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Revision 2

USNRC REGULATORY GUIDE SERIES

REGULATORY GUIDE 4.2, REVISION 2

PREPARATION OF ENVIRONMENTAL REPORTS FOR NUCLEAR POWER STATIONS

JULY 1976

U.S. NUCLEAR REGULATORY COMMISSION

(b) Siltation and sedimentation processes;

(c) Dredging activities and disposal of dredged materials; and

(d) Location of structures in or affecting navigable waters.

The Commission is developing specific guidance concerning the information to be requested from applicants in order to meet the provisions of this Memorandum of Understanding. As various implementing actions are taken, appropriate changes will be made in this guide.

4. Commission Action on Environmental Reports

As noted in §51.50, "*Federal Register* notices; distribution of reports; public announcements; public comment," of 10 CFR Part 51, the NRC places a copy of each applicant's environmental report in the Commission's 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. In addition, a public announcement is made, and a summary notice of the availability of the report is published in the *Federal Register.*

The applicant's environmental report and any comments received from interested persons are considered by the NRC staff in preparing a Draft Environmental Impact Statement (DES) concerning the proposed licensing action. The NRC staff's draft statement, the applicant's environmental report, and any comments received on the statement or report are provided to the Council on Environmental Quality. Copies of the draft statement and the applicant's environmental report will be provided to (a) those Federal agencies that have special expertise or jurisdiction by law with respect to any environmental impacts involved and which are authorized to develop and enforce relevant environmental standards; (b) the Environmental Protection Agency; and (c) the appropriate State and local agencies authorized to develop and enforce relevant environmental standards and the appropriate State, regional, and metropolitan clearinghouses. A reasonable effort will be made to distribute draft environmental statements prepared for licensing actions to all States that may be affected and to appropriate national and local environmental organizations. The draft statement is made available to the general public in the same manner as is the applicant's environmental report. Comments on the applicant's environmental report and the draft statement are requested within a specified time interval. These activities are based on §§51.22, 51.24, and 51.25 of 10 CFR Part 51.

As described in detail in §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 Impact Statement (FES). The final statement is transmitted to the Council on Environmental Quality and is made available to appropriate Federal, State, and local agencies and State, regional, and metropolitan clearinghouses. A public announcement is made and a notice of availability is published in the *Federal Register.*

Subsequent hearings and actions 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 the NRC's Final Environmental Impact Statement. 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.

5. Cost-Benefit Analysis

The cost-benefit analysis referred to in paragraph 51.20(b) of 10 CFR Part 51 should consist of two parts. In the first part, alternative site-plant combinations (site-plant combinations are defined and discussed in Chapter 9) and station systems should be examined in order to show that the proposed facility is the cost-effective choice, considering economic, social, and other environmental factors and any institutional (governmental, etc.) constraints. In the second part of the cost-benefit analysis, the benefits to be created by the proposed facility should be weighed against the aggregate of environmental, economic, and other costs to be incurred.

6. Environmental Reports

Sections 51.20 and 51.21 of 10 CFR Part 51 require the applicant to submit two environmental reports (see Appendices A and B). The first is the "Applicant's Environmental Report – Construction Permit Stage," which must be submitted in conjunction with the construction permit application. The second is the "Applicant's Environmental Report – Operating License Stage," which must be submitted later in conjunction with the operating license application. The applicant's environmental reports are important documents of public record. Therefore, the applicant is urged to give full attention to their completeness.

If the site for a nuclear power station already contains one or more units (i.e., steam-electric plants) in operation, under construction, or for which an application for a construction permit or operating license has been filed, the applicant should consider the environ-

mental effects of the proposed units (and their inservice schedule) in conjunction with the effects of existing or planned units. Furthermore, if the site contains significant sources of environmental impact other than electric power units, the interactions of these sources with the proposed nuclear unit should be taken into account.

Effects between units are considered especially important as efforts to conserve such resources as water focus on the transfer and reuse of materials within plant complexes. In addition, adjacent or contiguous facilities involving the potential interchange of radionuclides should be treated in considerable detail to ensure the applicant's full knowledge of interrelationships with the proposed nuclear station.

a. Construction Permit Stage

The applicant should present sufficient information in the environmental report that is submitted with the application for a construction permit to allow staff evaluation of the potential environmental impact of constructing and operating the proposed facility. In all cases, the site-specific environmental data presented at the time of filing for a construction permit should (1) document the critical life stages and biologically significant activities (e.g., spawning, nesting, migration) that increase the vulnerability of the potentially affected biota at the proposed site and (2) characterize the seasonal variations of biota likely to be affected by the station.

An applicant wishing to accelerate the start of construction by early submittal of the environmental report (according to the procedure set forth in paragraph 50.10(e) of 10 CFR Part 50) may submit an initial evaluation of environmental impact based on an analysis of at least 6 months of field data related to the proposed facility and suitable projections of the remaining seasonal periods if the information called for in item (1) above is provided. If this is done, the applicant should also make a commitment to furnish, within 6 months of the time of filing, a final evaluation based on a full year of field data.

b. Operating License Stage

The "Applicant's Environmental Report – Operating License Stage" should, in effect, be an updating of the earlier report and should:

(1) Discuss differences between currently projected environmental effects of the nuclear power station (including those that would degrade and those that would enhance environmental conditions) and the effects discussed in the environmental report submitted at the construction stage. (Differences may result, for example, from changes in plans, changes in station design, availability of new or more detailed information, or changes in surrounding land use, water use, or zoning classifications.)

(2) Discuss the results of studies that were not completed at the time of preconstruction review and that were specified to be completed before the preoperational review. Indicate how the results of these studies were factored into the design and proposed operation of the station.

(3) Describe the scope of the monitoring programs that have been and will be undertaken to determine the effects of the operating station on the environment. Include any monitoring programs being developed or carried out in cooperation with Federal and State fish and wildlife services. The result of preoperational monitoring activities should be presented (refer to Chapter 6 of Section B of this guide). A listing of types of measurements, kinds and numbers of samples collected, frequencies, and analyses should be provided and the locations described and indicated on a map of the area.

(4) Discuss planned studies, not yet completed, that may yield results relevant to the environmental impact of the station.

