



Energy Facility Contractors Group

Dedicated to Promoting Excellence in DOE Operations

PMWG

White Paper/Best Practice

**BASELINE CHANGE
PROPOSALS
AND CONTINGENCY**

FINAL

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EXECUTIVE SUMMARY

Introduction and Purpose: To successfully manage project complexity and risk, the U.S. Department of Energy (DOE) and the National Nuclear Security Administration (NNSA) have developed processes and tools that, when used properly, will accurately baseline projects and adapt to changes during project execution. Two of these tools are: 1) Baseline change control, which is used to manage and implement changes during project execution; and 2) Contingency, which provides for managing risk and uncertainty. (For the purpose of this paper, Contingency is formed of two elements: DOE-held Contingency, and contractor-held Management Reserve [MR].) Baseline Change Proposals (BCPs) and Contingency/MR are applied inconsistently on DOE and NNSA projects. This paper communicates their concepts, requirements, best practices, and recommendations to improve project performance.

Conclusions and Recommendations: DOE provides detailed requirements and guidance on the development and implementation of BCPs and Contingency. Inconsistent and confusing terminology, interpretation, and implementation of these tools can lead to confusion, which costs time and money, and threatens project success. BCPs take too long to develop, process, and approve. BCPs have the dual purpose of making adjustments that do not change the project baseline, as well as those that modify the baseline. This dual purpose and terminology can cause confusion in implementation. BCPs are often inefficient and fail to fulfill the fundamental function of establishing a cost and schedule baseline efficiently. Similarly, Contingency and MR are often misapplied and misunderstood, leaving projects without an effective method of managing in-scope changes and risk. Lack of effective BCP and Contingency/MR implementation has a deleterious effect on DOE project performance; results in misalignment between project and contract baselines; leads to increased cost (and risk); and diminishes DOE's and contractors' credibility and ability to manage their project portfolios.

The overall recommendation is that DOE, NNSA, and the contracting community develop a common understanding and consistent use of the same processes. Joint training should be conducted (with DOE, NNSA, and contractors) to ensure a common understanding of requirements and application. DOE requirements, guidance, and definitions should be strengthened and clarified. For example, at some DOE sites (for projects executed by Management and Operations [M&O] contractors), overall Contingency is estimated as part of a risk-based process and MR is segmented and allocated to the control of the contractor, based on ownership of risks and/or other factors. At other sites, DOE either does not allow the use of MR or controls MR as it would DOE-held Contingency. Further, differences exist between the use and implementation of Contingency/MR and BCPs on projects executed under Federal Acquisition Regulation (FAR) Part 15 vs. those executed under M&O contracts. Projects executed under traditional FAR Part 15 contracts have different and more complex pricing and estimating requirements; thus, confusion exists due to differing expectations between DOE and the contractors. DOE, NNSA, and the contracting community need to follow consistent definitions and requirements throughout the DOE Complex.

Best industry practices could be employed to shorten and streamline the BCP process. For example, at some sites, 20-30 different signatures and approvals are required to gain approval, which can take several months. By the time BCPs are approved, circumstances have often changed so much that the BCP is obsolete, and the process must start again. Frequently, work continues with no means to accurately measure performance. Streamlining and simplifying the BCP process would minimize rework and reduce management cost and effort. Through improved communication, clear requirements and guidance, and joint training, the change management process can be improved, enabling the contractors and DOE and NNSA to better manage projects. Similarly, a clear understanding of Contingency/MR and their appropriate usage will facilitate project management that is more consistent with industry practices.

1 INTRODUCTION AND PURPOSE

1.1 Purpose

DOE and NNSA¹ projects and programs for the acquisition of capital assets are governed by DOE Order 413.3B. The Order sets forth requirements for the entire project lifecycle—from initial formation through execution and closeout—and is supplemented by a series of guides providing further guidance to enable success. Project success is achieved when an asset or capability is delivered that fulfills its function; is delivered on time, on budget, and safely; and meets quality objectives. Often, projects within DOE are complicated and risky due to the nature and type of work. To manage complexity and risk, DOE has developed a set of processes and tools that, when used properly, help accurately baseline a project and implement changes during execution.

Two important management tools and processes are: 1) BCP, which is used to manage and implement changes during project execution; and 2) Contingency, which is generally defined as specific provisions for unforeseeable elements of cost and schedule within the defined project scope.

This paper communicates the purpose and requirements of BCP and Contingency and identifies best practices to DOE and NNSA and contractors, to help improve project performance and save time and money.

1.2 Approach

For BCPs and Contingency, this paper first discusses accepted concepts and definitions, based on DOE requirements and guidance. Observed practices and difficulties are discussed to illustrate effective and ineffective practices based on actual projects. Recommendations for improvement are then provided.

This analysis was developed by a team with experience across the DOE Complex. The team reviewed DOE requirements and guidance (chiefly within DOE O413.3B and the 413 series of Guides), along with industry requirements from organizations such as the Association for Advancement of Cost Engineering, International (AACE).

¹ For the purpose of this paper, the term “DOE” is meant to encompass NNSA regarding the application of project management requirements, even if NNSA is not specifically noted in the discussion.

2 BASELINE CHANGE PROPOSALS (BCPs)

2.1 BCP Definition, Purpose, and Current Requirements

The change control process ensures that revisions to an approved project and/or contract baseline are properly identified, reviewed, approved, and implemented. This process helps the Integrated Project Team (IPT) evaluate and approve contract and project changes so that baselines and contracts—from scope, cost, schedule, budget, performance, and contract management perspectives—all remain aligned. Change control is an important management process that 1) ascertains when a change is required; 2) ensures that the required change is agreed upon; 3) manages the actual change as it occurs; 4) ensures that the contract remains aligned with the project; and, 5) identifies who approves the changes at the various scope, cost, and schedule thresholds.² Change control is used to:

- Approve, document, track, and communicate changes to the Performance Measurement Baseline (PMB)
- Reconcile existing baseline budgets and baseline schedules to prior baseline budgets and schedules for changes to authorized work, in the detail needed by management for effective control
- Control changes to work records that would alter previously reported amounts for actual costs and schedule, earned value, and/or budgets—including only modifications for error correction, routine accounting adjustments, effects of customer- or management-directed changes, improvement of the baseline integrity, or accuracy of performance-measurement data
- Prevent revisions to the project and program budget except for authorized changes

BCPs are commonly used to satisfy two functions: 1) To control changes and other events that are within scope (such as the use of DOE-held Contingency) and other adjustments that do not impact the overall Performance Baseline (PB); and 2) To control changes that are out of scope, such as cardinal changes to a facility or system size and functionality, which necessitates a change to the PB, Total Project Cost (TPC), and schedule.

The Project Execution Plan (PEP), required by DOE O413-B and approved by the Acquisition Executive (AE), provides approval thresholds specifying organizational control over baseline change approval and the change control process. The AE may delegate all change control authority within the PB to the Program Manager (PM), Site or Field Office Manager, FPD, or others as specified in the PEP. DOE G413.3-20 provides threshold guidance in Table 3-1 (below) and Supplement 1, Table S1-1.

