

Environment, Safety and Health (ES&H) Considerations for Planning and Reviewing SC Projects (CD-1 and CD-2)

● Scope and Applicability

Scope

This guidance on environment, safety and health (ES&H) considerations for Office of Science (SC) Projects is intended to promote some standardization to the expectations for quality and adequacy in the ES&H documentation at the Project Planning Phase, and for some consistency to the DOE Office of Science reviews of these Projects. This guidance, therefore, may be used by those developing, planning and managing SC Projects (e.g., Integrated Project Teams), as well as by those who may be reviewing the Projects for SC (e.g., Project Review Committees). Those using this guidance should not feel constrained by it and should use it, as appropriate, with proper tailoring for the Project being planned and/or reviewed. The tailoring concept is discussed in the attachments to this guidance that have specific suggestions. This document is intended to be guidance only, and is not intended to be used as a checklist for ES&H audits or formal oversight assessments.

Proper ES&H planning during the conceptual design phase can alleviate problems that can affect the cost, schedule and management of SC's Projects. Recent SC reviews of the planning phases of several Projects have provided some insights into ES&H considerations that should be included in such early project planning. The lessons learned from these SC reviews offer SC some opportunities for improvement that have been used to develop this guidance on ES&H considerations during conceptual design. These opportunities for improvement are included in

Section ●. Included are lessons learned on several recurring early planning difficulties involving the technical and compliance aspects of ES&H, the schedule for preparing ES&H documentation, and the management aspects and management structure for implementing

ES&H. Included in Section ● is a listing of ES&H-related issues and suggestions to assist with the description of the planning going into SC's Projects. This listing can be used by those planning the Projects as well as by those reviewing the ES&H aspects of the Projects.

Applicability

Department of Energy (DOE) Order 413.3 specifies the acquisition process and critical decisions for Projects and their approval by DOE. The Office of Science utilizes the requirements and guidance in Order 413.3 in its review and approval of Projects and their milestones. Upon

completion of the Conceptual Design Report (CDR) during the Project Planning Phase, SC conducts a conceptual design review of a Project's technical scope, cost, schedule, management, and ES&H in support of the DOE Acquisition Executive's approval of Critical Decision-1 (CD-1, Approve Preliminary Baseline Range).

The "Critical Decision Prerequisites" for CD-1 in Order 413.3 (see Attachment 4 to the Order) that are related to ES&H are the: Conceptual Design Report; Preliminary Project Execution Plan; and the Preliminary Hazard Analysis Report. The **Conceptual Design Report (CDR)** contains a description of the Project and the aspects of the Project that may have safety and/or environmental implications. The CDR also has a preliminary consideration of ES&H consequences of the project, a recognition of permits that may be needed, and plans for considering the National Environmental Policy Act (NEPA) documentation process. The **Project Execution Plan (PEP)** contains a description of the Project's management structure, including line management's responsibility and accountability for ES&H. The PEP also contains a schedule for completion of the Project including a schedule for the NEPA process, as appropriate. The **Preliminary Hazard Analysis (PHA) Report** describes all potential hazards that may be associated with the project and provides an early analysis of the hazards and their potential risks. The recognition, description and analysis of potential hazards will evolve and change as the design matures through preliminary and final design.

While this guidance is targeted at front-end project planning, users are encouraged to look further "downstream" in the project lifecycle and carefully consider the evolution of ES&H considerations as the project matures.

A prerequisite for Critical Decision-2 (CD-2, Approve Performance Baseline) is completion of the **National Environmental Policy Act (NEPA) documentation** process. If the NEPA process for an SC Project could entail the preparation of an Environmental Assessment (EA) or an Environmental Impact Statement (EIS), the document development and preparation process usually needs to begin during conceptual design. The CDR then can be used to provide information and data for input to the NEPA documentation in terms of describing the construction and operational aspects of the Project, the site and environs for the Project, and a preliminary assessment of the potential environmental consequences of the Project. The PHA Report also can serve as data input for preparation of the NEPA documentation

The SC expectation is that all Projects be completed on schedule, within budget, and meet the technical scope as reflected in the formal project management documents. This will be achieved by complying with all of the project management requirements of applicable laws, orders, and directives. ES&H considerations are among the requirements that must be met and must be properly planned early in the life of Projects. The improper planning and management of ES&H can negatively affect the schedule, cost, and operations of Projects. SC, therefore, reviews the ES&H planning and management of its Projects to be sure that safety and environmental considerations are properly planned and managed, and to be sure that they are properly integrated into the Project's cost and schedule profiles, and thus efficiently and effectively achieved.

