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PREPARATION OF ENVIRONMENTAL REPORTS FOR COMMERCIAL URANIUM ENRICHMENT FACILITIES

A. INTRODUCTION

1. Purpose

The purpose of this guide is to provide assistance to applicants for the development of environmental reports dealing with the construction, operation, and decommissioning of uranium enrichment facilities. A uranium enrichment facility is defined as any facility designed or used for the separation of the isotopes of uranium, except laboratory-scale facilities designed or used for experimental or analytical purposes only.

2. National Environmental Goals

Before issuing a license authorizing uranium enrichment facility construction or operation, the Nuclear Regulatory Commission (NRC) is required to assess the potential environmental effects of the proposed activities in order to ensure that issuance of the license is consistent with national environmental goals as set forth by the National Environmental Policy Act of 1969 (Public Law 91-190). To obtain information essential to this assessment, the NRC requires each applicant for a license to submit a report on the potential environmental impact of the proposed plant and associated facilities.

The national environmental goals expressed by section 101(b) of the National Environmental Policy Act (NEPA) are as follows:

> ". . .it is the continuing responsibility of the Federal Government to use all practicable means, consistent with other essential considerations of national policy, to improve and coordinate Federal plans, functions, programs, and resources to the end that the Nation may
>
> "(1) fulfill the responsibilities of each generation as a trustee of the environment for succeeding generations;
>
> "(2) assure for all Americans safe, healthful, productive, and esthetically and culturally pleasing surroundings;
>
> "(3) attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences;
>
> "(4) preserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice;
>
> "(5) achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and
>
> "(6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources."

3. Applicant's Environmental Reports

Part 51 of Title 10 of the Code of Federal Regulations provides in §§51.20 and 51.21, quoted below, the general requirements for environmental reports.

"51.20 Applicant's Environmental Report–Construction Permit Stage"

"(a) Environmental Considerations. Each applicant* for a permit to construct a production or utilization facility covered by §51.5(a) shall submit with its application a separate document, entitled 'Applicant's Environmental Report–Construction Permit Stage,' which contains a description of the proposed action, a statement of its purposes, and a description of the environment affected, and which discusses the following considerations:

"(1) the probable impact of the proposed action on the environment;

"(2) any probable adverse environmental effects which cannot be avoided should the proposal be implemented;

"(3) alternatives to the proposed action;

"(4) the relationship between local and short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and

"(5) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. The discussion of alternatives to the proposed action required by paragraph (a)(3) shall be sufficiently complete to aid the Commission in developing and exploring, pursuant to section 102(2)(D) of NEPA, 'appropriate alternatives * * * in any proposal which involves unresolved conflicts concerning alternative uses of available resources.'

"(b) Cost-Benefit Analysis. The Environmental Report required by paragraph (a) shall include a cost-benefit analysis which considers and balances the environmental effects of the facility and the alternatives available for reducing or avoiding adverse environmental effects, as well as the environmental, economic, technical and other benefits of the facility. The cost-benefit analysis shall, to the fullest extent practicable, quantify the various factors considered. To the extent that such factors cannot be quantified, they shall be discussed in qualitative terms. The Environmental Report should contain sufficient data to aid the Commission in its development of an independent cost-benefit analysis.

"(c) Status of Compliance. The Environmental Report required by paragraph (a) shall include a discussion of the status of compliance of the facility with applicable environmental quality standards and requirements (including, but not limited to, applicable zoning and land-use regulations and the thermal and other water pollution limitations or requirements promulgated or imposed pursuant to the Federal Water Pollution Control Act) which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection. The discussion of alternatives in the Report shall include a discussion whether the alternatives will comply with such applicable environmental quality standards and requirements. The environmental impact of the facility and alternatives shall be fully discussed with respect to matters covered by such standards and requirements irrespective of whether a certification or license from the appropriate authority has been obtained (including, but not limited to, any certification obtained pursuant to Section 401 of the Federal Water Pollution Control Act**). Such discussion shall be reflected in the cost-benefit analysis prescribed in paragraph (b). While satisfaction of Commission standards and criteria pertaining to radiological effects will be necessary to meet the licensing requirements of the Atomic Energy Act, the cost-benefit analysis prescribed in paragraph (b) shall, for the purposes of NEPA, consider the radiological effects, together with the other effects, of the facility and alternatives.

"(d) The information submitted pursuant to paragraph (a)–(c) of this section should not be confined to data supporting the proposed action but should include adverse data as well.

"(e) In the Environmental Report required by paragraph (a) for light-water-cooled nuclear power reactors, the contribution of the environmental effects of uranium mining and milling, the production of uranium hexafluoride, isotopic enrichment, fuel fabrication, reprocessing of irradiated fuel, transportation of radioactive materials, and management of low level wastes and high level wastes related to uranium fuel cycle activities to the environmental costs of licensing the nuclear power reactor shall be as set forth in |Table 4|: No further discussion of such environmental effects shall be required.

*Where the "applicant," as used in this part, is a Federal agency, different arrangements for implementing NEPA may be made, pursuant to the guidelines established by the Council on Environmental Quality.

**No permit or license will, of course, be issued with respect to an activity for which a certification required by Section 401 of the Federal Water Pollution Control Act has not been obtained.

"This paragraph does not apply to any applicant's environmental report submitted prior to June 6, 1974.

"(f) Number of copies. Each applicant for a permit to construct a production or utilization facility covered by §51.5(a) shall submit 200 copies of the Environmental Report required by paragraph (a).

"51.21 Applicant's Environmental Report–Operating License Stage

"Each applicant for a license to operate a production or utilization facility covered by §51.5(a) shall submit with its application 200 copies of a separate document, to be entitled 'Applicant's Environmental Report--Operating License Stage,' which discusses the same matters described in §51.20 but only to the extent that they differ from those discussed or reflect new information in addition to that discussed in the final environmental impact statement prepared by the Commission in connection with the construction permit. The 'Applicant's Environmental Report–Operating License Stage' may incorporate by reference any information contained in the Applicant's Environmental Report or final environmental impact statement previously prepared in connection with the construction permit. With respect to the operation of nuclear reactors, the applicant, unless otherwise required by the Commission, shall submit the 'Applicant's Environmental Report–Operating License Stage' only in connection with the first licensing action that would authorize full power operation of the facility."

4. Federal Water Pollution Control Act

As provided in an "Interim Policy Statement," published in the *Federal Register* on January 29, 1973 (38 FR 2679), the Federal Water Pollution Control Act (FWPCA) Amendments of 1972 (Pub. Law 92-500, 86 Stat. 816) affect NRC's responsibilities under the National Environmental Policy Act of 1969 (NEPA). NRC's NEPA responsibilities will be modified as various implementing actions are taken under the FWPCA, and appropriate changes will be made in this guide. However, since NRC will continue to evaluate environmental impact, the basic scope and content of the information needed to prepare an environmental report will remain unchanged.

If the proposed cooling system in an application does not comply with thermal effluent limitations under Sections 301 and 306 of Pub. Law 92-500 and if the disposition of any request for a waiver under Section 316(a) is not expected until after the issuance of a construction permit, the environmental report should clearly identify and provide supporting analysis for the most feasible alternative cooling system that would be selected if the request for modification is denied.

5. Commission Action on Environmental Reports

As provided in §51.50, "Federal Register notices; distribution of reports; public announcements; public comment," of 10 CFR Part 51, NRC places a copy of each applicant's environmental report in the NRC Public Document Room in Washington, D.C. and in a local public document room near the proposed site. The report is also made available to the public at the appropriate state, regional, and metropolitan clearinghouses. At the same time, a public announcement is issued and a summary notice is published in the *Federal Register.*

The applicant's environmental report, relevant published information, and any comments received from interested persons are considered by the NRC staff in preparing a "Draft Environmental Statement" concerning the proposed licensing action. The staff's draft statement and the applicant's environmental report are transmitted for information to the Council on Environmental Quality and for comment to federal agencies who have jurisdiction by law, who have special expertise, or who are authorized to develop and enforce environmental standards. The statement and report are also distributed for information to the appropriate governor or to state and local officials authorized to develop and enforce environmental standards of any affected state. Comments on the report and the draft statement are requested within a specified time interval. The draft statement is made available to the general public in the same manner as is the report.

As described in detail in §§51.22 through 51.26 of 10 CFR Part 51, the NRC staff considers the comments on the report and on the draft statement received from the various federal, state, and local agencies and officials, from the applicant, and from private organizations and individuals and prepares a "Final Environmental Statement." The final statement is transmitted to the Council on Environmental Quality and is made available to appropriate federal, state, and local agencies and to state, regional, and metropolitan clearinghouses. A public announcement is issued, and a notice of availability is published in the *Federal Register.*

Subsequent hearings and action (as described in Subpart D, "Administrative Action and Authorization; Public Hearings and Comment," of 10 CFR Part 51) on the environmental aspects involved in issuance of a construction permit or operating license are based on the applicant's environmental report and on NRC's Final Environmental Statement (FES). The FES takes into account information from many sources, including the

applicant's environmental report and its supplements, and the comments of the various governmental agencies, the applicant, and private organizations and individuals.

The applicant's environmental report is an important document of public record. Therefore, the applicant is urged to give full attention to its completeness.

6. Preparation of Environmental Reports

Part 51 provides general information concerning the content of an applicant's environmental report. To provide specific and detailed guidance, the following "Standard Format and Content of Environmental Reports for Commercial Uranium Enrichment Facilities" has been prepared.

