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Revision 0

Schedule Development, Control and Maintenance Process

Cognizant Section: Project Analysis & Control

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ABBREVIATIONS AND ACRONYMS

CAM	Cost Account Manager
CBFO	Carlsbad Field Office
CWIT	Complex-Wide Integration Tool
DOE	U.S. Department of Energy
PAC	Project Analysis & Control
PCR	Programmatic Change Request
WIPP	Waste Isolation Pilot Plant
WBS	Work Breakdown Structure

1.0 INTRODUCTION

Schedule development, control, and maintenance are the part of program management that ensures timely and safe completion of program objectives and approved work scope. Scheduling facilitates effective planning, statusing, critical path management, and variance analysis, which are essential to the success of all projects. The schedule ensures that work is planned and scheduled, interfaces are establish between project participants, and provides visibility of work progress and valid schedule information necessary to make timely management decisions. The schedule also ensures that Integrated Safety Management System/Voluntary Protection Program principals are considered in the planning process. The scheduling process supports the integration of the project's scope, cost, and schedule objectives by documenting a logical sequence of work through the creation of relationships and interdependencies that determine total work time and related critical path. The process ensures that the schedule supports resources planning and performance measurement. This process description ensures that the Waste Isolation Pilot Plant (WIPP) scheduling system is developed, controlled, maintained, and reported against in a manner consistent with ANSI/EIA 748-A-1998, *Approved American National Standard Earned Value Management Systems*, the industry standard for earned value management and U.S. Department of Energy (DOE) Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*.

2.0 SCHEDULES

A structured approach for establishing, maintaining, and controlling project schedules ensures that program milestones, activity schedules, and lower-level project/work plans support higher-level schedules and program commitments. The work breakdown structure (WBS) forms the basis for planning the project schedule and together with the organizational breakdown structure provides the framework for both vertical and horizontal integration of scope, cost, and schedule baseline.

The program schedules will be developed according to the following:

- Program schedules will be prepared and maintained throughout the duration of the program in appropriate detail for each WBS element.

- Scheduling control methods will be used to ensure that lower-level project/work plans and activity schedules support higher-level schedules and program objectives.

- Baseline schedules will not be changed unless the criteria established in the *Carlsbad Field Office Programmatic Change Control Process* (DOE/CBFO-95-1122) are met.

- Preliminary schedules will be developed in the planning module prior to work authorization. Once the work has been authorized, the appropriate activities are transferred to the project baseline schedule.

2.1 Schedule Hierarchy

The Carlsbad Field Office (CBFO) Management Control System CWIT (complex-wide integration tool) employs a hierarchy of schedules beginning with program level milestones and ending with detailed working schedules in a descending, integrated, and tiered methodology, as follows:

CBFO Project Master Milestone Schedule – CBFO-controlled milestones. The schedules initiation and each subsequent revision must be approved by the CBFO. The schedule is generated from lower level schedule activities where logic relationships are contained. All changes to the CBFO Project Master Milestone Schedule require formal change control.

Integrated Project Summary Schedule – An intermediate level schedule that summarizes the detailed working schedules and fully integrates and supports the master schedule. This schedule depicts summary activities for monitoring progress.

Integrated Project Working Schedules – The detailed working schedules are the lowest level of the scheduling system. This is the level where critical path method logic exits and performance is measured. This is also the level where activities are coded to enable sorting by WBS, organizational breakdown structure, and building block. The detailed schedules are used to status and update the summary schedules.

Note: Schedule levels are not the same as WBS levels.

2.2 Schedule Development

Project Analysis & Control (PAC), in conjunction with the cost account managers (CAMs) and the other project participants, will develop or update the integrated project working schedules in the CWIT database per the CBFO Baseline Drivers and Planning Assumptions. The CAMs and project participants will develop their new, or update their current, schedules and submit their input to PAC for input into the CWIT database and to check for interdependencies to ensure project integration. Once the schedules have been completed, the CAMs, project participants, and their CBFO counterparts will review the schedules to ensure that they support the CBFO Baseline Drivers and Planning Assumptions.

Activities are defined to the lowest level of detail that may provide meaningful information consistent with effective program management and accurate reporting of progress. Development of detailed schedules is important in the planning process since it results in the identification and sequencing of activities necessary to perform work and meet project milestones.

2.2.1 Schedule Detail

Specific scheduling requirements are established by the timeframe for which the schedule is to be developed. Near-term schedule activities are defined in the greatest detail. Out-year schedules are defined in progressively less detail as determined by the

level of planning and design information available, which is normally the baseline drivers and planning assumptions. Schedules developed during the current execution year are required to be of sufficient detail to enable effective management of program activities.

2.2.2 Schedule Logic Preparation

Once all milestones and activities have been identified to support the CBFO Program Guidance, their relationships must be defined. These relationships are described in various types of predecessor/successor relationships. Activities within a program generally exist in a framework in which activities and milestones have to be completed prior to starting the next activity (finish-to-start relationship). Activities which may be initiated at the same time (parallel activities) are called start-to-start activities. Finish-to-finish activities are those which may start at different times, but must be completed at the same time; the activities may have differing durations. When an activity is independent, it may start at any time as long as it is completed prior to the completion of the last task identified on the critical path.