² DOE G 413.3-20 Change Control Management Guide

Source: DOE G 413-B; Table 3-1. Change Approval Authority for Project Changes Approval		
Approval Authority	BCP Type	Project Change Thresholds
SAE—Deputy Secretary	Deviation (change to PB)	Approve: <ul style="list-style-type: none"> • TPC increase in excess of the lesser of \$100M or 50% (cumulative) of the original CD-2 cost baseline. • Any change in scope and/or performance that affect the ability to satisfy the mission need or are not in conformance with the current approved PEP and PDS • Endorse: Reduction in funding adversely affecting approved funding profile Notify (SAE and OECM) of: <ul style="list-style-type: none"> — Any PB deviation (approved TPC, CD-4 date, or any performance and scope parameters that cannot be met) — CD-4 schedule change of 12 months or more from original PB; post CD-2 projects terminated, or projects no longer meeting Department objectives.
Under Secretary/ NNSA Administrator <i>May be delegated to PSO</i>	Deviation (change to PB)	Approve: <ul style="list-style-type: none"> • PB changes below the SAE level • Any slippage of the CD-4 date.
Acquisition Executive <i>May be delegated to Site Manager or FPD</i>	Contingency (change within PB)	Approve: <ul style="list-style-type: none"> • Any change to the PEP • Use of Contingency up to the approved TPC or CD-4 date for managing DOE owned Risks
Contractor Project Manager (PM)	MR (change within CPB)	Approve: <ul style="list-style-type: none"> • Use of MR for managing contractor risks • As specified in the contract

As depicted in Figure 1, the PMB is a subset of the PB and is used to manage project cost and schedule using the Earned Value Management System (EVMS). Meaningful performance measurement data require a documented PMB, which reflects the most current conditions of the project and program. Once the PMB is established, cost and schedule changes are processed through formal change-control procedures. Authorized changes must be incorporated into the PMB in a timely manner and reflected in both budgets and schedules.

- Prevent revisions to the project and/or program budget except for authorized changes
- Document changes to the PMB

2.2 Observed BCP Practices, Usage, and Difficulties

DOE Guide G 413.3-20 provides a thorough description of the baseline change control process, including the differences between M&O and traditional FAR Part 15 and non-M&O contracts. However, in many cases DOE is inconsistent in how they apply change control requirements, which has driven contractors to invent new processes to implement them. The following sections describe practices observed at one or more DOE sites, which ultimately lead to improper or inefficient execution of the change control process.

2.2.1 Typical BCP Documentation

The following types of documentation are typically required in the BCP process:

- Cost/Contract Performance Reports (CPRs) and change control logs
- Revised control account documentation, Control Account Plans (CAPs), and revision request forms
- Revised Statement of Work (SOW) and Work Breakdown Structure (WBS) documentation

2.2.2 Development of BCPs

- BCPs are used to control in-project and within baseline changes, and also to incorporate out-of-scope changes. However, there is no differentiation between these two types of BCPs. It requires research to understand which BCPs are for in-scope events and which are for out-of-scope events that change the baseline. This lack of clear differentiation has led to the misapplication of BCPs to allow the use of DOE-held Contingency for out-of-scope events and risks. (See Section 3.2.2 for an example of an inappropriate use of DOE-held Contingency for an out-of-scope event)
- There is not a clear definition on the level of detail that needs to be in a BCP before it goes into the approval phase. Some locations require a dollar-for-dollar match between the approved BCP value and the value that ends up in the EVMS software. Other locations allow some flexibility between the approval and the implementation processes.
- Methods used to develop BCPs are inefficient, in that input is usually gathered from project team members individually and then pieced together. Sites where BCPs are developed in a team environment appear to be more successful in completing the process.
- Confusion exists on the difference between budget (BAC in the PMB), and funding drives improper use of BCPs. For example, BCPs have been used to remove budget (BCWS) from an underrun control account because that action appeared to free up funding for additional work scope.

2.2.3 Approval of BCPs

- BCPs are usually approved by officials “in series,” creating multiple comment incorporation loops as the document progresses up the approval chain. Sites that conduct planning and customer communication meetings prior to beginning the approval process are more efficient in processing BCPs, and there is far less rework in the approval process.
- Approval levels are frequently higher in practice than are required. BCPs for scope that is within the Contract Budget Base (CBB) and will be funded by MR should require contractor PM approval only. It is common for DOE to put lower dollar thresholds on BCPs, which prevents contractors from using their MR without DOE approval.

- Cycle-time expectations for BCP approval and implementation are, in general, not established by DOE or the contractor, so the process tends to drag out. Locations that have specific cycle-time expectations seem to complete the process more quickly.

2.2.4 Implementation of BCPs into EVMS software

Entering BCPs into software tools is technically difficult. BCPs “stack up,” which further increases the difficulty. Approval cycles are not sensitive to the fact that often BCPs must be entered in the same sequence that they were developed.

2.3 Industry Experience and Best Practices

Within the project management discipline, the term change refers to the alteration of a previously agreed project parameter including, scope, deliverables, budgets or schedules. The need for change and subsequent triggering of a need for management of change may be driven by a number of factors, both external and internal to a project. Project management and change management share the goal of increasing the likelihood that a project or initiative delivers its intended result and outcome.

When a change is introduced within a project or initiative, it needs to be effectively managed on both the technical side and the people side. The technical side will focus on ensuring the change is planned, analyzed, developed, designed and delivered effectively. The people side will focus on ensuring the change is communicated, embraced, adopted and implemented by the employees who may have to do their jobs differently as a result of the change. The change management discipline provides the structure, processes and tools to make this happen. Common factors found in successful change management implementations within DOE and its contractors include:

- a) Planning – Contractors typically implement a baseline change management process to document changes to project plans and execution strategy. Functional managers analyze the impact of those changes on project and/or program plans. Communication strategies, such as trend meetings, are used to provide early warning and communicate impacts among the affected organizations and stakeholders. The contractor management team examines alternative strategies for optimal implementation of the change, which includes examining and mitigating risks to achieve balance in the technical, schedule, and cost baselines of the project or program. All identified risks are analyzed and broken down until they can be clearly assigned to either the contractor or DOE.
- b) Governance – To function efficiently and effectively, DOE and its contractors must have consistent, defined processes and established authorities. Policies and procedures are documented and employees are trained, and every level of management is accountable. Issues with execution are promptly addressed by management. DOE and its contractors must also assess the cumulative impacts of changes to EAC and other project metrics.
- c) Leadership/Sponsorship – An effective change management process requires leadership to set the course and maintain direction. The leader must be able to communicate a shared vision to all affected organizations and stakeholders, including the customer. They must be persuasive but also willing to compromise. Significant changes require an appropriate level of sponsorship within the organization to address impediments as they arise. The most efficient and effective change management processes address leadership/sponsorship issues in both the contractor and owner organizations.
- d) Stakeholder Involvement – Stakeholders are the people and organizations who have a vested interest in the content and outcome of a project. They are often the initiators of significant changes to project or program plans. In addition to the DOE customer, these include suppliers and subcontractors, affected units of local government, permitting agencies,

federal regulators and oversight agencies, treaty organizations, and the U.S. Congress. To be effective, the change management process must establish and maintain formal stakeholder communications, as they illuminate issues and needs throughout the project or program lifecycle.

- e) Alignment of the Workforce – The workforce carries out the execution of the project or program plan. At project or program startup, the workforce is frequently small and communication of the project or program plan is straightforward. As the project or program progresses, the management processes and performance goals must be kept in line with the changing requirements of the project or program plan. Senior DOE and contractor management should establish strategies for communicating project or program changes, and what they mean to affected organizations and individuals in the workforce. This includes establishing revised performance goals, providing additional staff training, reorganizing workgroups as appropriate, and other activities to ensure that DOE and contractor workforce efforts are focused on common goals and objectives.

