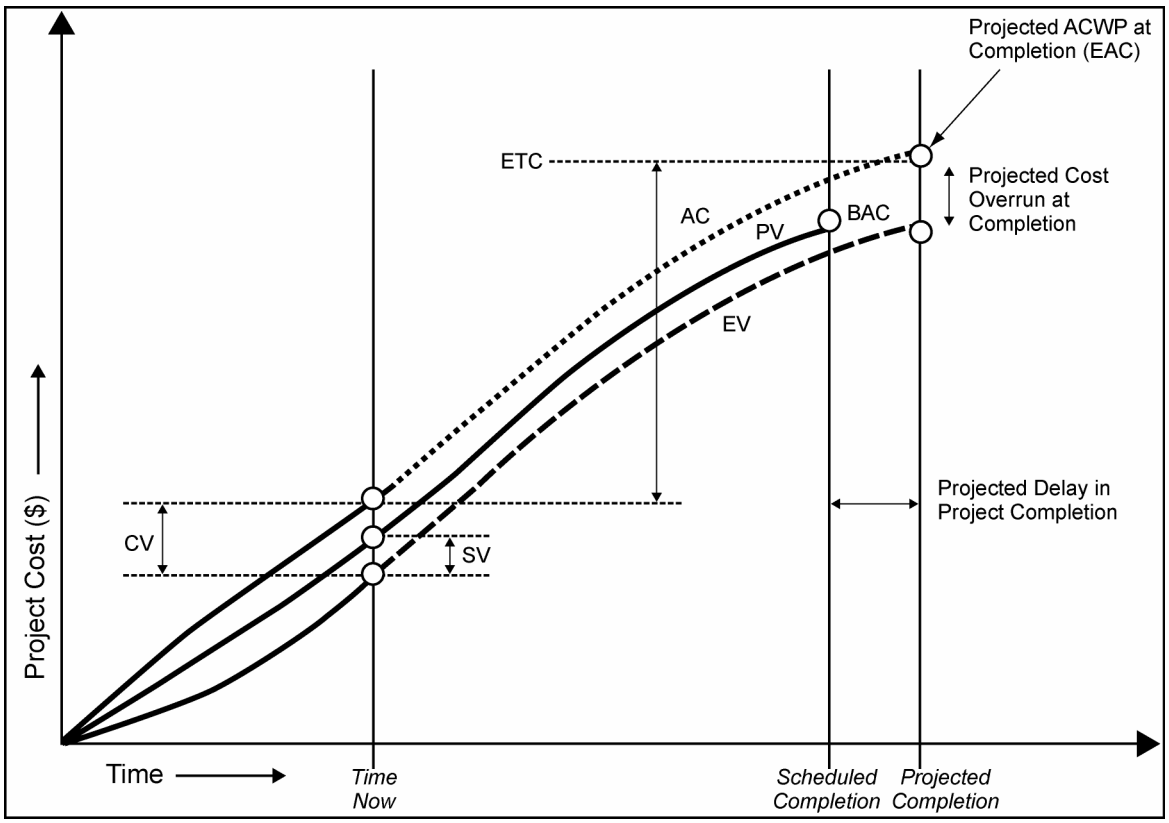

Figure 2-1. Earned Value Data Elements

2.3.5 Control Account Performance Analysis [Guide 22, 23, 25, 26, 27 {2.4a, b, d, e, f}]

The control account managers prepare variance analysis statements or explanations for each control account exceeding established variance thresholds. The control account managers are responsible for determining the cause of the variance and its impact on the control account and the related activities and milestones, developing a corrective action plan (as appropriate), and including this information in the pertinent sections of the monthly report.

Control account managers periodically (at least annually) develop a comprehensive EAC at the control account level using all available information to arrive at the best possible estimate.

2.3.6 Project Performance Analysis [Guide 22, 23, 25, 26, 27 {2.4a, b, d, e, f}]

Project performance analysis is an ongoing process that includes routine and ad hoc analyses of problem causes, corrective actions, risk analysis, and cost savings opportunities. The process is formalized via the monthly report, which includes a review of cost and schedule performance information, identification of significant problem areas, and the status of corrective actions.

2.3.7 Monthly Project Status Calculations and Forecasts [Guide 22, 23, 25, 27 {2.4a, b, d, f}]

On a monthly basis, the Project Office and PMCS Manager update the EAC at level two of the WBS to account for all changes from the baseline that have been identified. The EAC update reflects a current analysis of project status and risks. The EAC is calculated by using a standard cost and schedule performance formula (BAC-BCWP+ACWP) and adding the proposed Baseline Change Requests (BCRs) and calculated adjustments and corrections.

2.4 REPORTING

2.4.1 Objective

The objective of the reporting process is to provide accurate and timely reports needed by both the project office and DOE to manage the cost, schedule, and work scope on the project. The deputy project director shall define a project-specific reporting calendar that is consistent with the project monthly reporting cycle.

2.4.2 General Reporting [Guide 25, 26 {2.4d, e}]

The project director/deputy project director will provide regular reports to DOE and SLAC management on project status. The level of reporting will be defined in the Project Execution Plan (PEP). Once the project has obtained Critical Decision-2 approval, the reporting cycle will be at least monthly. Reports will be sent to the appropriate management levels as defined in the PEP.

Project management regularly reviews the project status and develops corrective actions as required. Management review may include review of any or all of the following:

- Project cost/schedule performance rolled-up to a level appropriate to the overall risks of the project;
- Variance analysis and suggested corrective actions;
- Critical path activity performance;
- Project personnel and staffing;
- Project baseline change performance;
- Management reserve/contingency (used and remaining);
- Risk strategies.

Management addresses variances that are outside the threshold ranges, and the deputy project director implements appropriate corrective actions. Once the project has received an approved performance measurement baseline (at Critical Decision-2), monthly DOE reports are generated by the deputy project director as specified in DOE Order 413.3. In addition, the deputy project director supports the Federal Project Director in preparing quarterly reports and presentations to the DOE Acquisition Executive.

2.4.3 Monthly Reporting Cycle [Guide 22, 23, 25 {2.4a, b, d}]

After Critical Decision-2, reports generated from the EVMS are updated and published monthly. The large amount of data, number of people providing input, processing time, and other considerations require that an orderly process is used to collect, review, report, and use the data generated by the system.

The monthly reporting cycle is based on the accounting month. The SLAC accounting calendar ends on the last day of each calendar month and is used as the basis for the reporting cycle on the project.

Project management generates earned value monthly reports after Critical Decision-2 is achieved. The purpose of the monthly report is to provide project director/deputy project director, SLAC senior management, and DOE a periodic assessment of each project by which to monitor and manage the project. These project status reports contain the following information:

- Financial summary;
- Status of key milestones;
- Progress narrative;
- Baseline change control log actions;
- Project director/ deputy project director comments;
- EVMS data;
- Variance explanations (if required).