(5) Propose environmental technical specifications. The recommended format for these specifications is presented in Regulatory Guide 4.8, "Environmental Technical Specifications for Nuclear Power Plants." Detailed technical specifications may become an appendix to the applicant's "Environmental Report – Operating License Stage," but the body of the report need only include the required discussion of general scope described in Section 6.2 of this guide. Interim guidance will continue to be provided on a case-by-case basis.

7. Preparation of Environmental Reports

a. Purpose of This Guide

Section B of this guide identifies the information needed by the staff in its assessment of the potential environmental effects of the proposed nuclear facility and establishes a format acceptable to the staff for its presentation. Use of the format of this guide will help ensure the completeness of the information provided, will assist the NRC staff and others in locating the information, and will aid in shortening the time needed for the review process. Conformance with this format, however, is not required. An environmental report with a different format will be acceptable to the staff if it provides an adequate basis for the findings requisite to the issuance of a license or permit. However, because it may be more difficult to locate needed information, the staff review time for such a report may be longer, and there is a greater likelihood that the staff may regard the report as incomplete.

The staff plans to provide additional information on a data retrieval system (outlined in Appendix C) in a future revision of this guide.

In developing the implementation policy for Regulatory Guide 4.2, Revision 2, both the difficulties that applicants might face unless a suitable transition period was provided and the NRC staff's need for information to complete the review of applications for construction permits and operating licenses have been considered. Therefore, the NRC staff will use Regulatory Guide 4.2, Revision 2, in the evaluation of environmental reports submitted in connection with applications docketed after December 31, 1976.

If an applicant wishes to use this revision in developing the environmental report submitted in connection with an application docketed on or prior to December 31, 1976, the report will be evaluated on the basis of pertinent portions of this revision of the guide.

b. Scope

In order to cover a wide variety of anticipated situations, the scope of this guide is comprehensive. In some instances, requests for specific information may not be applicable to a particular station or site.

Some of the text of this guide (e.g., Section 7.1) has been written with specific reference to light-water-cooled reactors. For applicants proposing to construct and operate other types of reactors, guidelines on the recommended content of these sections will be provided on a case-by-case basis. Similarly, offshore power systems will, in general, require special guidelines for each individual case.

c. Presentation of Information

Some of the information to be included in the environmental report (e.g., that pertaining to demography, meteorology, hydrology) may have already been prepared by the applicant during consideration of the safety aspects of the proposed facility. In such cases, this information (whether in the form of text, tables, or figures) should be incorporated in the environmental report where appropriate to avoid duplication of effort. The presentation in the environmental report of some information that also appears in the applicant's safety analysis report is necessary because these reports are responsive to different statutory requirements and because each report should be essentially self-contained.

The applicant should strive for clear, concise presentations of the information provided in the environmental report. Each subject should be treated in sufficient depth and should be documented[6] to permit a reviewer to evaluate the extent of the environmental impact independently. The length of the environmental report will depend on the nature of the station and its environment. Tables, line drawings, and photographs should be used wherever they contribute to the clarity and brevity of the report. The number of significant figures stated in numerical data should reflect the accuracy of the data.

Pertinent published information relating to the site, the station, and its surroundings should be referenced. Where published information is essential for evaluation of specific environmental effects of the station construction and operation, it should be included, in summary or verbatim form, in the environmental report or as an appendix to the report. In particular, water quality standards and regulations relevant to the environmental impact assessment should be given in an appendix. If the applicant considers the reports of work it supported will contribute to the environmental impact analysis, these may be included as appendices.

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[6]*Documentation* as used in this guide means presentation of information, supporting data, and statements and includes (1) references to published information, (2) citations from the applicant's experience, and (3) reference to unpublished information developed by the applicant or the applicant's consultants. Statements not supported by documentation are acceptable provided the applicant identifies them either as information for which documentation is not available or as expressions of belief or judgment.

B. STANDARD FORMAT AND CONTENT OF ENVIRONMENTAL REPORTS

CHAPTER 1
PURPOSE OF THE PROPOSED FACILITY AND ASSOCIATED TRANSMISSION

In Chapter 1 of its environmental report, the applicant should demonstrate the purpose of, and thus the benefits of, the proposed facility with respect to the power requirements to be satisfied, the system reliability to be achieved, or any other primary objectives of the facility and how these objectives would be affected by variations in the scheduled operation of the proposed station. In this chapter, the term "applicant's system" includes all existing, committed, and planned generating units owned in whole or in part by the applicant and all large (greater than 100 MWe), existing, committed, and planned generating units not owned in whole or in part by the applicant that it plans to rely on for meeting demand and reliability requirements to which it is committed.

1.1 System Demand and Reliability

This section should discuss the requirements for the proposed nuclear unit(s) in the applicant's system and in the region, considering the overall power supply situation, past load and projected load, and reserve margins. In addition, the applicant should consider the impact of applicable energy conservation and other potential load-affecting programs on its planning effort. Inconsistencies between the data presented and that furnished to the Federal Power Commission (FPC) or the regional reliability council should be explained.

The discussion on the applicant's energy conservation program should mention the steps that have been taken and those being planned to encourage energy conservation in connection with such matters as advertising, sales promotion, consumer education, rate structure, and efficiency of production and utilization of electricity. Evidence of the effects of increasing rates on consumption of electrical energy and forecasts of future impacts on demand from further rate increases should be included in the discussion.

A full and clear description of the applicant's system should be provided, including, for each generating unit or group of units, the extent of ownership by the applicant and the commitments involved. Where an entire power pool, planning area, reliability council, coordinating agreement, etc., is involved, identification should be clear and details should be presented in separate tables.

1.1.1 Load Characteristics

In order to portray the relationship of the proposed generating facility to the applicant's system and related systems, data should be provided on the following: (a) the applicant's system, (b) the power pool or area within which the applicant's planning studies are based, and (c) where available, the regional reliability council or the appropriate subregion or area of the reliability council as follows:

1.1.1.1 Load Analysis. The past annual peak load demands and the annual energy requirements for a period beginning at least 10 years prior to the filing of the environmental report should be reported. In addition, the future projected annual peak demand should be reported from the year of filing of the environmental report up to and including, as a minimum, the first 24 months following start of commercial operation of the last unit with which this report is concerned. To the extent feasible, the applicant should also present future demands during the expected life of the facilities under review.