2.3.1 Change Initiation

A key step in a timely change management process is the identification of a potential change and the correct classification of the change, according to the contract documents. Based on how the changes are initiated, several common factors are observed within DOE, which frequently result in delays in the change initiation step:

- Internal changes are initiated by responsible managers. Changes are frequently identified in trend reports that are tracked and monitored by a trend board. Trends that cannot be mitigated as variances may be approved as a PMB change for the remaining work. Examples of improper practices include:
 - Trends are not fully analyzed for stakeholder impacts, resulting in additional time delays for communication and coordination, especially with DOE
 - Trend boards are slow to respond because of disagreement on trend classification (variance vs. baseline change)
 - Trend is improperly classified as a variance when additional budget should be allocated from MR, resulting in BCPs that are rushed through
 - Internal re-planning BCPs are submitted long after the trend is resolved, resulting in a second round of decision-making by the PM
- Directed changes are caused by DOE policy directives (such as those that have the force and effect of law and regulation), regulatory, or statutory actions and are initiated by entities external to the Department, to include external funding reductions, and other changes promulgated external to DOE but which DOE must incorporate. Directed change decisions are reviewed and verified by the Office of Engineering and Construction Management (OECM) and Office of Management and Budget (OMB), and follow the appropriate baseline management process. Examples of practices that create confusion include:
 - Directed changes are not fully analyzed for stakeholder impacts, resulting in additional time delays for communication and coordination. BCPs are submitted by the contractor long after a directed change decisions are made or the BCP is significantly different from a previously prepared proposal. These stakeholder coordination issues can result in multiple rounds of decision-making by DOE.
 - Directed changes (DOE Contingency events) are improperly addressed, as if they were internal changes (allocated from MR), resulting in Requests for Equitable Adjustments

(REAs) and multiple BCP actions. This is often the result of realized risk events that were either not in the project risk register or were not recognized as “owned” by DOE.

2.3.2 Change Execution and Governance

Implementation of a timely change management process depends on consistent, defined processes and established authorities. Governance issues are observed within the contractor and DOE and NNSA projects and often result in delays in the change execution step and examples include the following:

- In an effort to keep the project on track, contractor, DOE and NNSA senior management sometimes encourage staff to “work around” approved procedures, producing inconsistent results and sending the wrong message regarding quality commitment. Temporary policy/process changes should be documented and communicated to the support staff. Process improvement procedures should be used to implement appropriate and lasting changes in a timely manner.
- Contractor or DOE change management procedures require that inordinate levels of detail be in place before a change is submitted for approval. BCPs must contain sufficient detail to communicate the change in work scope, schedules, and budget amounts for each affected control account. Exacting details can be addressed through coordination and communication during baseline change implementation.
- DOE and NNSA personnel inject themselves into the contractor’s internal change management process. This may indicate a lack of adequate formal DOE and NNSA change management procedures, insufficient DOE and NNSA staff training, or stakeholder involvement issues within the contractor’s change management processes. Baseline change control levels and approval authorities should be documented and adhered to. DOE Guide 413.3-20, *Change Control Management Guide*, provides an excellent reference for M&O and non-M&O change management governance guidelines.

2.4 BCP Process Improvements and Implementation

DOE, NNSA, and each project site have established procedures on the implementation of BCPs. The processes in place are relatively mature and effective; however, they have very inconsistent application across projects. DOE Guide 413.3-20 provides an excellent background on the process and definitions as they apply to both M&O and non-M&O contracts. The socialization of this document internally, and with our federal counterparts, is essential in gaining a common understanding of the process and definitions. The following recommendations will bring the document to the forefront of the issues on the approach for each project:

2.4.1 Reserve BCPs for Baseline Changes

Reserve the term “BCP” for events that change the PB, TPC, and/or another material aspect of the project that will change the baseline.

- Develop separate categories and appropriate designations for the type of change that is being addressed. At an overarching level, they would be termed “In-scope Baseline Adjustments Requests” (BARs). These would be for events that only require an internal adjustment to the baseline components and that do not change the PB, TPC, or represent a cardinal change to some project feature. Five change types are recommended with the **name/acronym subject to change**:
 - BCP – changes to TPC requiring congressional approval
 - CA – Contingency Allocation requires DOE/NNSA approval as specified in the PEP
 - BCA – Budget change authorization to move MR to control accounts (contractor approvals only)
 - BCR – Budget change request for internal changes to control accounts (contractor approvals only)
 - Budget versus funds – Authorization to allocate MR to fund overruns (doesn’t get budget, but claims the funding from MR to cover overruns so that it isn’t used elsewhere)

2.4.2 Training

- Engage senior leadership on each site to agree on the application of DOE G 413.3-20.
- Develop training material on DOE G 413.3-20 that is specific to M&O and non-M&O contracts.
- Implement an integrated site working group with federal and contractor employees to assess the site BCP process and jointly provide training to PMs in both organizations.

2.4.3 Project Execution Plan

- Determine consistent approval thresholds based on type of project.
- Include an approval timeline in the PEP for each approval level, which should be completed in one reporting cycle to avoid project impact.

2.4.4 Best Practices

Best practices identified at sites across the Complex should be assessed on a site-by-site basis for applicability. The following best practices are in place at the Savannah River Site and include:

- *Pre-Change Control Board (CCB) Meeting* – This meeting is a monthly meeting held two weeks before the contractor CCB meeting and is typically a meeting held amongst Contractor personnel. This meeting is normally attended by the contractor area Project Controls Managers (PCMs) – those assigned to a specific project or program. The Field PCM (the contractor person in charge of all the PCMs) chairs the meeting. Each area PCM presents the BCPs they plan to bring to the contractor CCB meeting. They discuss the level of the BCP, the reasons for the BCP, and when the BCP will be ready. The Field PCM may determine that it does not meet the criteria for a baseline change, and should be carried as a variance. The team ensures that the Control Account Manager (CAM) and the Project Director are on board with the BCP. In many cases the BCP is being driven by a contract modification and/or letter of direction (LOD), which may add scope to the contract. The timing of the BCP is also discussed, including whether Authorized Unpriced Work (AUW) is

required. When the contractor has received a contract modification and/or LOD, a Not to Exceed (NTE) amount is often provided.

- *Blue Team* – This meeting is held with DOE and the contractors. The purpose of the meeting is to inform DOE of the BCPs planned for their next CCB. The Director of Project Integration & Planning (PI&P), the Change Control Coordinator, the Field and Central PCMs attend for the contractor. Their counterparts attend from DOE. If a BCP impacts a capital asset project, typically the Federal Project Director (FPD) will attend. In addition to the Level-2 BCPs, which go to DOE at SRS, DOE is briefed on the Level-3 BCPs approved by the Contractor. This meeting prepares DOE for their change control and gives them an opportunity to tweak the words on the BCPs coming to them.
- *Execution of AUW* – EVMS rules only allow budgeting for specifically authorized work activities. The ability to perform AUW prior to negotiation of a project change is essential for the timely execution of new work scope. In particular, when a complex BCP is to be submitted, or when critical work needs to be executed, it is essential to have a mechanism to initiate the work scope.
- *Approval Authorities* – In the PEP, the minimum approval authority by type of BCP needs to be clearly defined to limit the time required to gather signatures. The approval requirements should be streamlined with the understanding that there are several project stakeholders that need to be kept informed of any changes, but whose approval is not necessarily required.

