QA:N/A

MOL.20070111.0019

National Environmental Policy Act

N E P A

Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements

Second Edition

December 2004

U.S. Department of Energy
Environment, Safety and Health
Office of NEPA Policy and Compliance

DOE F 1325.8
(8-89)
EFG (07-90)

United States Government **Department of Energy**

memorandum

DATE: DEC 23 2004

REPLY TO ATTN OF: Office of NEPA Policy and Compliance (J. Daniel: 202-586-9760)

SUBJECT: NEPA Guidance: Revised Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements (the Green Book)

TO:

Secretarial Officers and Heads of Field Organizations

I am pleased to provide the attached revised guidance, *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, Second Edition* (the Green Book), which my staff prepared with help from your National Environmental Policy Act (NEPA) Compliance Officers (NCOs) and in consultation with the Office of the Assistant General Counsel for Environment. We expect this guidance to promote clarity, accuracy, and consistency in preparing environmental assessments (EAs) and environmental impact statements (EISs) to better support your decisionmaking. Elements of this guidance should also be helpful in preparing other NEPA documents (e.g., supplement analyses).

This updated Green Book contains various recommendations to help those involved in the preparation and review of EAs and EISs. The guidance revises the 1993 version of the Green Book and provides updated advice on what should be included (i.e., content) in these NEPA documents.

In preparing this revised guidance, we addressed comments that NCOs provided in coordination with your staffs on a draft that we circulated in June 2004 and discussed at our July 2004 NEPA Community Meeting. We are distributing the updated Green Book to DOE's NEPA Community and will post it on our DOE NEPA Web site at *www.eh.doe.gov/nepa* under Guidance.

Please promote this guidance to those in your organization who prepare or assist in preparing NEPA documents. Questions regarding the revised Green Book should be directed to Jim Daniel in the Office of NEPA Policy and Compliance at 202-586-9760 (james.daniel@eh.doe.gov).

John Spitaleri Shaw
Acting Assistant Secretary
Office of Environment, Safety and Health

cc: DOE NEPA Community

Attachment

Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements

Second Edition

December 2004

U.S. Department of Energy
Environment, Safety and Health
Office of NEPA Policy and Compliance

printed on recycled paper

Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, Second Edition

Preface

This document provides recommendations for the Department of Energy's (DOE's) preparation of environmental assessments and environmental impact statements under the National Environmental Policy Act of 1969 (NEPA). The Office of NEPA Policy and Compliance prepared these recommendations in consultation with the Office of the Assistant General Counsel for Environment and following coordination with the DOE NEPA Community. The recommendations should materially aid those responsible for preparing and reviewing NEPA documents to focus on significant environmental issues, adequately analyze environmental impacts, and effectively present the analysis to decisionmakers and the public. The recommendations are not all-encompassing, however; preparers must apply independent judgment to determine the appropriate scope and analytical requirements of NEPA for each proposal. These recommendations do not constitute legal requirements, but are intended to enhance compliance with existing NEPA regulations (40 CFR Parts 1500–1508, 10 CFR Part 1021).

This second edition revises the original document issued in 1993. The revisions include new sections addressing biological impacts, endangered species protection requirements, environmental justice, cumulative impacts, Clean Air Act conformity, Floodplain and Wetland Environmental Review Requirements, historic preservation requirements, mitigation, responses to comments, and the glossary. Recommendations have been added regarding the use of distribution lists and an index, and the discussions of accident analysis and other topics have been updated to reflect topic-specific guidance issued by the NEPA Office and recent DOE experience. Some sections of the original document have been reorganized or reworded. The NEPA Office may revise this document further from time to time to address additional issues and, as necessary, to reflect new policies, regulations, and judicial determinations. The NEPA Office welcomes suggestions for improvement.

This guidance document and related NEPA requirements and guidance are available on the DOE NEPA Web site at *www.eh.doe.gov/nepa*.

Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, Second Edition

Contents

1. How to Apply These Recommendations 1
2. Document Summary 4
3. Purpose and Need for Action 5
4. Description of Alternatives, Including the Proposed Action 7
   - 4.1 Proposed Action 7
   - 4.2 Range of Reasonable Alternatives 9
   - 4.3 No Action Alternative 11
   - 4.4 Describing Alternatives 12
5. Affected Environment 14
6. Environmental Impacts (Effects) 16
   - 6.1 Impact Identification and Quantification 19
   - 6.2 Human Health Effects 20
   - 6.3 Biological Impacts 25
   - 6.4 Transportation Impacts 26
   - 6.5 Accident Analysis 27
   - 6.6 Environmental Justice 29
   - 6.7 Cumulative Impacts 29
   - 6.8 Compliance with Other Requirements 31
     - 6.8.1 Endangered Species Act 31
     - 6.8.2 Clean Air Conformity Requirements 32
     - 6.8.3 Floodplain and Wetland Environmental Review Requirements 33
     - 6.8.4 National Historic Preservation Act 33
   - 6.9 Mitigation 34
   - 6.10 Comparison of Impacts 34
   - 6.11 Conclusions in EAs and EISs 35
7. List of Preparers, List of Agencies and Persons Consulted, and Distribution List 36
8. Appendices, References, and Index 37
9. Responses to Comments 39
10. General Document Quality and Readability 41
    - 10.1 Objectivity 41
    - 10.2 Writing Quality 41
    - 10.3 Graphics and Data Treatment (Units, Statistics) 43
    - 10.4 Glossary 45

1. How to Apply These Recommendations

Introduction

This document provides background information and recommendations to improve the quality of environmental assessments (EAs) and environmental impact statements (EISs) that the U.S. Department of Energy (DOE) prepares under the National Environmental Policy Act of 1969 (NEPA) and to thereby expedite the review and approval of EAs and EISs. The NEPA process is intended to inform the public and decisionmakers about the potential environmental impacts of proposed actions and alternatives and ultimately foster better decisions.

Sections 2 through 9 generally parallel the format for EISs described in the Council on Environmental Quality's (CEQ's) regulations for implementing NEPA (40 CFR 1502.10), though much of this document applies to the preparation of EAs as well as EISs. The discussions highlight any distinctions to be drawn between EAs and EISs in the application of the recommendations in this document. Section 10 covers general principles to improve the readability of any NEPA document. Clear writing makes it easier to review the EA or EIS and understand the analysis presented, which enhances public participation and decisionmaking.

This document focuses on the content of an EA or EIS, rather than the NEPA process itself. For example, section 4.1 includes recommendations for how to describe the proposed action but not recommendations on when a proposal becomes a proposed action subject to review under NEPA. Most sections begin with a background discussion, which summarizes applicable requirements. The recommendations highlight approaches that should be considered, as appropriate, when implementing the requirements. Many sections conclude with references to more detailed, related guidance.

Throughout this document, the term **analyzed alternative** refers to an alternative for which the potential environmental impacts are assessed in detail. (See section 4.) An alternative considered but dismissed from detailed evaluation is not an "analyzed alternative" for purposes of this document. The terms **impact** and **effect** are synonymous and used interchangeably, consistent with 40 CFR 1508.8. One term, however, may be favored in a particular context (e.g., health effects, transportation impacts).

Because each DOE proposed program or project presents a unique set of circumstances and potential impacts, the preparation of EAs or EISs does not reduce to a simple formula or cookbook. Therefore, the recommendations in this document should be adapted to the particular circumstances presented by each proposal, often by using a **"sliding-scale" approach**.

Sliding-Scale Approach

The sliding-scale approach to NEPA analysis applies generally to all of the recommendations in this document. This approach recognizes that agency proposals can be characterized as falling somewhere on a continuum with respect to environmental impacts. This approach implements CEQ's instruction that in EISs agencies "focus on significant environmental issues and alternatives" (40 CFR 1502.1) and discuss impacts "in proportion to their significance" (40 CFR 1502.2(b)). (Note that under CEQ's regulations and judicial rulings the degree to which environmental effects are likely to be controversial with respect to technical issues is a factor in determining significance. See 40 CFR 1508.27 for guidance on determining significance in the NEPA context.) The sliding-scale approach also makes good sense for EAs and other NEPA documents.

When applying the sliding-scale approach to NEPA analysis, the preparer should analyze issues and impacts with the amount of detail commensurate with their importance. The term "scale" refers to the spectrum of significance of environmental impacts. Proposals with clearly small environmental impacts usually will require less depth and breadth of analysis either in identifying alternatives or analyzing their impacts (though the analysis still must satisfy all NEPA requirements). Conversely, as proposals fall increasingly closer to the high end of the continuum of potential environmental impacts, the depth and breadth of analysis will increase.

Application of the sliding-scale approach is not, however, a rationale for preparing an EA (even a complex EA) rather than an EIS for a proposal with potentially significant environmental impacts. While some EAs need to be more complex than others, proposed actions with the potential for significant environmental impacts normally require an EIS. (DOE's NEPA regulations at 10 CFR 1021 Subpart D, Appendices C and D identify proposed actions that normally require EAs and EISs.)

Consistency in EAs and EISs

When preparing EAs and EISs, sometimes information from existing NEPA documents can be used. For example, descriptions of the affected environment may be used directly or updated as required. Analysis of impacts may be used or refined in a new NEPA document if the existing analysis adequately describes the impacts from an analyzed alternative. Using parts of approved EAs and EISs can help reduce document preparation time and foster consistency.

Similarly, information from other DOE (or other agency) documents, such as documented safety analyses, may be summarized and expressly incorporated by reference into EAs and EISs. NEPA document managers should review assumptions and methodologies employed in the existing documents to ensure the analysis is applicable to the new EA or EIS.

Care also should be taken when preparing EAs and EISs to ensure that consistent and appropriate statements are made with regard to facility status and DOE programs and policies that affect the entire DOE complex. For example, an EA or EIS that describes and analyzes the generation and management of nuclear waste must describe and analyze waste disposition activities in a manner consistent with facility status and DOE's programs and policies for the waste. An EA or EIS that is consistent with other NEPA documents, facility status, and DOE programs and policies will more accurately reflect choices among alternatives and provide more useful information for the public and the decisionmaker.

Recommendations

- Apply the advice in this document thoughtfully and sensibly in light of the specific circumstances that each proposed action presents.

- Use this document as one tool among many (for example, use it in conjunction with DOE's EA and EIS checklists). These recommendations do not provide comprehensive guidance on the preparation of EAs or EISs, or a replacement for good judgment.

- Provide a level of detail and analysis commensurate with the importance of the issue or potential impact. Focus EAs and EISs on issues with potential for significant environmental impacts. Bear in mind that CEQ guidance defines an EA as a concise document that should not contain long descriptions or detailed data (Question 36a, "Forty Most Asked Questions Concerning CEQ's NEPA Regulations," as amended, 51 FR 15618, April 25, 1986; hereafter "CEQ's 40 Questions").

- Identify trivial issues and impacts as such. Include only enough discussion to show **why** more study is not warranted.

- Provide information that a concerned citizen might want, keeping in mind that concerned citizens may need evidence for conclusions that seem obvious to the preparers.

- Where substantial deviation from this general guidance appears necessary, arrange discussions, through the NEPA Compliance Officers, among cognizant program and field offices and the Office of NEPA Policy and Compliance, and Counsel, as appropriate, on the approach to the EA or EIS.

Related Guidance

- Environmental Assessment Checklist, 1994

- Environmental Impact Statement Checklist, 1997

Available on the DOE NEPA Web site (*www.eh.doe.gov/nepa*) under Guidance.

2. Document Summary

Background

A document summary facilitates the review of an EIS. For many readers, the summary forms their first and lasting impression of an EIS. The summary also highlights the major findings and conclusions of the environmental analyses for the public and the decisionmaker. Although not required, a brief summary similarly may be useful in an EA.

CEQ NEPA regulations require that: "Each environmental impact statement shall contain a summary which adequately and accurately summarizes the statement. The summary shall stress the major conclusions, areas of controversy (including issues raised by agencies and the public), and the issues to be resolved (including the choice among alternatives). The summary will normally not exceed 15 pages" (40 CFR 1502.12).

