U.S. DEPARTMENT OF ENERGY
CONTRACT AND PROJECT MANAGEMENT
ROOT CAUSE ANALYSIS

CORRECTIVE ACTION PLAN

CORRECTIVE MEASURE 3

IDENTIFICATION OF BEST RISK MANAGEMENT PRACTICES
AND
ANALYSIS OF DOE RISK MANAGEMENT PLANS

SUMMARY REPORT

JULY 2009

Contents

1.0 Introduction

In April 2008 the Department of Energy (DOE) published the *U.S. Department of Energy Contract and Project Management Root Cause Analysis,* and then subsequently published the *U.S. Department of Energy Contract and Project Management Root Cause Analysis Corrective Action Plan* in July 2008. The root cause analysis identified the most significant challenges impeding the improvement of DOE contract and project management. One of the most significant issues identified was that, in many cases, risks associated with DOE projects are not objectively identified, assessed, communicated, and managed through all phases of planning and execution.

The Department understands that improvements in risk management practices are essential to improving DOE project management. While improvements in risk management have been realized, the Department recognizes the need for further enhancements to risk management approaches and practices, including increased consistency and commitment. Risk management, including risk planning, risk assessment (risk identification, risk register, risk analysis), risk handling, risk monitoring, risk reporting, and risk feedback are evident within DOE to varying degrees; however, a consistent approach to evaluating, controlling and mitigating risks is lacking. DOE risk management has not matured sufficiently to consistently provide reliable and useful products and subsequent results.

Accordingly, DOE has developed a Department-wide corrective measure to improve risk management. The corrective measure is to: “establish objective, uniform methods for assessing, communicating, and managing project risks and uncertainties. This includes the development of realistic budgets and schedules, and the consistent definition, development, and use of management reserve and contingency”.

The Department has also established a multi-Program Corrective Measure team to review and assess current DOE risk management practices in EM, SC, and NNSA including risk planning, risk assessment, risk monitoring, risk reporting, and risk mitigation activities. The team’s activities include reviewing project Risk Management Plans (RMP) and evaluating risk management findings from recently completed external independent reviews (EIR) and independent project reviews (IPR). The team identified the effective documentation of specific risk management functions as well as ineffective risk management practices. This summary report provides the preliminary results of the team’s initial activities and the associated deliverables.

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2.0 Discussion of Approach

The following discusses the approach taken by the Corrective Measure #3 team members to assess the effectiveness of DOE risk management.

IDENTIFICATION OF REPRESENTATIVE PROJECTS FOR REVIEW

Initially, the project team selected 24 DOE projects and programs for review of their respective risk management processes and procedures. This included 13 EM projects or restoration programs, 6 NNSA projects, 3 SC projects, and 2 EE projects. These projects and programs were selected based on a number of factors, including 1) good cross-section from all DOE program offices, 2) projects that represent both capital construction and ongoing operations/cleanup, 3) generally the larger projects within DOE, and 4) projects/programs that are ongoing and for which Risk Management Plans are fairly recent (generally later than 2006). The listing of projects is shown in Attachment 1.

Following the initial selection, the project team determined the critical decision approval point for each project or program (CD-1, CD-2, etc.), as a reference point for consideration of the Best Practices that would apply (see following discussion). We also documented whether each project is represented by separate and distinct federal and contractor Risk Management Plans (RMPs), or a combined RMP. We also documented whether these plans were readily available and accessible to the project team either electronically or as a hard copy, or would need to be augmented by updated risk documentation from the site offices. This listing is included in Attachment 1.

DEVELOPMENT OF BEST PRACTICES

Concurrent with the identification of representative projects, we developed a set of risk management Best Practices. These are intended to provide a useful checklist for assessing the validity and completeness of project risk management plans, processes, procedures and execution or performance. The Best Practices have been drawn from:

- DOE G 413.3-7, Risk Management Guide (9/16/08)
- OMB Memorandum for the Heads of Executive Departments and Agencies (M-07024), “Updated Principles for Risk Analysis” (9/19/07)
- GAO-09-3SP, GAO Cost Estimating and Assessment Guide–Chapter 14, Cost Risk and Uncertainty (March 2009)
- DOE Root Cause Analysis, Contract and Project Management (April 2008)
- DOE Root Cause Analysis, Contract and Project Management - Corrective Action Plan (July 2008)
- Various DOE External Independent Reviews (EIRs) and Internal Project Reviews (IPRs)

- Experiences of DOE personnel, contractors and consultants on past projects in a variety of industry sectors

- Recommended practices and standards developed by and issued through various professional organizations including PMI.

The Best Practices were initially categorized into two groupings. First, a set of general best practices were defined that can lay the framework for a successful and effective risk management program at the project level. Second, a listing of best practices was provided by the various elements of a risk management program. These were presented by project phase (i.e. critical decision approval), as would be applicable and expected over the life of a project.

The Best Practices are beneficial and applicable to all types of projects. However the concepts and practices may be tailored based upon project complexity; the size and duration of the project; the initial overall risk determinations for the project; organizational risk procedures; available personnel and their skill levels relative to risk management; and available data and its validation.

Attachment 2 lists the Best Practices draft developed by the project team. Based on the projects reviewed for risk management best practices, the Office of Science appears to have a well-defined and documented approach, process, and associated personnel to effectively carry out risk activities.

SCORING TEMPLATE

The Best Practices were reviewed by the project team, and then organized into a scoring template arranged by critical decision phase, and again subdivided by risk activity. (See Attachment 3) Risk activities categories are

- Risk planning

- Risk identification

- Risk analysis

- Risk handling

- Risk monitoring

- Risk reporting

As seen in Attachment 3, each risk activity includes a handful of best practice criteria that the project team used to score each project's RMP, risk register, and risk analysis. Scoring was based on a 0-3 approach, defined as follows:

0—Not addressed or completed at all

1—Done in a very rudimentary manner, meeting bare minimum

2—Meets guidelines and expectations and reasonably complete

3—Exemplary example of best practice in application.

Most of the projects/programs were scored according to one or maybe two phases. For example, many projects have received CD-2 approval, thus, we scored the risk management practices according to the risk documents prepared at this phase. Thus, the entire template was never filled out, but rather only those critical decision phases most relevant.

DATA GATHERING

With the scoring template and list of DOE projects in place, the project team, using a data call from DOE EM, solicited updated RMPs and risk analyses from the various project offices and Federal Project Directors. In some cases the project team already possessed some of the necessary information from previous EIRs, but we believed the most effective review would be generated by examining the most recent risk documentation that is available. Response was generally good from the sites, although time and budget constraints precluded the project team from receiving all the data requested.

DATA REVIEW AND SCORING

It is important to note that the project team only evaluated information documented in the RMPs, risk registers, and risk analyses. We also referenced EIR reports, which only look at a point in time, but which gave us a means of comparison and provided valuable findings from previous in-depth reviews of the risk management process being implemented for specific projects and programs. The team did not evaluate the actual implementation of risk management practices which would be gathered through site interviews or review of monthly reports and mitigation activities.