Section 3

Accounting

3.1 ACCOUNTING PROCESSES

The comparison of actual costs and the work accomplished with baseline plans generated during the planning and budgeting phase is included in internal and external reports. Forecasts of future costs and schedule dates are made and corrective actions are initiated when problems are identified.

3.1.1 Objective

The objective of the accounting process is to provide accurate and timely recording and reporting of the actual costs associated with all project work.

3.1.2 Cost Accounting Policy [Guide 16 {2.3a}]

All financial transactions are documented, approved, and recorded properly in the financial accounting system on a consistent and timely basis in accordance with Generally Accepted Accounting Principles (GAAP) and applicable Cost Accounting Standards. Any change in any Laboratory's accounting practice that may have a material impact on the financial data must be approved by the Laboratory's CFO. In accordance with Laboratory practice, the Office of the CFO is delegated the authority to direct and monitor adherence to generally accepted accounting principles to ensure compliance with all applicable laws and regulations.

3.1.3 Cost Code Structure [Guide 16, 17, 18, 19 {2.3a, b, c, d}]

The cost code structure for each project is developed in conjunction with the development and integration of planning, scheduling, and assignment of work scope/task to the responsible organization. Subsequently, these planning tasks lead to the creation of control account numbers (Project IDs) in the financial accounting system that identify the correct cost collection account, and control account, for specific items of work.

The Project Office submits request to Accounting to open a control account to enable costs to be recorded in the financial accounting system. Control accounts will be closed when the work is complete.

All direct labor, material, subcontracts, and other direct costs (ODC) are charged directly to the account numbers that are assigned at the job or task level as appropriate for the specific control

account. Indirect charges also accumulate in the control account, applied as rates to the appropriate direct charges. The established project cost code structure will ensure that actual costs are collected so that direct comparison with associated budgets can be made at the appropriate WBS level(s). The selected account assignment scheme will assure that:

- Direct and indirect costs are recorded in a manner consistent with the budgets.
- Direct and indirect costs can be summarized from control accounts into the WBS without allocation of a single control account to more than one WBS element.
- Direct and indirect costs can be summarized by the project's organizational elements without allocation of a single control account to more than one organizational element.

3.1.4 Cost Accumulation [Guide 16 {2.3a}]

The actual costs are accumulated and processed by the financial systems. The direct costs are identified by control account cost elements, and the indirect costs are allocated via preapproved indirect rates. All costs reported in the accounting system are transferred into the earned value management system as the ACWP.

3.1.5 Direct Labor Cost [Guide 16 {2.3a}]

Direct labor charges are recorded by each direct labor employee in a uniform manner via an institutional time and effort reporting system on a semi-monthly basis. The hours or percent effort are recorded and direct labor dollars are charged to the project control accounts, and are available monthly from the financial system.

3.1.6 Material Cost and Accounting [Guide 16, 21 {2.3a, f}]

Encumbrances are recognized at the point an approved order is placed. Equipment and material costs enter the general ledger through the accounts payable system. Once the receiving department has recorded receipt in the procurement system, or after the control account manager acknowledges physical receipt of materials by signing the invoice or sending electronic approval, invoices are approved for payment and processed by the Accounts Payable group. In situations where earned value is credited (materials are received and acknowledged) and the invoice is not yet paid, estimates may be used to accrue costs.

3.1.7 Subcontract Cost [Guide 16 {2.3a}]

Subcontract costs are entered into the general ledger via the accounts payable system only after receipt of an invoice is approved by the control account manager. The actual cost (ACWP) reported for these subcontracts may require that an accrual be made for costs estimated to have been incurred in addition to the actual costs recorded. This accrual is added to previously invoiced costs and then reversed in the next month's data when the new cost is added. Accruals are treated consistently with generally accepted accounting principles (GAAP).

3.1.8 Other Direct Cost (ODC) [Guide 16 {2.3a}]

ODCs are costs other than direct labor and material. Principal items included in this category are travel and other services.

3.1.9 Indirect Cost Accumulation [Guide 13, 19 {2.2h, 2.3d}]

Indirect costs are allocated monthly to project control accounts. Indirect costs are applied to each project at the current approved annual rates. The CASB disclosure statement explains in detail the process concerning the collection and reporting of indirect costs. See Section 3.2.1 for more information regarding the CASB statement.

3.1.10 Accounting Adjustments [Guide 19, 30 {2.3d, 2.5c}]

Retroactive adjustments to previously reported actual costs are prohibited. Adjustments are reported monthly, consistent with GAAP.

3.2 INDIRECT COST PLANNING AND CONTROL

3.2.1 Objective

The Laboratory maintains a cost accounting system that allocates indirect costs to final cost objectives (Project IDs). Indirect costs are collected in discrete cost pools and distributed to the individual project beneficiaries via published rates that are formally reviewed and approved by the Office of the CFO. The "Cost Accounting Standards Board Disclosure Statement" (CASB) identifies all indirect cost pools with a discrete and specific set of cost objectives or beneficiaries.

3.2.2 Indirect Cost Pools [Guide 4, 13, 19, 24 {2.1d, 2.2h, 2.3d, 2.4c}]

As described in 3.2.1 above, the CASB disclosure identifies all indirect cost pools, and defines how these cost pools are distributed to the final or benefiting cost objectives. Some of the larger cost pools (relative to the total mix of indirect cost pools) at the laboratory are payroll burden, procurement burden, common site support, and the general and administrative cost (G&A). The current CASB may be obtained from the Office of the CFO.

3.2.3 Allocation of Indirect Costs to Projects [Guide 4, 13, 19, 24 {2.1d, 2.2h, 2.3d, 2.4c}]

Indirect cost pools are allocated based on causal-beneficial relationships to the final cost objectives (i.e., Project ID). Indirect costs are distributed using individual rates that are applied to the base cost of discrete and specified resources (labor, procurements, services, etc). The basis of each cost allocation is reviewed annually by the Office of the CFO to assure that each indirect cost pool is appropriately identified with the correct set of beneficiaries. As explained in 3.2.1 and 3.2.2, the

composition of each indirect cost pool and the beneficiaries associated with each indirect cost pool are fully disclosed within the CASB disclosure statement.

3.2.4 Revisions to Indirect Rates [Guide 4, 13, 19, 24 {2.1d, 2.2h, 2.3d, 2.4c}]

On a few occasions, new program, project, or business requirements present themselves in the current year that could not be anticipated in prior years. Accordingly, revisions to current-year rates and out-year rate projections may be necessary. SLAC strives to conduct current-year operations to reduce or eliminate revisions to current year rates. Revisions to current-year pricing structures are reviewed for compliance with Federal Cost Accounting Standards (CAS) and are fully disclosed by the Office of the CFO.

3.3 MATERIAL ACCOUNTING [Guide 20, 21 {2.3 e, f}]

EVMS Guideline 20 applies to manufacturing processes. If the project is a research and development project, and we do not need to implement procedures for unit cost, equivalent unit cost, or lot costs, because we do not produce identical products for multiple customers. EVMS Guideline 21 also applies to manufacturing processes. We do not bulk order material for project work, and therefore do not need to implement procedures for residual inventory tracking.