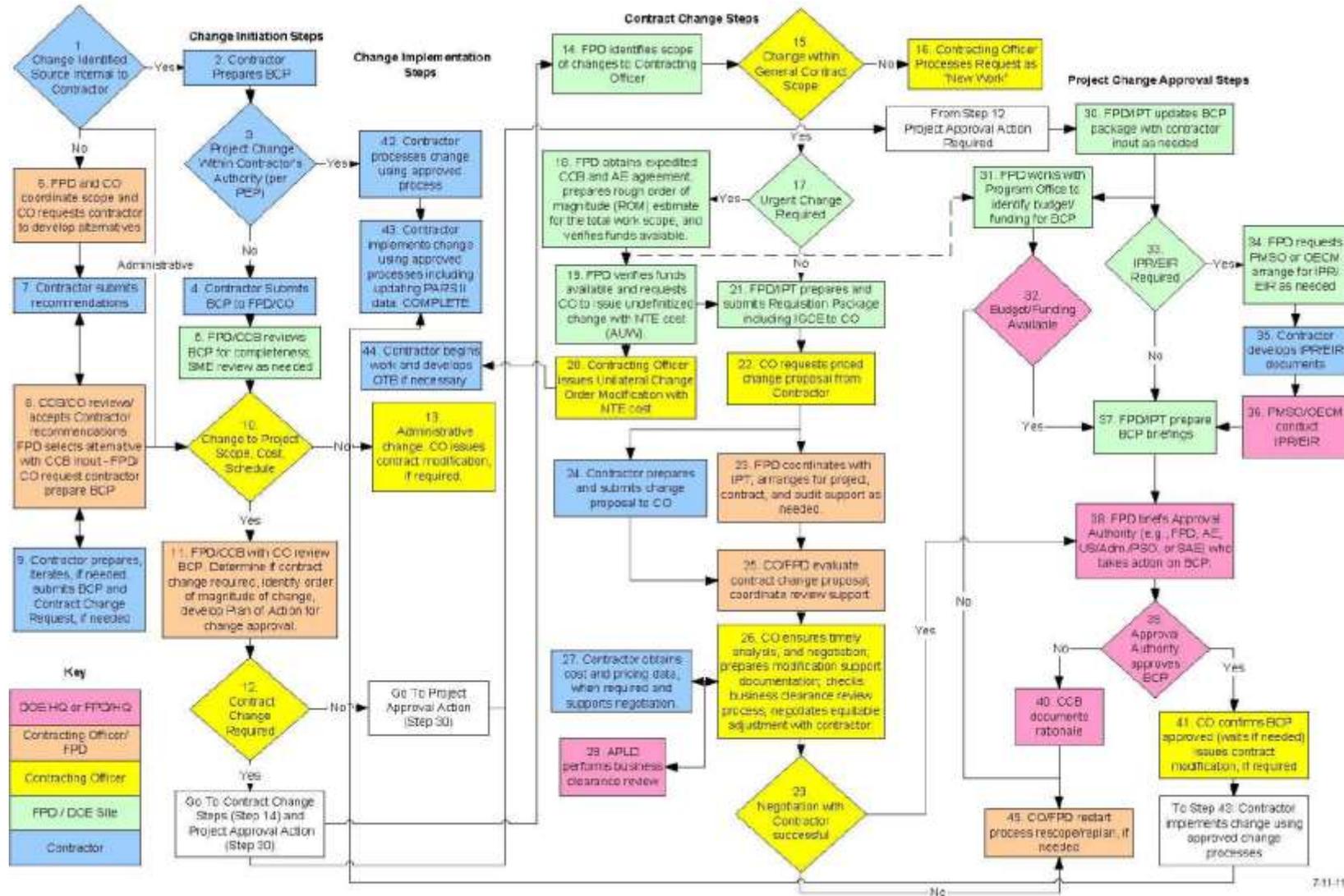


Figure 2. Overall Contract and Project Change Control Process (Non-M&O)

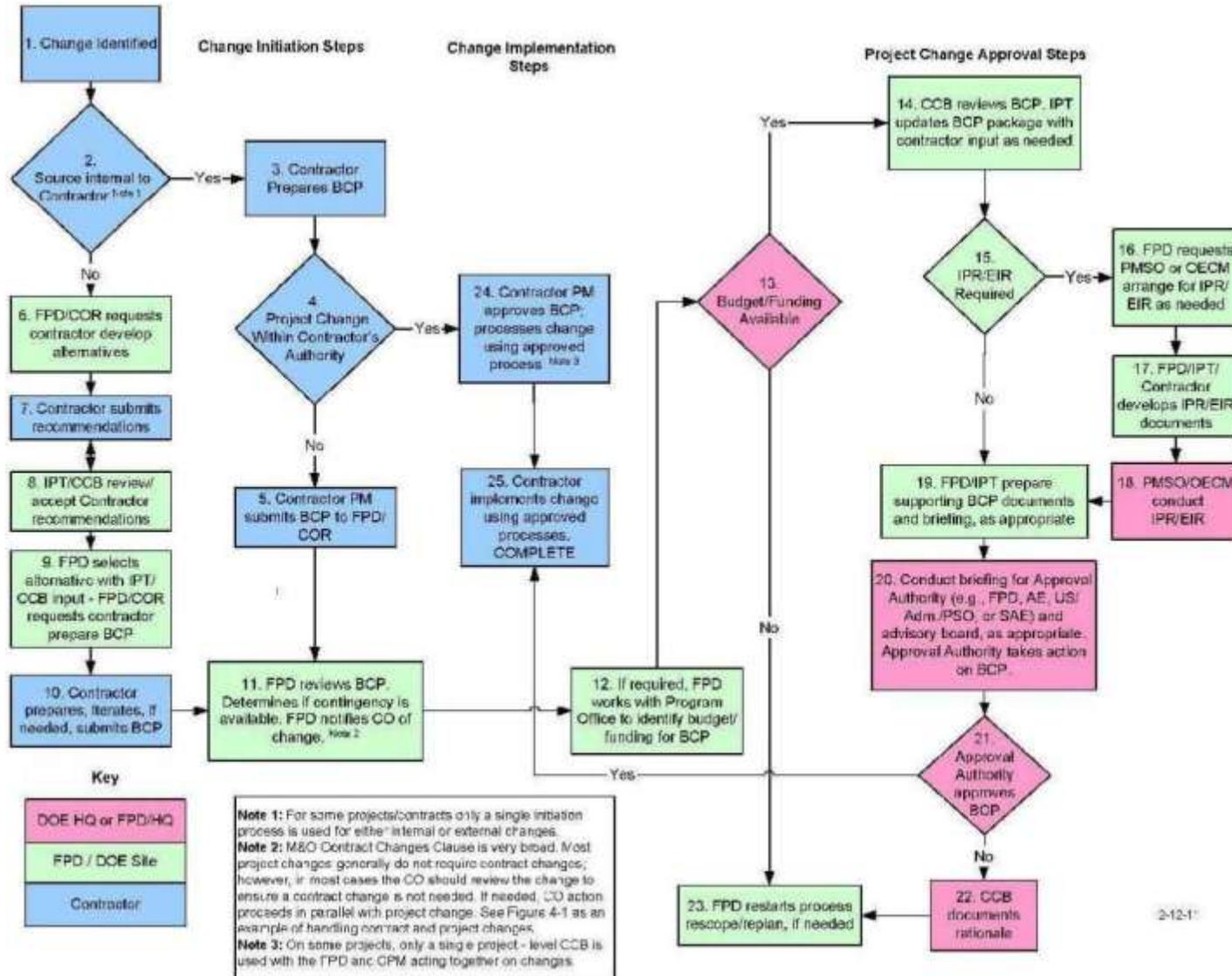


Figure 3. Overall Change Control Process (M&O)