Although the scoring template shows a “Total Score” for the risk management criteria in each critical decision phase, we do not emphasize nor encourage using this as a benchmark or means of comparison among projects. The intent is not to “grade” each project, but rather to identify the use of best practices. Likewise, the scoring template provides a means to identify gaps in the risk implementation programs that need further guidance or attention.

For the sake of continuity and consistency, most of the project reviews were conducted by two members of the project team who have wide experience in DOE projects, and particularly EIRs. After the project team reviewed about 12 projects, the DOE IPT decided to conduct reviews of projects to assist the team and gather a level of understanding of the process. Due to late receipt of data and limited funding, the project team review was curtailed such that all project RMPs planned for review were not completed; however, a representative sample was finished and the project team believes it is sufficient to identify gaps in risk management processes.

GAP ANALYSIS

Once the risk management plan reviews were completed, the project team, with input from the DOE IPT, developed a list of risk management processes and practices that are not being followed or implemented consistently on the DOE projects studied. This gap list may not be complete as the project team did not obtain implementation information from the projects. This is recommended as a future activity. However, the draft gap analysis is a starting point to identify areas of weakness in DOE risk management program implementation and will feed into later tasks for recommending changes to DOE requirements, guidance, and training programs

EXAMPLES OF DOE BEST RISK MANAGEMENT PRACTICES

Best practices are exemplified by a score of 3 for a particular criterion. Specific examples of best practices include the following:

Project or Program	Criterion
NSLS II	Monthly updating of risk status
PSF and Richland EM Program	Probability/consequence risk ranking
PSF, ORP, WTP	Mature risk monitoring processes are in place
Oak Ridge EM Program (contractor)	Adequacy of remaining contingency allowances (cost and schedule) periodically re-evaluated using quantitative risk analysis techniques and methodologies
Richland	Key project assumptions, including risk analysis bounding assumptions, are finalized, clearly communicated and used as basis for risk analysis
Paducah	Incorporation of probability/benefit matrix for opportunities

Best practice examples by major risk activity include the following:

Baseline Development to CD-2	Project or Program	Exemplary Practice
Risk Planning	RL 0011/0012	Key assumptions well-documented in RMP.
Risk Identification	RL 0011/0012	Good breakdown of specific probabilities.
Risk Analysis	RL 0011/0012, Paducah (contractor)	Standardized matrix has lots of detail. Excellent incorporation of probability/benefit matrix for opportunities.
Risk Monitoring	Physical Sciences Facility, 12 GeV	Good discussion of risk tracking, updating, and reporting in RMP.
Detailed Design to CD-3	**Project or Program**	**Exemplary Practice**
Risk Analysis	OR EM Program (contractor)	Remaining contingency allowances periodically re-evaluated using quantitative risk analysis techniques.

EXAMPLES OF INEFFECTIVE PRACTICES

The following areas were identified in a majority of projects and represent deficient risk management practices. (The numbers refer to the check list item number):

- Key project assumptions are not documented. The importance of identifying the assumptions and bounding conditions needs to be emphasized. Much like an engineering/design effort that establishes a set of assumptions and basis of design before drawings and specifications are completed, the risk analysis needs its own set of key assumptions in order to define the limits and boundaries for the risk events and contingency allowances. (3.1.3).

- Basis for consequences is not defined. Consequences need to be bracketed and quantified for two distinct activities during the risk analysis process: 1) for the initial risk ranking using the probability/consequence matrix, and 2) for the establishment of best case, most likely, and worst case numbers as input to the Monte Carlo simulation. Much like a cost estimate, the basis for the consequences should be documented so that it is clearly understood how the numbers are derived. (3.2.4).

- Risk triggers are not identified. Projects generally do not go to the effort to identify the predecessor activities or events that, if happen, can trigger the risk event to occur. The risk triggers are normally identified on the Risk Assessment Form, but this is not always filled out by the project team. Without the identification and monitoring of triggers, the likelihood of the risk event occurring increases, which increases the likelihood of schedule delays and/or cost growth. (3.2.5).

- Opportunities are not identified. Risk analysis needs to emphasize the identification of both risks and opportunities. Admittedly, opportunities for cost savings are typically dwarfed by risks, but for the size of projects DOE undertakes, opportunities provide valuable vehicles to save project dollars. Unfortunately, opportunities are often overlooked or ignored during risk analysis. Project teams too often fall back on value engineering studies as a way to save dollars during the design phases, not realizing that larger cost savings can be garnered by working the technical and programmatic opportunities. (3.3.1).

- Likelihood of mitigation success is not always considered when setting contingency allowances. Similar to the initial risk ranking (high, medium, or low) that is derived by a combination of probability and consequence, the probability of mitigation success needs to be considered when the consequences are established for the residual risk remaining after the mitigation action. By ignoring the likelihood of mitigation success, the project team automatically assumes the mitigation is 100% successful, which is not the case. The incorporation of mitigation likelihood has the effect of increasing the value of the consequence range, which directly impacts the contingency derived from Monte Carlo analysis. (3.4.3).

The detailed scoring sheets are available but not included in this summary report. The purpose of the scoring was to develop the lists and not to rate specific projects. A complete summary of gaps is provided in Section 3.0. Each of the weaknesses identified above are included in the gap analysis list. In addition, Attachment 4 contains a list of DOE risk management observations by select Corrective Measure 3 team members. This list of observations is not based on reviews of DOE RMPs rather the selective experience of some team members.

3.0 Summary of Gaps and Planned Next Steps

This summary of gaps is the result of a study of the implementation of best risk management practices on selected current projects. The team evaluated project risk management plans (RMPs) to determine how well the RMPs implemented guidance from a checklist of best practices. We also reviewed external independent review (EIR) reports to determine issues raised regarding risk management implementation on the selected projects. We did not have the opportunity to discuss the implementation with project teams.

If we found inconsistent implementation of a best practice, then we have included it in this summary. The following "gaps" are listed by critical decision (CD) phase and then by risk management process, where appropriate. We have not listed all the best practices, but have listed those that many projects are either appear to be not performing the practice at all or are performing incompletely, based on the small sample of project plans reviewed. For each item listed, we identify the source of the item. If the item came from a section in the best practices list, the item number is shown: e.g., (3.4.1). If the issue came from an EIR report or input from a DOE team member we have so indicated.

This summary is intended to identify issues and not solutions. Later CM-3 tasks will identify what changes are recommended to requirements, guides, and training programs.

CD-0 AND CD-1

The projects studied for Task 1 were all in the post CD-2 stage. Therefore, information on the CD-0 and CD-1 stages is not available for use in this analysis. However, based on the status of risk management plans and related risk management activities on current projects, the team considers that sufficient risk management planning is probably not occurring during the early stages of a typical project. Furthermore, we note that the absence or inadequacy of early risk analysis and management were identified in 2008 as a root cause of DOE project management failures and we have no reason to believe this situation is demonstrably better at this time. As a result, we believe that additional guidance or verification of implementation is most likely needed for DOE projects at an early-stage of development.