The safety and health of the work force and the public, and the protection of the environment at SC's Projects and facilities, can be achieved through the implementation of Integrated Safety Management (ISM). This approach is applicable to the development of Projects, as well as research initiatives and programs during operations. ISM helps in avoiding injuries, program delays, and cost overruns from accidents or environmental releases. Integrating ES&H and Project planning is especially important for SC due to the diversity of technical Projects and their often unique mix of ES&H issues. ISM and ES&H considerations need to begin early in the Project Planning Phase and be carried throughout the Project into operations. The ultimate goal is to eliminate hazards as much as possible, manage those that remain with administrative and engineering controls, and minimize all waste streams during both construction and operation.

II ES&H Lessons Learned

The SC review of the ES&H aspects of the early Project Planning Phase has focused on the question: **“Are ES&H aspects being properly addressed given the project’s current stage of development?”** The “current stage of development” for these recent reviews has been the conceptual design of the Project Planning Phase, leading to DOE approval of CD-1.

Several important aspects among the ES&H considerations which have recurred as early planning difficulties offer lessons learned and opportunities for improving how SC's Projects can be more efficient and timely in addressing ES&H during conceptual design. The five most frequently recurring of the ES&H aspects are discussed below along with some suggestions for addressing the associated difficulties.

(1) ES&H Line Management Responsibility and Accountability.

Some recent reviews of the conceptual design planning for SC Projects recognized difficulties with respect to the identification of line management responsibility and accountability for ES&H. In some cases, a clear line of authority for ES&H was not identified within the Project. For some Projects, there also was no clear identification of line management responsibility and accountability for the subcontractors who would be working for the Project.

Suggestions: The documentation prepared during the Project Planning Phase should contain a clear and specific description of the management structure for the Project that includes the identification of line authority for ES&H during the Project. To the degree that it is known at this early stage of Project development, a statement also should be provided on the transition of ES&H responsibility and accountability for the Project to the operational facility that would conduct research activities. It is SC's expectation that line management is responsible for assuring the safe conduct of Science programs, including Project development. Integrating ES&H and management during Project planning is especially important for SC due to the diversity of technical Projects and their often unique mix of ES&H issues. For SC Projects, the ES&H line responsibility normally starts with the Project Director or the person who is in charge of all aspects of the Project's development. Most Projects also have an ES&H staff specialist who reports to the Project Director. Some Projects also draw upon ES&H matrix support, as

appropriate, from the host National Laboratory's ES&H organization. The plan and design of the Project's roles, responsibilities, and accountabilities for ES&H needs to be part of the early planning for SC Projects and included in the appropriate Project documentation. The PEP is the appropriate documentation where a clear definition of this management structure must appear.

For a general discussion of SC's expectations of ES&H in relation to its conduct of scientific research, see the SC-80 web site at <http://www.science.doe.gov/SC-80/> and click on "Science and Safety" under "Documents". The Science and Safety booklet discusses SC's general approach to Integrated Safety Management.

(2) Scope and Content of the Preliminary Hazards Analysis Report.

Most of the recent Projects reviewed by SC prepared Preliminary Hazard Analysis (PHA) Reports, as required by Order 413.3. There is no guidance on the scope, content or format for PHA Reports. These Reports, therefore, have taken many forms and have been prepared in varying levels of detail. Some PHA Reports have been brief listings of such items as chemicals, gases under pressure, and hazardous materials that are expected to be used by the Project or when the Project becomes an operational research facility. Other PHA Reports have contained fairly detailed descriptions of all hazardous materials and potential accidents that might be associated with these Projects, including analyses with mitigating circumstances.

