U.S. NUCLEAR REGULATORY COMMISSION

ENVIRONMENTAL STANDARD REVIEW PLAN

9.4.2 CIRCULATING WATER SYSTEMS

REVIEW RESPONSIBILITIES

Primary—Organization responsible for the review of hydrology information

Secondary—None

I. AREAS OF REVIEW

This environmental standard review plan (ESRP) directs the staff's analysis of alternatives to the applicant's proposed circulating water systems. This includes evaluation of alternatives, in comparison with the proposed system, to identify those systems that are environmentally preferable to the proposed system. Environmentally preferable alternatives should be compared with the proposed system on a benefit-cost basis to determine if any such system should be considered as a preferred alternative to the proposed system.[(a)]

The scope of the review directed by this plan should be limited to alternative circulating water systems considered feasible for construction and operation at the proposed plant site and that (1) are not prohibited by Federal, State, regional, local, and affected Native American tribal agreements, (2) are consistent with the Federal Water Pollution Control Act (FWPCA), commonly referred to as the Clean Water Act (CWA), and (3) can be judged as practical from a technical standpoint with respect to the proposed dates of plant construction and operation. This review should also include the investigation of alternatives proposed by other reviewers to mitigate impacts associated with construction and operation of the proposed circulating water system. The review should include (1) alternative intake designs and locations, (2) alternative discharge designs and locations, (3) alternative water supplies, and

(a) The review of environmentally preferable alternative circulating water systems should include both environmental and economic considerations. The activities of and information from two or more reviewers may be needed to conduct this portion of the review.

(4) alternative water treatment. The reviewer should consider the kind and magnitude of environmental impacts and the efficiencies and economics of the alternatives.

This plan provides the methodology for reaching staff conclusions with respect to the environmental preference of alternative circulating water systems and, for environmentally preferable systems, conclusions regarding any such systems having a better benefit-cost balance than the proposed system.

Review Interfaces

The reviewer for this ESRP should obtain input from or provide input to the reviewers for the following ESRPs, as indicated:

- ESRPs 2.3.2, 4.1.1, 4.3.1, 5.1.1, 5.3, and 5.3.3.2. Obtain input from these reviewers to develop the comparative land-use and ecological impact data.

- ESRPs 2.3, 4.2.2, 4.3.2, and 5.2.2. Obtain input from these reviewers to develop the comparative water-quality, water-use, and aquatic ecological impact data.

- ESRP 3.3.2. Obtain descriptions of water treatment systems that may be used in comparisons or evaluation of alternative water-treatment systems.

- ESRPs 4.1.3 and 5.1.3. If proposed construction or operations of the circulating water system results in adverse impacts to historic properties, obtain information regarding alternative systems or locations that may be taken into consideration as a means to avoid the impacts.

- ESRPs 4.4.1 through 4.4.3. If socioeconomic impacts from proposed construction of the circulating water system appear to be adverse, obtain information regarding alternative systems or locations that may be taken into consideration as a means to avoid the impacts.

- ESRPs 5.3.1.2, 5.3.3.1, 5.3.3.2, and 5.8.2. Obtain input from these reviewers to develop comparisons of intake and discharge effects.

- ESRPs 4.6 and 5.10. Provide these reviewers, as appropriate, with a list of those measures and controls to limit adverse impacts that were developed as a result of this review of circulating water system alternatives.

- ESRPs 10.4.1 and 10.4.2. Provide relevant data and information to the appropriate ESRP Chapter 10.0 reviewers to permit the inclusion of any such alternatives in the final evaluation of the proposed action if an obviously superior alternative circulating water system or system component is identified.

- Interface with Environmental Project Manager (EPM). Obtain input from the EPM when an alternative circulating water system appears to be environmentally preferable and meets regulatory requirements.