CD-2, CD-3, AND POST CD-3

Risk Planning

- Key project assumptions are not documented. The importance of identifying the assumptions and bounding conditions needs to be emphasized. Much like an engineering/design effort that establishes a set of assumptions and basis of design before drawings and specifications are completed, the risk analysis needs its own set of key assumptions in order to define the limits and boundaries for the risk events and contingency allowances. (3.1.3).

- Risk management is not generally used as a project planning or decision-making tool.

- The IPT generally does not include a risk management expert and many IPT members have limited knowledge of risk management practices or project risk issues, usually to meet the needs of a Critical Decision or review of the project.

- Risk management is not normally incorporated or integrated into the routine project activities but is treated as a separate activity.

Risk Identification

- Risk identification is incomplete or lacks thoroughness. Many projects are not developing comprehensive lists of risks and are not including the complete IPT in developing the risks. The risk lists are not updated periodically. Causes of project failures (from various sources including GAO, DOE RCA, and NRC) are not routinely included in risks considered. Project assumptions are not consistently used to determine project risks and most projects do not include a cross-walk between assumptions and risks. The project requirements (status of completeness or reasonableness) are not consistently used for risk identification. (3.2.1, 3.2.2).

- Opportunities are not identified. Risk analysis needs to emphasize the identification of both risks and opportunities. Admittedly, opportunities for cost savings are typically dwarfed by risks, but for the size of projects DOE undertakes, opportunities provide valuable vehicles to save project dollars. Unfortunately, opportunities are often overlooked or ignored during risk analysis. Project teams too often fall back on value engineering studies as a way to save dollars during the design phases, not realizing that larger cost savings can be garnered by working the technical and programmatic opportunities or through acquisition strategies that are used. (3.3.1).

- Basis for consequences is not defined. Consequences need to be bracketed and quantified for two distinct activities during the risk analysis process: 1) for the initial risk ranking using the probability/consequence matrix, and 2) for the establishment of best case, most likely, and worst case numbers as input to the Monte Carlo simulation. Much like a cost estimate, the basis for the consequences should be documented so that it is clearly understood how the numbers are derived. (3.2.4).

- Risk triggers are not identified or not employed correctly. Projects generally do not go to the effort to identify the predecessor activities or events that, if they happen, can trigger the risk event to occur. The risk triggers may be identified on the Risk Assessment Form, but this form is not always filled out by the project team or a trigger is identified as risk event. Without the

identification and monitoring of triggers, the likelihood of the risk event occurring increases, which increases the likelihood of schedule delays and/or cost growth. (see Section 4.3.3 of DOE G 413.3-7 which correctly states "a risk trigger metric is an event, occurrence or sequence of events that indicates that a risk may be about to occur …") (3.2.5).

- Probability of occurrence does not have firm bases in most cases. Many times the probability chosen is optimistic. Independent reviewers have difficulty reviewing these figures mostly due to lack of knowledge of the project details. A basis statement is usually not provided to justify the probability chosen.

Risk Analysis

- Quantitative analysis is not complete or uses questionable methods. Most projects are now using Monte Carlo methods but applications of probability of occurrence and consequences are not applied uniformly. (3.3.4).

- Quantitative analysis of schedules is inconsistently applied, with some projects analyzing only cost impacts of schedule delays and not including impacts on schedules (time). (3.3.3).

- The bases for probability distributions chosen for risk analyses are generally not documented. Projects generally use the same distribution for all risks or with standard percentages.

Risk Handling

- Likelihood of mitigation success is not always considered when setting contingency allowances. Similar to the initial risk ranking (high, medium, or low) that is derived by a combination of probability and consequence, the probability of mitigation success needs to be considered when the consequences are established for the residual risk remaining after the mitigation action. By ignoring the likelihood of mitigation success, the project team automatically assumes the mitigation is 100% successful, which is not the case. The incorporation of mitigation likelihood has the effect of increasing the value of the consequence range, which directly impacts the contingency derived from Monte Carlo analysis (3.4.3).

- Many risks are handled by passing to another organization (government to contractor, or contractor to government) without a realistic analysis of the consequences of such risk transfers or the assurance that those risk assignments are accepted and being handled by the other party.

- Risk mitigation costs and schedule are not consistently included in project cost and schedules. (3.4.1).

Risk Monitoring

- Risk Owners do not consistently update risk status during the project and report status and progress on monthly basis (3.5.2)

- Previously identified "low" risks are not periodically reassessed to confirm they have not changed or become more significant threats (or opportunities) to the project (3.5.3).

- Projects are apparently not managing appropriate level of risk on their projects (see 413.3A 6.g (p. 39)

Risk Reporting

- RMPs are not consistently requiring inclusion of risk in monthly and quarterly reports (3.6).

CD-4

The project team did not review any completed projects and therefore we are unable to identify gaps in documenting risk management at project completion. However, based on what we have seen in CD-2/3 reviews, further guidance may be needed on including risk management results (use of risk in managing project, risks realized or unrealized, contingency use, etc.) in completion reports and lessons learned documents.

NEXT STEPS

The following are the next steps to be taken by the Corrective Measure 3 team.

Identify Effective Risk Management Tools

The team will identify the specific management tools used to manage risk, including risk planning, assessment, handling, monitoring, reporting, and feedback at sites and on specific projects. The team will also identify the processes used by project teams to manage risk. We will document lessons learned and develop a mechanism to transfer best risk management practices across DOE programs and projects. To the extent necessary, the team will develop appropriate risk management tools, formats, and processes that will fill gaps or provide needed consistency across all DOE programs and projects. The team will also centralize effective risk management tools on a DOE website for use by all Programs and projects.

Update Guidance and Develop Standard Templates

Based on the identification of best risk management practices, the team will revise and update existing risk management documentation such as DOE Guide 413.3–7 Risk Management and DOE O 413.3A. In addition, we will develop new guidance documents, if necessary, to improve and enforce more effective management of risks. The team will

also address approaches needed to ensure management incentives are in place to support and require effective risk management across DOE programs and projects.

Revise Training Materials

Currently DOE conducts two risk management training courses as part of the PMCDP training program. Based on the identification of best risk managements practices and tools, the team will review and recommend changes to the current risk management training materials to reflect best practices and updated guidance.

Establish a Cadre of Subject Matter Experts

Lastly, the team will develop a charter for a group of risk management subject matter experts. We will also identify a list of risk management subject matter experts for future use by DOE. The group of subject matter experts will be a resource available to Program Offices and Federal Project Directors to provide assistance in developing and implementing risk management processes and products.

