4 PREPARING AN ENVIRONMENTAL IMPACT STATEMENT: PROCESS

An EIS must be prepared for proposed actions that:

- Are major Federal actions significantly affecting the quality of the human environment (10 CFR 51.20(a)(1));
- The NRC, as a matter of its discretion, has determined that an EIS should be prepared (10 CFR 51.20(a)(2)); or
- Are of the type listed in 10 CFR 51.20 (b).

An EIS provides decision makers and the public with a detailed and objective evaluation of significant environmental impacts, both beneficial and adverse, likely to result from a proposed action and reasonable alternatives. In contrast to the brief analysis in an EA, the EIS includes a more detailed interdisciplinary review. The EIS provides sufficient evidence and analysis of impacts to support the final NRC action in the Record of Decision (ROD; Section 4.10). The draft and final EIS and ROD are made available to the public. Figure 4 outlines the EIS process.

For major licensing actions, as part of the NRC environmental review process, an applicant/licensee should submit information necessary for the environmental review (i.e., prepare an ER, supplement an existing ER, or provide the necessary information with the license application, as appropriate). The environmental PM will review this information and use it to form the basis for assessing environmental impacts of the proposed action and alternatives. Chapters 4 and 5 of this guidance document discuss the EIS process and preparation of the EIS document. Applicants/licensees may find the information in Chapter 6 useful when preparing environmental reports or supplemental environmental reports in support of the proposed action (10 CFR 51.45, 51.60, 51.61, 51.62, 51.66).

For rulemaking actions, there is no applicant to provide environmental information, though in some cases there may be a petitioner for rulemaking who would supply environmental information. Generally, the environmental information needed to support the rulemaking EIS is developed by NRC staff and contractors. Rulemaking EISs usually do not contain site-specific information though generic sites or situations may be described, hence the term Generic Environmental Impact Statement (GEIS). As discussed in Section 1.6.2, "Tiering," rulemaking GEISs should provide ample information regarding bounding conditions and assumptions to allow future reference and tiering

4.1 Project Planning

4.1.1 EIS Team

As stated in Section 1.2.2, EPAB is assigned the responsibility for preparing NMSS EISs. EPAB will designate an EIS or environmental PM who will form an EIS team. The EIS team should include the licensing PM, relevant technical staff who will either prepare or review the EIS, and staff of the Office of Public Affairs and OGC. Also, the environmental and licensing PMs' Section Chiefs, and Licensing

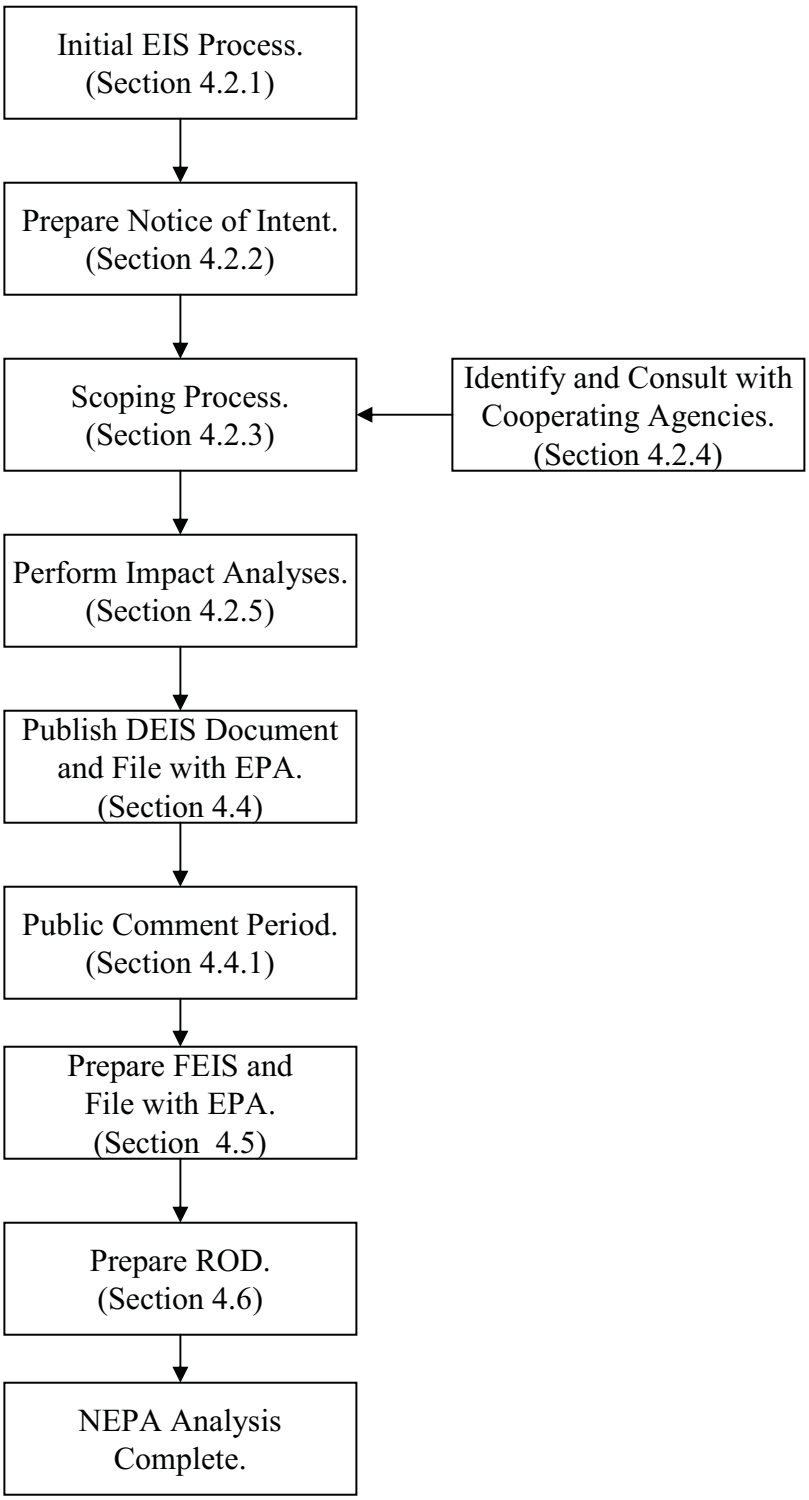

Figure 4: Major steps in the EIS process.

Assistants, and representatives of the Office of State and Tribal Programs (OSTP), and the applicable Regional Office may be part of the team.

The environmental PM, with assistance from the EIS team, should:

- Determine the preliminary scope of the EIS including:
  - developing a purpose and need statement;
  - identifying a list of preliminary alternatives; and
  - developing a list of potentially significant environmental issues.
- Prepare a project plan for the EIS process, including a preliminary schedule for preparing the EIS.
- Assess the need for and provide a recommendation on contractor support.
- Conduct planning for the scoping process to determine:
  - the number and type of scoping meetings;
  - the locations of scoping meetings; and
  - agencies, groups, and individuals to be invited to participate.
- Identify potential cooperating agencies.
- Prepare the notice of intent to be published in the *Federal Register*.

4.1.2 Project Plan

The environmental PM, with assistance from the EIS team, should prepare a project plan for the EIS process. This plan should be used as a basis for managing the project and should be periodically reviewed and modified as needed as the project proceeds. A Gantt chart describing the plan should also be prepared. The plan should include:

- Project purpose and background;
- A description of the principal project tasks and sub-tasks (e.g., planning, scoping, contract acquisition, public participation, technical analyses, preparation of DEIS, etc.);
- Schedule corresponding to the tasks and sub-tasks;
- Resources in staff hours and contract support funds (preferably at the task level);
- Project organization, technical disciplines needed, and responsibilities, including responsibilities for concurrence/approval at each phase; and
- References.

4.1.3 Contractor Support

Because of the complex nature of an EIS and the need for representation, on an EIS team, of several scientific disciplines not normally present amongst NRC staff, the NRC typically uses contractors to assist with preparation of EISs. In some cases, the EIS may be prepared principally by NMSS staff with contractors assisting staff in developing specific portions of the EIS, or a contractor may prepare most of the EIS with the oversight of the environmental PM. Therefore, the EIS team must determine the extent to which contractor support will be required. If the team finds that NMSS staff are not available or do not possess the appropriate expertise, the staff should recommend using an outside contractor to assist in the development of those portions of the EIS for which staff does not have expertise or resources. It is the environmental PM's responsibility to contact the NMSS Program Management, Policy Development and Analysis Staff to discuss the need for contractor support with the appropriate Technical Assistance Program Manager. To best plan and have EIS contractor support in place at the time the license amendment/application is received, the licensing PM should coordinate with EPAB prior to the receipt of the amendment/application.

For rulemaking actions, obtaining contractor support usually begins after Commission approval of the rulemaking plan, though various administrative tasks such as developing the statement of work and independent government cost estimate should be initiated prior to Commission approval.

4.2 EIS Development

4.2.1 Initial EIS Development

Following the acceptance review, as discussed in Section 1.3.3, the environmental PM and other necessary technical reviewers or contractors should begin development of a preliminary draft of the EIS. This effort assists with identification of missing and unclear information, facilitates the preparation of requests to the applicant/licensee for additional information (RAI), streamlines the EIS development, and may assist during the scoping process. Typically, the preliminary draft EIS and the RAIs will not be completed until after the scoping process is complete.

In evaluating the applicant's environmental information, the environmental PM and other technical reviewers should identify and evaluate the quality assurance measures taken by the applicant in collecting and analyzing data. Quality assurance measures, including verification and validation, are also evaluated where computer models have been used to predict environmental consequences of the proposed actions.

Related generic and site-specific EISs should be reviewed to determine if there is a potential for using existing analyses (Section 1.6, *Utilizing Existing Environmental Analyses*). Attention should be given to the bounding conditions (both environmental and nonenvironmental) and related assumptions of these previous analyses to determine if they apply to the new proposed action. This comparison and determination should be briefly described in the EIS. Applicable portions of existing EAs and/or EISs should be incorporated by reference to shorten the length of the EIS.

The identification of potential cooperating agencies should also be made at this time in order to allow full participation in the development of the EIS. A more complete discussion of the role of cooperating agencies is provided in Section 4.2.4, *Consultations and Cooperating Agencies*.

4.2.2 Notice of Intent

After the environmental information and application are accepted for detailed review, the environmental PM will publish the notice of intent (10 CFR 51.26) in the *Federal Register*. The notice of intent is required (10 CFR 51.27) to: (i) state that an environmental impact statement will be prepared; (ii) describe the proposed action and alternatives (if possible); (iii) state whether an environmental report has been filed, and if so, where it is available; (iv) describe the scoping process including the role of participants, whether scoping comments will be accepted, the last date for submitting comments, whether scoping meeting(s) will be held, including the time and place; and (v) state the contact information for the environmental PM. The notice of intent will also briefly describe the proposed action and possible alternatives, describe the proposed scoping process, and state the name and address of the environmental PM. An example is provided in Appendix E.

4.2.3 Scoping Process

Scoping occurs early in the EIS process and provides a means by which the scope of issues to be addressed related to the proposed action are identified. CEQ requirements for scoping are found at 40 CFR 1501.7 and NRC requirements for scoping are found at 10 CFR 51.26-29. Objectives of the scoping process (10 CFR 51.29) include:

- Defining the scope of the proposed action that is to be the subject of the EIS;
- Determining the scope of the EIS and identifying alternatives and significant issues to be analyzed in depth;
- Identifying, and eliminating from detailed study, issues that are peripheral or are not significant;
- Identifying any EAs and other EISs that are being or will be prepared that are related to the EIS under consideration;
- Identifying other environmental review and consultation requirements related to the proposed action;
- Indicating the relationship between the timing of the environmental analyses and the NRC's tentative planning and decision making schedule;
- Identifying any additional cooperating agencies and, as appropriate, allocating assignments for preparation and schedules for completion of the EIS to the NRC and any cooperating agencies; and
- Describing the means by which the EIS will be prepared, including any contractor assistance to be used.

Potential participants in the scoping process are described in 10 CFR 51.28 and typically include:

- The applicant or petitioner for rulemaking (if applicable) in the case of an EIS prepared in support of a rulemaking action;
- Any person who has petitioned for leave to intervene, been admitted as a party, or requested to participate in the proceeding;
- Any Federal agency which has jurisdiction by law or special expertise;
- Affected State and local agencies;
- Affected Federally recognized American Indian Tribes; and
- Any other interested person.

The environmental PM shall ensure that adequate and timely notice of scoping meetings is provided to all potentially interested parties. One of the most frequent complaints about scoping meetings is that participants were not given sufficient notice or did not hear about the meetings until the last minute. In addition to publishing the notice of intent in the *Federal Register*, the meetings should be announced on the NRC's website, in local or regional newspapers, posters around the meeting location, and/or on local radio and television stations at least one week before the meeting is to be held. The environmental PM should consult with the NRC Office of Public Affairs for assistance with newspaper, radio, or television announcements or other avenues for public outreach.

Additional efforts to inform potentially affected groups, such as American Indian tribes and minority and low-income populations, should be undertaken by requesting assistance from tribal leaders, church and community leaders, or other appropriate individuals to disseminate the information. Where such groups may be affected or have expressed concerns, allowing additional time to inform the public before the scoping meeting should be considered. For example, announcements can be included in newsletters read by these groups.

Scoping that is done before an EIS is initiated (e.g., to support an EA preparation) cannot substitute for the formal scoping process after publication of the notice of intent, unless an earlier notice stated clearly that this possibility was under consideration, and the earlier notice expressly provides that written comments on the scope of alternatives and impacts would still be considered. There are no time requirements for the scoping process (10 CFR 51.29 and 40 CFR 1501.7), however; 45 days from the notice of intent should be considered as a minimum length for scoping and accepting scoping comments. If scoping meetings are held, they should be scheduled to ensure that there is a sufficient comment period following the scoping meetings. Comments received after the scoping period has expired should be considered to the extent practicable but may not be able to be included in the scoping report that is issued listing the comments received. For supplemental EISs, scoping is not required (10 CFR 51.92); however, circumstances may indicate that scoping is appropriate (e.g., substantive new or significant information or circumstances) .