Recommendations

- Ensure the summary is concise, informative, and easy to read.

- Focus the summary on a comparison of analyzed alternatives. Describe each alternative, identifying the preferred alternative(s) if one or more exists (40 CFR 1502.14 (e)). Highlight key differences among alternatives, emphasizing the environmental implications of choosing among them. Include a table of comparison of impacts.

- Emphasize issues and impacts in proportion to their importance.

- Describe areas of controversy (including those raised in comments).

- State the issues to be resolved, including the decision to be made and its relationship to the purpose and need for agency action.

- Prepare the summary to read as a "stand-alone" document. It may be bound with the rest of the EA or EIS, or printed separately.

  Explanation: Address key elements of the entire EIS (or EA) such that the reader will understand the analysis without referring to the main body of the EIS. The summary should include information essential to a reasoned choice among alternatives, but may refer to EIS sections where subjects are treated in greater depth.

- Be consistent with the main body of the EA or EIS. Do not introduce ideas, information, or conclusions in the summary that are not otherwise in the EA or EIS.

- In a draft EIS, briefly describe the scoping process, summarize major issues raised in scoping comments, and identify major changes made to the scope of the EIS in response to comments. In a final EIS, briefly describe the public comment process, summarize major issues raised in comments and DOE's response, and identify major changes from the draft to final EIS.

Related Guidance

- Environmental Impact Statement Summary, 1998

Available on the DOE NEPA Web site (*www.eh.doe.gov/nepa*) under Guidance.

3. Purpose and Need for Action

Background

An EIS must "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action" (40 CFR 1502.13). Similarly, an EA must include a brief discussion of the need for the proposal (40 CFR 1508.9(b)). (CEQ regulations do not distinguish between "purpose" and "need," and use the terms together and separately.)

In general, the statement of purpose and need should reflect the goals to be achieved by the statutory authority or programmatic mission under which DOE is proposing to act (i.e., an explanation of *why* agency action is needed). The statement of purpose and need is not a justification of what DOE proposes to do (i.e., it is not a rationale for a proposed action or preferred alternative) nor is it an explanation why DOE is preparing an EA or EIS (i.e., it is not to comply with NEPA).

The statement of the agency's underlying purpose and need is critical to identifying the range of reasonable alternatives. If the purpose and need is defined too broadly, the number of alternatives that might require analysis would be virtually limitless. It is inappropriate in most situations, however, to define purpose and need so narrowly that only a single alternative could be identified for analysis. The proposed action is generally only one means of meeting the agency's underlying purpose and need for action.

Recommendations

- Relate the statement of purpose and need to the broad requirement or goal for agency action – not to the need for a specific proposal.

  Example: An appropriate statement of purpose and need for agency action could be that a site needs to perform laboratory analysis within 24 hours of water sampling to comply with quality assurance procedures. An inappropriate statement of purpose and need under these circumstances would be that the agency needs to construct a new on-site laboratory; a new on-site laboratory, however, could be the proposed action.

- Do not include requirements (e.g., conceptual design specifications) in the statement of purpose and need that unreasonably narrow or bias the range of reasonable alternatives.

  Example: Do not specify a particular technology in the statement of purpose and need if other technologies could be used to fulfill quality assurance procedures. An appropriate statement of purpose and need would allow different technologies to be included as reasonable alternatives.

- Write the statement of purpose and need to identify the problem or opportunity to which the agency is responding. Recognize that the statement will determine the range of reasonable alternatives.

  Example: If the purpose and need for agency action is a requirement to perform laboratory analysis within 24 hours of sampling to comply with quality assurance procedures, the range of reasonable alternatives could be limited to on-site

laboratory construction and expansion, and use of off-site laboratories, if any, that could reasonably be expected to provide 24-hour turnaround consistently.

However, if the purpose and need for agency action is to increase laboratory analysis capability (i.e., without a 24-hour turnaround restriction), the range of reasonable alternatives also would likely include using DOE and commercial laboratories nationwide.

4. Description of Alternatives, Including the Proposed Action

Background

In defining the scope of an EA or EIS, it is important to clearly describe the proposed action and identify the range of reasonable alternatives. In general, the range of reasonable alternatives is broader and the number of alternatives appropriately subjected to an analysis of impacts is greater in an EIS than in an EA. (In this document, "analyzed alternative" means an alternative, including any proposed action and no action, for which potential environmental impacts are assessed in detail. It does not include those alternatives considered but dismissed from detailed evaluation.) The following sections address how to define the proposed action, determine the range of reasonable alternatives, define the no action alternative, and describe all analyzed alternatives. The depth of analysis required for assessing and comparing the potential impacts of the alternatives is addressed in section 6.

CEQ's regulations direct all agencies to use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment (40 CFR 1500.2(e)).

From among the analyzed alternatives, an agency is to identify a preferred alternative. CEQ's regulations require that an EIS "[i]dentify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference" (40 CFR 1502.14(e)). CEQ's guidance indicates that the preferred alternative is the alternative that "the agency believes would fulfill its statutory mission and responsibilities, giving consideration to economic, environmental, technical and other factors." It is identified to inform the public of the agency's "orientation" (Question 4a, "CEQ's Forty Questions"). CEQ's guidance further states that the preferred alternative could be, but is not necessarily, the proposed action (Question 5a, "CEQ's Forty Questions").

CEQ's regulations require that EISs identify those alternatives that have been eliminated from detailed study (i.e., impacts analysis) because they are unreasonable and briefly discuss why they have been eliminated (40 CFR 1502.14(a)). This is also good practice for EAs, particularly when parties who are questioning the action have suggested alternatives that DOE believes do not respond to the purpose and need, or are unreasonable in other respects. If all or nearly all prospective alternatives are found to be unreasonable, the purpose and need may be too narrowly defined. (See section 3.)

4.1 Proposed Action

Background

Sometimes the proposed action is stated in the form of a specific alternative (e.g., to build and operate a specific waste treatment facility with other treatment alternatives). Sometimes the proposed action is a broad proposal to fulfill the underlying purpose and need through one or more alternatives. As an example of the latter case, DOE may have a purpose and need to safely store or dispose of an inventory of waste that must first be treated to enhance its stability. The proposed action might be to select one or more waste treatment technologies described in the range of reasonable alternatives.

With regard to EISs, CEQ's regulations state that an agency should analyze "connected actions" and "cumulative actions" in one EIS. An agency also should analyze its "similar actions"

in one EIS when that is the best way to adequately assess the combined impacts of the similar actions or reasonable alternatives (40 CFR 1508.25).

Agency "connected actions" are those actions that automatically trigger other actions that may require EISs, cannot or will not proceed unless other actions are taken previously or simultaneously, or are interdependent parts of a larger action and depend on the larger action for justification. "Cumulative actions" are those that when viewed with other actions proposed **by the agency** have cumulatively significant impacts and therefore should be discussed in the same EIS. "Similar actions" are those that when viewed with other reasonably foreseeable or proposed **agency** actions have similarities that provide a basis for evaluating their environmental impacts together, such as common timing or geography.

CEQ's regulations are directed at avoiding segmentation, wherein the significance of the environmental impacts of an action as a whole would not be evident if the action were to be broken into component parts and the impact of those parts analyzed separately. Although CEQ's regulations do not specifically direct agencies to consider their connected actions, cumulative actions, and similar actions in defining the scope of an EA, the impacts from such actions should be considered together in a single EA.

Cumulative, connected, or similar **actions** should not be confused with cumulative **impacts**, which result from the past, present, or reasonably foreseeable actions of any Federal or non-Federal agency. (See section 6.7.)

Recommendations

- Think of a proposed action expansively and aim to include rather than exclude activities from the scope of a proposed action.

  Example: If a proposed action involves construction of a new facility, the EA or EIS should acknowledge that the facility eventually will be shut down and, as appropriate, require decontamination and decommissioning and other post-operational activities. These post-operational activities should be described to the fullest extent possible in the EA or EIS and their environmental impacts analyzed.

  If, however, the post-operational activities are sufficiently distant and DOE has no proposal yet for what activities would be undertaken, the post-operational activities may be treated as a connected action with indirect effects. (See section 6.) (The impacts of the proposed action and the connected action must both be described, but consideration of alternatives for the connected action may be deferred until the connected action is proposed.)

- Consider relationships between a proposed action and other actions DOE proposes to take that may affect the same environmental resources.

- Describe private and other Federal agency proposed actions that would be "enabled" by DOE's proposed action (such as issuing a grant or contract, participating in a cooperative agreement, approving a request for an interconnection with a transmission system, or performing "work for others").

  Explanation: An EA or EIS should not represent a private action that has been federalized by DOE funding as a DOE action. For example, the EA or EIS should state that "the proposed action is a DOE grant to State University for construction

and operation of a new undergraduate chemistry laboratory," rather than stating that DOE proposes to construct and operate a chemistry laboratory at the University. Note that actions by DOE's contractors on DOE's behalf are not "private" actions.

- Include transportation activities as part of the proposed action when the transportation activities would be necessary to make the action happen or are an essential follow-on to the primary action.

- Arrange consultations, through the NEPA Compliance Officers, among cognizant program and field offices, the Office of NEPA Policy and Compliance, and Counsel, as appropriate, when there is a substantive question about the scope of a proposed action.

4.2 Range of Reasonable Alternatives

Background

CEQ's regulations require agencies to use "the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects" (40 CFR 1500.2(e)).

Environmental Impact Statements

CEQ's regulations state that the comparative analysis of alternatives, including the proposed action, is the heart of an EIS (40 CFR 1502.14). The regulations require a rigorous exploration and objective evaluation of reasonable alternatives and that the EIS include the no action alternative (discussed separately in section 4.3).

An EIS need not discuss every unique alternative when an unmanageably large number is involved. CEQ's guidance states that for EISs, reasonable alternatives include those that are practical or feasible from a common sense, technical, and economic standpoint. "When there are potentially a very large number of alternatives, only a reasonable number of examples, covering the full spectrum of alternatives, must be analyzed and compared in the EIS" (Questions 1 and 2, "CEQ's Forty Questions").

Environmental Assessments

CEQ's regulations require that an EA include a brief discussion of alternatives to a proposed action that involves unresolved conflicts concerning alternative uses of available resources (40 CFR 1508.9(b)). Although this requirement (which stems from section 102(2)(E) of NEPA) has had varying interpretations, courts are increasingly requiring discussion of alternatives in EAs. In addition, DOE's NEPA regulations (but not CEQ's regulations) require that EAs include a no action alternative (10 CFR 1021.321(c)). Thus, an EA is used to satisfy requirements for analyzing alternatives, as well as to determine whether to prepare an EIS.

EAs that address proposals where there is heightened technical controversy surrounding potential impacts or where there is otherwise greater potential for significant environmental impacts from the proposed action may need to identify and analyze more alternatives than other EAs. (See section 6, Background.) Conversely, the smaller the impacts of the proposed action, the less need there is to consider alternatives. In other words, where a proposed action falls on the sliding scale will affect the alternatives analysis. All DOE EAs, however, must satisfy minimum requirements as reflected in 40 CFR 1508.9 and 10 CFR 1021.321. Alternatives that

might have fewer or smaller impacts than the proposed action should be considered. The addition of alternatives to an EA is not a substitute for preparing an EIS when one is required.

Recommendations

- Identify the range of reasonable alternatives that satisfies the agency's purpose and need. Include alternatives that would respond to the underlying purpose and need under a variety of reasonably foreseeable circumstances. Alternatives should be defined broadly enough to allow small changes in the way DOE implements the selected alternative, but not so broadly to preclude meaningful analysis.

- Analyze alternatives that seem impractical only because of current programmatic assumptions, but otherwise would be reasonable. Also, consider whether it is foreseeable that technical or economic factors might change such that an apparently infeasible but otherwise reasonable alternative would become feasible.