3 CONTINGENCY AND MANAGEMENT RESERVE

3.1 Introduction

There is considerable confusion and inconsistency regarding the use and implementation of Contingency and MR on DOE projects. The difficulties are apparent on projects executed throughout the DOE Complex. DOE has overall responsibility for project management and project delivery. DOE principally relies on two basic contracting methods for project delivery:

- 1) **M&O Contracts** – in which firms have been contracted by DOE (typically on a long-term basis) to manage a specific site and/or program (but not a specific project). The M&O contractors often self-perform a portion of the work and/or subcontract with commercial firms to provide, for example, engineering, construction, remediation, special equipment, and other items, for a capital building project at the site. Those projects are a subset of the overall M&O contract to manage the site. Under M&O contracts, to execute specific projects on the site, the M&O contractor acts as DOE's agent and the M&O PM and project team reports to a DOE Federal Project Director. The M&O contractor works with DOE to develop the project scope and baselines, including Contingency (and MR). DOE then approves the baseline (including Contingency and MR), releases funds to the M&O, and authorizes work to begin. M&Os focus on project management and delivery of the subcontracted service within the baseline approved and established by DOE. Due to the M&Os role as DOE's agent, the focus is typically on managing the internal M&O project and subcontractor contracts, budget, and schedule, as ultimate decisions are provided by DOE through the M&O to the subcontractor(s). In projects provided through M&O contracts, DOE determines the level of authority (through DOE Orders), decision-making that the M&O's hold, and the extent to which they can act and provide direction to subcontractors on behalf of DOE.
- 2) **Traditional, FAR Part 15–based contracts** – where DOE self-manages the project and contracts directly with the providers (e.g., engineering and construction firms, equipment vendors, etc.) for delivery of a specific asset or other objective (such as environmental remediation of a contaminated site). In traditional contracts, the contractor is solely responsible for delivering an asset, service, or other item, and does not act as DOE's agent (as compared to an M&O contractor). The contractors establish their own baselines, including whatever risk-based schedule and cost contingencies they believe are required, via their proposals to DOE. On the basis of the proposal, DOE then formulates a FAR Part 15–type contract. The contractor is solely focused on delivering the item in accordance with the contract for the specific project. DOE is then fully responsible for ensuring that the contractor delivers the contracted item

Understanding the difference between contracting methods is key to understanding how Contingency and MR are handled within each. The difficulties, confusion, and issues associated with Contingency and MR do not appear to be a function of the project delivery and contracting methods. Rather, the difficulties appear to stem from the following:

- Differing interpretations within DOE and with contractors regarding the purpose of Contingency and MR
- How Contingency and MR are accounted for
- How and when Contingency and MR are used

There are fundamental differences in the way that DOE has defined Contingency vs. the way that DOE project management organizations implement and interpret requirements. Inconsistent application of Contingency and MR costs time and money, diverts management attention from more urgent matters, and makes project execution inefficient and risky. Unnecessary friction is also created between DOE and contractors, which impacts design and construction subcontractors as well as vendors, via excessive delays and BCPs. The result of inconsistent understanding and application is that adverse relationships, through differing expectations, is created within the DOE-contractor project teams, thus negatively impacting performance.

DOE's project management orders and guidance originate from the staff offices—largely OECM. The generation and review of the documents (DOE Orders and Guides) involve the various site program offices in a collaborative manner. When the Orders and Guides are issued, the implementation process is handled by the program offices. Because the program offices represent disparate business lines, the implementation is tailored within the requirements to suit the programmatic project management structure. The Office of Science (SC), NNSA, Environmental Management (EM), Nuclear Energy (NE), and Energy Efficiency and Renewable Energy (EERE) hold the majority of DOE's capital project portfolio, and each utilizes a different blend of M&O contractor and FAR Part 15 acquisition methods. The diversity of business cultures and methods amongst the various DOE Sites and Contractor, in addition to the Site Office oversight differences, leads to an enterprise that is difficult to drive toward consistent interpretations, methods, and processes. This is evident in the examples that are cited in this paper.

This white paper reinforces requirements and guidance that DOE has promulgated, in order to improve communication and ensure consistent implementation. Examples are provided to illustrate where DOE policy has been properly and improperly applied. However, this discussion goes beyond the mere recognition of the issues concerning the application of DOE policy, but provides recommendations for improvement.

3.2 Definitions and Current Requirements

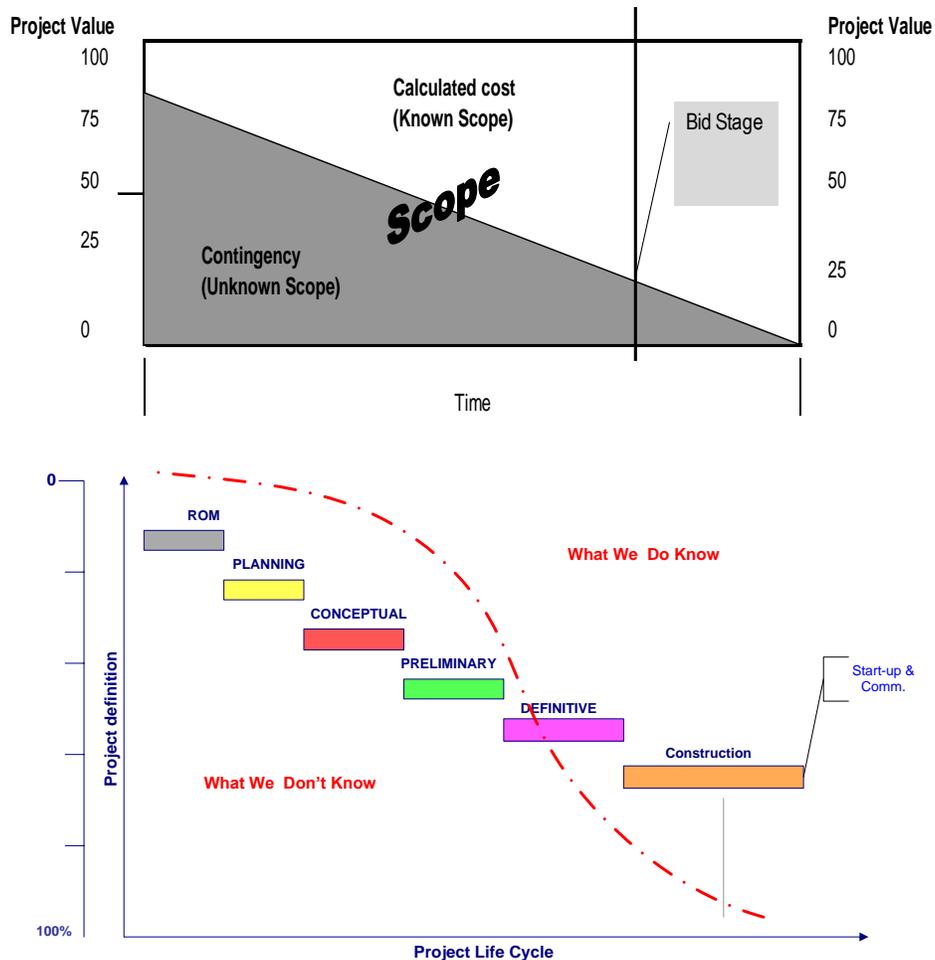
3.2.1 General Overview of Contingency and MR

As defined by DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, and DOE Guide 413.3-21, *Cost Estimating Guide*, Contingency is a project cost element (scope) directly related to project risks, and is an integral part of project cost estimates. AACE (formerly the Association for the Advancement of Cost Engineering) defines Contingency as: "Specific provisions for unforeseeable elements of cost within the defined project scope."

