# REVIEW PLAN

## FOR THE

## EXTERNAL INDEPENDENT REVIEW

## National Compact Stellarator Experiment (NCSX) at Princeton Plasma Physics Laboratory

## November 7, 2003

Prepared by:
Logistics Management Institute

Prepared for:
The United States Department of Energy
Office of Engineering and Construction Management
1000 Independence Avenue, SW
Washington, DC

## TABLE OF CONTENTS

# 1 REVIEW OVERVIEW

The following sections identify the type of review, define the scope and purpose of the review to be performed, identify previous reviews that have been performed, and establish the objectives of the review.

## 1.1 TYPE OF REVIEW

This External Independent Review (EIR) is in support of OECM's validation of the Performance Baseline (Critical Decision (CD)-2 EIR) for the National Compact Stellerator Experiment (NCSX) at the Princeton Plasma Physics Laboratory.

## 1.2 OBJECTIVES OF THE REVIEW

The objective of this EIR is to assist OECM in reviewing and validating the NCSX project's Performance Baseline and to assess the overall status of the project management and control system.

This EIR on-site review is scheduled during the week of Nov. 18, 2003. Office of Science has also scheduled an Internal Project Review during the same week. Although the two review teams may be briefed simultaneously on some aspects of the project, the EIR team under this task will work independent of the SC review team in gathering project details, analyzing and determining their findings.

## 1.3 SCOPE OF THE REVIEW

LMI will review available project management documents, e.g., resource-loaded Integrated Project Schedule, WBS, detailed Title I cost estimate, drawings and specifications, the Title I design review and responses, the Project Execution Plan, Risk Management Plan, Acquisition Execution Plan, Integrated Safety Management Plan and other safety documentation, Hazard Analysis, Contingency Analysis, NEPA documentation, and other pertinent project documentation. The review will focus on the key review elements described on pages 9-6 and 9-7 of DOE M 413.3-1 with additional lines of inquiry specific to the project as appropriate.

After reviewing project documentation provided through November 5, 2003, the LMI EIR Team has developed specific questions/comments/requests corresponding to the 13 key review elements as indicated below. The additional questions will not define or limit further detailed investigations into the key review elements once the EIR Team is on site. Responses to the additional questions below should be available to the LMI Team before or at the beginning of the on-site review.

*Resource Loaded Schedule*. For selected Work Breakdown Structure (WBS) elements identified below, the EIR Team will summarize the detailed basis for the cost estimate and schedule duration. The EIR Team will assess the method of estimation and the strengths/ weaknesses of the cost and schedule estimates for each WBS element reviewed. The EIR Team will identify and assess key cost and schedule assumptions and evaluate the reasonableness of these assumptions as related to the quality of the cost and schedule estimates.

Additional EIR Team questions/information requirements:

1. Several activities do not appear to have costs (e.g. ID 1201-100 thru 1201-500). Please explain the rationale for these items.
2. There are inconsistencies in the contingency rate shown in the resource-loaded schedule vs. the contingency rate in the cost and schedule backup e.g. WBS 81 and 82 (7-8% in schedule vs. 17-34% in cost backup). Please explain.

Selected WBS Elements for review:

WBS 121 Activity ID 121-038 VV vendor Fab. Test & deliver 3 periods (303 days, $2.95 million)

Additional EIR Team questions/information requirements:

1. Please provide predecessor/successor reports.
2. Provide the rationale for the 303 day duration and how the $2.95M cost is spread across the duration.
3. Please provide the design specification for this item.
4. Please provide the vendor(s) budgetary estimates, as well as any other documentation to support this estimate.
5. The resource-loaded schedule shows an activity cost of $2.95 million. The cost estimate backup documentation shows a cost of $2.73 million. Please clarify the difference.
6. Please discuss the rationale for the 40% contingency.