  Example: The proposed action is management of a legacy material that has no current programmatic use, but is not authorized to be sold and is not classified as a waste. Consider whether it is possible that the material could be reclassified as government surplus or as a waste (depending on its characteristics) and include alternatives that would prepare it for commercial sale or disposal.

  Example: The proposed action is development of a new processing facility. The site has extensive experience with a particular processing technology and expects to use that technology in the new facility. Other technologies might be applicable, but they have received less research and development and no funding for further development. In the NEPA document, include alternatives that use other technologies, particularly those that might have environmental, safety, or cost advantages.

- Do not overlook reasonable technology, transportation, or siting alternatives, including off-site alternatives.

- Address **reasonable** alternatives that are outside DOE's jurisdiction, even if they conflict with lawfully established requirements (e.g., an alternative that could be reasonable if an existing law could be amended or if a regulatory agency granted a waiver).

- Identify and briefly discuss alternatives considered but dismissed from detailed evaluation, particularly any such alternatives raised during the public scoping or comment process. Explain why an alternative is not reasonable (e.g., that the cost or time to implement would be impractical, technical implementation would be infeasible). Make the method for screening alternatives clear to readers. The failure to consider alternatives that **seem** reasonable to others would affect the credibility of an otherwise adequate NEPA review.

- Note that infeasible alternatives are certainly unreasonable; feasible alternatives also may be unreasonable.

  Example: It might be feasible to build a new facility at a given site without regard to infrastructure because all necessary infrastructure already exists. It might not be a reasonable alternative, however, to build the same facility at another site because the required infrastructure is not in place and could not be provided at reasonable time or expense.

- As a general guide for EAs (for which requirements are less specific than for EISs), use the sliding-scale approach when determining how many alternatives to identify and analyze in an EA and the depth of analysis to provide for each alternative. Consider adding alternatives if they might have fewer or smaller impacts than the proposed action.

4.3 No Action Alternative

Background

The no action alternative must be considered in all DOE EAs and EISs. The no action alternative may or may not be a reasonable alternative.

The no action alternative provides a baseline against which impacts of the other analyzed alternatives can be compared. No action does not necessarily mean doing nothing. Rather, the no action alternative often involves maintaining or continuing the "status quo" (e.g., a management plan or activity covered by an existing NEPA review). For **proposed new projects**, "no action" means that the proposed activity would not take place. For **proposed changes to an ongoing activity**, "no action" can mean continuing with present plans. It also can mean discontinuing the present course of action by phasing-out operations (Question 3, "CEQ's Forty Questions").

Recommendations

- In some situations, no action taken by DOE may constitute the only alternative to the proposed action.

  Example: DOE may be involved with a private applicant and faced with a go/no-go decision (e.g., fund or not fund, approve or not approve). In such a case, the no action alternative may include several sub-alternatives consisting of those reasonably foreseeable courses of action that would be available to the applicant if DOE denies its application. DOE should describe such sub-alternatives and analyze their impacts to the extent they are reasonably foreseeable.

- Consider the no action alternative even if DOE is under a court order or legislative command to act. (Note that if DOE clearly has no discretion regarding its action, then the action is not subject to NEPA review. See definition of *Action* at 10 CFR 1021.104(b).) Include discussion of the legal ramifications of no action, if appropriate.

- When a NEPA document addresses ongoing activities, it may be useful to consider more than one version of "no action."

  Example: A site-wide EIS might analyze the continuation of the present course of action as one no action alternative and discontinuation of present operations as a second no action alternative. In such cases, it is important to carefully name the no action alternatives to avoid confusion.

4.4 Describing Alternatives

Recommendations

- Describe each analyzed alternative, including no action, in sufficient detail so that its scope is clear and its potential impacts can be identified.

  Explanation: As appropriate, include the following elements in the description of each alternative –

  (1) *general project progression* – information on construction milestones, projected operating cycle, and any aspects of the alternative that could result in impacts that vary over time (for example, with time of day or season of the year);

  (2) *pre-operational activities* – information on construction, including pre-construction site surveys, site clearing and preparation (e.g., excavating, construction lay-down or staging areas), access road construction, and other activities that would be necessary to support construction;

  (3) *operational activities* – description of project and related support operations or facilities on-site and off-site, including identification of roads, parking lots, utility hook-ups, borrow sites, and maintenance and transportation activities. Identify waste streams in general (including emissions) and state how they would be treated and/or disposed of; and

  (4) *post-operational requirements* – description of reasonably foreseeable future requirements including site close-out and site restoration. Describe any related decontamination and decommissioning activities, including associated waste streams, to the extent practicable. Where only limited discussion of decontamination and decommissioning or other such distant future post-operational activities is possible, include a statement that a separate NEPA review may be needed before such future activities occur. (See section 4.1.)

- Describe alternatives objectively by focusing on clear explanations of the elements or activities that define each alternative and avoiding any appearance of bias.

- When identifying releases, include rate and duration. Provide an explanation when it is not possible to quantify releases that may result in significant impact (40 CFR 1502.22).

  Example: Rather than stating that the discharge rate would be "1.0 mg/hr," state that the estimated rate would be "1.0 mg/hr for 8 hours per day, 5 days per week during the lifetime of the operation." The impact of the latter is more readily determined.

- Use the same time span to assess the impacts of all alternatives, including no action.

- Encompass reasonably foreseeable modifications and circumstances that can change over time when describing an alternative. Aim to include rather than exclude activities from the scope of the alternative. Account for the possibility that the time estimated to implement an alternative may change.

Example: Identify a realistic maximum volume of chemical to be used in a process per unit time or over the entire length of the project, rather than, or in addition to, specifying the expected volume.

- Describe each analyzed alternative in a manner that makes clear to readers what the differences between alternatives would be (e.g., alternate location, technology).

- Consider structuring alternatives to allow a decision to be based on a combination of alternatives or elements of alternatives, as appropriate.

  Explanation: Sometimes DOE can fulfill its purpose and need by combining elements of two or more alternatives. DOE can choose this approach while the EIS is being prepared or in a record of decision. While the EIS is being prepared, if DOE identifies a preferred alternative that is a combination of elements of other alternatives, this combination should be presented in the EIS as a discrete alternative (i.e., present a cohesive description of the preferred alternative and its impacts rather than merely direct readers to the descriptions of its various elements).

  Otherwise, the EIS should state clearly that DOE may combine elements of alternatives in its record of decision, as appropriate. (Note that the analysis of potential impacts should provide sufficient information to allow the reader to determine the impacts of reasonable combinations of alternatives. This does not necessarily mean that the impacts of every conceivable combination of alternatives must be presented.)

- In defining an alternative, consider what measures are available to reduce environmental impacts and include these measures in the detailed description of the alternative.

  Explanation: Some measures may be inherent in any alternative (e.g., standard construction practices, standard operating procedures, implementation of resource protection policies, DOE-required procedures, pollution prevention activities). Other measures may be necessary for a particular alternative to be likely to proceed (e.g., scheduling construction or operation not to occur when an endangered migratory species is in seasonal residence on-site).

- Where discrete, major mitigation options are available, consider presenting them as separate alternatives or sub-alternatives so that their impacts can be compared. (See section 6.9.)

  Example: Sub-alternatives based on major mitigation strategies to reduce air impacts from a power plant might include a credit trading strategy or investment in regional road construction projects.

5. Affected Environment

Background

CEQ's regulations require a succinct description of the affected environment (with respect to the proposed action and all analyzed alternatives) in a discrete section of an EIS unless an agency has a compelling reason to use a different format (40 CFR 1502.10 and 1502.15). An EA should provide a brief description of the environment to be affected by a proposed action (and by any other analyzed alternative).

The extent of the "affected environment" may not be the same for all potentially affected resource areas. For example, traffic may increase within four miles of a site from which waste would be removed to a nearby landfill (the extent of the affected environment with respect to transportation impacts). In contrast, groundwater extending two miles from the site may be affected (the extent of the affected environment with respect to groundwater impacts).

Recommendations

- In describing the affected environment, lay the foundation for evaluating the potential environmental impacts of the analyzed alternatives.

  Explanation: Provide appropriate (i.e., sufficient, but not excessive) detail concerning environmental resources (such as air quality) that may be affected by the alternatives to adequately support the impact analysis, including cumulative impact analysis.

- Use affected environment descriptions from existing DOE NEPA documents, where appropriate and to the extent possible. Use the most current data available (e.g., latest census).

  Explanation: The description should not be reinvented when the description in existing NEPA documents could be used directly or updated. This can help reduce document preparation time and foster consistency among DOE NEPA documents. However, the description of the affected environment should be appropriate to the alternatives and, thus, may vary among DOE NEPA documents for a particular site.

- Limit the description of the existing environment to information that directly relates to the scope of the analyzed alternatives (i.e., provide the information that is necessary to assess or understand the impacts). Where appropriate, summarize and incorporate by reference more detailed descriptions of the affected environment.

  Example: Provide information on hydrogeology or water resources only if one or more alternatives would consume water or could result in discharges to surface or ground water.

- Incorporate in the EA or EIS descriptions of the affected environment relevant to the discussion of compliance with requirements other than NEPA. (See section 6.8.)

  Example: Environmentally-sensitive resources (e.g., floodplains and wetlands, threatened and endangered species, and property of historic, archeological, or architectural significance) may be present in the area and affected by the analyzed alternatives. If such resources are present, be sure to satisfy requirements for environmental review under applicable laws, regulations, and Executive Orders and,

to the extent possible, integrate such review with the EA or EIS. When appropriate, state that environmentally-sensitive resources are not present. Append consultation letters, as appropriate.

- Present information on the potentially impacted minority and low-income populations. Consider whether these populations may interact with the environment in ways that create unique exposure pathways. Distribution of these populations may be diffuse and not captured by census data alone. Supplement census data with other relevant information.

  Explanation: Minority and low-income populations should be identified for the geographic region relevant to each resource area or impact type. Consider, for example, whether minority or low-income populations uniquely rely on certain natural resources for food or natural areas for cultural, religious, or economic reasons. If no such populations are present, then document this finding; explain that there is no need for further environmental justice analysis for that resource area.

6. Environmental Impacts (Effects)

This section provides recommended approaches for analyzing impacts. The general recommendations provided in this section apply to impact analysis for all resource areas, as do the recommendations regarding impact identification and quantification in section 6.1. Sections 6.2 through 6.7 provide recommendations for analyzing certain impacts that are routinely encountered in DOE NEPA documents. Sections 6.8 through 6.11 discuss other aspects of impact analysis.

Two concepts used in discussing environmental impacts are risk and bounding analysis. The term risk has a wide variety of meanings. Frequently in EAs and EISs, risk is expressed quantitatively as the probability of an adverse event occurring multiplied by the consequence of that event (i.e., the product of these two factors). Risk also can refer to a general statement of concern, hazard, or danger, or it can denote uncertainty or chance. Thus, it is important to define clearly the context in which the term is used.

A bounding analysis is an analysis designed to identify the **range** of potential impacts or risks, both upper and lower. Such an approach might be used in an EA or EIS, for example, to simplify assumptions, address uncertainty, or because expected values are unknown. As a practical matter, a bounding analysis most often is used to provide conservatism in the face of uncertainty.

Background

Section 102(2)(C) of NEPA requires evaluation of:

- unavoidable impacts
- the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity
- any irreversible or irretrievable commitments of resources.

In addition, CEQ regulations (40 CFR 1502.16) state that an EIS should discuss:

- direct and indirect effects
- possible conflicts between the proposed action and the objectives of Federal, regional, state, local, and tribal land use plans, policies, and controls
- energy and natural or depletable resource requirements and conservation potential of alternatives and mitigation measures
- urban quality, historic and cultural resources, and the design of the built environment.

CEQ regulations also require consideration of cumulative impacts (40 CFR 1508.25(c); cumulative impacts are discussed in section 6.7).