4.2.3.1 Scoping Meetings

Although public scoping meetings are not required by NRC's or CEQ's regulations; it is encouraged. NRC practice is to usually hold one or more scoping meetings in the vicinity of the site(s) affected by the proposed action. In certain circumstances (e.g., limited public interest) public scoping meetings may not be held, however, public scoping comments must still be solicited. For rulemaking actions, the scoping meetings should be centrally located to facilitate stakeholder participation. The environmental PM and the EIS team, as appropriate, should visit the site prior to the scoping meeting if they have not already done so in the past. The purpose of a site visit is to familiarize the environmental PM and the team of technical experts who will be preparing the EIS with the site and locale. The environmental PM may visit relevant Federal, State, and local agencies, especially potential cooperating agencies, to obtain information needed to prepare the EIS and to facilitate communication with agencies having an interest in the proposed action. The environmental PM is responsible for coordinating meetings with the licensee and other parties.

The number of scoping meetings to be held should be determined by the types of concerns that have been identified, the areal extent of the proposed action (including direct and indirect impacts), and the amount of controversy associated with the proposed action. For example, if public interest appears to be associated primarily with activities at the site of the proposed action, it may be sufficient to hold a single scoping meeting at a location close to the site. On the other hand, if concerns are raised about transportation of radioactive materials to/from the site, or about other issues having regional or broader impacts, then scheduling scoping meetings in other locales where potential impacts have been identified may be appropriate.

There are no prescribed guidelines for conducting scoping meetings. Development of a format for the meeting should be given careful consideration by the environmental PM and planning team. In preparing for public scoping meetings, PMs should be aware of NRC's "Enhancing Public Participation in NRC Meetings; Policy Statement" (67 FR 36920; NRC, 2002a). Additional guidance is available for conducting public meetings in NUREG/BR-0224, "Guidelines for Conducting Public Meetings" (NRC, 1996a) and NUREG/BR-0297, "NRC Public Meetings" (NRC, 2002b). Relevant guidance is also contained in NRC Management Directive 3.4 "Release of Information to the Public" (NRC, 1999) and NRC Management Directive 3.5 "Public Attendance at Certain Meetings Involving NRC Staff" (NRC, 1996b). Planning for the conduct of the scoping meeting should focus on:

- Goals of scoping;

- Procedures to be used for the meeting;

- Need to focus the discussion in the scoping meeting on:
  - Receiving comments relevant to the proposed activity;
  - Significant issues;
  - Alternatives to be considered;
  - Receiving additional information that participants in the scoping process can provide;
  - Other appropriate concerns;

- Ensuring that the meeting does not become a debate on either the applicant/licensee's justification for the proposed action or the past issues or actions; and

- Use of the EIS in making a decision on the proposed action.

In planning scoping meetings, the environmental PM, with the assistance of the Licensing Assistant, should consider the following to enhance communications:

- Preparing handouts that explain the roles of NRC, cooperating agencies, scoping participants, objectives of scoping, how the meeting is to be conducted, and some background on the proposed action [These handouts can be based on information in the notice of intent, but it should be written in plain language to facilitate communication with a broad audience];.

- Determining the type of meeting format, logistics and setup of the meeting room, procedures for speakers (e.g., registration, order of speaking, time allowed for each speaker), use of handouts, use of public feedback forms, and use of a facilitator;

- Holding an earlier separate meeting with local media reporters to discuss the proposed action, the NEPA process, and the goals of the scoping meeting [Additional guidance is provided in NUREG/BR-0202, "Guidelines for Interviews with the Media" (NRC, 2000).];

- Conducting a poster session (i.e., open house) prior to the scoping meeting to provide an opportunity for one-on-one discussions with interested parties [Ensure that the public understands when comments are being formally transcribed and/or taken.];

- Having the meeting transcribed to document public comments and support the preparation of the scoping report;

- Starting a mailing list for those interested in receiving information about the scoping report, DEIS, etc.; and

- Setting up an EIS project email address to accept comments and a website to house key work products.

Possible formats for conducting scoping meetings include, but are not limited to, the following:

- Facilitated format in which the facilitator opens the meeting with an introduction about the purpose of the meeting and a brief discussion of the background of the proposed action, solicits questions and comments from the audience, guides and focuses the discussion on relevant issues and points, and summarizes the discussion at the end of the meeting;

- Panel format in which a panel of individuals responsible for the EIS and a moderator (often the senior decision maker) introduce the meeting and project similar to the preceding format, but with the panel addressing specific background information on NRC, the project and the decision-making process, and the moderator guiding the meeting (i.e., solicits questions and comments from the audience, guides and focuses the discussion on relevant issues and points, and summarizes the discussion at the end of the meeting); and

- Open house format in which the meeting is set up as a series of discussion stations to address specific issue areas or resources of concern (e.g., public health, ecological resources,

socioeconomic) [Attendees should be encouraged to discuss their concerns with appropriate EIS team experts and/or to write down their concerns and turn them in at the meeting. This format can include a formal introduction explaining the purpose of the meeting and directing the attendees to specific areas of interest. It should also include an opportunity for attendees to present oral comments to the NRC and the meeting audience, usually at the end of the meeting.].

4.2.3.2 Scoping Report

In addition to the oral comments gathered at scoping meetings, participants in the scoping process are provided an opportunity to submit written comments on the scope of the EIS. The scoping comment period should extend approximately 30 days after the scoping meeting is held if possible. After the scoping meeting and receipt of written comments, the environmental PM and team will prepare a scoping summary report [10 CFR 51.29(b)]. This report should be a concise summary of the determinations and conclusions reached and should include the following:

- Brief discussion of how the scoping process was conducted, including the dates, locations, and attendance at meetings;
- Discussion of the significant issues and concerns raised;
- Discussion of the alternatives to be evaluated;
- Preliminary schedule for preparing the EIS; and
- Identification of cooperating agencies who will participate in the preparation of the EIS and their roles in EIS preparation.

The environmental PM should send a copy of the final scoping report to each participant in the scoping process. In addition, the report should be included in the EIS as an appendix. The scoping process ends when the issues and alternatives to be addressed in the EIS have been clearly identified and summarized in the scoping report. However, the issues and alternatives can be revised any time before publication of the DEIS.

4.2.4 Consultations and Cooperating Agencies

4.2.4.1 Consultations

Early consultations are essential to: (i) maintaining the planned schedule for completion of the EIS, (ii) gathering complete information, and (iii) identifying potentially significant impacts. Some agencies require 30 days or more to respond to consultation requests and may require additional information from NRC (e.g., photographs, maps, specialized surveys). Consultations may include a number of agencies (e.g., local, county, State, tribal, Federal) which will have information relevant to the site. At a minimum, the following consultations are typically required:

- Section 106 consultation with the SHPO/THPO, Federally recognized American Indian Tribes, or Native Hawaiian organizations for actions with the potential to cause/have effects on historic properties; and

- Section 7 consultation with the FWS for actions which may affect listed species or designated critical habitat.

The environmental PM should document consultations and other sources of information with a brief summary providing the following information: (i) the name of the person, position, and agency consulted; (ii) the date and purpose of the consultation; (iii) a brief summary of the discussion and the staff's resolution; and (iv) references to publicly available documents containing additional information. Consultation letters should be included in an appendix to the EIS. The discussion of the consultation in the EIS should describe why the staff initiated the consultation and summarize the details of the issues and the resolution of the comments in the EIS. The PM is referred to Section 1.4 for a summary of consultation requirements under Section 106 of the National Historic Preservation Act and Section 7 of the Endangered Species Act. Appendix D provides detailed instructions for completing these consultations.

4.2.4.1.1 Interactions with the State

As required by 10 CFR 51.70(c), the staff will cooperate fully with State agencies to reduce duplication between NEPA and State and local requirements. Lists of State Liaison Officers can be found on the OSTP WWW at <www.hsrd.ornl.gov/nrc/asframe.htm>. Often, the State Liaison Officer for NRC is the head of the State agency responsible for radiation protection. Other State contacts (e.g., representatives from the State department of health or environmental quality) who are typically copied on correspondence regarding a license should also be notified of the action.

The environmental PM should contact the NRC Regional Offices to inform them of State interactions. The NRC Regional State Liaison Officers and Regional State Agreement Officers can be found on the OSTP WWW at <www.hsrd.ornl.gov/nrc/contacts/ospstaff.htm>.

OSTP should also be made aware of State interactions. Consulting with the NRC State Liaison Officer is recommended during any consultation with the State. The NRC State Liaison Officer may offer insight to recent NRC-State interactions. During significant interactions with the State, the appropriate NRC State Liaison Officer should receive copies of correspondence with the State.

4.2.4.1.2 Other Consultations

The environmental PM should consult with other agencies that may be impacted or directly involved and identify Federal and State laws that may apply to the site (Section 5.1.4, *Applicable Regulatory Requirements, Permits, and Regional Consultations*). The staff should consult with the agencies responsible for implementing these laws. Examples include sites located on or near Federally controlled land (e.g., Bureau of Land Management), those that affect jurisdictional wetlands (e.g., U.S. Army Corps of Engineers), in proximity to or upstream from National Parks, in proximity to coastal areas subject to the Coastal Zone Management Act, and/or designated as Resource Conservation and Recovery Act (RCRA) or Comprehensive Environmental Response, Compensation, and Liability Act sites by the EPA. If there is a need to contact the EPA, the EPA liaison in DWM should be informed of the contact and the outcome or status. Consultations with American Indian tribes should be conducted in a sensitive manner recognizing the unique government to government relationship that exists based on Federal law and treaties and should be coordinated with the OSTP.

4.2.4.2 Cooperating Agencies

NEPA implementing regulations encourage agencies to become cooperating agencies [10 CFR 51.14(a) and 40 CFR 1501.6, 40 CFR1508.5]. Cooperating agencies can be Federal, State, or local agencies, or an American Indian tribe, if the action may affect a reservation. Frequently, other Federal and/or State agencies have jurisdiction over some aspect of the proposed action. In other cases, an agency may have special expertise in relation to specific environmental issues of concern, and its involvement as a cooperating agency will facilitate the exchange of information and help ensure that applicable requirements are met.

The environmental PM, in consultation with the licensing PM, identifies potential cooperating agencies and requests the participation of agencies at the earliest possible time. Cooperating with Federal, State, and local agencies will reduce duplication between Federal, NRC, and comparable State and local requirements. For potential cooperating agencies that are unfamiliar with nuclear project it may be beneficial for both the licensing and environmental PMs and OGC to meet with representatives of these agencies to explain NRC's mission and other topics relevant to the proposed action.

Contact potential cooperating agencies by letter to determine their interest in participating in the EIS process. Once an agency expresses an interest in becoming a cooperating agency, an agreement should be formalized between NRC and the agency (e.g., a letter of consent, procedural agreement, or a memorandum of understanding) on the cooperating agency's role (e.g., providing information, early review of draft EIS analyses, preparation of EIS sections). It should also be noted that cooperating agencies may have different business practices than NRC and these difference should be addressed as early as possible (e.g., different comment periods for the DEIS).

4.2.4.3 Potentially Interested or Affected Groups

Potentially interested or affected groups, including civic, American Indian tribes, ethnic, special interest groups, and local residents may have special concerns about the proposed action. Identifying those groups and understanding their interests are effective tools for emphasizing important environmental issues and de-emphasizing less important issues. The NRC encourages enhanced public participation in agency decisions.

4.2.5 Impact Assessment

Impacts are assessed for the proposed action and each alternative for each resource described in the affected environment. Consider direct, indirect, cumulative, long-term, short-term, beneficial and negative impacts. To the extent possible, the analysis of impacts should be quantified. Where there is incomplete or unavailable information for evaluating reasonably foreseeable significant adverse impacts, follow the procedures in 40 CFR 1502.22. If an impact can not be quantified it should be described qualitatively. Beneficial impacts may also be identified but both positions should be discussed if a benefit to one party is not viewed as benefit to a second party. A scientific basis should be provided; however, it is recognized that there are areas that require professional judgement based on the available information. A more detailed approach for determining impacts is presented in "Environmental Impact Assessment," (Canter, 1996).

4.2.5.1 Direct and Indirect Impacts

Direct impacts, or effects, are caused by the action and occur at the same time and place. Indirect impacts, or effects, are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. A detailed definition is provided in 40 CFR 1508.8 and describes the following areas of impact: ecological; aesthetic; historical; cultural; economic; social; and health. Both radiological and nonradiological impacts should be discussed. A section on radiological dose impacts should always be provided, including both direct and indirect radiation dose impacts to humans and environmental pathways.

Both geographic and temporal boundaries for each resource should be identified to assist with the discussion of cumulative impact analysis findings discussed below. The EIS author should focus on resource areas where there are impacts. The impacts should be assessed over the expected lifetime of the action (e.g., expected duration of the site) and beyond. Although impacts may exist, they may not be significant. Also, an impact which is not significant does not equate to "no impact." Describe the assessment of impacts from all resources, even those for which an impact was not found.

4.2.5.2 Cumulative Impacts

Cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable 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).

Examples of cumulative impacts that may be considered:

- Pollutant discharges into surface water;
- Deterioration of recreational uses from loading water bodies with discharges of sediment, nutrients, or thermal effluents;
- Reduction or contamination of ground water supplies; or
- Physically segmenting a community through incremental development.

To determine cumulative impacts, the environmental PM should follow CEQ guidelines as outlined in "Considering Cumulative Effects Under the National Environmental Policy Act" (CEQ, 1997). Other sources of guidance are available from EPA (1999) and the Canadian Environmental Protection Agency (1999).

In general, a cumulative impacts assessment includes the following:

- Determining which resources are affected by the proposed action;
- Identifying other past, proposed, and reasonably foreseeable future actions that either have or might affect those resources;

- Consulting with Federal, State, regional, and local regulators and affected American Indian tribes;

- Identifying likely important cumulative effects;

- Describing cause and effect relationships between stresses (e.g., construction or operation of the facility) and resources;

- Identifying and evaluating potential impacts, but focusing on the most important cumulative impact issues; and

- Determining the magnitude and significance of the proposed action in the context of the cumulative impacts of other past, present and future actions.

If the cumulative impacts are significant, consider avoiding, minimizing, mitigating, or monitoring to address uncertainties.

The following information should be included in the EIS:

- Identification of relevant past, present and reasonably foreseeable future actions, in addition to the proposed action;

- Description of important cause-and-effect pathways;

- Description of significant cumulative impacts and a quantitative description of the magnitude of these impacts;

- Justification for determining that other likely cumulative impacts are not significant;

- For significant cumulative impacts, a discussion of applicant commitments or staff recommendations for actions to minimize environmental harm;

- For significant cumulative impacts, the need for monitoring to reduce uncertainties; and

- Evaluation of reasonable alternatives for cumulative impacts.