2.2.3 Activity Duration

Estimating the duration of an activity requires information from numerous sources, including technical, operational, construction, regulatory, transportation, characterization, shipping information, and budget constraints. Activity durations are based on a five-day work week using days as the measure of duration. Some regulatory and operations activities may require seven-day work week for stakeholder and regulators review.

2.2.4 Activity Status

The integrated project working schedule is the level where periodic activity statusing occurs monthly for all activities. More frequent statusing, such as weekly, can occur when necessary. CAMs and the project participants provide the status to PAC for input into the CWIT database. Physical products, milestones or other objective measures are used to measure progress for discrete activities. Schedule statusing is performed to coincide with the monthly accounting period. Actual costs are collected in the WTS accounting system and are downloaded electronically into the CWIT database. Activity status, including physical percent complete is used by the CWIT to determine budgeted cost of work performed. This allows for earned value reporting of the time-phased budget. The system also provides status and forecasted completion dates to compare baseline versus actual dates. (Note: **Baseline** dates cannot be changed during statusing, this requires change control.)

2.2.5 Variance Reporting/Analysis

Schedules and variance analysis reports are generated monthly, and are analyzed to measure performance, identify potential program impacts, and provide information for management control. Prepared monthly are the:

CBFO Milestone Status Report - The report shows the baseline and latest forecast dates for CBFO-controlled milestones and indicates the variance between the two dates.

90-Day Look-Ahead Schedule - The schedule shows interim milestones required to accomplish the high-level CBFO milestones.

Milestone Variance Analysis Report - The report depicts the variance analysis, project impact, corrective action plan, milestone variance history, and baseline driver impact for the milestones that are behind schedule.

Variance Analysis Report - The report shows the start and end dates for the time-phased budget; planned, earned, and actual total cost to date; cost and schedule variance; cost and schedule performance index; budget and estimate at completion; and performance percent complete. The report is used by the CAMs to explain cost, schedule and, at completion, variance analysis: project impacts, and corrective action plan and results.

2.2.6 Activity Resources

Resources applied to schedule activities support the CBFO Project Master Milestone Schedule, the WIPP lifecycle baseline, and are further elaborated in the integrated project working schedule per the activity based cost estimate sheets prepared for the budget execution year, and a two-year rolling window. Out-year activities are resource loaded per the WIPP lifecycle baseline planning spreadsheet. The CWIT uses the resource information to generate cost account plans for the execution year.

2.2.7 Schedule Traceability

Schedule traceability refers to the ability to relate various activities and milestones within the CWIT scheduling database. There are two forms of relationships that are of importance in the scheduling context: vertical and horizontal schedule relationships, or traceability.

2.2.7.1 Vertical Traceability

Vertical traceability refers to the ability to relate activities and milestones between different levels of schedules. Milestones that appear on more than one level of schedule must have the same date (baseline, actual or forecast) on each level in order to satisfy vertical traceability. Activities must also be horizontally traceable.

2.2.7.2 Horizontal Traceability

Horizontal traceability refers to the ability to relate activities and milestones to logically preceding and succeeding activities and milestones. The purpose of this traceability is to relate significant decision points, constraints, and interfaces as well as to assess impact on future activities and milestones based on actual performance to date and current program conditions.

Horizontal traceability exists within the integrated project working schedule; activities, milestones and decision points are tied together as appropriate with logic relationships. The project detail schedule logic establishes the sequence of work required to accomplish activities across the project. Since all discrete effort is contained in the CWIT database, impacts of behind schedule work to other activities or milestones is known and reported. When such impacts occur, PAC works with the performing organization, and higher level management if required, to determine work-around solutions.

2.2.8 Critical Path

Through the creation of the relationship among tasks, significant interdependencies are established which determine the total work time and the related longest path through the project. This longest path is called the critical path. Each activity on the critical path becomes a critical activity, and represents the schedule path with the highest risk and least margin for error. Based on schedule progress and performance, the critical path of a project can change. Therefore, the critical path needs to be identified, analyzed, and evaluated on a regular basis. Since WIPP is an ongoing operating facility without a project completion date to measure float against, the critical path is identified in the CWIT by applying hard constraints on the CBFO high-level milestones only.

3.0 SCHEDULE BASELINE/REVISIONS

The integrated project schedule is baselined when the planning process is complete and is fully supportive of project requirements (CBFO Baseline Drivers and Planning Assumptions) and authorized changes. At this point, accomplishment dates for milestones and start and complete dates for activities are preserved, or baselined, as a benchmark against which to assess future performance. Schedule baseline dates are the basis for the time phasing of the performance measurement baseline and generate the budgeted cost of work performed.

Changes to controlled milestones are made via the Washington TRU Solutions LLC Programmatic Change Process (WP 15-FC.01). All programmatic baseline change requests submitted for a schedule baseline change will be reviewed by PAC for any impacts across the project to ensure project integration. Once reviewed and approved by the WTS change control board, CAMs and project participants, PAC will update the baseline in the CWIT database. Only changes authorized through DOE/CBFO-95-1122 are incorporated into the schedule.

4.0 REFERENCES

DOE Order 413.3, *Program and Project Management for the Acquisition of Capital Assets*

ANSI/EIA 748-A-1998, *Earned Value Management Systems*

DOE/CBFO-95-1122*, Carlsbad Field Office Programmatic Change Control Process*

WP 15-FC.01, Washington TRU Solutions LLC Programmatic Change Control Process