WBS 131 Activity ID 131-037 TF Coil Procurement (425 days, $1.22 million)

Additional EIR Team questions/information requirements:

1. Please provide the rationale for the 425 day duration and how the $1.22M cost is spread over the duration.
2. Please be prepared to discuss the magnitude of the float at delivery.
3. Please provide predecessor/successor reports.
4. The contingency analysis states that the TF coils are reasonably simple and standard. If so, what are the specific issues driving the 24% contingency and how do they relate to the requirement for "close tolerances of the device?"
5. The resource-loaded schedule shows an activity cost of $1.22 million. The cost estimate backup documentation shows a cost of $1.05 million. Please clarify.
6. In the M&S backup sheets, the individual costs for tooling, material, and labor add up to $1.036M (excluding profit), not the $956K shown elsewhere. Please discuss.
7. Please provide the detail for the complete build-up of the estimate, including vendor quotes, equipment specifications, manhour determination and rates.
8. Please discuss the difference between tooling and labor.

WBS 141 Activity ID 172-037 Modular Coil Casting Procurement vendor cost (371 days $5.2 million)

Additional EIR Team questions/information requirements:

1. Be prepared to discuss the 2000 day float.
2. Please provide the rationale for the 371 day duration and how the $5.2M cost is spread over the duration.
3. Please provide cost information for ID "MT-PVVS-Fab"
4. The resource-loaded schedule shows an activity cost of $5.2 million. The cost estimate backup documentation shows a cost of $4.8 million. Please clarify.
5. Please provide the detail for the complete build-up of the estimate, including vendor quotes, equipment specifications, manhour determination and rates.
6. Please provide the design specification for this item.

WBS 141 Activity ID 171-041 Modular coil winding (18 coils) (184 days $3.13 million)

Additional EIR Team questions/information requirements:

1. Please provide predecessor/successor reports.
2. Provide the rationale for the 184 day duration and how the $3.13M cost is spread across the duration.
3. Explain the 138 day float at delivery
4. This activity appears to be a combination of a fairly low-cost procurement coupled with extensive in-house fabrication expense. Is this correct? If so, how are both estimated? Please provide specifications and vendor quotation.
5. Are all 18 coil windings the same, and therefore, does each coil cost $174K?
6. It is difficult to correlate the $3.13 million shown in the resource-loaded schedule with the numbers presented in the cost backup. The cost backup does not reference activity ID nos., therefore, how are costs allocated and tracked?

WBS 62 - Cryogenic Systems (409 days, $944K)

Additional EIR Team questions/information requirements:

1. Please provide predecessor/successor reports.
2. Provide the rationale for the 409 day duration and how the $944K cost is spread across the duration.

3. Please provide schedule duration and cost details for the 88 day duration for GN2 Cryostat Cooling System with a cost of $189.2K. Be prepared to discuss the scope and scheduling logic for the Design, Fab/Assy/Installation, and Procurement elements.
4. The cost backup detail sheet needs clarification.
   - Please define the column headings.
   - Please clarify the material quantities, lengths, volumes, etc used for estimating purposes?
   - Where are the specifications for material and equipment?
   - Please provide vendor quotes, actual procurements, engineering calculations, or whatever has been used to develop the cost.
5. The total cost for this WBS, according to the backup sheet, appears to be $618K. This does not agree with the summary estimate figure of $787K. Please clarify.

WBS 85 - Systems Integrated Testing (928 days, $924K)

Additional EIR Team questions/information requirements:

1. Please provide predecessor/successor reports.
2. Provide the rationale for the 928 day duration and how the $924K cost is spread across the duration.
3. Please provide the lower level schedules that support "Procedure/Document Preparation" with 509 days duration and $437.2K cost.
4. Please provide the lower level schedules that support "Integration System Tests" with a 65 day duration and a cost of $332.6K. Be prepared to explain why this WBS is not on the Critical Path?
5. Please provide complete details and backup for how the cost estimate is developed. What is the estimate based on? What resources are required, and for how long? What are the discrete activities that are planned? What milestones are planned? What are the deliverables? Is there a planning document for this WBS?
6. The Summary Description for this WBS states that pre-operational tests are ***assumed*** covered by the individual WBS elements. Is this in fact the case, and can you verify that these costs are covered elsewhere? Does this refer to the testing of individual pieces of equipment prior to assembling the entire stellerator?
7. The 20% contingency for this activity seems low (in relation to other contingency values in the estimate), given the statements that integrated systems testing and startup of a complex fusion system has high technical and schedule risk. Please discuss.
8. The resource-loaded schedule total cost for this activity and the Cost Baseline Update (part of the backup documentation) total cost do not agree. Please clarify.