The applicant should present the expected annual load duration curve for at least 24 months following the start of commercial operation of the proposed nuclear station in order to show the relationship of the station to the short-term system requirements.

1.1.1.2 Demand Projections. Demand projections should show explicitly any assumptions made about economic and demographic projections involved in the forecasting methodology. Specifically, any changes in the demand projections expected on the basis of alternative assumptions made about household formation, migration, personal income, industrial and commercial construction volume and location, or other factors should be specified. Past and future growth trends should be compared and explanations should be given for deviations in trends.

Monthly data for both actual and latest forecast peak load should be provided, as well as both actual and latest forecast total monthly kWh sales from October 1972 through the most current month. A copy of the reports supplied to the FPC in accordance with FPC Order 496 should also be provided in an appendix to the environmental report.

The applicant should describe its forecasting methods. Where regression equations or elasticity demand models are used to estimate projections, all statistical measures of correlation should be provided. If the method of correlation forecasting is used, the historic electric loads should be correlated with such variables as population, gross national product, consumer income, Federal Reserve Board Index of Industrial Production, appliance saturation, or other factors. Wherever possible

and to the extent that demand projections are based on the accuracy of past demand projections for the applicant's system performed on the same or a comparable basis, these past demand projections should be shown and compared with the past loads. This comparison of the applicant's earlier projections and the actual loads experienced should be listed in a table along with the percent deviation between the previously forecasted loads and past loads.

1.1.1.3 Power Exchanges. Past and expected future net power exchanges applicable at the time of the annual peak demands presented above should be shown as they relate to demand estimates supporting the station capacity under review.

1.1.2 System Capacity

The applicant should briefly discuss power planning programs and criteria used as they apply (a) to the applicant's system, (b) to the power pool or area within which the applicant's planning studies are based, and (c) to the regional reliability council or the appropriate subregion or area of the reliability council. System capabilities, both existing and planned, should be tabulated for the three respective areas to the extent applicable at the time of the annual peak demand for 5 years preceding filing of the environmental report through at least 2 years beyond the start of commercial operation of the last nuclear unit with which the report is concerned. Each generator with a capacity of 100 MWe or greater should be listed separately for the initial reporting year, and capability additions thereafter should be separately tabulated by date, including net non-firm-power sales and purchases, retirements or deratings, and upratings. Each generator should be categorized as to type (hydroelectric, fossil, nuclear, pumped storage, etc.) and as to function (base load, intermediate, peaking, etc.). Estimates of projected capacity factor ranges for each unit tabulated should be provided. Small peaking units may be lumped into a single category for simplicity.

1.1.3 Reserve Margins

The applicant's method of determining system generating capacity requirements and reserve margins should be described including:

1. The method employed for the scheduling of outages of individual generating units within the applicant's system.

2. The method and criterion employed to determine the minimum system reserve requirement, such as single largest unit, probability method, or historical data and judgment. If probabilistic studies are used as a planning tool, the results should be stated along with the significant input data utilized, such as the load model generating unit characteristics, unit availability, the duration of periods examined, treatment of interconnections, and a general description of the methodology employed.

3. The effect of operation of the proposed nuclear unit(s) on the applicant's or planning entity's capacity requirements. In addition, the effects of present and planned interconnections on the capacity requirements should be discussed.

4. The reserve margin responsibility of participants in the regional coordinating council or power pool.

1.1.4 External Supporting Studies

Reports should be summarized and referenced or statements should be included that indicate the power requirements in the overall area(s), as determined by responsible officials in the regional reliability council and/or the power pool or planning entity with which the applicant is associated.

The report or statements should include the following information or a statement that such information is not available:

1. Description of the minimum installed reserve criterion for the region and/or subarea;

2. Identification, description, and brief discussion of studies and/or analyses made to assess the area-wide adequacy and expected reliability of power supply for the first full year of commercial operation of the entire station covered in this report; and

3. The minimum reserve requirement in the region and/or subarea for the first year of operation of the completed nuclear station.

1.2 Other Objectives

If other objectives are to be met by the operation of the proposed facility, such as producing process steam for sale or desalting water, a description of these should be given. An analysis of the effect of other objectives on the station capacity factor or availability of individual units should be given.

1.3 Consequences of Delay

The effects of delays in the proposed project on the reserve margin of the power supply for the applicant's system, subregion, and region should be discussed for increments of delay of 1, 2, and 3 years. The effect of no action to increase capacity should also be illustrated.

CHAPTER 2

THE SITE AND ENVIRONMENTAL INTERFACES

This chapter should present the basic relevant information concerning those physical, biological, and human characteristics of the area environment that might be affected by the construction and operation of a nuclear power station on the designated site. To the extent possible, the information presented should reflect observations and measurements made over a period of years.

2.1 Geography and Demography

2.1.1 Site Location and Description

2.1.1.1 Specification of Location. The site location should be specified by latitude and longitude of the reactor to the nearest second and by Universal Transverse Mercator Coordinates (Zone Number, Northing, and Easting, as found on USGS topographical maps) to the nearest 100 meters. The State and county or other political subdivision in which the site is located should be identified, as well as the location of the site with respect to prominent natural and man-made features such as rivers and lakes.

2.1.1.2 Site[1] Area. A map of the site area of suitable scale (with explanatory text as necessary) should be included; it should clearly show the following:

1. The station property lines. The area of station property in acres should be stated.

2. Location of the site boundary. If the site boundary lines are the same as the station property lines, this should be stated.

3. The location and orientation of principal station structures within the site area. Principal structures should be identified as to function (e.g., reactor building, auxiliary building, turbine building).

4. The location of any industrial, recreational, or residential structures within the site area.

5. The boundary lines of the plant exclusion area (as defined in 10 CFR Part 100). If these boundary lines are the same as the station property lines, this should be stated. The minimum distance from each reactor to the exclusion area boundary should be shown and specified.

6. A scale that will permit the measurement of distances with reasonable accuracy.

7. True north.

8. Highways, railways, and waterways that traverse or are adjacent to the site.

2.1.1.3 Boundaries for Establishing Effluent Release Limits. The site description should define the boundary lines of the restricted area (as defined in 10 CFR Part 20, "Standards for Protection Against Radiation"). If it is proposed that limits higher than those established by §20.106(a) (and related as low as is reasonably achievable provisions) be set, the information required by §20.106 should be submitted. The site map discussed above may be used to identify this area, or a separate map of the site may be used. Indicate the location of the boundary line with respect to the water's edge of nearby rivers and lakes. Distances from the station effluent release points to the boundary line should be defined clearly.

