

**U.S. Department of Energy**

**Office of Management, Budget and Evaluation**

Reviews, Evaluations, and  
Lessons Learned



Initiated by: Office of Engineering and Construction Management



# REVIEWS, EVALUATIONS, AND LESSONS LEARNED

## 1.0 OVERVIEW

Reviews and evaluations are essential to maintain confidence that project management systems and processes, and technical efforts, are integrated and effectively coordinated throughout the Department of Energy (DOE). This process provides knowledge to make necessary decisions and to confirm project accomplishments.

Reviews and evaluations provide confidence in the continuing ability of the project to meet its technical, schedule, cost, and programmatic commitments. They also provide value-added assistance to the PD and PM as needed. Reviews and evaluations are performed at all levels of management throughout the lifecycle of the project. The process consists of planning and conducting reviews and evaluations during the project's Initiation, Definition, Execution, and Transition/Closeout phases.

All aspects of the review and evaluation (assessment) process should be subject to continuous improvement through a critical decision feedback process. At each critical decision point, feedback should be provided and continuous improvement realized. Information feedback on the adequacy of controls is obtained, opportunities for improving work definition and planning are identified and implemented, internal and external independent oversight is conducted, and if necessary, regulatory enforcement actions occur.

Quality improvement, management oversight, and independent evaluation processes should be included as a part of the project's planning, scheduling and budgeting activities. The Preliminary Safety Analysis Report (PSAR) provides a valuable feedback mechanism to the design process through developing and documenting a defensible safety basis for the project, as does DOE and project independent reviews. In addition, an integrated team approach permits the feedback and continuous improvement processes to be functioning at formal and informal levels.

All reviews and evaluations should be based on a tailored approach considering project-specific attributes; review/decision objectives; and project size, cost and complexity. These reviews and evaluations form a valuable body of knowledge for future projects and therefore should form the documented foundation for lessons learned reports.

The lessons learned process provides useful information DOE can employ to inform and train current and future project teams. Lessons learned can be derived from prior experience, evaluation activities, directed action items, jeopardy items, issues, concerns, accidents, incidents, and corrective actions.

## **2.0 PURPOSE**

The purposes of reviews and evaluations during the Initiation and Definition phases are to help ensure that projects support the Department's mission goals and strategic plans. Reviews and evaluations also help verify that a project can be successfully performed within allocated resources and applicable constraints.

The purposes of reviews and evaluations during Execution and Transition/Closeout phases are to: (a) validate that projects are being successfully executed according to plans and within established technical scope, schedule, and cost baselines; (b) ensure agreed upon project products and deliverables are being provided; (c) provide recommendations for improving the project's technical scope, schedule, and cost performance; and (d) support the project process by developing recommendations and necessary supporting data to arrive at decisions to either proceed or not proceed with subsequent project life cycle phases.

The purpose of the lessons learned process is to provide both DOE and contractor managers with the opportunity to review summary documentation of project issues and their mitigating efforts, and to incorporate the experience of other projects into their own projects.

## **3.0 PROJECT REVIEWS**

Reviews are part of the project planning process and assist the PD/PM and upper-level management in developing project plans and verifying that the project mission will be met. Reviews provide information to help make decisions, and demonstrate and confirm a project's accomplishments at various stages. The core of all DOE project reviews is a presentation of Earned Value Management System (EVMS) indicators when EVMS is employed. Such indicators include, as a minimum, cost performance index, Schedule performance index, estimate-at-completion, estimated time to complete, and a trend of management reserve and risk-based allowance use. Cost and schedule performance indices are to be based upon a rolling assessment, and evaluated down to at least Level-3 of the project's Work Breakdown Structure. Review objectives include:

- Ensure readiness to proceed to a subsequent project phase.
- Ensure orderly and mutually supportive progress of various project efforts.
- Confirm functional integration of project products, and the combined efforts of organizational components.
- Enable identification and resolution of issues at the earliest time, lowest work level, lowest cost, and least impact.
- Support event-based decisions.
- Control risk.

Two major functions of the PD/PM and the integrated project team (IPT) are to prepare project status reports and conduct project status review meetings. Properly planned and presented, these efforts reduce the number of information requests imposed on the project. These two activities are to be timely, informative, and accurate.

Reviews communicate information on a project's current status, progress, completeness, correctness, or work completion. Reviewers include users, suppliers, contractors, managers, stakeholders, and peers. Under the direction of the PD/PM, the project should involve the user in organizing, scheduling, and presenting project reviews. One or more of the following types of reviews are performed in support of DOE projects:

- *Regular/Periodic.* Involve project status, trends, design and construction progress for systems and interfaces. These reviews include monthly reviews, quarterly reviews, peer reviews for development work, and so forth. All are an integral part of ongoing project activities.
- *Areas of Special Concern.* Involve critical technology, hazards, special procurements, high risks, etc. Some of these reviews can be planned and budgeted in advance, others will be on an as-needed basis. All such unplanned reviews are funded by the project.
- *Event-Driven.* Involves mission validation, safety analysis report, baseline validation, critical decisions. These reviews are necessary to obtain approval to proceed to follow-on project phases. These reviews are an integral part of a project and are planned in advance; most are performed by independent entities.
- *Unscheduled.* Could involve the General Accounting Office, Defense Nuclear Facilities Safety Board (DNFSB), DOE Headquarters, or the user. Generally performed on projects with high congressional visibility or projects that experience schedule or cost difficulties. For large, visible projects, these reviews may be anticipated and planned, and should include both schedule and cost components.
- *Status Reviews.* Performed to determine the current condition of a project or activity. For example, progress towards completion, compliance status, or readiness to proceed. Reviews could include items (project baselines, requirements, subsystems, or project end products), or activities (planning, design, or construction). These reviews can involve management and/or the user. Products from these reviews include review plans, review reports, action item lists, and action item resolution reports.
- *Design Reviews.* Design reviews determine if a product (drawings, analysis, or specifications) is correct and will perform its intended functions or meet requirements. Design reviews are peer or internal reviews. They are an integral part of the project test and evaluation effort and may be planned as such.

Reviews are generally organized and provided by project personnel, including contractor and subcontractors. Other entities are involved when needed, such as technology experts,

engineering, senior management, the end-product user, and appropriate stakeholders. A review has a specific objective and the performers plan the review to meet that objective. Review information is generally presented in a meeting, with the review participants questioning the presenters to ensure a thorough understanding of the material and information being presented. Unresolved issues are placed on an action-item list and each action assigned to an individual to be resolved within a specified performance period. A review report is prepared, summarizing review results and including a list of unresolved or open issues and responsible personnel. Resolution of unresolved issues noted during a review are documented. Critical design reviews, Critical Decision-0 through Critical Decision-4, held during a project life cycle, assesses the status of a project in order to obtain approval to proceed to the next phase.

Reviews are an important project activity and should be planned as an integral part of the project. They should be tailored to project complexity, duration, and Critical Decision points. The user or management may request additional reviews at any time. The PD/PM needs to establish a balance between a need-to-inform and the cost of providing reviews.

## **4.0 APPLICATION**

Providing a consistent DOE review and evaluation process at each critical decision point ensures adequate control of resources in meeting project objectives. Documenting these activities provides the value-added benefit of including a project's lessons learned into the Department's body of knowledge.

Reviews are essential for the PD/PM to maintain confidence that project systems, processes, and technical efforts are integrated, effectively coordinated and provide the required information. Reviews also help ensure that the project is progressing at an effective and acceptable rate, particularly regarding established baselines.

Each project has phases through which it evolves. A clear understanding of these phases permits better control and use of resources in achieving goals. Regardless of size and complexity, project phases consist of Initiation, Definition, Execution, and Transition/Closeout. The following sections describe the review data repository, the governing body of requirements, and the various critical decision points in the critical decision process.

### **4.1 DOE Data Repository**

The DOE data repository, maintained by Office of Engineering and Construction Management (OECM), provides project management reporting that includes scope, schedule and cost performance. Headquarters and other major milestone information is also included. The repository contains review and assessment checklists (Table 1) for all projects presented to the Energy Systems Acquisition Advisory Board (ESAAB), noting their progress through the critical decision process. Data is preserved throughout the lifecycle of each project proposed and approved. In addition to reviews and reports, the repository contains information regarding

issues and jeopardy management items and identified corrective actions. The Issue/Action Item and Jeopardy Form is designed to accommodate either general issues or specific action items. It is also used for jeopardy issues that may require escalation to higher levels of management. The Issues/Jeopardy tracking log is maintained by each project to track all issues or actions originating from an ESAAB, or from agency or management requests. These documents become an integral part of the DOE's "lessons learned" file, available for evaluation and application on future projects. The PD/PM coordinates updates from the Field to OECM on a monthly and/or quarterly basis.

**Table 1. ESAAB Review and Evaluation Checklist**

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**CD-0 CRITERIA**

- Have the program's strategic goals and objectives been addressed? YES  NO
- Are project objectives, requirements, priorities, and constraints documented? YES  NO
- Has a Project Risk Management Plan been prepared and project risks identified, analyzed, and determined to be either avoidable or manageable? YES  NO
- Has the MNS and pre-project planning activities been completed? YES  NO
- Have all significant project issues been identified, resolved, and documented? YES  NO
- Is an IPT organized and functioning? YES  NO
- Has a mission need Independent Project Review been completed? YES  NO
- Have technical and functional requirements been identified? YES  NO

**CD-1 CRITERIA**

- Has a Preliminary Hazard Analysis Report been issued? YES  NO
- Is the risk identification and analysis complete? YES  NO
- Has a request for PED funding been submitted? YES  NO
- Is the Conceptual Design Report complete? YES  NO
- Has an Acquisition Strategy, including all elements, been completed? YES  NO
- Has a verification of mission need review been completed? YES  NO
- Has the preliminary Project Execution Plan, including baseline range and documents, been submitted for approval? YES  NO
- Has the Project Data Sheet for design been submitted? YES  NO
- Have all significant issues been addressed, resolved, and documented? YES  NO
- Have long-lead and special equipment items been identified? YES  NO

**CD-2 CRITERIA**

- Are project engineering and design (PED) funds available for use for design of the project? YES  NO
- Has the contractor's performance measurement system been reviewed and validated? YES  NO
- Has the final Project Execution Plan been issued? YES  NO
- Has the independent cost review or estimate been completed and verified? YES  NO

- Has a Preliminary Safety Analysis report been completed? YES  NO
- Has a National Environmental Policy Act, and Record of Decision been documented? YES  NO
- Has a performance baseline EIR been performed? YES  NO
- Have the project plan and performance baselines been updated? YES  NO
- Has the Project Data Sheet for construction been submitted? YES  NO
- Have all significant issues been resolved and documented? YES  NO

**CD-3 CRITERIA**

- Have appropriate safety documents been completely approved? YES  NO
- Has the project been included in the budget submittal process? YES  NO
- Has the project plan and performance baseline been finalized? YES  NO
- Have design and procurement packages been completed? YES  NO
- Has the Program Office verified that this project supports the mission need? YES  NO
- Has an execution readiness IR been completed? YES  NO
- Have all issues and/or jeopardy items been identified, addressed, and documented? YES  NO

**CD-4 CRITERIA**

- Have all activities been executed and completed, including construction? YES  NO
- Has all design verification testing been completed? YES  NO
- Have the Operational Readiness Review and acceptance reports been completed? YES  NO
- Has the safety documentation been completed and approved? YES  NO
- Has the project closeout report and its supporting documentation been completed? YES  NO
- Has a Lessons Learned document been completed? YES  NO
- Have all issues been closed out and documented? YES  NO

**4.2 Mission/Program Documentation Review and Assessment**

During the Initiation phase, the Program Office, in partnership with the originating office, submits the Mission Need Statement (MNS) and the pre-acquisition planning documentation to the Deputy Secretary of Energy and the review board (ESAAB) for review and assessment. Prior to the submission of the MNS for ESAAB approval, a mission need independent project review is performed to ensure that: (a) the mission is credible and justifiable; (b) the mission supports the DOE mission; (c) alternative solutions have been considered; and (d) the MNS is ready to proceed for ESAAB consideration. When submitted, the documentation should contain short, qualitative information primarily focused on mission need. The Deputy Secretary of Energy may approve the mission need documents; approve mission need (Critical Decision-0) and the funding request; request modifications and re-submittal, or terminate further project efforts. Approval of Critical Decision-0 confirms that the proposed project supports the DOE mission, initiates “formal” start of the project, and authorizes development of the conceptual

design and supporting studies to adequately define and develop the project. Documentation supporting the decision should include a preliminary analysis of risk (technical, schedule, and cost), together with an estimate of potential impact on Departmental resources. The preliminary risk analysis serves to identify issues and opportunities to be addressed during conceptual design. Other deliverables during the Initiation phase include: project level functions and requirements, alternative/value management studies, long-lead approach procurements, a project data sheet for design, and preliminary schedule and cost baseline ranges.

For projects explicitly directed and initiated by Executive Order or Congressional Act and executed in accordance with Federal Facility Agreements, Tri-Party Agreements, or Presidential or Secretarial Announcement, the direction or edict serves as the Approve Mission Need, Critical Decision-0.

### **4.3 Conceptual Design Review and Assessment**

Products developed during conceptual design for review and assessment include Acquisition Strategy (AS); Conceptual Design Package; preliminary Project Execution Plan; baseline ranges; system-level functions and requirements; site investigations; applicable codes, standards and procedures; safety and operability reviews; verification of mission need; a Value Management Plan; and a Preliminary Hazard Analysis Report. Unless a PD/PM has been selected and an IPT organized, details associated with the conceptual design remain the responsibility of the Program Office and the originating Field Office sponsor. However, if not already completed, conceptual design marks the organization of the IPT consisting of the Federal program manager, the PD, the PM, and others as designated by the PD.

For all projects, the appropriate Acquisition Executive (AE) conducts a quarterly project performance review with the Federal project manager and staff. The contractor may participate in this review as appropriate. For Major System projects, the schedule and agenda are coordinated with OECM, and OECM is invited to participate with the Program Secretarial Officers (PSO) in the review. Quarterly performance reviews for other projects having a total project cost (TPC) less than \$20M may be delegated to a Senior Executive Service Program Manager or Operations/Field Office manager. The contractor may participate in this review as appropriate. OECM is invited to participate in all performance reviews for projects having a TPC greater than \$5M.

### **4.4 Preliminary Design Review and Assessment**

The conceptual design review and assessment is performed to verify that sufficient progress has been achieved, the level of information has been developed, and requirements have been satisfied to allow the expenditure of PED funds for project design. During preliminary design, the beginning of the Execution phase, the PD/PM ensures completion and submittal of: (a) the Project Data Sheet for construction; (b) National Environmental Policy Act documentation; (c) the Preliminary Safety Analysis Report; and (d) Final Project Execution Plan, including the

performance baselines. A review of the responsible contractor's project management system, a performance baseline External Independent Review, and preparation of an independent cost estimate or performing an independent cost review are also completed to ensure project compliance with requirements and validation of data. As appropriate, long-lead and special procurements may begin during this phase, including requesting a partial Critical Decision-3 decision.

With confirmation of all aspects of the preliminary design review and assessment completed, Approve Performance Baseline, Critical Decision-2, is approved. OECM updates and records the data in the DOE data repository.

#### **4.5 Final Design and Construction Review and Assessment**

With approval by the appropriate ESAAB to begin final design and project construction, the final documentation updates occur. These include the Project Execution Plan (PEP), performance baselines, verification of mission need, safety documentation, and design and procurement packages to the degree appropriate to initiate construction. Construction, in this sense, is a generic term that may refer to engineering development, physical construction, remedial actions, etc. A Critical Decision-3 also requires the performance of an Execution Readiness Independent Review. Completion of this review initiates the request for budget and congressional authorization and appropriation. Critical Decision-3 is approved after confirmation of completion and verification of documents listed above, and the expenditure of funds for construction is authorized. All data reviewed by the ESAAB is filed in the DOE data repository, including "lessons learned" for future potential evaluation and application.

#### **4.6 Project Transition/Closeout/Operations Review and Evaluation**

Prior to project closeout or start of operations, the cognizant PD/PM coordinates acceptance/completion documentation to support Critical Decision-4. These documents include the Operational Readiness Review (ORR) and Acceptance Report, the Final Safety Analysis Report (FSAR), and the lessons learned report. Not all projects will undergo transition activities, but may proceed directly to closeout as prescribed by project planning documentation. In this case, a final project closeout report is completed and submitted to the ESAAB for review. Verification of the closeout plan includes the following:

- Roles, responsibility, and authority of personnel for safe closeout of the project
- Alternative use studies or approvals
- Decontamination, decommissioning, and demolition planning, if required
- Closeout approval
- Permits, licenses, and/or other environmental documentation
- Disposition of all claims

- Termination or closeout of contracts
- Lessons learned report
- Submittal of a final closeout report and any adjustment to obligations and costs
- Reallocation of resources
- Post-project reviews.