If any topics in this guide relate to information not available at the time the environmental report is prepared, the applicant should indicate when such information will be available. A number of the topics may apply only in part, or not at all. The applicant should apply the guidelines for preparation of the report as is appropriate to the type of plant being proposed and should identify any topic that is not relevant to the particular plant being proposed.

An environmental report submitted in conjunction with the application for a construction permit should contain sufficient information to permit the NRC staff to evaluate the potential environmental impact of constructing and operating the proposed facility. The site-specific environmental data presented should (1) fully document the critical life stages and biologically significant activities (e.g., spawning, nesting, and migration) that increase the vulnerability of the potentially affected biota at the proposed site and (2) be adequate to characterize the seasonal variations of biota likely to be affected by the plant. The "Applicant's Environmental Report–Construction Permit Stage" should contain an analysis based on at least one year of relevant field data. However, the applicant may submit an initial evaluation based on at least six months of field data and suitable projections on the remaining seasonal periods, provided condition (1) above is met and provided the applicant makes a commitment to furnish, within six months of filing, a final evaluation based on a full year of field data.

The "Applicant's Environmental Report–Operating License Stage" should contain proposed environmental technical specifications. These specifications define the operating conditions important to the protection of the environment and specify monitoring programs and administrative procedures and controls necessary to ensure compliance. Guidance for the preparation of these environmental technical specifications will be furnished to the applicant by the NRC staff.

Descriptive or narrative text, as well as tables, charts, graphs, etc., should be used in the report. Each subject should be treated in sufficient depth to permit the NRC to evaluate independently the extent of the environmental impact. If test results are needed to support conclusions, information on test data, procedures, techniques, and equipment used to perform tests should be supplied wherever it contributes to the clarity of the report. Descriptive and narrative passages should be brief and concise.

Pertinent published information relating to the site, the plant, and the surroundings should be referenced. Where published information is essential to evaluate specific environmental effects of the proposed activities, it should be included verbatim or in summary form in the environmental report or an appendix to the report.

Some of the information to be included in the environmental report may have already been prepared by the applicant during consideration of the safety aspects of the proposed plant. In such cases, this information (in the form of text, tables, or figures) should be incorporated in the environmental report in order to provide a complete document.

The site and surroundings of a uranium enrichment facility may contain other sources of environmental impact, including other plants that utilize chemical or radioactive materials. In preparing the environmental report, the applicant should consider the effects of the proposed facility in conjunction with the effects of these other plants.

B. STANDARD FORMAT AND CONTENT OF ENVIRONMENTAL REPORTS FOR COMMERCIAL URANIUM ENRICHMENT FACILITIES

Summary

This section should precede the body of the report. Its purpose is to provide a summary of the pertinent data, narrative, and evaluation included in the applicant's environmental report. This summary would be used by organizations, individuals, and members of the general public whose primary interest is to obtain a quick overview of the significant features and conclusions of the report in order to determine whether the applicant has complied with NEPA, as implemented by NRC's regulations in 10 CFR Part 51. The summary would preferably be in tabular form. It should include the following information:

1. A concise description of the significant characteristics of the proposed uranium enrichment

*Lines indicate substantive changes from previous issue.

facility, including the major site features and the major plant design and operating parameters.

2. A comparison of alternative site and plant designs, as extracted from the material prepared for Section 7 of the environmental report.

3. A listing of significant effects of the proposed plant as extracted from the benefit-cost analysis of Chapter 8 of the report and the conclusions drawn from weighing the aggregate of these effects. This listing should include both adverse and beneficial environmental and socioeconomic impacts that would occur if the proposal is implemented.

If the applicant considers any information requested by this or any other section of the guide to be a trade secret or commercial or financial information submitted in confidence, the requested information should be submitted as a separate proprietary document in accordance with 10 CFR §2.790. In addition, any information requested by this or any other section of the guide that is classified information should be submitted as a separate classified document in accordance with the appropriate classification and security regulations.

Chapter 1
PROPOSED ACTIVITIES

1.1 Background Information

In this section, the applicant should discuss the scope of its business, its location, and its organizational structure. The applicant should also identify the architectural, engineering, and construction firms and the consultants that will be working on the project.

1.2 Need for Facility

The degree of enrichment and quantities of separative work that will be provided for domestic use should be described. A 20-year projection of national and foreign requirements for the services should be supplied. Alternative sources of supply of the proposed plant's services should also be discussed.

If delay of the proposed project would have effects on the nation's energy program or on the applicant's business (such as loss of contracts, jobs, or future business), these effects should be discussed.

If the proposed plant is to meet other objectives, such as obtaining commercial and technical experience from the operation of a demonstration facility or from the performance of research and development, a description of these objectives should be given.

1.3 Proposed Project Schedule

The applicant should present a proposed project schedule showing, as a minimum, the dates for initiation of site preparation, plant construction, and operation.

Chapter 2
THE SITE

In this section, the applicant should describe the physical, biological, and human characteristics of the area environment that might be affected by the construction and operation of a uranium enrichment facility on the proposed site. To the extent possible, the information presented should reflect observations and measurements made over a period of years.

2.1 Site Location and Layout

The applicant's rationale for the selection of the geographical region in which the proposed uranium enrichment facility is to be located should be discussed. Information should be presented on locations of appropriate power sources, the labor force, coolant water availability, potential customers, sources of uranium feed and other specialized materials, methods of transportation, company-related considerations, and special socioeconomic factors.

A map should be provided showing the site and its location with respect to state, county, and other political subdivisions. Other detailed maps should show the location of the limited access plant perimeter; applicant's property; power sources and transmission lines; abutting and adjacent properties, including bodies of water, wooded areas, and farms; nearby settlements; industrial plants, parks, and other public facilities; and transportation links (railroads, highways, airports, waterways). These and all other maps included in the environmental report should indicate a distance scale and compass North (at least). Coordinates should be Universal Transverse Mercator.

The total site area owned by the applicant and that part occupied by the plant should be indicated. Other existing and proposed uses of the site property and the areas devoted to these uses should also be indicated. Any plans for site modifications should be described. Contour maps that include plant location should also be supplied.

2.2 Regional Demography and Land and Water Use

The applicant should provide a map that covers the area within a 5-mile radius of the proposed plant location and indicates all inhabited locations. This map should have circles with radii of 1, 2, 3, 4, and 5 miles (centered at the plant location). Each circle should be divided into 22.5° sectors, with each sector centered on one of each of 16 compass points (N, NNE, NE, etc.). The permanent and transient populations within each of the sectors formed by the concentric circles and the radial lines should be estimated and tabulated for the last year in which affected populations were not influenced by the proposed activities. Similar estimates and tabulations should be provided for the census years throughout the anticipated life of the plant.

The applicant should provide tables giving population and visitor statistics of neighboring schools, plants, hospitals, sports facilities, residential areas, parks, etc., within five miles of the plant. The nature and extent of present land use (agriculture, livestock raising, dairies, residences, industries, recreation, transportation, etc.) should be indicated. A table should also be provided to show, for each sector, the distance from the plant to the nearest site boundary and the nearest residence.

Describe and tabulate the amounts of present water use (water supplies, irrigation, reservoirs, recreation, etc.) within the plant site and outward to a distance of five miles from the plant.

The locations of other industrial facilities, including other proposed or existing nuclear facilities, should be noted on the maps. Effluents from these industrial facilities which could interact with the proposed plant or its effluents should be identified.

The degree of detail to be provided in this section will generally depend on the potential for interaction of the plant and its surroundings. The applicant's evaluation may show that the facility will have environmental impact in areas more than five miles away, e.g., along a river. If this is the case, the applicant should provide appropriate information about such areas.

2.3 Regional Historic, Scenic, Cultural, and Natural Landmarks

Areas valued for their historic, scenic, cultural, or natural significance may be affected. The environmental report should include a brief discussion of the historic, scenic, cultural, and natural significance of the site and nearby areas, with specific attention to the sites and areas listed in the "National Register of Historic Places"* and the "National Registry of Natural Landmarks."** Further guidance can be obtained from the National Park Service publication, "Preparation of Environmental Statements: Guidelines for Discussion of

*The "National Register of Historic Places" is published annually in the *Federal Register;* additions are published on the first Tuesday of each month.

**The "National Registry of Natural Landmarks" appeared in 37 FR 1496.

Cultural (Historic, Archeological, Architectural) Resources," August 1973.*

The applicant should discuss his consultation with the appropriate State Liaison Officer for Historic Preservation** concerning properties under consideration for nomination to the "National Register of Places." The environmental report should contain evidence of contact with the Historic Preservation Officer for the State involved and a copy of his comments concerning the effect of the undertaking on historic, archaeological, and cultural resources.

In addition, the report should indicate whether the site has any archaeological significance and explain how any conclusion in this regard was reached. If such significance or value is present, plans to ensure its preservation should be described.

The report should indicate whether new transmission lines, roads, pipelines, and utilities to be constructed in support of the proposed project will pass through or near any area of known historic, scientific, cultural, natural, or archaeological significance.

2.4 Geology

A description of the major geological aspects of the site and its immediate environs should be provided. The level of detail presented should be appropriate to the proposed plant design. For example, if holding ponds are to be created, a detailed description of soil and bedrock types, etc., should be provided. Except for those specific features that are relevant to the environmental impact assessment, the discussion may be limited to noting the broad features and general characteristics of the site and environs (topography, stratigraphy, soil and rock types).