*Total Estimated Cost (TEC) and Project Schedule*. The EIR Team will provide an independent evaluation of the TEC and overall Project Schedule, and discuss whether the TEC and schedule are reasonably consistent with similar DOE and/or other government/industry type projects. The EIR team will assess cost and schedule contingency and other cost and schedule factors related to TEC and the project completion schedule. As part of this work, the EIR Team will assess whether the TEC include all costs necessary for completion including startup and "hot" testing, as appropriate. Identify specific work activity that constitutes project completion and whether these completion activities are sufficiently well defined. The EIR Team will include an assessment of whether the project completion activities are consistent with DOE guidance for work to be included/excluded from the project. The EIR Team will also assess whether the project funding profile is consistent with the resource-loaded schedule.

Additional EIR Team questions/information requirements:

1. Please be prepared to discuss the 2000 day float in WBS 121.
2. What is the rationale for the 163 day duration and spread of $451.7K costs for ID "MT-PVVS-Fab"
3. Please provide supporting schedules for or activity "E10-encumr (A/9)costing $330K and activity "JPP-encumr (A/9) costing $ $550K.
4. Be prepared to explain the logic for the Critical Path among "Modular Coil final Design", "Mod Coil Winding for R&D", and "Mod Coil Casting. Concentrate on the activities with 116 day float.
5. Please explain the rationale for the duration for activity "JPP-encumr (A/9)" of 48 days at a cost of $505.6K.
6. Are the "Resource Loaded Schedule", "Master Schedule" and the "NCSX Cost Estimate Baseline" based on the same schedule?
7. Provide a Critical Path printout of Zero float activities. Explain the Critical Path float of over 116 days.

8. Please indicate what level mentioned in PEP Section 7.2 corresponds to the "NCSX cost Estimate Baseline Schedule.
9. Please provide the rationale for the schedule contingency.
10. What are the reasons for the project cost growth from $72 million at CD-1 to $81 million today?
11. The contingency analysis does not appear to use Monte Carlo or other probabilistic techniques. Please discuss the particular technique used, and what advantages/disadvantages it holds over conventional probabilistic techniques.
12. The project contingency in May 2002 was 28% (prior to CD-1). It is still 28% prior to CD-2. Please discuss.
13. The Project Management contingency of 17% seems high given that it is level-of-effort and specific resources are defined. Please be prepared to discuss how this contingency level is determined.
14. Why does Project Engineering carry a 34% contingency? This seems very high. Why would Project Engineering carry a significantly higher contingency than Project Management?
15. What escalation rates have been used and how is escalation incorporated in the estimate? What is the total escalation for the project?
16. Some WBS elements have no "backup" cost estimating files in the Cost and Schedule documentation. Please provide missing backup documentation.
17. Are spares required for some of the NCSX components? If so, where are the costs captured, and how are costs determined? If not, what is the rationale for not having spares, and does this present a risk to the project?
18. What are the general cost estimating assumptions?

*Work Breakdown Structure.* The EIR Team will assess whether the WBS incorporates all project work, and whether it represents a reasonable breakdown of the project work scope, and assess whether the resource-loaded schedule is consistent with WBS for the project work scope.

Additional EIR Team questions/information requirements:

1. The cost estimate for WBS 85 ($1.05M) appears small relative to the overall project cost. Please provide detail regarding what is included in WBS 85.
2. Please explain the vehicle for accomplishing the WBS elements marked "not in MIE" and where their costs are included.
3. The WBS and WBS dictionary are inconsistent leading to questions about what is included in the scope. For example, WBS 231, 232, and 233 are stated in the WBS as not being in the MIE Project, but the Dictionary provides a SOW. This same comment applies to WBS elements 32, 33, 34, 35, and 37. A couple WBS elements – 62 and 64 – are referred to in the Dictionary as future upgrades. Please explain why the two documents differ.
4. WBS 62, 64, and 65 are stated in the WBS as not in the MIE Project, but the resource-loaded schedule shows activities and costs for all. Please explain.