For projects transitioning to a user, the user and the project organizations perform tests and evaluations to ensure that the project, as designed and built, can be safely operated and meets project mission requirements and project products and deliverables commitments. Transition of the project to the user concludes with the documented final acceptance of the facility by the user organization. This is reported to the ESAAB for inclusion by OECM in the DOE repository.

## **5.0 TRADITIONAL PERFORMANCE REVIEW**

All of the methods for ascertaining performance are no substitute for a stand-up, face-to-face presentation by the project that provides a forum for discussing progress and performance. For each project, the appropriate AE conducts a quarterly project performance review with the PD/PM and staff. For Major System projects, the schedule and agenda for these reviews are coordinated with OECM, and OECM is invited to participate with the AE in the review. Quarterly performance reviews for other projects having a TPC less than \$400M may be delegated to the assigned AE. The SAE should conduct quarterly reviews of projects having a TPC greater than \$400M, and of other projects selected and scheduled by the Under Secretaries. These reviews provide both information exchange and more detailed information than that provided in status reports.

The contractor may participate in quarterly reviews as appropriate. The review schedule and agenda are coordinated with the Office of Management, Budget and Evaluation (OMBE), and OMBE is invited to participate in the reviews with senior managers for projects having a TPC greater than \$5M.

A performance review can occur in many forms. Generally, it is a PD's/PM's verbal and visual presentation of current project status. Such reviews do not replace the contracted fee incentive process, but are an adjunct that provides timely information in an open forum. Performance reviews are scheduled on consistent, periodic intervals to help ensure uniformity and regularity, the attendance of all interested parties, and avoid the possibility of long periods of time between reviews. These reviews, properly prepared, presented, and conducted in the proper interface mode, increase teaming between the DOE and the contractor's staff.

Performance reviews provide opportunities to present more specific and detailed project information than possible in a structured, formal status report. These meetings provide opportunities to address questions and concerns, discuss future actions and activities, identify

needed user or contractor support, and discuss actions or decisions by external entities that influence the project (e.g., Office of Management and Budget (OMB), Environmental Protection Agency, Congress, DNFSB). Finally, these meetings are a forum for identifying, discussing, and resolving issues (or assigning actions) before issues become a problem. Performance reviews should use an approach tailored to project specific attributes, review/decision objectives, project status, size, and complexity.

## **6.0 INDEPENDENT REVIEWS**

Credible, independent project reviews are an expectation of Congress, OMB, local stakeholders, Tribal Nations, and the DOE, Headquarters Program Offices, and DOE Operations/ Field Offices. As discussed, the PD/PM will conduct periodic reviews and assessments of project status throughout project Definition and Execution to discuss project progress, planning and development, effective use of funds, mission need, and project status. Independent reviews, however, are conducted by non-proponents of the project. An independent review may be a science-based or engineering-oriented peer review; a review of the project management structure and interrelationships between key organizational components; a review targeted to a specific issue such as cost, budget, or schedule; a review covering safety; or any combination thereof. Several independent reviews may be combined for efficiency, as appropriate. The completion of a rigorous independent review should reduce the need to perform additional resource-consuming audits and reviews by other organizations. Reviews may be scheduled or unscheduled to meet a specific objective or need, such as a budget validation or a CD request. The scope of a review is dependent on the cost/complexity of the project and its current status, and the needs and objectives of the reviewing organization.

The project may also experience reviews that are initiated by other governmental agencies such as the General Accounting Office, Office of the Inspector General, DNFSB, or others. These reviews need to be conducted with as little project impact as possible.

The DOE recognizes that independent reviews are valuable in assessing the status and health of its projects, and are therefore supportive of these reviews. However, independent reviews need to be coordinated with the PD, and the AE, if necessary, to minimize overlap, confusion and project impact.

### **6.1 External Independent Reviews**

An External Independent Review (EIR) is conducted by reviewers from outside the Department. OECM, in cooperation with the program and project, selects an appropriate contracting agency to perform such reviews, excluding the M&O/M&I contractors. The actual selection of reviewers, contract management and contact with the contracting officer, and dialogue with the EIR contractor on matters pertaining to the contract, are the responsibility of OECM.

All EIRs are managed by OECM, in coordination with the appropriate PSO to define review scope, select a review time, and evaluate credentials of potential reviewing organizations and individuals. Review results are documented in a review report, and the data filed in the DOE data repository. The following components are planned and coordinated with the appropriate PD:

- Specific review scope and objectives
- Review start and completion time
- Method of performing the review
- Organizations/personnel to be interviewed
- Areas of risk (to be reviewed at greater levels of detail)
- Organization of the review report and resolution of findings
- Credentials of reviewing organization and individuals
- Appropriateness of the review team (skills mix, experience, preparation).

The PSO Project Management Support Office provides on-site coordination for the EIR contractor, resolves issues of schedule and access while on site, gathers and provides requested information for the review team, and responds to the review team on errors of fact or needed clarification. The Project Management Support Office does not provide direction to the reviewers as to the reviewers' findings on the content of the report.

Line management, including the Deputy Secretary, PSO, or a program or project organization within the PSO, may request an EIR. EIRs also may be initiated in response to an external requirement. Reviews, studies, or investigations conducted by the General Accounting Office or the Office of the Inspector General are not considered EIRs for DOE purposes.

External technical reviews are used to determine if complex issues exist, and to provide assistance in resolving them. If a design is new, untried, or unproven, and no standards against which judgments regarding viability can be made, a review by appropriately trained and knowledgeable experts is in order. Technical reviews also include reviews of the contractor's project control system.

A tailored approach should be applied in determining the quality and level of detail to be in an EIR. Simpler areas that offer low risk of project impact should receive less scrutiny than high-risk areas, potential costly areas, or areas where problems seem to be developing.

## **6.2 Independent Project Reviews**

An Independent Project Review (IPR) is conducted by reviewers within the Department. The Deputy Secretary or SAE, the PSO, the Operations/Field Office Manager, Program Managers and Federal project managers may authorize or conduct IPRs as required. The PSO or

Operations/Field Office manager, as part of the project management oversight process, may request IPRs through the Project Management Support Office for any project, including MS projects. Regardless of the organizational level initiating an IPR, the PSO or Operations/Field Office manager notifies OECM of its intent to conduct such a review, and OECM is included as an invited observer. OECM coordinates its participation on a case-by-case basis with the appropriate organization. Members of an IPR team are not obtained from the responsible Program Office within a PSO organization, related contractors from the project office, or a related funding program. Reviews may use laboratory, contractor, university, or other expertise from organizations not directly funded by or related to the project being reviewed.

### **6.3 Independent Cost Reviews**

Independent Cost Reviews (ICRs) are used primarily to verify project cost and schedule estimates and support the Critical Decision-2 process in establishing project performance baselines. ICRs are an integral part of the performance baseline EIR. However, an ICR or even an Independent Cost Estimate (ICE) may be requested at other times and for other reasons. The OMBE functions as DOE's agent to establish contracts for ICRs. ICRs are documented in formal reports submitted to the SAE/AE by OMBE. Each ICR is reconciled with the current Program Office estimate.

### **6.4 Types of Independent Reviews**

The following mandatory reviews are conducted on all projects having a TPC greater than \$5M:

- *Mission Need IPR*. This is a limited review of the project prior to Critical Decision-0 to validate the mission need and the funding request.
- *Performance Baseline EIR*. This is a detailed review of the entire project, including an ICR, prior to Critical Decision-2. It verifies proposed technical, schedule, and cost baselines. For projects with a TPC greater than \$20M, it also assesses the overall status of the project management and control system.
- *Executability Review EIR or IPR*. This is a general review of the project prior to Critical Decision-3 that may range from an abridged review of specific areas within a project to a comprehensive review of the entire project. As a minimum, it verifies the readiness of the project to proceed into construction or remedial action. This review is an EIR for Major System projects with a TPC greater than \$400M, and an internal review (IPR) for all non-Major System projects. OMBE should be provided with the IPR report for their review prior to the Critical Decision meeting.

### **6.5 Other Project Reviews**

A number of opportunities exist throughout a project's life cycle to use the review process to implement and enhance project execution. Examples of reviews typically performed during the lifecycle of a project include design reviews, environmental assessments, safety analysis review,

operational readiness review, etc. The use of non-advocate experts to supplement the project staff is an approach that can bring credible industry expertise and resources to the review process. This can significantly broaden the review viewpoint.

Reviews are used to determine if a project will perform its intended functions, meet established requirements, and provide required products. Reviews are also used to determine the current condition of a project. They are an integral part of the project and should be planned in advance and used to complement the line organization's responsibilities.

### ***6.5.1 OMBE Mission Need Review and Acquisition Strategy Review***

OMBE should review each MNS and its justification and each AS for projects having a TPC greater than \$5M as part of the Critical Decision-0 and Critical Decision-1 approvals, respectively. PA&E will review the MNSs and OECM will review the ASs. These reviews reflect the Department's commitment to assuring improved front-end alignment with corporate strategy, and its resolve to perform more thorough planning, alternative evaluations, and risk assessments early in the acquisition of materiel assets. The MNS and AS are stand-alone documents that provide and/or reference the documented rationale for the AE's justification and strategy for moving a project forward into the Definition phase, and the overall acquisition planning and controls that will support the Execution phase. These documents provide the bases for the IPT's consideration and conclusions associated with the alternatives, risk/risk trade-offs, AS, and planning.

### ***6.5.2 Technical Review***

Technical reviews are necessary when uncertainty exists concerning the outcome of a key project decision. For example, if a process technology is untried, or unproven, and no standards against which judgments regarding viability can be made, then an in-depth review by appropriately trained and knowledgeable peers is in order. Specific types of reviews can include:

- Alternative systems
- Constructability
- Functions and requirements
- Preliminary design
- Detailed design
- Technology
- System verification
- Physical configuration
- Test readiness

- Functional configuration
- Operability and Reliability, Availability, and Maintainability

### **6.5.3 Decision-Point Review**

Decision-point reviews verify that sufficient (often prescribed) progress is achieved, level of information is developed, and requirements are satisfied to effectively initiate performance of subsequent activities.

The nature of decision-point reviews (excluding CD reviews) can be project control systems-oriented, technically oriented, or both. The higher the decision-level, the greater the need to perform a review. Depending on the project needs and purpose, the scopes of decision-point reviews vary; they can range from simple reviews of minor project elements to Critical Decisions. Decision Point Reviews are documented by OECM during the ESAAB process.

### **6.5.4 Operational Readiness Review**

Although titled a review, an ORR is not a project review in the normal use of the term. Rather, an ORR is an in-depth independent evaluation of the readiness of completed facilities, systems, equipment, procedures, personnel, and supporting and interfacing systems and organizations to begin facility operation. Because of the importance of this activity, ORR planning is initiated early in a project's lifecycle. Planning may (as a minimum) include the project and the user organization and document decisions concerning assignment of responsible individuals, identification of resource needs, and preparation of a resource-loaded schedule. In most cases, the ORR is a DOE responsibility.

## **7.0 TITLE**

Experience has shown that pre-established checklists are an essential part of the review process. This is the case regardless of the project or the phase of the project being reviewed.

Environmental management has approached the review process by developing a somewhat generic checklist for EM projects: The Environmental Management–Project Definition Rating Index (EM-PDRI). In this case, the rating index is solely intended for use in evaluating the readiness of an EM project to obtain a critical decision.

In a like manner, sample project checklists have been provided (Attachments 1 through 18) to assist individual projects in assessing the status of various aspects of the project at various stages of completion. Inclusion of these checklists is for information only, and their use is entirely optional. If the checklists are used, they should be reviewed and tailored to meet the needs of the project.

## **8.0 LESSONS LEARNED**

The lessons learned process needs to be established on each project to create a strategy that ensures continuous project improvement. The process involves DOE and contractor participation.

The intent of lessons learned is to provide effective and enhanced information to assist existing and future projects. To do so, the process must capture pertinent information throughout the lifecycle of the project. Two processes are involved: development and incorporation. Development includes the identification, documentation, validation, and dissemination of lessons learned data. Incorporation includes associating lessons learned outcome to applicable project activities for specific improvement actions.

The lessons learned process is designed to produce a coordinated system for performance evaluation and facilitation of improvements. Contractor management and internal assessment is the preferred way to create a continuous improvement environment. This evaluation should use a tailored approach and focus on key activities associated with project goals. Areas with the greatest consequences of failure should receive particular emphasis.

### **8.1 Background**

The DOE lessons learned is not limited to any specific topic or set topics. Rather, the scope is essentially unlimited, so that the potential value of the program also becomes unlimited. That is, the broader the program and the broader the participation, the greater the opportunity for project savings of both time and resources.

The DOE lessons learned program is not limited to “negative” experiences or lessons learned. Rather, it is intended to document, assemble and make available to others both negative and positive experiences so the maximum benefit might be obtained from the program.

### **8.2 Scope**

The scope of information that a project can submit to the DOE lessons learned database is unlimited, ranging from project initiation through turnover and operation. Topics could range from Actual Cost of Work Performed to Work Breakdown Structure and everything in between. The DOE’s intent is to obtain the broadest input possible and thus provide the broadest assistance possible.

Projects are encouraged not to prejudge the value of their input, but rather to err on the side of too much data rather than too little.

Keys to a successful lessons learned process include: (1) project management support; (2) assignment of an individual to be responsible for the program; (3) recognition of participants; and (4) submitting lessons learned.

### **8.3 Program Organization**

The DOE lessons learned program can be found on the DOE home page at [www.energy.gov](http://www.energy.gov). An EM lessons learned home page can also be found at this location. DOE contacts on this subject may also be found there.

The DOE home page is linked to many other lessons learned sites, both internal and external to the DOE. A recent visit to the site revealed more than 1,000 associated sites.

### **8.4 Lessons Learned Program Phases**

Several examples of different phases of the lessons learned program follow. These examples are for information purposes only and are not intended to imply requirements.

- *Process Flow Chart.* The lessons learned program flowchart (see Figure 1) is useful for a structured, site-wide lessons learned program. In this case, lessons learned are gathered into a central site database as well as the DOE-Headquarters database. The flowchart is part of a site lessons learned procedure, and can provide maximum value when used in that context. Although a procedure and flowchart may be overkill for individual projects, the same philosophy applies to be of maximum value, a lessons learned program must be organized, and the program must be assigned to a responsible project individual. Lessons learned may be submitted by anyone associated with the project and personnel should be encouraged to do so. However, submittals should be to the lessons learned coordinator for review, discussion and collection prior to their being submitted to the DOE database.

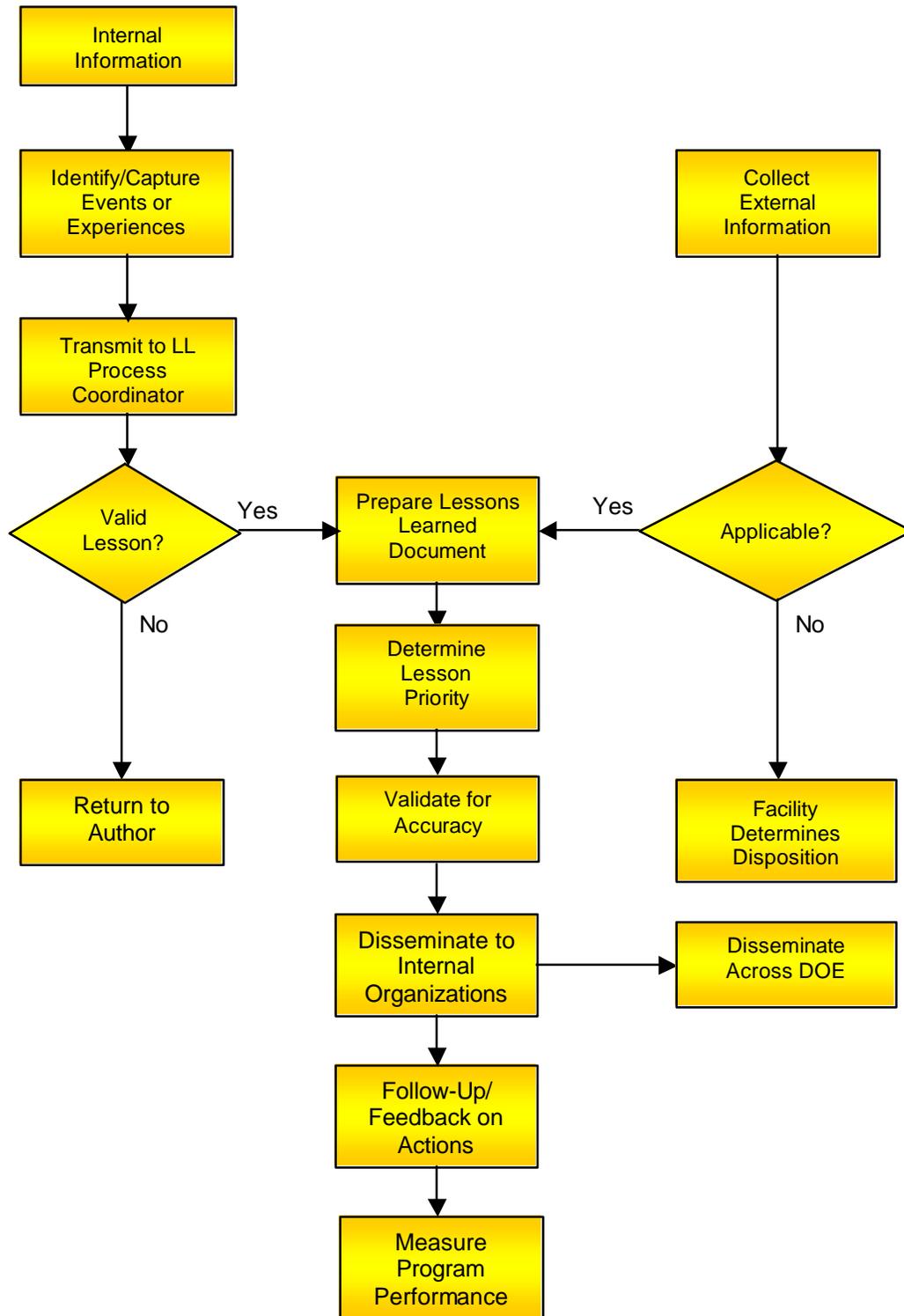


Figure 1. Lessons Learned Process Flowchart

- *Lessons Learned Categories.* To aid in organizing the lessons learned database, lessons learned can be sorted by topic or category, and subdivided by urgency, usefulness, good practice, and benefit to others. A sample method of categorizing lessons learned is provided in Table 2.