2.5 Hydrology

The effects of plant construction and operation on adjacent surface and ground waters are of prime importance. The applicant should describe, in quantitative terms, the physical, chemical, biological, and hydrological characteristics of the waters, their typical seasonal ranges and averages, and their historical lows and highs. The hydrological parameters include temperature, flow rate, stage, water table altitude above the mean sea level, chemical or saline stratification, tides, floods, currents, wave action, and flushing times.

If competition for water may be significant to the establishment of a long-term water supply, the applicant should also provide a forecast of other competing uses for water. The forecast should be obtained from framework studies of the appropriate basin commission or planning agency. This information should be provided only for those waters that may affect plant effluents and plant water supply or that may be reasonably assumed to be affected by the construction or operation of the plant.

The applicant should include a description of significant tributaries above and below the site and the pattern and gradients of drainage in the area. Where pollution exists, the applicant should identify the source of the pollutants, the nature of the pollutants (e.g., chemical species, physical characteristics such as color, temperature, etc.), the range of concentrations involved, and the time variations in release, if any. Note that information relating to water characteristics should include measurements made on or near the site.

For plants with once-through cooling, the applicant should present the monthly maximums, minimums, and averages of flow and water quality for the water bodies that may be affected by construction or operation of the plant. These data should be based on not less than 10 years of record and preferably 25 years or longer. Supplemental data that relate the current speed and direction, tidal stage or water surface elevation, or other periodic changes should be supplied for site-specific reaches of receiving water. These data should be collected by onsite measurement wherever possible. The data are necessary to develop a systematic evaluation of the interaction of the proposed releases with the receiving water and to permit establishment of distributional isopleths of temperature or chemical and radioactive contaminants.

For systems involving water storage, the applicant should indicate the surface areas, flow rates (in and out), evaporation, percolation, and net volumes of the water to be stored. The applicant should also provide data concerning any drawdown of ground water caused by withdrawals from neighboring major industrial and municipal wells. Indicate how the withdrawals may result in the transport of material from the site to these or other wells.

Indicate how the volumes and areas of affected water bodies change with expected seasonal and other level functions. Monthly values of these parameters should be presented as a minimum; daily or shorter increments should be provided where they are important in determining the basis for evaluation of environmental effects. If a stream or other water body is to be used by the plant, the observed or estimated 7-day, once-in-10-years low flow should be presented. Additionally, the period-of-record drought flow sequence, transposed to the plant intake, should be provided where water supply availability may be questionable.

*Copies may be obtained from Chief Historian, Room 1226, National Park Service, 18th & C Streets NW., Washington, D.C. 20240.

**State Liaison Officers are listed in the *Federal Register* of March 15, 1972, and supplemented in December 1972.

Vertical and areal variations of affected water bodies should be established in the vicinity of the site as a basis for evaluating any proposed mixing zones.

If features of a proposed plant such as artifical lakes and canals create artificial conduits for flow of ground waters between and among aquifers, the applicant should furnish sufficient site-specific detail to justify his evaluation of the effects of construction and operation of the plant on established ground water tables and usage.

2.6 Meteorology

The following data on site meteorology should be presented: (a) daily and monthly averages and extremes of temperature, dewpoint, and humidity; (b) monthly wind characteristics (and heights at which such wind characteristics data are applicable or have been measured), including speeds and directions and their frequencies and the joint frequencies of wind speed, stability category, and direction; (c) precipitation; (d) frequency of occurrence and effects of storms accompanied by high-velocity winds, including tornadoes and hurricanes. In item (b), the joint frequencies of wind speed, stability, and direction should be presented in tabular form; the frequencies should be given as fractions when using 5-year National Weather Service (formerly U.S. Weather Bureau) summaries* or as the number of occurrences when using only one or two years of onsite data. The data should be presented for each of 16 compass directions, and the stability categories should be established to conform as closely as possible to those of Pasquill.**

Coverage should also include a discussion of climatology, existing levels of air pollution and their effects on plant operations, the relationship of the meteorological data gathered on-site to the data gathered on a regional basis, and the impact of the local terrain and large lakes and other bodies of water on meteorological conditions in the area. Attention should be directed to the meteorological situation on a regional basis.

Applicants proposing a wet, dry, or wet-dry cooling tower as the principal heat sink should furnish in the construction permit application appropriate summaries of joint humidity data, along with the joint wind speed, stability category, and wind direction frequencies for heights related to the estimated height at which cooling tower moisture will be dispersed. Such data will be used to provide a basis for estimating the impact of tower operation on the environment. If the applicant does not have the detailed site-specific meteorological data described above, he may present information applicable to the general site area and obtained from the National Weather Service or other authoritative source.

2.7 Ecology

In this section, the applicant should note the flora and fauna in the vicinity of the site and describe their habitats and distribution. This initial inventory will reveal certain organisms which should be given specific attention because of their importance to the community. A species is "important" (for the purposes of this guide) if a specific causal link can be identified between the enrichment facility and the species and if one or more of the following criteria applies: (a) the species is commercially or recreationally valuable, (b) the species is threatened or endangered,*** (c) the species affects the well-being of some important species within criteria (a) or (b), or (d) the species is critical to the structure and function of the ecological system or is a biological indicator of radionuclides in the environment.

The initial inventory should establish the identity of the majority of terrestrial and aquatic organisms on or near the site and their relative (qualitative) abundances. The applicant should identify the "important" species from this list and discuss in detail their quantitative abundances. The discussion should include species that migrate through the area or use it for breeding grounds. A map that shows the distribution of the principal flora communities should be provided.

The discussion of species-environment relationships should include descriptions of area usage (e.g., habitat, breeding) for important species. Also discuss life histories of important regional animals and aquatic organisms, their normal seasonal population fluctuations, and their habitat requirements (e.g., thermal tolerance ranges). Include identification of food chains and other interspecies relationships, particularly when these are contributory to predictions or evaluations of the impact of the enrichment plant on the regional biota.

The applicant should identify any definable preexisting environmental stresses from sources such as pollutants, as well as any ecological conditions suggestive of such stresses. The status of ecological succession should be described. The applicant should discuss the histories of any infestations, epidemics, or catastrophes (caused by natural phenomena) that have had a significant impact on regional biota.

*National Climatic Center, Federal Building, Asheville, N.C.

**Slade, D.H., ed., *Meteorology and Atomic Energy*, 1968, p. 102, TID-24190, USAEC, 1968.

***New terminology defining "endangered or threatened with endangerment" is contained in the "Endangered Species Act of 1973," Pub. Law 93-205, 87 Stat. 884.

Ambient noise data relative to communities surrounding the proposed site should be reported, where appropriate.

The information requested in this section should be presented in two separate subsections, the first entitled "Terrestrial Ecology" and the second, "Aquatic Ecology." The sources of information should be identified. As part of this identification, the applicant should present a list of any published material dealing with the ecology of the region. The applicant should locate and describe any ecological or biological studies now in progress for the site or its environs.

Chapter 3
THE PLANT

The uranium enrichment plant should be described in this section. Since environmental effects are the primary concern of the report, the plant effluents and related systems that interact with the environment should be described in particular detail.

3.1 External Appearance

A general description of the site and the plant facilities should be provided. The description should be accompanied by a site plan showing the plant perimeter and the size and location of all plant buildings, chemical and waste storage areas, settling ponds, substations, and cooling towers. The location and evaluation of all release points for gaseous and liquid wastes should be shown. A plant profile should be shown to scale by line drawings or other illustrative techniques.

The applicant should provide an assessment of the visual effects of the plant on nearby cultural, scenic, historic, and recreation areas. The assessment should include drawings of the proposed facility and its surroundings if visible from these nearby areas. The number of people affected per year by the change in landscape should be estimated.

The architectural design and efforts to make the structures and grounds aesthetically pleasing should be noted.

3.2 Plant Operation

The operations included in uranium enrichment should be described in sufficient depth to permit the identification of all sources of radioactive and nonradioactive wastes and effluents. The description should be both qualitative and quantitative and should include flow diagrams and tables, if necessary, to indicate major process equipment, chemical reactants, intermediate products, final products, and the origin, form, concentration, and daily quantity of all plant effluents. Flow rates should be given for the design capacity of the plant.

The individual radionuclides that are expected to be contained in solid waste and in gaseous and liquid effluents should be specified. Transuranics and fission products should be given special attention if uranium from reactor fuel reprocessing is to be used. The quantities of nonprocess effluents such as laundry and sanitary wastes should be estimated, and pollutant concentrations, oxygen demand, and other relevant data should be given.

This section should also provide data (using diagrams, if possible) on the intake quantity, consumption, and discharge of water. The estimated temperatures of all liquid effluents should be provided. Also, data on the usage of electric power, natural gas, etc., for operation of the plant at its design capacity should be supplied.

3.3 Waste Confinement and Effluent Control

The applicant should describe the equipment and design features that have been incorporated into the plant to keep the release of gaseous and liquid effluents within the limits specified in the "as low as practicable" requirements and other applicable regulations. Equipment and design features used to conserve depletable resources should also be described.

This section should include a comprehensive description of the building and process effluent systems (for example, the ventilation systems; liquid recycle systems; liquid collection, treatment, and disposal systems; and solid collection, recovery, packaging, transportation, and disposal and storage systems). Tabulate the expected quantities and concentration of all radioactive and nonradioactive materials, both prior to treatment and upon release to the environment. Also estimate the expected concentration peaks, as well as annual averages. Supporting information should be provided regarding the effectiveness of each system to control the effluents at the stated levels.