*Risk Management*. The EIR Team will determine if risks have been identified and properly classified as high, medium, and low; assess whether appropriate risk mitigation actions have been incorporated into the baseline; assess whether adequate contingency has been included in TEC and Schedule; and describe the approaches used to determine risk and assess adequacy.

Additional EIR Team questions/information requirements:

1. Are there any concurrent line item projects or GPP that may impact this project through limiting resources or access? If so, please be prepared to discuss impacts and risks.
2. Please be prepared to discuss how your process for contingency assessment (both cost and schedule) relates (or does not relate) to the risk identification/mitigation process.
3. Be prepared to discuss how specific risk mitigation actions incorporated into he cost and schedule baselines.
4. What is the plan for releasing contingency? What is the impact of released contingency on the EAC?

*Preliminary Design and Design Review*. The EIR Team will evaluate adequacy of preliminary design including adequacy of drawings and specifications, and assess whether they are consistent with system functions and requirements; assess whether all safety Structures, Systems, and Components are incorporated into the preliminary design; review results of the preliminary design review; and

assess whether additional work identified in the design review has been incorporated into the Performance Baseline.

Additional EIR Team questions/information requirements:

1. Are there any costs or modifications needed for the liquid nitrogen storage tank and helium supply manifold? Have these existing systems been checked out and verified as adequate for the NCSX?
2. The Preliminary Design Review recommended that the Project address the issue of lack of access for bolt installation and tightening of fasteners between field period assemblies in the inboard area. How has the Project resolved this issue?

*System Functions and Requirements*. The EIR Team will assess whether "design to" functions and requirements are reflected in the baseline, including safety and external requirements such as permits, licenses, and regulatory approvals; and evaluate whether system requirements are derived from and consistent with Mission Need.

Additional EIR Team questions/information requirements:

1. It appears that one Neutral Beam system will be installed as part of the Project, with other NBs planned for installation during the operational phase. Is there sufficient room and availability to install additional beams later and can the project meet the scope baseline with a single neutral beam?

*Hazards Analysis*. The EIR Team will evaluate the quality of the Hazard Analysis and assess whether all scope, schedule, and costs necessary for safety are incorporated into the baseline. The EIR Team will review the classification of SSCs as safety class or safety significant; assess the Hazards Analysis process, including the use of internal and external safety reviews; and review any Defense Nuclear Facilities Safety Board and/or Nuclear Regulatory Commission interface and discuss the status of their involvement.

*Value Management/Engineering*. The EIR Team will assess the applicability of Value Management/Engineering, and whether a Value Engineering (VE) analysis been performed with results being incorporated into the baseline. Also, the EIR Team will provide an assessment of the VE process for this project.

Additional EIR Team questions/information requirements:

1. Please make available any formal documentation, in addition to the briefing, from the engineering task force that focused on value engineering. How was each VE item resolved?
2. Be prepared to discuss how value management incentives have been incorporated into the contracts awarded to date and the plan for incorporating these incentives into future contracts.
3. How will Value Engineering activities be continued through the life of the Project?

*Project Controls/Earned Value Management System (EVMS)*. The EIR Team will assess whether all project control systems and reporting requirements will be in place prior to Critical Decision-2. For projects where EVMS is not required, the EIR Team will assess the adequacy of an alternate project control system for monitoring and controlling project costs and schedules.

Additional EIR Team questions/information requirements:

1. Please provide a list of all PPPL generic management procedures and be prepared to supply copies of specific procedures as required.
2. Please provide copies of the CD-0 and CD-1 approval letters for this project
3. Does PPPL have a 10-year Site Comprehensive Plan? If so, please provide.
4. Has a Construction Project Data Sheet (CPDS) been prepared for the project? If so, please provide.
5. Please be prepared to discuss each progress-reporting document (progress reports) with emphasis on derivation of reported earned value—how is it determined and by whom, and how verified. Please use the progress reporting documents to appraise current project status. Be prepared to describe the frequency of distribution, and recipients, for each status reporting document.
6. Be prepared to describe the process for developing revised estimates of cost at completion based on performance to date, commitment values for material, and estimates of future conditions. Who does it, how often, and in what context?