Attachment 1—
List of Risk Management Plans Reviewed

Project Name/Description	DOE Program	EIR Review	Critical Decision	DOE RMP	Contractor RMP	Combined RMP
Integrated Biorefinery Research Facility Project	EE	March 2009 Reviewed	CD-2/3			X Reviewed
Research Support Facility Project	EE	March 2009 Reviewed	CD-2/3			X Reviewed
National Synchrotron Light Source II Project	SC	October 2008 Reviewed	CD-3			X Reviewed
12 GeV Upgrade Project (TJL)	SC	October 2007 Reviewed	CD-2			X Reviewed
Physical Sciences Facility Project (PNNL)	SC	June 2007 Reviewed	CD-2			X Reviewed
Highly Enriched Uranium Materials Facility Project	NNSA	October 2007 Reviewed October 2008 Reviewed	CD-2 CD-3 ICR			X Reviewed
Nuclear Materials Safeguards and Security Upgrade Project, Phase II	NNSA		CD-2			Reviewed by RLF (NA-54)
Chemistry and Metallurgy Research Replacement (LANL): - 04-D-125 CMRR - Equipment - 04-D-125A (CMRR) PHASE A Radiological Laboratory Utility Office Building (RLUOB) Project	NNSA		CD-1 CD-1 CD-3			X
Pit Disassembly and Conversion Facility (SRS)	NNSA		CD-1			
Mixed Oxide Fuel Fabrication Facility (SRS)	NNSA		CD-3		X	
Waste Solidification Building (SRS)	NNSA		CD-2		X	
Sodium Bearing Waste Treatment Project	EM	September 2008; Reviewed	BCP & CD-2	X	X Reviewed	
Oak Ridge PBS OR-0013B and PBS OR-0040; Accelerated Cleanup Project	EM	December 2007; March 2006 Reviewed	BCP and CD-2	X Reviewed		

Project Name/Description	DOE Program	EIR Review	Critical Decision	DOE RMP	Contractor RMP	Combined RMP
Oak Ridge PBS OR-0013B and PBS OR-0040; Accelerated Cleanup Project	EM	December 2007; March 2006 Reviewed	BCP and CD-2		X Reviewed	
Richland PBS RL-0011	EM	November 2007 Reviewed	CD-2			X Reviewed
Richland PBS RL-0012,	EM	November 2007 Reviewed	CD-2			X Reviewed
Richland PBS RL-0013/0080	EM	November 2007 Reviewed	CD-2			X Reviewed
Richland PBS RL- 0030	EM	November 2007 Reviewed	CD-2			X Reviewed
Richland PBS RL- 0040	EM	November 2007 Reviewed	CD-2			X Reviewed
Paducah Environmental Management Program - PA-0013 and PA-0040	EM	May 2007 Reviewed	CD-2	X Reviewed		
Paducah Environmental Management Program - PA-0013 and PA-0040	EM	May 2007 Reviewed	CD-2		X Reviewed	
Portsmouth Environmental Management Program PBS PO-0013, PO-0040 and PO-0041	EM	February 2007	CD-2	X Reviewed by SK/RLF		
Portsmouth Environmental Management Program PBS PO-0013, PO-0040 and PO-0041	EM	February 2007	CD-2		X Reviewed by SK/RLF	
Los Alamos National Laboratory EM Program PBS LANL-0013, LANL-0030, LANL-0040D, LANL-0040N	EM	October 2006 Reviewed February 2005	CD-2 CD-2			X
Los Alamos National Laboratory TRU Waste Facility Project	EM	June 2008	CD-3			X Reviewed
ORP Tank Farm Project	EM	September 2006 Reviewed	CD-2	X Reviewed		
ORP Tank Farm Project	EM	September 2006	CD-2		X (new contractor plan not available)	

Project Name/Description	DOE Program	EIR Review	Critical Decision	DOE RMP	Contractor RMP	Combined RMP
Idaho Cleanup Project PBS ID-0011, ID-0012B-D, ID-0013, ID-0014B ID-0030B, ID-0040B	EM	January 2006 Reviewed	CD-2	X	X	
U233 Downblending and Disposition Project	EM	August 2006; 2009 Rev Reviewed	CD-2/3A; CD-1			X
DUF_6 Conversion Project	EM	Sept. 2004 June 2005 Sept 2007 Reviewed	CD-2 CD-3 BCP	X	X	
Waste Treatment Plant Projects	EM	Various; DNFSB Lessons Learned Reviewed	CD-2 CD-3 Mgmt Rev		X Reviewed	
Salt Waste Processing Facility (SRS)	EM		CD-2 CD-3			X

Attachment 2—Risk Management Best Practices

This document summarizes risk management best practices as applicable to all DOE projects. It is intended to provide a useful checklist for assessing the validity and completeness of project risk management plans, processes, procedures and execution or performance.

These Best Practices have been drawn from:

- DOE G 413.3-7, Risk Management Guide (9/16/08)
- OMB Memorandum for the Heads of Executive Departments and Agencies (M-07024), "Updated Principles for Risk Analysis" (9/19/07)
- GAO-09-3SP, GAO Cost Estimating and Assessment Guide–Chapter 14, Cost Risk and Uncertainty (March 2009)
- DOE Root Cause Analysis, Contract and Project Management (April 2008)
- DOE Root Cause Analysis, Contract and Project Management - Corrective Action Plan (July 2008)
- Various DOE External Independent Reviews (EIRs) and Internal Project Reviews (IPRs)
- Experiences of DOE personnel, contractors and consultants on past projects in a variety of industry sectors
- Recommended practices and standards developed by and issued through various professional organizations.

The Best Practices are presented in two groupings. First, a set of general best practices is provided that can lay the framework for a successful and effective risk management program at the project level. Then a listing of best practices is provided by the various elements of a risk management program. These are presented by project phase, as would be applicable and expected over the life of a project.

As with current DOE guidance, the operable definition of risk for this document is a factor, element, constraint, or course of action that introduces an uncertainty of outcome that could impact project objectives. The risks handled are comprised of both threats (negative consequences) and opportunities (positive benefits).

These Best Practices will be beneficial to all types of projects. However the concepts and practices may be tailored based upon project complexity; the size and duration of the project; the initial overall risk determinations for the project; organizational risk procedures; available personnel and their skill levels relative to risk management; and available data and its validation.

It should be noted that, throughout the listing of best practices that follows, there may be some repetition and redundancy. However since the intent is to provide a fairly complete and all-encompassing listing of best practices as well as to clarify the expectations of DOE management and project review teams, some different ways of stating the same practices or objectives may be beneficial and useful.

GENERAL BEST PRACTICES

1. There should be a cultural environment that fosters risk management related learning, innovation, due diligence, responsible leadership, management participation and involvement, lessons learned, continuous improvement, and successive knowledge transfer.

2. The risk management process should be a continuous and iterative process and should be forward looking, structured, and informative.

3. The risk management framework should be completely integrated into the procedures and processes of the organization.

4. Throughout the project life cycle, the Integrated Project Team (IPT) should support the Federal Project Director (FPD) and be actively engaged and participatory in the risk management process.

5. There should be a risk management organizational breakdown structure that:

    a. Highlights the management framework used for risk management and decision processes.

    b. Illustrates the chain of authority and communication for risk management decision processes.

    c. Provides a means to assign organizational ownership of risks.

6. Risk management processes should be established by both the DOE (led by the FPD) and their contractors (led by the Contractor Project Manager).