Suggestions: Some of the Projects have inquired, in advance of the SC onsite CDR reviews, about the appropriate content of a PHA Report. The PHA Report should be tailored to the Project and the hazards that likely will be associated with it. Some analysis of the potential hazards should be conducted and presented in the Report. Projects with greater environmental or safety risks, or a unique or unusual combination of hazards considerations, should receive more scrutiny and have more detailed analyses. The Report, therefore, should not be just a listing of materials, but should attempt to analyze their hazard potential so that the early planning for the Project can consider alternative materials, the minimization of their use, and/or mitigation measures, as appropriate. This essentially is an application of Integrated Safety Management and its core functions of defining the scope of work, analyzing the hazards, and beginning to develop and implement hazards controls. Preparing the PHA Report in this way should assist the Project's planning and help minimize unforeseen hazards that could affect the schedule and cost of the Project.

For Projects where a potential nuclear hazard may exist, the plan for scheduling the preparation of a Preliminary Safety Analysis Report (PSAR) should be presented. Approval of a PSAR must precede any early procurement actions and the start of construction.

For examples of recent PHA Reports, contact the SC Construction Management Support Division or visit the web site at <http://www.science.doe.gov/SC-80/sc-81/index.html>.

(3) The NEPA Process: Integration of NEPA & Project Schedules.

Most of the Projects reviewed by SC had considered NEPA compliance during the conceptual design phase. This is the proper time to begin the NEPA planning. At the time of the SC reviews,

however, not all of the projects had finalized, with their local DOE offices, the determination on what NEPA documentation was appropriate for their Projects. Most of the Projects ultimately determined that Environmental Assessments (EA) were the proper level of documentation, but the schedules for the preparation of the EAs were not always integrated with the project schedules. The time frame for preparation and approval of an EA, in relation to the Project schedule, was not always understood or appreciated.

Suggestions: When the EA and Project schedules are developed separately and not integrated, there is a risk that preparation and completion of the EA may become a critical path item that could delay the achievement of CD-2. Several Projects reviewed by SC showed EA processes with schedules that came within one-to-three months of the planned CD-2 approval date. Recent data on the preparation schedules for EAs across the DOE complex shows that the median completion time for EAs has been about 10 months, with an average completion time of about 15 months. Given this time frame, it is important to make an early determination on the NEPA documentation needed for SC Projects and then to integrate the NEPA and Project schedules when an EA, or an Environmental Impact Statement (EIS), is to be prepared. This will contribute to compliance with NEPA requirements, such that the documentation can be prepared in a manner that is timely and cost effective for the Project, while meeting DOE's expectations for quality, adequacy, and completeness in the NEPA documentation.

If DOE and the Project are unsure whether an EA or an EIS will be prepared, it may be useful to prepare a draft Project schedule that integrates both the schedules for an EA (as noted above) and for an EIS. Recent data on the preparation schedules for EISs across the DOE complex shows that the median completion time for project EISs has been about 21 months, with an average completion time of about 29 months. Once a determination is made on which documentation will be appropriate for the Project, the Project schedule can be adjusted accordingly.

For SC guidance on EAs and their timing and scheduling, see the SC ES&H Division web site at <http://www.science.doe.gov/SC-80/sc-83/nepacomp.html> and then under "Documents", click on "Guidance, Procedures & Other Publications". At the "NEPA Policy and Guidance" page, scroll down and click on *Office of Science Quality Assurance Plan for Environmental Assessments: Preparation, Review, Approval, and Use as a Service in Decisionmaking. August 1994. Revised: July 2000. ER NCO Communication No. 94-04.*

(4) NEPA Documentation for Project Partners and Collaborators.

Some of SC's Projects involve collaborations or partnerships among several National Laboratories. Typically, these involve one National Lab that hosts a Project and serves as the lead for the proposed facility or Project. Other National Labs then collaborate to conduct aspects of the R&D or to fabricate components or equipment that would be provided to the Project at the host Lab site. Some Labs also will continue to partner with the Project as collaborators when the Project transitions to facility operations and then conducts scientific research sponsored by SC. Some of SC's recent Project reviews found that NEPA requirements were being considered for the Project at the host site, but it was not clear that NEPA considerations were being considered for the related collaborations at other sites.