- *High-Level Lessons Learned.* Table 3 provides a high-time summary of lessons learned on past projects over a period of several years. In this case, although the lessons learned are somewhat generic, they are also common to many projects, i.e., often repeated.
- *Lesson Learned Issues.* Table 4 is a summary of key issues from an ORR Assessment Lessons Learned Report. This approach was used to focus attention on the most important lessons learned, and to identify those few that could have the most impact on future ORRs.

**Table 2. Lessons Learned Categories**

<b>Lessons Learned</b>	<b>Red/Urgent (Actual Event)</b>	<b>Yellow/Caution (Potential Event Conditions)</b>	<b>Blue/Information (Fact or Discovery of Benefit to Others)</b>	<b>Green/Good Work Practice (Promoting or Producing Positive Proven Results)</b>
<b>Public Safety</b>	Event related to site operation that has affected public safety and health or threatened public safety and health	Potential event related to site operation that may have affected public safety and health	Information to protect public safety and health including, but not limited to, cumulative findings from trending	Action, activity, or practice that improves public safety and health
<b>Worker Safety</b>	Fatality, near fatality, serious injury, or permanent/total disability	Conditions that result in: <ul style="list-style-type: none"> <li>▪ injury</li> <li>▪ temporary/partial disability or significant loss of work time or productivity</li> </ul>	Information to protect worker health and safety including, but not limited to, cumulative findings from trending	Action, activity, or practice that promotes: <ul style="list-style-type: none"> <li>▪ safe work practices or</li> <li>▪ healthful work practices</li> </ul>
<b>Environmental Protection</b>	Uncontained hazardous release beyond the site boundary. Significant uncontained onsite hazardous release requiring cleanup	Condition that may have resulted in an uncontained release to the environment or a moderate onsite hazardous release	Information to protect the environment, including: <ul style="list-style-type: none"> <li>▪ measurable, but minor, hazardous releases or</li> <li>▪ cumulative findings from trending</li> </ul>	Action, activity, or practice that: <ul style="list-style-type: none"> <li>▪ prevents on or offsite environmental degradation or</li> <li>▪ will limit or reduce on or offsite releases to the environment</li> </ul>
<b>Compliance</b>	Violations of Federal or state law with significant penalties	Violations of Federal or state law with minor penalties. Significant noncompliance with the technical requirements of DOE directives	Information that may improve compliance performance	Action, activity, or practice that improves the compliance performance of the site
<b>Management/ Administration</b>	Significant management violations including fraud, abuse, and discrimination	Identified actions reflecting failure to operate within DOE management imperatives	Information that may improve DOE management performance	Action, activity, or practice that improves DOE management performance
<b>Investment and Investment Protection</b>	Significant loss or damage of major equipment, property, or facility	Potential for major equipment, property or facility to become: <ul style="list-style-type: none"> <li>▪ lost or damaged</li> <li>▪ degraded</li> <li>▪ unreliable</li> </ul>	Information that may improve: <ul style="list-style-type: none"> <li>▪ value</li> <li>▪ efficiency</li> <li>▪ cost</li> </ul>	Action, activity, or practice that improves: <ul style="list-style-type: none"> <li>▪ specifications</li> <li>▪ reliability</li> <li>▪ efficiency</li> <li>▪ credibility</li> </ul>
<b>Public Interest</b>	Onsite event that is perceived by the public to have: <ul style="list-style-type: none"> <li>▪ an effect on public safety and health or</li> <li>▪ threatened public safety and healthy</li> </ul>	A potential site operations event that may have affected the public, excluding safety and health, had the event occurred	Information beneficial to public relations	Action, activity, or practice that promotes benefits to the public

**Table 3. Lessons Learned from Past Projects**

1. Assign one, totally responsible PD to the project. This person needs to be experienced in project management. The PD also needs to be very familiar with the project construction site, DOE Site personnel, site contractor personnel, DOE and contractor rules, requirements, Orders and procedures that apply to the site.
2. The PD must be delegated all of the authority needed to manage the project. Typically, the PD needs more authority than most people think is required.
3. Authority should be verified in writing with appropriate DOE and contractor managers being made aware of the assignment.
4. The PM should report at a high enough level within the organization to demonstrate (1) the project is important; (2) senior management supports the project; and (3) the PM has adequate access to senior management to resolve problems and obtain resources. The reporting level also establishes the PM's ability to access and work directly with other senior staff personnel.
5. A Memorandum of Understanding should be prepared between the PM and the PD, outlining authorities and responsibilities of each. This becomes very important as the project progresses through design and construction; there cannot be two individuals providing guidance and direction to contractors and subcontractors.
6. Clear lines of communication should be established between the project and DOE, subcontractors, suppliers, and other support organizations—both DOE and contractor.
7. Establish a strong cost/schedule control organization and strong configuration management/records management organization. Also prepare and issue detailed procedures for these organizations.
8. Develop and implement a change control procedure early in the project along with a project change control board. Establish reasonable change control limits. Changes requests should be well documented, justified, approved and recorded. Justification should include all impacts of the change, including schedule, cost, technical, design, procurement, construction, startup, operation, and maintenance.
9. Board membership should include representatives from the contractor safety, technical, engineering, operations, and maintenance organizations.
10. As a minimum, the following should be placed under change control as soon as approved versions are available: project design criteria, cost estimates, schedules, specifications, and drawings.
11. All personnel supporting the project should report to the PD. If matrix support is necessary, then that matrix support to the project should understand they report to the PD.
12. All project funding must be under the control of the PD. Authorization to spend project funds must be through approved GWA's, work authorizations, etc.

13. If support is required from matrix organizations (technical/R&D), these organizations should prepare a scope of work, a cost estimate, and a schedule for the support to be provided. The schedule should contain meaningful, measurable quarterly milestones.
14. All tasks, planning packages, and work packages should consist of a scope of work, a cost estimate and a schedule.
15. Consider organizing project engineering personnel as “sub-project managers.” That is, organize and assign project work efforts into sub-projects again, each having scopes, resource loaded schedules and cost estimates. For the vitrification facility, typical sub-project assignments could include the melter, off-gas system, feed retrieval system, electrical system, emergency electrical system, DCS, instrumentation system, glass gem forming system, HVAC, etc. Anything that can be described as a discrete work effort, and for which funding, authority, and responsibility can be assigned.

The second and most important aspect of this arrangement is assigning the responsible engineer total authority and responsibility for the assigned system(s). This includes preparation of conceptual design criteria; preparation of design criteria; drawing and specification preparation; design reviews and design review comment resolution; preparation of procurement documents and equipment procurement, including inspections and installation; preparation of CC tests and oversight of performance; preparation of SO tests, including selection and training of SO test team and serving as SO test team leader; preparation, review and approval of operating manuals and procedures; training of operators and maintenance personnel; review and approval of appropriate vendor data; resolution of field problems; and providing expert support during facility startup and cold operation.

The responsible engineers would be the responsible work package managers, which includes budget authority and responsibility, monthly budget analysis, and variance analyses and explanation.

The value that flows from such an organizational arrangement is total responsibility, authority, and most importantly, ownership. In addition, the PD is full aware of who the responsible persons are, and can immediately obtain needed information and data.

A secondary benefit of such an organization is that the project is continually training future PDs/PMs.

16. Ensure all project personnel are fully aware that annual performance reviews, promotions and salary increases are totally based on performance.
17. Perform at least three “team reviews” of the facility design, if possible, at the AE’s facility: conceptual, Title I, and Title II. If a facility model is available, make the model a key part of the review. The review teams should include operations and maintenance personnel as well as safety, QA, and technical and field/construction engineering.
18. Require timely responses to all vendor data submittal and design review comments.

19. Locate all project personnel and essential support personnel (e.g., operating manual technical writers) in the same facility, if possible, to maximize communication and increase the feeling of belonging to the project team. If common building location is not possible, then certainly common area becomes essential.
20. Establish a field/construction engineering group to provide construction interface and problem resolution, safety oversight, daily and weekly construction meetings, and constructability reviews.
21. All design review packages should be reviewed by all involved organizations: safety, QA, technical, operations, and maintenance. Establish strict review times and respond to all review comments.
22. Encourage (strongly) that responsible system engineers frequently overview construction activities to respond to questions, participate in and respond to field problems; and to remain fully familiar with the facility to simplify drawing walkdowns; training of operations and maintenance personnel; accelerate equipment, line and valve tagging; and simplify CC and SO test procedure preparation and performance.
23. Establish a single, well-organized records management/configuration management center. Establish a computerized records identification and tracking system using bar coding where possible. Ensure the records system maintains copies of all project records until facility turnover. If space is a problem, consider microfilming the older records. Also, keep copies of all design review comments and responses. Also maintain a complete, easily retrievable vendor data system including all past versions and all review comments and resolutions.
24. As part of all procurement contracts, include sufficient hold-back to guarantee receipt of all vendor data. That is, make non-submittal painful for the vendor.
25. Prepare and maintain a detailed WBS. Tie all project activities to the WBS. Make the WBS flexible enough so that additional activities can be added with minimal disruption. Along with the WBS, prepare and distribute a WBS Dictionary.
26. Establish numerous, smaller work packages so the responsible engineers can provide adequate attention to cost and schedule management.
27. Ensure the cost/schedule group provides adequate monthly performance data so that analysis and explanation can be provided for the monthly project performance reports.
28. Hold monthly project review meetings for contractor and DOE management. Review all significant project areas, including problem areas and recommended corrective actions. If possible, have the responsible engineers present their own areas of responsibility.
29. Maintain a continuous contingency usage log to provide a continuous track record of contingency usage. Establish the log as soon as capital funds are received and maintain the log throughout the life of the project. As part of the log, include change order identifiers and explanations of approvals and reasons for contingency usage. Maintain a continuous plot of

contingency usage and provide copies to all interested parties, especially senior contractor and DOE management.

30. Establish and maintain an action item log so that actions are documented along with responsible parties and due dates. Include the architect-engineer, the construction manager, and the DOE.
31. Prepare and maintain schedules that roll-up from the work package level to the project master schedule. All schedules should be time-phased, resource-loaded and include frequent, meaningful, and measurable milestones and a critical path.
32. Prepare either change request or, as a minimum, impact studies of DOE directed changes. Especially those that change standards, requirements, Orders, agreements, etc.
33. Train all project personnel in the cost/schedule system, the reporting system, the configuration control system, and the records management system.
34. For major procurements, assign a resident engineer at the vendor's shop. Also provide a resident engineer at the AE's offices during the design period.
35. For engineered procurements, when a resident is not assigned, ensure the responsible engineer visit the supplier frequently enough to confirm reported progress and schedule and cost status, and to validate reported problems and solutions.
36. For off-site activities, use QA auditors to examine, evaluate, and report potential problems.
37. Use cost/schedule curve extrapolation to project anticipated future costs and progress. Early notification of potential problems can be obtained through curve projections and mathematical calculations.
38. Prepare and distribute a Project Approval Authority Matrix outlining the authority and responsibility of each manager assigned to the project.
39. Train all engineers and technical personnel assigned to the project to avoid making verbal commitments or providing inadvertent work direction (changes) to suppliers and subcontractors.
40. Establish "reasonable" variance thresholds. That is, establish thresholds that are related to the risk involved.
41. Initiate component and system test procedures, operating manuals and procedures, ORR, and startup activities very early in the project: during Title I.

**Table 4. Issues from ORR Lessons Learned**

Partial certification packages cause considerable confusion
Several organizations were required to answer the same line of inquiry
Where interfaces between the functional support group and the operating organization were mature and working well, certification packages of readiness were timely, well-prepared, and usually of high quality
<u>Where interfaces were poorly defined and not agreed upon, the simple process of assigning responsibility was difficult, with the same issues being revisited many times</u>
<u>Some of the support organizations who were a provider of services to the facility as well as to similar facilities on an ongoing basis felt minimal responsibility for documenting their readiness to support this specific facility</u>
None of the support organizations were given any direction by facility personnel on the readiness review effort
There was no attempt to integrate responses nor assure that what the individual organizations did was compatible with facility needs or other responses
Management had little involvement early in the effort to determine readiness
A realistic, resource-loaded schedule should be provided and maintained
The large number of lines of inquiry (1,500) diluted the focus on important items. The review and approval cycle should catch and eliminate inapplicable lines of inquiry
Persons assigned responsibility for preparation of certification packages to answer lines of inquiry were frequently in the wrong organization, and had no interest in taking ownership
Line management (facility and operations) wasn't involved in certification package preparation until the review was nearly complete
It was unclear from the start who was responsible
<u>More clearly written lines of inquiry along with specific acceptance criteria might reduce this problem</u>
Parallel processing of readiness information created extra work to ensure an independent, timely readiness assessment
Consideration should be given for future events to conduct a single independent readiness review, either by DOE or by the contractor, but not by both
An ORR can be completed in 6 days
All deficiencies, both findings and observations, must be documented on a deficiency form and described in sufficient detail to assess the impact on readiness. This includes deficiencies corrected on the spot
The schedule for the ORR needs to be established consistent with a firm determination as to when turnover from construction will occur
The daily debriefs need to include all ORR team members and facility management
The contractor ORR (management review) shouldn't start prematurely. Readiness should be achieved before starting the review. ORRs are to be used to verify readiness, not to achieve

readiness
Closure of corrective actions can be ensured by preparing closure packages and applying effort and detail commensurate with or greater than the initial assessment
The ORR is not and should not be a substitute for a routine independent assessment or self-assessment at a site
<u>When planning the ORR, include not only the time on-site for conducting interviews and observations, but also time to consolidate individual thinking and analyze data in order to present coherent and informative conclusions</u>
The duration of an ORR should not exceed 2 weeks, including report preparation
The most common problem is late approval of the safety basis documentation which prevents putting the implementing procedures in place and completing operator training and qualification
Early in the project, define the ORR prerequisites and core requirements or core objectives
<u>Ultimately, the success of the project will depend on the accuracy with which the ORR prerequisites are identified, defined, tracked, and verified complete</u>
The temptation to conduct the ORR in parallel with achieving readiness should be avoided
Begin with the end in mind
<u>Inadequate validation and verification of operational or maintenance/surveillance procedures which are newly prepared or recently modified</u>
Site access training, facilities walkthroughs, and document reviews are essential for team members to gain the necessary familiarity with the project prior to the kickoff of the ORR
Get agreement during development of the ORR plans, between the facility contractor and the DOE on the details of the operations that are available for demonstration
Give the plan-of-action and the implementation plan to oversight groups (EH, DNFSB, state agencies) as soon as possible
The value and effectiveness of the ORR/RA can be significantly decreased by ineffective corrective actions to resolve the issues identified during the ORR/RA
The Surveillance actually tests the function or protective action upon which the safety basis depends.

## 9.0 REVIEW CHECKLISTS

The following sample checklists are provided to assist project management and project personnel in managing projects. These checklists are general in nature and their use is optional. In addition, they may be tailored to meet specific project needs. The checklists are primarily intended as a structured method of reminding PDS/PMs of those items that should be considered in preparing and providing required project deliverables. Checklists, if completed and retained in the project files, could also provide documented evidence of the process by which important project decisions were made. In summary, checklists are simply another tool to assist the PD/PM in completing their primary assignment: delivering a project that meets mission requirements on schedule and within budget.