In the broad sense of the word, Contingency is the amount of money (and/or time) required to execute the project and which cannot be reasonably included in the details of the estimate. It is intended to cover only risks associated with the project SOW, as conceived within the PB. Contingency is not intended to provide for additions to the baseline scope (a concept which is often not followed).

How Contingency is apportioned between DOE and contractors, how it is controlled, and how it is authorized, are separate matters from the definition of Contingency.

Figures 4 and 5 summarize the Contingency concept through the project lifecycle. As the project progresses, Contingency decreases as the calculated cost (“known scope”) proportionally increases.



Figures 4 (top) and 5 (bottom). Contingency and Known Scope vs. Unknown Scope

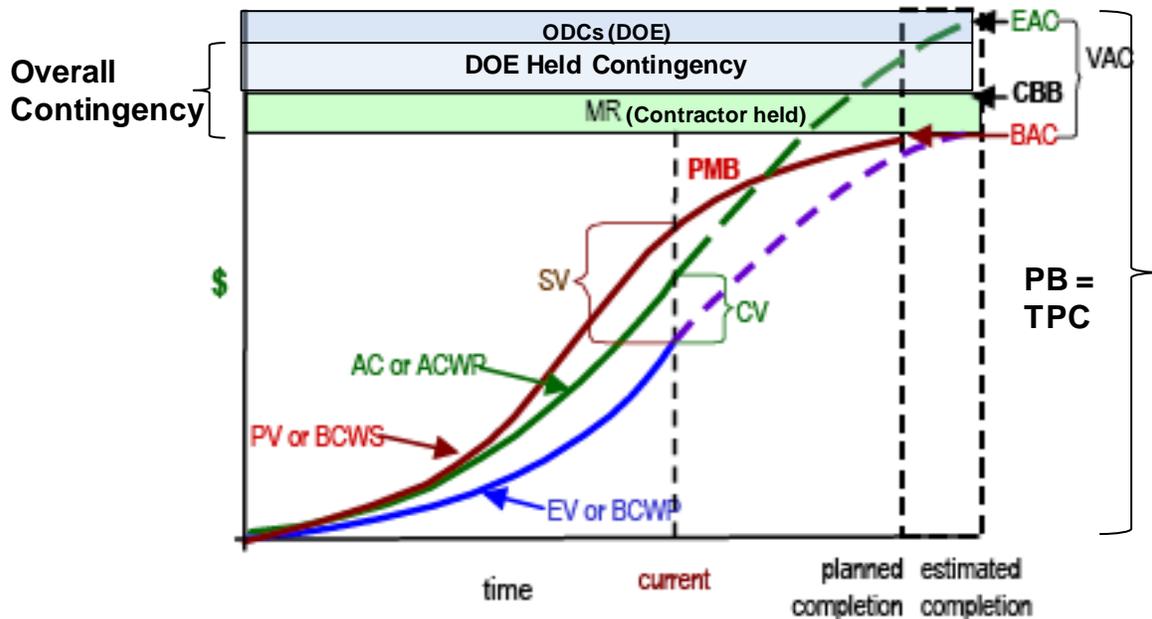
(Through the project life cycle and development stages. From the American Society of Professional Estimators, *Contingency & Project Risk: A Practical Guide and Training Materials for the Construction Estimator*, January 7, 2009 (presentation), R. McMartin and J. Ledger)

To differentiate between who holds what portion of Contingency, the DOE-held Contingency is only intended to cover federal risks within the scope of the project, and not risks borne by the contractor. Contingency amounts held by contractors (M&O contractors and FAR Part 15 contractors), through MR, are meant to cover risks within their purview and scope. In the case of M&O contractors, DOE determines the amount of MR allocated to the M&Os control, through the definitions contained in DOE Orders and project-specific agreements (which are often inconsistent and lead to the problems and issues discussed herein).

Within DOE guidance and requirements, overall Contingency is comprised of two elements: 1) DOE-held Contingency (to cover federal risks); and 2) MR, which is held by the contractor (to cover contractor risks).

A significant point is that for FAR Part 15–based contracts, MR is not specifically identified in the bid or contract documents, as it is not a priced cost element. However, after contract award, MR is estimated and extracted from an estimate of the CBB, for EVMS compliance. The treatment of MR in FAR Part 15 contracts can be confusing in terms of contract administration and management. Further discussion is provided in Section 3.2.3.

Figure 6, extracted and modified from the DOE EVMS Gold Card, illustrates the PB components of a project and how Contingency is treated. Note that the referenced DOE EVMS Gold Card chart was modified below to show “Overall Contingency” components.



- | | |
|---|---|
| AC = Actual Cost (= ACWP) | EV = Earned Value (= BCWP) |
| ACWP= Actual Cost of Work Performed (= AC) | MR = Management Reserve (held by contractor) |
| BAC = Budget at Completion | ODC = Other Direct Costs (DOE internal costs) |
| BCWP = Budgeted Cost of Work Performed | PB = Performance Baseline (TPC) |
| BCWS = Budgeted Cost of Work Scheduled (= PV) | PMB = Performance Measurement Baseline |
| CBB = Contract Budget Base = PMB + MR | PV = Planned Value (=BCWS) |
| CP = Contract Price = CBB
(including profit/fee for purposes of this figure) | SV = Schedule Variance |
| CV = Cost Variance | TPC = Total Project Cost |
| EAC = Estimate at Complete | VAC = Variance at Complete |

Figure 6. Performance Baseline Components

Adapted and modified from the DOE EVMS Gold Card (see DOE G413.3-10a, Appendix B)

Based on DOE’s Guidelines, both DOE-held Contingency and MR are part of the PB, and thus are expected to be spent to accomplish the scope of work. As in-scope changes to the project are defined and approved, portions of Contingency and MR are incorporated into the PMB. The PMB is the basis on which EVMS is calculated.

Following are the specific definitions and further discussion of Contingency and MR, per DOE project management requirements and guidelines.

3.2.2 Contingency

From DOE G430.1-1, Chapter 11, the definition of overall Contingency is defined as follows:

This definition [Contingency] has been adopted by the American Association of Cost Engineers. DOE has elected to narrow the scope of this definition and defines Contingency as follows:

Covers costs that may result from incomplete design, unforeseen and unpredictable conditions, or uncertainties within the defined project scope. The amount of the Contingency will depend on the status of design, procurement, and construction; and the complexity and uncertainties of the component parts of the project. Contingency is not to be used to avoid making an accurate assessment of expected cost.

It is not DOE practice to set aside Contingency for major schedule changes or unknown design factors, unanticipated regulatory standards or changes, incomplete or additions to project scope definition, force majeure situations, or congressional budget cuts. Project and operations estimates will always contain Contingency.

Estimators should be aware that Contingency is an integral part of the estimate.

DOE O413.3B (Attachment 2, Definitions) further defines Contingency (in this case “DOE-held Contingency”) as the following:

The portion of the project budget that is available for risk uncertainty within the project scope, but outside the scope of the contract. Contingency is budget that is not placed on the contract and is included in the TPC [Total Project Cost]. Contingency is controlled by Federal personnel as delineated in the PEP [Project Execution Plan].

As noted in DOE G413.3-21, Contingency is “the risk based, quantitatively derived portion of the project budget that is available for managing risks within the DOE performance baseline.” Contingency can consist of both money and time (e.g., schedule, which can then be converted to money as project circumstances warrant). This definition is applicable to both DOE and contractor elements.

