FACILITIES MAINTENANCE AND ENGINEERING PROCEDURE		
Subject: **ASSIGNMENT OF RISK AND CONTINGENCY**	FMEP-G-0180	Rev. No. 3
	Page 1 of 7 Approval: DJD Date: 9/14/07	

1.0 PURPOSE

Identifying risk, assessing its severity and selecting and managing options for resolving those risks provides a structure for establishing cost and scheduling provisions, to mitigate probable technical, cost, contract, and schedule risks associated with project execution. The purpose of this procedure is to ensure consistency in the development of contingency reserves for the mitigation of risk.

2.0 GENERAL

Since risk impacts our ability to successfully accomplish the job within technical, schedule and cost estimates, risk management has proven to be an important success factor. This procedure addresses the steps needed to prepare a risk analysis that is used to determine the amount of contingency necessary for successful completion of the project.

A unique parameter that must be followed by Facilities Maintenance and Engineering (FME) at NCI-Frederick is a 10% target maximum on contingency (set by NCI-F) as determined by utilizing the Quantitative Risk Analysis Matrix (QRAM) process. Detailed engineering or studies may be required to further develop the scope of work and assumptions upon which the project cost estimate is based to ensure that contingency is sufficient to mitigate risk items and associated contingency to the acceptable maximum level. The project QRAM will be included in all CA, IFA and FA packages forwarded for NCI approval.

Contingency is derived through analyzing the risk associated with the work scope being estimated or performed. The magnitude of estimated contingency, both schedule and cost, depends on planning, design, procurement, and construction; and the complexities and uncertainties of the operation. For less complex projects or projects in the preliminary planning stages, contingency is often estimated as a percentage of a particular cost or component of work. FME estimating procedure, FMEP G-0130 discusses the three principal estimates generated by FME (i.e., Preliminary planning estimates, conceptual authorization estimates, and fiscal authorization estimates).

Schedule risk is defined as the additional time required to meet the proposed schedule based upon uncertainties associated with those activities. Schedule contingency is a bottoms-up approach where the Project Manager determines his/her confidence in meeting the anticipated beneficial occupancy date. The “At Risk” contingency is added to activities

where the Project Manager does not have confidence in meeting the proposed schedule based where concerns regarding individuals, organizations, vendors, or service providers exist.

3.0 IDENTIFYING RISK AND ESTABLISHING CONTINGENCY FOR PROJECTS GREATER THAN $50K

Contingency reserves are needed to successfully execute a project based on identified risk. The Quantitative Risk Analysis Matrix (QRAM) (Exhibit 1a) is the method used to identify, analyze, quantify, and mitigate risk. The Potential Risk Checklist (Exhibit 2) is a means to identify issues to populate the QRAM. Completion of the QRAM results in a summary risk management plan that is useful in managing the project. This approach will formulate a reasonable prediction of the total cost for completing the scope of work undertaken, including an estimation of risk.

The following subsections describe the content of and approach for development of a QRAM. Exhibit 1b provides an example of a completed QRAM for projects greater than $1M. For projects greater than $50K but less than $1M, a slightly modified version of the QRAM (Exhibit 1c) can be used if the project team elects to do so. Within this modified QRAM the focus is on the identification of risk items, the mitigation activities, and the impact to cost and schedule. A unique parameter that must be followed by Facilities Maintenance and Engineering (FME) at NCI-Frederick is a 10% target maximum on contingency (set by NCI-F) as determined by utilizing the Quantitative Risk Analysis Matrix (QRAM) process. Detailed engineering or studies may be required to further develop the scope of work and assumptions upon which the project cost estimate is based to ensure that contingency is sufficient to mitigate risk items and associated contingency to the acceptable maximum level. The QRAM will be developed by the project team under the direction of the Project Manager. The QRAM will include a statement such as: "The Project Team has identified the above items as potential risks".