An impact may be adverse or beneficial, and the overall impacts of an alternative may be significant even if on balance the impacts would be beneficial (40 CFR 1508.8 and 1508.27(b)(1)). In addition to characterizing impacts, an EA or EIS should discuss means to mitigate impacts. (See section 6.9.)

Direct effects are caused by an action and occur at the same time and place as the action. Indirect effects are reasonably foreseeable effects caused by the action that occur later in time or farther in distance (40 CFR 1508.8). Irreversible and irretrievable commitments of resources include resource loss (such as the burning of fossil fuel) and forgone resources (i.e., resources

that would remain but would be inaccessible or could not be used, such as land and ecosystems inundated by dam construction).

In general, impacts (beneficial and adverse) will be more thoroughly analyzed in an EIS than in an EA because an EIS deals with actions that admittedly may have significant impacts. An EIS must devote substantial treatment to all reasonable alternatives analyzed to enable a comparison among those alternatives. Also, an EIS must identify the methodology used for the impacts analysis (often discussed in an appendix) and make explicit reference to scientific or other resources relied upon (40 CFR 1502.24). All NEPA documents must rely on high quality information, including accurate scientific analysis (40 CFR 1500.1(b)).

When confronted with incomplete or unavailable information for an analysis of reasonably foreseeable, significant adverse environmental effects, CEQ's regulations require agencies to indicate that such information is lacking and to obtain the information when doing so does not entail an exorbitant cost and the information is essential to a reasoned choice among alternatives (40 CFR 1502.22). Otherwise, agencies are to discuss the implications for the analysis.

An EA may focus the impacts analysis on the proposed action in order to provide the basis for a significance determination. The CEQ regulations (40 CFR 1508.9(b)), however, require an EA also to include brief discussions of the impacts of alternatives to a proposed action that involves unresolved conflicts concerning alternative uses of available resources. As with the choice of alternatives (section 4.2), the analysis of impacts of alternatives should be more detailed in an EA where there is heightened technical controversy surrounding potential impacts or where there is otherwise greater potential for significant impacts. That is, the sliding-scale approach applies to impacts analysis in much the same way as it applies to the choice of alternatives. An unusually complex and lengthy EA, however, may indicate the need for an EIS (Question 36b, "CEQ's Forty Questions").

CEQ distinguishes between the "environmental consequences section" of an EIS, which should be devoted largely to a scientific analysis of the impacts of the analyzed alternatives, and the "alternatives section," which should present a concise comparison of alternatives (based on and summarizing information developed in the "environmental consequences section") (Question 7, "CEQ's Forty Questions"). In both cases, DOE normally presents the impacts of each analyzed alternative by resource area. In some cases impacts may be presented by alternative. Section 6.10 provides some general approaches to alternatives comparisons in both EAs and EISs.

Recommendations

- Address environmental impacts in proportion to their potential significance. That is, focus the impacts analysis and discussion on project attributes that have significant impacts or potential for significant impacts.

- Identify, but do not address, clearly insignificant impacts in detail. Indicate **how** all relevant environmental attributes were considered, and provide enough information to show why greater consideration is not needed.

- Identify all potential nontrivial impacts from all elements of an alternative, including those that may not be the primary focus of the alternative.

  Example: For proposed waste treatment and disposal, the EA or EIS should assess any adverse environmental effects of transport, storage, and handling on worker and

public health and environmental resources, in addition to the more obvious effects from treatment and disposal operations.

- Identify possible indirect impacts, and indicate the degree to which these impacts are uncertain.

  Example: The classic example of an indirect impact is growth and development that follows the construction of a road or the extension of utility lines. Another example is the installation of a flood control or hydroelectric power dam that might directly interrupt salmon migration and spawning; over time, bald eagles (which feed on salmon) might indirectly suffer from a loss of food supply.

- Analyze environmental impacts for as long as they are reasonably foreseeable, not speculative, including foreseeable long-term as well as short-term effects.

  Example: Waste disposal impacts may occur hundreds or thousands of years from the time the actual disposal activity took place.

- It may be helpful to present the impacts by resource area (rather than by alternative) to allow for direct comparison among alternatives.

- Consider environmental impacts within geographic boundaries appropriate for each resource reviewed.

- Separately address the impacts from all elements or activities encompassed within each alternative (e.g., construction, operation, waste management, transportation, decontamination and decommissioning).

  Explanation: This approach allows a comparison of elements of alternatives, which can allow decisionmakers to assess whether to combine elements of two or more alternatives. This approach also allows a comparison of mitigation options.

- Where requirements (e.g., standards) are directly relevant to limiting environmental impacts, identify the requirements, briefly state their conditions (e.g., release limits), and indicate whether the alternative threatens a violation of any applicable environmental protection requirement. Note that compliance with requirements does not mean there is no potential for significant impacts, and demonstrating compliance does not substitute for analyzing impacts.

- Consider the quality of the affected environment. An alternative that would contaminate a pristine area or that would increase pollutant levels close to applicable limits (e.g., an alternative that could cause "significant deterioration") may have significant impacts.

- Do not confuse the description of impacts from the no action alternative with the description of the affected environment.

  Example: The affected environment's air quality discussion might describe the general climate, wind, temperature, rainfall, ambient concentrations of air pollutants at the site, and current site emissions and emission rates. Also, this discussion would identify, as appropriate, existing air quality permits and specify the attainment status for criteria pollutants. In contrast, impact assessment for the no action

alternative would include projections of future site emissions and emission rates without the proposed action.

- Identify any responsible opposing views regarding how to conduct impacts analysis or interpret conclusions.

  Explanation: DOE's approach may not be the only credible way to analyze potential impacts and interpret the results of the analysis. Different means may be identified through comments on the EA or EIS or through other information. The EA or EIS should (1) acknowledge the controversy (i.e., the differences of opinion or fact) and (2) explain the basis for DOE's choice of methodology in a manner that demonstrates that the analysis in the EA or EIS is technically sound and provides a sufficient basis for decisionmaking. Also, consider explaining how use of the different methodology would affect the conclusions, as this different perspective might be useful to the decisionmaking process. In some cases, it may be prudent and useful to present the results of using the alternative data, assumptions, or methodologies.

6.1 Impact Identification and Quantification

Recommendations

- Quantify impacts to the extent practicable, consistent with the sliding-scale approach and taking into account available project information and design data. Acknowledge uncertainty and incompleteness in the data. Where the uncertainty is significant or a major factor in understanding the impacts, explain how the uncertainty affects the analysis.

  Explanation: In some cases, it is appropriate to explain uncertainty qualitatively (e.g., by discussing the factors that make the estimate uncertain and considering that uncertainty when comparing impact estimates). In other cases, a more detailed analysis might be necessary. One tool for such cases is sensitivity analysis, which identifies the factors that most affect the estimate and provides insight into the range of potential impacts.

- Provide sufficient data and references to allow review of the validity of analytical methods and results.

- Present impact estimates so as to avoid inappropriate comparisons or summing (don't add apples and oranges).

  Explanation: EAs and EISs evaluate numerous and varied impacts (e.g., health effects, transportation impacts) for each alternative. In comparing alternatives, any quantitative impact estimates should be presented separately. Any attempt to combine them should recognize differences and uncertainties in methodology or calculation.

- Do not attempt to quantify impacts on environmental resources when it is clear from the context that impacts would be virtually absent. Provide a brief negative declaration, such as, "The project would not affect threatened or endangered species or their habitats," and provide appropriate references, consultation letters, or explanation.

- Compare environmental impacts in their appropriate context. Do not use regional, national, or global comparisons that might trivialize the significance of a local impact.

  Example: Local comparisons may sometimes appropriately provide a context for assessing impact (e.g., withdrawing 10 hectares of agricultural land from use in a county with 10,000 hectares in production of the same crop). However, it would be inappropriate to say, "Five traffic fatalities would be expected locally as a result of the alternative's shipping campaign, but this is small compared to the approximately 200,000 traffic fatalities that would be expected to occur nationally during the same five-year period."

- In addition to identifying pollutants that would be released and wastes that would be produced, identify potential effects from these substances (e.g., human diseases, and effects on plant and animal populations and ecosystem functions). A quantified release rate should not be the endpoint in impact analysis.

  Example: Releases into fresh water streams may affect humans who drink the water, alter aquatic invertebrate populations, or accumulate in sediment and ultimately have adverse impacts on benthic invertebrates.

- Recognize that relative comparisons do not provide absolute information, and both relative and absolute information generally are needed.

  Example: The statement "routine emissions would increase by 0.05 percent" does not describe an impact (although it is a valuable part of the description of the alternative). The statement provides neither the absolute value of emissions nor the basis for determining their environmental impacts. Further, relative comparisons, particularly those given without a baseline of absolute magnitude, may be misleading (e.g., "99.9% pure water" could describe raw sewage).

- Describe the likelihood of potential impacts whenever possible.

  Explanation: Both the estimated frequency and the magnitude of impacts inform readers about the nature of the impact and mitigation options. Often, the most significant impacts arise from scenarios that are unlikely to occur, whereas less significant impacts may occur frequently.

- In general, use available data for an EA. If data needed to quantify impacts are not available, qualitatively describe the most relevant impacts. Be aware that inability to satisfactorily characterize an important impact in an EA likely will render it inadequate to support a finding of no significant impact.

6.2 Human Health Effects

Background

The principal potential human health effect from exposure to low doses of radiation is cancer. Human health effects from exposure to chemicals may be both toxic effects (such as nervous system disorders) and cancer. Exposure and dose are neither health effects nor environmental impacts. Rather, they cause the health effects. A common problem in estimating effects from human exposure to chemicals or radiation is the failure (or inability in some cases) to carry the

analysis to completion; that is, to identify, and quantify when appropriate, potentially significant health effects (e.g., number of deaths). Also, consider the potential for non-radiological and non-chemical human health effects (e.g. physical injury).

It is appropriate, but not at all sufficient for purposes of analysis, to state that DOE facilities and operators would have to comply with all applicable requirements, that exposure to workers and the public would be minimized by using appropriate and approved safeguards and procedures, or that exposure to workers and the public would be maintained as low as reasonably achievable below applicable dose limits.

Recommendations: Human health effects generally

- Apply the sliding-scale approach when characterizing human health effects.

- Determine the period of estimated exposure by how long an alternative would expose workers or the general public. In general, impacts should be analyzed for as long as they are reasonably expected to occur.

  Explanation: Typically use 30 years for workers and the public unless the alternative specifies a different period of potential exposure (e.g., the operating life of the facility is assumed to be 10 years). If there is a potential for lifelong exposure to the public (e.g., from long-lived contaminants that are permanently at a site, such as from waste disposal or residual radioactivity or contaminants that persist in soils or groundwater), use 70 years for the period of estimated exposure. Impacts related to decommissioning may need to be considered beyond the operational lifetime of a facility, and waste disposal impacts may occur hundreds or thousands of years from the time that the disposal activity takes place.

- Analyses generally should be based on realistic exposure conditions. Where conservative assumptions (i.e., those that tend to overstate the impact) are made, describe the degree of conservatism, and characterize the "average" or "probable" exposure conditions if possible.

- Consider all potential routes of exposure, not just the most obvious route.

  Example: Where the proposed activities might result in the air suspension of contaminated soils, consider the downwind exposure of the public to suspended particles.

- Aim to provide estimates of potential health effects from chemical or radiological exposure for three subsets of populations and maximally exposed individuals in those populations:

  (1) involved workers (participants at the location of the action),

  (2) noninvolved workers (workers that would be on the site of the alternative but not involved in the action), and

  (3) members of the general public.

  Provide these estimates for both routine operations and accident scenarios. (Accidents are discussed in section 6.5.)

- Provide the basis for health effects calculations, as it may be misleading to present only the resulting estimates. As appropriate, present the dose, or dose-to-risk (health effects) conversion factor, potential health effects calculated for the year of maximum dose and for the total period of estimated exposure, and any other germane information (further discussion below).