Chapter 4
ENVIRONMENTAL EFFECTS OF SITE PREPARATION, PLANT CONSTRUCTION, AND OPERATION

The preparation of the site and the construction and operation of a uranium enrichment facility and related facilities will inevitably affect the environment. Some of the effects will be adverse, and some will be beneficial. Effects are considered adverse if environmental change provides an added stress that lessens a desirable characteristic of an important biotic population or natural resource (e.g., safety, health, abundance, productivity, aesthetics); if the change provides an added stress that tends to lower the quality of renewable resources or to impair the recycling of depletable resources; or if the change provides an added stress that reduces the diversity and variety of individual choice, the standard of living, or the extent of sharing life's amenities. Effects are considered beneficial if they enhance the characteristics just enumerated.

The applicant's discussion of adverse environmental effects should make clear which effects are considered unavoidable but subject to later amelioration and which effects are regarded as unavoidable and irreversible. Those effects that represent an irretrievable commitment of resources should receive detailed consideration in Sections 4.1 and 4.2. (In the context of this discussion, "irretrievable commitment of resources" means a permanent impairment of natural resources, e.g., loss of wildlife habitat; destruction of nesting, breeding, or nursing areas; interference with migratory routes; loss of valuable or aesthetically treasured natural areas.)

Measures planned to reduce any undesirable effects of the total project on the environment should be described in detail.

The impacts of construction and operation of the proposed plant should be quantified to the fullest extent practicable and presented systematically. In the discussion of each impact, the applicant should make clear whether the supporting evidence is based on theoretical, laboratory, onsite, or field studies undertaken on this or previous occasions. The source of each impact and the population or resource affected should be made clear. The impacts on water, air, land, and biota should be distinguished. Any changes that may be brought about in the ecological system due to these impacts should be defined.

The applicant should discuss the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. As used in this guide, "short-term" refers to the facility life through decommissioning and "long-term" to time periods extending beyond this life. The applicant should assess the cumulative and long-term effects of the action from the point of view that each generation is trustee of the environment for each succeeding generation.

4.1 Effects of Site Preparation and Plant Construction

The applicant should organize the discussion in terms of the effects of site preparation and plant construction on (a) land use and (b) water use. The applicant should consider consequences to both human and wildlife populations and indicate which are unavoidable, reversible, etc., according to the categorization set forth earlier in this chapter.

4.1.1 Land Use

In the land-use discussion, the applicant should describe how construction activity may disturb the existing terrain and wildlife habitats. Consideration should be given to the effects of such activities as construction of power transmission towers, excavation and filling, creation of building material supply areas, construction of temporary or permanent roads, and disposal of trash and wastes.

The applicant should indicate the proximity of human populations and identify undesirable impacts on their environment arising from noise and from inconvenience due to the movement of men, material, and machines. Undesirable impacts of activities associated with any provision of housing, transportation, and educational facilities for workers and their families should be included. A schedule of the estimated work force to be involved in site preparation and plant construction should be presented for each year of site preparation and construction. Any expected changes in accessibility of historical and archaeological sites in the region should be described.

The applicant should discuss measures designed to mitigate or reverse undesirable effects. Such measures might include erosion control, dust stabilization, landscape restoration, control of added vehicular traffic, and restoration of affected animal habitat.

The discussion should also include any site preparation and plant construction activities whose consequences may be beneficial to the region.

4.1.2 Water Use

The water use discussion should describe the impact of site preparation and construction activities on

area water sources. The applicant should describe the effects of these activities on fish and wildlife resources, water quality, water supply, aesthetics, and other characteristics. Also describe measures to mitigate undesirable effects. Such measures might include pollution control, erosion control, and other procedures for environmental protection.

4.2 Effects of Plant Operation

This section should describe radiological, chemical, biological, and other effects that plant operation may have on human population and important biota. The applicant should indicate which of these impacts are unavoidable, reversible, etc. The parameters of plant operation at which an undesirable impact may be produced should be tabulated, along with the limits that are not to be exceeded under normal operating conditions. The actions planned if the limits are exceeded should also be discussed.

All project impacts of plant operation should be compared with any relevant standards or criteria established by the Commission, EPA, the State, or other government agencies.

4.2.1 Effects of Ionizing Radiation

The applicant should consider in this section the radiological effects of normal plant operation on man and important biota. Estimates of the radiological impact on man via various exposure pathways should be provided. The various pathways should be identified and described in textual and flowchart format. The critical nuclide and critical exposure pathway should be identified.

4.2.1.1 Liquid Effluents. The applicant should estimate the expected annual average concentrations of radionuclides (tabulated in Section 3.3) in receiving water at locations where water is consumed or otherwise used by human beings or where it is inhabited by biota of significance to human food chains. The dilution factors used in preparing the estimates and the locations where the dilution factors are applicable should be specified.

The applicant should estimate uptake of radionuclides by important biota and associated doses. The applicant should determine the expected radionuclide concentrations in aquatic and terrestrial organisms significant to human food chains. Bioaccumulation factors used should be referenced.

Using the above information and any other necessary supporting data, the applicant should estimate the annual whole body and significant organ dose commitments (mrem) to individuals in the population from all receiving-water-related pathways, i.e., all sources of internal and external exposure. Details and models of the calculations should be provided as an appendix.

4.2.1.2 Airborne Effluents. From release rates of airborne radioactive material (see Section 3.2) and meteorological data (see Section 2.6), the applicant should estimate annual whole body and significant organ dose commitments (mrem) to (a) individuals exposed at the point of maximum ground-level concentrations offsite, (b) individuals exposed at the site boundary in the direction of the prevailing wind, and (c) individuals exposed at the nearest existing residence in the direction of the prevailing wind. Assume annual average meteorological conditions for the sectors of concern. Locations and evaluations of points of release and receptors used in calculations should be identified.

The applicant should estimate uptake of radionuclides by important biota and associated doses. Deposition of radioactive materials on surrounding land surfaces should be estimated. Provide estimates of annual whole body and significant organ dose commitments to an individual (mrem) received via potential pathways.

An appendix describing the models used in all of the above calculations should be provided.

4.2.1.3 Summary of Radiation Dose Commitments. The applicant should present a table that summarizes the estimated annual radiation dose commitments to individuals and to the population within five miles of the site. The tabulation should include the annual whole body dose commitments to the population (man-rem) from all receiving-water-related and gaseous pathways.

4.2.2 Effects of Chemical Discharges

In this section, the quantities and specific concentrations of nonradioactive wastes in gaseous and liquid effluents at the point of discharge and in the plant environs should be compared: (a) with federal and state air and water quality standards, Occupational Safety and Health Administration standards, or other governmental standards and (b) with the ambient quantities and concentrations that prevail prior to plant operation. Particular attention should be given to releases of fluorine and uranium (as a chemical toxicant) and their compounds. Specific points and modes of release, such as holding ponds and cooling towers, should be identified and discussed.

The projected effects of the effluents in terms of perception, adverse response or chronic exposure of important biota (including any long-term buildup in soils, sediments, and important biota) should be identified and discussed. Identify and discuss the projected effects of the effluents on man-made

structures, taking into consideration such factors as increased electrochemical corrosion and direct or indirect chemical attack.

Dilution and mixing of discharges in the receiving environs should be discussed in detail. Provide estimates of concentrations at various distances from the point of discharge. The effects on ground water should be included.

4.2.3 Effects of Operation of the Heat Dissipation System

Waste heat alters the thermal conditions of the environment. Since the heat transfer is usually effected through the surface of a river, pond, lake, estuary, or ocean or by the evaporation of water in a cooling tower, the meteorology and hydrology of the environment and the aquatic ecology are of primary importance in determining what effects the released heat will have on the aquatic environment.

4.2.3.1 Effluent Limitations and Water Quality Standards. The applicant should describe guidelines and thermal standards or limitations applicable to the water source (including maximum permissible temperature, maximum permissible increase, mixing zones, and maximum rates of increase and decrease). Indicate whether and to what extent these standards or limitations have been approved by the Administrator of the Environmental Protection Agency as required by the Federal Water Pollution Control Act, as amended. The applicant should indicate whether the discharge could affect the quality of the waters of any other state or states.

4.2.3.2 Physical Effects. The applicant should describe the effect that the heated effluent will have on the temperature of the receiving body of water with respect to space and time. Changes in temperature caused by drawing water from one depth and discharging at another should be described. Any model studies and calculations that have been performed to determine these characteristics should be discussed. References to reports that provide supporting details should be included.

Details of calculational methods used in predicting thermal plume configurations should be given in an appendix to the report. The results should be portrayed in graphic form, showing isotherms in three dimensions for a range of conditions that form the basis for the estimation of ecological impact.

Where releases are determined to be affected by tides and winds, a probability rose relating directions, extent of modification, and time should be included. Show both a daily and an annual probability rose where tides are operative.

4.2.3.3 Biological Effects. The applicant should describe the effects of released heat on marine and freshwater life and should give the basis for the prediction of such effects. In this discussion, appropriate references should be made to the ecological data presented in Section 2.7. Expected thermal effects should be related to the optimum and tolerance temperature ranges for important aquatic species (as defined in Section 2.7) and the food base that supports them. The evaluation should consider not only the mixing zone, but also the entire regional aquatic habitat potentially affected by operation of the proposed plant.

Potential hazards of the cooling water intake and discharge structures that could affect fish species and food base organisms should be identified, and steps planned to measure and minimize the hazards should be discussed. Diversion techniques should be discussed in the light of information obtained from ecological studies on fish population, size, and habitats.

The applicant should discuss any effects that passage through the heat dissipation system has on zooplankton, phytoplankton, meroplankton, and small nektonic forms such as immature fish. Also discuss the resultant implications for the important species and functional groups.