7. A responsibility assignment matrix with roles and responsibilities for various risk management tasks should be developed.

8. Risk management goals should be stated clearly, and risk assessments and risk management decisions should be communicated accurately and objectively in a meaningful manner.

9. Risk planning should be completed to:

    a. Establish the overall risk nature of the project, including the project's importance and prioritization.

b. Defines the overall experience and project knowledge of the IPT, as well as the technical background and risk knowledge of the IPT.

c. Identifies the overall level of project risk.

10. Risks should be characterized both qualitatively and quantitatively.

11. Risk characterization should inform a range of policies and actions to reduce risks.

12. Judgments used to develop risk assessments, including assumptions, defaults and uncertainties, should be stated explicitly and the rationale for these judgments and their influence on the risk assessment should be articulated.

13. Peer reviews of risk assessments can ensure that the highest professional standards are maintained.

14. To inform priority setting, programs and projects should seek to compare risks, grouping them in broad categories of concern (e.g., high, moderate, and low).

15. Programs and projects should attempt to coordinate risk reduction efforts wherever feasible and appropriate.

16. Risk handling strategies should consider:

    a. Feasibility in terms of project objectives as well as baseline funding and schedule.

    b. Expected effectiveness based on the tools and expertise available to the IPT.

    c. Results of cost/benefit analysis.

    d. Impacts on other technical portions of the project.

    e. Other analysis relevant to the decision process.

    f. Backup strategies that can be deployed if necessary.

17. The cost for risk handling strategies should be included in the cost range (pre-CD-2) or baseline or held as contingency.

18. Risk handling strategies should be continually reviewed for their affordability, achievability, effectiveness, applicability, and resource availability.

19. Project Acquisition Strategy should be reflective of project risk level and incorporate risk handling strategies (avoidance, transference, or mitigation) appropriate for the project.

20. Any transference of risk (e.g., between DOE and contractor or between project and program) requires written acceptance of the risk before the transfer can be considered complete.

21. Both residual risks and secondary risks should be considered in risk analyses.

22. Risk and uncertainty analysis should quantify the imperfectly understood risks that are in the project and identify the effects of changing key cost driver assumptions and factors.

23. Management should be given a range of possible costs and the level of certainty or confidence in achieving the point estimate.

24. Periodic risk and uncertainty analysis should be conducted to improve estimate uncertainty.

25. Cost element correlation should be considered in any quantitative analysis.

26. Contingency reserves should be recommended and included to achieve the desired confidence level.

27. The risk monitoring process should provide both qualitative and quantitative information to decision-makers regarding the progress of the risks and risk handling actions being tracked and evaluated.

28. Risk monitoring is also used to identify new risks or changes in the assumptions for risks previously identified.

29. The Risk Monitoring process should be tailored to the program and/or project, and:

    a. Ensure risk owners are current and performing their role and responsibilities

    b. Ensure risk identification is current and that risks have not changed since first identified

    c. Ensure risk handling strategies are implemented as planned and achieve expected results

    d. Review backup plans and strategies as appropriate

    e. Review cost and schedule contingency calculations and adequacy

    f. Review risk management communications and assess their effectiveness

    g. Ensure recognition of benefits and early consideration of safety and security-related risks

    h. Ensure the risk register and other related forms are current and accurate

30. Risk reporting processes should be used to:

    a. Provide early identification of emerging risks and/or risks that are realized

    b. Ensure that the status of key project risks are being racked

    c. Ensure that risk handling strategies are being implemented

BEST PRACTICES BY PROJECT PHASE

Table 1 presents a listing of risk management best practices as would be applicable and expected during each of the key phases of a project. These begin prior to the submittal of a Mission Need Statement for the project (that is to be approved at CD-0), and continue through the remaining phases of project execution until the project is completed and CD-4 is approved.

Table 1. Best Practices by Project Phase

Mission Need Pre-CD-0	Conceptual Design Pre-CD-1	Baseline Development Pre-CD-2	Project Execution After CD-2
Risk Planning			
Risk planning process begins prior to CD-0	Initial draft of Risk Management Plan is developed to provide a roadmap for both the government and contractor teams	Complete version of Risk Management Plan is developed and approved by FPD	Risk Management Plan is periodically reviewed for currency and applicability and revised as needed (with appropriate approvals)
Methods are established to manage risks, including the scales, metrics and mechanisms	Risk methodologies are refined and formalized	Risk management processes are formalized, in place and actively being worked	
Communication structure is established	Risk related communications are initiated and formalized	Risk management related communications are a routine part of project communications activities and reports.	
Planning process addresses project objectives, assumptions, mission need, customer/stakeholder expectations, and site office risk management policies and practices	Key project assumptions are further identified, defined and documented	Key project assumptions, including risk analysis bounding assumptions, are finalized, clearly communicated and used as basis for risk analysis that supports project baseline contingency allowances	As risk monitoring progresses, project assumptions are re-visited and re-assessed as appropriate and necessary. Any changes to key assumptions are captured as Baseline Changes
Risk management activities and focus for conceptual design phase are identified and documented	Risk management activities and focus for preliminary design phase are identified and documented	All remaining risk management activities have been identified and incorporated in the project baseline	

Table 1. Best Practices by Project Phase

Mission Need Pre-CD-0	Conceptual Design Pre-CD-1	Baseline Development Pre-CD-2	Project Execution After CD-2
Budget for conceptual design phase risk management is established, including resource identification	Budget for preliminary design phase risk management is established, including resource identification	Project baseline includes appropriate activities, resources and costs for risk management activities over the remaining project life cycle	
Initial responsibility assignment matrix for risk management is developed.	Responsibility assignment matrix is refined as needed.	The risk management responsibility matrix is reflected in the Project Execution Plan, and effectively implemented	
Risk Identification			
Initial risk breakdown structure is considered to provide a hierarchical structuring of risks	Risk identification is a key area of focus during evaluation of project alternatives	Risk identification is continued with regular additions to the Risk Register as preliminary design is completed	Project processes are in place to ensure new risks are identified on routine basis and old risks can be retired
Risk templates, checklists, lessons learned from other projects and other appropriate sources identified to stimulate risk identification	Tools used to facilitate risk identification are refined and enhanced to ensure applicability and comprehensiveness for specific needs of project		
Based on mission need and project objectives, key project risks and uncertainties are identified	Risks are identified and considered for all alternatives under consideration during this phase		
All members of the IPT (or prospective IPT), program office and other stakeholders are active participants in the risk identification effort	The participants in the risk identification process include all elements of the IPT and any contractors supporting the project	The participants in the risk identification process include all elements of the IPT and any contractors supporting the project	
Risks are clearly defined both in terms of the event and the consequences to the project or program	Risk definition becomes more explicit and specific as conceptual design progresses	Risk definition is completed and forms the basis for baseline development	
Risks are separately identified to the maximum extent possible and grouping of risks is avoided or minimized	Risks are separately identified to the maximum extent possible and grouping of risks is avoided or minimized		
Both threats and opportunities are identified	Both threats and opportunities are identified		
Owners are assigned for all identified risks	Risk owners are evaluated to ensure appropriateness and currency with project plans and organizational structure	Risk owners are evaluated to ensure appropriateness and currency with project plans and organizational structure	