Data and Information Needs

The degree of detail should be modified according to the anticipated magnitude of potential impacts of the proposed systems and to the practicability of adapting the reviewed alternative to the proposed site. Data or information should be obtained for the following systems:

(1) Intake Systems

- sketches or preliminary designs and operational characteristics of alternative intake systems, showing the intake design and its relationship to water surface, bottom geometry, shoreline, and discharge structure (from the environmental report [ER])
- alternative pumping facilities, if proposed (from the ER)
- alternative locations of the proposed intake system and pumping facility on the same waterbody (from the ER)
- alternative procedures and schedules for intake defouling, including any use of defouling chemicals (from the ER)
- descriptions and operational characteristics of any alternative trash racks, traveling screens, trash baskets, or fish return systems (from the ER)
- predicted physical impacts from hydrologic alternatives and impacts to aquatic ecosystems, including entrapment, impingement, and entrainment, for each alternative intake system (from the ER)
- capital, maintenance, and operating costs for each alternative intake system and costs associated with system adaptation to the proposed site (from the ER).

(2) Discharge Systems

- sketches or preliminary designs and operational characteristics of alternative discharge systems showing the discharge design, its location with respect to the receiving water body, and its relationship to water surface, bottom geometry, intake structure, and shoreline (from the ER)
- description of alternative discharge lines (or canals) from the heat dissipation system to the receiving water body (from the ER)

- description of alternative locations of the proposed discharge system on the same water body (from the ER)

- estimated physical impacts from hydrologic alterations and impacts to aquatic biota for each alternative discharge system (from the ER)

- capital, maintenance, and operating costs for each alternative discharge system and costs associated with system adaptation to the proposed site (from the ER).

(3) Water Supply

- description of potential alternative sources of water and their availability, including location of water supply source with respect to the plant site (from ESRP 2.3.1, the ER, and consultation with Federal, State, regional, local, and affected Native American tribal agencies)

- water availability data, including groundwater sustained yield, average surface-water flows and yields, and estimates of potential water shortages associated with each alternative water supply (from ESRP 2.3.1)

- present and known future restrictions on use of water from alternative water sources (from the ESRPs 2.3.1 and 2.3.2)

- economic and environmental cost data for water delivered from each alternative source (from the ER).

(4) Water Treatment

- description and purpose of alternative water treatment systems for

  - circulating water system (from the ER)
  - plant (service) water system (from the ER)

- chemicals and additives (or mechanical treatment) to be used in each alternative water treatment system (from the ER)

- operating cycles for each alternative water treatment system (from the ER)

- capital, maintenance, and operating costs for each alternative water treatment system (from the ER and the general literature).

(5) Other Data

- site and vicinity hydrological data (from ESRP 2.3.1)

- site and vicinity water use, current and projected (from ESRP 2.3.2)
- site and vicinity water-quality criteria (from ESRP 2.3.3)
- site and vicinity ecological data (from ESRP 2.4)
- proposed circulating water system design and operation (from ESRPs 3.3.2 and 3.4)
- plant water use (from ESRP 3.3.1)
- impacts of proposed circulating water system construction and operation (from ESRPs 4.2, 4.3.2, 5.2, 5.3.1, and 5.3.2)
- capital, maintenance, and operating costs for the proposed intake system, discharge system, and water treatment system, and water costs for the proposed water supply (from the ER).

II. ACCEPTANCE CRITERIA

Acceptance criteria for the review of alternatives to the proposed circulating water system are based on the relevant requirements of the following:

- 10 CFR 51.71 with respect to the need to discuss alternatives in the environmental analysis
- 10 CFR 51, Appendix A, with respect to discussing alternatives to the proposed action
- 40 CFR 122 and 125 with respect to National Pollutant Discharge Elimination System (NPDES) permit conditions
- Federal Water Pollution Control Act
- Coastal Zone Management Act of 1972, as amended
- Endangered Species Act of 1973, as amended
- Fish and Wildlife Coordination Act of 1958
- Marine Mammal Protection Act, as amended
- Marine Sanctuaries Act of 1972, as amended
- Magnuson-Stevens Fishery Conservation and Management Act
- Rivers and Harbors Appropriation Act of 1899.