7. What is the Laboratory Project Controls organization, and the interrelationships and information exchanges between it and the cost account managers? Be prepared to discuss the experience and training level of the project controls personnel assigned to this project.
8. Be prepared to discuss the information exchange and integration processes between the accounting, budget, and PCS systems pictorially shown in exhibit B-4-A of the document, "PPPL Project Control system Description."
9. How is the process for assessing earned value for R&D work documented?
10. Describe the communication process for conveying variance information to appropriate levels of management for implementing corrective actions.
11. How does PPPL follow the guidance ANSI/EIA 748-A-1998, *Earned Value Management Systems* for implementing EVMS for projects? Has PPPL been certified as compliant with ANSI/EIA 748-A-1998?
12. Who are the stakeholders? Are there coordination issues with other DOE Sites besides OR?
13. Describe the funds management system. What ensures that annual funding is not exceeded?

*Project Execution Plan (PEP)*. The EIR Team will review the PEP and determine if it reflects and supports the way the project is being managed, is consistent with the other project documents, and establishes a plan for successful execution of the project.

Additional EIR Team questions/information requirements:

1. The PEP (Revision 1, Draft K, page 13) states that Quality Assurance support is provided by PPPL however, the organization chart (Figure 4-1, page 12) does not include a position for QA. Be prepared to discuss how PPPL supports the QA process.
2. The organization chart (Figure 4-1, page 12) does not include a position for "Start-Up Manager." What is the plan for the position of Start-Up Manager?
3. The version of the PEP provided has no signatures. Who has reviewed and approved the PEP and what are plans to obtain DOE HQ approvals?
4. Be prepared to discuss the qualifications, experience and training levels of the management organization (described in the PEP), particularly for the PPPL Project Manager and the NCSX Federal Project Director.
5. What is the plan for addressing Safeguards and Security issues in the PEP? What other documents describe the Safeguards and Security processes?
6. Please provide a copy of the NCSX Project QA Plan mentioned on page 33 of the PEP.
7. Be prepared to discuss the use of project management reserve funds.
8. Be prepared to discuss the Change Control process employed for the Project. Please provide any Change Control documentation (forms, logs, etc.) created for the Project.
9. Please explain the Configuration Control process employed for the Project. Please provide any configuration control documentation created for the project.

*Start-up Test Plan.* The EIR Team will assess whether the start-up test plan identifies the acceptance and operational system tests required to demonstrate that system meets design operational specifications, and/or safety requirements. The EIR team will review key tests to ensure that sufficient description is provided to estimate cost and schedule durations associated with these tests and assess the adequacy of the descriptions of success and the incorporation of the test requirements into the preliminary design. Finally, the EIR team will assess whether there is sufficient cost and schedule contingency for test and equipment failure during start-up testing.

*Acquisition Strategy*. The EIR Team will review the Acquisition Strategy to determine if it is consistent with the way the project is being executed. The EIR Team will evaluate any changes from CD-1 that may impact whether the current strategy represents best value to the government.

Additional EIR Team questions/information requirements:

1. The "NCSX Acquisition Execution Plan (NCSX-PLAN-AEP)", Revision 0, June 28,2002, appears outdated. Has this document been revised? If so, please provide the update. Be prepared to discuss how this plan will be maintained up to date.
2. Be prepared to discuss how quality requirements are defined in contract documents and how they are enforced.
3. The AEP does not discuss the relationship(s) of the project components to the "Not in MIE Project" WBS elements. Be prepared to discuss the coordination process for WBS components designated "Not in MIE Project" with needs of fabrication and installation contractors.
4. Be prepared to discuss how are small business participation plans incorporated in acquisition planning?
5. Be prepared to discuss the current strategy for incorporating "shared savings" incentives (or the like) in the fabrication and installation contracts?

*Integrated Project Team (IPT)*. The EIR Team will assess whether the project management staffing level is appropriate, and determine if appropriate disciplines are included in the IPT. The EIR Team will identify any deficiencies in the IPT that could hinder successful execution of the project.

Additional EIR Team questions/information requirements:

1. How and by whom was the Integrated Project Team (IPT) selected? What is the IPT charter? Are the duties and responsibilities of the IPT being met?
2. How did the IPT participate in developing the PEP?
3. Be prepared to discuss the professional qualifications of selected IPT members.
4. Although the Integrated Project Team includes representatives from project controls, procurement and ES&H, there is no representation from QA or systems engineering. Who on the IPT will be responsible for oversight of QA and systems engineering issues?