Suggestions: The NEPA documentation discussed in (3) above is related to the Project at the host site, and the analysis of the Project's potential environmental consequences at the host site. If a Project includes work being done by partners or collaborators at sites other than (or away from) the host site, NEPA's documentation requirements may apply at the partners' sites as well. Since the partners' work is related to the completion of the Project, any complications, delays or unexpected costs for NEPA analyses of the Project-related work at a partner's site(s) may affect adversely the Project at the host site. The Project and its local DOE office, therefore, should work with the partners and collaborators, and their local DOE offices, to ensure that DOE's NEPA requirements are met for all project related work, including at the partners' sites. The Project and local DOE Office do not need to conduct the NEPA process for the partners, but rather ensure that it is conducted and completed according to the procedures in place for the partners' sites. If appropriate, the work being done at the partners' sites could be included in the NEPA documentation for the Project at the host site (i.e., in an EA). This should be discussed between the Project, the partners, and DOE early in the Project Planning Phase.

The risk that NEPA might delay the Project and impact its cost is reduced by assuring that the NEPA requirements for all aspects of the Project are planned properly and early.

(5) Early Involvement of Regulators and the Public.

Most of the Projects had not conducted any significant outreach with the public or the appropriate regulators by the time of the SC reviews of the CDRs during the Project Planning Phase. Some of the Projects were planning to use the NEPA process, and the EAs, for such outreach. The DOE requirements for local public involvement in the EA process do contribute to outreach and do involve the public and the local regulators. For some Projects reviewed by SC, public involvement using the NEPA process would have been the first outreach effort to inform and involve the public and the regulators. This may be too late, in some cases, to affect early dialog that could be beneficial to the Project and thus avoid delays, especially if the public or the regulators take issue with aspects of the Project as described and analyzed in the NEPA documentation.

Suggestions: The Draft EAs for SC Projects are coordinated with the public and with several Federal, state and local regulatory agencies once the EAs are ready for formal state and tribal coordination under DOE's NEPA procedures. Early involvement of the appropriate regulatory agencies and the public as soon as possible (i.e., before or during the preparation of the EA) would help to foster effective communications and a smooth regulatory approval process, prior to release of the EA for public review. Some contact with the public and the regulators prior to the NEPA process also could help to avoid misunderstandings or delays in the process and thus the Project. The ES&H risks of the several Projects recently reviewed by SC appeared to be minimal, however, any delay in the NEPA processes due to regulatory or public questions or concerns still could affect the Project schedules. While the NEPA process does aid public involvement, it should not be the only vehicle used for outreach and communications with the public and the regulators. Public involvement in SC Projects should not await the formal release of NEPA documentation for public review.

Tailored ES&H Considerations

This section contains a listing of ES&H-related issues and suggestions that is designed to assist with the description of the planning and thinking that is going into SC's Projects, or that will go into the Projects. This listing also provides a basic set of issues for consideration by SC's Project review committees in developing the focus of the review. Earlier versions of this listing have been provided to SC's Project staffs in advance of the SC CDR reviews. The listing of issues also contains reference to the guiding principles and core functions of ISM, in order to help structure the ES&H aspects of the Project in an integrated manner that affects and demonstrates safety.

There may not be specific responses or inclusions to some of the listed issues at this point in the Project life, but a Project's documentation (i.e., CDR, PEP, PHA, NEPA, etc.) should indicate the plans to work toward those issues that apply to the Project. The listed issues and suggestions may not be all inclusive or entirely applicable across all SC Projects. Projects, therefore, should feel free to add to this or provide any other information related to ES&H that is found to be pertinent at the Project Planning Stage. The consideration of ES&H for SC Projects should be tailored to the Projects and their potential for hazards and for safety or environmental risks and consequences.

SC's Projects should provide a summary of the ES&H plans and aspects of the Projects to the SC review teams during the briefings that are held in conjunction with the "Conceptual Design Reviews" or the "Technical, Cost, Schedule, Management and ES&H Reviews". Part of the summaries may include reference to specific data or information in the CDRs (or other provided documents), as appropriate. Some of the issues and suggestions in this guidance may overlap and be related and can be addressed together, as appropriate.

(1) General ES&H Issues.

The ES&H aspects of the Project should be planned and addressed within the framework of ISM and its principles and core functions. The general issues listed in this subsection are related to the ISM guiding principles for line management responsibility for safety and for clear roles and responsibilities, as well as the ISM core function of defining the scope of work (which in this case is development of the Project and its ES&H considerations).