4.2.5.3 Evaluation of Significance

Impact significance determination involves considering the context and intensity of the impacts. Context means that consideration should be given to what the impacts are, where they will occur, how long they will last, who is affected, and the carrying capacity of the affected environment. The evaluation of significance should be based on the following considerations (40 CFR 1508.27):

- Impacts can be both beneficial and adverse. Are there significant adverse impacts despite the existence of beneficial impacts?

- Are there undesirable public health or safety impacts?

- Does the proposed action comply with laws, regulations, or executive orders related to historic or cultural resources, park lands, prime farmlands, wetlands, wild/scenic rivers, or ecologically critical areas?

- Are the impacts on the quality of the human environment likely to be controversial?

- Are the impacts on the human environment highly uncertain, or do they involve unique or unknown risks?

- Does the proposed action establish a precedent for future actions with significant impacts? Does it represent a decision in principle about a future consideration?

- Is the proposed action related to other actions with individually insignificant, but cumulatively significant impacts?

- Does the proposed action adversely affect districts, sites, structures, or other objects listed in or eligible for listing in the *National Register* or will the action result in significant destruction of scientific, cultural, or historical resources?

- Will the proposed action adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act?

- Will the proposed action cause a violation of Federal, State, or local law or requirements for the protection of the environment?

The environmental and licensing PMs in coordination with management initially determine what impacts the proposed action, taking into account reasonable mitigation, will have on the quality of the human environment. Impact predictions should include comparisons to threshold levels (carrying capacity, maximum concentration limits, etc.). Similar actions, regulations, professional judgement, and public opinion or controversy may all contribute to the evaluation of the significance of the impacts related to the proposed action.

A standard of significance has been established by NRC (see NUREG-1437) for assessing environmental impacts. With the standards of the Council on Environmental Quality's regulations as a basis, each impact should be assigned one of the following three significance levels:

- ***Small***: The environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

- ***Moderate***: The environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

- ***Large***: The environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

4.2.6 Request for Additional Information

As discussed in Section 4.2.1, the environmental PM or NRC contractor should develop a preliminary draft of the EIS to assist with the preparation of RAIs. When using a contractor, the outline and draft of the alternatives chapter (Section 5.2, *Alternatives*) should be approved by NRC staff before the contractor begins development of the preliminary draft EIS. The scoping process should be completed before the preliminary draft EIS and the RAIs.

RAI is a term applied to additional information (clarifications and questions) requested of the applicant/licensee in order to complete the environmental and safety reviews. The NMSS goal is to focus the content of RAIs to that additional information necessary to support a regulatory decision. Preparation of a preliminary draft EIS ensures that the necessary information is being requested. RAIs should be documented in a letter to the applicant/licensee. Responses to RAIs should also be in writing.

4.2.7 Format and Content of EIS

NRC's standard format for an EIS is described in Appendix A of 10 CFR 51. Program-specific guidance may identify additional format and content requirements or options. The text of the EIS (not including appendices) should normally be less than 150 pages and for proposals of unusual scope or complexity less than 300 pages. CEQ guidance is provided in 40 CFR 1502.10–1502.18 and 1502.25. An acceptable method of meeting these requirements is provided in Chapter 5, *Preparing an Environmental Impact Statement: Format and Technical Content*.

4.3 Internal Review of the Environmental Impact Statement

Preliminary and final DEIS documents are reviewed by the environmental and licensing PMs, their Section Chiefs, the EIS team, Branch Chiefs, and Division Directors. The Office Director and/or Deputy Office Director may review certain NEPA documents (e.g., EISs involving a great deal of public interest). OGC will review all EIS documents to make a determination of "no legal objection" prior to release to the public. The environmental PM will coordinate the review. The NMSS Division Director (normally the DWM Director) responsible for preparing the EIS is the decision maker for the preliminary recommendation in the DEIS.

After internal review, the initial draft document will be forwarded to the cooperating agencies for review. The document should clearly indicate the following statements on each page: "DRAFT" and "Release of this information to the public or other interested parties is only to be made upon the express permission of the U.S. Nuclear Regulatory Commission." It may be beneficial to meet with cooperating agencies to discuss the preliminary EIS.

The environmental PM and team will revise the DEIS in response to the cooperating agencies comments. A courtesy final DEIS document may be provided to the State and cooperating agencies before the notice of availability is filed with EPA (Section 4.6, *EPA Review*). Reviewers should avoid inadvertent public releases of draft documents.

A preliminary recommendation on the proposed action should be included in the DEIS [10 CFR 51.71(e)]. The preliminary recommendation should be based on the information discussed in 10 CFR

51.71 (e.g., scope of review, analysis of major points of view, status of compliance, and analysis of the environmental effects of the proposed action and reasonable alternatives). In lieu of a recommendation the staff may indicate that two or more alternatives remain under consideration.

4.4 Publishing the DEIS

When submitting the DEIS to the printer provide a copy of the distribution list, as described in NUREG/BR-0188, "Distribution List Descriptions for NRC Reports and Documents," for the initial distribution of DEIS. Sufficient copies must be printed and available for distribution to those who request a copy, either during the scoping process or during the DEIS review period. Copies should also be available for public review in the public electronic reading room. Documents incorporated by reference in the DEIS must also be available for public review in the NRC public document room.

The following NRC standard forms may assist the environmental PM in completing the DEIS.

- Form 335 - Bibliographic Data Sheets;
- Form 426 - Authorization to Publish a NUREG; and
- Form 460 - Request for Graphic Services.

4.4.1 Notice of Availability and Distribution of DEIS

The NRC must publish a *Federal Register* notice announcing the availability of the DEIS as described in 10 CFR 51.117. There are no format or content requirements for a notice of availability other than those associated with the preparation of notices for publication in the *Federal Register* (OFR, 1998). In addition to announcing the availability of the DEIS, the notice of availability must request comments on the proposed action and the DEIS, specify where comments should be submitted, specify when the comment period ends, and when applicable, indicate the dates and location of public meetings to discuss the DEIS. Public comments can be received by mail, email, and on the NRC website, in addition to public meetings. The NRC notice of availability should be coordinated with filing the DEIS with EPA. An example notice of availability is provided in Appendix E.

Beyond the minimum required period of 45 days (10 CFR 51.73), the time period for public comment on a DEIS will be determined based on the potential environmental impact, the extent of the proposed action, any associated controversy, and external time requirements (e.g., statutory deadlines). The environmental PM should ensure the NRC notice of availability and comment period is consistent with EPA's notice of availability (i.e., publication dates in *Federal Register*).

For rulemaking actions, the DEIS is usually issued for a 75-day public comment period to coincide with the comment period on the proposed ruel.

Following completion of the final DEIS, the lead agency is expected to distribute the DEIS for comment to any interested parties. The DEIS will be distributed in accordance with the provisions of 10 CFR 51.74 which include requirements for distribution, news releases, and the notice of availability.

4.4.2 Filing the DEIS with EPA

The DEIS is filed with the EPA's Office of Federal Activities (OFA) who will also publish a *Federal Register* notice of availability. Five copies of the DEIS (including appendices) and a transmittal letter identifying the name and telephone number of the environmental PM should be addressed to:

US Environmental Protection Agency
Office of Federal Activities
EIS Filing Section
Mail Code 2252-A, Room 7241
Ariel Rios Building (South Oval Lobby)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

More information on the EPA process is provided at EPA's OFA WWW at <http://www.epa.gov/compliance/nepa/submiteis/index.html> and <http://www.epa.gov/compliance/resources/policies/nepa/fileguide.html>. EPA's review is described in Section 4.6. As described in the EPA filing guidelines (EPA, 1989), the environmental PM should complete distribution prior to transmittal of the DEIS to EPA for filing and review. The EPA notice of availability is a list of all EISs filed the previous week, and is published on Fridays. The NRC notice of availability is a more detailed description of the DEIS and must provide the information in 10 CFR 51.73 and 51.117.

4.4.3 DEIS Public Meetings

Following the publication of the DEIS for public comment, the EIS team usually conducts a public meeting or meetings near the site of the proposed action to receive public comments. In certain circumstances public meetings need not be held (e.g., limited public interest). However, public comments must still be solicited. For rulemaking actions, meetings should be centrally located to facilitate stakeholder participation. The purpose of the public meeting is to allow the staff to explain the contents of the DEIS as well as accept public comments. For actions, such as rulemaking, that may have a national impact, it may be appropriate to schedule and hold a series of public meetings at a number of different locations. For more information see Section 1.7, *Public Meetings*. The following should be considered in preparing for and conducting meetings to gather public comments:

- Scheduling meetings—Provide the public with a reasonable opportunity to review the DEIS prior to the meeting. Generally, the meeting should be held at least 30 days after the EPA notice of filing. However, meetings should not be held so late in the comment period as to preclude attendees from submitting written comments after the meeting.

- Announcing meetings—Announce the dates, times, and locations in the *Federal Register* notice of availability for the DEIS, in a press release to local media, in newspaper advertisements, on NRC's website, and by other means that may be recommended by local officials or groups. Planning for the meeting(s) should be completed before distributing the DEIS.

- Conducting meetings—Records of public meetings should be maintained, including a transcript, a list of attendees (as well as addresses of attendees desiring to be added to the mailing list) and a meeting summary.

- Location of meetings—Hold public meetings at a neutral location (e.g., school auditorium, hotel meeting room, community center, etc.) large enough to handle the expected attendees.

- Format—The format of public meetings will vary. The environmental PM and the EIS team should be prepared to give a summary of the proposed action and potential impacts, allowing time for questions prior to gathering comments from the public.

- Cost—In budgeting for these meetings, the costs should include renting facilities and the necessary equipment, hiring staff (e.g., court reporters, security), and other expenses such as advertisements in the local media.

- The number of people expected to attend the proposed meeting—The number of attendees should be considered when selecting the facility. Guidance is provided in Management Directive 3.5, *Public Attendance at Certain Meetings Involving the NRC Staff* (NRC, 1996b).

- Identify the members of the EIS team who will attend the meeting, and determine their role—For some meeting formats, formal presentations and/or a question and answer session may be appropriate.

- A facilitator—A facilitator may be useful to establish ground rules for conducting the meeting and keeping the meeting focused on the action and DEIS under review. This is especially important for contentious or controversial (local or national) issues.

The following NRC standard forms will assist the environmental PM in preparing for public meetings:

- Form 30 - Request for Administrative Services;
- Form 420 - Request for Premium Cost Mail Service;
- Form 587 - Request for Court Reporting Services; and
- Form 659 - NRC Public Meeting Feedback.

4.4.4 EPA Review

The Clean Air Act (42 USC 7401 et seq.)authorizes the EPA to review proposed actions by Federal agencies in accordance with NEPA and to make those reviews public. Section 309 of the Clean Air Act states that the Administrator [of the EPA] shall review and comment, in writing, on the environmental impact of any matter relating to duties and responsibilities granted pursuant to the Act or other provisions of the authority of the Administrator contained in: (i) legislation proposed by any Federal department or agency; (ii) newly authorized Federal projects for construction and any major Federal agency action (other than a project for construction) to which NEPA applies; and (iii) proposed regulations published by any department or agency of the Federal government. Written comments will be made public at the conclusion of the review. If the EPA Administrator determines that any such legislation, action, or regulation is unsatisfactory from the standpoint of public health welfare or environmental quality, they will publish their determination and the matter will be referred to the CEQ.

If the proposing or "lead" agency does not make sufficient revisions in response to EPA's review of the proposed action and the project remains "environmentally unsatisfactory," EPA may refer the matter to the CEQ for mediation.

The EPA Administrator has delegated responsibility for these reviews to EPA's OFA and the ten EPA Regional Administrators. OFA has developed the following criteria in rating the environmental impacts of a proposed action:

- **LO** - Lack of Objection;

- **EC** - Environmental Concerns - Impacts identified that should be avoided. Mitigation measures may be required.

- **EO -** Environmental Objections - Significant impacts identified. Corrective measures may require substantial changes to the proposed action or consideration of another alternative, including any that was either previously unaddressed or eliminated from the study, or the no-action alternative. Reasons include:

  - violation of a Federal environmental standard;
  - violation of the Federal agency's own environmental standard;
  - violation of an EPA policy declaration;
  - potential for significant environmental degradation; or
  - precedent-setting for future actions that collectively could result in significant environmental impacts.

- **EU** - Environmentally Unsatisfactory - Impacts identified are so severe that the action must not proceed as proposed. If these deficiencies are not corrected in the FEIS, EPA may refer the EIS to CEQ. Reasons include:

  - substantial violation of a Federal environmental standard;
  - severity, duration, or geographical extent of impacts that warrant special attention; or
  - national importance, due to threat to national environmental resources or policies;

EPA uses the following criteria to rate the adequacy of the EIS:

- 1 - Adequate: No further information is required for review;

- 2 - Insufficient Information: Either more information is needed for review or other alternatives should be evaluated. The identified additional information or analysis should be included in the FEIS; or

- 3 - Inadequate: Seriously lacking information or analysis to address potentially significant environmental impacts. The draft EIS does not meet NEPA and or Section 309 requirements. If not revised, or supplemented, and provided again as a DEIS for public comment, EPA may refer the EIS to CEQ.

Additional information on the Section 309 process can be found at EPA's OFA WWW at <http://www.epa.gov/Compliance/nepa/comments/ratings.html> .

4.4.5 Responses to Comments on the DEIS

Depending on the extent of the proposed action, the anticipated impacts, and the degree of public controversy, the number of written and oral comments received can vary. Comments may lead to modification of the proposed action or alternatives, additional impact analyses, or factual corrections. The FEIS will include responses to individual or grouped substantive comments (10 CFR 51.91).

Comments can be grouped into categories to facilitate responses. All comments must be analyzed, appropriate responses prepared, and the EIS revised as appropriate. Detailed responses should be made to comments that (i) are substantive, (ii) relate to inadequacies or inaccuracies in the analysis or methodologies used, (iii) identify new impacts or recommend reasonable new alternatives or mitigation measures, or (iv) involve substantive disagreements on interpretations of significance. Several typical types of comments and appropriate responses are discussed below.

- Comments on Inaccuracies and Discrepancies—Factual corrections should be made to the DEIS in response to comments that identify inaccuracies or discrepancies in factual information, data, or analyses.

- Comments on the Adequacy of the Analysis—Comments that express a professional disagreement with the conclusions of the analysis or assert that the analysis is inadequate may or may not lead to changes in the FEIS. Public comments may necessitate a reevaluation of analytical conclusions. If, after reevaluation, the environmental PM believes a change is not warranted, the response should provide the rationale for that conclusion.