## 1.4 REVIEW DELIVERABLES

The EIR Team will prepare and present a formal outbrief to the NCSX Project team at the conclusion of the EIR on-site effort. A copy will be provided to OECM and the COR prior to the briefing. The Briefing will address all major findings and observations for each of the 13 Elements reviewed but will not formalize any recommendations or provide an assessment as to the reasonableness or appropriateness of the Project's Performance Baseline

The EIR Team will document the EIR and analysis in a draft report focusing on the key review elements. The report will include recommendations that correspond to all findings and selected observations. All non-conformances to established requirements will be fully referenced, comparisons to documented benchmarks will be defined and contrasted, and observations involving professional judgment will be so noted. The basis for each finding/observation will be identified. Each recommendation will clearly identify the necessary action and the proposed benefit to the project.

The report will contain appendixes as required including a listing of documents reviewed, resumes of the review team, a list of acronyms, Best Practices, and a Corrective Action Plan shell containing a complete listing of the recommendations in our report.

The draft report will be submitted to OECM in accordance with the schedule contained in this review plan. OECM will coordinate review of the draft report for comments on factual accuracy by the Office of Science program/project team as appropriate.

After addressing comments, LMI will issue the final report.

# 2 BACKGROUND

Section 2, Background, includes a description of the project, followed by the status of the project.

## 2.1 DESCRIPTION OF THE PROJECT

The NCSX project involves the design and fabrication of the NCSX facility. At the heart of the facility is the plasma confinement device, or stellarator core. This will be an assembly of several magnet systems that surround a highly - shaped plasma. Coils provide the magnetic field for plasma shape control, inductive current drive, and field error correction. The vacuum vessel and plasma facing components produce a high vacuum plasma environment with access for heating, pumping, diagnostics, and maintenance. The entire system is surrounded by a cryostat to permit cooling of the magnets at cryogenic temperature.

The NCSX fabrication project scope includes all the equipment required at the start of operations (First Plasma and initial field mapping), plus systems needed to support coil operation at cryogenic temperatures, and refurbishment of and installation of equipment for 1.5 MW of neutral beam heating power. The scope includes Title I through Title III engineering, physics analyses in support of he design, manufacturing development for certain components, fabrication, assembly and installation, integrated systems testing, and project management associated with producing the in-scope equipment. It includes achievement of first plasma.

## 2.2 STATUS OF PROJECT

CD-0 and CD-1 have been approved, and preliminary design is complete.

# 3 REVIEW LOGISTICS

In Section 3, we address the logistics associated with this review.

## 3.1 DATES AND LOCATION OF REVIEW

The on-site review will take place at the PPPL in Princeton, NJ from November 18 - 21, 2003.

## 3.2 REVIEW SCHEDULE

The planned schedule for the NCSX EIR is as follows:

| | |
|---|---|
| October 22 | LMI receives verbal/email (to be followed by written Task Order) authorization from COR, NETL |
| October 29 | LMI submits draft Review Plan (draft review SOW) to OECM |
| October 30 | OECM submits draft Review Plan (draft review SOW) to Office of Science (SC) for review and comment |
| November 4 | SC provides comments on the draft Review Plan (draft review SOW) to OECM/LMI |
| November 6 | LMI provided final Review Plan (final review SOW) to OECM |
| November 7 | OECM provides approved Review Plan to LMI and SC |
| November 7-17 | LMI/OECM receive Government-Furnished Information and Project Documentation |
| November 18 -21 | Conduct Site Visit with Out briefing |
| December 5 | LMI submits draft EIR Report to OECM |

| | |
|---|---|
| December 12 | OECM/LMI receive factual accuracy comments on EIR Draft Report from SC |
| December 19 | LMI addresses factual accuracy comments and submits final EIR Report to OECM |