Recommendations: Carcinogenic effects from radiation exposure

- When providing quantitative estimates of carcinogenic effects of radiation exposure, express population (or collective) effects as an estimated number of excess fatal cancers and express maximum individual effects as the estimated maximum probability of the premature death of an individual. **Excess fatal cancers** refers to those latent cancer fatalities beyond what would be expected to occur in the population absent the radiation exposure.

- Evaluate effects for involved workers, noninvolved workers, and the general public under both routine operations and accident scenarios. Discuss uncertainty associated with estimates, as appropriate.

- When providing quantitative estimates of radiation impacts, always use current dose-to-risk conversion factors that have been adopted by cognizant health and environmental protection agencies, such as the Nuclear Regulatory Commission and the Environmental Protection Agency (EPA). Specify the conversion factors being used and provide a reference to their source. Be aware that conversion factors are occasionally revised to incorporate new experimental and epidemiological information.

  Example: Analyses are frequently conducted using models and codes that project Total Effective Dose Equivalent (TEDE) estimates rather than exposure or intake estimates and, in such cases, it is normally appropriate to use TEDE dose-to-risk factors. As of this writing, the dose-to-risk conversion factor that should be used for estimating excess cancer deaths from exposure to low dose rates of ionizing radiation is 600 cancer deaths (latent cancer fatalities) per million person-rem TEDE (6×10^{-4} deaths per rem). This conversion factor may be applied to the general population (which includes children) and the worker population. In general, estimates of cancer mortality derived from these conversion factors should not be stated using more than one significant digit. As of this writing, the dose-to-risk factor recommended for morbidity (cancer incidence) is 800 cancers per million person-rem (8×10^{-4} cancers per rem). ("Estimating Radiation Risk from Total Effective Dose Equivalent (TEDE), ISCORS Technical Report No. 1," DOE/EH-412/0015/0802 rev. 1, January 2003.)

  Use of the dose-to-risk conversion factors described above is acceptable for most comparative analyses. Such use, however, will tend to result in more conservative estimates than use of more detailed, radionuclide-specific methods for assessing risk. More detailed methods may be used when doing so would produce a more useful estimate based on project-specific information. One method to prepare such detailed analyses is to use the appropriate exposure-to-risk factors from Federal Guidance Report #13 ("Cancer Risk Coefficients for Environmental Exposure to Radionuclides," EPA 402-R-99-001, September 1999).

- Use statements about background or natural sources of radiation and about relevant dose limits judiciously to help explain the impacts but not to suggest that the impacts are acceptable. Do not assert that the average annual effective dose equivalent caused by a

project translates to an insignificant increase in risk simply because it constitutes only a small increase above background or because it complies with applicable requirements. Present information and allow readers to make their own judgments.

> Example: The average annual effective dose equivalent that individuals receive from naturally occurring radiation, or some other point of reference (e.g., airplane travel), might provide readers perspective on doses estimated for the analyzed alternative. Impacts from the alternatives would occur independently of impacts from natural background radiation, however, and the text should not imply that background radiation provides a basis for judging the significance of the impacts of the analyzed alternative.
>
> Example: While compliance with applicable requirements is necessary for the alternative to be permitted or approved, the discussion must describe the impact of the alternative as well as state whether DOE would be in compliance. The fact that exposures are subject to limits and must be maintained as low as reasonably achievable (under DOE Order 5400.5) does not in itself demonstrate that the effects on workers' health (from the project or cumulatively with other exposures) are insignificant. EAs and EISs should fully disclose impacts and present sufficient information to allow a comparison among the alternatives.

- Always define "risk" when using the term and provide the context for its use. If "risk" or "probability" is used in describing potential effects, be certain to state the effect the probability describes (e.g., the probability of cancer death, probability of high dose rate, probability of a particular accident scenario). Present the probability and potential effect in addition to any risk estimate. (See section 6, introduction.)

- Consistent with the sliding-scale approach, the assessment of health effects from occupational radiation exposures in EAs usually need not be as extensive as the assessment in EISs. When estimated occupational dose rates are substantially below 1 rem per year for each individual and 1,000 person-rem per year for the worker population, the following may serve as a model description of the health effects from occupational radiation exposure from normal operations:

> *Worker exposures to radiation under normal operations would be controlled under established procedures that require doses to be kept as low as reasonably achievable and that limit any individual's dose to less than 5 rem per year. Based on relevant experience with _____ [reference similar projects for which worker exposure data is available], DOE expects the average annual dose rate from this alternative to be maintained below ___ rem per year [e.g., 0.1 rem per year]. The collective worker dose would not exceed ___ person-rem. [Obtain the result by multiplying: average dose rate (rem/year, from the previous sentence)* ***times*** *the average number of workers being exposed* ***times*** *the operational life of the project (years).] Based on the currently recommended dose-to-risk conversion factor of* 6×10^{-4} *excess fatal cancers per person-rem [cite current Federal guidance], workers engaged in this alternative would not be expected to incur any harmful health effects from radiation exposures they receive during normal operations.*
>
> Example: Assuming that an average worker population of 50 people each receive an average exposure of 0.1 rem per year for the project lifetime of 30 years, the workers' collective dose would be 50 × 0.1 rem/year × 30 years = 150 person-rem. Multiply the estimated person-rem by the dose-to-risk conversion factor to calculate

the estimated number of excess fatal cancers among the worker population for the life of the project (150 person-rem × 0.0006 fatal cancers/person-rem = 0.09 fatal cancers). A fatal cancer would not be expected among this population. It would not be appropriate, however, to interpret this result as indicating that there is zero risk of harm to workers from the radiation exposure.

The above model description may be used when exposures are confidently projected to be below the levels indicated – the farther below, the more appropriate the simple approach becomes – and when there are no substantial counterindications to its use. Two examples of such counterindications are: (1) the exposure estimates are unusually uncertain, such as when workers would be operating under conditions for which there is little relevant experience; or (2) there is a high level of interest regarding the alternative in which occupational radiation risk might be an issue.

- For EISs, or for EAs for which counterindications exist (as discussed above), include more complete statements of health effects, such as in the following example for involved workers.

  Example: [Discuss any counterindication, e.g., why is the exposure estimate uncertain and how is that uncertainty factored into the dose estimate. Then provide a more detailed discussion of the estimated health effects than in the preceding example, adding information such as the estimate for the maximally exposed worker.] Based on a dose-to-risk conversion factor of 6×10^{-4} latent cancer fatalities per person-rem, the maximally exposed worker (dose rate of 1 rem per year) would have an estimated annual probability of a fatal cancer induced by the radiation of 6×10^{-4} [cite current Federal guidance]. The estimated probability of the worker dying from cancer induced by such radiation doses over the worker's projected exposure period (30 years) is approximately 2×10^{-2} (or 1 chance in 50).

  The group of 200 workers are estimated to be exposed at an average dose rate of 50 mrem/year. Assuming the group is exposed at this rate for 30 years, the estimated number of excess fatal cancers induced among the workers would be about 0.2. It is likely there would be no fatal cancers attributable to this exposure.

Recommendations: Effects from chemical exposure

- As appropriate, and as discussed generally above, evaluate toxic and carcinogenic health effects from exposure to hazardous chemicals for involved and noninvolved workers and the general public. For toxic effects, compare dose estimates with appropriate reference doses. For carcinogenic effects, calculate values for potential carcinogenic effects from exposure or dose estimates using appropriate exposure-effect or dose-effect relationships.

- As appropriate data permit, evaluate acute and chronic health effects (including cancer and occurrence of inheritable mutations) and address cumulative or synergistic health effects from exposure to multiple chemicals.

- If reference doses, exposures, or exposure- or dose-effect relationships are not available, use reference concentrations, Occupational Safety and Health Administration permissible exposure limits, or other criteria that may be available in such sources as EPA's Integrated Risk Information System database or the National Library of Medicine's MEDLAR database.

6.3 Biological Impacts

Background

DOE activities may expose populations of plants and animals (biota) to radioactive and chemically hazardous materials in environmental media or to materials released in waste streams. DOE Order 450.1, Environmental Protection Program, requires a biota protection program, including environmental monitoring, that may provide data for evaluating potential impacts in an EA or EIS.

Physical, chemical, or radiological stressors – individually or in any combination – can impact animal and plant life. A variety of dose and risk assessment tools are available for conducting screening evaluations to identify potential impacts to biota, and for conducting evaluations of dose and risk, as needed. Screening, followed by detailed assessment, where appropriate, can ensure that the magnitude of the assessment effort is scaled to the likelihood and severity of environmental impacts.

The principal biological impacts of concern in most circumstances are assessed at the population level, with a focus on the potential decrease in local species population size and a decline in suitable habitat. When threatened or endangered species, or commercially- or culturally-valuable species, may be affected, however, consideration of impacts to individuals may be appropriate.

Recommendations

- Analyze the impact of each alternative on aquatic and terrestrial biota, as appropriate. In addition to chemical and radiological stressors, consider physical stressors individually and cumulatively, when assessing potential biological impacts.

  Examples: A physical stressor might be a new fence that would have no effect on a sensitive bird species, while severely impeding a major migratory route for mule deer. A second example might be the physical impact a wind farm could have on migratory birds.

- Note that routes of exposure for biota and people may differ.

  Example: Human access to certain areas of a DOE site might be restricted, but the restrictions might not prevent exposure to animal and plant life. Exposure pathways from contaminated soil or sediment for a burrowing terrestrial animal and benthic aquatic animal, respectively, could be much greater than for humans.

- When conducting biota dose and risk assessments, identify the appropriate dose or risk standards, criteria, or benchmarks. When conducting assessments, use principal indicator species in the analysis.

  Explanation: The species should have a comparably high degree of sensitivity to the stressor(s) being evaluated, and should be important to the structure and function of the biological community. In general, if a more sensitive species is not significantly impacted, other species likely will not be significantly impacted either.

- Indicate whether implementation of each alternative would comply with applicable dose limits for protection of biota.

Explanation: DOE currently uses radiation dose limits of 1 rad/day for the protection of aquatic organisms (DOE O 5400.5), and guidelines of 1 rad/day for terrestrial plants and 0.1 rad/day for terrestrial animals (A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota, DOE-STD-1153-2002, July 2002). The DOE Technical Standard provides guidance and examples of representative species that could serve as indicators of radiological impact in assessments.

- Identify impacts on threatened or endangered species and their critical habitat. (See section 6.8.1.)

6.4 Transportation Impacts

Background

When transport of waste or materials of a hazardous or radioactive nature is part of an analyzed alternative, or, more generally, when transport is in any respect a major factor (e.g., transportation of construction materials for a proposed major project), the environmental impacts of such transport should be analyzed, even when DOE is not responsible for the transportation. Transportation impacts include those from transport **to and from a site, as well as impacts from on-site transport**, when such activities are needed to accomplish the analyzed alternative. Include loading or unloading activities in the transportation impacts analysis.

Recommendations

- As with the choice of alternatives, apply a sliding-scale approach to the transportation analysis. The nature of the alternatives determines whether to describe the transportation impacts qualitatively or to analyze them quantitatively.

- Analyze all transportation links that are reasonably foreseeable parts of the analyzed alternative, such as overland transport, port transfer, and marine transport. If the action contains links that traverse the global commons (e.g., the oceans or outer space), then impacts from such transport should be included in the NEPA analysis; state that the global commons analysis is provided pursuant to Executive Order 12114.

- Do not base conclusions about significance of transportation impacts exclusively on statements that transportation would be conducted in accordance with all applicable regulations or requirements of the U.S. Department of Transportation, the Environmental Protection Agency, the Nuclear Regulatory Commission, or state authorities.

- Evaluate both routine (i.e., incident-free) transport and accidents. (Accident analysis is discussed in section 6.5.) Evaluate potential public and worker health impacts from exposure to chemicals or radiation. Also, be sure to consider non-radiological and non-chemical transportation impacts, such as fatalities from collision that do not result in any cargo release. In many cases, such impacts would exceed estimated radiological and chemical impacts.