- Comments That Identify New Impacts, Alternatives, or Mitigation Measures—If public comments on a DEIS identify impacts, alternatives, or mitigation measures that were not addressed in the draft, the environmental PM should determine if they warrant further consideration. If they do, the EIS team should determine whether the new impacts, new alternatives, or new mitigation measures should be analyzed in either the FEIS, a supplement to the DEIS, or a completely revised and recirculated DEIS. If the environmental PM determines that the new impacts, alternatives, or mitigation measures do not warrant further analysis, the response should provide rationale for that conclusion.

- Disagreements With Significance Determinations—Comments may directly or indirectly question the significance or severity of impacts. A reevaluation of these analyses may be warranted and may lead to changes in the DEIS. If, after reevaluation, the environmental PM does not think that a change is warranted, the response should provide the rationale for that conclusion.

- Expressions of Personal Preferences—Comments that express personal preferences or opinions on the proposal do not require a response, however, they should be summarized in the comment section of the FEIS.

4.5 Finalizing the EIS

As a result of public comments the EIS team may determine that additional information is needed from the applicant/licensee before the DEIS can be finalized. Additional RAIs should be provided to the applicant/licensee in writing with the responses to those requests also documented in a letter to the NRC.

Preliminary and final FEIS documents are reviewed by the environmental and licensing PMs, their Section Chiefs, the EIS team, Branch Chiefs, and Division Directors. The Office Director and/or Deputy Office Director may review certain NEPA documents (e.g., EISs involving a great deal of public interest). OGC will review all EIS documents to make a determination of "no legal objection" prior to release to the public. The environmental PM will coordinate the review.

4.5.1 Publishing the FEIS

When submitting the FEIS to the printer provide a copy of the distribution list, as described in NUREG/BR-0188, "Distribution List Descriptions for NRC Reports and Documents," for the initial distribution of FEIS. Sufficient copies must be printed and available for distribution to those who request a copy. Copies should also be available for public review in the public electronic reading room. Documents incorporated by reference in the FEIS must also be available for public review in the NRC public document room.

4.5.2 Distributing the FEIS

Following completion of the FEIS, the lead agency is expected to distribute the FEIS. The FEIS will be distributed as described in 10 CFR 51.93:

- Distribution to:
  - EPA;
  - applicant or petitioner;
  - any other party to the proceeding and each commentor; and
  - appropriate State, regional, and metropolitan clearing houses;
- News releases; and
- Publishing *Federal Register* notice of availability (10 CFR 51.118).

For rulemaking actions, the notice of availability is published in the *Federal Register* notice with the Final Rule.

4.5.3 Filing the FEIS with EPA

The FEIS is filed with the EPA's Office of Federal Activities (OFA) who will also publish a *Federal Register* notice of availability. Five copies of the FEIS (including appendices) and a transmittal letter identifying the name and telephone number of the environmental PM should be addressed to:

US Environmental Protection Agency
Office of Federal Activities
EIS Filing Section
Mail Code 2252-A, Room 7241
Ariel Rios Building (South Oval Lobby)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

More information on the EPA process is provided at EPA's OFA WWW at <http://www.epa.gov/compliance/nepa/submiteis/index.html> and <http://www.epa.gov/compliance/resources/policies/nepa/fileguide.html>. As described in the EPA filing guidelines (EPA, 1989), the environmental PM should complete distribution prior to transmittal of the FEIS to EPA. The EPA notice of availability is a list of all EISs filed the previous week, and is published on Fridays. The NRC notice of availability is a more detailed description of the FEIS and must provide the information in 10 CFR 51.93 and 51.118.

4.5.4 Abbreviated FEIS

If only minor changes are made in the DEIS in response to comments and the changes are confined to either factual corrections or explanations of why the comments do not warrant further response then an abbreviated FEIS may be prepared [10 CFR 51.91(a)(3)]. An abbreviated FEIS contains the substantive comments received on the DEIS, responses to those comments, and an errata section with modifications and corrections to the DEIS in response to comments. No rewriting or reprinting of the DEIS is necessary.

4.5.5 Full Text FEIS

If the changes to the DEIS are major, the full-text of the FEIS should be published. The format of the FEIS is the same as the DEIS, except that the FEIS includes the substantive comments on the DEIS, responses to those comments, and changes in or additions to the text of the DEIS. The comments are usually placed in an appendix. The FEIS may incorporate by reference the appendices of the DEIS, if there are no changes to the appendices. The availability of a full-text FEIS aids subsequent use of the document for tiering and supplementing purposes.

4.6 Record of Decision

The FEIS and SER form the basis for the NRC decision to approve or deny the applicant/licensee request. The environmental PM will prepare a concise public ROD (10 CFR 51.102-103) that states: (i) what the decision is; (ii) all alternatives considered by the NRC and specifying the alternative(s) considered to be environmentally preferable; (iii) preferences among alternatives based on relevant factors; (iv) whether the NRC has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the selected alternative and if not, explain why; and (v) summarize any license conditions or monitoring programs adopted as mitigation measures, if applicable. The ROD may be integrated into any other record prepared by the Commission in connection with the proposed action [10 CFR 51.103(c)]. The ROD may also incorporate by reference material contained in an FEIS.

For NRC, issuance of the license, license amendment, or other authorization within the jurisdiction of the NRC such as decommissioning and license termination typically constitute the ROD.

Until the ROD is issued, no action concerning the applicant/licensee proposal will be taken that could have adverse environmental impacts or limit the choice of reasonable alternatives. If NRC is considering an application from a non-Federal entity and is aware that the applicant is about to take an action within the agency's jurisdiction that would meet either criterion (adverse effect or limiting choices), NRC will promptly notify the applicant to stop the action.

The following suggested format satisfies the ROD content requirements specified in 10 CFR 51.103:

- Introductory Material—A cover sheet includes the following information, or most of this information is included at the top of the first page.
  - Title;
  - Docket number and name of applicant /licensee;
  - Preparing office and office location;
  - Cooperating agencies, if any;
  - Signature and title of the responsible official, and signature and title of concurring officials, if any (signature(s) may appear on the last page of the ROD if a cover sheet is not prepared); and
  - Date of signature of approving and concurring officials (this is the official date of the ROD).
- Summary—A summary is needed only if the ROD exceeds 10 pages. It should be a brief synopsis of the ROD.
- Decision [10 CFR 51.103(a)(1), 40 CFR 1505.2(a)]—A clear and concise description of the decision should be prepared. All important aspects or details of the decision should be identified. There should be no ambiguities regarding the specifics of what is or is not being approved.
- Alternatives Including the Proposed Action [10 CFR 51.103(a)(2), 40 CFR 1505.2(b)]—Identify the alternatives considered by the NRC and specify the alternative or alternatives which were considered to be "environmentally preferable."
- Management Considerations [10 CFR 51.103(a)(3), 40 CFR 1505.2(b)]—This section provides the rationale for the decision. Discuss factors, including national policy considerations, NRC's statutory mission, social, economic, technical, and other pertinent considerations weighed in the decision-making process.

- Mitigation and Monitoring [10 CFR 51.103(a)(4), 40 CFR 1505.2 (c)]—Committed mitigation measures and related monitoring and enforcement activities, if any, for the selected alternative are presented here. State whether the NRC has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the alternative selected. Measures to avoid or reduce environmental harm which were not selected should also be identified with a brief explanation of why such measures were not adopted. Mitigation and monitoring that will become part of the agency's authorization should be included as stipulations or license conditions in the ROD (i.e., license or license amendment).

- Public Involvement—Briefly describe efforts to seek public views throughout the NEPA process.

4.7 Implementation and Monitoring

Until the ROD has been signed and for at least 30 days following the publication by the EPA of the *Federal Register* notice stating that the FEIS has been filed with the EPA, no action having either an adverse environmental effect or that would limit the choice of alternatives can be taken (10 CFR 51.100-101). Following approval of the ROD and the satisfaction of all other requirements the NRC may approve the action. The approved action must be in accordance with the decision(s) as documented in the ROD. No substantive changes may be made in the implementation of the decision without reconsideration of NEPA compliance needs.

Monitoring and enforcement activities for mitigation measures are generally specified in the ROD as an element of the decision. Most other monitoring activities, however, will not be specified in the ROD. A monitoring plan is recommended for most actions requiring an EIS and should be developed as soon as possible after approval of the ROD.

4.8 References

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Canter, L.W., 1996. "Environmental Impact Assessment." Irwin/McGraw Hill, Boston, MA.

CEQ (Council on Environmental Quality), 1997. "Considering Cumulative Effects Under the National Environmental Policy Act." CEQ, Executive Office of the President, Washington, D.C. <http://ceq.eh.doe.gov/nepa/ccenepa/exec.pdf> (December 19, 2002).

EPA (U.S. Environmental Protection Agency), 1989. "Filing System Guidance for the Implementation of 1506.9 and 1506.10 of the CEQ Regulations Implementing the Procedural Provisions of NEPA." U.S. Environmental Protection Agency, Washington, D.C. *Federal Register*: Volume 54, pp. 9592-9594. March 7. Also available at <http://www.epa.gov/compliance/resources/policies/nepa/fileguide.html> (December 19, 2002).

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OFR (Office of the Federal Register), 1998. "Federal Register Document Drafting Handbook." OFR, National Archives and Records Administration, Washington, D.C. <http://www.archives.gov/federal_register/publications/document_drafting_resources.html>. (December 19, 2002).

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NRC, 1999. "Release of Information to the Public." Management Directive 3.4. U.S. Nuclear Regulatory Commission, Washington, DC. December 1.

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NRC, 2002a. "Enhancing Public Participation in NRC Meetings; Policy Statement." U.S. Nuclear Regulatory Commission, Washington, DC. May 28. <http://www.nrc.gov/public-involve/public-meetings/meeting-faq.html>. (December 19, 2002).

NRC, 2002b. "NRC Public Meetings." NUREG/BR−0297. U.S. Nuclear Regulatory Commission, Washington, DC. August.

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5 PREPARING AN ENVIRONMENTAL IMPACT STATEMENT: FORMAT AND TECHNICAL CONTENT

This chapter discusses one method of preparing an acceptable EIS. This chapter generally follows the outline of an EIS as described in 10 CFR 51, Appendix A. This EIS format is generally present in all EISs. The information to be provided by the applicant/licensee is described in Chapter 6, *The Environmental Report: Format and Technical Content*.

The scope of the EIS should be balanced against the credible threat to the environment posed by the proposed action (e.g., facility construction, facility operation, or decommissioning). The EIS should present a detailed and thorough description of each affected resource for the evaluation of potential impacts to the environment. Every resource may not receive the same level of detailed review. This is consistent with one of the goals of NEPA, which is to concentrate on the issues that are significant to the proposed action and its potential environmental impacts.

In addition to the EIS, NRC typically prepares a SER to evaluate the radiological impacts of a proposed action. Although there is some overlap between the content of an SER and an EIS, the intent of the documents is different. Since the documents provide input to each other, they must be developed in parallel. This guidance applies to licensing actions. Additional guidance for the preparation of EISs for rulemaking actions is contained in NUREG/BR-0053, "Regulations Handbook" (NRC, 2001).

The rest of this chapter is written to follow the outline of an EIS. Each of the following section headings describe the types of information usually included in the EIS. It is acceptable to combine chapters to make a more readable document, as long the required information (10CFR 51.70 and 51.71) is present. Following is an example table of contents:

Executive Summary

Chapter 1 Introduction
- 1.1 Purpose of and Need for the Proposed Action
- 1.2 The Proposed Action
- 1.3 Scope of This Environmental Analysis
  - 1.3.1 Issues Studied in Detail
  - 1.3.2 Issues Eliminated from Detailed Study
- 1.4 Applicable Regulatory Requirements, Permits, and Regional Consultations
- 1.5 Comments on the Draft Environment Impact Statement

Chapter 2 Alternatives
- 2.1 Process Used to Formulate Alternatives
- 2.2 Proposed Action
- 2.3 No-Action Alternative
- 2.4 Other Reasonable Alternatives
- 2.5 Alternatives Considered but Eliminated
- 2.6 Comparison of the Predicted Environmental Impacts
- 2.7 Preliminary Recommendation

Chapter 3 Description of the Affected Environment

Chapter 4 Environmental Impacts

Chapter 5 Mitigation Measures

Chapter 6 Environmental Measurements and Monitoring Programs
- 6.1 Radiological Monitoring
- 6.2 Chemical Monitoring
- 6.3 Ecological Monitoring

Chapter 7 Cost-Benefit Analysis

Chapter 8 Summary of Environmental Consequences

Chapter 9 List of Preparers

Chapter 10 Distribution List

Chapter 11 List of References

Appendices

5.1 Introduction of the EIS

The following background information should be provided:

- Proposed action and relevant background;
- Explanation of why this action requires an EIS;
- Brief history of the facility (if not a new application) or program, as appropriate; and
- List of the other alternatives considered.

5.1.1 Purpose and Need for the Proposed Action

This section explains why the proposed action is needed. It describes the underlying need for the proposed action and should not be written merely as a justification of the proposed action, nor to alter the choice of alternatives. Another common mistake is to identify compliance with NEPA and CEQ regulations as the need. Examples of need include a benefit provided if the proposed action is granted or descriptions of the detriment that will be experienced without approval of the proposed action. In short, the need describes what will be accomplished as a result of the proposed action.

5.1.2 The Proposed Action

This section should briefly describe the proposed action, including the name of the applicant/licensee, the title of the project, the location (with a map), and the schedule. This section should also describe the desired outcome or goal of the proposal. For example, at a decommissioning site, the licensee must meet the 10 CFR 20, Subpart E, radiological criteria for license termination. For a new fuel cycle facility, the applicant/licensee must meet the 10 CFR 70 criteria.

5.1.3 Scope of This Environmental Analysis

This section describes the scoping process. The scoping process, as described in Section 4.2.3, will result in the scope of the EIS.

The following information should be included in the EIS:

- History of the planning and scoping process for this project;
- Discussion of public concerns;
- List of cooperating agencies and the reasons they became cooperating agencies;
- List of other Federal, State, local, and other organizations contacted; and
- Summary of related EISs, EAs and other relevant documents, such as the SER and includes mention of former EAs for the site and GEISs used in tiering.

5.1.3.1 Issues Studied in Detail

The scoping process identifies two categories of issues - those that need to be studied in detail (but do not necessarily result in significant impacts) and those that can be eliminated from detailed study because the impacts are minimal. Resources (ground water, historic properties, ecological resources, etc.) are generally the same as issues. However, a resource could be split into two issues - for example, short-term socioeconomic impacts due to construction and long-term socioeconomic impacts to land use. To make the EIS less like an encyclopedia and more issue-driven, it is recommended that the environmental analysis be separated into these two categories. This approach leads to an EIS that emphasizes the principal results of the analysis, and these two sections (5.1.4.1 and 5.1.4.2) are a summary of the conclusions regarding environmental impacts.