The tentative agenda for the on-site visit is as follows:

| | |
|---|---|
| November 18 | Meet NCSX project team and SC IPR team at approximately 9:00 a.m. and present EIR in briefing. Receive presentations by NCSX project team (project status including design and funding, scope, cost, and schedule baselines; finalize interview schedule. Tour site as appropriate. |
| November 18-20 | Conduct interviews with project team members, review documentation, and draft preliminary findings and observations. Interviews will supplement those that may be conducted concurrently with the IPR team. |
| November 21 | Present closeout briefing (preliminary findings/observations) to SC representative(s) and the project team at 8:30 a.m. |

### 3.3 ON-SITE SUPPORT REQUIREMENTS

The EIR Team will require the following support during the on-site visit:

- Work space independent of the IPR team. For this review two separate work areas should be provided, each capable of supporting two simultaneous interviews/conversations
- Access to a copier and personal computer workstation with printer
- Telephone access, preferably in the working space
- A hard copy of the project documentation including that located on the Website. In lieu of duplicating website information, access in each work space to the website with the ability to print pertinent pages or sections of website documents will be sufficient
- Full access to the NCSX project team and contractors

It is important that the NCSX project team and all required NCSX support contractors (especially the cost estimator(s) and schedulers) be available for discussions with the LMI EIR Team at the site during the on-site review.

### 3.4 PRE-REVIEW TELECONFERENCES AND PRE-MEETINGS

Pre-review telephone calls may be held and emails exchanged with the field and headquarters project/program managers to:

- Confirm the dates and location of the on-site review
- Coordinate the delivery of government furnished information
- Coordinate a tentative agenda for the on-site review
- Confirm the absolute need to have the cost estimator attend the on-site review
- Discuss the schedule for delivering the draft and final reports and obtaining DOE and SC factual accuracy comments

Email and telephone communication will continue directly with the project managers during this period to clarify and resolve logistical issues.

### 3.5 INFORMATION TO BE MADE AVAILABLE PRIOR TO ON-SITE MEETING

- Detailed resource loaded schedule
- Detailed cost estimate
- Contingency Analysis/Contingency Plan
- System Functions and Requirements Document (also referred to as the "design-to" requirements)
- Results of and responses to Site preliminary Design Review
- Conceptual Design Report
- CD-0 and CD-1 Approval Documents
- Project Execution Plan
- Integrated Project Team Charter and Assignment Letter
- Hazards analysis
- Risk management assessment/ Risk Management Plan
- Acquisition strategy/ Acquisition Plan
- Value Management/Engineering report
- Test plan for Start-up should also be provided.
- Reports and Corrective Action Plans from previous reviews

### 3.6 FINAL REPORT DISTRIBUTION

- OECM EIR Program Manager (6)
- NETL, COR (2)
- Federal Project Director (1)

## 4 TEAM MEMBERS AND ASSIGNMENTS

Participating LMI Review Team members and their assignments are shown in the table below. Team member bios are also provided.

| Topic | Lead Reviewer, Principal Author | Reviewer(s), Contributing Authors |
|---|---|---|
| 1. Resource Loaded Schedule | Gray | Scango/Reams |
| 2. TEC and Project Schedule | Scango | Gray |
| 3. WBS | Flannery | Scango/Gray |
| 4. Risk Management | Flannery | |

| | | | |
|---|---|---|---|
| 5. | Preliminary Design and Design Review | Hassenzahl | Reams |
| 6. | System Functions and Requirements | Hassenzahl | |
| 7. | Hazards Analysis | Hassenzahl | Reams |
| 8. | Value Management/Value Engineering | Flannery | Hassenzahl |
| 9. | Project Controls/EVMS | Flannery | Gray |
| 10. | Project Execution Plan | Flannery | Scango |
| 11. | Startup Test Plan | Hassenzahl | Reams |
| 12. | Acquisition Strategy | Flannery | |
| 13. | Integrated Project Team | Flannery | Reams |
| Team Leader | | Reams | |

**Mr. Stephen Flannery, CCE**, an LMI consultant, has over 33 years of experience managing and evaluating capital projects, including those associated with environmental restoration, radioactive and hazardous waste management, nuclear power plants, petroleum refineries, petrochemical plants, and oil field facilities. Mr. Flannery is certified as a cost engineer by AACE International and has extensive experience estimating costs from conceptual to definitive project phases, trending, value engineering, performance measurement and cost control, bid analysis and contract development, cost management system development and evaluation, planning and scheduling, claims evaluation, and business process improvements. He has performed innumerable economic and financial feasibility analyses, as well as independent baseline reviews and validations of projects for DOE's Environmental Restoration, Waste Management, and Civilian Radioactive Waste Management programs. Mr. Flannery has a B.S. and an M.S. in Civil Engineering, both from the University of Michigan.

