

Project Assessments: An Essential Element of Project Management during Project Execution - 14505

James G Burritt, PE, Longenecker and Associates, Las Vegas, NV

ABSTRACT

Most waste remediation projects are one of a kind, frequently using unique technology and processes that are developed for the specific application.. This situation demands a high-performing project manager and project team using all the modern project management tools and practices available. These tools and practices must include an active, adequate system to continually monitor project compliance and progress. This system consists of reviews and on-going project assessments which is, ideally, developed and managed by the project manager. These assessments and reviews can be conducted by members of the project staff or by external subject matter experts. If appropriate, assessments may be directed by external authority, either in the project's chain of command, or by other oversight organizations who have the authority to initiate the reviews. In the case of external reviews, the successful project manager will know scope of the assessment and will perform a self assessment of that scope before the external team arrives. If circumstances permit, the project team will have corrected all the deficiencies before the external review team arrives.

This paper suggests areas for evaluation and sample lines of inquiry as well as techniques the project manager could employ to develop a self assessment program that can result in high project performance and continuous performance improvement.

INTRODUCTION

The author, under contract to the U. S. Department of Energy (DOE), has conducted a number of reviews of DOE projects, including major waste remediation and capital construction projects. He has also conducted reactor safeguards assessments for the U.S. Navy. One key to project success is a comprehensive understanding of the status, both from the standpoint of compliance with directives and regulations, and with progress against an accurate performance measurement baseline. It is important that the project manager have confidence that the project is successfully proceeding toward completion by keeping focused on technical goals and by measuring progress against the performance measurement baseline, as well as ensuring continuing compliance with applicable rules and regulations. Additionally, the project team needs to know as soon as possible if the project goes off track.

Rigorous project review programs are recommended by the National Research Council in their reports on project management within the Department of Energy and by the Project Management Institute, among others. They are required by Department of Energy Directives. While project reviews initiated and conducted by external entities

are common, continuing and event-specific reviews scheduled and conducted by the project manager and his staff are not as common.

While the DOE has a rigorous project review and assessment program, the review and assessment process described herein is applicable to any project in any environment.

Reviews and assessments can be originated either by the project or by entities outside the project. Examples of the latter include peer reviews, external independent reviews, Government Accountability Office (GAO) reviews, and the like.

Ideally, all reviews, whether initiated internally within the project or externally, will be conducted objectively, with the intent of improving the project's performance. With this approach, the success of the review is measured by the degree that it helps the project improve, and not merely by the size of the list of findings and observations for the project to rectify. When an externally initiated review is announced, the reviewing entity should identify the purpose and scope of the review and should provide a list of lines of inquiry. (Of course, the lines of inquiry may be expanded as the review progresses and areas for expanded investigation are identified.)

While the author recognizes that a typical project can be overburdened by reviews, the reviewed entity should prepare for each review by going over the lines of inquiry to ensure that the project is complying with requirements and is accurately measuring project progress. Then, the project team should prepare material to address the lines of inquiry before the review team arrives on-site. In other words, do a pre-review to prepare.

The project manager should develop and execute a self-assessment review schedule which covers the activities that the contractor is responsible for as well as activities for which the project staff is responsible. The nature and extent of the review and assessment program depends upon the nature and complexity of the project. To ensure objectivity for self-assessments it may be occasionally worthwhile for the project manager to engage the services of an external entity to perform the review for him rather than using in-house assets.

Project reviews can be of two types: progress or compliance. Progress reviews are periodic, usually monthly and quarterly. They present information on cost and schedule performance, and progress toward the technical baseline. Compliance reviews verify compliance with laws, rules, regulation, and directives. Compliance reviews also verify that management systems established to comply with various requirements are working satisfactorily. For DOE projects, externally initiated compliance reviews are conducted as a project prepares for a Critical Decision.

All findings and recommendations should be logged, tracked, and adjudicated in a corrective action program. All reviews should include a review of the corrective action program to ensure that adequate progress is being made toward completing items. The reviews should sample some of the closed corrective action items to ensure that the project is not slipping back into old ways of operating.

The author has observed, while conducting external reviews of projects, that those projects which had utilized an effective self-assessment program were generally better managed, were in better compliance with rules and regulations, and adhered more closely to the performance baseline than those projects which did not have self-assessment programs. For example, one large project with a particularly rigorous self-assessment program completed an External Independent Review with very few findings and negative observations. Conversely, another large project, with a much less rigorous self-assessment program had many findings and negative observations. Projects whose self assessment programs assessed their progress reporting systems generally detected adverse trends earlier than those projects which did not.