This section provides a summary of the issues that require more detailed study. Among these issues are those that may result in significant short- or long-term impacts. Each issue and the conclusion regarding its potential impact are described briefly (no more than a few paragraphs). A more detailed analysis of the impacts should be presented in the EIS chapter, "Environmental Impacts."

5.1.3.2 Issues Eliminated from Detailed Study

This section summarizes the issues that were found to have minimal short- and long-term impacts. Each issue and the conclusion regarding its potential impact are described briefly in one or two paragraphs. If

necessary, the issues eliminated from detailed study are discussed further in an appendix. The reader is referred to the appropriate EIS section in the appendix if there is further explanation.

5.1.4 Applicable Regulatory Requirements, Permits, and Regional Consultations

The staff review includes identification of applicable consultations, approvals, and authorizations (and the relevant agencies). The review should include: (i) determination of the status of the consultations and/or authorizations; (ii) identification of environmental concerns; and (iii) evaluation of potential administrative problems that could delay or prevent agency authorization.

The staff should:

- Identify all Federal, State and local permits, licenses, approvals, and other entitlements that must be obtained in connection with the proposed action.

- Produce a summary of compliance with applicable environmental quality standards and requirements that have been imposed by Federal, State, and local agencies.

Table 1 illustrates a sample format for summarizing the list of permits, licenses, approvals, entitlements and consultations and their status. The table can be used by the reviewers to identify areas of environmental concern and determine applicant/licensee compliance with existing standards and regulations. In some circumstances (e.g., a potential problem in State siting authorizations), the environmental PM may need to prepare additional information to fully cover the subject material. If it is uncertain whether a Federal permit, license, approval, or other entitlement is necessary, the DEIS will so indicate (10 CFR 51.71(c)).

Table 1. Sample format for Federal, State, and local authorizations and consultations

Agency	Authority	Activity Covered	Status*
US. Army Corps of Engineers	Clean Water Act, Section 404	Dredge and Fill Permit	Approval to be obtained
U. S. Fish and Wildlife Service	Endangered Species Act	Biological Assessment	Undetermined at present
State Historic Preservation Office	National Historic Preservation Act	Consultation	Initial consultation complete
*This field to be filled in based on the consultations with relevant agencies.			

5.1.5 Comments on the Draft Environmental Impact Statement

In the Final Environmental Impact Statement (FEIS), include a summary of the major public comments on the DEIS. Include details on the comments and responses in an appendix.

The following information should be included in the FEIS:

- Date(s):
  - DEIS was submitted to EPA;
  - Notice of intent was published in the *Federal Register*; and
  - DEIS was made available to the public;
- Methods used to publicize the availability of the DEIS;
- Schedule of public meetings held on the DEIS, including location, date, and time; and
- Summary of major comments and responses.

5.2 Alternatives

This section introduces alternatives that could also accomplish the need for the proposed action. This section should discuss the no-action alternative, the proposed action, and the reasonable alternatives. Alternatives should be included that will avoid or minimize adverse effects upon the quality of the human environment.

All alternatives, including the no-action alternative, should receive equal and objective treatment. The phrase "range of alternatives" includes all reasonable alternatives (including the no-action alternative) to the proposed action, as well as those other alternatives that are eliminated from detailed study, with a brief discussion of the reasons for eliminating them. Reasonable alternatives are those alternatives that meet the proposal objectives and applicable environmental standards and are technically feasible.

The number of alternatives considered is generally small (e.g., three to five alternatives). The discussion of alternatives should include similar types of descriptions as for the proposed action. Describing the alternatives in a parallel format for presentation makes the comparisons clear to the reader. The alternatives should also be summarized in a table for efficiency and clarity.

The environmentally preferable alternative is the alternative that offers the best combination of minimized damage to the biological/physical environment and protection of historic, cultural, and natural resources. The environmentally preferred alternative may not necessarily be the same as the proposed action or chosen alternative because of many factors, including cost/benefit analyses, mitigating factors, and legal considerations.

A preliminary recommendation on the proposed action should be included in the DEIS [10 CFR 51.71(e)]. The preliminary recommendation should be based on the information discussed in 10 CFR 51.71 (e.g., scope of review, analysis of major points of view, status of compliance, and analysis of the environmental effects of the proposed action and reasonable alternatives). In lieu of a recommendation the staff may indicate that two or more alternatives remain under consideration.

5.2.1 Process Used to Formulate Alternatives

Briefly describe the process used to formulate alternatives - licensee submittals, public input during the scoping process, interdisciplinary discussions, etc. As a general matter, the staff has broad discretion in consideration of alternatives in the EIS and is not limited to considering only those alternatives proposed by the applicant/licensee. However, the selection of an alternative solely because it is economically superior to the proposed action is inconsistent with past NRC practice. In general, the staff should include all reasonable alternatives to the proposed action with the purpose of identifying those that are environmentally superior (NRC, 1997).

5.2.2 Proposed Action

This section describes the proposed action in greater detail, usually what the applicant/licensee proposes in their license application. It should not include descriptions that are more appropriate in the purpose and need section.

This section should also describe the facility and location. It should provide a detailed description of the facility's geographical location including an overview map of within 50 miles of the site, a more detailed map within 5 miles, and a map of the facility layout. The layout description should identify all buildings and pertinent features. The site features most likely impacted (or to cause impacts) by the proposed action should be described in detail. The location description will establish a geographical point of reference for other resource descriptions (e.g., land and water use, local ecology, or socioeconomic).

The facility descriptions should include the nature and extent of present and proposed operations at the site, facilities that might be constructed, modified, or impacted as a result of the proposed action, summary description of the facility operations (including the types and methods of material movement from one part of the site to another), and identification of the radionuclides and hazardous materials used, including where and how they are stored, handled, utilized, and disposed. A complete description of the facility support systems (e.g., electrical power, gas supply and water supply etc.) should be provided. This section should also describe nonradiological and radiological contamination at the site/facility and provide a discussion of background radiological characteristics. Discuss any accidents that may have occurred during operation and their impacts.

5.2.3 No-Action Alternative

This section describes the no-action alternative along with a description of the major impacts. For the no-action alternative, the proposed action would not take place. This serves as a baseline for comparing alternatives. For example, in a license application proposing new construction and/or activities the no-action alternative would be to not grant the license (i.e., no construction or activity). In a license renewal situation, the no-action alternative would be to deny the amendment request (the licensee would still have to comply with other applicable requirements). For certain decommissioning actions, the no-action alternative (i.e., not perform the decommissioning activity) may not be a reasonable option and detailed analysis of impacts is not usually performed.

5.2.4 Other Reasonable Alternatives

This section describes other reasonable alternatives to the proposed action and a summary of their major impacts. A description of reasonable alternatives depends on the nature of the proposal and the facts in each case. As discussed in 40 CFR 1502.14, the emphasis is on reasonable rather than whether the applicant/licensee likes or is capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant/licensee (CEQ, 1981).

5.2.5 Alternatives Considered but Eliminated

This section summarizes the alternatives that were eliminated from detailed study, with a brief discussion of the reasons for eliminating them. The section does not need to be exhaustive, but should at least discuss alternatives that have been proposed in applicant/licensee documents, public meetings, and related correspondence. If the no-action alternative is not a reasonable option due to legal, safety, or considerations, it should also be discussed in this section.

5.2.6 Comparison of the Predicted Environmental Impacts

This section describes and compares all alternatives. Discussion of the impacts of the alternatives should be limited to a descriptive summary of the impacts to all resources. The information contained in this section should also be incorporated into a summary table.

5.2.7 Preliminary Recommendation

As described in 10 CFR 51.71(e) the DEIS should normally include a preliminary recommendation on the proposed action. This recommendation should be based on the information and analyses contained in the DEIS and reached after consideration of the environmental impacts of the proposed action and reasonable alternatives. In lieu of a recommendation the staff may indicate that two or more alternatives remain under consideration.

5.3 Description of the Affected Environment

The description of the affected environment focuses on baseline conditions, i.e., the status quo. The baseline conditions will be used to assess the impacts discussed in Section 5.4, *Environmental Impacts.*

The following environmental resources should be considered, as appropriate in preparing the EIS:

- Land use;
- Transportation;
- Geology and soils;
- Water resources;
- Ecology;
- Meteorology, climatology, and air quality;
- Noise;
- Historical and cultural resources;

- Visual/scenic resources;
- Socioeconomic;
- Public and occupational health; and
- Waste management.

5.3.1 Land Use

This section should describe existing and planned (without the proposed action) land uses for the site and vicinity. The EIS should include maps that provide locations of schools, hospitals, farming areas, and other land uses important to impact assessment. A discussion of possible conflicts between Federal, State, regional, and local (and in the case of a reservation, American Indian tribe) land-use plans, policies, and controls for the site should also be included.

5.3.2 Transportation

If transportation is an important issue, it may be necessary to develop a separate section on transportation instead of incorporating this information in the land use or socioeconomic section. This section should describe transportation resources at and around the facility. The EIS should describe transportation infrastructure as it is important for considering impacts such as site workers commuting and transportation of materials. This section should describe local roads and highways, railroads, navigable rivers, and provide information on current levels of traffic.

5.3.3 Geology and Soils

The section should provide a brief summary of regional and site geology. Reference the SER for additional details. The EIS should discuss regional and local structure, the site stratigraphy, characteristics of the soil, major structural and tectonic features (e.g., faults), any other significant geological conditions, local and regional seismicity data, and volcanism.

5.3.4 Water Resources

This section describes the water resources, including surface and ground water hydrology, water use, and water quality. The EIS should describe the surface water bodies and ground water aquifers that could be affected by the proposed action and should consider both regional and site specific data. The EIS should provide a map showing the relationship of the site to major hydrogeologic systems. Describe flood plains, wetlands, streams, reservoirs, etc. The EIS should include a description of site-specific and regional data on the characteristics of surface and ground water quality in sufficient detail to provide the necessary data for other reviews dealing with water resources. The EIS should include a discussion of water quantity available for use and possible conflicts between Federal, State, regional, local and American Indian tribe, in the case of a reservation, water-use plans, policies, and controls for the site.

Consumptive water uses that could affect the water quality and supply of the proposed action or that may be adversely affected by the proposed action should be identified including water source, locations of diversions and returns, amount used and seasonal use patterns, and water rights. Also, recreational, navigational, and other non-consumptive water uses including those that could be affected by offsite area construction and operation by location, activity, and amount used, and seasonal use patterns should be

provided. Finally, this section should identify water uses that provide potential pathways for both radiological and nonradiological effluents including water sources, locations of diversions for consumptive uses, locations of receptors for non-consumptive uses, amount used, and seasonal use patterns.

Additional sources of information should be utilized when needed to complete the analysis. Sources include local water supply companies or agencies, river basin commissions, State agencies (e.g., water resources, fish and wildlife), Federal agencies (e.g., U.S. Army Corps of Engineers and the U.S. Geological Survey) and American Indian tribal agencies. From the information gathered from these resources, compile and tabulate water uses by the categories and characteristics, but limit the analysis to consideration of past, present, and known future water uses. The EIS preparer should ensure that water-use data and information are adequate to serve as a basis for assessing the impacts of proposed project construction and operation on consumptive and non-consumptive water uses.

5.3.5 Ecology

This section describes the principal ecological (terrestrial and aquatic) features of the site and vicinity, transportation corridors, and region, with emphasis on the plant and animal communities that may be affected by the proposed action. This information should include transient and migratory species to reflect any seasonal variations in ecological populations.

The EIS should include a description of ecological resources (e.g., endangered, threatened, and important species including estimates of their abundance) and special habitat needs (e.g., cover, forage, and prey species) of species in the area. The EIS should include information on the species and habitats as described in Table 2.

A complete species list may be prepared as an appendix to the EIS. Additionally, a summary should be provided of the consultations with appropriate Federal, State, regional, local, and American Indian tribal agencies, including the FWS and the State fish and wildlife agency, with details provided in an appendix.

In addition to NEPA, Section 7 of the Endangered Species Act, and 50 CFR 402, require the NRC to meet certain requirements in the protection of endangered and threatened species and critical habitat. The environmental PM is referred to Appendix D for a detailed description for completing the Section 7 consultation requirements.

5.3.6 Meteorology, Climatology, and Air Quality

This section should provide a detailed description of the meteorological/climatological conditions and baseline air quality of the site and region around the proposed action.

The EIS should provide a description of relevant meteorological, climatological, and air quality data sufficient to establish regional and local baseline conditions for the site. The information provided in this section will be used in the analysis of impacts on air quality. The EIS should include:

- Description of the existing regional air quality for completeness and accuracy; and
- Air pollutants for which there are non-attainment or maintenance areas in the region.

Table 2. Important species and habitats

Species	Habitat
Rare species • Listed as threatened or endangered at 50 CFR 17.11 (Fish and Wildlife) or 50 CFR 17.12 (Plants). • Proposed for listing as threatened or endangered, or is a candidate for listing. • Listed as a threatened, endangered, or other species of concern by the State or States in which the proposed facilities are located. Commercially or recreationally valuable species. Species that are essential to the maintenance and survival of species that are rare and commercially or recreationally valuable (as defined previously). Species that are critical to the structure and function of the local terrestrial and aquatic ecosystems. Species that may serve as biological indicators to monitor the effects of the facilities on the terrestrial and aquatic environments.	Wildlife sanctuaries, refuges, or preserves, if they may be adversely affected by the proposed action. Habitats identified by State or Federal agencies as unique, rare, or of priority for protection, if these areas may be adversely affected by the proposed action. Wetlands (Executive Order 11990), flood-plains (Executive Order 11988), or other resources specifically protected by Federal regulations or Executive Orders, or by State regulations. Land areas identified as "critical habitat" for species listed as threatened or endangered by the FWS.

5.3.7 Noise

This section describes the current sources and levels of noise. This discussion should be consistent with the terms concepts described in EPA (1974) and American Society for Testing and Materials (1996) material. The EIS should include a comparison of the estimated sound levels to appropriate limits. The EIS should provide a description of the analysis and assessment of current and historical trends, noise levels, applicable sound level standards, and current practices to minimize adverse noise impacts.

5.3.8 Historic and Cultural Resources

In addition to NEPA, Section 106 of the National Historic Preservation Act, and 36 CFR 800, require the NRC to meet certain requirements in the protection of cultural and historical resources. The environmental PM is referred to Appendix D for a detailed description for completing the Section 106 consultation requirements.