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

- Regulatory Guide 4.2, Rev. 2, *Preparation of Environmental Reports for Nuclear Power Stations* (NRC 1976), with respect to alternative systems designs

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

- The "Memorandum of Understanding between the Corps of Engineers, U.S. Army, and the NRC for the Regulation of Nuclear Power Plants," 40 FR 60115, 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.

- Federal, State, regional, local, and affected Native American tribal regulations on water use, air and water quality, effluent discharge, and land use.

Technical Rationale

The technical rationale for evaluating alternatives to the applicant's proposed circulating water systems is discussed in the following paragraph:

> The consideration of alternatives is the essence of the NEPA process. The review conducted under this ESRP section contributes to the consideration of alternatives by addressing alternative means of cooling water circulation to determine whether there is an obviously superior method in terms of environmental impacts and economic costs when compared to the proposed system.

III. REVIEW PROCEDURES

The principal objectives of this analysis procedure are (1) to provide assistance to those ESRP Chapter 4.0 and 5.0 reviewers concerned with construction or operational circulating water system impacts in identifying and verifying means to mitigate adverse impacts associated with the proposed circulating water systems, and (2) to identify and analyze reasonable alternatives to the applicant's proposed systems to the extent needed to rank them from an environmental standpoint as preferable or inferior to the applicant's proposed system. Tables 9.4.2-1 through 9.4.2-5 can be used or adapted to aid the review as appropriate.

The depth of the analysis should be governed by the nature and magnitude of proposed circulating water system impacts predicted by the ESRP Chapter 4.0 and 5.0 reviewers. When adverse impacts are

predicted, the reviewer should coordinate with these reviewers in identifying and analyzing means to mitigate these impacts. The proposed system with any verified mitigation schemes (i.e., measures and controls to limit adverse impacts) should be the baseline system against which alternative circulating water systems will be compared. The nature and adversity of the remaining unmitigated impacts for this baseline system should establish the level of analysis required in the review of alternative systems to permit staff evaluation and conclusions with respect to the environmental preference of these alternatives. If no adverse impacts have been predicted for the proposed system and the system will comply with the requirements of the CWA, the reviewer should conclude that there are no environmentally preferable heat dissipation-system alternatives.

When environmentally preferable alternatives have been identified, the review should be expanded to consider the economic costs of any such alternative. The reviewer should estimate the capital, operating, and maintenance costs for each circulating water system component considered and for each component of the proposed system. The reviewer should use these data to estimate total annual costs for each system and should use these annual costs for economic-cost comparisons. The reviewer should determine if there are any site-specific factors that might affect the costs of any alternative and should factor these increased or reduced costs into the comparison. As necessary, these cost estimates should consider allowances for additional maintenance costs when it can be shown (e.g., by operating experience) that system reliability will be lower than expected for the proposed system. This analysis should be done in consultation with appropriate reviewers for ESRPs 10.4.1 through 10.4.3. Assistance from these reviewers should be requested to establish the economic-cost data used to develop a benefit-cost comparison with the baseline (proposed) circulating water system.

In this analysis, the reviewer should consider alternatives to the following components of the plant circulating water system:

(1) intake systems
(2) discharge systems
(3) water supply
(4) water treatment.

The analysis should consider only those alternatives that are applicable at the proposed site and compatible with the proposed heat dissipation system.[(a)]

The following procedure for developing the analysis of alternative circulating water systems considers both environmental and economic cost factors. In following this procedure, the reviewer should initially consider only the environmental factors and should repeat the procedure for economic factors only for those alternatives shown to be environmentally preferable by the evaluation procedures of this ESRP.

(a) Alternative heat dissipation systems are the subject of ESRP 9.4.1. When the reviewer of that section considers potential alternative heat dissipation systems that involve circulating water system components other than those proposed, the reviewer of this plan should provide assistance in determining appropriate circulating water system components for such heat dissipation systems.

Initial Environmental Screening

The reviewer should consider the following factors in the initial environmental screening of each alternative circulating water system to eliminate those systems (or components) that are obviously unsuitable for use at the proposed site. Economic factors should not be considered in this initial screening.

- plant water requirements
- site terrain and relationship to water bodies
- water body geometry
- other water use
- ecological considerations
- legislative or regulatory requirements.