Typically, an overall Contingency estimate is developed by evaluating the cost and schedule impact of various risks (e.g., labor availability, labor rate risk, productivity, and material and equipment unit pricing risk). A Contingency estimate (in terms of cost and schedule) is typically developed by the M&O contractor and agreed to by DOE (in terms of cost and time), prior to being included in the project budget and subsequently in the PB. Thus, Contingency is segregated from the PMB, and usage is controlled through formal procedures and management approval. When approved for use, a portion of the Contingency budget for a specific event or events is then incorporated into the PMB through a formal mechanism.

In other words, Contingency is cost expected to be spent for in-scope items that have not been identified yet, but which can be quantified in aggregate. For example, on a construction project being executed by an M&O contractor, during construction a change is made to add a redundant pump in a fluid system to improve reliability. In this case, it is not new scope at the PB level because the system function and capability remains the same, but it is additional scope to the CBB. Thus, costs for design and construction will increase, and there will be impacts to other systems (e.g., electrical and instrumentation and controls). In this example, the risk for this element is owned by DOE, as the manner in which the fluid transfer is changed, and this was not a risk that was designated to the M&O. Thus, the M&O contractor submits a request to the Federal Project Director to utilize Contingency (DOE-held); it is approved in a timely manner;

the PMB is updated; and work proceeds. The change to the PMB is not a PB change, because the work is for in-scope elements and the PB (or TPC) does not change.

An example of an invalid use of Contingency would be an instance where extra work is required for an expansion of the same project facility footprint, due to changes necessitated by new requirements (such as an additional process line or equipment). In this example, the building size increases by 50% and thus the configuration of many facility systems changes and capacities increase. This would clearly be an out-of-scope change, in that the technical baseline (Key Performance Parameters [KPPs] such as facility size, capability, etc.) are much different and were never contemplated when the PB was established. To accommodate this change, a BCP would be developed, submitted, and evaluated before the change could be implemented. Thus, the PB and TPC would change.

Because Contingency is held and controlled by DOE, the only significant differences between work executed by an M&O and work executed by a contractor under a FAR Part 15 contract, would relate to the negotiated change. In the case of an M&O contractor, since they act as an agent of the government, there is likely no extra fee involved for the M&O, although they would need to negotiate the change with the design and construction subcontractors.

In the case of the FAR Part 15 contractor, the DOE and contractor would need to negotiate and definitize the change directly, potentially requiring certified cost proposals, and this could be a more lengthy process. However, because DOE typically includes Contingency in the PB, thus allocating Contingency to the contractor should not be overly complicated.

3.2.3 Management Reserve

DOE O413.3B (Attachment 2, Definitions) defines MR as the following:

An amount of the total Contract Budget [Base] withheld for management control purposes by the Contractor. Management reserve is not part of the Performance Measurement Baseline.

As noted in DOE G413.3-21:

The Contractor MR budget is the risk-based quantitatively derived portion of the contract budget base (CBB) that is set aside for management purposes to handle risks that are within the contractor's contractual obligations. Once the CBB has been established, it is allocated to MR and the Performance Measurement Baseline (PMB). The MR is not intended to justify a post contract increase to the CBB. MR is maintained separately from the PMB and is utilized through the contractor's change control process. MR is not used to resolve past variances (positive or negative) resulting from poor contractor performance or to address issues that are beyond the scope of the contract requirements. Use of MR should follow EVMS rules as per ANSI/EIA-748A.

For projects executed under an M&O contract, MR is a separately estimated item used to handle contract in-scope risks, and the MR budget is set and agreed to by DOE and the M&O contractor before the PMB is set, on a project-by-project basis. MR is meant to provide flexibility to the M&O contractor to efficiently handle changes that DOE agrees are best managed by the M&O, without having to expend the time and expense of formally requesting another authorization from DOE. MR usage can be tied to ownership of project risks by the M&O, vs. those owned by DOE (which would be covered by DOE-held Contingency). In all cases, MR is fully within the contractor's control to utilize, subject to the requirements and guidelines. It can include both cost and schedule within the defined PMB.

In the case of traditional FAR Part 15–based contracts, MR is not specifically identified in the contract price, because it is an unallowable cost, per the FAR. However, after contract award,

per DOE EVMS requirements and compliance, an MR amount must be extracted from the CBB, and it should be consistent with contractor's management approach and risks to implement the project EVMS. Thus, the MR amount is estimated and extracted from the CBB and segregated from the PMB.

This situation—primarily a semantics, terminology, and practice problem, not a contract compliance problem—creates considerable confusion amongst the contractors, the DOE project management organization, and the DOE procurement and contracting organizations. The FAR does not allow MR to be priced separately. There have been instances where this confusion has caused the contractor to have never included any reserve in their bid, but were retroactively forced by the DOE project management organization and EVMS requirements to provide an estimate of MR to implement in EVMS.

In any case, all successful projects organizations and contractors prudently implement and incorporate flexibility into project budgets (via a reserve of some sort) because projects can be complex endeavors fraught with uncertainty and complexity. There needs to be a tool available to efficiently fund small to modest in-scope changes. MR, or whatever other term is used, provides that flexibility.

3.3 Observed Practices and Difficulties

A good example of where DOE and contractor interpretation and implementation of Contingency and MR are consistent with one another, and with DOE requirements and guidance is at the Savannah River Site. This is based on inputs from DOE personnel, as well as the M&O contractor and FAR Part 15 contractors. Each is familiar with the requirements and guidance, are able to communicate effectively with one another, and understand the terminology and application of the principles. MR is appropriately allocated and authorized to the M&O contractor projects, and the contractors compliantly utilize it without hindrance by DOE. This makes day-to-day project management smoother. DOE-held Contingency is accessed and utilized through the change control process when appropriate.

There are some disconnects in the application of MR on FAR Part 15 contracts, apparently stemming from conflicting terminology and requirements embodied in procurement and contract requirements vs. project management and EVMS requirements (as discussed in Section 3.2.3). Within projects acquired under M&O contracts, the development and usage of MR is on a project-by-project basis, which leads to inconsistency. DOE Guidance lacks development of MR and discussion of which risks are federal and which are to be managed by the M&O contractor.

There are also differing interpretations and use of Contingency and MR within the joint NNSA-M&O project team. The differing interpretations and implementation, when taken together with other items typical to complex project execution at an operating Security Category I, Hazard Category 3 nuclear facility, compound the risks, which could lead to additional cost increases and schedule delays. In some instances, DOE-held Contingency has been inappropriately removed from projects prior to construction, and/or used to fund out-of-scope events.

The lesson learned is that, once the PB is established, DOE-held Contingency and MR should not be reduced to suit external events without clear recognition (and acceptance) of the potential negative impact on, and in-scope risks to, project performance. Usage of DOE-held Contingency and MR should be restricted to in-scope risks only. Formal risk, estimate, and schedule analyses should be employed to provide decision-makers with the necessary information that enables them to evaluate advantages and disadvantages before proceeding.

3.4 Contingency and MR Process Improvements and Implementation

3.4.1 Improve Definitions and Terminology

The processes to develop and utilize DOE-held Contingency and MR are defined in the following DOE guidance documents:

- *Risk Management Guide* (G 413.3-7a)
- *EVMS* (G 413.3-10a)
- *Project Definition* (G 413.3-12)
- *Change Control* (G 413.3-20)
- *Cost Estimating Guide* (G 413.3-21)

Although MR and Contingency are defined in the DOE documents, improvements and better coordination between various documents are recommended to better and more precisely communicate on topics that are often confusing, and where acronyms and terminology are used interchangeably but have different meanings.