The environmental PM should consider historic, archaeological, and traditional cultural resources in sufficient detail to provide the basis for subsequent analysis and assessment of possible impacts. Historic and cultural resources include districts, sites, buildings, structures or objects of historical, archaeological, architectural, or cultural significance. The environmental PM should be aware of results of any surveys conducted; the location and significance of any properties that are listed in or eligible for inclusion in the *National Register* as a historic place; and any additional information pertaining to the identification and description of historic properties that could be impacted by the proposed action.

The construction, subsequent operation, and/or decommissioning of a facility could impact historic properties directly (e.g., destruction or alteration of the integrity of a property) or indirectly (e.g., prohibiting access or increasing the potential for vandalism). In considering the areal extent of the review, note that a facility can have a visual or audible effect on historic resources that are located some distance from the proposed facility.

The NRC can authorize the applicant/licensee to initiate consultations with the SHPO to determine if there are any historic properties listed in or eligible for inclusion in the *National Register*. The review should also include historic properties included in State or local registers or inventories and any additional important cultural, traditional, or historic properties. If necessary, during scoping, discuss with the SHPO any organizations or individuals that might be able to assist in identifying and locating archaeological and historic resources (for example, university and American Indian tribal archaeological and historical staffs).

If a property appears to meet the *National Register* criteria, or if it is questionable whether the criteria are met, the staff may request, in writing, an opinion from the U.S. Department of the Interior regarding the property's eligibility for inclusion in the *National Register*. The request for determination of eligibility should be sent directly to the Keeper of the *National Register*, National Park Service, US. Department of the Interior, Washington, D.C. 20013-7127. Guidance from the National Park Service can be found on the WWW at <http://www.cr.nps.gov/nr/publications/> (NPS, 2003a).

The Archeology and Ethnography Program of the National Park Service may be a useful source of expertise in the area of historic and cultural preservation and is staffed with professionals who may be able to assist the NRC staff in the environmental review and in analyzing the results of the applicant's surveys and investigations. Further information can be found on the WWW at <http://www.cr.nps.gov/aad/> (NPS, 2003b).

To discourage property vandalism and scavenging, particularly in the case of archaeological sites, it may be necessary to provide information to the SHPO for handling in a confidential manner. Summary information, which does not include site-specific information, could be included in the EIS documentation. State and tribal laws/policies addressing the handling of confidential and sensitive information vary and may not coincide with Federal regulations, regardless of how the information is marked by a licensee/applicant or NRC. Hence, specific requests for maintaining confidential or sensitive information should be discussed with States and tribes.

Contact the Advisory Council on Historic Preservation if guidance is needed, if there are substantial impacts on important properties, in the event of a disagreement, or if there are issues of concern to American Indian tribes or Native Hawaiian organizations.

The EIS should summarize the applicant's and staff's review and include the following information:

- Historic properties listed in or eligible for inclusion in the *National Register*;
- Historic properties included in State or local registers or inventories;
- Any additional important cultural, traditional, or historic properties;
- Efforts to locate and identify previously recorded archaeological and historic sites;
- Overall results and adequacy of any surveys (archival or field) that were conducted by the applicant; and
- A list of organizations and individuals contacted by the applicant/licensee or the staff who provided significant information concerning the location of cultural and historic properties.

5.3.9 Visual/Scenic Resources

This section describes the landscape characteristics, manmade features, and view of the proposed action site.

The EIS should include the staff's assessment of the applicant/licensee's rating of the aesthetic and scenic quality of the site in accordance with the Bureau of Land Management (BLM) Visual Resource Inventory and Evaluation System (BLM, 1984, 1986a, 1986b, 2002). Particular attention should be paid to viewsheds and likely activities in the proposed action that may reduce the visual/scenic resource. This description will be used later in evaluating the impacts of the proposed action and alternatives on visual/scenic resources.

5.3.10 Socioeconomic

This section describes population distribution and community characteristics within the region that are likely to be affected by the proposed action and each alternative. The EIS should include descriptions of relevant past and current population distributions. Both permanent and transient populations should be identified. Describe low-income and minority populations. This description will be used to assess impacts (including radiological impacts) on social, economic, and community resources.

The following information should be presented in the EIS:

- Population characteristics (e.g., ethnic groups, and population density);
- Economic trends and characteristics, including employment and income levels;
- Housing, health and social services, and educational resources;
- Area's tax structure and distribution; and

- Summary of any coordination with appropriate local and regional agencies or groups who collect these types of data.

5.3.11 Public and Occupational Health

This section describes levels of background radiation, major sources and levels of background chemical exposure, occupational injury rates, and health effects studies performed in the region.

The EIS should include information on current background levels, historical exposure levels for actions similar to the proposed action, and a summary of any public health studies performed in the region sufficient to establish baseline information for analysis of impacts to public and worker health.

5.3.12 Waste Management

This section summarizes the historical baseline data regarding the production, handling, packaging, and shipping of waste. The EIS should discuss disposal practices for solid, hazardous, radioactive, and mixed wastes including disposal capacity. The baseline conditions will be used in the analysis of nonradiological and radiological impacts due to waste management.

5.4 Environmental Impacts

This section summarizes the known and potential impacts (e.g., direct, indirect, and cumulative) of the proposed action and each alternative. These impacts should consider normal operational events as well as reasonably foreseeable accidents (e.g., design basis events for 10 CFR 72 licensees or credible consequence events for 10 CFR 70 licensees). When analyzing impacts, resources should be considered separately, and where necessary, in combination (e.g., noise impacts on wildlife, or transportation impacts on land use).

Activities (i.e., construction, operation and decommissioning) should be evaluated in sufficient detail to determine the significance of potential impacts and to recommend how these impacts should be treated in the process (e.g., consideration of alternative designs or practices that would mitigate adverse environmental impacts).

Evaluation of each identified impact should result in one of the following determinations:

- The impact is small and mitigation is not required.

- The impact is adverse but can be mitigated by specific design or procedure modifications that the reviewer has identified and determined to be practical.

- The impact is adverse, cannot be successfully mitigated, and is of such magnitude that it should be avoided.

5.4.1 Land Use Impacts

This section should describe the impacts to land use for each alternative. The following information should be presented in the EIS:

- Long-term restrictions of land use resulting from the proposed action and long-term changes in land use of the site and vicinity;
- Short-term changes in land use of the site and vicinity;
- Restrictions or modifications of lands classified as floodplain, wetlands, or coastal zone; as described in Section 5.4.5;
- Conflicts between Federal, State, local, or American Indian land use plans;
- Mitigation measures for adverse impacts (e.g., earth leveling, revegetation, landscaping, cleanup and disposal of debris, erosion control structures, land management practices, stabilization of spoil piles, and stabilization of dikes on cooling lakes); and
- Prevention of current or planned mineral resources exploitation (e.g., sand and gravel, coal, oil, natural gas, or ores).

5.4.2 Transportation Impacts

This section describes transportation impacts, both incident-free and accidents, for each alternative. The discussion of transportation impacts should include all phases of the project from any newly constructed transportation corridors or increased usage of existing corridors for construction of the project, through transportation issues during operation of the facility, to any increased transportation which may occur during decommissioning. Guidance for this review is provided in NUREG-0170, "Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes" (NRC, 1977a).

The analysis should consider transportation mode, routes, risk estimates, and impacts of transportation on the environment, including increases and decreases in usage of transportation corridors. Consider new construction that may be needed to upgrade existing or create new transportation routes and modes.

The following information should be included in the EIS:

- Transportation mode, routes, and risk estimates and impacts and their significance for each alternative;
- Potential mitigative measures proposed to decrease the transportation impacts for each alternative including the degree that these measures are effective in mitigating the impacts for each alternative; and
- Comparison of the offsite dose consequences and resulting health effects as calculated by the applicant/licensee and those contained in the SER. Review of the dose consequence analysis including the direct, indirect, and cumulative socioeconomic impacts and the impacts to biota.

The EIS author should coordinate this section with the transportation analysis conducted for the SER.

5.4.3 Geology and Soils Impacts

This section summarizes potential geological impacts, which may also be assessed in the staff's SER. The analysis should be incorporated by reference from the SER. Examples of geological environmental impacts include soil compaction, soil erosion, subsidence, landslides, and disruption of natural drainage patterns.

5.4.4 Water Impacts

This section describes the surface and ground water impacts from the proposed action and each alternative, including water use, and water quality. The description should include consideration of site-specific and regional data on the water-use characteristics, water quality, and hydrology of ground and surface water. The description should include an analysis and evaluation of construction, operation and decommissioning activities in sufficient detail to determine the significance of potential water impacts and to recommend how these impacts should be treated in the process (e.g., consideration of alternative designs or practices that would mitigate adverse environmental impacts). The details of these supporting analyses (e.g., actual environmental measurements, modeling assumptions and results) should be disclosed by reference or placed in an appendix to the EIS.

The analysis should consider the following:

- Changes to the hydrological system that could cause ground and surface water impacts at and near the site [The analyses of water system alterations and water-supply/water consumption comparisons should be included. These changes could include water quantity and availability, water flow, and movement patterns, and erosion, deposition, and sediment transport. All water system characteristics should be included in this analysis (e.g., all sources of water, points of discharge, and water diversions) that modify the availability of water. The analyses should include short-term and long-term effects and include discussions of flood plain alterations.];

- Impacts resulting in reduced water availability [Identify the location of those water users likely to be affected, and consider adverse effects (e.g., lowered ground water table, reduced well yields, lowered surface-water levels at intake structures) to determine their impacts on individual water users or water-use areas. The reviewer should consider seasonal requirements for water and temporal variations in water availability. The reviewer should also consider the potential for an incompatibility between water availability as affected by project activities and existing and known future water rights and allocations. The nature and extent of these future water inequalities should be identified.]; and

- Water quality potentially impacted by modifications to the ground and surface water system or users [The analysis should consider short-term effects as well as long-term effects caused by each alternative. Alternatives should be identified that avoid adverse effects and incompatible development in the flood plain. The reviewer should identify alternative designs, construction and operational practices, or procedures that could mitigate or avoid the impacts.]

The following information should be included in the EIS:

- A description of the impacts to water quality/availability in the region;
- Direct, indirect, and cumulative impacts from each alternative (radiological and nonradiological);
- Assessments of both short- and long-term effects;
- A comparison of water quality impacts to appropriate standards;
- A description of the aquatic transport and diffusion characteristics relevant to the alternatives which should include references to the models used and identification of the input data considered;
- A dose assessment of the radiological impacts based on sufficient aquatic transport parameters and population data; and
- A description of mitigative measures for water quality/availability impacts.

5.4.5 Ecological Impacts

This section summarizes the ecological (terrestrial and aquatic) impacts of the proposed action and each alternative. An assessment of both onsite and offsite activities including transportation corridors should be provided. The assessment should be in sufficient detail to: (i) predict and evaluate the significance of potential impacts to important species and their habitats; and (ii) evaluate how these impacts should be considered in the process.

The analysis should consider activities that:

- Create obstacles to the movements of vertebrates or result in increased dispersal of invertebrate species known to be important as disease vectors or pests;
- Disturb benthic (i.e., lake, sea, or river bottom) areas [All dredged areas or areas affected by dredging may be considered as temporarily lost habitat, therefore dredging should be limited, if possible.];
- Potentially increase surface run-off [Good construction practices will generally control surface run-off. Where drainage courses represent an especially important resource, attention should be given to measures for their protection.];
- Involve dewatering of wetlands [Guidelines under the Federal Water Pollution Control Act (i.e., Section 404 of the Clean Water Act), the Coastal Zone Management Act of 1972, and the Marine Sanctuaries Act of 1972 should be followed in evaluating the significance of dewatering on wetlands. Generally, dewatering of biologically productive wetlands may be considered an adverse impact that should be avoided. The percentage loss of such wetlands in the region should be considered to place the loss in perspective for the licensing decision. Because of the

importance of wetlands, alternatives to avoid any loss of this habitat should always be considered. Contact with the U.S. Army Corps of Engineers, Regulatory Branch District Office, may be necessary to obtain a wetland delineation and/or permit to modify a wetland.];

- Involve dredge spoils and placement of fill [Drainage from dredge spoil areas should comply with existing EPA guidelines. The analysis should consider whether adequate practices have been provided for management of this stage of construction. Filling of biologically productive wetlands should generally be avoided. Dumping of dredge spoils should be performed under the cognizance of the EPA and the Regulatory Branch District Office of the U.S. Army Corps of Engineers.];

The depth and extent of the input to the EIS should be governed by the attributes of the ecological resources that could be affected and by the nature and magnitude of the expected impacts to those resources.

The following information should be included in the EIS:

- Results of consultations performed as required by Section 7 of the Endangered Species Act;

- Loss of habitat for endangered or threatened species in the context of guidelines under the Endangered Species Act of 1973 [Where loss of habitat for commercially or recreationally important species occurs, the environmental PM should consider the effects on the harvestable crop. It should generally be concluded that loss of up to 5 percent of such habitat in the site vicinity will have negligible impact on the crop and need no further analysis. Where losses exceed 5 percent, the environmental PM should consider the loss in relation to regional abundance of these species.];

- Practices to minimize soil erosion and the number of hectares disturbed;

- Clearing of vegetation from stream banks, making certain that it is limited to that necessary for placement of structures or decontamination of hazardous or radiological constituents;

- Secondary impacts on wildlife, such as altered behavior resulting from construction noise, in addition to direct impacts on animals such as loss of habitat and road kills; and

- Lost important terrestrial and aquatic species and habitats from the viewpoints of their uniqueness within the region under consideration, relative impacts, and long-term net effects.

5.4.6 Air Quality Impacts

This section describes the air quality impacts from the proposed action and each alternative and the atmospheric transport and diffusion processes important in determining impacts. The description should include an analysis and evaluation of construction, operation and decommissioning activities in sufficient detail to determine the significance of potential air quality impacts and to recommend how these impacts should be treated in the process (e.g., consideration of alternative designs or practices that would mitigate adverse environmental impacts). The details of this supporting analyses (e.g., actual

environmental measurements, modeling assumptions and results) should be disclosed. Adverse cumulative effects of each alternative should be identified.

The analysis should utilize models and assumptions that have been approved or recognized for use in appropriate regulatory guidance for air quality monitoring and/or dose assessments. At least one annual data cycle should be used for transport and diffusion calculations. Data should be presented in the appropriate periods. For example, if emissions are continuous, annual data should be used; if emissions are intermittent, consideration should be given to the frequency and duration of the event. Data, such as averages and extremes, should be based on a period of record that represents long-term conditions in the area.