- Estimate the annual and total impact of all transportation associated with the analyzed alternative, by the use of specific routes (if known and appropriate), to represent the expected environmental impacts over the term of the analyzed alternative, including, for chemical and radiological exposure, the impact on a maximally exposed individual. Impacts related to transportation must be totaled over the duration of the project (e.g., 48 trips per

year for 5 years). (Note: This total is not the cumulative impact of transportation impacts from an analyzed alternative and other transportation activities over the same time period in the area.)

- Be sure to use current, technically sound estimation methods and data for assessing the impacts of transportation (e.g., the most current version of RADTRAN, when quantification is appropriate).

6.5 Accident Analysis

This section summarizes key points from "Recommendations for Analyzing Accidents Under the National Environmental Policy Act" (2002), which provides more detailed guidance.

Background

An accident is an unplanned event or sequence of events that results in undesirable consequences. Accidents may be caused by equipment malfunction, human error, or natural phenomena. NEPA documents should inform the decisionmaker and the public about the chances that reasonably foreseeable accidents associated with proposed actions and alternatives could occur, and about their potential adverse consequences.

The key to informative accident analyses is to develop realistic scenarios that address the range of reasonably foreseeable event probabilities and consequences, including low probability/high consequence accidents and higher probability/(usually) lower consequence accidents. The environmental consequences of accidents are impacts (effects) on human health and the environment. Accident analyses in NEPA documents should estimate the magnitude of risk (for accidents, risk is normally defined as the probability of the accident occurring multiplied by the consequence of the accident) that each analyzed alternative would present and provide comparisons of risks among alternatives, providing information necessary for a reasoned choice among alternatives and appropriate consideration of mitigation measures.

It may be appropriate in certain cases to address potential environmental impacts that could result from intentional destructive acts. Analysis of such acts, which are not accidents, poses a challenge because the potential number of scenarios is limitless and the likelihood of attack is unknowable. Consequences of destructive acts, however, may be compared to consequences of severe accidents, because the forces resulting in releases of hazardous or radioactive materials could be similar.

Recommendations

- Develop realistic scenarios that represent the spectrum of reasonably foreseeable accidents. Analyze maximum reasonably foreseeable accidents for a given alternative to represent potential accidents at the high consequence end of the spectrum. Also analyze other accidents in the "spectrum" if they may contribute importantly to, or even dominate, accident risks.

  Explanation: A maximum reasonably foreseeable accident is an accident with the most severe consequences that can be reasonably expected to occur for a given proposal. It is not the same as a worst-case accident. A worst-case accident is one whose probability is so remote or speculative as to render it not reasonably foreseeable and therefore not helpful to the decisionmaker. Analysis of worst-case accidents is not required under NEPA.

- Consider scenarios with frequencies of 10^{-6} to 10^{-7} per year if the consequences may be very large. Scenarios with frequencies less than 10^{-7} per year rarely need to be examined.

- Because one purpose of NEPA analysis is to inform the public, consider analyzing an accident scenario in which the public has expressed a keen interest, even when the scenario is not reasonably foreseeable. Do not, however, analyze physically impossible accidents or scenarios that are based on pure conjecture (consistent with 40 CFR 1502.22). Always explain why a scenario of interest to the public was excluded from analysis.

- Use a bounding approach when many uncertainties prevent a more realistic approach (i.e., one based on expected values), but be aware that bounding analyses may mask differences among alternatives.

- Evaluate accident impacts on the public, involved workers, and non-involved workers. For each of these population groups, evaluate impacts on the maximally exposed individuals and the collective impact to the group.

- Identify and quantify potential health effects (e.g., latent cancer fatalities). Do not report only dose estimates. Always use current dose-to-risk conversion factors that have been adopted by cognizant health and environmental protection agencies. (See section 6.2.)

- Present both the probability of occurrence (i.e., the probability that adverse consequences would occur) and the consequences of the accident. Risk (which often is defined as the product of probability and consequence) also can be presented, but it should augment, not substitute for, the separate presentation of probability and consequence.

- Consider non-radiological impacts that could result from an accident (e.g., impacts from releases of toxic chemicals). Also consider injuries and fatalities from construction and physical hazards that are often greater than those from radiological and chemical exposures.

- Evaluate (at least qualitatively) indirect impacts to the environment that would result from contamination resulting from an accident, such as economic issues (e.g., the cost of cleanup), water quality, and impacts to biota.

- Discuss factors contributing to uncertainties in the accident analysis. Decisionmakers need to understand the nature and extent of uncertainty in choosing among alternatives and considering potential mitigation measures. In circumstances where substantial uncertainty exists regarding an estimate, a qualitative estimate may be used.

- In many cases, existing safety documents may be summarized and incorporated by reference in NEPA accident analyses. Make sure such safety documents are appropriate for the NEPA review. Ensure that accident risk comparisons among alternatives are fair by using a consistent set of assumptions or clearly noting any differences.

Related Guidance

- Recommendations for Analyzing Accidents Under the National Environmental Policy Act, 2002

Available on the DOE NEPA Web site (*www.eh.doe.gov/nepa*) under Guidance.

6.6 Environmental Justice

Background

Each Federal agency is to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, **disproportionately high and adverse human health or environmental effects** of its programs, policies, and activities on minority populations and low-income populations" (Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 1994, 59 FR 7629; emphasis added).

The Presidential Memorandum accompanying the Executive Order directs Federal agencies to "analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the National Environmental Policy Act."

EPA defines environmental justice as: "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."

Recommendations

- For each alternative, consider whether there are any significant adverse impacts to minority and low income populations (see section 5) that would appreciably exceed impacts to the general population or other appropriate comparison group. Consider all potential impacts (e.g., health effects, air quality, water quality, cultural resources, cumulative impacts).

- Consider whether minority and low-income populations would have different ways than the general population of being affected by an alternative. Examples include unique exposure pathways or rates of exposure (e.g., from subsistence fishing), special sensitivities (e.g., to air pollution because of less access to health care and poorer control of asthma), or different uses of natural resources (e.g., for cultural, religious, or economic practices).

Related Guidance

- CEQ, Environmental Justice Guidance under the National Environmental Policy Act, 1997

Available on the DOE NEPA Web site (*www.eh.doe.gov/nepa*) under Guidance.

6.7 Cumulative Impacts

Background

Cumulative impacts (or "cumulative effects" as they also are known) are defined in the CEQ regulations as follows:

> "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or

non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7).

Recommendations

- Describe cumulative impacts for each analyzed alternative. Understanding the cumulative impacts for each alternative may help distinguish among alternatives.

  Explanation: When two alternatives would affect the same resource(s) in the same, or a very similar, way for the same period of time, it would not be necessary to analyze or describe the cumulative impacts separately for both alternatives. In such cases, clearly explain the basis for concluding that the cumulative impacts are the same or very similar.

- Evaluate potential cumulative impacts for all impact areas.

  Example: The importance of considering cumulative impacts is demonstrated by the markedly different effects of adding a small amount of liquid to a full glass as opposed to a nearly empty one. Similarly, the cumulative impact of taking an action that would increase traffic by a few trucks per day at an already overcrowded intersection is different from the impacts of adding the same traffic to a little-used rural crossing. Also, a small loss of wildlife habitat from one alternative, combined with losses from other projects, may produce an overall significant loss of wildlife habitat and materially affect the regional biodiversity.

- Consider impacts from relevant past, present, and reasonably foreseeable future actions that occur within defined geographic boundaries for as long as they are reasonably foreseeable for the alternative.

  Explanation: The availability of information tends to determine how far into the past actions can be examined. Certain types of data, such as land use at DOE sites, may be available over several decades, while others, such as water quality data, may only be available for relatively short periods. Present actions tend to be easier to identify than past or future actions. Coordination with Federal, state, and local agencies and other relevant organizations often is helpful in collecting available data.

- Identify pathways and potential impacts appropriate for the cumulative impacts analysis. The sources of impacts on a resource may be more diverse when analyzing cumulative impacts than project-specific impacts, and the nature of impacts may differ.

  Example: The cumulative impacts on fish might be affected by effluent released from the alternative plus non-DOE sources, such as agricultural runoff, erosion from construction activities, or effluent from other facilities, including some yet to be built.

- Consider cumulative impacts when developing mitigation.

Related Guidance

- CEQ, Considering Cumulative Effects Under the National Environmental Policy Act, 1997

Available on the DOE NEPA Web site (*www.eh.doe.gov/nepa*) under Guidance.

6.8 Compliance with Other Requirements

Background

CEQ's and DOE's regulations require integration of NEPA with other environmental review and consultation requirements to the fullest extent possible and combining environmental documents to reduce duplication and paperwork (40 CFR 1500.4(k) and (o), 1502.25, 1506.4; 10 CFR 1021.341). In addition, CEQ's regulations require that an EIS identify all Federal permits, licenses, and other entitlements that must be obtained in implementing the proposal (40 CFR 1502.25(b)). Note that agency obligations under these other requirements are independent from NEPA and must be complied with even when an EA or EIS is not required.

A statement that the proposed action or analyzed alternatives would be in compliance with applicable environmental regulations, DOE Orders, or licenses does not substitute for a discussion of potential environmental impacts. As a practical matter, all alternatives must comply with applicable requirements, yet some actions may nevertheless have significant environmental impacts (e.g., a new nuclear power reactor).

Recommendations

- Explain whether and how each alternative would be in compliance with applicable requirements. Do not rely, however, on compliance with applicable requirements (e.g., waste disposal permits, water or air emissions permits) as evidence that an analyzed alternative does not have potential for significant impact.

  > Example: Rather than just stating that "all wastes would be disposed of in accordance with applicable regulatory requirements and DOE Orders," address (e.g., document by reference) whether each alternative provides adequate disposal capacity in a facility that is permitted to receive the waste type.

- Conduct a single analysis that satisfies the requirements of NEPA and other applicable requirements. In general, include this analysis in an appendix or separate section of the EA or EIS. Include a summary of pertinent parts in the impacts section of the EA or EIS, and reference rather than repeat analysis from the more detailed appendix or separate section devoted to the discussion of compliance with other applicable requirements.

6.8.1 Endangered Species Act

Background

Section 7 of the Endangered Species Act (ESA) directs all Federal agencies to use their existing authorities to conserve threatened and endangered species and, in consultation with the Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS), to ensure that their actions do not jeopardize listed species or destroy or adversely modify critical habitat. Section 7 applies to management of Federal lands, as well as other Federal actions that may affect listed species, such as Federal approval of private activities through the issuance of Federal permits, licenses, or other actions.

Pursuant to Section 7(c) of the ESA, DOE must prepare a biological assessment whenever an endangered or threatened species or its critical habitat may be affected by a proposed action. Such an assessment should be undertaken during the NEPA process, if possible, so that the results of the assessment can be included in the consideration of potential environmental impacts.

Recommendations

- When a listed species or designated critical habitat may be affected by an alternative, initiate early informal consultation under Section 7 with FWS or NMFS.

- Include a description of Section 7 consultation activities (both formal and informal) in the EA or EIS. Include any correspondence from FWS or NMFS, as well as any biological assessment or biological opinion, in an appendix.

Related Guidance

- Endangered Species Act Consultation Handbook: Procedures for Conducting Section 7 Consultations and Conferences, 1998

Available on the FWS Web site at *endangered.fws.gov/consultations/s7hndbk/s7hndbk.htm.*

6.8.2 Clean Air Conformity Requirements

Background

Federal agencies must ensure that their actions conform to applicable Federal, state, or tribal implementation plans for achieving National Ambient Air Quality Standards (NAAQS: 40 CFR Part 50). To conform, Federal actions must not contribute to new violations of the standards, increase the frequency or severity of existing violations, or delay timely attainment of standards in the area of concern (e.g., a state or a smaller air quality region such as a cluster of counties). The conformity analysis (40 CFR Part 93) and NEPA process should be conducted in parallel and integrated to the extent practicable.