DISCUSSION

Review and Assessment Planning

Each project should develop a project review schedule. It should include self assessments as well as scheduled external reviews. The schedule should cover a reasonable length of time, for example one year. It should include the topic, the segment of the project affected by the review, the reviewing organization, the time frame for the review, and the expected duration of the review. It should be a rolling list, updated periodically. As a minimum, a copy of the schedule should be provided the members of the project team.

The reviewing organization must be aware that reviews can be disruptive to routine project management operations, and where possible, should consider reviewing the project in increments over a period of time rather than reviewing the entire project at once. Of course, there are times, such as reviews which are prerequisite for a Critical Decision under DOE's capital asset project management order (DOE Order 413.3B), when it is appropriate to evaluate the entire project at once.

Each review will have a designated leader. It is important that the reviewer(s), either an individual or a team, are experienced in the disciplines and area they are reviewing. They cannot be second-teamers. Ideally, they are or have been in a position that has been responsible for the areas they are covering.

The team leader must set the tenor of the review. He must ensure that the review is focused on progress and compliance, with an overall mindset that the objective of the review is to improve the project where needed. He must ensure that the reviewers remain objective, and establish a policy that the success of the review will not be measured by the number of findings or negative observations.

Each review should have a review plan. The plan serves two purposes; it makes the reviewers plan the effort, and it allows the reviewed entity to prepare for the review. The contents of the plan are determined, in part, by the scope and extend of the review

or assessment. The review plan should as a minimum contain the following topical areas:

- Type and purpose of review or assessment
- Scope of the review or assessment
- Review areas and lines of inquiry
- Documents to be reviewed
- Schedule

When the review or assessment is complete, a list of findings and observations should be prepared and provided. The project office should have an action tracking system that includes the item, the responsible entity, the due date for corrective action, a description of the recommended and actual corrective actions, and the concurrence of a responsible individual that the action is, in fact complete.

While the proposed self-assessment and review programs described in this paper are discussed in the context of the Department of Energy, they are applicable to most any project, government or commercial.

A notional process flow for a compliance review is depicted in figure 1.