The applicant should discuss the potential biological effects of modifying the natural circulation of the water body, especially if water is withdrawn from one region or zone and discharged into another. This discussion should consider such factors as the alteration of the dissolved oxygen and nutrient content and distribution in the receiving water, as well as the effects of scouring and suspended sediments. Where natural salinity is modified by plant water flow, the effects should be quantitatively discussed.

Plant-induced changes in the temperature of the discharged water subsequent to environmental stabilization can affect aquatic life in the receiving body. Accordingly, the applicant should discuss the possible effects of operational changes (and other temporary related conditions), including the dependence of effects on the season in which the changes occur.

4.2.3.4 Effects of Heat Dissipation Facilities. The applicant should discuss the expected effects of heat dissipation facilities (such as cooling towers, lakes, spray ponds, or diffusers) on the local environment and on agriculture, housing, highway safety, recreation, air and water traffic, airports, etc. These effects should be related to meteorological phenomena, including fog, icing, precipitation modification, humidity changes, cooling tower blowdown and drift, and noise. Where cooling towers are considered either as a design basis or as an alternative, the discussion should include estimates

of the dimensions of the visible plume under various stability classes (Pasquill) and the probability distribution of wind directions, air temperature, and humidity expected for the site. If fog clouds or icing may occur, indicate the estimated hours per year, distances, and directions of such conditions. Also discuss the transportation arteries (including navigable waters) potentially affected and measures to be used to mitigate such effects. Possible synergistic effects that might result from mixing of fog or drift with other effluents in the atmosphere should be considered. (Environmental effects of chemicals discharged from cooling tower blowdown and drift should be discussed in Section 4.2.2.)

In addition to the meteorological effects noted, other local environmental impacts may occur. These should be described. For example, if a cooling pond or lake is created or if ground water is a source of station water supply, the effects on ground water may be substantial; consequently, the alteration of water table levels, recharge rates, and soil permeability should be discussed.

4.2.4 Effects of Sanitary and Other Waste Discharges

The applicant should describe and discuss the environmental impact associated with sanitary and other waste systems.

4.2.5 Other Effects

The applicant should discuss any effects of plant operation that do not clearly fall under any single topic of Sections 4.2.1 through 4.2.4. These may include changes in land and water use at the plant site, interaction of the plant with existing or projected neighboring plants, disposal of solid and liquid wastes other than those discussed in Sections 4.2.1 through 4.2.4, and other effects that tend to diminish the quality of the environment; for example, noise, visual impact, or increased traffic. Where appropriate, these effects should be discussed in terms of applicable federal, state, and local standards and guidelines.

4.3 Resources Committed

The applicant should discuss any irreversible commitments of resources due to site preparation and plant construction and operation. This discussion should include both direct commitments and irreversible environmental losses such as destruction of wildlife habitat, removal of land from agricultural use, and diversion of electrical power.

In this discussion, the applicant should consider lost resources from the viewpoints of both relative impacts and long-term net effects. As an example of relative impact assessment, the significance of the loss of a few members of a given species could vary, depending on the total population in the immediate region. Such a loss in the case of a small local population would be less serious if the same species were abundant in neighboring regions.

Similarly, the loss of a given area of highly desirable land should be evaluated in terms of the total amount of such land in the environs.

These relative assessments should include statements expressed in percentage terms. The amount of expected resource loss should be related to the total resource in the immediate region, and the total in the immediate region should be related to that in surrounding regions.

4.4 Decommissioning and Dismantling

The applicant should describe his plans and policies regarding the actions to be taken at the end of the plant's useful life. Information should be provided on the long-term uses of the land; the amount of land irretrievably committed, if any; the expected environmental consequences of decommissioning; and the estimated monetary cost involved in decommissioning, discounted to present value.

The applicant should also discuss the consideration given in the design of the plant and its auxiliary systems to eventual decommissioning, the amount of equipment and buildings to be removed during decommissioning, and the expected condition of the site after decommissioning.

Since the environmental impact of terminating plant operation is partly determined by plant design, applicants should give attention to the subject early in project planning.

4.5 Radioactive Material Movement

The transportation of radioactive materials may have environmental effects. In this section, the radioactive materials to be transported to and from the site should be described.

A description of the uranium feed to be used and the quantity to be shipped to the site each year should be provided. The form of uranium feed, enrichment (if recycled), total weight per shipment, expected form of packaging, and estimated number of shipments per year should be discussed.

The applicant should estimate the weight of the enriched product to be shipped from the site each year, the number of shipments per year, and the form of packaging expected to be used.

Estimates of the annual, weight, volume, and activity of any radioactive waste materials to be shipped from the site should be provided. The applicant should categorize the wastes according to whether they are liquid, solid, or gaseous. Any processing required before shipment should be described.

The applicant should provide a table of the principal shipment categories, the types of transportation systems to be employed, and the estimated vehicle miles for each category and transport mode for the first five full years of commercial operation.

The information supplied by the applicant will be used by NRC to estimate (per trip and per year) the radiological dosages to drivers, helpers, and population along the transport route for uranium feed, enriched uranium, and radioactive wastes.

Chapter 5
ENVIRONMENTAL EFFECTS OF ACCIDENTS

The applicant should discuss the environmental effects of possible accidents that may occur at the plant or during the transportation of materials to or from the plant. Include transportation accidents that produce an impact away from the site or its environs.

5.1 Uranium Enrichment Facility Accidents

The applicant should analyze and present in tabular form a spectrum of accidents involving both chemical and radiochemical materials and ranging in severity from trivial to very serious.

The following are examples of accidents that should be considered: fluorine leak, scrubber failure, compressor leak, power failure, water failure, fire, explosion, criticality incident, and rupture or valve failure of a UF_6 cylinder. The cause of each possible accident should be provided, e.g., human error, equipment failure, utility failure, flood, earthquake, or tornado. To the extent possible, each accident should be characterized according to the probability of occurrence.

Source terms applicable to the analyses of the accidents should be derived as follows:

1. Tabulate all chemicals and radiochemicals used in the operation;

2. List the physical form of each material, i.e., liquid, gas, or solid;

3. List the largest in-process and in-storage inventory for each form of each material;

4. Estimate the magnitude of the accidents, including criticality incidents, and the quantities of hazardous materials released as a consequence;

5. Specify the properties of each material that are important with regard to its dispersability and its effects, e.g., particle size distribution, solubility, concentration, and radionuclide distribution;

6. Subject each hazardous material inventory to the assumed accidents and, taking credit for installed engineered safety features, establish the source terms from those inventories that would yield the most damaging effects.

Using the derived source terms, the applicant should assess the environmental impact of each accident in terms of exposure or damage to important biota and the human population. Models used to describe the dispersion of hazardous materials should be explained or referenced.

In evaluating the environmental risk from the entire spectrum of accidents, the applicant need not incorporate the highly conservative assumptions used in evaluating design basis events in the safety analysis report. The SAR analyses serve as bases for deriving performance requirements of engineered safety features, and use of these analyses would result in substantial overestimate of environmental risk. For this reason, all accidents analyzed in the environmental report should be evaluated realistically; that is, the expected consequences of a postulated accident should be calculated.

The applicant should state the radiological and chemical standards that have been used to judge the consequences of the spectrum of accidents analyzed.

In the case of airborne releases, the applicant should use dispersion factors (χ/Q) based on the onsite meteorological data at the 50% probability level. If no site meteorological data are available, the appropriate values should be calculated using data from 5-year U.S. Weather Bureau Summaries* or other authoritative sources, provided applicability of these data to the site is established.

5.2 Transportation Accidents

The potential environmental effects from a spectrum of transportation accidents involving radioactive and nonradioactive materials should be evaluated in a manner similar to that described in Section 5.1. Even though the probability of such an accident may be low and its consequences small, the applicant should identify the environmental effects that might result. Adequate documentation should be presented to provide assurance that all safety requirements will be met before radioactive and nonradioactive materials are transported.

*National Climatic Center, Federal Building, Asheville, N.C.

Chapter 6
EFFLUENT AND ENVIRONMENTAL MEASUREMENTS AND MONITORING PROGRAMS

The purposes of this chapter are (a) to describe the means by which the applicant plans to collect the initial or baseline data presented in other chapters and (b) to describe the applicant's plans and programs for monitoring the environmental impacts of site preparation, plant construction, and plant operation.

Section 6.1 discusses the applicant's program to measure preexisting characteristics of the site and the surrounding region. This program should establish a reference framework or baseline for assessing subsequent environmental effects attributable to the activity. The applicant's attention is directed to two considerations pertinent to this section. First, the term "preexisting" refers to the characteristics of the site before plant construction and operation. A given characteristic or parameter may or may not require assessment before site disturbance and plant construction, depending on whether that particular characteristic may be altered at these stages. Second, in most instances this guide indicates the specific environmental effects that should be evaluated; consequently, the parameters that should be measured will be apparent. In some cases, the applicant may need to establish a monitoring program based on his own identification of potential or possible effects. In such instances, the program should be explained. The applicant should carefully review the plans for measurement of preexisting conditions to ensure that these plans include all factors that should be monitored, as discussed in Section 6.2.

The applicant should discuss the sampling program, including frequency, methodology, calibration and checks with standards, and instrumentation for collection and analysis. Information should be provided on instrument accuracy, sensitivity, and (especially for highly automated systems) reliability. If standard analytical or other techniques are used, they need only be identified and referenced.