The following steps should be considered by the reviewer as part of the initial environmental screening procedures for each system:

- Work through the EPM to consult with appropriate Federal, State, regional, local, and affected Native American tribal agencies when needed to conduct this screening.

- Consult the appropriate NPDES administrative agencies to screen for those alternatives that will not meet CWA requirements.

- Establish any other justifiable environmental bases for rejection of a given alternative. When the reviewer rejects an alternative, that alternative needs no further consideration other than preparation of the reasons and justification for the rejection.

(1) Intake Systems—To analyze alternative intake systems, the reviewer should perform the following steps:

(a) Consult with the appropriate ESRP Chapter 4.0 and 5.0 reviewers to identify any mitigation measures or potentially superior alternative intake systems identified by these reviewers.

(b) Consider the following classes of alternatives:

- alternative intake systems (e.g., offshore vs. shoreline)
- proposed system design modifications (e.g., reduced intake velocity, fish return system)
- alternative locations of proposed system (e.g., up/downstream, alternative water bodies)
- alternative procedures (e.g., screenwash operation, thermal defouling).

(c) Consider the following environmental impacts and economic costs or factors for each mitigation measure and class of alternative:

- construction impacts

- impacts to aquatic ecology, including
  - entrapment
  - impingement
  - entrainment
  - other (site-specific) aquatic impacts.

- water-use impacts, including physical impacts resulting from hydrologic alterations (e.g., breakwater construction) and impacts resulting from siting on the floodplain[(a)]

- compliance with Federal, State, regional, local, or affected Native American tribal regulations, requirements, or ordinances

- capital cost, annual operating and maintenance costs, and total annual costs.

(d) Compare the proposed system with those remaining classes of alternatives not eliminated in an initial screening:

- Use a format similar to that shown in Table 9.4.2-1.

- Inputs for this table may be either absolute costs and benefits or incremental costs and benefits referenced to the proposed intake system.

- Additional factors may be included on a site- or system-specific basis.

(2) Discharge Systems—To analyze alternative discharge systems, the reviewer should perform the following steps:

(a) Consult with the appropriate ESRP Chapter 4.0 and 5.0 reviewers to identify any mitigation measures or alternative discharge systems suggested by these reviewers.

(b) Consider the following classes of alternatives:

- alternative discharge systems (e.g., submerged offshore vs. shoreline) and discharge type (e.g., slot, multiport)

- proposed system design modifications (e.g., modified discharge velocity, screens to prevent fish entry)

- alternative locations of proposed discharge system (e.g., up/downstream, alternative water body).

(a) See ESRP 2.3.1 for a definition of the floodplain.

(c) Consider the following environmental impacts and economic costs or factors for each of the above classes of alternatives:

- construction impacts
- impacts to aquatic ecology
- water-use impacts, including physical impacts of hydrological alterations and siting on the floodplain
- compliance with Federal, State, regional, local, or affected Native American tribal regulations, requirements, or ordinances
- capital costs, annual operating and maintenance costs, and total annual costs.

(d) Compare the proposed system with those remaining classes of alternatives not eliminated in an initial screening. Use a table format similar to that shown in Table 9.4.2-1.

(3) Water Supply Systems—To analyze alternative water supplies, the reviewer should perform the following steps:

(a) Consult with the appropriate ESRP Chapter 4.0 and 5.0 reviewers to identify any mitigation measures or alternative water supplies suggested by these reviewers.

(b) Consider as potential alternative water sources those water bodies within reasonable proximity to the proposed plant site that are capable of supplying plant water needs.

(c) When such water sources can be identified, compare them with the proposed water source using the following comparison factors:

- water body location and description
- estimated availability of water for plant use
- restrictions (if any) on water use for power plant cooling
- estimated aquatic, terrestrial, social, and environmental impacts associated with construction, operation, and maintenance of water transport systems from the water body to the plant
- capital costs and operation and maintenance costs of the water transport system, including annual costs of water as delivered to the plant and costs associated with any necessary water treatment.