The conformity analysis may involve two phases. First is the conformity review process to determine whether the conformity regulations would apply to an alternative (i.e., whether a conformity determination is needed). Second is the conformity determination process to demonstrate how an alternative would conform to the applicable implementation plan.

Recommendations

- Complete the conformity review process for all analyzed alternatives in EAs and EISs to facilitate the comparison of alternatives with respect to air quality issues. A conformity review normally is not needed for the no action alternative; a conformity review may be needed, however, if activities associated with the no action alternative have pollutant air emissions that have not been subject to a prior conformity review.

- Conduct the conformity determination process (if needed) for only the preferred alternative. Consider preparing a draft conformity determination for each analyzed alternative in cases where doing so would increase flexibility in making a final decision subsequent to the EA or EIS or allow comparison of the full cost requirements of each alternative.

  Explanation: The extent of analysis needed for a conformity determination coupled with the potential need to negotiate binding mitigation measures or offsets with non-DOE entities normally makes it impractical to complete the conformity determination process for all alternatives. Moreover, the conformity regulations do not require that conformity determinations be conducted for all alternatives.

Related Guidance

- Clean Air Act General Conformity Requirements and the National Environmental Policy Act Process, 2000

Available on the DOE NEPA Web site (*www.eh.doe.gov/nepa*) under Guidance.

- Compliance with the General Conformity Regulations, 2003

Available on DOE's Environmental Policy and Guidance Web site at *www.eh.doe.gov/oepa/guidance/caa/conformbrf.pdf*.

6.8.3 Floodplain and Wetland Environmental Review Requirements

Background

Executive Orders 11988 Floodplain Management (May 24, 1977) and 11990 Protection of Wetlands (May 24, 1977) direct Federal agencies to undertake various actions to protect floodplains and wetlands, including preparing a floodplain or wetland assessment for any action proposed in a floodplain and new construction proposed in a wetland. DOE's regulations implementing these Executive Orders, Floodplain and Wetland Environmental Review Requirements (10 CFR Part 1022), require that any floodplain or wetland assessment normally be included in an EA or EIS, if one is being prepared (10 CFR 1022.13(b)).

A floodplain or wetland assessment includes a description of the alternatives, a discussion of its potential effects on the floodplain or wetland (including a discussion of floodplain or wetland values), and consideration of alternatives (10 CFR 1022.4). The outcome of a floodplain assessment is documented in a floodplain statement of findings, which may be incorporated into a finding of no significant impact, final EIS, or record of decision, as appropriate (10 CFR 1022.14). A wetland statement of findings may be similarly prepared for a wetland assessment but is not required.

Recommendation

- Identify the need for a floodplain or wetland assessment when determining the required level of NEPA documentation.

6.8.4 National Historic Preservation Act

Background

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires Federal agencies to "take into account" the effect of their projects on historical and archeological resources and to give the Advisory Council on Historic Preservation the opportunity to comment on such effects. Where both NEPA and the NHPA are applicable, draft EAs and EISs must integrate NHPA considerations along with other environmental impact analyses and studies (40 CFR 1502.25). Additional requirements regarding consultation with external parties and other aspects of integrating NHPA and NEPA are found in regulations implementing Section 106 (36 CFR Part 800, Subpart B).

Recommendation

- Identify early in the NEPA planning process whether to request comments on an EA or EIS by the Advisory Council on Historic Preservation or other parties, such as the State or Tribal Historic Preservation Officer.

6.9 Mitigation

Background

Mitigation involves taking steps to avoid, minimize, rectify, reduce, eliminate, or compensate for the impact of an analyzed alternative (40 CFR 1508.20). Examples of mitigation include "design alternatives that would decrease pollution emissions, construction impacts, aesthetic intrusion, as well as relocation assistance, possible land use controls that could be enacted, and other possible efforts." Mitigation measures discussed in an EIS must cover the range of impacts of the analyzed alternatives, and such measures should be considered even for impacts that by themselves would not be considered "significant" (Question 19a, "CEQ's Forty Questions").

Recommendations

- Consider mitigation for all impact areas, emphasizing steps to address those impacts with the greatest potential for significance.

- Evaluate pollution prevention strategies and technologies beyond those inherent in the alternative.

- Indicate whether the implementation of a mitigation measure is within DOE's jurisdiction. Identify any external parties (e.g., state, local, or tribal government agencies; land owners) who must be involved in establishing or implementing the mitigation.

- Consider involving affected communities in the development of mitigation measures.

6.10 Comparison of Impacts

Recommendations

- Present the impacts of alternatives in comparative form to sharply define the issues and provide a clear basis for choice (40 CFR 1502.14). The use of tables to show comparisons is recommended, along with text to explain or emphasize major issues.

- Conduct analysis to discriminate among alternatives. Do not present bounding impact estimates that obscure differences among alternatives.

- Present enough information to allow readers to evaluate the differences among alternatives. Avoid bias for or against alternatives.

- Where DOE may wish to choose from among elements of more than one alternative, present impacts in a manner that permits appropriate comparisons of various combinations.

  Explanation: For some proposals, DOE may select a combination of elements from more than one alternative rather than a single alternative analyzed in an EA or EIS.

For example, an EIS might analyze several treatment technologies as discrete alternatives, but DOE might choose to implement more than one technology to manage a diverse waste stream. Recognize that the impacts of a combination might not be simply the sum of the parts. (See section 4.4.)

- Consider using analytic tools such as a sensitivity analysis to focus the comparison on the most important factors affecting impact estimates.

  Explanation: A sensitivity analysis identifies the factors that most strongly influence an estimate. This can aid the comparison, for example, by highlighting that transportation distance (i.e., miles driven) is a relatively greater contributor to the likelihood of accidents than the number of shipping and receiving locations.

6.11 Conclusions in EAs and EISs

Recommendations

- Make clear how conclusions follow from the analysis contained in the EA or EIS. Do not present unsubstantiated conclusions.

- Provide sufficient information to support a technical review of the analysis and conclusions. This often can be accomplished by citing appropriate references or providing detailed technical information in an appendix. (See section 8.)

- Explain the cause-and-effect relationship between an action and its impacts; do not simply provide the end result.

  Example: Do not simply state that the construction of a fence would reduce the mule deer population on a site. Rather, explain how the fence could prevent mule deer migration, for example, between high elevation summer ranges on the DOE site and off-site lower elevation winter ranges. Then explain that, because both winter and summer habitat are essential for the survival of this mule deer population, the fence would cause a reduction of ___ percent or elimination of the mule deer population on the site. Provide sufficient information for a reader of the EA or EIS to confirm the conclusion.

7. List of Preparers, List of Agencies and Persons Consulted, and Distribution List

Background

An EIS (but not an EA) is required to list the names and qualifications (expertise, experience, and professional disciplines) of persons who were primarily responsible for preparing the EIS or significant background papers (40 CFR 1502.17). An EA must contain a list of outside agencies and persons consulted (i.e., those outside DOE and its contractors) during preparation of the document (40 CFR 1508.9(b)). An EIS must include a list of agencies, organizations, and individuals to whom copies of the EIS are sent (40 CFR 1502.10).

CEQ and DOE conflict-of-interest considerations at 40 CFR 1506.5(c) and 10 CFR 1021.310 apply to preparation of an EIS but not to preparation of an EA. DOE's regulations require that a draft or final EIS include "a disclosure statement executed by any contractor (or subcontractor) under contract with DOE to prepare the EIS" that the contractor (or subcontractor) has no conflicts of interest (10 CFR 1021.310).

Recommendations

- Indicate DOE (not a contractor) as the preparer on the title page of an EA or EIS because DOE is responsible for complying with NEPA; the contractor's role is to assist DOE.
- Do not list DOE or DOE-contractor personnel who prepare an EA or who are consulted during its preparation in the list of outside agencies and persons consulted.
- For an EIS prepared by a contractor or subcontractor, confirm the absence of conflict of interest early in the process.
- Include a distribution list in both the draft and final EIS.

8. Appendices, References, and Index

Background

CEQ's regulations state that, if prepared, an appendix to an EIS shall: (a) consist of material prepared in connection with the EIS, (b) consist of material that substantiates analysis fundamental to the EIS, (c) normally be analytic and relevant to the decision to be made, and (d) be circulated with the EIS or be readily available upon request (40 CFR 1502.18). In general, there will be less need for and use of appendices in EAs than in EISs because EAs address less significant impacts and are more concise documents. In addition, CEQ guidance states:

> Lengthy technical discussions of modeling methodology, baseline studies, or other work are best reserved for the appendix... a plain language summary of the analysis and conclusions of that technical discussion should go in the text of the EIS.... Material that is not directly related to preparation of the EIS should be incorporated by reference (Question 25a, "CEQ's Forty Questions").

Material incorporated by reference shall be cited and briefly described in the EIS and must be reasonably available for public inspection (40 CFR 1502.21). Applying the same procedure to EAs makes good sense.

CEQ regulations also require that an index be included in EISs (40 CFR 1502.10). CEQ advises that:

> The EIS index should have a level of detail sufficient to focus on areas of the EIS of reasonable interest to any reader. It cannot be restricted to the most important topics. On the other hand, it need not identify every conceivable term or phrase in the EIS. If an agency believes that the reader is reasonably likely to be interested in a topic, it should be included (Question 26a, "CEQ's Forty Questions").

An index also may be useful in an EA.

Recommendations

- Ensure that information in the main body of the EA or EIS is consistent with any relevant appendix. Similarly, limit appendices to information that supports discussions in the main body.

- Provide supporting information that reviewers may want to examine, such as details of the modeling methodology, in an appendix. As a general rule, do not put raw data in an appendix, unless the data are critical for analytical validation.

- Provide analyses prepared under related environmental review requirements (e.g., a biological assessment prepared for endangered species consultation requirements of Section 7 of the Endangered Species Act) in an appendix (and include a brief summary in the affected environment and impacts sections of the EA or EIS). The main body of the EIS may reference, rather than repeat, analysis from the appendix. Also include official communications related to environmentally-sensitive resources in appendices. (See section 6.8.)

- Segregate information that is exempt from disclosure requirements, such as classified information or nonclassified security-sensitive information (e.g., official use only information), into an appendix to allow public review of the remainder of the NEPA document (10 CFR 1021.340(b)).

- If a reference document is not available for public review (e.g., a classified document), present as much information as possible in the EA or EIS to verify the relevant conclusions from the reference document.

- Cite personal communications or "unpublished file data" only as sources of information, not as support for conclusions regarding the significance of impacts.

  Example: A personal communication with a local official may be cited as the source of information for traffic volume on a particular highway but could not be cited for an analysis of increased fatalities expected per increased volume of traffic.

- Cite a draft document only if it is the best available source of relevant information, has attained sufficiently high review or approval within the issuing organization, and is available to the public.

- Do not rely upon the table of contents as an index.

- Consider using an index specialist. Do not rely solely on computer software to generate an adequate index; apply a quality control process.

9. Responses to Comments

This section summarizes key points from "The EIS Comment-Response Process" (2004), which provides more detailed guidance.

Background

CEQ's regulations require that, in preparing a final EIS, agencies "assess and consider comments [received on a draft EIS] both individually and collectively" and respond to comments by modifying alternatives; developing and evaluating alternatives not previously given serious consideration; supplementing, improving, or modifying analyses; making factual corrections; or explaining why comments do not warrant further agency response (40 CFR 1503.4(a)).

Recommendations

- Provide a response to each comment, and tell whether (and if so where) the comment resulted in changes to the EIS.

  Explanation: Give equal weight to oral and written comments. Address all substantive elements of a comment.

  If changes were made in response to a comment, briefly describe the changes and identify the sections of the EIS that were changed.

  Acknowledge comments that are out of scope, and explain in the response why they are; if prudent, respond anyway to answer a question or to set the record straight.

- Apply the sliding-scale concept.