2.1.2 Population Distribution

Population data presented should be based on the 1970 census data and, where available, more recent census data. The following information should be presented on population distribution.

2.1.2.1 Population Within 10 Miles. On a map of suitable scale that identifies places of significant population grouping, such as cities and towns within a 10-mile radius, concentric circles should be drawn, with the reactor at the center point, at distances of 1, 2, 3, 4, 5, and 10 miles. The circles should be divided into 22½-degree sectors with each sector centered on one of the 16 compass points (with reference to true north, e.g., north-northeast, northeast, etc.). A table appropriately keyed to the map should provide the current residential population within each area of the map formed by the concentric circles and radial lines. The same table or separate tables should provide the projected population within each area for (1) the expected first year of station operation and (2) by census decade (e.g., 1990) through the projected station life. The tables should provide population totals for each sector and annular ring and a total for the 0 to 10 miles enclosed population. The basis for population projections should be described. Furnish the age distribution of the projected population (e.g., 0 to 12 years, 12 to 18 years, > 18 years) for the year corresponding to the midpoint of the station operating life. The distribution by age of the U.S. population may be used provided there is no

[1] *Site* means the contiguous real estate on which nuclear facilities are located and for which one or more licensees has the legal right to control access by individuals and to restrict land use for purposes of limiting the potential doses from radiation or radioactive material during normal operation of the facilities.

knowledge the site has a significantly different distribution. Appendix D provides guidance concerning the use of the U.S. age population distribution.

2.1.2.2 Population Between 10 and 50 Miles. A map of suitable scale and appropriately keyed tables should be used in the same manner as described above to describe the population and its distribution at 10-mile intervals between the 10- and 50-mile radii from the reactor. Furnish the age distribution of the projected population (e.g., 0 to 12 years, 12 to 18 years, > 18 years) for the year corresponding to the midpoint of the station operating life. The distribution by age of the U.S. population may be used provided there is no knowledge the site has a significantly different distribution. Appendix D provides guidance concerning the use of the U.S. age population distribution.

2.1.2.3 Transient Population. Seasonal and daily variations in population and population distribution within 10 miles of the proposed station resulting from land uses such as recreational or industrial should be generally described and appropriately keyed to the areas and population numbers contained on the maps and tables of Sections 2.1.2.1 and 2.1.2.2. If the station is located in an area where significant population variations due to transient land use are expected, additional tables of population distribution should be provided to indicate peak seasonal and daily populations. The additional tables should cover projected as well as current populations. Wherever possible, applicants should state the expected residence times for the transient population.

2.1.3 Uses of Adjacent Lands and Waters

On detailed topographical maps, show the locations of the station perimeter; exclusion area boundary; utility property; abutting and adjacent properties; water bodies; wooded areas; farms; residences; nearby settlements; commercial areas; industrial plants; parks; dedicated areas; other public facilities; valued historic, scenic, cultural, recreational, or natural areas; and transportation links (e.g., railroads, highways, waterways). Indicate the total acreage owned by the applicant and that part occupied or modified by the station and station facilities. Indicate other existing and proposed uses, if any, of applicant's property and the acreage devoted to these uses. Describe any plans for site modifications, such as a visitors center or park.

Provide, in tabular form, the distances from the centerline of the first operational nuclear unit proposed to the following for each of the 16 sectors described in Section 2.1.2 above:

1. Nearest milk cow (to a distance of 5 miles)

2. Nearest milk goat (to a distance of 5 miles)

3. Nearest residence (to a distance of 5 miles)

4. Nearest site boundary

5. Nearest vegetable garden (greater than 500 ft^2 in area; to a distance of 5 miles)

Indicate which, if any, of the cow and goat locations are dairy operations. Where possible, the applicant should provide specific information on the actual usage of the milk, whether the milk is used raw by infants, children, or adults or whether or not the milk goes to a dairy. Estimate the dairy dilution factor, and provide the basis. Determine the fraction of the milk at the dairy that is used to produce dairy products such as butter, whey, etc.

Indicate (for the 5-mile-radius area) the nature and extent of present and projected land use (e.g., agriculture, livestock raising, dairies, pasturelands, residences, wildlife preserves, sanctuaries, hunting areas, industries, recreation, transportation) and any recent trends such as abnormal changes in population or industrial patterns. If the area near the station site is zoned for specific uses, the applicant should indicate the zoning restrictions, both at the site and within 5 miles of the reactor building location and any local plans to restrict development to limit population encroachment.

Provide data on annual meat (kg/yr), milk (liters/yr), and truck farming production (kg/yr) and distribution within a 50-mile radius from the proposed reactor. Provide the data by sectors in the same manner as indicated in Sections 2.1.2.1 and 2.1.2.2. Furnish information on type, quantity (kg/yr), and yield (kg/m^2) of crops grown within a 50-mile radius from the proposed reactor. Provide information on grazing season (give dates), feeding regimes for cattle (such as grazing practices, green chop feeding, corn and grass silage feeding, and hay feeding), pasture grass density (kg/m^2), and yield statistics (kg/m^2) for harvested forage crops for beef and dairy cattle feeding within a 50-mile radius of the proposed reactor. Agricultural production, crop yield, grazing, and feeding data may be obtained from sources such as local and State agricultural agencies, agricultural agents, and other reliable sources.

Determine and indicate in tabular format the past, present, and projected commercial fish and shellfish catch (according to the National Marine Fisheries Service (NMFS) standard reporting units) from contiguous waters within 50 miles of the station discharge. Report the catch by total landings and by principal species, indicating the amounts used as human food. Indicate the location of principal fishing areas and ports of landing associated with these contiguous waters, and relate these locations to harvest by species. Note the amounts consumed locally. Determine and tabulate the present and projected recreational fish and shellfish harvest from

these waters in the same format, also indicating principal fishing areas and their respective yield by species. As above, indicate the amounts consumed locally. Include any harvest and use of seaweed, other aquatic life, or any vegetation used as human food from these waters.

