U.S. NUCLEAR REGULATORY COMMISSION

ENVIRONMENTAL STANDARD REVIEW PLAN

4.3.2 AQUATIC ECOSYSTEMS

REVIEW RESPONSIBILITIES

Primary— Organization responsible for review of ecological information

Secondary—None

I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's description, quantification, and assessment of the impacts of construction of the proposed facilities on the aquatic ecosystem. The scope of the review directed by this plan will include an assessment of both onsite and offsite construction activities, including transmission line and access corridor construction. The assessment should be in sufficient detail to (1) predict and evaluate the significance of potential impacts to "important" species and their habitats, and (2) evaluate how these impacts should be considered in the NRC licensing/permitting decision. If necessary, the reviewer should consider alternative designs or construction practices to mitigate the intensity of environmental impacts.

Review Interfaces

This section describes the types of interfaces needed with other staff. Interfaces require coordination primarily with the leads for terrestrial ecology and hydrology, and to a lesser extent with the leads for socioeconomics, alternatives, and cumulative impacts. The reviewer for this ESRP should obtain input from or provide input to reviewers for the following ESRPs, as indicated:

- ESRP 2.3.1. Obtain information regarding the hydrology of the site.
- ESRP 2.3.2. Obtain a description of surface-water and groundwater uses for use in the description of impacts to the aquatic ecosystem from construction or refurbishment.

- ESRP 2.3.3. Obtain information about the water-quality conditions at the site in enough detail to determine impacts to the aquatic environment from construction.

- ESRP 2.4.2. Obtain descriptions of the aquatic ecology of the site and vicinity. Provide input on the significant impacts of construction on the aquatic environment to the reviewer of ESRP 2.4.2 for preparation of information on aquatic ecology to support the analyses made in ESRP 4.3.2.

- ESRP 3.1. Obtain information about the power plant's external appearance and layout to support the analyses made in ESRP 4.3.2.

- ESRP 3.4.2. Obtain a description of the intake, discharge, and heat dissipation system design and performance characteristics for use in the description of impacts on the aquatic ecosystem from construction.

- ESRP 3.6.2. Obtain a description of sanitary system effluents and their treatment for use in the description of impacts on the aquatic ecosystem from construction.

- ESRP 3.7. Obtain information about the location of the power transmission system with respect to water resources to support the analyses made in ESRP 4.3.2.

- ESRP 4.1.1. Obtain an evaluation of the impacts of construction on land use of the site and vicinity for use in the description of impacts on the aquatic ecosystem from construction.

- ESRP 4.1.2. Obtain an evaluation of the impacts of construction on land use within the transmission line and access corridors and other offsite areas for use in the description of impacts on the aquatic ecosystem from construction.

- ESRP 4.2.1. Obtain an evaluation of the impacts on hydrology for use in the evaluation of impacts on the aquatic environment from construction.

- ESRP 4.2.2. Obtain an evaluation of the potential water-use impacts for use in the description of impacts on the aquatic ecosystem from construction.

- ESRP 4.4.2. Provide information regarding impacts on the aquatic ecosystem from construction for use in the evaluation of social and economic impacts from construction.

- ESRP 4.6. Provide a list of applicant commitments and staff evaluations of practices to limit adverse environmental impacts of construction.

- ESRP 4.7. Provide information on aquatic ecosystems for evaluation of cumulative impacts from construction activities.

- ESRP 6.3. Provide information on impacts on the aquatic ecosystem from construction for use in the evaluation of the hydrological monitoring programs.

- ESRP 6.5.2. Provide information on impacts on the aquatic environment from construction for use in the evaluation of the aquatic ecology monitoring programs.

- ESRP 6.6. Provide information on impacts on the aquatic ecosystem from construction for use in the evaluation of the chemical monitoring programs.

- ESRPs 9.3 and 9.4. Provide a notification that alternative sites and plant or component designs should be considered if the reviewer determines that a proposed construction activity would result in an adverse environmental impact that cannot be mitigated by alternative construction practices and procedures.

- ESRP 10.1. Provide a brief summary of the unavoidable impacts that are expected to occur during construction. This should be limited to the more significant impacts (e.g., modification of habitat for "important" species).

- ESRP 10.2. Provide a brief summary of irreversible and irretrievable commitments of aquatic resources that are expected to occur during construction. For example, this would include any permanent loss of aquatic habitat or loss of wetlands.