## ATTACHMENT 1. PROJECT PREPLANNING CHECKLIST

The following queries are appropriate when reviewing a project in preparation for initial design efforts. Where appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
A. Problem/need identified and justified?			
B. Trade studies identified / completed?			
C. Technical needs identified, planned, scheduled, funded?			
D. Sponsor identified?			
E. Program manager identified and assigned?			
F. Has the Integrated Project Team been organized and a charter prepared?			
G. Project manager identified and assigned?			
H. Identify potential organizations involved and potential issues?			
I. Project high-level functions, requirements, and interfaces identified: complete, realistic?			
J. Applicable codes, standards, and references to applicable codes, standards, and other documents identified?			
K. Considerations for permits, licenses, environmental impacts identified?			
L. Lessons learned review and experience interviews completed?			
M. Does the project involve retrofitting/modifying an existing facility or system?			
N. Has a compliance matrix been prepared that links requirements and source documents?			
O. Have the stakeholders been identified and involved?			
P. Program manager identified and assigned?			
Q. Has the Integrated Project Team been organized and a charter prepared?			
R. Draft Preliminary Acquisition Strategy developed?			

## ATTACHMENT 2. SCOPE OF WORK REVIEW CHECKLIST

The following queries are appropriate when reviewing a statement of work defining the scope of work supported by the schedule and cost estimate. Where appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
A. Statement of work specific enough to permit a subcontract/supplier to identify and estimate manpower and resources needed to accomplish each statement of work task element?			
B. Interfaces between all parties, facilities, other projects delineated or clearly implied?			
C. Specific duties of subcontracts/suppliers stated so requirements and products are defined. Customer can determine whether the subcontractor/suppliers have complied?			
D. Specifications or exhibits:			
1. Applicable reference documents adequately identified?			
2. Documents properly cited and referenced to the appropriate statement of work element?			
E. Deliverables:			
1. A time-phased data requirement identified for each deliverable?			
2. If elapsed time is used, does it specify calendar or work days?			
3. Acceptance criteria properly delineated?			
4. Deliverables adequately identified and measurable?			
5. Frequent measurable milestones identified for each deliverable?			
6. Inspection points identified and adequately defined?			
7. Deliverable requirements clearly identified?			
8. Deliverables inspection and acceptance criteria and required acceptance tests clearly defined?			
F. Appropriate and applicable requirements been considered (safety, procurement, regulatory, QA, security, etc.)?			
G. All requirements for data (drawing lists, equipment lists, milestones, etc.) specified separately in a data requirements appendix or its equivalent?			
H. When other documents are referenced:			
1. Is the proper reference document described?			
2. Is the entire reference pertinent to the task, or should only portions be referenced?			
3. Is each document cross-referenced to the applicable statement of work task elements?			
4. Is each reference specific as to applicable chapters, sections,			

Checklist Questions	Yes	No	Comments
paragraphs?			
I. Is specific direction clearly distinguished from general information?			
J. Headings been checked for format and grammar?			
1. Subheadings compatible?			
2. The text compatible with the title?			
3. Is a multi-decimal or alphanumeric WBS numbering system used?			
K. Statement of work maintained under change control?			
L. Are changes to the scope identified, documented, approved, incorporated?			
M. Are the scope, schedule, and cost estimate directly linked?			
N. Does the scope clearly define the activity to be performed?			
O. Does the scope adequately define the deliverables?			
P. Does the scope support the project and DOE mission?			
Q. Are all scope assumptions documented?			

### ATTACHMENT 3. RISK EVALUATION CHECKLIST

The following queries are appropriate when identifying, determining, and evaluating project risks. Where appropriate provide explanatory comments or qualifications to supported verified answers.

Checklist Questions	Yes	No	Comments
<b>A. Technology</b>			
1. New technology?			
2. Unknown or unclear technology?			
3. New application of existing technology?			
4. Modernized/advanced technology in existing application?			
<b>B. Time</b>			
1. Project schedule uncertainties or restraints that may impact project completion or milestone dates?			
2. Long lead procurement items that may affect critical path or milestone completion?			
<b>C. Contractor Capabilities</b>			
1. Potentially non-existent or unavailable qualified vendors or contractors?			
<b>D. Interfaces</b>			
1. Significant transportation or infrastructure impacts?			
2. Multiple project interfaces?			
3. Significant interfaces with operational facilities?			
<b>E. Safety</b>			
1. Criticality potential?			
2. Significant contamination potential?			
3. New design basis accidents or other unreviewed safety questions?			
4. Hazardous material involved?			
<b>F. Environmental</b>			
1. Environmental assessment or environmental impact statement required?			
2. Potential for releases or additional releases?			
3. Undefined disposal methods?			
4. Any Environmental Permits or licenses required (RCRA, NEPA, CAA, CWA, etc.)?			
<b>G. Regulatory Involvement</b>			
1. Is EPA involved in any project decisions?			
2. Are state regulators involved in any project decisions?			
3. Is the Defense Nuclear Safety Board involved in any project decisions?			
4. Is the NRC involved in any project decisions?			
<b>H. Political Visibility</b>			
<b>I. Number of Key Participants</b>			
1. Will there be more than one primary contractor			

Checklist Questions	Yes	No	Comments
performing work?			
<b>J. Complexity</b>			
1. Undefined or unclear functional requirements?			
2. Undefined or unclear design criteria?			
3. Complex design features?			
4. Difficult to functionally test?			
5. Existing or as-built conditions documented?			
6. New/unproven technologies?			
<b>K. Labor Skills, Availability, Productivity</b>			
1. Adequate and timely resources available?			
2. Specialty resources required?			
3. Is a rapid labor build-up required?			
4. Will labor be exposed to environmental extremes (heat, cold, etc.)?			
5. Will any project work be performed in radiologically controlled zone?			
<b>L. Number of Locations/Site Access/Site Ownership</b>			
1. Will project work be performed in more than one physical location (areas, sites, buildings, etc.)?			
2. Are infrastructure improvements required?			
<b>M. Funding/Cost Sharing</b>			
1. Is project duration greater than 2 years?			
2. Are other Federal agencies or States providing funds?			
3. Are other governments (countries) providing funding?			
<b>N. Magnitude/Type of Contamination</b>			
1. Is hazardous or low-level waste present?			
2. Is high-level or mixed waste present?			
3. Has waste present been characterized?			
<b>O. Quality Requirements</b>			
1. Is precision work required?			
2. Is rework expected due to nature of project tolerances?			
3. Does NQA-1 apply?			
<b>P. Public Involvement</b>			
1. Will the Citizens Advisory Board be involved in making project decisions?			
2. Will the Citizens Advisory Board be involved in establishing priorities?			
3. Will other intervener organizations (Sierra Club, Green Peace, etc. ) be interested in the project?			
<b>Q. Other</b>			

## ATTACHMENT 4. CRITICAL DECISION-0, APPROVE MISSION NEED CHECKLIST

The following queries are appropriate when reviewing a project in preparation for requesting CD-0, Approve Mission Need. When appropriate, provide explanatory comments or qualifications to support verified answers.

Checklist Questions	Yes	No	Comments
A. Mission Need Statement prepared?			
B. Acquisition strategy prepared?			
C. Preconceptual planning complete?			
D. Mission need independent review performed?			
E. Preliminary estimate of Project Engineering and Design (PED) funding developed?			
Alternatives analyses/studies identified and completed?			
G. Preliminary risk management plan prepared and initial risk identification and evaluation completed?			
H. Project manager/project team identified and assigned?			
I. Top level functional and operating requirements identified?			
J. Responsibility/authority memorandums of understanding: approved?			
K. Project team responsibility matrix prepared?			
L. Preliminary project cost estimate and schedule completed?			
M. Technology development plan prepared?			
N. Project interfaces defined?			
O. Laboratory, mock-up, pilot plant needs tests identified?			
P. Project charter prepared?			
Q. Draft scopes of work and cost estimates for anticipated contracted work prepared?			
R. Preliminary environmental (NEPA) strategy prepared?			
S. Organizational interfaces identified?			
T. Data sheet for design with special procurement disclosure prepared?			
U. Preliminary operating and maintenance strategy developed?			
V. CD-0 package prepared, reviewed, and approved by PD?			
W. If appropriate, has a CD-0 EM-PDRI review been performed?			
X. Project work breakdown structure and dictionary issued?			
Y. Planning started for testing, turnover, ORR, closeout?			
Z. Has a contract to obtain conceptual design support been prepared?			

## ATTACHMENT 5. PROJECT READINESS FOR DESIGN CHECKLIST

The following queries are appropriate when reviewing a project prior to initiating any design effort: conceptual, preliminary, final. Where appropriate, provide explanatory comments or qualifiers to verified answers.

Checklist Questions	Yes	No	Comments
<b>A. Design Criteria</b>			
1. Design criteria approved and issued?			
2. Design criteria under change control and controlled distribution?			
3. Project disciplines reviewed the design criteria and validated the requirements?			
4. Process established for Design Criteria Revisions?			
5. All codes, regulations, orders, and other governing/source documents identified and applicability defined?			
6. Are governing documents that can be waived to optimize or simplify design identified?			
7. Copies available of all specified reference documents (applicable dates) and have their impacts to the project been assessed?			
8. Current, applicable as-built drawings available?			
9. Are required permits and responsible persons identified?			
a. NEPA documentation?			
b. Excavation permits/underground utilities?			
c. Building permits?			
d. Code compliance certifications?			
e. Regulatory permits (e.g., nuclear)?			
10. Is a field walkdown required to validate design criteria?			
11. Has a utility assessment been completed and documented?			
12. Are all technical interface requirements and demarcation points identified understood?			
<b>B. Technical Basis</b>			
1. Has the technical baseline been developed consistent with the project phase?			
a. Conceptual design requirements?			
b. Definitive design detailed design requirements identified?			
c. Construction (design completed)?			
2. Are deliverables defined and delivery schedules documented?			

Checklist Questions	Yes	No	Comments
a. Intermediate reviews?			
b. Review times, schedule?			
c. Product information?			
d. Project data (e.g., schedule, monthly reports, costs reports)?			
3. Are the deliverable's acceptance criteria clearly defined?			
4. Are documentation standards defined (e.g., design standards and formats, measurement standards (SI), electronic format, etc.)?			
5. Are as-built requirements identified and defined?			
6. Are safety requirements defined and safety classifications determined?			
7. Are quality requirements identified and documented?			
8. Are quality requirements consistent with technical requirements and facility operations? (e.g., NQA-1)			
9. Are constructability, maintainability, operability, reliability reviews required and responsibilities identified?			
<b>C. Cost Baseline</b>			
1. Has the cost baseline been adequately established?			
2. Is the estimate consistent with the contract methodology? (e.g., fixed-price, cost reimbursement, etc.)			
3. Have risk based allowances been developed across the major work breakdown structure elements?			
4. Does the estimate reflect all labor, material, and markup costs?			
5. Was construction labor established by man-loading, if required?			
6. Does the estimate reflect the proper escalation index?			
<b>D. Schedule Baseline</b>			
1. Does the project schedule reflect all major phases and activities?			
2. Is the schedule based on calendar periods and is it consistent with project requirements?			
NOTE: If the project start date is firm, the project schedule should be calendar-based. If the project start is undefined, the schedule should be duration-based, keyed to contract notice-to-proceed.			
3. Are the schedule and estimate bases consistent?			
4. Does the schedule contain a clearly identified critical path?			
5. Do the schedule and estimate reflect the same work breakdown structure and are they traceable?			

Checklist Questions	Yes	No	Comments
6. Does the schedule have a realistic activity logic flow and does it meet the site/DOE milestone schedules?			
7. Does the schedule reflect risk-based allowances for each major activity?			
<b>E. Contract Compliance</b>			
1. Have the contract Terms and Conditions been reviewed by legal?			
2. Are the contract technical requirements consistent with the contract and have they been reviewed by the CO or COTR?			
3. Are the deliverables clearly defined and consistent with reporting and requirement definitions?			
4. Is the delivery method for all contract deliverables defined and is ownership transfer documented?			
5. Is an approved statement of work included and are the requirements clearly defined?			
6. Are suppliers required to prepare and submit a statement describing their understanding of the scope of work?			
7. Is the scope of work and technical requirements consistent with the contract Terms and Conditions?			
8. Are there any Government provisions in the contract that need to be reviewed?			
<b>F. Project Planning</b>			
1. Has a draft Project Execution Plan been developed for the project?			
2. Will a project kickoff meeting be held?			
- Scheduled?			
- Agenda proposed?			
- Attendees notified?			
- Minutes to be issued?			
3. Are alignment meetings planned and scheduled?			
4. Has the responsibility been assigned for preparing and issuing telecons and meeting minutes?			
5. Will a procurement plan for material acquisition be required?			
6. Has a quality assurance plan (QAP) been developed?			
7. Will a construction method of performance evaluation be required and will the recommendations be documented for review if conditions change?			
8. Are there requirements for performing make/buy determinations? Are they clearly defined?			
9. Are environmental reviews and permitting requirements identified and included in planning documents?			

Checklist Questions	Yes	No	Comments
10. Are qualifications/training requirements for project personnel identified and documented in the PEP?			
11. Are project records preparation and retention requirements identified?			
12. Are work acceptance and project acceptance criteria identified?			
13. Is adequate funding available for the scope of work to be performed?			
14. Will the project be fully funded or incrementally funded? If incrementally funded have funding/schedule impacts been assessed if funding is delayed? Have alternative/work-arounds been considered?			
15. Have special requirements been addressed that increase the risk of project success (e.g., decontamination, radiation monitoring, utilities support, security clearances, etc.)?			
16. Have travel considerations been included in project planning (e.g., passports, local travel, airline tickets, etc.)?			
17. Have demolition and waste handling/removal been identified and addressed?			
18. Have efficiency opportunities been considered and identified (e.g., value engineering, lifecycle cost tradeoffs, energy conservation, etc.)?			
20. Has planning been performed for resolving/incorporating comments into project documentation?			
<b>G. Project Reporting and Performance Assessment</b>			
1. Are performance measurement processes identified?			
2. Are project reporting requirements identified?			
3. Is a process defined to identify and implement value engineering changes/ideas?			
<b>H. Change Management</b>			
1. Is a process identified for documenting, assessing impacts, and implementing changes?			
2. Are project preliminary baseline ranges clearly identified and are the baselines consistent and integrated?			
3. Is a process identified for developing and approving/disapproving proposed changes?			
4. Are project approval responsibilities and authorities identified and documented?			

## ATTACHMENT 6. CRITICAL DECISION-1, APPROVE ALTERNATIVE SELECTION AND COST RANGE

The following queries are appropriate when reviewing a project in preparation for requesting Critical Decision-1. When appropriate, provide explanatory comments or qualifications to support verified answers.

Checklist Questions	Yes	No	Comments
A. Conceptual Design Report completed?			
B. Acquisition Strategy and Plan prepared?			
C. Preliminary project excavation plan prepared?			
D. Baseline range cost estimate and schedule developed?			
E. Systems Engineering Management Plan prepared?			
F. Verification of mission need validated?			
G. Preliminary Hazards Analysis Report prepared?			
H. Risk Management Plan prepared?			
Technology development plan revision issued?			
J. Request for PED funding submitted?			
K. Program funding for conceptual design identified?			
L. Preliminary Project Execution Plan prepared?			
M. Contracting strategy developed?			
N. Scopes of work cost estimates for contracted work completed?			
O. Stockholder participation plan prepared?			
P. Configuration control process identified?			
Q. Change control process identified?			
R. Earned value management system identified?			
S. Communications plan prepared?			
T. Status reporting process developed?			
U. Work Breakdown Structure and dictionary prepared?			
V. Environmental strategy identified?			
W. Waste Minimization/Pollution Prevention plan prepared?			
X. Project team training and development completed?			
Y. Quality Assurance Plan prepared?			
Z. SSC quality levels and safety levels determined?			
AA. Utility needs/availability survey completed?			
BB. Change control boards established?			

Checklist Questions	Yes	No	Comments
1. Chairman named?			
2. Members identified?			
3. Charter prepared?			
4. Operating procedures prepared?			
CC. Design review personnel identified/trained?			
DD. Permitting Plan prepared?			
EE. If required, has a CD-1 EM-PDRI review been completed?			
FF. Have changes identified during the CD-0 review and approval been reflected in the project?			
GG. Has a training and certification program & plan been developed?			