Indicate the closest location to the point of discharge that is publicly accessible (from land and from water) and influenced by the discharge flow. Provide a qualitative estimate of the fishing success that a fisherman could have at this location. Identify and describe any fish farms or similar aquatic activity within the 50-mile area utilizing water that reasonably may be affected by the power station discharge. Indicate the species and production from each of these facilities and the amounts consumed locally. If hunting occurs within 50 miles of the station, determine the average annual harvest by species, and indicate the amount of game that will be consumed locally. Fish landings, recreational and commercial fin and shellfish harvests, and hunting and game information may be obtained from sources such as Federal, State, and county recreation, conservation, game, and fish agencies. Institutional or other authoritative sources may also be used. Where adequate data are not available, the applicant should determine the information independently.

The information in this section should be organized in a manner that demonstrates coordination of the principal activities of the proposed station with the various uses of land and water outside the station. These activities should include details of required offsite access corridors such as railroad spurs, rights-of-way for cooling water conveyance, new or future roadways, and other cultural features that relate to the principal purpose of the facility. The discussion should include reference to the reservation of rights-of-way for any future expansions that might be foreseen at the time of the application.

On a monthly basis, identify the location, nature, and amounts of present and projected surface and ground water use (e.g., water supplies, irrigation, reservoirs, recreation, and transportation) within 50 miles of the station where the water supplies may be contaminated by station effluents and the present and projected population associated with each use point, where appropriate. In addition, all population centers taking water from waterways between the station and the ocean, or such lesser distance as the applicant can technically justify, should be tabulated (distance, uses, amounts, and population). Sources that are river bank wells should be tabulated separately with their associated populations. The effect of present and projected regional consumptive water uses by the station on the supplies or vice versa should be identified. Water and sewage treatment processes should be described where water suppliers may be affected by station effluents.

Data on both present and projected future water use should be summarized and tabulated; users should be located on maps of legible scale. Tabulations containing information similar to that listed below should be provided for water users that may be affected.

1. Number: Include numbers shown on maps identifying the location of water users;

2. Distance from Station: Separate intake and discharge locations should be identified as follows:

a. Identify radial distance from station for each water user;

b. Provide distance from station via water route, or by River Mile, etc.;

3. Coordinates: Provide map coordinates, if appropriate;

4. Withdrawal Rate: Provide present and projected withdrawal rate (in cfs or gpm) for each water use;

5. Return Rates: Provide present and projected return rates (in cfs or gpm) if appropriate:

6. Type of Water Use: Provide type of water use for each location, e.g., municipal, industrial, irrigation;

7. Source and Projection Dates of Water-Use Estimates: Where use rates are anticipated to change over the life of the project, indicate periodic projections and the source of the projection information. Sources for such projections may be available for users or planning agencies at different levels of government.

For items 4 and 5 above, if use varies significantly seasonally, indicate monthly values. Also, where substantial holdup or flow changes occur in water use systems, such as in storage ponds or by flow augmentation, indicate the character of the changes.

In addition, for ground water users, indicate the types of ground water use, depth of wells, ground water elevation, and return rates (if to surface water), and characterize the use by aquifer.

2.2 Ecology

In this section, the applicant should describe the flora and fauna in the vicinity of the site, their habitats, and their distribution. This initial inventory will reveal certain organisms which, because of their importance to the community, should be given specific attention. A species is "important" (for the purposes of this guide) if a specific causal link can be identified between the nuclear power station 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,[2] (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. Special attention should be given to the relative importance of the station area to the total regional area of the living resources (potential or exploited).

The applicant should provide data on the count and distribution of important domestic fauna, in particular cows and goats, that may be involved in the radiological exposure of man via the iodine-milk route. A map that shows the distribution of the principal plant communities should be provided.

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

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

The information 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, present a list of pertinent published material dealing with the ecology of the region. Locate and describe any ecological or biological studies of the site or its environs currently in progress.

[2]In the writing and reviewing of environmental reports, specific consideration should be given to possible impact on any species (or its habitat) that has been determined to be endangered or threatened with endangerment by the Secretary of the Interior and the Secretary of Commerce. New terminology defining "endangered or threatened with endangerment" has been promulgated in Pub. Law 93-205, 87 Stat. 884.

2.3 Meteorology[3]

This section should provide a meteorological description of the site and its surrounding area. The description should include the use of at least one annual cycle from the onsite meteorological program for a construction permit application and at least two annual cycles (preferably three or more whole years), including the most recent 1-year period, for an operating license application, plus examination of additional regional meteorological information. Sufficient data should be included to permit independent evaluations and assessments of atmospheric diffusion characteristics and station impacts on the environment. A discussion of climatology, existing levels of air pollution and their effects on station operations, the relationship of the meteorological data gathered on a regional basis to local data, and the impact of the local terrain and large lakes and other bodies of water on meteorological conditions in the area should also be included.

The following data concerning site meteorology, taken from onsite meteorological measurements and nearby representative stations, should be presented:

1. Diurnal and monthly averages and extremes of temperature, dewpoint, and humidity;

2. Monthly and annual wind speed and direction data in joint frequency form at all heights of measurement representative of wind characteristics for points of effluent release to, and transport within, the atmosphere;

3. Monthly and annual joint frequencies of wind direction and speed by atmospheric stability class at heights and intervals relevant to atmospheric transport of effluents;

4. Total precipitation by month, number of hours with precipitation, rainfall rate distributions, and monthly precipitation wind roses;

5. Frequency of occurrence of winds greater than 50 knots by storm type (e.g., orographic or synoptic flow regimes, tornadoes, and hurricanes).

This information should be fully documented and substantiated as to validity of its representation of expected long-term conditions at and near the site.

[3]Data for this section may be drawn from information in Section 2.3 of the Preliminary Safety Analysis Report, as appropriate.

Guidance on acceptable onsite meteorological measurements and data format is presented in Regulatory Guide 1.23 (Safety Guide 23), "Onsite Meteorological Programs."