Section 4

Subcontract Management

When substantial effort associated with large and complex projects is obtained through subcontracts, the subcontracts must be written in such a way that information required for earned value management may be readily obtained from the subcontractor. The scope, complexity (risk), criticality, and cost of the subcontracted work may warrant inclusion in the subcontract of an earned value (EV) flow-down provision.

4.1 SUBCONTRACTS WITH EV FLOW-DOWN [Guide 9, 10,16,22,23 {2.2d, e, 2.3a, 2.4a, b}]

The earned value flow-down subcontracts are generally high dollar value and high-risk subcontracts. These subcontracts require careful planning prior to solicitation and award. The solicitation (RFP) or Memorandum of Understanding (MOU) must include the proper language. The contract must include the appropriate contract clauses, including full description of the reporting requirements. The reporting requirements include monthly earned value, and performance reporting from the subcontractor to the project. Requirements for reporting are described in the Request for Proposal (RFP) and formalized in the contract.

4.2 SUBCONTRACTS WITHOUT EV FLOW-DOWN [Guide 9, 10,16,22,23 {2.2d, e, 2.3a, 2.4a, b}]

The method of payment to non-EV flow-down subcontractors will generally drive the planning for receipt of cost and schedule information required to perform earned value management. For most subcontracts, payment will be made based either on the achievement of planned milestones or, for design and construction, the percentage of completion of those milestones; or on the basis of cost reimbursement for labor hours expended and materials consumed. Information provided by the subcontractor with requests for payment must be sufficiently detailed that accurate cost information can be incorporated in the earned value reporting.

An EV flow-down requirement is not mandatory for any one of the following types of subcontracts:

- Firm Fixed Price (FFP);
- Time and material;
- Support subcontracts that are primarily level of effort (LOE).

Section 5

Change Control

Change control ensures that any project changes are identified, evaluated, coordinated, controlled, reviewed, approved, and documented in a manner that best serves the project. This process is discussed in the Change Control Procedure.

5.1 CHANGE-CONTROL PROCESS

5.1.1 Objective [Guide 28, 29, 31, 32 {2.5a, b, d, e}]

Change control has the following objectives:

- Provides the methods used to ensure the integrity of the project's cost, schedule, and work-scope baseline.
- Enables the implementation of timely and auditable changes to the baseline.
- Ensures that no work is performed without prior authorization.

DOE Manual 413.3-1, and other DOE guidance documents, establish change control requirements for DOE projects. The project implements DOE requirements in project procedures for change control.

5.1.2 Change Documentation [Guide 28, 29, 31, 32 {2.5a, b, d, e}]

The project budget base and the performance measurement baseline are two important budget entities for which full control and accountability must be maintained. A detailed change log is maintained to record all changes to authorized work and to reconcile original budgets and schedules and all changes for the WBS elements.

All changes to the performance measurement baseline made as a result of contractual changes, formal reprogramming, internal replanning, or the use of the management reserve/contingency are documented and reported to the customer, as required. Changes that impact the performance measurement baseline are formally controlled, and are documented through the formal change-control process.

5.1.3 Change Request [Guide 28, 29, 31, 32 {2.5a, b, d, e}]

Change control thresholds are defined in the Project Execution Plan. All changes are recorded and tracked through the change control process. Each change is identified and numbered sequentially.

5.1.4 External and Directed Changes [Guide 28, 29, 31, 32 {2.5a, b, d, e}]

An external change is one that is imposed on the project, generally by DOE, with direction to implement. Such a change affects one or more baseline elements (scope, cost, or schedule) and may include, but is not limited to:

- DOE approved funding changes;
- Program Secretarial Officer direction;
- New or revised DOE policy directives.

Typically, the DOE Federal Project Director will provide a written notice of the external or directed changes to the project director. Unless specifically authorized in the written instruction, the change will be acted upon in accordance with the Project Execution Plan change control process.

5.1.5 Internal Changes [Guide 28, 29, 31, {2.5a, b, d}]

The objective of an internal change is to reflect a more accurate, realistic project plan. It is sometimes necessary to perform replanning actions that are within the scope of the authorized contract. These replanning actions may be appropriate to compensate for cost, schedule, and technical problems that:

- Have caused the original plan to become unrealistic.
- Require a reorganization of work or personnel in order to increase the efficiency for accomplishing the effort.
- Require different engineering or construction approaches.

Internal replanning is intended for in-scope changes that relate to future budgets. All budget changes to the baseline are documented in a baseline change proposal and retained in project files. Approved changes are incorporated into the performance measurement baseline in a timely manner, usually before the end of the next reporting period.

5.1.5.1 Internal Replanning Restrictions [Guide 28, 29, 30, 31 {2.5a, b, c, d}]

The following restrictions apply to any type of internal replanning:

- Retroactive changes to the previously reported PV, EV, and AC are prohibited, except for the correction of errors.
- Only the future portion of open work packages may be changed.
- Minor modifications to work packages are discouraged and, in most cases, should not be implemented.
- The time phasing of the PV may be changed in open work packages, as long as the following two conditions apply: (1) the changes only affect future budgets/efforts; and (2) the work packages continue to support key milestones in the schedules after the changes are implemented.
- A budget transfer from one control account to another is prohibited unless the accompanying work is also transferred. This transfer is accomplished by returning the

budget to the management reserve/contingency, and then releasing the management reserve/contingency to the control account where the work will be performed.

- An internal change must be approved before a budget revision can be formally incorporated into the performance measurement baseline and its associated work executed.
- Internal changes and plans are reviewed to ensure that replanning or the conversion of planning packages does not result in the application of budget intended for future work to a near-term effort.

5.1.5.2 Changes within Control Accounts [Guide 28, 29 {2.5a, b}]

Replanning within the established control-account scope, schedule, and BAC parameters are considered "internal to the control account" in that they do not affect the control account scope or BAC, nor do they violate the control milestones. Review and approval of the revised plan by the deputy project director or designee, and the control account manager, are required to ensure that the planning procedures are followed, and that resources are available to support the revised plan. An internal change process is used to document the rationale and approval for all internal changes. Two internal changes are typical in this class:

- Rolling-wave planning (converting planning packages to work packages).
- Change to the work approach within the control-account scope and BAC.

5.1.5.3 Other Internal Replanning [Guide 28, 29, 31 {2.5a, b, d}]

Due to unplanned cost, schedule, and/or technical problems (realized risks), the existing plan might become unrealistic, and revisions could be necessary. These plan revisions would result in reorganizing future work or changing the methods and approaches from those originally planned. These revisions could be identified as a result of the normal variance analysis process or while developing a comprehensive EAC. Internal replanning may cover a single control account or multiple control accounts. All changes are governed by the threshold established in the Project Execution Plan. Impact and justification for all budget changes are documented in the change request, and all internal changes used to authorize internal replanning are recorded in the change log. Typical internal changes are:

- Scope and budget transfers between control accounts (e.g., make vs. buy).
- Changes to the work approach that change the control account scope or the BAC.
- Management reserve/contingency transfers.
- Future rate changes significant enough to warrant replanning.
- Funding revisions that affect resource availability.
- Adjusting subcontract budget values to reflect negotiated values.
- Adjusting material budgets to reflect modifications to material lists after design phases.