## ATTACHMENT 7. CRITICAL DECISION-2, APPROVE PERFORMANCE BASELINE CHECKLIST

The following queries are appropriate when reviewing a project in preparation for requesting Critical Decision-2. When appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions -- Technical	Yes	No	Comments
A. PED funds available?			
B. Preliminary design report, specifications and drawings issued?			
C. Review of contractor EVMS completed?			
D. Final Project Execution Plan issued?			
E. Independent Cost Review performed?			
F. NEPA documentation prepared?			
G. Project Data Sheet for Construction prepared?			
H. PSAR issued?			
I. Baseline external independent review completed?			
J. Final risk management plan issued?			
K. Permits and licenses obtained?			
L. Design reviews complete and comments resolved?			
M. Trade studies and value engineering studies completed?			
N. Long-lead procurement items identified? Funding requested?			
O. Design change process developed and implemented?			
P. QA surveillance, audit appraisal plan prepared?			
Q. Waste minimization/pollution prevention plan prepared?			
R. HVAC balancing and testing plan prepared?			
S. Special acceptance test equipment available?			
T. Performance reporting initiated?			
U. Performance metrics identified?			
V. If required, has a EM-PDRI review been performed?			
W. Have changes identified during the Critical Decision-1 review been reflected in the project?			
X. Have construction contracts been prepared?			
Y. For rework/retrofit projects has design bases reconstruction been evaluated and resolved?			

## ATTACHMENT 8. CRITICAL DECISION-3, APPROVE START OF CONSTRUCTION CHECKLIST

The following queries are appropriate when reviewing a project in preparation for requesting Critical Decision-2. When appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
A. Baseline budget for construction?			
B. Request construction funding?			
C. Update Project Execution Plan?			
D. Final design, procurement and construction packages prepared?			
E. Verification of mission need complete?			
F. Approved safety documentation available?			
G. Execution readiness independent review performed?			
H. Project team training and qualification completed?			
I. Operating and maintenance philosophy developed?			
J. Execution readiness independent review or independent project review completed?			
K. Design reviews complete and comments resolved?			
L. Operating and acceptance draft test procedures prepared?			
M. Construction site characterization complete?			
N. Other tasks completed?			
1. Craft training?			
2. Safety orientation?			
3. Security orientation?			
4. Badging?			
5. Access roads?			
6. Lay-down areas?			
7. Construction contractor facilities?			
8. Permits?			
O. Preliminary construction and procurement schedules prepared?			
P. Construction contracts and independent cost estimates?			
Q. Field change process finalized?			
R. Testing laboratory identified and accepted?			
S. Equipment calibration laboratory identified and accepted?			
T. Lockout/tagout program developed?			
U. QA surveillance, audit, appraisal plan prepared?			
V. Construction inspection plan?			
W. ORR/RA plan drafted?			
X. If required, has a Critical Decision-3 EM-PDRI review been performed?			
Y. Have changes identified during the Critical Decision-2 review been reflected in the project?			

## ATTACHMENT 9. PROJECT READINESS FOR CONSTRUCTION CHECKLIST

The following queries are appropriate when reviewing a project in preparation for initiating construction activities. Where appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
<b>A. Planning</b>			
1. Are there pending or unapproved revisions to the project design? Will they affect the construction baseline?			
2. Are drawings and specifications completed, approved and provided to construction for comment?			
3. Is the project method of performance clear and are each organization's responsibilities understood?			
4. Is the construction scope of work clearly defined and understood?			
5. Was a constructability review performed?			
6. Is ample time allowed for construction review of design documents prior to planning the job?			
7. Are there outstanding action items as a result of the design document review and approval, planning meetings? Are actions and completion dates assigned?			
8. Are there approved inspection plans?			
9. Are process control packages required? If so, are they prepared and approved?			
10. Are quality and inspection requirements clearly identified in the specifications?			
11. Are the acceptance criteria for each specification clear?			
12. Have special safety or environmental requirements been identified in the general requirements?			
13. Have waste minimization and pollution prevention opportunities identified during design been planned?			
14. Have procurement requisitions been reviewed to preclude procurement of hazardous materials? Has the list of hazardous materials to be procured by this project been reviewed for possible non-hazardous substitutes?			
15. Are hazardous materials involved? Are provisions for disposal identified?			
16. Have provisions been made to avoid cross-contamination of materials, and to minimize the amount of packaging brought on site?			
17. Will hazardous material inventories be appropriately managed to preclude the unnecessary generation of waste from product expiration, product damage, excess materials, etc?			

Checklist Questions	Yes	No	Comments
19. Have provisions been made to recycle construction debris, e.g., adequate collection containers, pickup and transport to a recycler?			
20. Have all required permits and their status been communicated to construction?			
21. Have SSC safety classes been defined/assigned?			
22. Is the approved PEP available to all project participants?			
23. Has (will) an Engineer/Constructor PEP supplement been prepared?			
24. Is there an approved construction Quality Assurance Plan?			
25. Has a construction work order been prepared? Does it authorize full funding?			
26. Has a job walk down been performed?			
27. If an existing facility is involved, has a written list of forms, procedures and their revision status to enable conformance with the facility's work control process been provided?			
A. How are contractors to be notified of changes to these forms or procedures?			
B. Have contractor personnel been instructed in their use?			
C. Does the project team (including plant support personnel) have an approved Memorandum of Understanding (MOU) for standardization of meeting times, breaks?			
D. Has the MOU been signed by the facility manager?			
E. Has the standardization of lunch breaks and meeting times been included on the agenda for the construction kickoff meeting?			
28. Has there been a construction kick-off meeting? If so, have minutes been issued?			
29. Have provisions been made for field verification of key control points, tie-ins, and terminations?			
30. Have interface requirements with plant operations been established (outages, work permits, etc.)? Have they been communicated?			
31. Is this a hazardous work site? Is the safety organization involved and will a safety plan be prepared?			
32. Is work site survey/scanning required, planned, completed?			
33. Will core drilling be required? Has planning defined the interfaces for core drills and responsibility for design calculations etc?			
34. Has the schedule/location/attendees for regular progress meetings been addressed and communicated?			

<b>Checklist Questions</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
35. Is there objective evidence that a seismic evaluation of the design was completed?			
36. Is funding available to field verify ECNs?			
37. Has a project lead engineer been named for performing engineering activities during construction?			
38. Have necessary make-or-buy decisions been completed?			
39. Has the responsibility for construction inspection been determined and assigned?			
40. Has a site investigation been completed to identify hazards that may require work stoppages or special operations to remove or work around (e.g., underground tanks, lead, asbestos, contaminated soil, etc.)?			
41. Have plans been made to train and badge contractor employees prior to notice to proceed?			
42. Has a Project Record List been prepared and provided?			
43. Will a good faith inspection (for asbestos) be performed prior to construction start (If not, construction cannot proceed)?			
44. Is a personnel radiation hazard involved? Will administrative limits be exceeded? If so, approval signatures must be obtained in accordance with radiation control procedures.			
45. Has construction been informed concerning project reporting/communication requirements (e.g., immediately reporting any safety occurrence)?			
46. If applicable, has the use of pre-engineered shoring been considered as a cost reduction item?			
47. Have hot tie-ins been included in the scope of work in accordance with requirements?			
48. Has an organization been budgeted to perform an electrical inspection to National Electric Code?			
<b>B. Budgeting</b>			
1. Has a construction cost estimate been prepared?			
2. Has a Construction Work Plan been prepared and agreed upon?			
3. How was each non-engineering/non-construction organization cost estimate if services determined (e.g., as-built, QA/QC, environmental, etc.)?			
4. Are cost and schedule allowances adequate? Are they risk based?			
5. Is there escalation in the estimate and, if so, for what purpose, is it properly applied and shown in the correct WBS?			
6. Are CAPs in place?			

<b>Checklist Questions</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
7. Are all reporting responsibilities defined?			
8. Does the budget match the WBS? If not, has a change request been approved to account for the deletion/addition to allowances?			
9. Are sufficient funds allocated for radioactive material packaging, housing, transportation, and burial costs?			
<b>C. Scheduling</b>			
1. Is a tentative construction schedule prepared and approved? Is it realistic and achievable? Does it logically denote all activities, and logically follow the planned project sequence?			
2. Has procurement been included in construction planning and scheduling?			
3. Are schedule allowances adequate?			
4. Does the detailed construction schedule contain all customer key interfaces and milestones including TPA milestones?			
5. Is construction mobilization and demobilization included in the schedule?			
6. Does the construction and project schedule adequately reflect the testing and turnover process?			
7. Are portions of the project fixed priced? If so, does contract specify submittal of contractor progress reports?			
8. Does the schedule identify the critical path?			
<b>D. Performance Measurement and Analysis</b>			
1. What method will be used to measure and report performance? Are the systems of all project participants compatible?			
2. Is the format, content, frequency and distribution of reports defined?			
<b>E. Change Control</b>			
1. Has a change control process been defined and implemented?			
2. Have change request thresholds been established?			
3. Have change boards been established?			
<b>F. Project Management</b>			
1. Ensure all project and site requirements are documented and understood by personnel performing the work.			
2. Coordinate the preparation of a master estimate and schedule to perform assigned work; ensure the estimate and schedule are achievable.			
3. Ensure all work is performed in a safe and responsible manner, in accordance with project and site procedures			

Checklist Questions	Yes	No	Comments
and requirements.			
4. Provide estimates and schedules, and telecon records to the PD/PM for approval prior to transmittal to other contractors.			
5. Review project status and provide a monthly status report to the PD/PM.			
6. Identify problem areas and develop and implement corrective actions. Assign a responsible individual for each corrective action.			
7. Implement change control for the phase of the project being managed, and providing change documentation to the PD/PM for change board action.			
8. Approve all project documentation per the project approval and distribution matrix.			
9. Prepare and maintain action item lists that include a responsible individual and completion date. Track action items to completion and closeout.			
<b>G. Excavation Considerations</b>			
1. Will ground penetrating radar (GPR) be used prior to excavation to avoid intersecting buried utilities during excavation? Has an operating/scanning plan been prepared?			
2. Will all buried utilities encountered during excavation be included in the as-builts?			
3. Have alternative technologies been considered to supplement the GPR information (e.g., radio-frequency electromagnetics, terrain conductivity, magnetics, acoustic wave propagation, etc.)?			
4. Will onsite interpretation and ground marking concurrent with interpretation be a requirement imposed upon the GPR activity?			
5. How will the GPR crew be provided feedback on performance, good or bad (e.g., were utility lines indicated by GPR actually found during excavation, was the depth as indicated, etc.)?			
6. Has an excavation record search been performed to identify buried lines?			
7. Have all identified lines been included in the design documents?			
8. If a search has not been performed, has one been planned and scheduled?			

## ATTACHMENT 10. CRITICAL DECISION-4, APPROVE START OF OPERATIONS OR PROJECT CLOSEOUT CHECKLIST

The following queries are appropriate when reviewing a project in preparation for requesting Critical Decision-4. When appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
A. Checkout, testing, and start-up funding approved?			
B. Operational readiness reviews and acceptance report complete?			
C. Project transition to user report complete?			
D. Operational and acceptance testing and all corrective actions complete?			
E. Project records disposition plan prepared and implemented?			
F. Operations and maintenance training planned and completed?			
G. Vendor data dispositioned?			
H. Inspection, NDE, laboratory test records obtained and filed?			
I. Preventative maintenance procedures and records filed?			
J. Procurement and construction complete?			
K. Punch list complete?			
L. Unresolved safety questions resolved?			
M. Red-lines and as-built?			
N. Lessons learned report?			
O. Project closeout reports?			
P. Project demobilization plan?			
Q. Project support of user organization?			
R. Other			
1. Spare parts available?			
2. Vendor data complete, identified, stored?			
3. Fire extinguishers installed?			
4. Alarms tested?			
5. First aid supplies and equipment available/identified/properly stored?			
6. Furnishings installed?			
7. Tags and labels installed?			
8. Signage installed?			
9. Safety equipment available, identified, properly stored?			
10. Protective clothing available, identified, properly stored?			
S. Have changes identified during the Critical Decision-3 review been reflected in the project?			

## ATTACHMENT 11. ORR/RA READINESS REVIEW CHECKLIST

The following queries are appropriate when reviewing a project in preparation for an RA/ORR. When appropriate, provide explanatory comments or qualifiers to support verified answers.

(DOE Order 425.1 Operational Readiness Reviews; DOE-STD-3006-95, Planning and Conduct of Operational Readiness Reviews (0.2.21, November 1995; DOE Manual 251.1-1)

Checklist Questions	Yes	No	Comments
<b>A. Preparations</b>			
1. Current project documents identified, organized, centrally located, accessible and retrievable?			
2. Individual identified as interface with ORR team?			
3. Contractor management assessment completed and corrective actions completed?			
4. Plan-of-Action prepared based on tailoring, hazard category, and hazard class?			
5. Prerequisites identified and completed?			
6. Readiness to proceed memorandum (declaration of readiness to operate) prepared and approved?			
7. Preparations complete for ORR team support:			
a. Offices and meeting space?			
b. Furnishings?			
c. Telephone, copy machines, computers, printers, and fax machines?			
d. Communications plan including daily meetings?			
8. Plan for follow-up communication with ORR team prepared?			
9. Action tracking/closure methodology identified?			
10. Final ORR report reviewed for recommendations and observations for improvement?			
<b>B. Core Requirements</b>			
1. Adequate and correct procedures prepared and safety limits identified for operating and process systems and utility systems?			
2. Training and qualification programs for user personnel established, documented and implemented? (The training and qualification program encompasses the range of duties and activities required to be performed.)			
3. Level of knowledge of user personnel adequate based on reviews of examinations and examination results, and selected interviews with operating and operations support personnel?			
4. Facility safety documentation in place that describes the "safety envelope" of the facility? The safety documentation should			

Checklist Questions	Yes	No	Comments
characterize the hazards/risks associated with the facility and should identify mitigating measures (systems procedures, administrative controls, etc.) that protect workers and the public from those hazards/risks. Safety systems and systems essential to worker and public safety are defined and a system to maintain control over the design and modification of facilities and safety-related utility systems is established?			
5. A program in place to confirm and periodically reconfirm the condition and operability of safety systems, including utility systems?			
6. A process established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, and audit organizations?			
7. A systematic review of the facility's conformance to applicable DOE Orders performed, and any non-conformances identified? Schedules for obtaining compliance justified in writing and approved?			
8. Management programs established, sufficient numbers of qualified personnel provided, and adequate facilities and equipment available to ensure operational support services adequate for operations, (e.g., training, maintenance, waste management, environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, criticality safety, and engineering)?			
9. A routine and emergency operations drill program established and implemented?			
10. An adequate startup or restart test program developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and training of user personnel?			
11. Functions, assignments, responsibilities, and reporting relationships clearly defined, understood, and effectively implemented with line management responsibility?			
12. The implementation status for DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities, adequate for operations?			
13. Sufficient numbers of qualified and trained personnel available to support safe operations?			
14. A program established to promote a site-wide culture in which personnel exhibit an awareness of public safety, health, and environmental protection requirements and, through their actions, demonstrate a high-priority commitment to comply with these requirements?			
15. The facility systems and procedures, as affected by facility modifications, consistent with the description of the facility, procedures, and accident analysis included in the safety basis?			

Checklist Questions	Yes	No	Comments
16. The technical and managerial qualifications of those personnel at the DOE Field organization (including Facility Representatives), and at DOE Headquarters who have been assigned responsibility for providing direction and guidance to the contractor, are adequate (DOE ORR only)?			
17. The breadth, depth and results of the responsible contractor review are adequate to verify the readiness of hardware personnel, and management programs for operations (DOE ORR only)?			
18. Proposed modifications to the facility reviewed for potential impacts on procedures and training and qualification? Procedures revised to reflect these modifications and training performed to these revised procedures?			
19. The technical and management qualifications of personnel responsible for facility operation and maintenance are adequate?			
20. DOE Operations Office oversight programs, such as occurrence reporting, facility representative, corrective action, and quality assurance programs, are adequate (DOE ORR only)?			
<b>C. Core Objectives</b>			
1. Facility safety documentation describes the safety envelope of the facility?			
2. Safety documentation characterizes hazards and risks, and identifies mitigating measures to protect workers, the public and the environment from the characterized hazards?			
3. Safety systems defined in the facility safety documentation?			
4. Adequate and correct safety limits for operating systems?			
5. Programs to control the design and modification of facilities and safety-related utility systems are in place?			
6. Facility systems, as affected by facility modifications, consistent with the description of the facility, procedures, and accident analysis included in the safety basis?			
7. Adequate and correct procedures for operating systems and utility systems prepared and validated?			
8. Proposed modifications to the facility reviewed for potential impacts on procedures, and procedures revised to reflect approved modifications?			
9. Facility procedures, as affected by facility modifications, consistent with the description of the facility, procedures, and accident analysis included in the safety basis?			
10. A program in place to confirm and periodically reconfirm the condition and operability of safety systems, safety-related process systems, and safety-related utility systems?			
11. Safety systems and other instruments that monitor Technical			

Checklist Questions	Yes	No	Comments
Safety Requirements checked for calibration?			
12. All safety and safety-related utility systems currently operational and in a satisfactory condition?			
13. Training and qualification programs for operations personnel established, documented, and implemented that cover the range of duties required to be performed by operations personnel?			
14. Technical qualifications of contractor personnel responsible for facility operations are adequate?			
15. Proposed modifications to the facility reviewed for potential impacts on training and qualification?			
16. Training performed to approved procedures?			
17. Level of knowledge of operations personnel adequate based on reviews of examinations, exam results, selected interviews, and observation of work performance?			
18. Sufficient numbers of qualified personnel to support safe operations?			
19. Personnel exhibit an awareness of public and worker safety, health, and environmental protection requirements and, through their actions, demonstrate a high-priority commitment to comply with these requirements?			
20. An emergency drill program, including program records, established and implemented?			
21. A routine operations drill program, including program records, established and implemented?			
22. Managerial qualifications of user personnel responsible for facility operations are adequate?			
23. Functions, assignments, responsibilities, and reporting relationships clearly defined, understood, and effectively implemented with line management responsible for control of safety?			
24. A process established to identify, evaluate, and resolve deficiencies and recommendation made by oversight groups, official review teams, audit organizations, and the user?			
25. A systematic review performed of the facility's conformance to applicable DOE Orders?			
26. Non-conformances to applicable DOE Orders justified, or schedules for gaining compliance justified in writing and formally approved?			
27. An adequate startup or restart test program developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and the training of user personnel?			
28. A program established to promote a site-wide safety culture?			