3.1 Identify the Risk Type: The categories that should be considered to include contractual, technical, cost, schedule and programmatic. The project team along with other support staff should be involved in this assessment. Some additional examples of the risk areas to consider include:

- Funding and customer performance expectations
- Reliability, maintainability, or operability requirements; acquisition strategy

- Rates and estimations
- Long lead items, subcontractor or external interfaces, resource availability
- Staff experience, communications
- Market conditions

3.2 Prioritization of Risk: The project team determines the priority of the risk item. A high, medium or low priority is assigned to each risk item. If a risk item is urgent, serious, or has the potential for rapid growth, a high priority rating is warranted. High, Medium or Low priorities are assigned and then sequenced by using a number scheme (1 = Highest Priority, 2 = Next Highest, etc.). The priorities may be driven by schedule urgency, not necessarily the probability of occurrence or the likely impact. The highest priority risk should be the one that the Project Manager and team are most concerned about, in terms of jeopardizing project success. The QRAM table should be organized with the highest priority risk item listed first.

3.3 Specific Risk Item: After the project team identifies general areas where risk may exist, the next step in the QRAM process is for the project team to identify specific risks that may exist in each area. Each risk is specifically described in detail to enable estimating the cost impact of the problem and the development of specific ways of mitigating the risk. This description should identify: why, what and the impacts.

3.4 Probability of Occurrence: The probability of occurrence is the likelihood that the risk item will occur. This is a subjective value that should be based on past history or on engineering judgment. Assessing probabilities is subjective; however, individuals with the most knowledge are the best suited to classify the probability of occurrence. If the probability of occurrence is 100%, it is not a risk and should be included in the baseline as a planned activity. Probabilities are classified into six levels: High, Significant, Moderate, Minor, Low, and Unlikely, (90 %, 70%, 50%, 30%, 20% and 10% respectively).

3.5 Cost to Correct: The cost to correct is the estimate of all activities required to complete if the risk item occurs. In the event that a risk may occur multiple times, each anticipated event should be accounted for in the cost to correct. The project team must prepare a justification supporting the estimate. This may be developed in the form of a resource loaded schedule and/or a Basis of Estimate.

By developing a schedule, the impact on the overall project schedule can be evaluated. Greater planning makes it easier to determine the mitigation steps.

3.6 Likely Impact: The likely impact is the weighted cost of the risk item before mitigation. The likely impact is determined by multiplying the Probability of Occurrence by the Cost to Correct. (Probability of Occurrence * Cost to Correct = Pre-Mitigation Analysis Likely Impact)

3.7 Risk Mitigation Sequence: Risk mitigation planning involves identifying alternatives for reducing or minimizing risk. An evaluation of the alternatives leads to a final selection for implementation. Risk mitigation planning recognizes that each mitigation action has a cost and schedule impact associated with it. This impact should be compared to the impact on the project if no mitigation actions are taken. The risk mitigation sequence is repeated until each risk is identified, evaluated, and mitigation methods are described and assessed.

3.8 Mitigation Delta Cost: The delta cost column provides an estimate of the cost of the mitigation activities. It should be supported by a documented BOE. Some mitigation activities may not have a cost impact, such as changes that are made to plans that are within the budget, contract language changes that reduce vagueness with the customer or a subcontractor, or discussions that are held with the customer at an already planned meeting. The majority of the risk mitigation activities have costs associated with them.

Note: If the mitigation activities are certain to take place, then the mitigation costs should be included in the Estimate to Complete (ETC), not the QRAM.

3.9 Mitigation Delta Time: Delta time is an assessment of the impact of the mitigation activity to the overall baseline project schedule. If there is no impact to the project schedule, this column is left blank. If the mitigation activity is on the critical path, or if the activity affects a milestone or deliverable, the days of impact are shown in this field.

3.10 Assess the Residual Risk: At the point, when risk items and mitigation plans have been identified and detailed, the next step in the risk management process is to assess the residual risk. The elements or residual risk are probability of occurrence %, cost to correct, and remaining likely impact.

Residual Risk Probability of Occurrence % - This states the likelihood of the original risk item occurring after the mitigation activities have been performed. This probability is generally less than the value in the pre-mitigation analysis probability of occurrence column and is represented as a percentage. If the probability of occurrence is 100%, it is not a risk. The likely impact is so high that it should be included in the baseline as a planned activity.

3.10.1 Residual Risk Cost to Correct: Should state the estimate, supported by details, of the corrective action that would be required if the risk item still occurred even if the mitigation activities were performed. This value should be less than or equal to the cost in the pre-mitigation analysis cost to correct column. This number is shown as thousands of dollars ($K). In most cases, the costs to correct may remain the same; however risk reduction is reflected in a lower probability of occurrence.