5.1.5.4 Changes to Actual Direct and Indirect Costs [Guide 29, 30 {2.5b, c}]

Changes to actual costs incurred, whether direct or indirect, are considered retroactive changes and are not permitted. Accounting adjustments must be made in the current month, in accordance with financial accounting procedures.

5.1.5.5 Changes to Budgeted Direct and Indirect Rates [Guide 29 {2.5b}]

An indirect-rate analysis is prepared at least annually in conjunction with the release of the revised indirect rates by the Office of the CFO. Salary rate revisions generally occur in the last month of the fiscal year. The project must determine whether rate changes are significant enough to warrant internal control-account changes.

5.1.5.6 Changes in Scope or Nature of Work [Guide 28, 29, 31 {2.5a, b, d}]

Additions to or deletions from the scope or nature of work performed by a control account is an allowable reason for making changes to the budget in that specific control account. For example, internal or DOE-directed design reviews might yield results that make it necessary to revise the technical, schedule, or organizational plans. Whether such changes result from an internal decision or from a decision directed by the DOE, changes to control account budgets are controlled in the same manner. Open work packages are examined by each control account manager to determine the impact. Those open work packages that are directly affected can be replanned using one of the two following methods:

- Close the open work package by setting the cumulative BCWS equal to the cumulative BCWP, and make this value the BAC for the closed work package (the ACWP always remains unchanged). The remaining budget from the former work package (i.e., old BAC – cumulative BCWP) plus unopened work packages and planning packages become the BAC value for the new replanning effort.
- Leave the affected work package open, and replan the future budget and scope if the earned value method that is used can accommodate this type of replanning.

5.1.5.7 Changes in Make-or-Buy Determination [Guide 28, 29, 31 {2.5a, b, d}]

When warranted, the make-or-buy (self-performed vs. subcontracted) decision made during the proposal phase and implemented at the contract award phase might need to be revised. When this happens, affected control account managers must replan when the resulting dollar amounts are significant. If the revised make-or-buy decision results in a budget that differs from the original budget, the delta budget is taken from (or added to) the management reserve/contingency, and the budget log reflects the change.

5.1.5.8 Changes in Funding Profiles [Guide 28, 29, 31 {2.5a, b, d}]

If significant changes in contract funding occur, the existing schedules may need to be revised. Under this circumstance, there needs to be agreement between the project and the DOE regarding the scope, schedule, and budget revisions to the remaining contractual effort, and the normal change control process is followed.

5.2 Scheduling Changes [Guide 28, 29, 31 {2.5a, b, d}]

After the baseline schedule is established, changes are made in accordance with the Change Control Procedure. Historical change records provide an audit trail for all revisions to the baseline schedules. The deputy project director maintains a baseline change control log. The log identifies and records each baseline schedule revision, the date and purpose of its incorporation, and the authority for the revision action. Electronic file copies of the baseline schedules, along with all updated schedules, are kept in addition to the log.

Section 6

Surveillance and Maintenance

6.1 SURVEILLANCE AND MAINTENANCE PROCESSES

System surveillance and maintenance are the processes of reviewing the health of the project earned value management system (EVMS) and making changes to actual implementation practices and procedures to ensure continued compliance with ANSI/EIA-748-A guidelines, and the approved SLAC EVMS description. Surveillance is monitoring and assessing, and maintenance is the effective administration of improvements and corrective actions identified through surveillance.

6.1.1 Objectives

Through effective surveillance and maintenance, the project anticipates two types of changes: (1) changes that result from a need to correct shortcomings, and (2) changes that represent opportunities for improvement. Surveillance and maintenance will be accomplished primarily through self assessment and implementation.

6.1.2 System Surveillance

The objective of system surveillance is to provide a process for assessing the implementation of the SLAC EVMS on required projects. Surveillance ensures that the system continues to fulfill the following functions:

1. Provide valid, timely information that depicts actual conditions and trends.
2. Provide timely indications of actual or potential project issues.
3. Maintain baseline integrity.

6.1.3 System Maintenance

The objectives of system maintenance are to provide a process that will continuously improve the operation of the EVMS, to ensure that all changes to the system are in conformance with SLAC and DOE requirements, and to update all system documentation impacted by system changes.

6.2 SELF ASSESSMENT FOR SYSTEM SURVEILLANCE AND MAINTENANCE

Self assessment is executed through a continuous quality control monitoring process and through periodic surveillance by knowledgeable and independent individuals. Continuous self assessment is performed by the project director/deputy project director, and project controls personnel, who are trained in the correct use of the SLAC EVMS, and are held accountable for proper implementation. Issues identified by project personnel will be brought to the attention of, at least, the next level of management on the project. Issue resolution will be coordinated by the project office if the issue involves changes to the EVMS or supporting SLAC procedures. The self assessment and surveillance process will include the following:

1. Project baselines will be reviewed during Critical Decision-2 reviews.
2. The EVMS system will be periodically, but not less than annually, reviewed against the ANSI/EIA-748-A Guidelines.
3. Recommendations to improve the earned value management system will be evaluated and implemented as appropriate.

Appendix A

ANSI/EIA-748-A Guideline Crosswalk

ANSI/EIA-748-A Guidelines	EVMS Implementation	Major Guideline Category	SLAC Procedure Reference
Guideline 1: Define the authorized work elements for the program. A work breakdown structure (WBS), tailored for effective internal management control, is commonly used in this process.	1.1.1, 1.1.3, 1.1.4	Organization	EVM System Description 1.1-015 Rev 1.0
Guideline 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.	1.1.1, 1.1.5, 1.3.5	Organization	EVM System Description 1.1-015 Rev 1.0
Guideline 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.	1.1.2, 1.1.6, 1.3.3, 1.3.4, 1.3.6, 1.4	Organization	EVM System Description 1.1-015 Rev 1.0
Guideline 4: Identify the company organization or function responsible for controlling overhead (indirect costs).	3.2.2 – 3.2.4	Organization	CASB DS Part IV, Indirect Costs CASB DS Part 4.4, Treatment of Variances from Actual Cost SLAC Indirect Budget Management
Guideline 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.	1.1.6, 1.3.3, 1.3.4, 1.3.5, 1.3.6	Organization	LCLS Procedure 1.1-018, Control Account and Work Package Planning
Guideline 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.	1.2.1, 1.2.2	Planning & Budgeting	LCLS Procedure 1.1-020, Project Schedule
Guideline 7: Identify physical products, milestones, technical performance goals, or other indicators that will be used to measure progress.	1.2.1, 1.2.2, 2.1.1, 2.1.2, 2.2,3	Planning & Budgeting	EVM System Description 1.1-015 Rev 1.0 LCLS Procedure 1.1-020, Project Schedule LCLS Procedure 1.1-022, Monthly Status and Reporting