Data and Information Needs

The type of data and information needed will be affected by site- and station-specific factors, and the degree of detail should be modified according to the anticipated magnitude of the potential impacts. The following site and vicinity data or information should be obtained:

- a map of the site and vicinity delineating areas of construction, particularly those where habitat of "important" species (see definition in Table 2.4.2-1) is expected to be altered, such as areas to be cleared along stream banks (from the environmental report [ER] and ESRP Section 3.1)

- the proposed schedule of construction activities as well as timing and duration of the activities

- the clearing methods, temporary and permanent erosion, runoff, and siltation control methods, dust suppression methods, and other construction practices for control or suppression specific to the site and the aquatic environment (from the ER)

- the area of disturbance from construction activities and an estimate of the extent and magnitude of area altered from construction activities (from the ER)

- the aquatic areas to be covered, including over-water structures, by permanent station facilities (from the ER)

- any proposed construction or refurbishment activity expected to impact "important" species and habitats (from the ER).

Additional background information about the aquatic ecology, hydrology, water quality, and the impacts of hydrological alterations and water use, that is necessary for this review of impacts on aquatic resources from construction, should be obtained from the reviewers of ESRPs 2.3.1, 2.3.2, 2.3.3, 2.4.2, and 4.2, the ER, and from consultation with Federal, State, regional, local, and affected Native American tribal agencies.

The following data and information about transmission corridors and offsite areas should also be obtained:

- the clearing methods, erosion, runoff and siltation control methods (both temporary and permanent), dust-suppression methods, and other construction practices for impact control or minimization that are specific to the proposed transmission system where it crosses or abuts water bodies and wetlands (from the ER)

- the water bodies and wetlands crossed or spanned that are expected to have tower foundations located within or near them (from the ER)

- the location and areal limits of construction activities having impacts on aquatic environs (from the ER and ESRP 4.2)

- a description of the magnitude and schedule of construction activities that are expected to affect "important" aquatic species and their habitats (from the ER and ESRP 4.2).

Additional background information about the aquatic ecology along the transmission corridors and offsite areas, necessary for this review of impacts on aquatic resources from construction, should be obtained from the reviewer of ESRPs 2.4.2 and 3.7 and can be found in the ER, general literature, and from consultation with Federal, State, regional, local, and affected Native American tribal agencies.

II. ACCEPTANCE CRITERIA

Acceptance criteria for the review of construction impacts on aquatic ecology in the vicinity of the site and transmission corridors are based on the relevant requirements of the following:

- 10 CFR 51.71 with respect to including in the EIS information on impacts to the terrestrial environment due to construction

- 10 CFR 51.75, with respect to analysis of impacts to the aquatic environment affected by the issuance of a construction permit, early site permit, or combined license.

- 10 CFR 52, Subpart A and C, with respect to analysis of impacts to the aquatic environment affected by the issuance of an early site permit or combined license.

- Coastal Zone Management Act with respect to natural resources and land or water use in the coastal zone.

- Endangered Species Act with respect to identifying impacts on Federally threatened or endangered species and/or Federally designated critical habitats by means of informal and/or formal consultations with the U.S. Fish and Wildlife Service and/or the National Marines Fisheries Service.

- Federal Water Pollution Control Act, as amended, commonly referred to as the Clean Water Act, with respect to (1) activities associated with the discharge of dredge or fill materials into waters of the United States and (2) restoration and maintenance of the chemical, physical, and biological integrity of water resources.

- Fish and Wildlife Coordination Act with respect to consideration of fish and wildlife resources in planning development projects that affect water resources.

- Magnuson-Stevens Fishery Conservation and Management Act, as amended, with respect to identifying impacts on Federally designated essential fish habitat (EFH) in the vicinity of the site and transmission corridors by means of consultation with the National Marine Fisheries Service.

- Marine Mammal Protection Act with respect to the protection of marine mammals.

- Marine Protection, Research, and Sanctuaries Act with respect to the dumping of dredged material into the ocean.

- Rivers and Harbors Appropriations Act with respect to construction of any bridge, causeway, dam, or dike over or in any port, roadstead, haven, harbor, canal, navigable river, or any other navigable water of the United States.

Regulatory positions and specific criteria necessary to meet the regulations and other statutory requirements identified above are as follows:

- LIC-203, Revision 1, Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Impacts (NRC 2004), with respect to NRC compliance with the Endangered Species Act.

- Regulatory Guide 4.7, Rev. 2, *General Site Suitability for Nuclear Power Stations* (NRC 1998), contains guidance that the ecological systems and biota at potential sites and their environs should be sufficiently well known to allow reasonably certain predictions of impacts and that there would be no unacceptable or unnecessary deleterious impacts on populations of important species or on ecological systems from the construction of a nuclear power station.