Table 1. Best Practices by Project Phase

Mission Need Pre-CD-0	Conceptual Design Pre-CD-1	Baseline Development Pre-CD-2	Project Execution After CD-2
Probability or likelihood of risk occurrence is identified and quantified, at least by category or ranking	Probabilities are refined and further quantified as new insights and understanding evolves from conceptual design	Specific probabilities are assigned for all risks to facilitate/enable quantitative risk analysis	
Consequences or impacts of risks that occur are defined and quantified to extent possible–this could be in broad categories	Estimates are developed for the consequences or impacts on all risks, especially moderate and high risks	Specific estimates of consequences are assigned for all risks to facilitate/enable quantitative risk analysis	
Risk triggers are identified when appropriate	Risk triggers are monitored and refined as needed	Risk triggers are monitored and refined as needed	Risk triggers are monitored and refined as needed
Initial Risk Register is developed and included with Mission Need Statement documentation	Risk Register is maintained as a key project tool and is regularly updated	Risk Register is maintained as a key project tool and is regularly updated	Risk Register is maintained as a key project tool and is regularly updated
Risk Analysis			
The overall risk level of the project is identified and communicated	Qualitative risk assessment completed for both threats and opportunities	Qualitative risk assessment revisited for both threats and opportunities	Qualitative risk assessment periodically re-evaluated for both threats and opportunities
Evaluation of mission, goals and objectives for project considers a comparative analysis of alternatives and overall risks associated with those alternatives	Risks ranked using standardized matrix that combines probability (likelihood) and consequences (impacts)	Risks ranked using standardized matrix that combines probability (likelihood) and consequences (impacts)	
Initial efforts include at least a qualitative cost and benefit review of possible alternatives, with appropriate consideration of relative risks	Specific, and likely different, risk matrices, are used to rank DOE and contractor risks	Specific, and likely different, risk matrices, are used to rank DOE and contractor risks	
Project cost and schedule range considers potential risk impacts	Initial quantitative risk analysis used to compare alternatives, ensure funding adequacy, and set cost and schedule range for preferred alternative	Quantitative risk analysis is completed and provides basis for project cost and schedule contingency allowances and funding plans used to establish baseline	Adequacy of remaining contingency allowances (cost and schedule) periodically re-evaluated using quantitative risk analysis techniques and methodologies
		Monte Carlo simulation techniques are used to perform quantitative risk analysis	

Table 1. Best Practices by Project Phase

Mission Need Pre-CD-0	Conceptual Design Pre-CD-1	Baseline Development Pre-CD-2	Project Execution After CD-2
Risk Handling			
Alternatives identified for evaluation during the conceptual design phase have considered the most appropriate mechanisms for handling identified risks	Alternative selection considers the mitigation or reduction of overall project risk to the extent possible	Cost and schedule baseline includes all planned risk handling strategies, including mitigation efforts	Risk handling strategies and actions are tracked and updated or revised as needed.
To extent possible, project scope and plans focuses on risk avoidance and transfer	Risk handling strategies have been developed and implemented for at least all identified moderate and high risks	Contingency allowances included in cost and schedule baseline are sufficient to handle all accepted risks as well as residual risks following mitigation actions	
When needed to mitigate risks, appropriate R&D or technology development efforts have been planned and budgeted as part of the conceptual design phase	Appropriate approvals have been obtained for all risks to be transferred to other parties	The likelihood of mitigation success or effectiveness has been considered when setting contingency allowances	
	Preliminary design phase plans focus on execution of risk handling strategies		
Risk Monitoring			
	Risk monitoring processes and responsibilities defined and implemented	Mature risk monitoring processes are in place and routinely used	Risk monitoring is a routine project process
	Risk Owners routinely reporting status and progress for all risks	Risk Owners update risk status and progress on monthly basis	Risk Owners update risk status and progress on monthly basis
	Metrics defined for monitoring of project risks, handling strategies and risk management effectiveness	Metrics used to evaluate the effectiveness of the project risk management process and risk handling strategies	Metrics used to evaluate the effectiveness of the project risk management process and risk handling strategies
		Previously identified “low” risks are periodically reassess to confirm they have not changed or become more significant threats (or opportunities) to the project	Previously identified “low” risks are periodically reassess to confirm they have not changed or become more significant threats (or opportunities) to the project
Risk Reporting			
Mission Need documentation includes reporting on all identified risks, including current assessment of those risks and identified handling strategies/plans	The Conceptual Design Report or other CD-1 documentation package includes a Risk Report	Monthly Project Report includes a section of risk or a separate risk management report	Monthly Project Report includes a section of risk or a separate risk management report

Table 1. Best Practices by Project Phase

Mission Need Pre-CD-0	Conceptual Design Pre-CD-1	Baseline Development Pre-CD-2	Project Execution After CD-2
	Risk Report presents status of key project risks, identifies risks that formed basis for recommendation of preferred alternative, and discusses risk handling strategies and plans to be implemented during preliminary design phase	Risk reporting presents overview of current risk status, identifies new risks or those with significant changes, provides detailed status on critical and near term risks, and discusses status of near term risk handling strategies and plans	Risk reporting presents overview of current risk status, identifies new risks or those with significant changes, provides detailed status on critical and near term risks, and discusses status of near term risk handling strategies and plans
	Updated risk register is routinely available to all members of the IPT and other project stakeholders	Updated risk register is routinely available to all members of the IPT and other project stakeholders	Updated risk register is routinely available to all members of the IPT and other project stakeholders

Attachment 3—Best Risk Management Practices–Checklist Items

The following checklist was developed from the best risk management practices list and was used to study DOE project and program risk management practices. The checklist has been organized by project phase and risk management activity.

1.0 Initiation to CD-0 (Mission Need - Mission Need Statement [MNS])

1.1 Risk Planning:

1.1.1 Methods are established to manage risks in MNS or other docs

1.1.2 Risk management activities and focus for conceptual design phase are identified and documented

1.1.3 Initial responsibility assignment matrix for risk management is developed in MNS or management plan.

1.2 Risk Identification

1.2.1 Risk templates, checklists, lessons learned from other projects and other appropriate sources identified to stimulate risk identification in MNS or other project docs

1.2.2 Based on mission need and project objectives, key project risks and uncertainties are identified (MNS)

1.2.3 All members of the IPT (or prospective IPT), program office and other stakeholders are active participants in the risk identification effort as stated in MNS or management plan/IPT charter

1.2.4 Both threats and opportunities are identified in MNS

1.2.5 Initial Risk Register is developed and included with Mission Need Statement documentation

1.3 Risk Analysis

1.3.1 The overall risk level of the project is identified and communicated in MNS

1.3.2 Evaluation of mission, goals and objectives for project considers a comparative analysis of alternatives and overall risks associated with those alternatives (MNS)