ANSI/EIA-748-A Guidelines	EVMS Implementation	Major Guideline Category	SLAC Procedure Reference
Guideline 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 un-defined work. On government contracts, if an over target baseline is used for performance measurement reporting purposes; prior notification must be provided to the customer.	1.3.1, 1.3.2, 1.3.4	Planning & Budgeting	LCLS Procedure 1.1-022, Monthly Status and Reporting
Guideline 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.	1.3.1, 1.3.2, 1.3.4, Section 4	Planning & Budgeting	LCLS Procedure 1.1-021, Cost Estimating LCLS Procedure 1.1-023, Subcontractor Management
Guideline 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.	1.3.4, Section 4	Planning & Budgeting	LCLS Procedure. 1.1-018, Control Account and Work Package Planning
Guideline 11: Provide that the sum of all work package budgets plus planning package budgets within a control account equals the control account budget.	1.3.4	Planning & Budgeting	LCLS Procedure 1.1-018, Control Account and Work Package Planning
Guideline 12: Identify and control level of effort activity by time-phased budgets established for this purpose. Only that effort which is immeasurable or for which measurement is impractical may be classified as level of effort.	2.1.1 – 2.1.3	Planning & Budgeting	LCLS Procedure 1.1-018, Control Account and Work Package Planning
Guideline 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.	3.1.9, 3.2.2 - 3.2.4	Planning & Budgeting	CASB DS Part IV, Indirect Costs CASB DS Part 4.4, Treatment of Variances from Actual Cost SLAC Indirect Budget Management SLAC Indirect Costs Allocation
Guideline 14: Identify management reserves and undistributed budget.	1.3.8	Planning & Budgeting	LCLS Procedure 1.1-021, Cost Estimating LCLS Procedure 1.1-019, Change Control

ANSI/EIA-748-A Guidelines	EVMS Implementation	Major Guideline Category	SLAC Procedure Reference
Guideline 15: Provide that the program target cost goal is reconciled with the sum of all internal program budgets and management reserves.	1.3.1, 1.3.2	Planning & Budgeting	LCLS Procedure 1.1-021, Cost Estimating
Guideline 16: Record direct costs in a manner consistent with the budgets in a formal system controlled by the general books of account.	3.1.2 – 3.1.8 Section 4	Accounting Considerations	CASB DS 2.5 Direct Labor CASB DS 2.1, 2.2, & 2.3 Direct Materials CASB DS 2.7 Other Direct Costs
Guideline 17: *(When a work breakdown structure is used)* Summarize direct costs from control accounts into the work breakdown structure without allocation of a single control account to two or more work breakdown structure elements.	3.1.3	Accounting Considerations	LCLS Procedure 1.1-018, Control Account and Work Package Planning
Guideline 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.	1.3.3, 3.1.3	Accounting Considerations	LCLS Procedure 1.1-018, Control Account and Work Package Planning
Guideline 19: Record all indirect costs, which will be allocated to the contract.	3.1.3, 3.1.9, 3.1.10 3.2.2 – 3.2.4	Accounting Considerations	CASB DS Part IV, Indirect Costs CASB DS Part 4.4, Treatment of Variances from Actual Cost
Guideline 20: Identify unit costs, equivalent unit costs, or lot costs when needed.	3.3	Accounting Considerations	N/A
Guideline 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. • 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. • Full accountability of all material purchased for the program including the residual inventory.	3.1.6, 3.3	Accounting Considerations	CASB DS 2.1, 2.2, & 2.3 Direct Materials
Guideline 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 to the actual (applied where appropriate) direct costs for the same work. This comparison provides the cost variance.	2.2.2 – 2.2.4 2.3.2 – 2.3.6 2.3.8, 2.4.3 Section 4	Analysis & Management	LCLS Procedure 1.1-022, Monthly Status and Reporting

ANSI/EIA-748-A Guidelines	EVMS Implementation	Major Guideline Category	SLAC Procedure Reference
Guideline 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.	2.2.2 – 2.2.4 2.3.2 - 2.3.6 2.3.8, 2.4.3 Section 4	Analysis & Management	LCLS Procedure 1.1-022, Monthly Status and Reporting
Guideline 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.	3.2.2 – 3.2.4	Analysis & Management	CASB DS Part IV Indirect Costs CASB DS Part 4.4 Treatment of Variances from Actual Cost LCLS Procedure 1.1-022, Monthly Status and Reporting
Guideline 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.	2.3.2, 2.3.5 – 2.3.8 2.4.2	Analysis & Management	LCLS Procedure 1.1-022, Monthly Status and Reporting
Guideline 26: Implement managerial actions taken as the result of earned value information.	2.3.5, 2.3.6, 2.4.2	Analysis & Management	LCLS Procedure 1.1-022, Monthly Status and Reporting
Guideline 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.	2.3.5 – 2.3.8	Analysis & Management	LCLS Procedure 1.1-021, Cost Estimating LCLS Procedure 1.1-022, Monthly Status and Reporting
Guideline 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.	5.1.2 – 5.1.5 5.1.5.1 – 5.1.5.3 5.1.5.6 – 5.1.5.8 5.2	Revisions & Data Management	LCLS Procedure 1.1-019, Change Control
Guideline 29: Reconcile current budgets to prior budgets in terms of changes to the authorized work and internal re-planning in the detail needed by management for effective control.	Section 5	Revisions & Data Management	LCLS Procedure 1.1-021, Cost Estimating LCLS Procedure 1.1-022, Monthly Status and Reporting LCLS Procedure 1.1-019, Change Control

ANSI/EIA-748-A Guidelines	EVMS Implementation	Major Guideline Category	SLAC Procedure Reference
Guideline 30: Control retroactive changes to records pertaining to work performed that would change previously reported amounts for actual costs, earned value, 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.	1.3.4, 3.1.10 5.1.5.1, 5.1.5.4	Revisions & Data Management	LCLS Procedure 1.1-022, Monthly Status and Reporting
Guideline 31: Prevent revisions to the program budget except for authorized changes.	5.1.2 – 5.1.5 5.1.5.1, 5.2 5.1.5.6 – 5.1.5.8	Revisions & Data Management	LCLS Procedure 1.1-019, Change Control
Guideline 32: Document changes to the performance measurement baseline.	5.1.2 – 5.1.4	Revisions & Data Management	LCLS Procedure 1.1-019, Change Control
Other. Surveillance. Surveillance is not included in the ANSI/EIA guidelines but is part of industry best practices.	6.1 – 6.2	N/A	LCLS Procedure 1.1-024, Surveillance