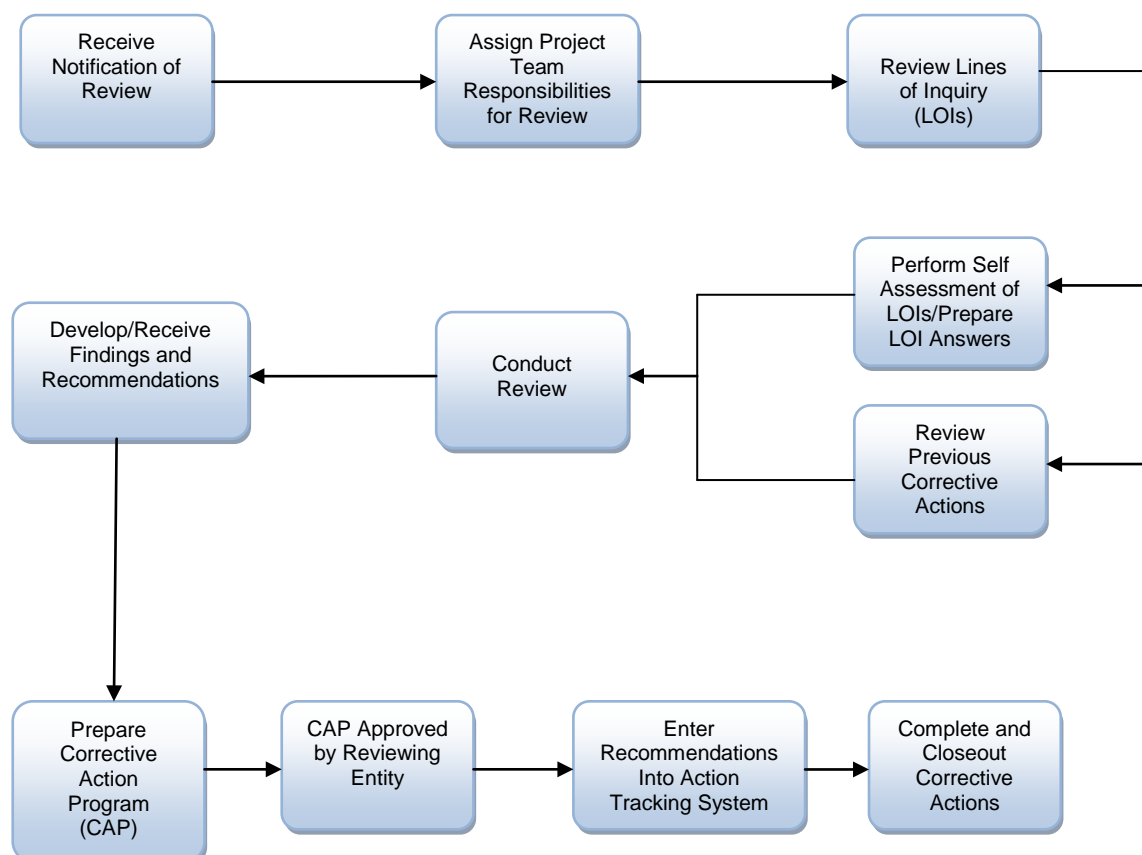


Fig. 1. Notional Compliance Review/Assessment Process Flow

Conduct of the Review or Assessment

Progress reviews are conducted periodically. They are typically made by the contractor to the project office, and by the project office to the program office or higher authority.

A typical progress review will include the following topics:

- Cost performance
- Schedule performance
- Adequacy of funding
- Status of the contract and changes
- Issues
- Look-ahead

One typical problem with progress reviews is that by the time the information is reported, it is out of date. It is not uncommon for a monthly progress report to be issued 4-6 weeks after the end of the month from which the data is collected. This reporting lag time is reflected in the lag time to detect and correct adverse trends. The project manager needs to take steps to ensure that data needed for progress reviews are collected and reported expeditiously so that project reviews are current, not ancient history.

Compliance reviews are conducted either as specific events, or as a continuous system of self assessments. Suggested areas and lines of inquiry for a compliance assessment and review program are discussed below. These areas will be tailored to suit the specific project situation. Some of these items may be evaluated only once during the project cycle. Others will be subject to periodic evaluation of the life of the project.

1. Systems Functions and Requirements

- A. Assess whether "design-to" functions are complete and have a sound technical basis including safety and external requirements such as permits, licenses, and regulatory approvals.
- B. Assess whether system requirements are derived from and consistent with the Mission Need.
- C. Assess whether the project completion requirements are clearly defined in the requirements document, and whether these requirements are quantified and measurable, or can otherwise be reasonably determined as satisfied.
- D. Determine whether the project requirements analysis adequately considered lessons learned from other projects.
- E. Determine whether systems functions and requirements have been properly documented, e.g., requirements document, system design descriptions, facility design description, or equivalent documentation.

2. Basis of Design

- A. Review the test program and any test results to verify justification of the design
- B. Review of process flow sheet and assess the reasonableness of the input and output parameters for each unit operation.
- C. Ensure process and material balance flow sheets are adequate to support environmental permitting, license and other regulatory decisions.
- D. Ensure that the design addresses results of reliability, availability, maintainability, and inspect-ability (RAMI) analyses.
- E. Assess the design & safety basis, and system, facility and functional design criteria and definitions against the program requirements and the key performance parameters to assure that full compliance and alignment exists.

3. Design Review

- A. Assess whether the design review process is adequate.
- B. Assess whether the Project Design Review Team contains appropriate experience and technical disciplines.
- C. Assess, based on a reasonable sample, whether design review comments were incorporated into the design and whether the costs and schedule changes associated with design changes were incorporated into the performance baseline.
- D. Verify that the Design Review confirmed that the Process Flow sheet and input and output parameters for each unit operation has a reasonable design basis.

4. Design Basis Information

- A. Assess the current status of drawings and specifications.
- B. Ensure consistency of drawings and specifications with systems functions and requirements.
- C. Review and assess instrumentation and control systems.
- D. Assess whether all systems, structures, and components needed for safety have been incorporated into the design.
- E. Review selected drawings to assess reasonableness of estimated equipment and construction costs.
- F. Assess the effectiveness of the design configuration control processes and procedures including the management of electronic and hardcopy data throughout the executing organizations and their subcontractors.

5. Value Engineering/Value Management

- A. Assess the applicability of Value Management/Engineering, and whether a Value Management Assessment and Value Engineering Studies should be or were performed with results being incorporated into the baseline.
- B. Assess the Value Management/Engineering processes including whether the VM team has a reasonable skill mix and experience background.
- C. Assess whether life cycle cost analysis was reasonably performed for the trade-off studies and various alternatives reviewed.