- Memorandum of Understanding between the U.S. Army Corps of Engineers and the NRC for the Regulation of Nuclear Power Plants (40 FR 37110) provides guidance with respect to the NRC exercising the primary responsibility in conducting environmental reviews and in preparing EISs for nuclear power stations. The Corps of Engineers should be consulted regarding (1) coastal erosion and other shoreline modifications, (2) siltation and sedimentation processes, (3) dredging activities and disposal of dredged materials, and (4) location of structures affecting navigable waters.

- Second Memorandum of Understanding and Policy Statement Regarding Implementation of Certain NRC and EPA Responsibilities, serves as the legal basis for NRC decision-making concerning licensing matters covered by NEPA and Section 511 of the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act.

Technical Rationale

The technical rationale for evaluating the applicant's construction impacts on aquatic ecosystems is discussed in the following paragraph:

The EIS should include an analysis that considers the environmental and other effects of construction on the aquatic environment and the alternatives available for reducing or avoiding adverse environmental and other effects, as well as the environmental benefits of the proposed action. Following the acceptance criteria listed above will help ensure that the environmental impact of the proposed action is considered with respect to matters covered by such standards and requirements.

III. REVIEW PROCEDURES

When reviewing the impacts of station construction on aquatic ecology, the reviewer should take the following steps:

(1) Review the general data and information necessary to determine the impacts of station construction on aquatic ecology:

(a) Identify the construction activities that affect "important" aquatic species and habitats on and in the vicinity of the site, transmission corridors, and offsite areas.

(b) Determine the areal extent and location of construction activities on and in the vicinity of the site, transmission corridors, and offsite areas, and occurrences of "important" aquatic species and habitats within reasonable buffers of these areas.

- Obtain a map superimposing construction impact areas over aquatic resource areas, emphasizing occurrences of "important" aquatic species and habitats (from ER).

- During the site visit, inspect construction areas, emphasizing areas where construction activities and occurrences of "important" aquatic species and habitats intersect.

- Supplement the data and information specified in this part through consultations with Federal, State, regional, local, and affected Native American tribal agencies (e.g., the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service and State resource agencies).

(2) Review construction activities and discuss the following impacts on aquatic ecology:

(a) Determine how construction activities would affect "important" species and their habitats (e.g., those resulting from scouring and siltation, dredging and soil disposal, exposure to physically and chemically altered habitat, altered hydrology, and interference with shoreline processes), and estimate the magnitude and duration of such impacts.

(b) Determine the impacts of construction on Federally threatened or endangered species and/or Federally designated critical habitat, evaluating these impacts relative to the local population and the total estimated population over the entire range of the species as noted in the literature.

(c) Identify water bodies receiving construction effluents and the expected average and maximum flow rates, composition, and physical and chemical characteristics of these effluents (from ESRP 4.2).

(d) Describe proposed construction best management practices for the amelioration of impacts (from the ER). For example, best management practices would be to avoid narrow reaches of water bodies and "important" habitats as sites for locating intake or discharge structures, and providing a zone of passage that permits normal movement of "important" species populations.

(e) For important species having commercial or recreational value, estimate the magnitude and duration of the impact on the species and their habitats.

(f) If "important" species or habitats occur in the project area, and the proposed project could adversely affect the species or habitat, consult:

- with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service under Section 7 of the Endangered Species Act. If construction is authorized, then prepare a biological assessment. If construction is not authorized (e.g., Early Site Permit without a limited work authorization), a biological assessment should not be prepared.

- with the National Marine Fisheries Service under the Magnuson-Stevens Fishery Conservation and Management Act concerning potential impacts on essential fish habitat.

(g) Identify potential disturbances of benthic areas by:

- placement of intake and discharge structures
- channel modifications for navigation or flow control
- placement and removal of cofferdams
- construction of bulkheads, piers, jetties, seawalls, dikes, berms, basins, and storm sewers

- direct dredging, including the area that may be affected by resulting siltation and turbidity.

(h) Relate the critical life history and habitat needs of "important" aquatic species (e.g., seasonal requirements, migration routes, spawning areas, nursery grounds, and feeding and wintering areas) to the plant location and construction schedule and consider whether impacts are likely to be of short duration or otherwise reversible.

(i) In analyzing such impacts, consider:

- percent or magnitude of the water body cross section that might be obstructed by construction activity at any time
- time and duration of such obstruction
- potential changes to water quality caused by construction activities.

(j) Identify potential clearing along reaches of streams, rivers, and other water bodies.