1.3.3 Initial efforts include at least a qualitative cost and benefit review of possible alternatives, with appropriate consideration of relative risks (MNS)

1.3.4 Project cost and schedule range considers potential risk impacts (MNS)

1.4 Risk Handling

1.4.1 Alternatives identified for evaluation during the conceptual design phase have considered the most appropriate mechanisms for handling identified risks (MNS)

1.4.2 To extent possible, project scope and plans focuses on risk avoidance and transfer (MNS)

1.4.3 When needed to mitigate risks, appropriate R&D or technology development efforts have been planned and budgeted as part of the conceptual design phase (MNS, management plan)

1.5 Risk Monitoring (none identified)

1.6 Risk Reporting

Mission Need documentation includes reporting on all identified risks, including current assessment of those risks and identified handling strategies/plans (MNS)

2.0 Definition to CD-1 (Conceptual Design)

2.1 Risk Planning:

2.1.1 Initial draft of Risk Management Plan is developed

2.1.2 Risk methodologies are refined and formalized (in RMP or PEP)

2.1.3 Risk related communications are initiated and formalized (required in RMP or PEP)

2.1.4 Key project assumptions are further identified, defined and documented (in RMP, PEP, or management plan)

2.1.5 Risk management activities and focus for preliminary design phase are identified and documented

2.1.6 Responsibility assignment matrix is refined as needed (RMP or PEP)

2.2 Risk Identification

2.2.1 Risk identification is a key area of focus during evaluation of project alternatives (Required by RMP)

2.2.2 Risks are identified and considered for all alternatives under consideration during this phase (CDR, RMP, or PEP)

2.2.3 The participants in the risk identification process include all elements of the IPT and any contractors supporting the project (RMP, PEP, IPT Charter)

2.2.4 Both threats and opportunities are identified

2.2.5 Estimates are developed for the consequences or impacts on all risks, especially moderate and high risks

2.2.6 Risk triggers are monitored and refined as needed (required by RMP or PEP)

2.2.7 Risk Register is maintained as a key project tool and is regularly updated (required by RMP or PEP)

2.3 Risk Analysis

2.3.1 Qualitative risk assessment completed for both threats and opportunities

2.3.2 Risks ranked using standardized matrix that combines probability (likelihood) and consequences (impacts)

2.3.3 Initial quantitative risk analysis used to compare alternatives, ensure funding adequacy, and set cost and schedule range for preferred alternative

2.4 Risk Handling

2.4.1 Alternative selection considers the mitigation or reduction of overall project risk to the extent possible (CDR, required by RMP or PEP)

2.4.2 Risk handling strategies have been developed and implemented for at least all identified moderate and high risks

2.4.3 Appropriate approvals have been obtained for all risks to be transferred to other parties (required by RMP or PEP)

2.4.4 Preliminary design phase plans focus on execution of risk handling strategies (required by RMP or PEP)

2.5 Risk Monitoring

2.5.1 Risk monitoring processes and responsibilities defined and implemented

2.5.2 Risk Owners routinely reporting status and progress for all risks (required by RMP or PEP)

2.6 Risk Reporting

The Conceptual Design Report or other CD-1 documentation package includes a Risk Report

3.0 Execution - Baseline Development to CD-2

3.1 Risk Planning:

3.1.1 Complete version of Risk Management Plan is developed and approved by FPD

3.1.2 Risk management processes are formalized, in place and actively being worked (required by RMP or PEP)

3.1.3 Key project assumptions, including risk analysis bounding assumptions, are finalized, clearly communicated and used as basis for risk analysis that supports project baseline contingency allowances (required by RMP or PEP)

3.1.4 Project baseline includes appropriate activities, resources and costs for risk management activities over the remaining project life cycle (required by RMP or PEP)

3.1.5 The risk management responsibility matrix is reflected in the Project Execution Plan, and effectively implemented (required by RMP or PEP)

3.2 Risk Identification

3.2.1 Risk identification is continued with regular additions to the Risk Register as preliminary design is completed (required by RMP or PEP)

3.2.2 The participants in the risk identification process include all elements of the IPT and any contractors supporting the project (required by RMP or PEP; IPT Charter)

3.2.3 Specific probabilities are assigned for all risks to facilitate/enable quantitative risk analysis

3.2.4 Specific estimates of consequences are assigned for all risks to facilitate/enable quantitative risk analysis

3.2.5 Risk triggers are monitored and refined as needed (required by RMP or PEP)

3.2.6 Risk Register is maintained as a key project tool and is regularly updated (required by RMP or PEP)

3.3 Risk Analysis

3.3.1 Qualitative risk assessment completed for both threats and opportunities

3.3.2 Risks ranked using standardized matrix that combines probability (likelihood) and consequences (impacts)

3.3.3 Quantitative risk analysis is completed and provides basis for project cost and schedule contingency allowances and funding plans used to establish baseline

3.3.4 Monte Carlo simulation techniques are used to perform quantitative risk analysis

3.4 Risk Handling

3.4.1 Cost and schedule baseline includes all planned risk handling strategies, including mitigation efforts

3.4.2 Contingency allowances included in cost and schedule baseline are sufficient to handle all accepted risks as well as residual risks following mitigation actions

3.4.3 The likelihood of mitigation success or effectiveness has been considered when setting contingency allowances

3.5 Risk Monitoring

3.5.1 Mature risk monitoring processes are in place and routinely used (required by RMP or PEP)

3.5.2 Risk Owners update risk status and progress on monthly basis (required by RMP or PEP)

3.5.3 Previously identified “low” risks are periodically reassess to confirm they have not changed or become more significant threats (or opportunities) to the project (required by RMP or PEP)

3.6 Risk Reporting

Monthly Project Report includes a section of risk or a separate risk management report (required by RMP or PEP)

4.0 Execution - Detailed Design to CD 3

4.1 Risk Planning:

Risk Management Plan is periodically reviewed for currency and applicability and revised as needed (required by RMP or PEP)

4.2 Risk Identification

4.2.1 Project processes are in place to ensure new risks are identified on routine basis and old risks can be retired (required by RMP or PEP)

4.2.2 Risk Register is maintained as a key project tool and is regularly updated (required by RMP or PEP)

4.3 Risk Analysis

Adequacy of remaining contingency allowances (cost and schedule) periodically re-evaluated using quantitative risk analysis techniques and methodologies (required by RMP or PEP)

4.4 Risk Handling

Risk handling strategies and actions are tracked and updated or revised as needed. (required by RMP or PEP)

4.5 Risk Monitoring

4.5.1 Risk monitoring is a routine project process (required by RMP or PEP)

4.5.2 Risk Owners update risk status and progress on monthly basis (required by RMP or PEP)

4.5.3 Previously identified “low” risks are periodically reassess to confirm they have not changed or become more significant threats (or opportunities) to the project (required by RMP or PEP)

4.6 Risk Reporting

Monthly Project Report includes a section of risk or a separate risk management report (required by RMP or PEP)