Checklist Questions	Yes	No	Comments
29. The breadth, depth and results of the responsible contractor management review adequate to verify the readiness of hardware, personnel, and management programs for operations (DOE Operational Readiness Review only)?			
30. Technical and managerial qualifications of the DOE field organization personnel and Facility Representatives assigned responsibility for providing direction and guidance to the contractor are adequate (DOE only)?			
31. Area/Operations Office oversight programs such as occurrence reporting, facility representative, corrective action, and quality assurance programs are adequate (DOE Operational Readiness Review only)?			
<b>D. Support Programs</b>			
1. Management programs established sufficient numbers of qualified personnel provided and adequate facilities and equipment available to ensure support services are adequate for operations?			
2. Training and Qualification programs for user personnel that cover the range of duties to be performed are established, documented, and implemented?			
3. Level of knowledge of user personnel adequate based on reviews of examination, exam results, selected interviews, and observations of work practices?			
4. The following support programs are included in the review, as applicable:			
a. Fire Protection			
b. Industrial Safety and Health			
c. Radiation Protection			
d. Maintenance			
e. Engineering Support			
f. Quality Assurance			
g. Criticality Safety			
h. Training			
i. Environment			
j. Waste Management			
k. Emergency Preparedness			
<b>E. Closeout</b>			
1. Findings documents prepared and issued?			
2. Corrective actions, responsible individuals and completion dates identified?			
3. Final DOE report received, reviewed, and understood?			
4. Lessons learned documented and reported?			

## ATTACHMENT 12. PROJECT SCOPE/COMPLETION CHECKLIST

The following queries are appropriate when reviewing a project in preparation for turnover or completion. When appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
1. Project physically complete (procurement, installation, construction) as defined in the project design criteria, approved project design documents, approved engineering change requests and approved field change requests?			
2. Project deliverables meet project design requirements as defined in the project design criteria and approved engineering change requests?			
3. Acceptance testing complete? Results validate project mission has been met?			
4. Accurate, current, and verified current equipment, instrument, lines, vessels, drawings and specifications lists complete?			
5. Construction progress photos, videos and files complete?			
6. Operating and maintenance manuals, procedures complete?			
7. All NDE records for both on- and off-site activities complete?			
8. Operator and maintenance training complete and documented training material available to user?			
9. ORR/RA complete and all actions closed?			
10. Recommended spare parts to support one year of operation available, identified, and properly stored?			
11. A complete set (identified, organized) of approved vendor data prepared for the user?			
12. Recommended special tools, lifting and handling devices, lubricants available?			
13. Preventative maintenance procedures for applicable equipment, and records of preventative maintenance activities prior to turnover available?			
14. All equipment, vessels, instruments, lines, conduit, etc., tagged, labeled?			
15. Sufficient pre-filters and HEPA filters to replace all process HVAC filters prior to cold startup?			
16. Necessary chemicals to support one year of operation available?			
17. Project personnel available to support cold operation and hot startup?			
18. Complete set of as-built drawings and specifications that reflect the completed project available?			
19. All punch list items completed and closed?			
20. Project lessons learned report issued?			
21. All facility signage completed and installed?			

<b>Checklist Questions</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
22. All necessary facility emergency alarms and equipment in place?			
a. Medical?			
b. Radiological?			
c. Criticality?			
23. All facility furniture and fixtures in-place?			
24. At project turnover a complete set of all project documentation prepared for user:			
a. Engineering change requests?			
b. Field change requests?			
c. Meeting minutes?			
d. Telephone conversations?			
e. Material certifications, lab test reports?			
f. Audit reports?			
g. Design review comments and comment resolutions?			
h. Source inspection reports?			
i. Receiving inspection reports?			
j. Research, laboratory, and pilot plant reports and results?			
k. Nonconformance reports?			
l. Critical decision(s) documentation?			
m. Monthly project status reports?			
n. Change board(s) minutes and records of decisions?			
o. RAM analysis?			
p. Safety documentation (e.g., FSAR)?			
q. Trade studies, engineering studies?			
r. Punch list report?			
s. Equipment test/run-in reports?			
t. Progress photos and videos?			
u. RA/ORR documentation?			

## **ATTACHMENT 13. DESIGN REVIEW GUIDANCE FOR DESIGN REVIEW CHAIRMAN**

The following queries are appropriate when planning to perform a design review of a project or portion of a project. Where appropriate, provide explanatory comments or qualifiers to support verified answers. Each Design Review Chairman is responsible for understanding and accomplishing all appropriate requirements.

1. All reviews must be accomplished in a manner that will result in a professional set of comments being provided for resolution:
  - a. Complete collation of all comments, no duplication.
  - b. No trivia, disposition these comments prior to forwarding to the AE.
  - c. No sarcasm or insinuations.
  - d. All comments clear and complete.
2. Ensure necessary review rigor, thoroughness and completeness are applied to the design review process and the review documentation.
3. Consider requiring all comments be provided in a specific, desired manner, e.g., comments to be on a separate sheet for each drawing or specification section. Collation and response can be greatly simplified.
4. Provide review instructions similar to the attached. Instructions must be appropriate to each review package.
5. Assign drawings, specifications, etc., by discipline, e.g., electrical drawings to electrically knowledgeable reviewers. Obtain concurrence of appropriate department representative.
6. Plan kick-off meetings to provide maximum value and usefulness to the reviewers. Determine the information the reviewers will need and provide it.
  - a. Review interfaces
  - b. Interface with other drawing packages
  - c. Other
7. Make attendance at the kick-off meeting mandatory, if appropriate. Provide reviewers with the rationale supporting this decision, and then be sure the kick-off meeting is valuable.
8. Provide reviewers with a plan/method of reviewing the design interfaces between review package and other interfacing review packages. The many review packages makes this design interface review especially difficult and important.
9. A design review checklist specific to the design package being reviewed should be prepared for each design review. Verbatim use of the sample checklist is not acceptable. Checklists should always include review for applicable Environmental, Safety and Health (ES&H) design features. Applicable Project Design Criteria ES&H requirements shall be referenced.

### **GUIDANCE FOR DESIGN REVIEWERS**

1. Be or get familiar with the facility, equipment, modification, etc., being reviewed. Ask questions. Use the kick-off meeting.
2. Do not make review comments that pose questions. Questions are too easy to answer with a yes or no and are of no value to the review process. The reviewer is expected to "dig out" the answer to questions they may have so that valid comments may be provided.

3. Be especially careful about comments beyond your review responsibility (e.g., operations commenting about construction security). The design review team needs informed comments, not guesses. If you have concerns, consult with responsible sources to confirm validity of your comment prior to submitting it.
4. Do not comment that something is “wrong” or “incomplete” without providing suggestions, examples, or guidance of some kind. This is not a rock game—whatever can be done to ease the AE’s job is to everyone’s advantage.
5. Submitted comments must have a project impact or significance—and not be trivial. Trivial comments will be dispositioned as such.
6. Comments must not be in conflict with requirements of the Project Design Criteria, Scope of Work or the Contract. Comments requiring changes to any of these documents require the commentor to prepare and submit a change request.
7. Comments must be pertinent to the drawings or specifications being reviewed.
8. Organizational review representatives have more responsibility than just collecting comments and passing them on to the Design Review Team. Requirements include screening comments within the member’s organization to ensure they represent the organization’s position, and not submitting comments that conflict or are inappropriate. Submit a consolidated set of comments to the design review committee chairman and inform organizational reviewers which comments were not submitted to the chairman.
9. Be professional in all comments, responses and discussions. Comments with sarcasm or other derogatory references to the project AE or any other project participant will not be accepted.
10. Familiarize yourself with the Environmental, Safety and Health (ES&H) requirements of the Project Design Criteria and applicable documents. Ensure that the design package you are reviewing specifically and properly applies all applicable ES&H requirements.

**Design Review Guidance**  
**Sample Design Review Checklist**

Note: This is a generic example only. Checklists must be customized for the specific design under review. Items in Section II, Environmental, Safety, and Health, identified with an M are mandatory items for all checklists.

Checklist Questions	Yes	No	Comments
<b>A. General</b>			
1. Have functional and operational requirements and design criteria been specified for this design?			
a. Were they used in the design process?			
b. Were all areas adequately covered in the design?			
c. Are design assumptions reasonable and adequately identified and described?			
d. Have assumptions necessary to perform the design task been adequately described and are they reasonable? Where necessary, have assumptions been identified for re-verification when the design tasks have been completed?			
e. Does the design meet the established requirements and the design criteria?			

Checklist Questions	Yes	No	Comments
f. Does the design represent the simplest design consistent with functional requirements and expected service conditions?			
g. Have available data on similar designs been used?			
h. Does the design meet functional requirements?			
• Stresses are within design limits?			
• De-rating is used?			
• Steady-state and transient conditions have been considered?			
• Have actual and “worst case” condition stresses been considered rather than nominal average stresses?			
2. Have human factors been considered in the design?			
a. Are controls well organized?			
b. Are controls located for efficient operation?			
c. Can monitoring devices be easily and accurately read?			
d. Can all operations be performed safely without danger to user or facility?			
e. Have human services requirements been considered (change rooms, lockers, showers, offices, communications, etc.)?			
f. Can maintenance be performed easily?			
g. Have operations requiring special skills or special attention been minimized?			
h. Does the design adequately consider remote operability, replacement, and maintainability requirements?			
i. Does the design minimize potential for human error (unique fittings to preclude inadvertent errors in making routine connections, clear labeling and logical layouts to preclude mistakes in valve operations, minimum reliance on irregular manual operations, etc.)?			
j. Has the design appropriately considered maintenance, operation and reliability, including maintenance procedures and techniques, unique maintenance requirements and frequencies?			
k. Have human factors engineering and operability been considered?			
3. Cost Estimating			
a. Have cost-benefit studies been performed? Are they realistic?			
b. Are cost estimates realistic?			
c. Are costs minimized?			
d. Does the design minimize overall cost to the extent practicable?			
e. Has the cost estimate been verified by an independent reviewer?			
4. Construction			
a. Are essential parameters to be controlled during construction clearly identified?			
b. Has constructability been considered?			

Checklist Questions	Yes	No	Comments
c. Is equipment (commercial and other) readily available?			
d. Are specified materials appropriate based on availability, cost, and application?			
e. Is the design producible by conventional means?			
f. Do the clearances and tolerances consider the effects of age and wear?			
g. Are mechanical tolerances within limits of normal shop practice?			
h. Are assembly clearances adequate?			
i. Are surface finish requirements the least stringent possible?			
j. Are required tolerances, fabrication techniques, processes, etc., consistent with standard practices?			
k. Have requirements for receiving and storing the equipment item been defined?			
l. Have welding, bolting, joining methods been adequately specified?			
5. Failure Modes			
a. Have redundance, diversity, and separation requirements for structures, systems, and items been considered?			
b. Have failure modes for critical elements been analyzed?			
c. Have failure effects, requirements related to structures, systems, and equipment (including definition of events and accidents which they must withstand) been considered?			
d. Do manufacturing, processing, and fabrication procedures minimize stress corrosion and fatigue?			
e. Does the design use engineered safety and operational protections to avoid an excessive risk-taking dependence on administrative infallibility?			
f. Is a single point failure analysis required?			
g. Are all indicating lights and electrical control considered fail-safe? Are colors and motions uniformly applied?			
6. Has the plant's environment effect on the design been considered?			
a. Are the specified construction materials resistant to the following as applicable:			
• Moisture			
• Oxygen			
• Acids			
• Salts			
• Radiation			
b. Have allowable leakages been specified?			
c. Have non-corrosive materials been used where required?			
d. Does the design avoid any materials unproven for use in the			

Checklist Questions	Yes	No	Comments
anticipated environment?			
e. Can the assembly be stored for extended periods of time without degrading effects?			
f. Are coatings (or finishes) compatible with the expected environment? With expected usage?			
g. Have all credible non-standard conditions been properly considered?			
7. Has the design's effect on the plant and the offsite environment been considered?			
8. Have transportability requirements been considered?			
9. Have natural phenomena design criteria been properly establishes?			
a. Will a Design Qualification Checklist (DQC) (for Seismic I equipment) be required?			
<ul style="list-style-type: none"> <li>• If yes, is responsibility for preparation of the DQC assigned?</li> </ul>			
<ul style="list-style-type: none"> <li>• If no, attach separate justification</li> </ul>			
b. Have NDE methods been applied correctly?			
10. Document Control			
a. Are drawings, equipment, valve, and instrument numbering system consistent with plant standards?			
b. Has completeness of drawings and specifications been verified?			
c. Are acceptance criteria specified in design documents sufficient to allow verification that design requirements have been adequately accomplished?			
d. Are design details complete and accurate? Are tolerances properly identified?			
e. Have obvious errors and omissions been corrected?			
f. Are adequate identification requirements specified?			
g. Are documents adequately identified and numbered?			
h. Do the design media, format, content, reproducibility, and quality comply with all applicable requirements (including referenced codes and standards)? Are the drawings structured to meet the needs of users after project completion?			
i. Have requirements for providing as-built drawings been specified?			
j. Has drawing traceability been provided?			
k. Are design tolerances appropriate and applied in a cost-effective manner and are standard materials and material sizes used where practicable?			
11. Interface Control			
a. Have the basic functions of each structure, system, and component been defined?			