The following information should be included in the EIS:

- A description of the impacts to air quality in the region;
- Direct, indirect, and cumulative impacts from each alternative (radiological and nonradiological);
- Assessments of both short- and long-term effects (hourly and annually);
- A comparison of air quality impacts to appropriate standards;
- Description of necessary air permits;
- A description of the atmospheric transport and diffusion characteristics in the region and at the site, which should include references to the models used and identification of the input data considered;
- A dose assessment of the radiological impacts based on sufficient meteorological and population data;
- A description of visibility impacts; and
- A description of mitigative measures for air quality impacts.

5.4.7 Noise Impacts

This section describes the analysis and assessment of predicted noise levels from the proposed action and each alternative. The description should include an analysis and evaluation of construction, operation and decommissioning activities in sufficient detail to determine the significance of potential noise impacts and to recommend how these impacts should be treated in the process (e.g., consideration of alternative designs or practices that would mitigate adverse environmental impacts). Details of supporting analyses (e.g., actual environmental measurements, modeling assumptions and results) should be disclosed. Known and/or predicted adverse direct, indirect, and cumulative effects of each alternative should be identified.

If the site is remote from communities (ecological and human) and does not represent an audible intrusion, and it is found that the applicant can comply with appropriate guides and standards, these facts should be stated with only a very brief discussion noting that under these conditions noise impacts will be minimal. If the foregoing conditions are not met, or if there are no applicable standards, predicted impacts should be described along with conclusions regarding the significance of the effect on the community.

If the site is located near communities (ecological and human) and noise impacts are a potential concern, the following information should be included in the EIS:

- A comparison of the current equivalent sound levels in the vicinity of the proposed action and applicable sound level standards (from consultation with Federal, State, regional, local, and affected American Indian tribal agencies) with predicted noise levels (e.g., sound contour maps) reported as L_{eq} or L_{dn} using the dBA scale;

- Major sources of noise (for locations described above), including all models, assumptions and input data;

- Proposed methods to reduce noise levels (as appropriate); and

- Estimated cumulative effects.

5.4.8 Historic and Cultural Impacts

This section describes the staff's assessment of potential impacts of proposed project activities on historic properties and cultural resources in the site and vicinity. Historic properties include districts, sites, buildings, structures, or objects of historical, archaeological, architectural, or traditional cultural significance (NPS, 2002). In addition to NEPA, Section 106 of the National Historic Preservation Act, and 36 CFR 800, require the NRC to meet certain requirements in the protection of cultural and historical resources. The environmental PM is referred to Appendix D for a detailed instructions on completing the Section 106 consultation requirements.. Elements of Section 110 of National Historic Preservation Act require Federal agencies to manage and protect identified, eligible historic properties located on lands under their jurisdiction. A source of expertise in the area of historic and cultural preservation is the Archaeology and Ethnography Program of the National Park Service, Department of Interior (NPS, 2003b).

The environmental PM should consider the following in preparing the analysis:

- Construction and/or operation activities that could result in potential impacts to historical properties or cultural resources;

- Proposed activities to ensure that the applicant is committed to using currently acceptable practices to minimize impacts;

- 36 CFR 800, which describes how to Federal agencies meet the statutory responsibilities under Section 106 of the National Historic Preservation Act;

- That there are generally two types of impacts on a resource: direct impacts (e.g., destruction during excavation), and indirect impacts (e.g., visual impact, denial of access, or increased potential for vandalism);

- Certain properties are not eligible for inclusion in the *National Register*, and assistance from the SHPO/THPO, the Office of Archaeology and Historic Preservation, or other qualified individuals may be necessary to complete the analysis;

- Adequacy of proposed methods to mitigate any adverse impacts on these resources such as alternative locations, designs, practices, or procedures that would mitigate predicted adverse impacts;

- Cost of the recovery required by the Historic and Archaeological Preservation Act of 1974 in the consideration of alternatives;

- Evaluations that may not justify preservation of the resource [In such cases the environmental PM may request that the applicant recover archaeological, historic, architectural, and cultural data related to the resource. This recovery may include recording by photographs and measured drawings, archaeological excavations to uncover data and material, removal of structures or salvage of architectural features, and other steps that will ensure full knowledge of the lost resource. Salvaged artifacts and materials should be deposited where they are of public and educational benefit.];

- Any procedures developed by the applicant/licensee that will be used during construction in the case of discovery of previously unidentified cultural resources;

- The potential for human remains to occur in the project areas should be evaluated [An inadvertent discovery of such items during construction may necessitate a work stoppage and consultation under Native American Graves Protection and Repatriation Act procedures.]; and

- Circumstances in which to contact the Advisory Council on Historic Preservation if guidance is needed (i.e., if there are substantial impacts on important properties, in the event of a disagreement, or if there are issues of concern to American Indian tribes or Native Hawaiian organizations).

The following information should be included in the EIS:

- Results of consultations performed as required by Section 106 of the National Historic Preservation Act;

- If appropriate, a statement that properties listed in or eligible for inclusion in the *National Register* will not be affected;

- Discussion of potential impacts (e.g., direct, indirect, and cumulative) to properties that are listed in or eligible for inclusion in the *National Register*;

- Description of any adverse impacts on historic properties not eligible for inclusion in the *National Register*; and

- Description of any measures and controls that are available to limit adverse impacts.

5.4.9 Visual/Scenic Impacts

This section describes the significant impacts on visual quality resulting from the proposed action and each alternative. Scenic qualities are impacted by surface disturbance, which creates a contrast with the natural environment. The greater the amount of ground disturbance, the greater the impact to scenic quality. The description should include an analysis and evaluation of construction, operation and decommissioning activities in sufficient detail to determine the significance of potential visual/scenic impacts and to recommend how these impacts should be treated in the process (e.g., consideration of alternative designs or practices that would mitigate adverse environmental impacts). The environmental PM may assess the licensee's rating of aesthetic and scenic quality of the site in accordance with the BLM Visual Resource Inventory and Evaluation System (BLM, 1984, 1986a, 1986b, 2002) as appropriate.

The EIS should describe the impacts of the proposed action and each alternative on the visual quality of the vicinity. Significant visual quality impacts should be thoroughly described, while less-significant, yet still noteworthy, impacts can be summarized. The EIS should describe how impacts could be minimized. The description of mitigation measures should provide a short discussion of costs of the mitigation measures.

5.4.10 Socioeconomic Impacts

This section describes the socioeconomic impacts within the region. Based on these descriptions, the environmental PM should identify and analyze project-induced changes to demographic, regional, community, social, political, and economic systems.

The EIS should describe impacts from the proposed action and each alternative relative to the current and predicted population distributions. Both permanent and transient populations should be considered.

The following information should be presented in the EIS:

- Impacts to population characteristics (e.g., ethnic groups, and population density);

- Impacts to economic trends and characteristics, including employment and income levels;

- Impacts to housing, health and social services, and educational resources; and

- Impacts to the area's tax structure and distribution.

5.4.11 Environmental Justice

The Commission has directed the staff to develop an environmental justice (EJ) policy statement. After the policy statement is completed, necessary updates to the EJ guidance will be incorporated. In the interim, the following draft guidance on environmental justice is being provided.

This section evaluates environmental impacts on low-income or minority populations by proposed project activities if disproportionately high low-income or minority populations are identified. Impacts that may have environmental justice implications may include health, ecological (including water quality and water availability), social, cultural, economic and aesthetic resources.

The EIS should follow the detailed guidance provided in Appendix C. The EIS should include a discussion of the methods used to identify and quantify impacts on low-income and minority populations, the location and significance of any environmental impacts during construction on populations that are particularly sensitive, and any additional information pertaining to mitigation. The following information should be included in the EIS:

- An assessment (qualitative or quantitative, as appropriate) of the degree to which each minority or low-income population is disproportionately receiving adverse human health or environmental (including socioeconomic) impacts during construction, operation, or decommissioning as compared with the other population in the vicinity. In addition, there should be an assessment comparing the impacts with the larger overall geographic area encompassing all of the alternative sites.

- An assessment (qualitative or quantitative, as appropriate) of the significance or potential significance of such environmental impacts on each low-income and minority population. Significance is determined by considering the disproportionate exposure, multiple-hazard, and cumulative hazard conditions.

- An assessment of the degree to which each low-income and minority population is disproportionately receiving any benefits compared with the entire geographic area.

- A discussion of any mitigative measures for which credit is being taken to reduce environmental justice concerns.

- When alternative sites are being evaluated, the same reviews should be available for each site.

- A brief description of pathways by which any environmental impact during construction may interact with cultural or economic facts that may result in disproportionate environmental impacts on low-income and minority populations.

5.4.12 Public and Occupational Health Impacts

5.4.12.1 Nonradiological Impacts

This section describes the pathways by which nonradiological releases could be transmitted to the environment and ultimately transferred to living organisms. The analysis should be based on the

information from Section 5.3.12, *Public and Occupational Health* to assess the potential impacts, mitigation measures and cumulative effects. The analysis should consider potential pathways for the transfer of nonradioactive materials from the proposed action and alternatives to the environment and ultimately to living organisms. The analysis should identify all pathways necessary to calculate public and occupational exposure.

The following information should be included in the EIS:

- A description of chemical sources (location, type, strength);
- Estimates of public and occupational exposures, a brief discussion of how the estimates were calculated, and a comparison of these exposures with the requirements of 40 CFR 190 and 29 CFR 1900;
- Brief discussion of environmental monitoring programs to verify compliance; and
- Discussion of mitigative measures and cumulative effects and how requirements have been met.

5.4.12.2 Radiological Impacts

This section summarizes the direct and indirect radiological impacts, mitigation measures, and cumulative impacts from each alternative. This section is divided into Sections 5.4.12.2.1, *Pathway Assessment* and 5.4.12.2.2, *Public and Occupational Exposure Impacts*.

5.4.12.2.1 Pathway Assessment

This section should describe the pathways by which radiation and radioactive releases can be transmitted to the environment and ultimately transferred to living organisms. The scope and depth of the review should include consideration of: (i) the pathways by which radioactive releases can be transported to individual receptors; (ii) the location of these receptors; and (iii) the credible threat to the environment posed by the facility, action, or activity.

The following information should be included in the EIS:

- Typical pathways by which radioactive materials could be transported from the various alternatives to receptors in unrestricted areas;
- Pathways identified as important for the various alternatives and a brief discussion of the staff's analysis to determine these pathways;
- Nearest receptors identified by the reviewer; and
- Brief discussion of food production, processing, and consumption in the area.

5.4.12.2.2 Public and Occupational Exposure Impacts

This section should describe the radiation dose to humans. The staff reviewer should evaluate the baseline information (Section 5.3.12, *Public and Occupational Health*) to assess the potential impacts, mitigation measures, and cumulative impacts.

The following information should be included in the EIS:

- Description of radiation sources (location, type, strength) related to the proposed action;
- Estimates of dose to an average member of the critical group and occupational dose estimates, a brief discussion of how the estimates were calculated, a comparison of these doses with the requirements of 10 CFR 20, and the conclusions with respect to compliance with 10 CFR 20;
- Brief discussion of environmental monitoring programs to verify compliance (Section 4.5, *Environmental Measurements and Monitoring Programs*);
- Discussion of mitigative measures; and
- Comparison of the offsite dose consequences and resulting health effects for reasonably foreseeable (i.e., credible) accidents as calculated by the applicant and those contained in the SER. The environmental PM should coordinate this section with the analysis conducted for the SER.

5.4.13 Waste Management Impacts

This section describes the staff's review, analysis, and evaluation of the applicant/licensee's solid, hazardous, and radioactive waste management program including the assessment of impacts resulting from storage or transportation. A discussion of mixed waste is also included in this section.

The EIS should be of sufficient depth and detail to confirm, with reasonable assurance, the quantitative impact of the waste management systems. Facility owners/operators are required by RCRA regulations to maintain sufficient information to identify their mixed wastes. The information required includes RCRA waste codes for the hazardous components, the source of the hazardous constituents, a discussion of how the waste was generated, the generation rate and volumes of mixed waste in storage, and any information used to identify mixed wastes or make determinations that the wastes are prohibited by land disposal restrictions. Each owner/operator is required (under RCRA regulations) to develop a waste-minimization plan that identifies process changes that can be made to reduce or eliminate mixed wastes, methods to minimize the volume of regulated wastes through better segregation of materials, and the substitution of nonhazardous materials.

The following information should be presented in the EIS:

- Descriptions of the sources, types, quantities, and composition of solid, hazardous, radioactive and mixed wastes expected from the proposed action;

- Description of proposed waste management systems designed to collect, store, and dispose of all wastes generated by the proposed action;

- Anticipated disposal plans for all wastes (i.e., transfer to an offsite waste disposal facility, treatment facility, or storage onsite); and

- A waste-minimization plan that identifies process changes that can be made to reduce or eliminate waste. This should contain a description of methods to minimize the volume of waste.

5.5 Mitigation Measures

Mitigation measures that could reduce adverse impacts should be incorporated in the proposed action and alternatives (40 CFR 1502.14(f) and 1508.20). The mitigation measures discussed in the EIS must cover the range of impacts of the proposal. The measures must include such things as design alternatives that would decrease pollution emissions, construction impacts, esthetic intrusion, as well as relocation assistance, possible land use controls that could be enacted, and other possible efforts. Mitigation measures must be considered even for impacts that by themselves would not be considered "significant." If the proposed action as a whole is considered to have significant effects, all of its specific effects on the environment (whether or not "significant") must be considered, and mitigation measures must be developed where it is feasible to do so (CEQ, 1981). Mitigation measures should be tangible and specific. For example, mitigation measures that avoid, minimize, rectify, reduce over time, or compensate are tangible as opposed to measures that include activities such as further consultation, coordination, and study. A more detailed synopsis is provided in "The NEPA Book," (Bass, Herson, and Bogdan, 2001).

All relevant, reasonable mitigation measures that could improve the project should be identified, even if they are outside the jurisdiction of the NRC. The probability of the mitigation measures being implemented and the time line for their implementation should also be discussed for both NRC activities and activities under the jurisdiction of another agency.

The anticipated effectiveness of these mitigation measures in reducing adverse impacts, the technical feasibility, and the cost-benefit of any recommended mitigation measures should be discussed in the EIS (costly actions that would yield only minor environmental benefits should not be recommended).

5.6 Environmental Measurements and Monitoring Programs

This section describes the environmental measurements and monitoring programs for the proposed action. A more detailed description of the monitoring program is usually provided in the SER prepared in parallel with the EIS.