Sufficient meteorological information should also be provided to adequately characterize atmospheric transport processes (i.e., airflow trajectories, diffusion conditions, deposition characteristics) out to a distance of 50 miles from the nuclear station. The primary source of meteorological information is the onsite meteorological program. Other sources of meteorological information could include available National Weather Service (NWS) stations, meteorological programs that are well maintained and well exposed (e.g., other nuclear facilities, university, private meteorological programs), and additional satellite meteorological facilities established by the applicant to characterize relevant conditions at critical onsite and offsite locations. Adequate characterization of atmospheric transport processes within 50 miles of the station may include examination of meteorological data from stations farther than 50 miles from the station when this information can provide additional clarification of the mesoscale atmospheric transport processes. For an assessment of atmospheric transport to distances of 50 miles from the station, the following additional regional meteorological information (based on at least a 1-year period of record) should be presented for as many relevant stations as practicable:

1. Wind speed and direction data at all heights at which wind characteristic data are applicable or have been measured;

2. Atmospheric stability as defined by vertical temperature gradient or other well-documented parameters that have been substantiated by diffusion data;

3. Monthly mixing height data; and

4. Total precipitation by month, number of hours with precipitation, rainfall rate distributions, and monthly precipitation wind roses.

All meteorological data should be concurrent for each station with the onsite data collection periods, presented by hour, and should be available on magnetic tapes. In addition, a map showing the detailed topographic features (as modified by the station) on a large scale within a 5-mile radius of the station, a smaller scale map showing topography within a 50-mile radius of the station, and a plot of maximum elevation versus distance from the center of the station in each of the sixteen 22½-degree compass point sectors (i.e., centered on true north, northnortheast, northeast, etc.) radiating from the station to a distance of 50 miles should be presented.

For assessment of the impact of station operation on the environment, data summaries (e.g., moisture deficit, visibility, solar radiation) should be presented to support the description given in Section 5.1.4 of the frequency and extent of fogging and icing conditions and other impacts on the atmospheric environment due to station presence and operation.

At the time of construction permit application, applicants proposing a wet, dry, or wet-dry cooling tower for main condenser cooling or service water cooling should furnish appropriate summaries of joint humidity data along with the joint wind speed, stability category, and wind direction frequencies for heights related to the estimation of cooling tower moisture dispersion for at least 6 months and preferably one annual cycle in order to provide a basis for the estimation of the impact of tower operation on the environment. If the applicant does not have the detailed site-specific meteorological data described above, it may present information applicable to the general site area from the National Weather Service or other authoritative sources. The detailed site-specific data may be scheduled in accordance with Section 6, "Environmental Reports," of the Introduction to this guide.

2.4 Hydrology[4]

The effects of station 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, the typical seasonal ranges and averages, and the historical extremes for surface and ground water bodies.

Information should be provided only for those waters that may affect station effluents and water supply or that may be reasonably assumed to be affected by the construction or operation of the station. For those water bodies and systems that may receive radionuclides from the station, the data should be supplied out to a radius of 50 miles from the site.

Expected seasonal and other temporal variations of important parameters such as flow and currents should be described monthly; daily or shorter increments should be provided when they are important in determining the basis for evaluation of environmental effects.

The applicant should identify, to the extent possible, the source and nature of the background pollutants (e.g., chemical species and physical characteristics such as

[4]Data for this section may be drawn from information in Section 2.4 of the Preliminary Safety Analysis Report, as appropriate.

U.S. NUCLEAR REGULATORY COMMISSION

Revision 2
July 1976

REGULATORY GUIDE

OFFICE OF STANDARDS DEVELOPMENT

REGULATORY GUIDE 4.2

PREPARATION OF ENVIRONMENTAL REPORTS FOR NUCLEAR POWER STATIONS

USNRC REGULATORY GUIDES

Regulatory Guides are issued to describe and make available to the public methods acceptable to the NRC staff of implementing specific parts of the Commission's regulations, to delineate techniques used by the staff in evaluating specific problems or postulated accidents, or to provide guidance to applicants. Regulatory Guides are not substitutes for regulations, and compliance with them is not required. Methods and solutions different from those set out in the guides will be acceptable if they provide a basis for the findings requisite to the issuance or continuance of a permit or license by the Commission.

Comments and suggestions for improvements in these guides are encouraged at all times, and guides will be revised, as appropriate, to accommodate comments and to reflect new information or experience. This guide was revised as a result of substantive comments received from the public and additional staff review.

Comments should be sent to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Docketing and Service Section.

The guides are issued in the following ten broad divisions:

1. Power Reactors
2. Research and Test Reactors
3. Fuels and Materials Facilities
4. Environmental and Siting
5. Materials and Plant Protection
6. Products
7. Transportation
8. Occupational Health
9. Antitrust Review
10. General

Copies of published guides may be obtained by written request indicating the divisions desired to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, Attention: Director, Office of Standards Development.

color and temperature), the range of concentrations involved, and the time variations in release. Information relating to water quality characteristics should include measurements made on or in close proximity to the site.

Station construction and operation will affect the hydrologic characteristics in the site area. Information should be provided to establish the bases for estimates of the effects. For systems involving water impoundments, the flow rates (in and out), evaporation, drawdown, percolation, evapotranspiration, and net volumes should be provided. In addition, provide elevation-area-capacity curves. Furnish sufficient site-specific data to justify the evaluation of the effects of construction and operation of the station on established ground water tables and usage.

Where a stream is to be used by the station in any way, the estimated 7-day, once-in-10-years low flow should be presented, in addition to observed instantaneous and average daily minimums. Furthermore, the period-of-record drought with the monthly flow sequence identified above, transposed to the station intake and adjusted for existing and projected upstream developments, should be provided. A description of significant tributaries above and below the site, their monthly flow sequences (if necessary to identify future water use), and the pattern and gradients of drainage in the area should be provided.

In order to develop a systematic evaluation of the interaction of proposed releases with the receiving water, and to permit establishment of distributional isopleths of temperature or chemical and radionuclide concentrations, as discussed in Chapter 5 of this guide, detailed hydrologic descriptions of the site environment to a radius of 50 miles are necessary. (Note that water use is discussed in Section 2.1.3.)

For the surface water environment, site-specific hydrologic information should include descriptions of both tidal and nontidal flow patterns. For large lakes and coastal regions, the description of nontidal circulation should include frequency distributions of current speed direction and persistence.

The seasonal cycles of temperature and salinity structure should be provided. Additionally, information should be included that describes the bottom and shoreline configuration, sedimentation rates (suspended and bed load), sediment gradation analysis, and distribution (sorption) coefficients.