6. Work Breakdown Structure

- A. Assess whether the WBS appropriately incorporates all project work.
- B. Assess whether the WBS represents a reasonable breakdown of the project work scope and is product oriented.
- C. Assess whether a WBS dictionary adequately describes the project work scope.
- D. Assess whether the overall integrated project Resource-Loaded Schedule is consistent with the WBS for the project work scope.

7. Resource Loaded Schedule and Independent Cost Review

- A. Assess the basis and defensibility of the project cost and schedule estimates associated with the overall integrated project Resource Loaded Schedule.
- B. Assess the approach to escalation and ensure that escalation is consistent with the duration of the project.
- C. Evaluate how procurement activities are factored into the cost estimate and schedule.
- D. Ensure resources and budget assumptions are appropriate
- E. Budget impacts

8. Critical Path

- A. Assess whether the Critical Path is reasonably defined and maintained.
- B. Assess whether the Critical Path reflects an integrated schedule and schedule durations are reasonable.
- C. Provide the duration between the Critical Path completion date and the project completion date and determine whether the schedule contingency (float) is reasonable and defensible for this type of project.

9. Risk Management

- A. Assess adequacy of the risk/opportunity assessment management plan/process (RAMP) and the method(s) used to identify and quantify risks, including an evaluation of assumptions, and whether a reasonably complete list of potential risks was developed for analysis.
- B. Assess adequacy of the qualitative analysis and rating (high, medium, or low) of current risks (including site specific factors such as availability of contractors) for probability of occurrence and for consequence of occurrence.
- C. Evaluate the extent and adequacy of quantitative risk analysis.
- D. Evaluate whether the risk watch list and risk assessment sheets appear to be complete.
- E. Evaluate the adequacy of the management control process for risk status/updating.
- F. Confirm that risks associated with use of any new technology have been accounted for appropriately in the risk assessment.
- G. Assess the range of cost and schedule contingency, including identifying contingency amounts associated with the 50% - 95% range of confidence levels, and provide an assessment of whether the basis of contingency is reasonable for this type of project.
- H. Assess whether all appropriate risk handling actions, including accepted risks, and residual risks have been incorporated into the performance baseline including cost and schedule contingency
- I. Evaluate the use of the RAMP and the monthly assessment of risks and opportunities
- J. Assess Government Furnished Services and Items (if applicable) communications/interface agreements

10. Project Execution Plan (PEP)

Assess whether the PEP is complete and current, reflects and supports the way the Project is being managed, establishes a plan for successful execution of the Project, and is consistent with the other project documents.

11. Integrated Project Team (IPT)

- A. Review the IPT Charter and staffing plans with respect to:
 - a. Adequate staffing and qualified personnel
 - b. Organizational structure and division of roles/responsibilities, and
 - c. Processes for assigning work and measuring performance.
- B. Assess whether the contractor project management staffing level is appropriate, determine if appropriate disciplines are included on the contractor project management team, and identify any deficiencies that could hinder successful Project execution.

- C. Assess whether all feasible risk mitigations have been identified and that the concerns for which explicit line management risk acceptance and actions will be required are appropriately supported.
- D. Assess plans for training/mentoring and understanding of roles/responsibilities of contractor and project staff.
- E. Evaluate the alignment between the project objectives/goals and the performance standards/plans of staff (management down through working level)
- F. Assess the overall structure and utility of the IPT.
- G. Assess the effectiveness of corporate communications, vertically (in both directions) as well as horizontally throughout the entire project team for any and all project related information that affects the effectiveness of the execution of the project.

12. Integrated Project Team Effectiveness and Dynamics

Review the integrated project team key personnel, dynamics and practices relative to:

- A. The leadership traits and experience/qualifications of the senior management team,
- B. Communication systems, techniques, media, participation and tracking,
- C. The presence and/or absence of constructive synergies through interactions between the project team members and interfacing support organizational representatives,
- D. Behavioral characteristics including (but not limited to) integrity, dedication, magnanimity, openness, creativity, fairness, assertiveness, communication skills, interpersonal skills, a "can do, get it done" attitude, inspiration, ambition, enthusiasm, empathy, competence, ability to delegate tasks, cool under pressure, team-building skills, problem solving skills, self-worth, self-esteem, and charisma.