(d) Use a format similar to that shown in Table 9.4.2-3 for this comparison. Data for this table may be prepared either as absolute benefits and costs or as incremental benefits and costs referenced to the proposed water source.

(4) Water Treatment System—To analyze water treatment systems, the reviewer should perform the following steps:

(a) Consider alternatives on the basis of systems that avoid or minimize the use of chemicals, use lesser quantities of or less toxic chemicals, or do not discharge chemical wastes directly to the environment.

(b) Unless an adverse impact attributable to the proposed plant service water treatment system has been identified, restrict this analysis to alternative circulating water treatment systems.

(c) Consult with the reviewer for ESRP 3.3.3 to determine proposed water treatment systems and with the reviewer for ESRP 5.3.2.2 to determine potential impacts of discharged chemicals to aquatic biota.

(d) Consider the following classes of alternatives:

- alternative water treatment systems (e.g., mechanical vs. chemical)
- modifications to the proposed system (e.g., alternative chemicals, alternative discharge points)
- alternative operating procedures (e.g., shock treatment vs. continuous chemical addition, modified cooling tower concentration factors).

(e) Determine the following environmental and economic costs or factors for each of the above classes of alternatives:

- impacts to aquatic ecology (e.g., chemical toxicity)
- land-use impacts (e.g., evaporation ponds)
- water-use impacts (e.g., increased water use to achieve lower discharge chemical concentrations)
- compliance with Federal, State, regional, local, or affected Native American tribal regulations, requirements, or ordinances
- capital costs, annual operating and maintenance costs, and total annual costs.

(f) Compare the proposed system with those remaining classes of alternatives not eliminated in an initial screening. Use a format similar to that shown in Tables 9.4.2-1 through 9.4.2-5.

General Considerations

The reviewer should ensure that each circulating water system alternative has been described in sufficient detail to enable the reviewer to make an effective analysis and comparison of environmental impacts leading to a staff conclusion that the alternative system is environmentally preferable or inferior to the proposed system. For those alternatives determined to be environmentally preferable, the reviewer should ensure that economic-cost data are available in sufficient detail to enable the reviewer to conduct benefit-cost balancing and comparisons with the proposed system, leading to a final staff conclusion for circulating water system consideration. The reviewer should also ensure that all comparisons were made on the basis of the proposed system as supplemented with those measures and controls to limit adverse impacts proposed by the applicant and concurred with by the staff. For those alternatives eliminated from consideration (1) on the basis of land-use, water-use, or legislative or regulatory requirements, or (2) because it is judged inferior to the proposed system, the reviewer should ensure that adequate documented justification for this action has been prepared.

If a mitigation measure or alternative circulating water system is to be considered, the reviewer should determine that the measure or system being evaluated has a lesser overall environmental impact than the proposed system (i.e., is environmentally preferable). When this is true, the economic costs of mitigation or of the alternative could result in an improved projected benefit-cost balance. When these criteria are met, the reviewer should verify those mitigation measures proposed by the reviewers for ESRP Chapters 4.0 and 5.0 or should identify the need for an alternative circulating water system. The reviewer should be guided by the following general considerations:

- The reviewer should keep in mind that an environmental review of alternative circulating water systems, if conducted in the depth applied to the review of the proposed system, would be expected to find additional impacts and/or increased severity of the impacts already predicted for the alternative. The reviewer should allow for this when evaluating the comparative environmental impacts of each proposed alternative with those of the proposed system.

- The reviewer should ensure that the level of detail provided for each economic, environmental, and social cost estimate is commensurate with the level of importance of the related environmental impact.

- The reviewer should adjust the economic costs of each alternative system on the basis of equivalent generating capacity.

- The evaluation of alternative circulating water systems may include consultation and coordination with those agencies responsible for NPDES administration. With the EPM as liaison, the reviewer should coordinate the evaluation of measures and controls to limit or avoid adverse impacts. When consulting through the EPM with the EPA, or with agencies of States that have memoranda of understanding with the NRC, the reviewer should ensure that the staff analyses and evaluations

(1) are consistent with the details of these memoranda, (2) will serve the environmental impact statement needs of these agencies, and (3) are consistent with the requirements of the CWA.