For the ground water environment, the hydrologic information should include descriptions of the major aquifers in the area, ground water piezometric contour maps of pre- and postconstruction conditions, hydraulic gradients, permeabilities for representative geologic features, total and effective porosities, bulk density estimates, storage coefficients, dispersion and distribution (sorption) coefficients, descriptions of pertinent geologic formations and soil types, including formation depth throughout the site and to the nearest downgradient well or water body (note that geology is discussed in Section 2.5), chemical properties, and time histories of ground water fluctuations. The applicant should provide data concerning any drawdown of ground water caused by withdrawals from neighboring major industrial and municipal wells that may result in the transport of material from the site to these or other wells.

Where features of a proposed station such as foundations, excavations, artificial lakes, and canals create artificial conduits for flow of ground water between and among aquifers, the applicant should furnish sufficient site-specific detail to justify its evaluation of the effects of construction and operation of the station on established ground water tables and usage. (Note that water use at the site is discussed in Section 2.1.3.)

In addition to providing the information described above for the hydrologic environment in the immediate vicinity of the station, information should also be provided for all points that could be affected by station construction and operation within the 50-mile radius where water is withdrawn or where there are significant changes in important parameters. All data for parameters should be adjusted to both present-day conditions and to those that may reasonably be expected to occur over the life of the station. Chemical and biological parameters of the hydrologic environment should be described in a like manner.

The amount of information required for evaluation of radionuclide transport in water should be commensurate with the models used in support of the analysis required in Appendix I to 10 CFR Part 50.

2.5 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 station design and particularly the heat dissipation system planned. For example, if holding or cooling 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, and soil and rock types).

2.6 Regional Historic, Archeological, Architectural, Scenic, Cultural, and Natural Features

Areas valued for their historic, archeological, architectural, scenic, cultural, or natural significance may be

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A. INTRODUCTION

1. National Environmental Goals

The national environmental goals are expressed by the National Environmental Policy Act (NEPA) of 1969 (Public Law 91-190, 83 Stat. 852), 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 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 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."

Prior to the issuance of a construction permit or an operating license for a nuclear power station, the Nuclear Regulatory Commission (NRC) is required to assess the potential environmental effects of that facility to ensure that issuance of the permit or license will be consistent with the national environmental goals presented above. In order to obtain information essential to this assessment, the NRC requires each applicant for a permit or a license to submit a report on the potential environmental impacts of the proposed station and associated facilities. The Commission's implementation of NEPA is discussed in Section 3 of this Introduction.

2. Federal Water Pollution Control Act

The responsibilities of the NRC under NEPA are affected by the Federal Water Pollution Control Act (FWPCA) Amendments of 1972 (Public Law 92-500, 86 Stat. 816). The FWPCA gives the U.S. Environmental Protection Agency (EPA) regulatory authority over the discharge of pollutants to waters in the United States from nuclear power stations requiring an NRC license or permit subject to the requirements of 10 CFR Part 51. Section 511 of the FWPCA provides that nothing under NEPA shall be deemed to authorize any Federal agency to review any effluent limitation or other requirements established pursuant to the FWPCA, or to impose, as a condition of any license or permit, any effluent limitation other than any such limitation established pursuant to the FWPCA.

Pursuant to the authority of the FWPCA, EPA requires applicants for discharge permits to submit information required by EPA in order to establish effluent limitations in permits. Pursuant to the authority of NEPA, the NRC may require applicants for licenses or permits to submit information required by NRC in order to evaluate and consider the environmental impacts of any actions it may take. Consequently, the informational needs imposed by the two agencies may be similar in the area of impacts on water quality and biota. In addition, the FWPCA requires that EPA comply with NEPA regarding the issuance of discharge permits for new sources, as defined in the FWPCA, but not for other point sources. The responsibilities of the NRC and EPA under NEPA as affected by the FWPCA are the subject of a memorandum of understanding discussed in Section 3.c.(1) of this Introduction.

In cases where the cooling system proposed in an application does not comply with the thermal effluent limitations under Sections 301 and 306 of Public Law 92-500 (FWPCA), a request for alternative thermal effluent limitations under Section 316(a) may be initiated according to the provisions of 40 CFR Part 122. If the request for alternative thermal effluent limitations under Section 316(a) is denied, the applicant will be required to submit a supplement to the environmental report presenting a description and environmental analysis of the alternative cooling system.

3. NRC Implementing Actions Concerning the Environment

a. Licensing and Regulatory Policy and Procedures for Environmental Protection (10 CFR Part 51)

The Commission's implementation of NEPA[1] is contained in 10 CFR Part 51, "Licensing and Regulatory Policy and Procedures for Environmental Protection."

[1] See also CEQ Guidelines (38 FR 20549) published August 1, 1973.

Other relevant information is contained in a proposed Annex, "Discussion of Accidents in Applicants' Environmental Reports: Assumptions," to Appendix D, 10 CFR Part 50 (36 FR 22851).

b. Radiological Impact Assessment (Appendix I to 10 CFR Part 50)

The Nuclear Regulatory Commission published Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation to Meet the Criterion 'As Low As Is Reasonably Achievable'[2] for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," to 10 CFR Part 50 in the *Federal Register* (40 FR 19437) as an effective rule on May 5, 1975. This revision of Regulatory Guide 4.2 includes changes in NRC's information requirements made necessary by Appendix I to 10 CFR Part 50.

On September 4, 1975, the NRC published amendments to Appendix I to 10 CFR Part 50 in the *Federal Register* (40 FR 40816). These amendments provide persons who have filed applications for construction permits for light-water-cooled nuclear power reactors that were docketed on or after January 2, 1971, and prior to June 4, 1976, the option of dispensing with the cost-benefit analysis required by Paragraph II.D of Appendix I if the proposed or installed radwaste systems and equipment satisfy the Guides on Design Objectives for Light-Water-Cooled Nuclear Power Reactors proposed in the Concluding Statement of Position of the AEC Regulatory staff in Docket No. RM-50-2 dated February 20, 1974 (reproduced in the Annex to Appendix I to 10 CFR Part 50).

The NRC staff intends to employ realistic analytical models for assessing the potential release of radioactive materials to the environment and for estimating their pathways and impacts over the operating life of the proposed nuclear facility. The models used in determining potential radioactive releases should consider all potential sources and pathways within the proposed station.