  Explanation: Respond to comments commensurate with their substance. Tailor the approach for responses to the circumstances of the EIS, taking into account the complexity of the issues presented and the number of comments received.

  Example: Provide a brief response to a focused brief comment; a more comprehensive response to a detailed, well-supported comment.

  One approach could be to use responses to well-developed, thorough comments as a foundation for responses to similar but less-detailed comments. Another approach could be to prepare a summary comment and a consolidated response for similar comments. Ensure any cross-referenced response is fully responsive to a specific comment.

- For identical or very similar comment documents received in high volume (e.g., multiple faxes, e-mails, or postcards), reprint and respond to one as a sample comment document, but provide the names of all commentors alphabetically.

  Explanation: Respond to a comment's substance without regard to how many commentors express a similar view.

- Integrate the comment-response process with other aspects of final EIS preparation. Use the process of responding to comments to focus final EIS preparation.

- Describe the overall comment-response process, including areas of controversy in issues raised by commentors and a summary of EIS changes made in response to comments.

- Explain the comment-response format so that all commentors can find responses to their and others' comments. Attach all comments (or summaries of voluminous comments).

Related Guidance

- The EIS Comment-Response Process, 2004

Available on the DOE NEPA Web site (*www.eh.doe.gov/nepa*) under Guidance.

10. General Document Quality and Readability

Background

A key challenge in preparing readable NEPA documents is to present technical material in language that a lay person can understand. CEQ's regulations require that EISs be written in plain language and recommend using appropriate graphics to enhance understanding by decisionmakers and the public (40 CFR 1502.8). The same editorial principles should be applied to EAs.

This effort to produce a quality, readable document enhances the entire NEPA process. Reviewers are more likely to focus on the most significant issues when presented with clear and accurate information. Decisionmakers can better compare alternatives when the analysis is presented clearly and without an abundance of agency or technical jargon.

10.1 Objectivity

Recommendations

- Remember that while EAs and EISs support decisions, they are pre-decisional documents and should not indicate that a decision has been made.

  Example: Use conditional wording and verb tense, such as "would" rather than "will," in action descriptions.

- Use language that is objective and descriptive, not judgmental, particularly with regard to the significance of impacts. Present impact data and any applicable or relevant requirements or standards for the reader to form judgments.

  Example: Do not characterize impacts as "acceptable." Use quantitative comparisons or words such as "very small" or "substantial," if necessary, to describe impacts.

- In EAs, do not use the word "significant" or "insignificant" in conclusory statements. Conclusions of overall insignificance or significance will be made in a finding of no significant impact or a determination to prepare an EIS.

- Avoid tone and nuance that are not objective.

  Explanation: When responding to public comments and in discussing responsible opposing views, do not subtly play down alternatives that DOE does not prefer. Provide professional, authoritative, and dispassionate responses, not casual or flip responses.

10.2 Writing Quality

Recommendations

- Write documents to inform, not intimidate, the interested public. Write precisely and concisely in plain language and active voice. Avoid jargon.

Example: Stating that "The waste would be repackaged and transported to the new storage facility" (passive voice) does not tell the reader who would take the action. "DOE would repackage and transport the waste to the new storage facility" (active voice) clearly identifies the party proposing to take the action. In this way, active voice communicates more information and gives the reader a clearer understanding of what is proposed.

- Avoid unnecessary repetition.

  Example: A detailed description of an activity that is part of more than one alternative need not be repeated for each alternative.

- Use technical writers and editors to help identify unclear passages, undefined terms, and unsupported conclusions, and generally to improve the presentation of material.

- Present plain language descriptions that accurately portray the technical complexity of issues.

- Define technical terms that may be unfamiliar to a lay person. Use existing authoritative definitions as much as possible. Provide a glossary when many specialized terms are used. (See section 10.4.)

  Example: Terms such as "risk" may have a different meaning in a technical sense than in a colloquial sense.

- Use regulatory terms consistent with their regulatory definitions.

  Example: Terms involving "toxic" and "hazardous" (such as hazardous material, hazardous substance, extremely hazardous substance, hazardous chemical, hazardous waste, toxic substances, and toxic waste) are frequently misused.

- Provide scientific names, as well as common names, for biota; to avoid confusion and ambiguity, include the subspecies or variety name if appropriate (particularly for endangered, threatened, or protected species).

- Do not rely solely on the "spell check" function of word processing programs to check for spelling errors. Correctly spelled words are often used incorrectly.

- When in doubt about the proper use of a word, grammar, or spelling, use the *Government Printing Office Style Manual,* which also provides guidance on document format; organization, and references.

Related Guidance

- Government Printing Office Style Manual

Available at *www.gpoaccess.gov/stylemanual.*

10.3 Graphics and Data Treatment (Units, Statistics)

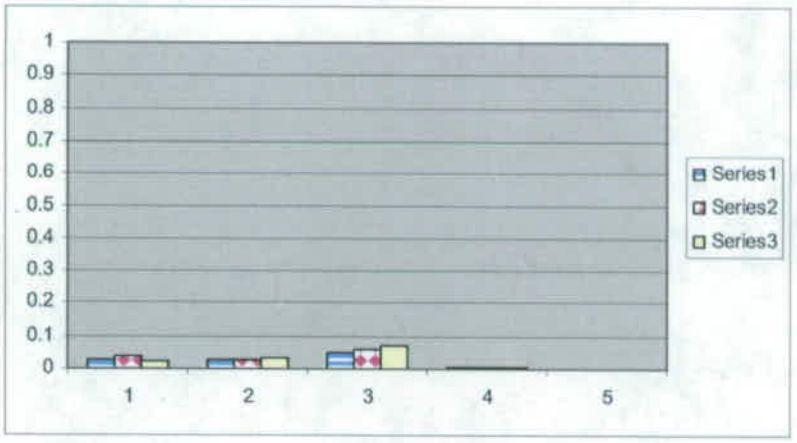
Recommendations: Graphics and tables

- Use easy-to-follow graphics and tables to summarize data, show correlations, and facilitate readers' access to information. Take care that graphics and tables inform and do not confuse the reader. In the text, highlight the key data and findings presented in the graphics and tables.

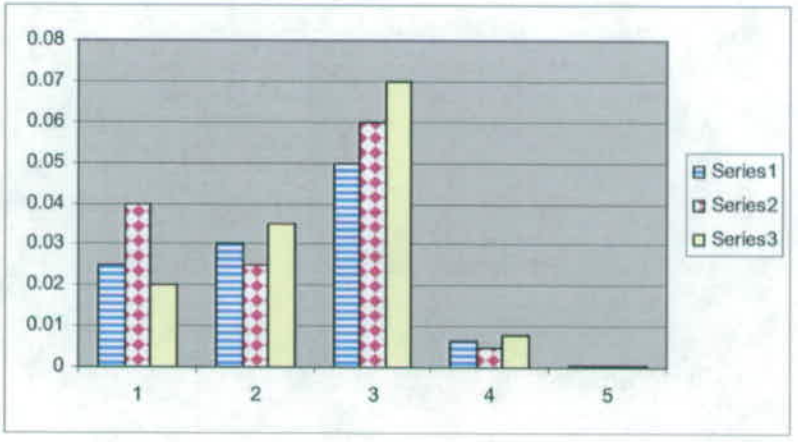
- Select axes for graphs to avoid misleading representations.

  Explanation: Do not use an enlarged scale to minimize the visual impact of a parameter value. The default graphing scales of various computer graphics software packages might result in inappropriate choices.

  Example: Plotting values that are all less than 0.1 on a chart with a scale of 0–1 makes it difficult to gauge any particular value and makes comparison of values more difficult. (See sample chart below.)



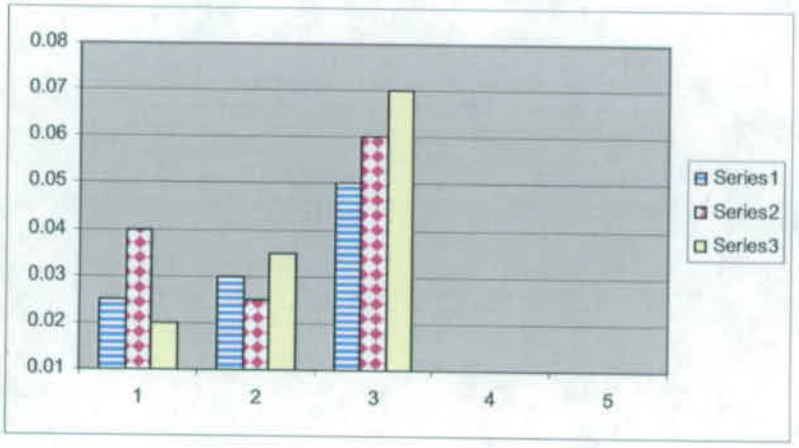
Presenting the same data on a chart with a more appropriate scale (0–0.08) makes it easy to identify each value and better interpret the relationship between values. (See sample chart below.)



- Plot graphs that may be compared to one another on the same axes and scales whenever possible.

- Avoid data graphs with axes that begin at a value other than zero, or construct such graphs carefully so as to avoid misleading the reader.

  Example: In the sample chart below, the values for items 4 and 5 appear, at first glance, to be zero. The values are not zero, but they are below 0.01 (refer to the sample charts above, which are based on the same data set). If presenting data in this manner, clearly note on the chart and in accompanying text that some values fall outside the scale presented in the chart.



- Use maps and drawings to depict all features that are needed to understand the project and its impacts; provide directional arrows and scale indicators.

- Do not include extraneous information, such as irrelevant contour lines on maps.

- Make maps and other figures consistent with the text.

Recommendations: Units

- Use consistent, relevant, and conventional units in tables, graphics, and text.

- Use the metric system to the extent possible. When the metric system is used, also include conventional (English) units to facilitate public understanding. When conventional units are used, also include metric conversions. (See DOE Guide 241.1-1A, Guide to the Management of Scientific and Technical Information, November 23, 2001.)

- Use authoritative sources for conversion factors, such as a recent edition of the *Handbook of Chemistry and Physics* (CRC Press).

- Avoid misplaced decimal points.

- Use units that facilitate comparisons and understanding.

Example: In comparing emissions to requirements, display both emissions and requirements in the same units. Use 5 parts per billion, not 0.000005 parts per thousand.

- If scientific notation is used, explain how to convert values to more traditional numbers.

- Use appropriate significant figures.

  Examples: "Three feet" is more correctly converted to "about one meter" than to "0.914 meters." Use 0.5 person-rem rather than 0.478 person-rem when the dose is known or estimated to only one significant figure, which is usually the case in NEPA assessments.

- Use consistent units throughout a document and appendices whenever possible.

Recommendations: Statistics

- Avoid misleading use of statistics, mixing cause and effect, and implying causation from correlation.

- Avoid use of an inappropriate statistic.

  Explanation: In some cases, using a range of values, the maximum or minimum value, or even all the data (e.g., presented graphically) may be more meaningful than using the arithmetic mean. For example, if a contaminant concentration has been measured twice with values of 10 and 1,000, the arithmetic mean value does not adequately characterize the situation, and it would be better to report both measurements. For some data (such as aquifer permeability, atmospheric pollutant concentration, coliform bacteria counts, or other data that span orders of magnitude), geometric means are more representative than arithmetic means.

10.4 Glossary

Background

Technical and regulatory terms used in NEPA documents should be defined to aid readers' understanding.

Recommendations

- Thoughtfully define terms to adequately describe how they are used in a particular document. Modify terms in the DOE NEPA glossary, as appropriate. Wholesale reinvention of definitions is unwarranted and wasteful.

- Mark in bold or italics the first occurrence of terms that are defined in the glossary to signal the reader to consult the glossary, as needed. Explain this system in a footnote or text box at the beginning of the NEPA document and the glossary.

Related Guidance

- Glossary of Terms Used in DOE NEPA Documents, 1998

Available on the DOE NEPA Web site (*www.eh.doe.gov/nepa*) under Guidance.