5.0 Execution—Post CD-3-Construction

5.1 Risk Planning:

Risk Management Plan is periodically reviewed for currency and applicability and revised as needed (required by RMP or PEP)

5.2 Risk Identification

5.2.1 Project processes are in place to ensure new risks are identified on routine basis and old risks can be retired (required by RMP or PEP)

5.2.2 Risk Register is maintained as a key project tool and is regularly updated (required by RMP or PEP)

5.3 Risk Analysis

Adequacy of remaining contingency allowances (cost and schedule) periodically re-evaluated using quantitative risk analysis techniques and methodologies (required by RMP or PEP)

5.4 Risk Handling

Risk handling strategies and actions are tracked and updated or revised as needed. (required by RMP or PEP)

5.5 Risk Monitoring

5.5.1 Risk monitoring is a routine project process (required by RMP or PEP)

5.5.2 Risk Owners update risk status and progress on monthly basis (required by RMP or PEP)

5.5.3 Previously identified “low” risks are periodically reassess to confirm they have not changed or become more significant threats (or opportunities) to the project (required by RMP or PEP)

5.6 Risk Reporting

Monthly Project Report includes a section of risk or a separate risk management report (required by RMP or PEP)

Attachment 4—Summary of Observations of DOE Risk Management Practices

Based on the specific experience of some Corrective Measure 3 team members, the following risk management practices have been noted by some of the team members.

1. DOE's projects are universally considering only a small percentage of the risks that are the causing DOE's cost and schedule overruns and performance problems. Most of the documents reviewed:

    - Do not include the sources of project failure identified in the root cause study.
    - Do not include the sources of project failure identified by DOE's lesson's learned program.
    - Do not include the sources of DOE project failure identified in the National Research Council's Assessments of DOE project management.
    - Do not include the sources of DOE project failure identified in the GAO's reports.
    - Do not include the risks identified in Attachment 8 of G 413.3-7.
    - Do not appear to have considered the completeness, reasonableness, or stability of project requirements.
    - Do not appear to have considered the risk resulting from assumptions or lack of information.

2. Most projects appear to be utilizing risk management only because it is required. Few Federal Project Directors seem to have more than surface level knowledge of the subject or have read either G 413.3-7 or the National Research Council's publication "The Owners Role in Project Risk Management" which was funded by DOE and was based on DOE's risk management performance problems.

3. Risk management is not being used as either a planning or decision making tool.

4. Risk Management is general being viewed as a stand alone activity rather than an integrated element of the larger project management effort. For example only a few of the projects that have been reviewed are:

    - Utilizing the earned value data that is already being collected and reported monthly as a risk indicator or trigger.
    - Including technical readiness level gaps as risk.
    - Include risks updates in their Quarterly Project Status Reviews.

5. Most risk probability and impact figures appear widely optimistic and unsupported. Independent reviewers do not appear to be evaluating the reasonableness of the figures or the knowledge levels of those developing the figures.

6. No evidence has yet been found that the Federal Project Directors are complying with (or understand) DOE Order 413.3A's requirement that "Federal Project Directors must demonstrate initiative in incorporating and managing an appropriate level of risk to ensure best value for the government" (Section 6.g. page 39). Further:

    - This requirement is not being included in the individual projects list of FPD responsibilities

    - This requirement is not listed as a Federal Project Director responsibility in DOE G 413.3-7 (see Section 3.3.1 page 5)

    - The submitted documentation was checked to see if this requirement was possibly being devolved to the contractor project manager. It was found that it does not appear under the contractor project manager's roles and responsibilities. (Note: this is a federal rather than a contractor responsibility)

7. While most projects claim that their risk management programs are continuous, few appear to be actually complying with Order 413.3A's requirement that risk manage must be continuous and the associated concept that new information needs to be gathered as the project progresses to provide additional insight into risk areas and allow for the continuous refinement of the risk mitigation strategies (see Section 5.k.(11) page 32). The Portsmouth Environmental Remediation Project reflects this problem.

    - Section 1 of their Risk Management Plan states "Risk Management is a continuous process that identifies, analyzes, mitigates, reports, and tracks risk that have the potential to adversely affect the Project."

    - The transmittal letter for the Risk Management Plan; however states that revisions are being made on a semi-annual basis.

    - The Risk Management Plan that was submitted by the contractor is dated February 2008 and is therefore 16 months old.

    - The Risk Assessment/Opportunity Forms that were submitted by the contractor; uniformly list February 20, 2008 as the "Last Date Evaluated".

    - The accompanying Federal Risk Management Plan for the Portsmouth Operations Project is dated May 2007 and is therefore 25 months old.

    - The Risk/Opportunity Forms that were submitted with the Federal Risk Management Plan show that they were Last Evaluated on either May 8, 2007 or March 9, 2007.

The fact that the Projects are only periodically updating their risk documentation and that most risk documentation is out-of-date is being flagged as a problem in many Independent Reviews. For example:

- One of the Major Findings of from the May 2009 External Independent Review of the Nuclear Materials Safeguards and Security Upgrades Project, Phase II was "the project's risk assessment is not current and does not properly characterize or evaluate risk to the project".

8. Triangle probability distributions are typically being employed when performing Monte Carlo simulations even though: 1) a far boarder set of probability distributions have been available for some years on all most all commercially available risk management software programs; and 2) the projects have not determined what shape of probability distributions are actually being experienced on the different risks areas that DOE projects routinely face.

9. Neither the projects nor some Independent Reviewers appear to have an adequate understanding of risk triggers. As a result risk triggers are being employed erroneously or not being employed at all on even those projects considered to have strong risk management programs.

    - The Risk/Opportunity Assessment Forms submitted with the Contractor's Risk Management Plan reviewed did not identify risk triggers.

    - The Risk/Opportunity Assessment Forms submitted with the Federal Risk Management Plan list risk triggers but incorrectly use exactly the same words to describe the risk event and the event trigger. For example, for the risk "Changes to DOE/Federal Orders/Federal & State Regulations" the event trigger is also listed as "Change to DOE Order or Federal and/or State Regulations." Similarly, for risk "Reduced Funding from IPABS Target" and the event trigger is also listed as "Reduction in funding levels from IPAB Target".

    - This runs counter to Section 4.3.3 of DOE G 413.3-7 which correctly states "a risk trigger metric is an event, occurrence or sequence of events that indicates that a risk may be about to occur …"

    - The Risk/Opportunity Assessment Forms submitted with the Federal Risk Management Plan for Project reviewed does not include an accompanying date for the risk trigger as recommended in Section 4.3.3 of DOE G 413.3-7.

    - The May 12, 2009 External Independent Review of the Nuclear Materials Safeguards and Security Upgrades Project Phase II listed the absence of risk triggers as a Major Finding, i.e. an omission that is of such significance that the ability of the project team to successfully execute the baseline is jeopardized. The EIR report provided little if any supporting information to help the project understand why the absence of risk triggers was considered of this importance and neither DOE's directives or the PMDCP risk management training course address the subject in a meaningful way.