Mitigation monitoring activities proposed to meet the intent of NEPA [40 CFR 1505.2(c)] should be clearly distinguished from monitoring required by program-specific guidance and/or discretionary monitoring activities.

5.6.1 Radiological Monitoring

This section describes the proposed monitoring program utilized to characterize and evaluate the radiological environment, to provide data on measurable levels of radiation and radioactivity, and to provide data on principal pathways of exposure to the public.

The following information should be provided in the EIS:

- Maps or aerial photographs of the facility with proposed monitoring and sampling locations clearly identified along with effluent release points;
- Brief description of the monitoring program including:
  - Number and location of sample collection points, measuring devices used, and pathway sampled or measured;
  - Sample size, sample collection frequency, and sampling duration; and
  - Type and frequency of analysis including lower limits of detection;
- Principal radiological exposure pathways (Section 5.4.12.2.1, *Pathway Assessment*); and
- Location and characteristics of radiation sources and radioactive effluent (liquid and gaseous, from Sections 5.4.4, *Water Impacts* and 5.4.6, *Air Quality Impacts*).

5.6.2 Physiochemical Monitoring

This section should describe the proposed monitoring program to characterize and evaluate the chemical and physical environment, to provide data on measurable levels of chemicals and baselines for physical parameters of importance (i.e., weather conditions).

The purpose of a chemical environmental monitoring program is to provide a basis for evaluating changes in the environment from the proposed action. The baseline monitoring program should characterize the environment before the proposed action so that a reasonable comparison can be made after the proposed action begins. The baseline program can also be used for all or some of the operational chemical environmental monitoring program.

The EIS should describe the applicant's/licensee's chemical monitoring program. Two aspects of monitoring should be considered:

- Baseline monitoring is used to support the applicant's baseline descriptions and provide information for operational comparison; and
- Operational monitoring establishes the impacts of operation of the facility and detects any unexpected impacts arising from facility operation.

Each of these aspects is discussed in greater detail below.

Baseline Monitoring

Information from the applicant's/licensee's baseline monitoring program is used to aid in the assessment of site acceptability/condition and to support the staff's database to identify impacts that could result from the selected alternative. Generally, data are needed on a seasonal basis and should be sufficient to characterize seasonal variations throughout at least one annual cycle.

The environmental PM should analyze the available data to determine that they are adequate to support the environmental descriptions of Section 5.3, *Description of the Affected Environment*, and the impact analyses of Section 5.4, *Environmental Impacts*. The following factors should be considered in the analysis:

- Location and number of monitoring stations (and wells) as required to consider the following factors:

  - Meteorological, soil, surface water, and ground water system characteristics in the site vicinity [e.g., surface-water flow fields in the site vicinity, ground water flow (e.g., saltwater intrusion)].

- Impact of sanitary and chemical waste-retention methods on ground water quality:

  - Type of sanitary and chemical waste-retention system; and
  - Transient hydrological and meteorological parameters in the site vicinity.

- Sampling frequency and times to ensure that important temporal variations (e.g., tidal variations and intense rainfall) are adequately monitored.

For review of on-site meteorological instrumentation, the analysis should ensure that the basic meteorological parameters measured by instrumentation include wind direction and wind speed at two elevations, and ambient air temperature difference between two elevations. Guidance on meteorological data to be used as input to atmospheric dispersion modeling and assessment is given in Regulatory Guides 1.111 (NRC, 1977b) and 1.21 (NRC, 1974). Guidance on instrument types, sampling heights, and locations is given in Regulatory Guide 1.23, Sections C.1 and C.2 (NRC, 1972). Guidance on effluent and environmental monitoring at uranium mills is given in Regulatory Guide 4.14 (NRC, 1980).

Operational Monitoring

The operational monitoring program is designed to establish the impacts of operation of the facility and to detect any unexpected impacts arising from facility operation. Operational monitoring may be required by other permitting agencies.

The environmental PM should verify that sufficient information has been provided to adequately assess the environmental monitoring program (e.g., measuring sediment transport and floodplains or wetlands) to: (i) describe the appropriate local and regional chemical characteristics; (ii) ensure environmental protection; and (iii) provide an adequate database for evaluation of the effects of facility operation.

The following information should be included in the EIS:

- Description of the results of the baseline monitoring program, including monitoring station locations and the methods, frequency, and duration of monitoring used in each case [Tables and maps should be used, if appropriate.];

- Intensity of sampling needed for each anticipated impact. It should be commensurate with the degree of impact expected;

- Validity of data; and

- Adequacy of data measurement techniques.

5.6.3 Ecological Monitoring

This section describes the major components of the applicant's proposed ecological monitoring program. Monitoring programs should cover elements of the ecosystem for which a causal relationship between construction, operation, or decommissioning and adverse change is established or strongly suspected.

The environmental PM should describe the applicant's/licensee's ecological monitoring program. Two aspects of monitoring should be considered:

- Baseline monitoring to support the applicant's baseline descriptions and provide information for operational comparison; and

- Operational monitoring to establish the impacts of operation of the facility and detect any unexpected impacts arising from facility operation.

Each of these aspects is discussed in greater detail below.

Baseline Monitoring

The program of ecological field monitoring is used to support the applicant's descriptions of the ecological environment. Baseline monitoring is needed to establish a database from which to observe potential future impacts. Generally, data are needed on a seasonal basis and should be sufficient to characterize seasonal variations throughout at least one annual cycle. Additional data may be needed on a site-specific basis.

The environmental PM should analyze the available data to determine that they are adequate to support the environmental descriptions of Section 5.3, *Description of the Affected Environment*; and the impact analyses of Section 5.4, *Environmental Impacts*. The following factors should be considered in the analysis:

- The location and number of monitoring stations as required to consider the following factors:

    - Distribution and abundance of "important" species, habitats, and communities [Critical life history information should include parameters such as feeding areas, wintering areas,

and migration routes to the extent that the proposed action is expected to affect these parameters.]; and

- Descriptions of any modifications that may affect the existing patterns of plant and animal communities (e.g., changing agricultural practices, development of holding ponds or reservoirs, and developing access routes).

Operational Monitoring

A program of operational ecological monitoring may be necessary to monitor the environmental impacts of facility or site operation. It continues the studies conducted during pre-operational monitoring. An operational monitoring program may be included with an application for an operating license, and for license renewal applications. Operational monitoring programs may not be fully developed at the time of applying for a construction permit.

When evaluating the ecological monitoring programs, the following features should be considered:

- Ensure that the applicant/licensee has, to the extent feasible, described the general scope and objectives of its intended programs and has provided a tentative list of parameters that should be monitored. The application should include:

  - Duration over which the parameters will be monitored; and
  - Provisions for updating the program.

- Establish whether adequate data will be provided as outlined above [If the monitoring programs are judged to be inadequate or to include unnecessary elements, the environmental PM should evaluate potential additions and deletions.];

- Consider the following features for the monitoring programs:

  - Relationship to environmental monitoring conducted by other agencies in the vicinity of the facility or site should be described;

  - Basis and objective of each element of the monitoring program should be clearly stated, as well as its relationship to the overall environmental monitoring program;

  - If outputs of a preceding monitoring program or project demonstrate no significant impacts, then provisions to study such effects in successive monitoring programs should be reduced or deleted;

  - The program should allow for periodic modification based on the results of previous monitoring to ensure that the current monitoring effort is sufficient and justified when compared to a current assessment of the effects that the proposed action/alternative are having on the environment; and

- Intensity of sampling required for each anticipated impact should be commensurate with the degree of impact expected [The reviewer should balance the potential impacts of any sampling program against the potential benefits when making this evaluation.];

- Measurement and sampling methods (e.g., sampling locations and equipment, the pattern, frequency, and duration of sampling and sample size) should be described;

- Statistical validity, including the mean, standard deviation, confidence limits, and sample size should be clearly indicated; and

- If population dynamics models were used in the impact analyses, determine if sampling data are available to support the model. If not, suggest such sampling if verification of the model is necessary.

The following information should be included in the EIS:

- Description of the results of the baseline monitoring program, including monitoring station locations and the methods, frequency, and duration of monitoring used in each case. Tables and maps should be used if appropriate;

- Intensity of sampling needed for each anticipated impact [Sampling intensity should be commensurate with the degree of impact expected.];

- Validity of data; and

- Adequacy of data measurement techniques.

5.7 Cost-Benefit Analysis

This section describes the major costs and benefits for each alternative. Consideration of the costs and benefits should be presented in the EIS (10 CFR 51.71). The costs and benefits should not be limited to a simple financial accounting of project costs for each alternative. Costs and benefits should also be discussed for qualitative subjects (i.e., environmental degradation or enhancement). Extensive or detailed analysis should be presented in an appendix to the EIS to avoid diverting attention away from primary issues such as public health and safety. The cost-benefit analysis is not simply a mathematical formula from which to justify economic parameters; other applicable qualitative factors should be discussed and weighed in the decision.

The environmental PM should describe the costs and benefits for the proposed action and each alternative. Qualitative environmental costs and benefits can be compared to the discussion of environmental impacts within the environmental report. Standard project costs can be reviewed utilizing standard cost estimating databases. Socioeconomic costs and benefits can be reviewed and compared against similar projects as applicable. NUREG/BR–0058 (NRC, 1995a) provides guidance for determining public health and safety impact valuation. NUREG–1530 (NRC, 1995b) provides background material and information relating to NUREG/BR–0058. The reviewer should also verify that analyses were performed in accordance with appropriate cost benefit guidance. Future costs and benefits should be discounted to present worth as discussed in "Economic Analysis of Federal Regulations Under

Executive Order 12866" found on the WWW at <http://www.whitehouse.gov/OMB/inforeg/riaguide.html> (OMB, 1996). This site also provides general guidance on calculating costs and benefits. The methods used for discounting should be explained, and applied consistently to both costs and benefits. NUREG–1727, *NMSS Decommissioning Standard Review Plan* (NRC, 2000), provides guidance on determining costs and benefits for decommissioning projects as well as providing guidance on determining ALARA and prohibitive costs related to ALARA.

The cost benefit analysis provides input to determine the relative merits of various alternatives; however, the NRC must ultimately base its decision on public health and safety issues.

5.8 Summary of Environmental Consequences

This section should summarize any adverse environmental impacts that cannot be avoided and for which no practical means of mitigation are available, the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved. As appropriate, this summary can be tabulated.

The environmental PM should ensure the following analysis is completed:

- Develop a list of:
  - Unavoidable adverse environmental impacts;
  - Irreversible and irretrievable commitments of resources (those materials that would be irretrievably committed during construction, operation, and decommissioning);
  - Short- or long-term impacts (consider that occupation of land for an indefinite period represents the maximum impact on long-term productivity, unless other long-term preemptions have been identified; identify through consultation with the appropriate reviewers other uses of the environment that will be precluded by facility construction, operation, and decommissioning and classify these as either short-term or long-term preemptions; determine how any short-term or long-term benefits of the proposed action affect any such preemptions.);
  - Procedures and practices to mitigate or avoid these impacts or commitments; and
  - Impacts or commitments that remain after all practical means to avoid or mitigate the impact have been taken;
- Categorize the identified impacts (direct, indirect, and cumulative) according to the resource (e.g., water resource);
- The categories may be further divided into construction, operational, and decommissioning impacts, if so desired;

- Ensure that each identified impact has been appropriately categorized. When a particular action or operation results in multiple impacts (e.g., access road construction and use may have impacts affecting land use, terrestrial ecology, and socioeconomic), ensure that the impacts are addressed in each appropriate category;

- Determine the magnitude of the impacts (direct, indirect, and cumulative) or commitments; and

- Evaluate the time scale of each impact (e.g., 4–6 months during construction, throughout the facility lifetime, indefinitely).

The information from Sections 5.3, *Description of the Affected Environment*; and 5.4, *Environmental Impacts* should be summarized for this section. The EIS includes a discussion of the predicted short-term unavoidable adverse environmental impacts of each alternative and the predicted long-term environmental impacts. Short-term represents the period from start of construction to end of the proposed action, including prompt decommissioning. Long-term represents the period extending beyond the end of the proposed action. The discussion should also include an evaluation of the extent to which the proposed action will preclude options for other future use of the environment. "Irreversible" impacts refer to commitments of environmental resources that cannot be restored. "Irretrievable" applies to material resources and will involve commitments of materials that, when used, cannot be recycled or restored for other uses by practical means. The following information should be listed in the EIS for the proposed action and each alternative:

- Unavoidable adverse environmental impacts;

- Irreversible and irretrievable commitment of resources;

- Short-term and long-term impacts; and

- Short-term uses of the environment and the maintenance and enhancement of long-term productivity.

For new facilities the maximum long-term impact to productivity would result if the facility is not dismantled at the end of the period of facility operation, and consequently the land occupied by the facility structures would not be available for any other use. For operating or decommissioning facilities the maximum long-term impact to productivity would occur if the restricted release criteria are used for decommissioning.

After reviewing the impacts and mitigation actions, organize these impacts by environmental categories and prepare a brief paragraph summarizing the nature and magnitude of each category of impact in sufficient detail to allow for a comparative analyses of the environmental consequences of each alternative. Table 3 illustrates an example format of a table used to describe the nature and magnitude of each impact.

Table 3. Example of environmental impacts

Impact Category	Adverse Impacts Based on Applicant's Proposal	Actions to Mitigate Impacts	Unavoidable Adverse/ Irreversible and Irretrievable Commitments of Resources/Short- and Long-Term Impacts
Regional Setting			
Geology and Soil			
Water Resource			
Ecological			
Air Quality			
Noise			
Historic and Cultural			
Visual/Scenic			
Socioeconomic			
Environmental Justice			
Public and Occupational Health			
Waste Management			

5.9 List of Preparers

This section should contain a list of preparers and credentials who participated in producing the EIS.

5.10 Distribution List

This section should contain a list of all parties to whom the EIS was distributed.

5.11 References Cited

All references used in the preparation of the EIS should be listed, including those cited in the text of the EIS and those that were not specifically cited but served as useful guidance during document development. Additionally, it is helpful to provide ADAMS Accession numbers, if applicable, to assist the public in finding relevant documents. Guidance in NUREG-0650 (NRC, 1999) should be useful for determining reference format.

5.12 Supplemental Information of Environmental Impact Statement Document

Appendices should be included at the end of the EIS that include information that is supportive of the findings in the EIS. Examples include:

- Scoping report;
- Glossary;
- Consultation letters;
- Dose assessments;
- Issues Eliminated from detailed study; and
- Technical evaluations.

5.13 References

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