6.1 Applicant's Preoperational Environmental Programs

The programs for collecting initial or baseline environmental data before operation should be described in sufficient detail to make it clear that the applicant has established a thorough and comprehensive approach to environmental assessment. The description of these programs should be confined principally to technical descriptions of technique, instrumentation, scheduling, and procedures. Only those parameters that may be related to the construction and operating effects of the plant should be monitored.

If information from the literature has been used by the applicant, it should be concisely summarized and documented by reference to original data sources. Where the availability of original sources that support important conclusions is limited, the applicant should provide either extensive quotations or references to accessible secondary sources. Any reports of work (e.g., ecological surveys) supported by the applicant that are of significant value in assessing the environmental impact of the facility should be included as appendices or supplements to the environmental report if these reports are not otherwise generally available. In all cases, information derived from published results should be clearly distinguished from information derived from the applicant's field measurements.

Analytical models may be used to predict the dispersion of contaminants by surface or ground water or the atmosphere. Such models should be described and supporting evidence of their reliability and validity presented.

6.1.1 Water

If surface or ground water may be affected by the proposed activities of the facility, the applicant should describe the programs by which the background condition of the water was determined. If a natural water body has already been subjected to environmental stress from pollutant sources, the nature of the stress and its consequences should be evaluated and the quality of the affected water body determined.

A projection of effects of the proposed activities on surface and ground water should be provided. Methods for obtaining baseline information (oxygen demand, fluoride concentration, etc.) should be described.

6.1.2. Air

The applicant should describe the program for obtaining information on local air quality and local meteorological conditions. The description should present the methodology for gathering baseline data and show the basis for predicting the dispersion of gaseous effluents.

6.1.3 Land

Data collection programs concerning the terrestrial environment of the proposed facility should be described and justified with regard to both scope and methodology.

6.1.3.1 **Geology and Soils.** The applicant should describe geological and soil studies designed to determine the environmental impact of the construction and operation of the plant. The description should include identification of the sampling pattern and justification for its selection, the sampling method, holding periods and preanalysis treatment, and analytic techniques.

6.1.3.2 **Land Use and Demographic Surveys.** The applicant should describe his program for identifying the actual land use in the site environs and for acquiring the demographic data for the region, as reported in Section 2.2. Sources of information should be identified and their accuracy assessed. Methods used to forecast from data and knowledge of planned developmental activities should be described.

6.1.4 Biota

In this section the applicant should discuss the program used to determine baseline ecological information on important biota (see Section 2.7). In addition, the programs for determining concentrations of chemical pollutants and radioactive material in important biota should be noted.

6.1.5 Radiological Monitoring

The preoperational radiological monitoring program should be described in detail. Include types of samples to be collected, sampling location and frequency, analyses to be performed, and analytical sensitivity. The discussion should include the rationale for the choices of sampling sites, analyses, and frequencies. Review of this section will be aided if the applicant includes maps of sampling locations and a tabular summary of the program.

The applicant should describe how he expects to extend the preoperational program into the operational phase and how the results of the preoperational program may be used to affect the design of the operational program.

6.2 Applicant's Proposed Operational Monitoring Programs

The applicant should present the proposed operational and accident monitoring program for the plant. The "Applicant's Environmental Report-Construction Permit Stage" should include as much information as possible on the proposed operational programs, as well as a discussion and explanation of any anticipated differences between the operational and preoperational programs. The "Applicant's Environmental Report-Operating License Stage" should contain a complete, detailed description of the proposed operational programs.

Review of these descriptions will be facilitated if the applicant includes maps of observation sites and tabular presentations or summary descriptions of such factors as frequency, types of samples, method of collection, analytic method, preanalysis treatment, instrumentation, significance, and minimum sensitivities.

6.2.1 Radiological Monitoring

The applicant should describe the proposed operational and accident monitoring systems and programs. The description should include routine effluent monitoring, environmental monitoring, and a discussion of their significance

6.2.1.1 **Effluent Monitoring Systems.** The applicant should describe the systems to be used to monitor radioactive liquid and gaseous effluents. Discuss the sensitivity limits for detecting radioactivity corresponding to expected routine release rates and accident conditions. Any effluent streams that will not be continuously monitored should be identified. The rationale for the absence of such monitoring should be provided.

6.2.1.2 **Environmental Monitoring.** The applicant should describe the operational surveillance program for radioactive materials in detail. Give specific attention to the types of samples to be collected, the sampling locations and frequency, the analyses to be performed on each sample, and the criteria for investigating increases of concentration of material detected in the environs. The analytical sensitivity for each analysis and the schedule for reporting data collected from the surveillance program should be discussed. Rationale for the choice of sampling locations, frequency, and types of samples to be collected should be presented.

6.2.2 Physical and Chemical Monitoring

The applicant's operational and accident monitoring program for physical and chemical effects should be described for both the effluent monitoring systems and the environmental monitoring program.

6.2.2.1 **Effluent Monitoring Systems.** The applicant should describe the systems for monitoring liquid, gaseous, and solid chemical effluents. Monitoring procedures prescribed by local, state, or federal agencies as conditions of operation should be identified. The sensitivity and reliability of the monitoring systems should be discussed.

If surface or ground water may be affected by plant operations or accidents, the applicant should describe the systems to be used to monitor the potentially affected surface or ground water.

6.2.2.2 **Environmental Monitoring.** The applicant should describe the operational surveillance program for chemicals. Give specific attention to the types of samples to be collected, the sampling locations and frequency, the analyses to be performed on each sample, and the criteria for investigating increases of concentration of material detected in the environs. The analytical sensitivity (detection threshold) for each analysis and the schedule for reporting data collected from the surveillance program should be discussed. Present the rationale for the choice of sampling locations, frequency, and types of samples to be collected.

6.2.3 Meteorological Monitoring

The applicant's program for monitoring meteorological phenomena during plant operation should be described. The information should include the locations of observation stations, instrumentation, and frequency and duration of measurements on which the applicant intends to rely. The basis for each of the applicant's choices should be stated.

6.2.4 Biota Monitoring

In the preoperational surveillance program, the applicant should have established methodology for determining the ecological characteristics of the region. In principle, this methodology should be appropriate for the subsequent monitoring program to be maintained during plant operations. However, the applicant may choose to modify some aspects of his methodology in view of the requirement for protracted monitoring. Such aspects may include frequency and observation sites. These modifications should be described and justified.

6.3 Related Environmental Measurement and Monitoring Programs

If the applicant's site lies within a region where environmental measurement or monitoring programs are carried out by public or other agencies not directly supported by the applicant, these programs should be identified and discussed. Relevance of the findings of such independent programs to the proposed facility should be described, and plans for exchange of information should be presented. Agencies responsible for the programs should be identified and, to the extent possible, the procedures and methodologies used should be briefly described.

Chapter 7
PLANT SITING AND DESIGN ALTERNATIVES

During the selection of a site and a specific plant design, an applicant uses many criteria to choose among the various available alternatives. Some of these criteria are the result of management decisions, while others are established to comply with local, state, and federal regulatory requirements. In this section the applicant should tabulate the criteria used to evaluate alternative sites and designs and, in a side-by-side comparison, show the results of the evaluation. The following factors should be considered when comparing alternative sites:

1. Physical characteristics of the area the demographic, geological, hydrological, meteorological, and seismological conditions of the site and surrounding area.

2. Location of power sources and transmission lines.

3. Location of the major product market.

4. Location of the raw materials, components, and sources of supply.

5. Availability of air, rail, roads, and water for transport of raw materials and supplies, finished products, and solid wastes.

6. Commitment of natural resources for site preparation and plant construction, including but not limited to the destruction or diminution of wildlife habitats, flora, woodlands, and marshlands.

7. Commitment of capital for site preparation and plant construction.

8. Cost of operation, including consideration of labor supply, prevailing regional wage rates, and other recurring or nonrecurring costs.

9. Availability of municipal services and facilities or, conversely, the cost of providing services such as health, education, housing, water treatment, and sewage treatment.

10. Requirements for relocating homes and families.

11. Existing and projected land-use and economic status of the community, i.e., rural, industrial, economically depressed; urban, industrial, stable; rural, agricultural, unstable; rural, recreational; etc.

Table 1 lists several environmental impacts that could lead to violation of regulatory criteria and that should be considered when comparing alternative plant designs.

Many regulatory criteria are specified in terms of quantitative standards and several alternatives will satisfy these standards. If the applicant makes a choice from several alternatives, all of which satisfy regulatory criteria, he should discuss in detail the reasons, including cost effectiveness, for choosing the particular design alternative.

Some criteria are not currently quantified because there is insufficient data on the effects of these impacts. This is particularly true for criteria dealing with environmental impacts. In such cases, the applicant should show the incremental increase in cost for an incremental decrease in impact and should discuss how the alternative selected adequately fulfills the criteria.

Only design aspects that could have an effect on the environment should be discussed.