APPENDIX B

Abbreviations, Acronyms, and Glossary of Terms

AC — Actual Cost
ACWP — Actual Cost of Work Performed
AE — Acquisition Executive
ANSI — American National Standards Institute
BAC — Budget at Completion
BCWP — Budgeted Cost of Work Performed
BCWS — Budgeted Cost of Work Scheduled
CBB — Contract Budget Baseline
CD — Critical Decision
CDR — Conceptual Design Report
CFO — Chief Financial Officer
CFR — Code of Federal Regulations
CO — Contracting Officer
CPM — Critical Path Method
DEAR — Department of Energy Acquisition Regulation
DOE — U.S. Department of Energy
EAC — Estimate at Completion
EIR — External Independent Review
ETC — Estimate to Complete
EV — Earned Value
EVMS — Earned Value Management System
FAR — Federal Acquisition Regulations
FY — Fiscal Year
ICE — Independent Cost Estimate
ICR — Independent Cost Review
IPR — Independent Project Review
IPT — Integrated Project Team
IR — Independent Review
ISM — Integration Safety Management
ISMS — Integrated Safety Management System
IT — Information Technology
LOE — Level of Effort
MS — Major System Project

NEPA — National Environmental Policy Act
OBS — Organizational Breakdown Structure
OECM — Office of Engineering and Construction Management
OMB — Office of Management and Budget
OPC — Other Project Costs
PARS — Program Assistant Secretaries
PB — Performance Baseline
PED — Project Engineering and Design
PEP — Project Execution Plan
PMB — Performance Measurement Baseline
PV — Planned Value
RAM — Responsibility Assignment Matrix
RD — Requirements Document
RFP — Request for Proposal
RFQ — Request for Quotations
SAE — Secretarial Acquisition Executive
SOW — Scope of Work
SSO — Stanford Site Office
SV — Schedule Variance
TEC — Total Estimated Cost (Capital)
TPC — Total Project Cost
UB — Undistributed Budget
WAD — Work Authorization Document
WBS — Work Breakdown Structure

Accrual Method. An accounting method in which revenue is recognized when earned rather than when collected, and in which expenses are recognized when incurred rather than when paid. Accrual-basis accounting is essential to accurate performance and progress information on contracts.

Acquisition Executive (AE). The individual designated by the Secretary of Energy to integrate and unify the management system for a program portfolio of projects, and implement prescribed policies and practices.

Acquisition Strategy. An acquisition strategy is a high-level business and technical management approach designed to achieve project objectives within specified resource constraints. It is the framework for planning, organizing, staffing, controlling, and leading a project. It provides a master schedule for activities essential for project success, and for formulating functional strategies and plans.

Actual Cost (AC). Total costs incurred (direct and indirect) in accomplishing an identified element or scope of work during a given time period. See also “Earned Value.”

Deviation. A deviation occurs when the current estimate of a performance, technical, scope, schedule, or cost parameter is not within the threshold values of the Performance Baseline for that parameter. It is handled as a deviation, not through the normal change control system.

Budget at Completion (BAC). The total authorized budget for accomplishing the scope of work. It is equal to the sum of all allocated budgets plus any undistributed budget. (Management reserve/contingency is not included.) The Budget at Completion will form the Performance Baseline.

Budgeting. The process of translating resource requirements into a funding profile.

Burden. Costs that cannot be attributed or assigned to a system as direct cost. An alternative term for Overhead.

Capability. A measure of the system's ability to achieve mission objectives, given the system's condition during the mission.

Change Order. A bilateral or sometimes unilateral order signed by the government contracting officer that directs the contractor to make a change that the *change clause* authorizes usually with, but sometimes without, the contractor's consent.

Conceptual Design. The concept for meeting a mission need. The conceptual design process requires a mission need as an input. Concepts for meeting the need are explored and alternatives considered to determine a set of alternatives that are technically viable, affordable, and sustainable.

Configuration Management. To control changes to, and to record and report changes to, data sets, reports, and documents.

Contingency (OECM names this "Management Reserve"). An amount of the total allocated budget withheld by the project for management control purposes. Contingency is not part of the Performance Measurement Baseline. The usage of the term *contingency* throughout this document is **not** the contingency held by DOE. The Project defines Contingency as the amount allocated for the Total Estimated Costs (TEC) and Management Reserve as the amount allocated for Other Project Costs (OPC).

Contract. A contract is a mutually binding agreement that obligates the seller to provide the specified product and obligates the buyer to pay for it.

Contractor. An individual, partnership, company, corporation, or association having a contract with a contracting agency for the design, development, maintenance, modification, or supply of deliverable items and services under the terms of a contract.

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.

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

Cost Variance. The algebraic difference between Earned Value and Actual Cost (Cost Variance = Earned Value – Actual Cost.) A positive value indicates a favorable condition, and a negative value indicates an unfavorable condition.

Costs to Date. Costs incurred to date by the contractor and reported to DOE, which are recorded as accrued costs. They represent all charges incurred for goods and services received and other assets required, regardless of whether payment for the charges has been made. Costs to date include all completed work and work in process chargeable to the contract; specifically, they include invoices for (1) completed work to which the prime contractor has acquired title; (2) materials delivered to which the prime contractor has acquired title; (3) services rendered; (4) costs billed under cost reimbursement, or time and material subcontracts for work to which the prime contractor has acquired title; (5) progress payments to subcontractors that have been paid or approved for current payment in the ordinary course of business (as specified in the prime contract); and (6) fee profits allocable to the contract.

Cost Performance Index (CPI). The ratio of earned value to actual costs (BCWP/ACWP). A value greater than one denotes favorable performance. CPI is often used to predict the magnitude of possible cost deviations from the baseline.

Critical Decision (CD). A formal determination made by the AE and/or designated official (Mission Need Statement) at a specific point in a project life cycle that allows the project to proceed. Critical Decisions occur in the course of a project, for example, prior to the commencement of conceptual design (CD-1), the commencement of execution (CD-3), and turnover (CD-4).

Critical Path. In a project network diagram, the series of logically linked activities that determine the earliest completion date for the project. The Critical Path might change from time to time, as activities are completed ahead of or behind schedule. Although normally calculated for the entire project, the Critical Path can also be determined for a milestone or a subproject. The Critical Path is usually defined as those activities with float less than or equal to a specified value, often zero.

Critical Path Method (CPM). A network analysis technique used to predict project duration by analyzing which sequence of activities (which path) has the least amount of scheduling flexibility (the least amount of float). Early dates are calculated by means of a forward pass using a specified start date. Late dates are calculated by means of a backward pass starting from a specified completion date to result in zero total float for each activity.

Design Criteria. Those technical data and other project information identified during the project initiation and definition (conceptual design and/or preliminary design phases). They define the project scope, construction features and requirements, and design parameters; applicable design codes, standards, and regulations; applicable health, safety, fire protection, safeguards, security, energy conservation, and quality-assurance requirements; and other requirements. The project design criteria are normally consolidated into a document, which provides the technical base for any further design performed after the criteria are developed.

Directed Change. A change imposed on a project(s) that affects the project's baseline. Example of directed changes include, but are not limited to, (1) changes to approved budgets or funding and (2) changes resulting from DOE policy directives and regulatory or statutory requirements.