The NRC has published a series of regulatory guides[3] that provide guidance in evaluating the potential radiation dose to individuals and populations within 50 miles (80 kilometers) of the station in order to demonstrate compliance with Appendix I to 10 CFR Part 50. These same analytical models can be used to evaluate the radiological impact of the radioactive effluents released during normal operation on the environment within 50 miles of the station.

The following principles stated by the Commission in its opinion on the Appendix I rulemaking proceedings,[4] although specifically related to the provisions of Appendix I, provide useful guidance for evaluating environmental impacts under NEPA.

(1) An applicant should be free to use as realistic a model for characterizing natural phenomena, including plant performance, as he considers useful. An applicant may take into account situations not adequately characterized by such standardized models as may be available with respect to specific features of plant design, proposed modes of plant operation, or local natural environmental features which are not likely to change significantly during the term of plant operation.

(2) Where selection of data is strictly a matter of interpreting experimental evidence, both the applicant and the Regulatory staff should use prudent scientific expertise to select those values which would be expected to yield estimates nearest the real case.

(3) If approximations implicit in a model can produce a deviation from the true result, the direction of which is either uncertain or would tend to underestimate dosage, or if available experimental information leaves a substantial range of uncertainty as to the best estimate of some parameter values, or both, data should be chosen so as to make it unlikely, with all such deviations and uncertainties taken into account together, that the true dose would be underestimated substantially.

(4) The models used in describing effluent releases should take into account all real sources and pathways within the plant; and the estimated releases should be characteristic of the expected average releases over a long period of time, with account taken of normal operation and anticipated operational occurrences over the lifetime of the plant.

(5) The model of the exposed individual and the assumed characteristics of the environs with respect to known occupancy and to land and water use should be

[2] Amended 40 FR 58847, December 19, 1975.

[3] Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I;" Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion for Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors;" Regulatory Guide 1.112, "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Power Reactors;" and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I."

[4] From the "Opinion of the Commission," Docket No. RM-50-2. Single copies of this volume may be purchased at a cost of $4.00 from the USERDA Technical Information Center, P.O. Box 62, Oak Ridge, Tennessee 37830. Copies of the complete opinion are also available for inspection and copying in the Commission's Public Document Room, 1717 H Street, NW., Washington, D.C. 20555.

determined in each case in accordance with the intent indicated below for each particular category of effluent for which design-objective guidelines are given.

(a) For design objectives affected by assumptions as to consumption of water or food (other than milk) produced in the environs, one should consider the model individual to be that hypothetical individual who would be maximally exposed with account taken only of such potential occupancies and usages as could actually be realized during the term of plant operation.

(b) For design objectives affected by exposure as a direct result of human occupancy (immersion exposure), the model individual should be the hypothetical individual maximally exposed with account taken only of such potential occupancies, including the fraction of time an individual would be exposed, as could actually be realized during the term of plant operation.

(c) For design objectives relative to thyroid dose as affected by consumption of milk, the iodine pathway through the environs of a plant and the characteristics of the model receptor should be essentially as they actually exist at the time of licensing.

c. Interagency Memoranda of Understanding

The Nuclear Regulatory Commission and other agencies of the Federal government sometimes have overlapping responsibilities regarding the issuance of licenses or permits. For the purposes of coordinating and implementing certain requirements to ensure effective, efficient, and thorough regulation of nuclear power stations and to avoid conflicting and unnecessary duplication of effort and standards related to the overall public health and safety and environmental protection, the NRC and other Federal agencies have entered into several memoranda of understanding.

(1) Memoranda of Understanding Between the NRC and the Environmental Protection Agency

For the purpose of implementing NEPA and the FWPCA in a manner consistent with both acts and the public interest, the Atomic Energy Commission[5] (AEC published in the *Federal Register* (38 FR 2679) on January 29, 1973, an Interim Statement of Policy concerning the effects of Section 511 of the FWPCA upon the AEC's statutory responsibility and authority under NEPA in licensing actions covered by Appendix D to 10 CFR Part 50 (now superseded by 10 CFR Part 51). On the same date, the AEC published in the *Federal Register* (38 FR 2713) a first "Memorandum of Understanding Regarding Implementation of Certain Complementary Responsibilities" between AEC and EPA under the FWPCA.

To further clarify the respective roles of NRC and EPA in the decision-making process concerning nuclear power stations and other facilities requiring an NRC license or permit, a "Second Memorandum of Understanding and Policy Statement Regarding Implementation of Certain NRC and EPA Responsibilities" was published in the *Federal Register* (40 FR 60115) on December 31, 1975. This Second Memorandum of Understanding supersedes the January 29, 1973 Memorandum; NRC has adopted the revised Policy Statement set forth in Appendix A to this Second Memorandum. The revised Policy Statement will serve as the legal basis for NRC decision-making concerning licensing matters covered by NEPA and Section 511 of the FWPCA. Appropriate changes will be made in future revisions of this guide as various implementing actions are developed to meet the provisions of the Second Memorandum of Understanding.

(2) Memorandum of Understanding Between the NRC and the Corps of Engineers, United States Army

Both the Corps of Engineers, United States Army, and the Nuclear Regulatory Commission have responsibilities for assuring that nuclear power stations on coastal and inland navigable waters and at offshore sites are built and operated safely and with minimum impact on the environment. For the purpose of coordinating and implementing consistent and comprehensive requirements to assure effective, efficient, and thorough regulation of nuclear power stations and to avoid conflicting and unnecessary duplication of effort and of standards related to overall public health and safety and environmental protection, the Corps of Engineers, United States Army, and the NRC have entered into a Memorandum of Understanding (40 FR 37110; August 25, 1975).

Under this agreement, the NRC will exercise the primary responsibility in conducting environmental reviews and in preparing environmental statements for nuclear power stations covered by this Memorandum of Understanding.

The Corps of Engineers will participate with the NRC in the preparation of the environmental impact statements to include the drafting of material for the sections that consider and evaluate the following topics, as applicable, and the analysis leading thereto:

(a) Coastal erosion and other shoreline modifications, shoaling, and scouring;

[5]The Atomic Energy Commission was abolished by the Energy Reorganization Act of 1974, which also created the Nuclear Regulatory Commission and gave it the licensing and related regulatory functions of the AEC.