One example is that DOE O413.3B and DOE G413.3-21 (Appendix B, Definitions) have slightly different definitions and wording for the terms “Contingency” and “Management Reserve.” To eliminate confusion, it is suggested that definitions match within all DOE guidance—or for simplicity, reference is made to a document where the governing and exact definition can be found. Further explanations regarding development and application should also be segregated from these precise definitions. The term “Contingency” needs to be carefully defined, since it is generally used in the industry to convey an amount of funding to cover in-scope risks. Thus, we recommend that the term “DOE-held Contingency” be used to mean funding held by DOE for federal in-scope risks and/or risks that DOE decides to hold. We further recommend that the term “Management Reserve” be used to mean funding held by contractors (M&O and FAR Part 15) to cover in-scope risks that the contractors are responsible for managing.

A second example for improvement relates to DOE G413.3-10a, which provides guidance on EVMS. In this instance, the DOE Gold Card figure (in Appendix B of the Guide) does not identify or define “Contingency,” but does define and include “Management Reserve.”

A third example involves the treatment and explanation of contract profit and fee in EVMS and change control. In DOE G413.3-20, Figure 3, a profit/fee project is included in the Contractor Performance Baseline (CPB) for FAR Part 15–type contracts, but may not be applicable or included at all for projects under an M&O contract. However the definition of CPB on DOE G413.3-20, page 17, indicates:

“The contractor’s PMB plus management reserve equals the contract total estimated cost also referred to as the Contract Budget Base (CBB)...” The contractor cannot change the CBB, schedule, or statement of work (SOW) that it agreed to in the original award...”

Figure 3-1 of the Guide indicates that profit/fee are not part of the CPB, but the definition indicates that the CPB includes the full contract award price, which would include profit/fee. Thus, we recommend that this figure in the Guide and the definition be made consistent, so that profit/fee is part of the CPB for traditional FAR Part 15 contracts. It also needs to differentiate and define the treatment of profit/fee for EVMS for projects acquired under M&O contracts.

Differentiation should also be made in the Orders and Guides regarding M&O contractors, FAR Part 15 contractors, and other contractors (such as construction contractors covered by FAR Part 14 for sealed bidding). This would clearly define the use and implementation of “profit/fee” and other related terminology and issues.

3.4.2 Improve Guidance on Development of MR and DOE-Held Contingency

There is little written guidance describing how, when, and if the Contingency from a cost estimate is apportioned between MR and DOE-Held Contingency, following approval of the estimate, for projects acquired under M&O contracts—especially in instances where DOE does not allow the contractor to develop a risk-based MR. There is an opportunity to address this in the guidance documents to better define and improve consistency in that process.

Inconsistencies in how MR and Contingency amounts are initially determined are a direct cause of improper approval of allocations to the PMB later in the process. Further guidance on the division of ownership risk (rather than just on dollar thresholds) would be helpful. For example, risks associated with design evolution within the scope of the CBB should be owned by the M&O contractor and have MR associated with them. Technical and Programmatic Risks (TPRA) should be owned by DOE and have an associated Contingency amount. This would be consistent with DOE G413.3-7a, Attachment 11; however, this practice has not been widely adopted.

The vast majority of difficulties with management of MR and Contingency appear to result from implementation of flawed processes on projects (which are inconsistent with required processes), rather than inadequate definition of the processes. There is a large gap between the processes and methodologies defined in DOE guidance and the processes that are actually in place on most projects. In many cases, FPDs apply thresholds on the amount of MR that can be used by the contractor, or do not allow contractors to utilize MR without FPD approval (which essentially makes it Contingency). This is especially true on projects acquired under the M&O contracting method.

This misapplication of MR needlessly eliminates the M&O contractor's ability to manage work within the CBB, and adds costly inefficiencies to project management. There are also numerous cases where there is no differentiation between MR and Contingency, resulting in improper utilization. For example, MR may be applied to new project scope, or Contingency may be used for in-scope events if there is no remaining MR.

3.4.3 Utilize Industry Guidance and Best Practices

Considerable guidance exists from industry and professional organizations (AACE, ASPE, NDIA, and others), which is largely consistent with DOE guidance. In some instances, different terminology is used, but the concepts and applications are the same. For example, methods for developing and controlling schedule contingency are defined in detail in the NDIA *Planning and Scheduling Excellence Guide* (PASEG). The *Risk Management Guide* is especially helpful, as it thoroughly defines development, use, and management of DOE Contingency, MR, and schedule contingency, and is consistent with EVMS requirements.

Contractors should make sure that methodologies from these documents are appropriately reflected in their local procedures.

3.4.4 Improve Communication and Implement Joint DOE/Contractor Training

It is recommended that DOE Site Offices and contractors re-affirm their intent to follow the guidelines on MR and Contingency processes, and to ensure that both FPDs and contractor PMs implement the guidance consistently.

Joint training with DOE and contractor personnel—in the same sessions, with the same instructors, in the same locations—would ensure a common understanding of standards and requirements. Training should include DOE decision-makers, FPDs, and others in the project management and execution chain.

4 CONCLUSIONS AND RECOMMENDATIONS

Although DOE has promulgated detailed requirements and guidance regarding the development, use, and implementation of BCPs and Contingency, inconsistent interpretation and implementation of these tools create confusion and hamper many projects.

Specifically, BCPs take too long to develop, process, and approve, and thus fail to efficiently fulfill their fundamental function. When approval takes months, the BCP is often obsolete by the time it is approved, and the process must start again. Streamlining and simplifying the approval process would minimize rework and reduce management cost and effort. Other suggestions include reserving the use of BCPs to events that actually change the PB, and developing another mechanism(s) (perhaps similar to the BCP) for events that do not change the PB.

Similarly, Contingency is often misapplied and misunderstood, leaving projects without an effective method of managing in-scope changes and risk. For example, within some DOE sites, overall Contingency is estimated as part of a risk-based process, and MR is segmented and allocated to the control of the contractor, based on ownership of risks and/or other factors. At other DOE sites, however, DOE either does not allow the use of MR, or it controls MR as it would DOE-held Contingency. This leads to differing expectations and confusion between DOE and the contractor.

Lack of effective BCP and Contingency implementation has a deleterious effect on DOE project performance, leads to increased cost and risk, and diminishes DOE's credibility and the ability to self-manage its project portfolio. This also diminishes the contractors' credibility and impacts their reputation.

Thus, the overall recommendation is that that DOE, NNSA, and the contracting community (from headquarters down to the site and project level) need to have a common understanding and consistent application of the same processes and utilize consistent definitions and terminology. This common understanding can only be achieved by effective communication and better training. Joint training should be conducted with DOE, NNSA, and contractors at the site level, so that a consistent understanding of requirements and application is achieved.

These are not overly complicated or difficult problems to solve. Better communication, clearer requirements and guidance, and joint training will improve project performance at multiple levels.

5 REFERENCES

1. DOE Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*
2. DOE Guide 413.3-7A, *Risk Management Guide*
3. DOE Guide 413.3-10a, *Earned Value Management System Guide*
4. DOE Guide 413.3-12, *Project Definition Guide*
5. DOE Guide 413.3-20, *Change Control Guide*
6. DOE Guide 430.1, *Cost Estimating Guide*, Chapter 11 (Contingency)
7. DOE Guide, 413.3-21, *Cost Estimating Guide*
8. Defense Acquisition University, *Earned Value Management “Gold Card”*