Duration. The number of work periods (not including holidays or other nonworking periods) required to complete an activity or other project element, and usually expressed as workdays or workweeks. Sometimes incorrectly equated with elapsed time.

Earned Value (EV). (1) A method for measuring project performance that compares the value of work performed (EV) with the value of work scheduled (Planned Value [PV]) and the cost of performing the work (Actual Cost [AC]) for the reporting period and/or cumulative to date; (2) the budgeted cost of work performed for an activity or group of activities.

Estimate at Completion (EAC). The latest revised cost estimate for a given work scope.

Estimate to Complete (ETC). Estimate of costs to complete all work from a point in time to the end of the project.

Estimated Cost. An anticipated cost for an applied work scope.

Facilities. Buildings and other structures; their functional systems and equipment, including site-development features such as landscaping, roads, walks, and parking areas; outside lighting and communications systems; central utility plants; utilities supply and distribution systems; and other physical-plant features.

Final Design. Completion of the design effort and production of all the approved design documentation necessary to permit procurement. Construction, testing, checkout, and turnover to proceed. Final design occurs between Critical Decision-2 and -3.

Firm Fixed Price Contract. Fixed price contracts provide for a firm price or, under appropriate circumstances, may provide for an adjustable price for the supplies or services that are being procured. In providing for an adjustable price, the contract may fix a ceiling price, target price (including target cost), or minimum price. Unless otherwise provided in the contract, any such ceiling, target, or minimum price is subject to adjustment only if required by the operation of any contract clause that provides for equitable adjustment, escalation, or other revision of the contract price upon the occurrence of an event or a contingency.

Independent Cost Estimate (ICE). A "bottoms up" documented, independent cost estimate that serves as an analytical tool to validate, crosscheck, or analyze cost estimates developed by project proponents.

Independent Cost Review (ICR). An essential project management tool used to analyze and validate an estimate of project costs. An independent cost review is typically conducted on all projects at the point of baseline approval. Such reviews may be required by the U.S. Congress, DOE management, DOE headquarters program offices, or field project management staff. The requiring office or agency will provide specific requirements for such reviews. An ICR may be performed by an independent internal or external organization.

Indirect Rate. Indirect rate means the percentage or dollar factor that expresses the ratio of an indirect expense incurred in a given period to a direct labor cost or another appropriate base for the same period.

Integrated Project Team (IPT). An IPT is a cross-functional group of individuals organized for the specific purpose of delivering a project to an external or internal customer.

Level of Effort (LOE). Effort of a general or supportive nature without a deliverable end product. An activity (e.g., vendor or customer liaison) that does not lend itself to the measurement of discrete accomplishment. It is generally characterized by a uniform rate of activity over a specific period of time. Value is earned at the rate that the effort is being expended.

Line Item. An appropriation by Congress for a specific effort, activity, or project. All budgets are appropriated by Congress through line items.

Management Reserve/Contingency. An amount of the total allocated budget held for management control purposes by the project. Management reserve/contingency is not part of the Performance

Measurement Baseline. The usage of the term *management reserve/contingency* throughout this document is **not** the same as contingency held by DOE. The project defines Contingency as the amount allocated for the Total Estimated Costs (TEC) and Management Reserve as the amount allocated for Other Project Costs (OPC).

Milestone. A scheduled event marking the due date for accomplishment of a specified effort (work scope) or objective. A milestone may mark the start, an interim step, or the end of one or more activities.

Mission Need. A performance gap between current performance and what is required.

Network Schedule. A schedule format in which the activities and milestones are represented along with the interdependencies between activities. It expresses the logic (how the program will be accomplished) and the time frames (when). Network schedules are the basis for critical-path analysis, a method for identification and assessment of schedule priorities and impacts.

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

Other Project Costs (OPC). Costs for engineering, design, development, startup, and operations, which are essential for project execution and are operating-expense funds.

Performance Measurement Baseline (PMB). The collected key performance, scope, cost, and schedule parameters. The Performance Measurement Baseline defines the threshold and boundary conditions for a project.

Planned Value (PV). 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. Also called the Performance Measurement Baseline.

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

Program Office. The DOE headquarters organizational element responsible for managing a program.

Project. In general, a unique effort that supports a program mission; has defined start and end points; is undertaken to create a product, facility, or system; and contains interdependent activities planned to meet a common objective or mission. A project is not constrained to any specific element of the budget structure (e.g., operating expense or plant and capital equipment). Construction, if required, is

part of the total project. Projects include planning and execution of construction, renovation, modification, environmental restoration, decontamination and decommissioning efforts, and large capital equipment or technology development activities. Tasks that do not include the above elements, such as basic research, grants, ordinary repairs, maintenance of facilities, and operations, are not considered projects.

Project Execution Plan (PEP). The plan for the execution of the project, which establishes roles and responsibilities and defines how the project will be executed. Every project implementing Earned Value management will have a unique project execution plan.

Remaining Duration. The time needed to complete an activity.

Responsibility Assignment Matrix (RAM). A structure that relates the project organization structure to the work breakdown structure to help ensure that each element of the project's scope of work is assigned to a responsible individual.

Risk. A measure of the potential inability to achieve overall project objectives within defined cost, schedule, and technical constraints, and has two components: (1) the *probability/likelihood* of failing to achieve a particular outcome, and (2) the c*onsequences/impacts* of failing to achieve that outcome.

Risk Management. The act or practice of controlling risk. An organized process that reduces risk, prevents a risk from happening, or mitigates the impact if it does occur.

Schedule. A plan that defines when specified work is to be done to accomplish program objectives on time.

Schedule Control. Controlling changes to the project schedule and preparing workaround plans to mitigate the impact of adverse results/delays by others.

Schedule Performance Index (SPI). A schedule performance indicator relating work accomplished to the planned schedule (BCWP/BCWS). A value greater than one denotes favorable performance.

Schedule Variance (SV). A metric for the schedule performance on a program. It is the algebraic difference between Earned Value and the Budget (Schedule Variance = BCWP – BCWS). A positive value is a favorable condition while a negative value is unfavorable. The SV is calculated in dollars or work units, and is intended to complement network analysis, not to supersede or replace it.

Scope of Work (SOW). The document that defines the work-scope requirements for a project. It is a basic element of control used in the processes of work assignment (scope) and the establishment of project schedules and budgets.

System. A collection of interdependent equipment and procedures assembled and integrated to perform a well-defined purpose. It is an assembly of procedures, processes, methods, routines, or techniques united by some form of regulated interaction to form an organized whole.

Total Estimated Costs (TEC). The Total Estimated Cost of a project is the specific cost of the project, whether funded as an operating expense or construction. It includes the cost of land and land rights; engineering, design, and inspection costs; direct and indirect construction costs; and the cost of initial equipment necessary to place the plant or installation in operation, whether funded as an operating expense or construction.

Total Project Cost (TPC). Total cost for the project, including all costs regardless of sources or type of funds.