3.10.2 Residual Risk Remaining Impact: The weighted cost of the occurrence of the risk after mitigation has taken place. The residual impact is determined by multiplying the value in the residual risk probability of occurrence column by the amount in the residual risk cost to correct column. The number is shown as thousands of dollars ($K).

3.11 Date When the Risk Can Be Closed: Risk mitigation activities are closed out when risk is no longer a factor in the success of the project. One of the following occurs: the activities defined in the risk mitigation plan have been executed, or the risk is determined to be no longer a potential problem. For example, if the risk was late receipt of equipment, the date the risk can be closed is most likely the date that the equipment is received. When risks are eliminated or no longer a potential problem, contingency assigned for that item can be reduced from the contingency plan or redirected for other purposes, as determined by project team consensus. These results are documented via the trend process. The FME Trend Program, FMEP G-0120 discusses this process.

3.12 Determining the Reserve: The reserve value comes directly from the QRAM. It is the sum of the mitigation delta cost column and the residual risk remaining impact columns

3.13 Documenting Assumptions and Developing Backup Documentation: Assumptions should be written while the QRAM is being developed. It is important to capture all of the key assumptions and document the Basis of Estimates for the probability of occurrence and cost to correct. This information is useful in updating the QRAM as the project progresses and on other future, similar projects. In addition, auditors can use this information to assess the robustness of the QRAM and reserve position.

3.14 Analyze Reserves: Once the QRAM and reserve position are complete, they should be assessed for realism by the project team. Regular reviews of project status against the Risk Management Plan will result in the identification of new risks, measurement of the effectiveness of mitigation steps and corrective actions.

4.0 CONTROLLING AND TRACKING CONTINGENCY

Contingency is controlled, approved, tracked, and documented, based upon established and approved levels of control. Contingency is for defined in-scope uncertainties and risks. Funds to perform additional work scope are provided from a management reserve held by NCI-Frederick, as described in Section 6 of this procedure. Even though the cost baseline exists throughout the project life, the assignment and use of contingency begins at conceptual approval. Since contingency is consumed as project work is performed part contingency reserves are included in the estimated cost at completion (EAC). Contingency is monitored and reported in monthly performance reports and discussed in project status reviews. The project manager has the responsibility to distribute and use contingency through a process that requires a contingency usage log (Exhibit 3a) and trends as described in the FME trend Program, FMEP-G-120.

5.0 CONTINGENCY USAGE LOG

The contingency usage log is maintained to document allocation of and remaining contingency whereas; trends (FME Procedure FMEP-G-0120) are used to document the purpose, the amount, and allocation of the contingency used. The contingency usage log provides a means of tracking the changes in the contingency position throughout the life of the project. An example of an acceptable contingency usage log is shown in Exhibit 3b. The first entry in the log is to establish the initial contingency balance. Transactions are

represented in thousands, for increases and decreases in the reserve position for each separately identified transaction. The contingency balance represents the net amount in contingency, after the contingency change transaction has occurred.

Examples of transactions and the impact to residual risk are as follows:

- Decrease due to the use of the contingency reserve for a risk item that results in an increase in the Actual Costs of the project and costs are included in the Estimate At Completion (EAC).
- Elimination of the risk item results in a decrease in the residual remaining risk.
- Scope changes, or elimination or reduction of a previously identified risk reduces the residual remaining risk reserve.
- Identification of additional risk items, associated with remaining scope of work, results in an increase in the project's residual remaining risk.

6.1 MANAGEMENT RESERVE:

Management reserve needed during project execution, for evolution or changes to the project scope, and other events that occur between the establishment of the baseline and project completion, is not identified by FME. Management Reserve funds may be made available to the project by the NCI-Frederick Program and Contracting Officer approval. Only upon approval of such a request, can the project baseline incorporate the scope, schedule and budget requirements of the change and increase the Estimate at Completion (EAC).

Exhibit 1a Quantitative Risk Analysis Matrix (blank)
Exhibit 1b Quantitative Risk Analysis Matrix for Projects >$1M (completed example)
Exhibit 3a Contingency Log
Exhibit 3b Contingency Log (example)