13. Change Control

Assess the project-level change control processes and procedures to assure that the project has properly developed and is effectively managing the revision control and information dissemination of:

- A. The scope of the project,
- B. The cost estimates associated with the scope basis,
- C. The schedules associated with the scope basis,
- D. The risks and opportunities associated with the project uncertainties, and
- E. The guiding management documents that form the authorized basis for the execution of the project.

14. Operational Readiness

- A. Review the startup test requirements and assess whether they represent
 - a. The acceptance and operational system tests required to demonstrate that the system meets design performance specifications and safety requirements, and
 - b. Sufficient operations readiness scope definition that a reasonable cost and schedule baseline for those activities has been established.
- B. Assess traceability of functional, operational, and safety requirements into the start-up test plans.
- C. Assess any exceptions taken by construction contractor or project consultants in meeting startup test specifications.
- D. Assess the startup test plans relative to whether they identify how tests will be determined to be successful, and that appropriate equipment and instrumentation are included in the preliminary design.
- E. Review key tests to ensure that sufficient description is provided to estimate cost and schedule durations associated with these tests.
- F. Assess whether cost and schedule included in the performance baseline are defensible to accomplish the required startup activities.
- G. Assess whether there is sufficient cost and schedule contingency for test and equipment failure during startup testing.
- H. Assess whether the start-up plan has been fully integrated with existing site functional organizations including security.
- I. Assess component, subsystem, system, and systems integration testing to ensure the project is including these activities in the scope, cost and schedule baselines, and
- J. Assess operator and maintenance personnel training and, if applicable, qualification to ensure the project is including and addressing these activities at an appropriate level of detail.

15. Project Monitoring and Reporting

- A. Determine the status of EVMS certification.
- B. Evaluate the knowledge level and involvement of the Cost Account Managers (CAMs)
- C. Assess whether the project control systems and reporting requirements are in place to correctly report project status data, percent complete, Estimate at Complete, and Earned Value.
- D. Assess the capability to provide timely and accurate transfer of actual cost information from the accounting system into the earned value management system.
- E. Discuss specifically whether accrual accounting is being used, and if not, assess the adequacy of the EV system to acceptably report monthly cost and schedule information.
- F. Assess the system/methodology for analyzing and managing the critical path(s) schedule.

- G. Evaluate the Federal and contractor control processes for evaluating and incorporating formal changes, conducting internal re-planning, and adjusting past, present and future information to accommodate changes.
- H. Identify whether the process includes a system to document, explain, and justify changes.
- I. Evaluate the control and use of contingency with respect to change control process.
- J. Assess whether Project Control/EVMS inherent in all review areas above are effective and these processes have been implemented.
- K. Assess the alignment between the WBS, RLS, and EVMS.

16. Project Contracting and Procurement

- A. Determine whether the way the project is being executed is consistent with the acquisition strategy.
- B. Determine whether the IPT reviewed previous acquisition strategies for similar projects and discussed them with the key personnel involved to take advantage of lessons learned.
- C. Determine whether contracts and procurement incentives and goals are appropriately applied and considered in the acquisition, procurement and contracting strategies.
- D. Determine whether the project will be executed using an appropriate contracting strategy...e.g. design-build or a design-bid-build approach.
- E. Evaluate any changes from prior critical decision phases.
- F. Assess whether the current AS still represents best value to the government.
- G. Assess any aspect of fast tracking the project and the full awareness of the risks as well as the benefits in that approach.
- H. Assess if approved changes are expeditiously incorporated as contract changes.

17. Construction Planning, Execution, and Support

- A. Assess Construction safety program
- B. Assess the engagement of experienced and appropriately qualified construction personnel in design development and review processes.
- C. Assess the engagement of experienced and appropriately qualified construction personnel in procurement and contractor/fabricator selection processes.
- D. Assess the intra-project roles and responsibilities and lead/support relationships and authority defined and active during the construction phase.
- E. Assess the change control processes and support.
- F. Assess response times, technical decision processes mechanisms, field and field-office communication, progress measurement, conflict resolution, etc.
- G. Assess construction/operations interface