Undistributed Budget (UB). Budget associated with specific work scope or contract changes that have not been assigned to a control account or summary-level planning package.

Work Breakdown Structure (WBS). A product-oriented grouping of project elements that organizes and defines the total scope of the project. The WBS is a multilevel framework that organizes and graphically displays elements representing work to be accomplished in logical relationships. Each descending level represents an increasingly detailed definition of a project component. Project components may be products or services. It is the structure and code that integrates and relates all project work (technical, schedule, and cost) and is used throughout the life cycle of a project to identify and track specific work scopes.

Work Breakdown Structure Dictionary. A listing of work breakdown structure elements with a short description of the work-scope content in each element.

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

Workaround. A response to a specific negative schedule event. Unlike a contingency plan, a workaround is not planned in advance of the risk event.

Appendix C

Roles and Responsibilities

Role	Responsibilities
Project Director	(1) Recognizes and accepts responsibility and authority for the project, including the implementation and operation of an EVMS compliant system. (2) Establishes contingency to be held for rate changes and other project unknowns, and authorizes its use through the baseline change control process. (3) Provides overall schedule constraints, guidance, and approval to control account managers after the establishment of the baseline schedule. (4) Approves/disapproves subcontract awards in accordance with the project policies and recommendations.
Deputy Project Director	(1) Manages the development, execution, and maintenance of project procedures that support the EVMS description. (2) Through the development of a responsibility assignment matrix based on a work breakdown structure and organizational breakdown structure, identifies functional managers and control account managers. (3) Identifies project variance-analysis thresholds, and negotiates and approves contract reporting level variance thresholds, control account budgets, and schedule planning. (4) During the baseline development phase, continually reviews and monitors the development of control account and intermediate level schedules and their subsequent impact on project objectives. (5) Implements a project-reporting cycle, cost code structure, Change Request, and a budget planning process. (6) Issues and approves all work authorization documents, as appropriate. (7) Approves/disapproves recommendation of the application of earned value flow-down provisions for subcontracts in accordance with contract provisions and negotiations with DOE. (8) Reviews and analyzes monthly project-level schedules and performance measurement reports. (9) Reviews significant variances and workaround plans for approval/disapproval with appropriate levels of management following monthly process status. (10) Resolves any scheduling and/or resource conflicts that cannot be resolved at the control account manager levels. (11) Creates planning packages. (12) Reviews workaround plans, and monitors corrective actions.
System Manager	(1) Direct and coordinate the integrated effort for their respective project WBS Systems. (2) Conduct the Conceptual, Preliminary, and Final Design Reviews as necessary to ensure a high quality design that meets the technical performance specifications of the project.

Role	Responsibilities
	(3) Critical review of the planning, scheduling and cost estimating for their project system. (4) Review and approval authority of all Level 4 change control proposals. (5) Ensure that all work in their integrated project system is planned and executed in accordance with SLAC and ES&H policies and ISMS procedures. (6) Serve as a member of the Change Control Board.
Control Account Manager	(1) Converts planning packages into work packages, assigns an earned value technique to each work package, and budgets each task by element of cost. (2) Applies appropriate earned value techniques by using the same basis used to establish the budget during initial planning, rolling-wave planning, and any other replanning efforts. (3) Initiates the opening and closing of project ID, commonly known as charge number (4) Negotiates and accepts the Statement of Work, budget, and schedule on work authorization documents. (5) Within a control account, identifies the tasks that must be accomplished in order for the control account statement of work to be accomplished. Revises the control account plan to incorporate authorized changes. (6) After baseline approval, documents the status of all in-process activities on a monthly basis, and takes actions required to develop and monitor the progress of corrective action plans to the point of resolution. (7) Plans the Planned Value (BCWS) and assesses the control account status based on the performance measurement baseline using data provided by the project and project subcontractors. Identify accruals. (8) Submits a new Estimate at Completion to the functional manager and project manager, as required, based on monthly reviews. (9) Reviews and analyzes job-cost history reports, invoices, the control account schedule, and performance measurement reports and variances. Analyzes schedule activities for slippages and impacts on the control account or other interdependent work. Develops workaround/corrective action plans for project-management review/approval. (10) Serves as the primary technical interface for subcontractors. Develops and reviews the Estimate at Completion with the subcontractor management team, and either submits the value as reported or develops an independent Estimate at Completion value. Approves subcontractor invoices, verifying actual work completed. (11) Completes the variance-analysis report following the normal review and approval cycle. Reviews the contractor-submitted Monthly Project Performance Report. As appropriate, uses the variance analysis included in the report to help prepare the control account variance analysis report. (12) By using other subcontractor information such as schedules, subcontract statement of work, and technical reports, develops control account plans based on the best knowledge of the non-earned value, flow-down subcontract work to be performed . (13) Develops detail schedules and networks that will depict horizontal dependency, float, and the critical path. Update control account status. As necessary, develop supplemental schedules for use in day-to-day operational planning and management.

Role	Responsibilities
Contracts Administration	(1) Prepares bid packages, RFPs, etc.; coordinates with prospective bidders; leads bid evaluations; and awards contracts. (2) Directs changes to subcontracted work within the general scope of awarded subcontracts. (3) Negotiates contractual changes. (4) Prepares, revises, and issues the Contract Modification.
Project Controls Manager	(1) Prepares and maintains the Performance Measurement Baseline. (2) Establishes and maintains the Earned Value Measurement System. (3) Establishes, coordinates, and updates all project earned value reports. (4) Maintains the WBS and WBS dictionary. (5) Maintains the controlled milestones and the milestone dictionary. (6) Maintains the Baseline Control Request process and tracks changes to the baseline. (7) Collects monthly actual costs for the project. (8) Produces the monthly Cost Schedule Performance Report. (9) Analyzes cost and schedule variances. (10) Assists Project Director and Deputy Project Director in forecasting budgets.
Financial Manager	(1) Act as the primary office of communication between project and financial officers of any partner labs and SLAC Accounting and the Budget Office. (2) Provide gate keeping oversight to the requisition process. Provide budget review of requisitions and communicate any budget issues to the appropriate project management. (3) Maintain the financial aspects of Memoranda of Understanding on behalf of the project between SLAC and various collaborating universities and laboratories. (4) Develop and maintain a project financial system which includes integration of the project cost and schedule performance data and SLAC financial system data. (5) Generate monthly summaries of the project budget, costs, obligations, and commitments in a format useful to project management in a timely manner. (6) Provide computer-generated models, algorithms for costs projections including forecast and trend analyses, and ad hoc reports (e.g. labor charges, overhead/indirect costs, etc.) as needed by the project. (7) Assist in the preparation of budget and institutional documents for the project for submittal to DOE or partner Labs. (8) Ensures partner lab accruals are accurately recorded. (9) Conducting her activities in accordance with all environmental, health and safety regulations and practices pertinent to this position.

Appendix D

References

Section 2: Earned Value Analysis and Progress Reporting

1. Project Management Institute, *Practice Standard for Earned Value Management* (2005).