- Describe how Integrated Safety Management is (or will be) used to ensure that all activities associated with the Project, the future operational facility and its research will be conducted safely and be environmentally compatible.
- Describe how this Project would be developed consistent with the Office of Sciences' expectations for conducting research in a manner that ensures protection of the workers, the public, and the environment.
- Describe the management structure for the Project (for construction and operation), as well as the planning for line management responsibility and accountability for ES&H.
- Describe how ES&H considerations and requirements are being integrated into the Project's schedule to facilitate timely compliance activities and to avoid Project delays and associated cost increases. Include a master schedule for the Project that shows the

integration of ES&H considerations (i.e., development of safety and NEPA documentation) with the Project's schedule of milestones.

(2) Project Construction, Risks & Hazards, and Related Facility Operational Issues.

The safety and environmental issues listed in this subsection are related to the ISM guiding principles for *balanced priorities, for hazards control tailored to work being performed, and for operations authorization*. They are related also to the ISM core functions of *defining the scope of work, of analyzing the hazards, and of developing and implementing hazards controls*.

- Describe the hazards and risks associated with this Project (for construction, operations, and end-of-project life).
- Describe the construction plans and the footprint for this Project, along with anticipated hazards and potential accidents. Describe how the hazards and risks will be managed and/or minimized.
- Describe any associated demolition of existing buildings or structures that would be needed to accommodate construction of this Project, the wastes that would be generated/created, the plans for the proper disposal of construction materials and debris, and the planning to prevent or mitigate hazards and accidents.
- Describe the potential environmental consequences that are expected to be associated with construction of this Project, along with the planning to prevent or mitigate environmental hazards.
- Describe the scientific operations of the Project, once it transitions to a research facility (i.e., the kind of research work that would occur), as best they are known at this stage in the Project's life.
- Describe the plans for radiological protection of workers and the public, as appropriate.
- Describe the anticipated use of hazardous chemicals and/or toxic materials, and the planning for minimizing their use and for preventing or mitigating the hazards.
- Describe the safety goals for the construction Project, and identify incentive programs (or plans for them) for the Construction Manager.
- Define the safety interfaces with the Construction Manager, the Project, and the local DOE Office.
- Describe the plan for preparation of safety documentation that would support long lead component procurement and Project construction, for those Projects considered to be nuclear facilities.

(3) Sustainable Design, Recycling, Pollution Prevention, Energy Efficiency, Waste Minimization and Waste Management.

The safety and environmental issues listed in this subsection are related to the ISM guiding principles for *balanced priorities, for hazard controls tailored to work being performed, and for operations authorization*. They are related also to the ISM core functions of *defining the scope of work, of analyzing the hazards, and of developing and implementing hazards controls*.

- Describe how this Project will be planned and designed to "start clean and stay clean", so that there will be no legacy wastes at the end of the life of the operational research facility.
- Describe the sustainable design features that will be incorporated into this Project (for both construction and operation).
- Describe the plans for utilizing or purchasing of recycled materials, as well as the plans for energy efficiency and for water use efficiency.
- Describe the plans for substitution and use of less hazardous materials.
- Describe the plans for waste minimization and pollution prevention for both construction and operation of the Project.
- Describe the anticipated use of radioactive materials and the anticipated generation and management of radioactive wastes.

(4) Standards, Requirements & Compliance.

The safety and environmental issues listed in this subsection are related to the ISM guiding principles for *balanced priorities*, for *identification of safety standards and requirements*, for *hazard controls tailored to work being performed*, and for *operations authorization*. They are related also to all five of the ISM core functions.

- Describe the standards and requirements for ES&H that apply to this Project and how they will be implemented.
- Describe the anticipated need for any environmental permits for this Project, and the plans for environmental compliance.
- Describe any consultations to date (or the plans for doing so) with local, state and Federal regulatory agencies regarding the Project.
- Describe the plans for involving/informing the local community about this Project.
- Describe the plans for complying with NEPA's procedural provisions for the siting and construction of the Project and for the research operations once the Project transitions to an operational facility. Include a master schedule for the Project that shows the integration of the development of the anticipated NEPA documentation with the Project's schedule of milestones.
- Describe any sensitive environmental resources that may be associated with this Project, and the plans to avoid or minimize potential impacts.
- Describe the alternatives that were considered (or are being considered) for the Project, including alternative sites and alternative technologies.
- Describe how the Project will comply with the requirements of 10 CFR 835 - including ALARA goals.