**Douglas A. Gray, P.E.** is a past Program Manager for a major Independent Cost Estimating contract with DOE, and currently provides independent cost review services for the Department. Mr. Gray has a BS in Chemical Engineering and has 26 years professional experience. He is a Registered Professional Engineer in two states. He has over 13 years experience as a project and program manager, and has managed DOE projects since 1990 at such locations as Rocky Flats, Oak Ridge, and DOE Headquarters. As a Program Manager, Mr. Gray has negotiated and executed many services and construction contracts for both the public and private sector, and has hired and directed numerous subcontractors. Mr. Gray's cost estimating, cost analysis, economic analysis, and scheduling expertise is derived from a number of engineering and project management assignments in the private sector, as well as from management of over 50 independent cost estimates and validations for such DOE projects as Accelerator Production of Tritium, the Tritium Extraction Facility, the Terascale Simulation Facility, and the Microsystems and Engineering Sciences Applications (MESA) Complex.

**Dr. William V. Hassenzahl, Ph. D.**, **(REQUESTED)** is Principal and President, Advanced Energy Analysis. He has over 35 years experience in the development of superconducting systems from both industry and government perspective. He is the founder of Advanced Energy Analysis, which provides technical consulting in a variety of areas related to electric systems ranging from large electric power grids to advanced medical devices. He is chairman of the Electrical Storage Association. He is the author of over 200 technical articles and is the author/editor of two books on

energy storage. Dr. Hassenzahl was the manager of the applied superconductivity program at LLNL in 1992-1993 and was the leader of the design team for the TPX magnets and assistant leader of the design team for the ITER magnets.

**Mr. Hugh E. Reams, P.E.,** an LMI Research Fellow, has more than 24 years of experience in the planning, programming, design, acquisition, repair, maintenance, and operation of facilities and infrastructure. He served 20 years as a commissioned officer in the U.S. Navy Civil Engineer Corps. During his career in the Navy Mr. Reams formulated long-term funding programs for construction, operations, and maintenance of the Navy's shore facilities including development of new estimating and prioritization methodologies. He also facilitated the $50 million construction program to support Cuban migrants and contracted engineer support in Haiti. After the Navy, he managed large housing reconstruction projects and then the day-to-day operations of a construction consulting firm with over 200 active projects. At LMI Mr. Reams has conducted External Independent Reviews of a number of DOE projects as both a team member and as the EIR Team Leader. He has completed numerous studies of public sector project management organizations and project management capacity analyses. Mr. Reams has a B.S. in Civil Engineering and a Masters of Engineering, both from The Pennsylvania State University.

**Mr. Guy John Scango, P.E.,** an LMI consultant, has 36 years of program/project management experience in both private industry and government with a comprehensive "hands-on" background in project management, design, construction, and operation of large programs and complex projects. Mr. Scango has a comprehensive knowledge of establishing/assessing DOE baselines. He is experienced in conducting independent cost estimates, development and assessment of resource loaded schedules, contingency, and risk analysis. As a DOE employee, he has served in the Office of Civilian Radioactive Waste, Office of Field Management, Strategic Petroleum reserve Office, and in the Superconducting Super Collider program. Mr. Scango has managed Independent Cost Estimates on over 40 Programs. As an independent consultant, he has completed tasks including reviews of Strategic Petroleum Reserve Readiness, numerous DOE EM projects, Brookhaven Graphite Reactor deactivation, and the Spallation Neutron Source. In private industry, he served as Director of Cost of the U.S. Synthetic Fuels Corporation. Mr. Scango has a B.S. in Mechanical Engineering from Carnegie Mellon University.

# 5 REFERENCES

- Project Documentation provided
- DOE O 413.3
- DOE O 430.1A
- DOE M 413.3-1
- DEAR and Federal Acquisition Regulations