Checklist Questions	Yes	No	Comments
b. Have interface requirements including definition of functional and physical interfaces involving structures, systems, and components been considered?			
c. Have layout and arrangement requirements (including ventilation criteria) been met?			
d. Have interdisciplinary checks been completed?			
e. Has the simplicity of the design been optimized?			
f. Have energy conservation design features been incorporated to minimize the consumption of energy?			
g. Have underground utilities been appropriately considered?			
h. Have plant as-builts been fully considered in the interface review?			
i. Does the design meet established requirements for associated system physical and functional interfaces?			
j. Have the interface requirements with site construction drawings been clearly specified and are they achievable?			
k. Are there any interface problems?			
l. Have availability of power requirements for the project been verified?			
<b>B. Environmental, Safety, and Health</b>			
1. General			
a. Have requirements to prevent undue risk to the health and safety of plant personnel, the public, and the environment been provided?			
b. Has the need for safety studies/reports been identified and planned?			
c. Does the design fulfill all the safety requirements identified in the project PSAR?			
d. Has the need for safety analysis of this design been determined?			
e. Is the equipment, system, or facility covered by an existing Safety Analysis Report (if not, will the safety analysis be completed in time to incorporate findings of the analysis into the design)?			
f. Is the design in compliance with applicable regulatory requirements and/or regulatory commitments?			
2. Safeguards and Security			
a. Have access and administrative control requirements for plant safeguards and security been provided?			
b. Have requirements imposed by the Nuclear Materials Control and Accountability System been considered?			
3. Radiation and Environmental Safety			
a. Have permissible personnel radiation exposures for specified areas and conditions been considered?			
b. Has the design properly considered the control of radiation,			

Checklist Questions	Yes	No	Comments
contamination and exposure to plant personnel and the public?			
c. Does the design comply with ALARA ?			
d. Have safety requirements dealing with source containment for preventing personal injury been considered?			
e. Have notches, cracks, crevices, and rough surfaces that might retain radioactivity been minimized in the design?			
f. Does the design provide for control of gaseous, liquid, and solid waste output?			
g. Has an acceptable level of radiation exposure been defined?			
h. Have personnel radiation protection requirements been considered and identified?			
4. Industrial Safety			
a. Have fire protection and fire resistance requirements been provided?			
b. Have safety requirements, including those dealing with the following, been considered?			
• Restricting use of dangerous materials?			
• Escape provisions from enclosures?			
• Grounding of electrical systems?			
• Barriers and railings?			
• Emergency and first aid equipment?			
• Evacuation provisions?			
c. Will the design meet the following environmental conditions?			
• Temperature (steady-state and transient)			
• Flow (steady-state and transient) including induced vibration			
• Pressure (steady-state and transient)			
• Seismic/natural phenomena			
• Nuclear radiation			
d. Does the design meet all established safety requirements?			
5. Criticality Safety			
a. Has a criticality safety evaluation been completed?			
b. If changes in operation or equipment are made, would this change the conclusions of the evaluation?			
c. Are the proposed controls adequate to assure criticality safety (e.g., administrative, configuration, process)?			
d. Have nuclear criticality safety considerations been incorporated?			
e. Have necessary features been provided to maintain personnel radiation exposures as low as reasonably achievable?			
6. OSHA			

Checklist Questions	Yes	No	Comments
a. Have all applicable OSHA requirements been incorporated into the design? Examples for which specific OSHA requirements apply are:			
• Trenching			
• Excavation			
• Stairways			
• Exits and entrances			
• Electrical installation			
<b>7. Environmental Regulations</b>			
a. Does the design properly incorporate design features to comply with applicable State and Federal environmental regulations? Examples of requirements that must be in the design are:			
• Effluent control and monitoring systems for radioactive and non-radioactive liquid and airborne effluents.			
• RCRA containment and inspection requirements.			
• RCRA monitoring, surveillance, and leak detection requirements.			
• Surface water runoff control provisions.			
• Systems to prevent unacceptable releases to the environment.			
NOTE: Release of radioactive and non-radioactive materials postulated to occur as a result of a DBA shall be limited by designing the facility such that at least one confinement barrier remains fully functional following any credible DBA.			
• Systems and equipment to meet commitments established in NEPA, NESHAP, and State PSD/PTC documents.			
• Designs that avoid use of environmentally restricted/hazardous materials.			
• Ventilation and off-gas treatment system requirements.			
• Storage and transfer system requirements.			
• Piping designs that minimize the entrapment and buildup of solids in the waste transfer system.			
• ALARA concepts to mitigate post-DBA releases of radioactive and non-radioactive materials.			
• Waste minimization considerations.			
<b>C. Technical/Plant Engineering</b>			
1. General			
a. Are materials, processes, parts, and equipment suitable for required application?			
b. Have performance requirements been considered?			
• Capacity?			
• Rating?			
• System output?			

Checklist Questions	Yes	No	Comments
• Reliability?			
c. Have calculations been performed and provided to support design output?			
d. Are control devices of proper type and adequate?			
e. Has the use of mechanical equipment in radioactive areas been minimized?			
f. Has a Technical risk assessment been considered (i.e., state-of-the-art versus proven design)?			
g. Have all necessary codes and standards been identified and a compliance evaluation considered?			
h. Has testing been adequately addressed?			
i. Has application of automatic data processing been appropriately considered?			
j. Are reliability requirements specified? If so, does the reliability analysis meet specified reliability requirements?			
2. Process Development			
a. Have design conditions been considered?			
• Pressure?			
• Temperature?			
• Fluid chemistry?			
b. Have chemistry requirements such as provisions for sampling limitations on fluid chemistry been provided?			
c. Is pilot plant or development work required and planned?			
d. Are key process control point identified?			
e. If any development work is needed, has it been funded or performed?			
f. Is all computer software and data properly identified and controlled?			
3. Mechanical			
a. Have mechanical requirements been considered?			
• Vibration?			
• Stress?			
• Shock?			
• Reaction forces?			
b. Have structural requirements for equipment foundations and pipe supports been provided?			
c. Have hydraulic requirements been considered?			
• Pump net positive suction heads?			
• Allowable pressure drops?			
• Allowable fluid velocities?			

Checklist Questions	Yes	No	Comments
• Antisiphoning provisions?			
• Elimination of inadvertent transfer routes?			
• Overflow provisions?			
d. Have break points been properly identified for system isolation or for line and valve classes?			
e. Has appropriate consideration been given to use of standardized parts, materials and processes, and have engineering standards and criteria been specified properly in the design?			
f. Can the equipment be readily assembled/disassembled as designed?			
4. Electrical			
a. Have electrical requirements been met?			
• Source of power?			
• Voltage?			
• Raceway requirements?			
• Electrical insulation requirements?			
• Motor requirements?			
• Proper function and routing?			
• Emergency power?			
b. Have cable and conduit schedules been prepared by the designer?			
5. Civil			
a. Have design loads been adequately conditioned?			
• Seismic?			
• Wind?			
• Thermal?			
• Dynamic?			
b. Have anticipated environmental conditions during storage, construction, and operation been considered?			
c. Have utility systems, interface requirements been considered and established?			
d. Have concrete requirements been properly identified?			
• Concrete finishes for protective coatings?			
• Proper additives, release agents, or curing compounds?			
6. Materials			
a. Have materials requirements been provided for:			
• Compatibility with existing plant equipment and processes?			
• Electrical insulation properties?			

Checklist Questions	Yes	No	Comments
• Protective coatings?			
• Corrosion resistance?			
• Radiation resistance?			
• Physical and chemical properties?			
• Welding materials?			
• Special processes?			
• Cathodic protection?			
b. Are the specified materials compatible with each other and the environmental conditions to which the material will be exposed?			
<b>D. Quality Assurance</b>			
1. Are the appropriate quality assurance requirements specified?			
a. Have modifications to commercial grade items and any associated verification operations or tests been appropriately documented?			
2. Has adequate accessibility been provided to perform the in-service inspection required during plant life?			
3. Have QA inspection requirements been properly identified?			
a. Can the design and its parts be easily inspected for conformance to engineering specifications?			
b. Have adequate acceptance criteria been specified and are the verification methods stated appropriately?			
c. Will a separate Acceptance Test Specification/Procedure be required? If yes, identify responsible organization(s) for preparation and issue (TBD if unknown).			
<b>E. Operations</b>			
1. General			
a. Are accessibility, maintenance, repair, and in-service inspection and the conditions under which they will be performed considered? (Overlay drawings should be provided if requested by the project manager.)			
b. Are operation and maintenance features consistent with user policies and procedures?			
c. Are adequate handling, storage, cleaning, and shipping requirements specified?			
d. Have OSHA and DOE requirements for operation and maintenance activities been specified?			
e. Have needs for bypasses and operating spares been established?			
f. Have personnel requirements and limitations including the qualifications and number of personnel available for plant operations and maintenance been considered?			
g. Are Operation and Maintenance manuals required? If so, have requirements been clearly identified?			

Checklist Questions	Yes	No	Comments
h. Are current operating documents (procedures, specifications, etc.) applicable to the design or are changes necessary?			
i. Is the equipment, system, or facility operable?			
j. Do the reliability, availability, and maintainability (RAM) analyses of the design support the RAM requirements?			
2. Operation			
a. Have operational requirements under various situations been considered?			
• Plant startup?			
• Normal process operation?			
• Process shutdown?			
• Plant emergency operation?			
• Special or infrequent operation?			
• System abnormal or emergency operation?			
b. Are critical parameters to be controlled during operation clearly identified?			
c. Have any locking devices, that are critical to operation or that will be inaccessible after assembly, been sufficiently evaluated and tested to assure their adequacy?			
d. Does the design match the intended (and possible abnormal) methods of operation of the system or facility?			
3. Maintenance and Repair			
a. Has prior maintenance and repair experience related to similar systems and items been considered?			
b. Have adequate maintenance features and requirements been specified?			
c. Are items requiring frequent maintenance easily accessible?			
d. Has maintenance personnel safety been considered?			
e. Are spare parts appropriately considered?			
f. Are accessibility and other design provisions adequate for performance of required maintenance, replacement, and repair?			
g. Have opportunities and limitations of remote maintenance and operation been considered?			
h. Have instrument calibration and preventive maintenance been considered?			
i. Have decontamination and decommissioning been considered?			
j. Have qualified and certified parts been specified?			
k. Can the hardware be adequately disposed of after use if it is radiologically or chemically contaminated?			
l. Is the equipment design adequate to implement the proposed maintenance philosophy?			

## ATTACHMENT 14. SAFETY SELF-ASSESSMENT INSPECTION CHECKLIST

The following queries are appropriate when planning to perform a safety inspection for a project or a portion of a project. When appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
<b>A. Program Analysis</b>			
1. The opening safety meeting conducted?			
2. Contractor work site compliance history reviewed?			
3. Daily safety briefings performed and documented?			
4. Daily contractor safety inspections performed and documented?			
5. Weekly safety meetings performed and documented?			
<b>B. Training</b>			
1. Employees oriented to user and OSHA standards?			
2. Confined space?			
3. Hazard communications?			
4. Ladders?			
5. Excavation?			
6. Scaffolding?			
7. Breathing air?			
8. Respirator use?			
9. Fire extinguisher location and use?			
10. Lock and tag?			
11. Fall protection?			
12. Hearing protection?			
<b>C. Safety Bulletin Boards.</b> Safety bulletin boards are required on sites with eight or more employees and should have, as a minimum, the following items posted:			
1. Occupational Safety and Health poster?			
2. Occupational Safety and Health Complaint form?			
3. Industrial Insurance Labor and Industries form?			
4. Citations and notices (as appropriate)?			
5. OSHA 200 Summary (February each year)?			
6. User-furnished safety bulletins, publications, and posters?			
<b>D. Pre-job Safety Planning</b>			
1. A walk down of the site prior to start of work performed with ES&H?			
2. Appropriate approval signatures on work permits?			
3. Asbestos Good Faith Inspection Report available?			
<b>E. Industrial Hygiene Program</b>			
1. Contractor has a hearing protection/hearing conservation program?			
2. Noise surveys are performed?			
3. Heat/cold stress is identified?			
4. Illumination is adequate?			

<b>Checklist Questions</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
5. Laser protection is provided?			
6. Dust control measures are adequate?			
7. Lead/asbestos programs are in place?			
8. Industrial painting/sandblasting programs are in place?			
9. Sanitation (cleanliness in general work areas, lunch areas, port-o-lets) is adequate?			
10. Varmints/insects controlled?			
11. Hazardous materials (such as potential carcinogens) are identified, stored, and used properly?			
<b>F. Hazard Communication Program</b>			
1. An MSDS file is located at the workplace and accessible?			
2. Each MSDS is updated and legible?			
3. Containers are labeled?			
4. The Hazard Communication Program and a list of hazardous materials are available?			
<b>G. Event Reporting</b>			
1. The contractor assists in event investigations and prepares records/reports?			
2. Workers are knowledgeable of when and whom to notify if an event occurs?			
<b>H. Emergency Response</b>			
1. Each employee is knowledgeable of the emergency response and notification requirements in the areas they are working?			
2. The contractor notifies construction management of any emergencies?			
<b>I. Radiation Protection</b>			
1. All radiation areas properly and conspicuously posted?			
2. A valid radiation work permit available covering the scope of work currently performed?			
3. Radiation monitoring coverage meets radiation work permit requirements and is appropriate for work performed?			
4. Proper personnel protective equipment used?			
5. Proper radiation dosimetry devices and procedures used?			
<b>J. Confined Space</b>			
1. An entry supervisor(s) designated?			
2. Confined space entry permits properly documented and posted at the confined space?			
3. All personnel sufficiently trained to enter the confined space?			
4. Monitoring instrumentation calibrated and used correctly?			
5. Retrieval equipment adequate for the work taking place and the space involved?			
6. A safe means of entry and exit available and properly maintained?			
7. Rescue personnel notified of confined space entry (if such notification is required)?			
8. Work in compliance with the Confined Space Entry Permit?			
<b>K. Personal Protective Equipment</b>			

<b>Checklist Questions</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
1. Contractor provides adequate personnel protective equipment for all employees and vendors?			
2. Contractor ensures personnel protective equipment properly maintained and used?			
3. Hard hats worn when required?			
4. Eye protection used when required?			
5. Proper foot protection worn when required?			
6. Proper work clothing worn as required?			
7. Respirator protection used as required?			
8. Respirators stored as required?			
9. Hearing protection used as required?			
<b>L. Fall Protection</b>			
1. A competent person designated responsible for fall protection?			
2. A fall protection work plan developed and used as required?			
3. Protective systems and equipment used as required when fall potentials of 6 ft or greater exist?			
4. A documented roof inspection performed prior to roof access?			
5. A quarterly inspection performed?			
<b>M. Signs, Signals, and Barricades</b>			
1. Proper warning signs and barricades used?			
2. All signs intended for hazard warning during hours of darkness reflectorized or illuminated?			
<b>N. Fire Protection</b>			
1. A competent person designated?			
2. Exits marked and kept clear?			
3. Fire extinguishers provided and have documented monthly inspections?			
4. No smoking signs posted and enforced near flammables?			
5. Temporary plastic structures, enclosures, or covers are of noncombustible materials?			
6. Flammable/combustible liquids properly stored?			
7. Flammable/combustible liquids stored in approved containers?			
8. Dispensing containers bonded and grounded?			
9. Dispensing containers provided with proper nozzles and vents?			
10. LP gas cylinders properly stored? Hose and gauges in adequate condition?			
11. Temporary heaters located away from combustibles or flammables?			
<b>O. Cranes and Rigging</b>			
1. A competent person designated to evaluate lists, rigging, and cranes?			
2. The equipment operator meets qualifications?			
3. Rigging equipment inspected and free from damage and unsafe conditions?			
4. The swing radius of cranes barricaded?			

<b>Checklist Questions</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
5. Safety latches or mousins used on load hooks?			
6. Quarterly inspections performed?			
<b>P. Tools</b>			
1. Personnel protective equipment used as required?			
2. All appropriate tool guards in place?			
3. Electrical tools in a safe condition?			
4. Air tools secured to the hose?			
5. Grinding tools used properly and in a safe working condition?			
6. Grinding tools properly guarded?			
7. Personnel using powder-actuated tools properly trained (licensed)?			
8. Powder-actuated tools properly used and stored?			
9. Abrasive wheels in a safe condition?			
<b>Q. Electrical</b>			
1. All electrical installations in a safe condition?			
2. GFCIs used on temporary circuits?			
3. Cords protected from damage?			
4. Equipment grounded as required?			
5. Panels, disconnects, and breakers kept clear (36 in.)?			
6. Lockout/Tagout practice followed?			
7. Appropriate guarding/barricading of LIVE circuits?			
<b>R. Welding and Cutting</b>			
1. A Hot Work Permit issued before any welding, cutting (spark producing), or heating operations are conducted?			
2. A fire watch maintained for a minimum of 30 minutes after completion of welding/cutting operations?			
3. Gas cylinders used, stored, and handled properly?			
4. Combustibles removed or protected during welding/cutting operations?			
5. Welding/cutting equipment in a safe condition?			
6. Hoses, leads, or cables kept out of walkways and protected from damage?			
7. Fire extinguishers accessible?			
8. Proper ventilation provided?			
9. Welding equipment properly grounded?			
10. Proper PPE/shielding used?			
<b>S. Ladders</b>			
1. A competent person designated to evaluate ladder use?			
2. Only Class 1 or 1-A ladders used?			
3. Ladders inspected before each use?			
4. Ladders used properly?			
5. Ladders stored properly?			
6. Access to ladders clear of materials?			
7. A minimum 36-in. extension above level of access (such as roof			

Checklist Questions	Yes	No	Comments
access)?			
8. Job-made ladders constructed properly?			
<b>T. Floor and Wall Openings/Open Sided Surfaces</b>			
1. Guardrails placed to guard openings that are 4 ft or more above the next level?			
2. All floor openings covered, marked, and secured from displacement?			
3. Materials stored at least 6 ft from openings?			
4. Stairways kept clear of trash and tripping hazards?			
<b>U. Scaffolds</b>			
1. A competent person designated to evaluate scaffolding design, construction, and maintenance?			
2. The proper scaffold used for the job?			
3. Scaffolds properly erected and tagged (such as green, yellow, red)?			
4. Handrails, midrails, and toe boards installed?			
5. Platforms fully planked and secured?			
6. Screens installed where personnel are required to work/walk below scaffolds?			
7. Scaffold parts in a safe condition and free from damage?			
8. Mobile scaffold wheels locked when the scaffold is used?			
9. Training for erectors/users conducted?			
10. Proper fall protection used when guardrails are not used?			
<b>V. Heavy Equipment</b>			
1. Monthly inspection on equipment documented?			
2. All heavy equipment inspected daily by the operator?			
3. Daily inspections of equipment used for lifting persons or materials documented (such as aerial lifts, cranes)?			
4. Operator proficiency/qualifications meet applicable requirements?			
5. A fire extinguisher in the cab?			
6. Hearing protection worn when applicable?			
7. Seatbelts worn?			
8. Rollover protection available?			
<b>W. Motor Vehicles/Safety Program</b>			
1. Vehicle operator has a proper license?			
2. Seat belts worn?			
3. Defective equipment tagged, segregated and not used?			
4. Vehicle licensed and has necessary permits?			
<b>X. Excavation and Trenching</b>			
1. A competent person designated to evaluate excavations and trenches?			
2. Excavations inspected and documented daily prior to personnel entry?			
3. Excavations properly sloped, shored, or used with a			

<b>Checklist Questions</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
trench box?			
4. Manufacturer's data on shoring/trench box on site and reviewed by safety?			
5. Excavations safely barricaded?			
6. Safe access and egress provided?			
7. Underground utilities identified, field marked, and/or protected?			
8. Underground utilities within 5 ft of excavation de-energized or a letter of justification from the facility owner obtained?			
9. Workers wearing appropriate PPE?			
<b>Y. Housekeeping</b>			
1. Walkways, corridors, and work areas kept clear of material and debris?			
2. At the end of each shift, a general cleanup of all work areas performed?			
3. Containers used for oily, flammable, or hazardous wastes (such as caustics, acids, harmful dusts, or similar materials) and equipped with covers?			
4. Electrical cords/hoses used, stored, and maintained properly?			
5. Access/exits clear of obstructions?			
6. Lunch areas clean and sanitary?			
7. Work areas free of protruding nails and/or other hazards?			
<b>Z. Concrete and Forms</b>			
1. Workers use appropriate PPE when working with concrete?			
2. Vertical protruding rebar guarded to protect workers from Impalement?			
3. Proper support provided for forms?			
4. Safe walkways provided for decking, wire mesh, and concrete placement?			
<b>AA. Material Handling and Storage</b>			
1. Material stored properly?			
2. Proper lifting techniques observed?			