18. Project Quality

- A. Assess the completeness, adequacy, and flow-down of the Project Quality Assurance Program based on applicable QA program requirements.. The review team will review the record of QA audits performed on the Project and the disposition of the audit findings.
- B. Assure that the QA/QC Plan and implementing procedures address personnel training and qualifications, quality improvement programs, document and record management, work processes, management and independent assessments, acceptance test planning and implementation, and the process for dispositioning field changes.
- C. Assess QA/QC requirements for construction planning.
- D. For nuclear projects, assess whether NQA-1 requirements have been appropriately incorporated into the "Design-to" functions.
- E. Assess vendor issues, including adequate NQA-1 suppliers (the numbers are going down), shortcomings in vendor QA programs and staff, vendor QA program implementation on the floor level (e.g. the understanding and alignment of the foreman and inspectors to the QA requirements), etc.
- F. Assess the requirements definition and flowdown
 - a. Direction
 - b. Execution
 - c. Communication
 - d. Verification
- G. Assess procedural compliance/execution
- H. Evaluate implementation of Commercial Grade Dedication
- I. Assess implementation of a graded approach to quality
- J. Evaluate culture to ensure no production pressures
- K. Evaluate effectiveness of corrective actions regarding human performance
- L. Ensure appropriate Federal understanding of QA with respect to oversight
- M. Evaluate any inconsistency in application between NQA-1 and ISO-9000
- N. Assess consistent application of regulations/requirements, and consistent interpretations.

19. Hazards Analysis (For DOE Nuclear Projects)

- A. Assess the hazards analysis process, including consistency with DOE-STD-3009-94 "Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Safety Analysis", the use of internal and external safety reviews, and whether an Integrated Safety Management System (ISMS) has been employed in identifying and addressing hazards.
- B. Assess whether the facility is properly categorized in accordance with the methodology in DOE-STD-1027 "Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports".
- C. Identify the functional make-up of the hazards analysis integrated project team (IPT), provide an assessment of the overall staffing mix and expertise of the

team, and determine the current involvement of the hazard analysis team on the Project.

- D. Assure that a reasonable and comprehensive list of potential accident scenarios and consequences for major hazards (include fire and seismic) are identified, with focus on those scenarios that will drive design requirements.
- E. Assess whether the hazards analysis of the selected process alternative is comprehensive and the safety requirements are incorporated in the design (DOE Deputy Secretary Clay Sell memo of 12/5/05), and whether subordinate alternatives continue to be evaluated.
- F. Assess whether worker safety hazards have been addressed in the design process, including radiation protection and criticality.
- G. Review any Defense Nuclear Facilities Safety Board (DNFSB) interfaces and discussed the status of their involvement and determined whether DNFSB issues were reasonably considered and addressed.

20. Safety (Nuclear and Industrial)

- A. Assess whether nuclear and facility safety programs adequately integrate safety into design and whether safety considerations are articulated in design documents.
- B. Assess whether a preliminary set of design basis accidents is established for the facility based on the potential for challenging or exceeding the DOE-STD-3009 Evaluation Guideline.
- C. Assess structures, systems and components (SSCs) and determine if:
 - a. The safety analysis identifies a complete set of SSCs;
 - b. The safety SSCs are designated according to defense-in-depth, safety-significant, or safety class; and
 - c. The functional requirements are identified for safety SSCs and are linked to design requirements in accordance with DOE O 420.1A/DOE G 420.1-1.
- D. Assess the adequacy of the Safety Design Reports being prepared for the next critical decision phase approval.
- E. Assess the completeness and adequacy of the approved Project ES&H Program and Plan.
- F. Confirm the completeness of the Integrated Safety Analysis and its schedule for submittal to DNSFB, if applicable.

21. Safeguards and Security

- A. Assess the completeness and accuracy of the applicable safeguards and security requirements, the methods selected to satisfy those requirements, and any potential risk acceptance issues applied to the Project and their incorporation into the Project.
- B. Assess adequacy of incorporation of Design Basis Threat requirements into the baseline.

- C. Review the Performance Baseline to ensure that cost, schedule, and integration aspects of safeguards and security are appropriately addressed.

22. Support and Maintenance

- A. Assess the thoroughness of definition of support and maintenance resources required for project execution.
- B. Assess the level of commitment of those support and maintenance resources in support of the project objectives
- C. Assess the responsiveness and performance of the support resources in response to the project needs.
- D. Assess the cost and schedule effectiveness of the support and maintenance resources in response to the project needs

RECOMMENDATIONS

Every project should establish a rigorous self-assessment and review program to ensure that the project manager and staff have a full appreciation of project status with regard to progress and compliance.

If time permits, each project should conduct a self-assessment of the areas scheduled to be reviewed by an external entity prior to the review.

Each project should tailor the assessment and review process to their particular project.

Recommendations developed as a result of assessments should be evaluated, and if accepted, tracked to completion.

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