- Identify water bodies where such habitat alterations would occur and indicate the extent of such changes.
- Compare the area of altered habitat with the extent of remaining similar habitats in the region.

(k) Identify potential dewatering effects on groundwater supply, wetlands (protected under Executive Order 11990 as amended by Executive Order 12608), and other aquatic habitats.

- Determine the location and areal extent of any wetlands that would be drained or filled.
- Assess the relative importance to the ecosystem of the affected wetlands by comparing them with the areal extent of similar wetlands in the region.
- Evaluate the potential for reversibility of impacts via natural attenuation or wetland restoration following construction.

(l) Identify disposal plans for dredged material and placement of fill material.

- Identify the areal extent of any water bodies or wetlands that would receive dredge spoils during construction.
- Consider the relative extent of similar water bodies and wetlands in the region, and in this context, analyze the importance of the impacted wetlands and water bodies to the ecosystem.

(m) Ensure that aquatic species expected to become established in water bodies affected by the cooling system are identified.

- Ensure that the applicant has described in the ER the aquatic species that are expected to become established in such water bodies.

- Consider how these colonizations may affect aquatic species in adjacent water bodies (e.g., food chain effects) and wetlands in the site and vicinity.

(n) In addition to the above analyses, consider any other site-specific construction impacts to aquatic ecosystems that can be predicted on the basis of construction and the local aquatic ecosystem, consulting with the reviewers for ESRPs 2.3, 2.4.2, 3.6, and 4.2 to identify such additional impacts.

(o) Ensure that the initial evaluation of environmental impacts has been submitted by the applicant if the applicant wishes to accelerate the start of construction.

- Ensure that an applicant wishing to accelerate the start of construction by early submittal of the ER has submitted in the ER an initial evaluation of environmental impacts based on an analysis of at least 6 months of field data related to the proposed facility. Ensure that the applicant has also submitted suitable projections of the remaining seasonal periods if information has already been provided on the critical life stages and biologically significant activities (e.g., spawning, migration) that increase the vulnerability of the potentially affected biota at the proposed site.

- If the preceding step has been taken, the reviewer should ensure that the applicant makes a commitment to furnish, within 6 months of the time of filing, a final evaluation based on a full year of field data.

- Applicant must show that the relevance of the information used in the monitoring program is appropriate and acceptable for the areal extent for the evaluation of impacts of construction on aquatic ecology.

(p) Become familiar with the provisions of standards, guides, and agreements pertinent to the construction of nuclear power stations:

- Refer to the "Acceptance Criteria" section of this ESRP for a list of the standards that are applicable to this environmental review.

- As required by these provisions, consult with the reviewer of ESRP 2.3 and with the appropriate agencies (e.g., the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service and the State resource agencies) to ensure compliance with the applicable regulations.

- Analyze construction activities in light of recognized best management practices.

IV. EVALUATION FINDINGS

Input to the EIS should include: (1) impacts of construction to aquatic ecosystems, (2) the impacts for which there are measures or controls to limit adverse impacts and the associated measures and controls, (3) the applicant's commitments to limit adverse impacts, and (4) the staff's evaluation of the adequacy of the applicant's measures and controls to limit adverse impacts. This information should be summarized by the reviewer of ESRP Section 4.6.

Any construction activity that should receive mitigative action should be described by the staff. Where mitigation of a predicted impact is an option, the reviewer should evaluate appropriate measures, which could include alternative placement of structures, alternative schedules, or alternative construction practices. The reviewer should evaluate alternatives for any proposed construction activity that is predicted to result in a substantive adverse impact that cannot be mitigated. Practices proposed by the applicant for the protection of the environment should be described if the reviewer determines that they are necessary.

The depth and extent of the input to the EIS will be governed by the attributes of the aquatic ecological resources that could be affected by plant construction, and by the nature and magnitude of the expected impacts to these resources. The reviewer should screen each predicted impact using criteria appropriate to the impacted segment of the ecosystem. The following should be evaluated by the reviewer for inclusion in the EIS:

- loss or modification of habitat for Federally listed endangered or threatened species under the Endangered Species Act.

- loss or modification of habitat for important species

- loss or modification of EFH and effects on Federally managed fish and shellfish species

- the clearing of vegetation from stream banks, making certain that it is limited to that necessary for placement of structures

- the applicant's commitment to the use of best management practices

- alternatives to mitigate such impacts, if the staff's analysis reveals a potential significant impact on fish populations

- lost "important" aquatic species and/or lost or degraded habitats based on their uniqueness within the region under consideration, relative impacts, and long-term net effects

    - The assessments of relative impacts should include statements expressed in percentage terms in which the amount of expected resource loss is related to the total resource in the immediate

region and in which the total resource in the immediate region is related to that in the surrounding regions.