TABLE 1

ENVIRONMENTAL FACTORS THAT SHOULD BE USED IN COMPARING ALTERNATIVE PLANT SYSTEMS

	Source of Impact	*Population or Resources Affected*	*Effect and Methods of Computation*	*Unit of Measure**
1. Water				
1.1	Discharge of chemicals to surface or ground water	Water supply of other users	Water quality may be impaired. Calculate the volume of water required to dilute chemical releases to values called for by applicable standards or to values estimated as lethal to important species in receiving waters. Express the volumes required for adequate dilution as a percentage of the annual minimum value of the daily net flow and indicate highest such percentage. Include the total solids if this is a limiting factor.	Acre-feet, %
		Fish** and wildlife	Water bodies and wetlands may be made uninhabitable for fish and wildlife because of excessive concentrations of chemicals, a reduction in dissolved oxygen concentration, or a reduction in food resources. Calculate the area impaired by chemical discharges and estimate loss of fish and wildlife.	Acres, pounds per year (by species)
		Plants	Ground-water contamination may affect trees and deep-rooted vegetation. Estimate area affected and report separately by land use. Specify such uses as recreational, agricultural, and residential.	Acres
		People	Ground-water contamination may affect nearby drinking water supplies. Compute annual loss of potable water.	Gallons per year
			Recreational water uses (boating, fishing, swimming) may be inhibited. Using factors such as stream cross section and annual minimum flow characteristics, determine on the basis of the daily chemical discharge the surface area or feet of shoreline required for dilution of chemicals to accepted water quality standards. Based on annual number of visitors to the affected shoreline, estimate the number of lost user-days per year. Any possible eutrophication effects should be estimated and included as a degradation of quality.	Shoreline distance, annual user-day
1.2	Discharge of radioactive materials to surface or ground waters	Water supply of other users	Water quality may be impaired. Calculate the concentration of each radionuclide at the point of discharge and at approximately 1000-foot intervals for a distance of 1 mile from the point of discharge. On a percentage basis compare the calculated concentrations with the values given for each of the radioisotopes in 10 CFR Part 20, Appendix B, Table II.	Percent

*Applicant may substitute an alternative unit of measure, where convenient. Such a measure should be related quantitatively to the unit of measure shown in this table.

**"Fish" as used in this table includes shellfish and other aquatic invertebrates.

TABLE 1 (continued)

	Source of Impact	*Population or Resources Affected*	*Effect and Methods of Computation*	*Unit of Measure**
1.2	(Cont'd)	Plants, fish, wildlife, and animals	Radionuclides discharged to surface waters or which enter ground water supplies may reconcentrate in plants, fish, wildlife, and animals. Estimate the uptake in different species and transfer between species. Sum dose contributions for radionuclides expected to be released.	Rads per year
		People	Radionuclides ingested with food and water will add to natural background radiation. Estimate biological accumulation in foods and intake by individuals and population groups. Sum dose contributions for radionuclides ingested.	Rems per year for individuals and man-rems per year for population
1.3	Water Consumption	Agriculture	Water may be withdrawn from agricultural usage and use of remaining water may be degraded. Calculate the volume of irrigation water withdrawn and the volume of dilution water required to reduce the dissolved solids concentration in the remaining water to an agriculturally acceptable level.	Acre-feet per year
		Industry	Water may be withdrawn from industrial usage. Calculate annual volume consumed.	Gallons per year
		People	Drinking water supplies may be diminished. Estimate the volume lost and the cost of replacement water.	Gallons per year
1.4	Heat dissipation	Aquatic biota	Temperature changes may affect aquatic species and the food base which supports them. Calculate the temperature increase in the mixing zone and the volume of water affected. Estimate loss of aquatic biota.	°C, acre-feet, pounds per year (by species)
1.5	Site preparation and plant construction	Water quality	Physical properties such as turbidity and color or chemical properties of natural waters may be impaired because of plant construction. Estimate the surface area of the affected water and calculate the volume of dilution water required to meet applicable water quality standards. (See 1.1.)	Acres and acre-feet
2. Air				
2.1	Discharge of chemicals to ambient air	Air quality, chemical	Pollutant emissions may diminish the quality of the local ambient air. The actual concentration of each pollutant (in parts per million) for maximum daily emission rate should be expressed as a percentage of the applicable emission standard or guideline. Report weight for expected annual emissions. Report possible effects on sensitive flora.	Percent and pounds or tons
		Air quality, odor	Odor in gaseous discharge or from discharge to water body may be objectionable. A statement should be made as to whether odor originating in plant is perceptible at any point offsite.	Statement

TABLE 1 (Continued)

	Source of Impact	*Population or Resources Affected*	*Effect and Methods of Computation*	*Unit of Measure**
2.2	Discharge of radionuclides to ambient air	Plants and animals	Radionuclide discharge may add to natural background radioactivity of local plant and animal life. Estimate deposit of radionuclides on, and uptake in, plants and animals. Sum dose expected from all releases.	Rads per year
		People, ingestion	Radionuclide discharge may add to the natural radioactivity in water bodies, soil, vegetation, and animal life. For radionuclides expected to be released, estimate deposit and accumulation in foods. Estimate intakes by individuals and populations and sum resulting dose for all expected radionuclides.	Rems per year for individuals (whole body and organ); man-rem per year for population
3. Other				
3.1	Land use during plant construction and operation	Land area	Land will be preempted for construction and operation of the plant. State the type and amount of land preempted according to its use (i.e., scenic, shoreline wetland, forest, farm land, etc.,) during both construction and operational phases.	Acres
		Land erosion	Cut and fill operations may increase erosion potential. Estimate the area and the amount of soil displaced and discuss detrimental and beneficial effects.	Acres, cubic yards, and statement
3.2	Loss of amenities during plant construction and operation due to noise and traffic	People	Noise and traffic may introduce undesirable qualities in the local environment. Estimate the number of residences, schools, hospitals, and population that will be affected and the duration of the effect for both construction and operational phases. Use Department Circular 1390.2 on Noise Abatement and Control (Department of Housing and Urban Development) to establish the degree of acceptability of noise.	Total population affected, years of duration
3.3	Aesthetic appeal	People	The landscape may be changed beneficially or detrimentally by the construction and operation of the facility. Qualified opinions including those of local and regional authorities should be rendered.	Statements
3.4	Accessibility to historical or archaeological sites	People	Access to historical or archaeological sites may be impeded or improved. Estimate the change in the annual number of visitors to historical sites and obtain opinions from local, state, and federal agencies regarding the change in the archaeological value of the site.	Visitors per year and statements
3.5	Change in area of wildlife habitat	Wildlife	The effects of plant construction and operation may be detrimental or beneficial. Obtain opinions from qualified local and state wildlife authorities.	Statements

Chapter 8
BENEFIT-COST ANALYSIS

The first six chapters of the environmental report should have described the site, the plant, the environmental effects of normal operation and accident conditions, and the monitoring program for the proposed facility. The seventh chapter should describe why the specific plant design on the particular site is, in the applicant's judgment, the most desirable combination of alternatives. This chapter should demonstrate through a benefit-cost analysis of the proposed plant why in the applicant's judgment the aggregate benefits outweigh the aggregate costs. Even though the NRC will independently prepare a benefit-cost analysis of the proposed plant in its Environmental Statement, the applicant should perform his own analysis to aid the NRC in its evaluation.

The applicant should note that the major objective of the preparation of the environmental report is to demonstrate that the aggregate benefits outweigh the aggregate costs for the proposed plant. Therefore, the tabulation and assessment of costs and benefits must be thorough and complete. A simple numerical weighing of benefits against costs is not feasible here because the majority of these impacts cannot be monetized and the selected criteria for assessment are not directly comparable. However, the applicant should use all the material developed for this report and presented in Chapters 1 through 7 to provide his best documented judgment of the aggregate plant impact.

In presenting the benefit-cost analysis for the proposed plant, the applicant should consider both the socioeconomic and environmental effects of plant construction and operation. Table 2 lists many of the economic and social impacts that should be assessed in terms of benefits and costs. The applicant should evaluate his particular situation, adding or subtracting items from the list as necessary for his use. The environmental factors to be considered have been discussed in Chapter 4; a checklist is shown in Table 3.

The benefit and cost factors for the plant should be summarized in a table. This table should make clear what the applicant considers to be the important benefits and costs of the proposed plant. A subsequent narrative should explain why, in the judgment of the applicant, the former outweigh the latter.

In developing the table, the applicant should use the methods and units indicated in the second column of Tables 2 and 3 for assessing and comparing benefits and costs where these are expressed in nonmonetary or qualitative terms. The table should also indicate, for each benefit or cost where applicable, who is likely to be affected and for how long; the section and page number in the report where it is discussed; and any special measures to be taken to alleviate an impact.

The applicant should carefully describe, in narrative form, any aggregation of effects. Discuss in detail the trade-offs that were made to justify the proposed plant. If any of the benefits or costs specified in Tables 2 and 3 are not used in the applicant's analysis, the rationale for omitting them should be explained.

TABLE 2

BENEFITS/COSTS OF SOCIOECONOMIC FACTORS ASSOCIATED WITH PLANT CONSTRUCTION AND OPERATION

Socioeconomic Factor	*Method of Determining Benefits/Costs**
1. Quantitative Factors	
1.1 Value of enriched uranium produced	Dollars
1.2 Tax revenues to be received by local, state, and federal government	"
1.3 New jobs (payroll) created at plant (T, P)**	"
1.4 Increased employment opportunities resulting from local purchase of goods and services	"
1.5 Increased local income resulting from local purchase of goods and services	"
1.6 Incremental change in regional product	"
1.7 Capital costs of land acquisition and improvement	"
1.8 Capital costs of plant construction	"
1.9 Operating and maintenance costs	"
1.10 Plant decommissioning costs	"
1.11 Research and development costs associated with potential future improvements in the plant	"
1.12 Increased costs to local government for the services required by the permanent increase in local workers and their families	"
1.13 Other	

*When benefits/costs are expressed in dollars, they should be discounted to present worth and annualized.
**T- temporary (during construction and startup).
P--permanent (during operation).