## ATTACHMENT 15. CHANGE REQUEST CHECKLIST

The following queries are appropriate when preparing or evaluating a project change request. Where appropriate, provide explanatory comments or qualifiers to support verified answers.

**NOTE:** Identify each area that will be impacted by the proposed change. The extent of each impact must be included with the change request package.

Checklist Questions	Yes	No	Comments
<b>A. Programmatic Impacts</b>			
1. Contract/project Contract			
2. DOE or project milestones			
3. Project Scope Baseline			
4. Project Schedule Baseline			
5. Project Cost Baseline			
6. Design, construction or vendor contractor			
7. Other contractors			
8. Other projects			
9. Other facilities			
<b>B. Technical Impacts</b>			
1. Project scope baseline			
2. Project schedule baseline			
3. Project cost baseline			
4. Life cycle costs			
5. Project subcontractors, subcontracts			
6. Project support organizations			
7. Project design specifications			
8. Project design drawings			
9. Construction/fabrication			
10. Tank farm drawings/as-builts			
11. Procurement			
12. Operating concepts			
13. Maintenance concepts			
14. System requirements			
15. Equipment requirements			
16. Process requirements			
17. Facility requirements			
18. Product specifications			
19. Instrumentation/control systems			
20. Materials of construction			
21. Decontamination and decommissioning			
22. Waste generation, treatment or disposal			
23. Pollution control			
24. Safety requirements			

<b>Checklist Questions</b>	<b>Yes</b>	<b>No</b>	<b>Comments</b>
25. Quality requirements			
26. Remote/robotics requirements			
27. Radiation or contamination control			
28. Testing, turnover, acceptance			
29. Operational readiness review			
30. Testing and acceptance			
31. Inspection			
32. Training			
33. Cold operation			
34. Project staffing: numbers, skills, qualifications			
<b>C. Documentation Impacts</b>			
1. Master equipment list			
2. Safety equipment list			
3. Safety basis documentation/authorization basis			
4. ESH&Q plans			
5. Mission need statement			
6. Project design criteria document			
7. Conceptual design reports			
8. Systems engineering			
9. Document control, records management			
10. Reporting			
11. Permits or licenses			
12. Interface control documents			

## ATTACHMENT 16. SCHEDULE REVIEW CHECKLIST

The following queries are appropriate when reviewing project schedules. Where appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
A. For the Schedule Performance Baseline, is there a minimum of two schedule levels: the project level with activities defined at the project element level, and the cost account level with activities defined at the work package/task package level?			
B. Does the schedule define the level of detail necessary to perform and manage the scheduled work?			
C. Are interim and required milestones identified?			
D. Do all activities on the schedule correlate to the WBS?			
E. Is there data to show the schedule has logic relationships within the project and between other projects or facilities?			
F. Is the schedule resource loaded?			
G. Is the schedule resource leveled?			
H. Have schedule constraints been addressed (i.e., regulatory/safety)?			
I. Is there a reasonable basis for the duration of the activities shown on the schedule?			
J. Were schedule analyses performed?			
1. Critical Path?			
2. Float?			
3. Resource availability?			
4. Viability/integration?			
K. Is the schedule maintained under change control?			
L. Are there direct linkages between the schedule elements, the cost estimate elements and the scope of work?			
M. Are changes to the schedule identified documented, approved and incorporated?			
N. Are all schedule assumptions documented?			

## ATTACHMENT 17. COST ESTIMATE REVIEW CHECKLIST

The following queries are appropriate when reviewing project cost estimates. Where appropriate, provide explanatory comments or qualifiers to support verified answers.

Checklist Questions	Yes	No	Comments
A. Was technical scope used in preparing the estimate?			
B. Was a WBS developed/utilized?			
C. Was a schedule used and is it integrated with the cost estimate?			
D. Is work divided into quantifiable elements?			
E. Were labor hours developed using analogy or parametric methods, or comparable historical activities?			
F. Were appropriate or unusual facility features addressed?			
1. Shift work?			
2. Dress requirements?			
3. Weather requirements?			
4. Resource constraints?			
5. Radiation?			
6. Contamination?			
G. Are costs for safety requirements included as required?			
H. Are construction management costs included, as required?			
I. Are project management costs included, as required?			
J. Determine labor rate derivation.			
Analogy?			
Do average hourly rates include:			
1. Shift differential?			
2. Crew mix?			
3. Overtime allocation?			
4. Labor taxes, insurance and fringe benefits?			
K. Are quantities clearly identified?			
L. Were material and supplies pricing developed using analogy or parametric methods, vendor quotes?			
M. Were materials and supplies usage requirements referenced to source documents?			
N. Were materials and supplies pricing supported by vendor quotes or historical cost data?			
O. Are equipment costs included and individually identified?			
P. Was subcontract pricing developed using analogy, parametric methods, or vendor quotes?			
Q. Was subcontract pricing supported by subcontractor quotes or historical cost data?			

Checklist Questions		Yes	No	Comments
R.	Are overhead, indirect, G&A, and other costs that are distributed among activities clearly and individually identified and properly applied?			
S.	Are risks associated with allowances identified and described?			
T.	Do allowances reflect level of confidence in:			
	1. Scope of work?			
	2. Pricing methodology?			
	3. Complexity of activity?			
	4. Schedule uncertainties?			
	5. Scope of work?			
U.	Do allowances provide for varying degrees of certainty in the estimate?			
V.	Were escalation factors (if used) provided or developed?			
W.	Were escalation factors (if used) properly applied?			
X.	Was adequate documentation provided for historical costs?			
Y.	Were historical costs in current dollars?			
Z.	Is documentation available including:			
	1. Statement of purpose of the estimate?			
	2. Assumptions?			
	3. Vendor quotations?			
	4. Historical comparisons?			
	5. Source of labor rates, unit rates and unit costs?			
	6. Escalation amount?			
	7. Escalation sources?			
	8. Allocation development?			
AA.	Are quality assurance and quality control costs included?			
BB.	Are training requirements included?			
CC.	Are the following regulatory requirement functions included:			
	1. Permitting?			
	2. Facility inspections?			
	3. Regulatory compliance logs and reports?			
	4. Site surveys?			
DD.	Does the estimate represent lifecycle costs?			
EE.	Is the cost estimate maintained under change control?			
FF.	Are cost estimate changes clearly identified, documented, approved and incorporated?			
GG.	Are there direct linkages between the scope, schedule, and cost estimate?			
HH.	Does the estimate reflect the resources identified on the schedule?			
II.	Are all cost estimating assumptions documented?			

## ATTACHMENT 18. TOTAL PROJECT COST, PROJECT ENGINEERING AND DESIGN COSTS, AND TOTAL ESTIMATED COST REVIEW CHECKLIST

The following queries are appropriate when developing and reviewing project cost estimates. Where appropriate, provide explanatory comments or qualifiers to support verified answers.

This document provides guidance and clarification with respect to the definitions and inclusions/exclusions of TPC, PED, and TEC. The information included in this document is based on DOE guidance.

### Definitions

*TPC.* All costs specific to a project incurred prior to start of operation.

*TEC.* All facility construction costs, procurement costs, and other costs specifically related to the construction efforts. These costs are typically capitalized.

*PED.* All preliminary and final design costs and other costs specifically related to the design effort. These costs are capitalized

*OPC.* Other Project Costs. All the operating costs related to the project which are typically expensed.

$$TEC + PED + OPC = TPC.$$

*See the last page for footnotes.*

### Project (TPC) Costing Guidance

ACTIVITY	TPC			
	PS <sup>9</sup>	CONC <sup>10</sup>	PED <sup>12</sup>	TEC
<b>A. PRE-AUTHORIZATION</b>				
1. Engineering Feasibility Study		X		
2. Site Selection Report		X		
3. Surveying for Siting		X		
4. Candidate Projects (support sheet and presentation to DOE) <sup>1</sup>		X		
5. Short Form Data Sheet		X		
6. Conceptual Design Plan		X		
7. Work Orders - CDR Prep. etc.		X		
8. Integrated Project Schedule (R&D, Safety, Environmental, Operational, etc.)		X		

ACTIVITY	TPC			
	PS <sup>9</sup>	CONC <sup>10</sup>	PED <sup>12</sup>	TEC
9. Requirements for Safety Analysis Determination		X		
10. Functional Design Criteria		X		
11. Evaluation of RCRA/EPA/State Permit Requirements		X		
12. Cultural Resources Review <sup>2</sup>		X		
13. Conceptual Design Report (CDP)		X		
14. Design Reviews		X		
15. Action Description Memo <sup>3</sup>		X		
16. NEPA Documentation		X		
17. Conceptual Project Schedule		X		
18. Plant Forces Work Review <sup>4</sup>		X		
19. Energy Conservation Report		X		
20. Economic/Life Cycle Cost Analysis		X		
21. Physically Handicapped Review		X		
22. Statement of Work - For Contractor Project Management Activities		X		
23. Preliminary Safety Analysis Studies		X		
24. Security Review and Plan		X		
25. Vulnerability Assessments <sup>5</sup>		X		
26. Master Safeguards & Secure Analysis		X		
27. Project Data Sheet (PDS) for Design		X		
28. ES&H Crosscut		X		
29. Strategic Facility Assessment <sup>6</sup>		X		
30. Estimates, as required (parametric; ICE)		X		
31. Project Validations		X		
32. Monthly Conceptual Status Report		X		
33. Request for Project Authorization		X		
34. Architect Engineer Selection - SOW for Off-Site Architect Engineer		X		
35. Identification of Project Record Requirements		X		
36. Draft Project Execution Plan (PEP)		X		
37. Project Quality Assurance (QA) Plan		X		
38. Configuration Management Plan <sup>7</sup>		X		
39. Pilot Plant Support		X		
40. Research and Development		X		
41. Expense Funding		X		

ACTIVITY	TPC			
	PS <sup>9</sup>	CONC <sup>10</sup>	PED <sup>12</sup>	TEC
42. Facility As-Built Drawing Preparation Prior to Design Start <sup>8</sup>		X		
<b>B. DESIGN (UNDER AUTHORIZATION)</b>				
1. Letter of Instruction – Design			X	
2. AE funding for Design			X	
3. Design Kickoff			X	
4. PEP Revisions			X	
5. PDS for Construction			X	
6. Integrated Project Schedules			X	
7. Project Revalidations			X	
8. Request for Project Authorization Modification			X	
9. AE Internal Design Coordination			X	
10. Identification of Long Lead Procurements			X	
11. Design Studies			X	
12. Design Calculations & Analysis			X	
13. CADD (and computer) Services			X	
14. Preliminary Safety Analysis Report (PSAR)			X	
15. Cost Estimates			X	
16. Procurement & Construction Specifications			X	
17. Design Reviews by Project Team			X	
18. Design Review Support by Non-Dedicated Contractor Personnel	X			
19. Drawings/Specifications			X	
20. Project Schedules			X	
21. Acceptance Test Procedures & Plans			X	
22. Certified Engineering Reports			X	
23. Research and Development Before Start of Design		X		
24. Research and Development After the Start of Design	X			
25. Performance Evaluations of AE			X	
26. Inspection Planning			X	
27. Surveys - Support Design			X	
28. Design Cost & Scheduling Analysis & Control			X	
29. Decision Progress Reporting			X	
30. Design QA Plan and Overview			X	
31. Constructability Reviews	X			
32. Outside Contractor Support Prior to Start of Design		X		
33. Outside Contractor Support for Design and Construction			X	

ACTIVITY	TPC			
	PS <sup>9</sup>	CONC <sup>10</sup>	PED <sup>12</sup>	TEC
34. Safety Reviews by AE			X	
35. Regulatory Overview by AE			X	
36. Reproduction for design			X	
37. Travel Support for Design			X	
38. Change Control Activities			X	
39. Required Permits Prior to Start of Design		X		
40. Required Permits After Start of Design			X	
41. Value Engineering Prior to Start of Design		X		
42. Design Value Engineering After Start of Design			X	
<b>C. PROCUREMENT AND CONSTRUCTION</b>				
1. Bid Package Preparation			X	
2. Bid Evaluations, Opening and Awards				X
3. Construction Coordination and Planning				X
4. Contract Administration				X
5. Architect Engineering (AE) Support			X	
6. Design Changes/Control			X	
7. Non-Conformance Reports (NCRs)				X
8. Control Systems for Construction Activities				X
9. Project Cost and Scheduling Analysis and Control				X
10. Project Assessment & Reporting				X
11. Construction Status Reports and Meetings				X
12. Davis-Bacon Administration				X
13. Vendor Submittals				X
14. Field Support of Construction				X
15. Field or Lab Tests				X
16. Radiation Control				X
17. Timekeepers				X
18. Radiation Protection by Contractor				X
19. Safeguards/Security Systems				X
20. Operating Contractor/Operator Support During Construction	X			
21. Project Cost Estimates				X
22. Quality Control (QC) Inspection				X
23. Inspection and Acceptance				X
24. Material Take-Offs				X
25. Negotiations of Contract Changes				X
26. Trips to Vendors/Fabricators				X

ACTIVITY	TPC			
	PS <sup>9</sup>	CONC <sup>10</sup>	PED <sup>12</sup>	TEC
27. Procurement Coordination				X
28. Equipment/Hardware Costs				X
29. Material Costs				X
30. Initial Complement of Operating Lab and Office Furniture				X
31. Spare Parts	X			
32. Installation/Alteration				X
33. Disposal of Radwaste				X
34. CPAF/FP Construction				X
35. Contractor/CM Force Account Work				X
36. Construction Contractor				X
37. Vendor Construction/installation support				X
38. Safety Plan & Overview				X
39. Decontamination (exceeds normal operating levels)	X			
40. Decontamination (as removal cost)				X
41. Surveying to Support Construction				X
<b>D. ACCEPTANCE</b>				
1. Perform Acceptance				X
2. Operation Testing: Prepare/Perform	X			
3. Final Safety Analysis Report (FSAR)				X
4. Operational Readiness Review	X			
5. Start-up	X			
6. Training	X			
7. As-builts				X
8. Project Closeout				X
9. AE & Construction Performance Appraisals				X
10. Project Closeout - Fact Sheet, Lessons Learned				X
11. Testing Equipment				X
12. Vendor Testing Support				X

### **Footnotes to Explain Activity**

1. Recommend capital facility upgrades submitted by operating plant management to support plant/program milestones and commitments.
2. An archeological survey performed prior to ground disturbing activities at a proposed project construction site.
3. A brief review of existing project environmental documentation and/or impacts to determine if further NEPA documentation is required.
4. Determines whether part or all of the project work will be performed by plant forces as defined by the Davis-Bacon Act.
5. An evaluation of the vulnerability of a facility which would allow a hostile agent within the plant to gather intelligence of national security interest.
6. A review that determines whether a facility is “mission essential” in conjunction with the planned upgrade to the facility.
7. A plan to ensure and document that all components of a project interface both physically and functionally.
8. Review and revision of existing facility as-built prior to design start.
9. PS -Project Support (operating expense)
10. CONC - Conceptual Design (operating expense)
11. PED - Project Engineering and Design (capital cost)