- The assessments of long-term net effects should include statements about whether impacts represent long-term net losses, long-term net gains, or balanced long-term gains and losses. For example, short-term impacts to individuals in the local impact area may be severe while long-term impacts to the local population may represent no net losses.

- disturbance of benthic areas. All dredged areas or areas affected by dredging may be considered as temporarily lost habitat; therefore, dredging should be limited, if possible.

- surface runoff. Good construction practices will control surface runoff. Where drainage courses represent an especially important resource, attention should be given to measures for their protection during construction or refurbishment. The reviewer should (1) determine if construction activities affecting water quality (e.g., runoff, turbidity) would comply with Federal, State, regional, and local water-quality standards, and (2) reach a conclusion as to whether controls proposed by the applicant will ensure satisfactory protection of surface waters.

- dewatering on wetlands. The Federal Water Pollution Control Act , the Coastal Zone Management Act, the Marine Sanctuaries Act, and regulations issued under these Acts should be followed in evaluating the significance of dewatering on wetlands. Generally, dewatering of biologically productive wetlands may be considered an adverse impact that should be avoided. The percentage loss of such wetlands in the region should be considered to place the loss in perspective for the licensing/permitting decision. Because of the importance of wetlands, alternatives to avoid any loss of this habitat should always be considered.

- dredge spoils and placement of fill. Dumping of dredge spoils should be performed under the cognizance of EPA, District Office of the Corps of Engineers, and appropriate State agencies. Drainage from dredge spoil areas should comply with existing federal and state guidelines.

If the reviewer verifies that sufficient information has been provided in accordance with the requirements of this ESRP section, then the reviewer should prepare a summary of the impacts associated with construction of the proposed project on the aquatic ecosystem. The summary should include an impact characterization for each category of impacts using the NRC's SMALL, MODERATE, LARGE terminology (see the Introduction) and discussion of potential mitigation measures considered, if applicable.

V. IMPLEMENTATION

The method described in the ESRP should be used by the staff in evaluating conformance with NRC's requirements, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the requirements.

VI. REFERENCES

10 CFR 51.71, "Draft environmental impact statement—contents."

10 CFR 51.75, "Draft environmental impact statement--construction permit."

10 CFR 52, Subpart A, "Early Site Permits."

10 CFR 52, Subpart C, "Combined Licenses."

40 CFR 423, "Steam Electric Power Generating Point Source Category."

Executive Order 11990, "Protection of Wetlands." 42 FR 26961, May 24, 1977

Executive Order 12608, 52 FR 34617, September 9, 1987.

Coastal Zone Management Act, as amended, 16 USC 1451 et seq.

Endangered Species Act, as amended, 16 USC 1531 et seq.

Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq. (also known as Clean Water Act).

Fish and Wildlife Coordination Act Amendment, 16 USC 661 et seq.

Magnuson-Stevens Fishery Conservation and Management Act, as amended, 16 USC 1801et seq.

Marine Mammal Protection Act, as amended, 16 USC 1361 et seq.

Marine Protection, Research, and Sanctuaries Act, as amended, 33 USC 1401 et seq.

"Memorandum of Understanding between the Corps of Engineers, U.S. Army, and the U.S. Nuclear Regulatory Commission for the Regulation of Nuclear Power Plants." 40 *Federal Register* 37110, August 25, 1975.

National Environmental Policy Act (NEPA), 42 USC 4321 et seq.

Rivers and Harbors Appropriations Act, as amended, 33 USC 403 et seq.

"Second Memorandum of Understanding and Policy Statement Regarding Implementation of Certain NRC and EPA Responsibilities," 40 *Federal Register* 60115, December 31, 1975.

U.S. Nuclear Regulatory Commission (NRC). 1998. *General Site Suitability for Nuclear Power Stations*. Regulatory Guide 4.7, Rev. 2, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2004. Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues. LIC-203, Revision, 1, Washington, D.C.

PAPERWORK REDUCTION ACT STATEMENT

The information collections contained in the Environmental Standard Review Plan are covered by the requirements of 10 CFR Part 51, and were approved by the Office of Management and Budget, approval number 3150-0021.

PUBLIC PROTECTION NOTIFICATION

The NRC may not conduct or sponsor, and a person is not required to respond to, a request for information or an information collection requirement unless the requesting document displays a currently valid OMB control number.