TABLE 2 (continued)

Socioeconomic Factor	*Method of Determining Benefits/Costs*
2. Qualitative Factors	
2.1 Disruption of people's lives (or the community) caused by acquisition of land for the plant site (T, P)	Discuss; provide numbers affected, how affected, acreage and original use, cost (based on state standards).
2.2 Overload of water supply, sewage treatment facilities, schools, or other public facilities (T, P)	Discuss; provide numbers affected, extent of overloading, cost, etc.
2.3 Inflationary rentals or prices and housing shortages resulting from sudden influx of personnel (T, P)	Discuss; provide numbers affected, cost, etc.
2.4 Congestion of local streets and highways (T, P)	Discuss; provide numbers affected, time lost, extent of congestion, cost, etc.
2.5 Incentive to development of other industry resulting from presence of plant	Discuss; provide data on other plants constructed or expanded because of influences of the plant. Discuss any adverse effects on business.
2.6 Availability of site personnel and equipment (e.g., fire-fighting, medical, radiological) to supplement local facilities (P)	Type of service, number, level of skill or capability, availability.
2.7 Impairment of recreational values resulting from decreased availability of sport animals, restrictions of access to preferred recreational areas (T, P)	Reduction in hunting, fishing, or camping permits, reduction in sales levels of related businesses, increase in individual complaints, or community dissatisfaction.
2.8 Deterioration of aesthetic and scenic values (T, P)	Discuss; relate to community or expert opinion.
2.9 Restrictions on access to areas of scenic, historic, or cultural interest (T, P)	Discuss; determine sites to be displaced, reduction in visitors per year to restricted sites, loss in local revenues.
2.10 Degradation of areas having historic, cultural, natural, or archaeological value (T, P)	Discuss; determine reduction in visitors per year, loss in local revenues.
2.11 Removal of land from present or contemplated alternative uses (P)	Discuss; original use contemplated, effects.
2.12 Change in real estate values in areas adjacent to the proposed facility (T, P)	Monetary units; percentage variation.

TABLE 3

BENEFITS/COSTS OF ENVIRONMENTAL FACTORS ASSOCIATED WITH PLANT CONSTRUCTION AND OPERATION

Environmental Factor	*Method of Determining Benefits/Costs**
1. Effects of Site Preparation and Plant Construction	
1.1 Disturbance of existing terrain; commitment of land (T, P)**	Number of acres, changes in planned use.
1.2 Disturbance of flora on site (T, P)	Type, degree, importance of species.
1.3 Landscaping (T, P)	Type, acreage.
1.4 Land conservation measures (P)	Discuss each separately; judge degree of effectiveness, acreage involved, cost per acre.
1.5 Erosion control measures (T, P)	Discuss each separately; judge degree of effectiveness, acreage involved, cost per acre.
1.6 Dust stabilization measures of site (T, P)	Discuss each separately; judge degree of effectiveness, acreage involved, cost per acre.
1.7 Change in aesthetic values at site (T, P)	Discuss; include expert opinions when available.
1.8 Change in aesthetic values of adjacent water bodies	Discuss; include expert opinions when available.
1.9 Disturbance of, or benefits to, wildlife habitats, land (T, P)	Type, degree, importance of species.
1.10 Disturbance of, or benefits to, fish and wildlife resources water (T, P)	Type, degree, importance of species.
1.11 Restoration of affected animal habitats (T, P)	Extent (number) of restoration for each species.
1.12 Relocation of housing for people (T, P)	Number, location, type of dwelling; how accomplished.
1.13 Change in accessibility of historical and archaeological sites (T, P)	Discuss each individually, degree of change, no. of visitors per year affected.
1.14 Access to roads (T, P)	Provide map showing locations.

*When benefits/costs are expressed in dollars, they should be discounted to present worth and annualized.
**T - temporary (during construction and startup).
P - permanent (during operation).

Table 3 (continued)

Environmental Factor	*Method of Determining Benefits/Costs*
1.15 Noise and vibration from equipment or explosives (T)	Discuss level (dB), frequency, and distance to nearest population (see 2.5.3).
1.16 Change in local traffic patterns and volume (T, P)	Number of vehicles affected; problems of congestion, safety, pollution.
1.17 Control of construction truck traffic (T)	Discuss measures taken.
1.18 Trash disposal (T)	Volume, type location, problems of safety, pollution.
1.19 Building supply or staging areas (T)	Location, acreage, type of materials.
1.20 Change in water quality (T)	Type of impurity, concentration, change in usability of water to each species, extent (acre-feet).
1.21 Change in water supply (T)	Volumetric change, species affected, alternatives.
1.22 Pollution control measures (T)	Discuss; state degree of control over each source.
1.23 Inconvenience created by movement of men, materials, and machines (T)	Discuss effect on individuals and community (include secondary effects).
1.24 Provision of housing for workers and families (T)	Discuss effect on individuals and community (include secondary effects).
1.25 Provision of transportation for workers and families (T)	Discuss effect on individuals and community (include secondary effects).
1.26 Provision of services (including health and educational facilities) for workers and families (T)	Discuss effect on individuals and community (include secondary effects).
1.27 Other	
2. Effects of Plant Operation	
2.1 Chemical impacts	
2.1.1 Impairment of water quality	Concentrations above natural ambient at discharge and at specified distances compared with standards, dilution volume required to meet standards for each chemical.

TABLE 3 (continued)

Environmental Factor	*Method of Determining Benefits/Costs*
2.1.2 Effect on aquatic organisms by toxic levels of discharge or by reduced oxygen concentrations	Estimate effect (reduction in number, vigor, size, etc.) on individual species.
2.1.3 Impairment of recreational water uses (boating, fishing, swimming)	Lost annual user days, area (acres), shoreline miles affected.
2.1.4 Contamination of drinking water of nearby communities through contamination of ground water	Annual loss of potable water (gallons per year).
2.1.5 Impairment of usability of wildlife habitats	Area (acres) of wet land, water surface, or terrestrial habitats by species.
2.1.6 Effects on plant life of contamination of ground water	Area (acres) adversely affected; distinguish acreage by use.
2.1.7 Impairment of quality of local ambient air through emission of pollutants	Percentage of allowable daily emission standard released for each pollutant.
2.1.8 Impairment of quality of life or aesthetics through perception of chemical release in air or water	Discuss; include data on distance from site at which release is perceived. Include effects on sensitive flora.
2.1.9 Long-term effect of effluents on man-made structures	Discuss; provide accepted industry data and standards.
2.2 Radiological Impacts	
2.2.1 Radionuclide discharge to receiving water which adds to natural background radiation levels in:	
a. Aquatic and terrestrial organisms significant to human food chains	Radionuclide concentrations (μCi/cc).
b. People through ingestion of food and water	Estimate accumulation in food, whole body and organ doses on intake (rem per year—individual; man-rem per year—population).
2.2.2 Radionuclide discharge to ambient air which adds to natural background radiation levels in:	
a. Ambient air, plants and animals significant to human food chains	Radionuclide concentrations (μCi/cc).
b. People through inhalation and ingestion of food crops and animals	Estimate deposition on and accumulation in foods, whole body and organ doses on intake (rem per year—individual; man-rem per year—population).

TABLE 3 (continued)

Environmental Factor	*Method of Determining Benefits/Costs*
2.3 Heat dissipation	Discuss; include temperature increases and volume of water affected; compare with applicable standards. Describe effects such as fog and icing. Estimate effects on local flora and fauna and on human population.
2.4 Biological impacts, sanitary and other waste discharges	Discuss; describe types, quantity of discharge, points of discharge and dilution. Compare with accepted standard. Where discharge is chemical, relate to impacts in 2.1 above. Estimate biological effects on local flora and fauna; discuss perception offsite; etc.
2.5 Other effects of plant operation	
2.5.1 Increased knowledge of environment from plant operation and R&D	Discuss; include specific types of data to be accumulated and where information is applicable.
2.5.2 Consumptive use of water at plant which diminishes supply available from the water body for people or agricultural use	Potential water withdrawn (gallons per year); estimate cost of replacement.
2.5.3 Noise from plant operation	Classify noise levels by category (use OSHA guidelines in 39 FR 23596 and Department of Housing and Urban Development guidelines); include number of residences, school population, hospital beds.
2.5.4 Interaction of the plant with other neighboring plants which effects the radiological, chemical, biological, or other impacts	Use appropriate standard for each impact.
2.5.5 Combined effects of a number of impacts (where measure of separate impacts does not adequately measure total effects)	Use appropriate standards for each impact.
2.5.6 Other	

Chapter 9
ENVIRONMENTAL APPROVALS AND CONSULTATIONS

The applicant should list all licenses, permits, and other approvals of construction and operation required by federal, state, local, and regional authorities for the protection of the environment. He should list those federal and state approvals that have already been received and indicate the status of approvals yet to be obtained. For general background, he should submit similar information regarding approvals, licenses, and contacts with local authorities.

The applicant should discuss the status of efforts to obtain a water quality certification under Section 401 of the Federal Water Pollution Control Act, as amended. If certification has not already been obtained, he should indicate when it is expected. If certification is not required, the applicant should provide an explanation.

In view of the effects of the plant on the economic development of the region in which it is located, the applicant should also note the state, local, and regional planning authorities contacted or consulted. OMB Circular A95 identifies the state, metropolitan, and regional clearinghouses. (A listing of applicable clearinghouses may be obtained from the NRC).

The applicant should cite meetings held with environmental and other citizen groups and indicate specific instances of applicant response to the recommendations of citizens groups.

Chapter 10
REFERENCES

The applicant should provide a bibliography of all sources used in preparation of the environmental report. References cited should be keyed to the specific sections and page numbers to which they apply.