Measures and Controls to Limit Adverse Impacts

When considering measures identified by the reviewers for ESRP Chapters 4.0 and 5.0 to mitigate adverse environmental impacts predicted for the proposed circulating water system, the reviewer's verification of the desirability of the measure should lead to the following conclusions:

- The measure provides the desired mitigation and does not introduce other adverse environmental impacts not predicted for the proposed system.

- The measure will result in an overall benefit-cost balance better than that of the proposed project.

- The measure is not precluded by Federal, State, regional, local, or affected Native American tribal regulations, requirements, or ordinances.

- The measure is consistent with NPDES requirements.

Alternative Circulating Water Systems

The initial step in evaluating those alternative intake systems, discharge systems, water supplies, or water treatment systems identified by the analysis procedure of this ESRP should be to categorize these systems as environmentally preferable or inferior to the proposed circulating water systems as modified by measures and controls to limit adverse impacts. The following criteria should be applied to this evaluation:

- When the reviewer determines that the proposed system (with mitigation measures, if necessary) will have no unavoidable adverse impacts and the system will comply with the requirements of the CWA, the reviewer should conclude that there are no environmentally preferable alternatives.

- When the reviewer determines that the proposed circulating water system will meet CWA requirements, but is predicted to have unavoidable adverse environmental impacts, the reviewer should evaluate the identified alternative systems for potential environmental preference to the proposed system. The scope and extent of this evaluation should depend on the nature and magnitude of the proposed system's environmental impacts. An environmental review for the alternatives may be needed following the analysis and evaluation procedures of the appropriate ESRP Chapters 4.0 and 5.0. The following criteria apply to this evaluation:

  - *Environmental preference will be established* when an alternative can be shown to have no unavoidable adverse impacts and will meet CWA requirements.

  - *Environmental preference may be established* when an alternative that meets CWA requirements can be shown to have unavoidable adverse impacts that are less severe in both nature and

magnitude than those of the proposed system. Determination of environmental preference under these conditions should involve consultation with the EPM and the appropriate ESRP Chapters 4.0 and 5.0 reviewers. This consultation should result in a joint determination of the status of any such alternative.

- *Environmental inferiority will be established* when an alternative can be shown to have unavoidable adverse impacts that are more severe in both nature and magnitude than those of the proposed system or that will not meet CWA requirements.

When the reviewer determines that there are environmentally preferable alternatives to the proposed circulating water system, the reviewer should conduct those portions of the analysis instructions of this ESRP that deal with the economic costs of the alternative systems.

- When environmentally preferable alternative circulating water systems have been identified, the reviewer should ensure that economic-cost data have been developed for the alternatives and that these data are adequate for a benefit-cost balancing and comparison with the proposed system. This portion of the evaluation procedure should be conducted with the assistance of appropriate reviewers for ESRPs 10.4.1 through 10.4.3. The reviewer should complete the economic and reliability portions of Table 9.4.2-1. On the basis of the completed table, the reviewer should balance and compare benefits and costs of the environmentally preferable alternative(s) with those of the proposed system. When an environmentally preferable alternative can be shown to have a higher benefit to cost ratio than the proposed system, the reviewer may conclude that it should be considered as an alternative to the proposed system. For those cases in which benefits of the alternative are less than those of the proposed system or where economic costs are greater than those of the proposed system, a tentative conclusion that the alternative is superior should lead to consultation with the EPM and with the appropriate ESRP Chapter 4.0 and 5.0 reviewers. If this consultation establishes that the benefit-cost balances of such alternatives are not superior to that of the proposed system, the alternatives should not receive further consideration. When alternatives have significantly decreased benefits or increased economic costs, they should be rejected for any further consideration as alternatives to the proposed systems.

IV. EVALUATION FINDINGS

This section of the EIS should meet the following objectives: (1) description of alternative circulating water systems considered and results of the staff's analysis of these alternatives, (2) presentation of the basis for the staff's analysis, and (3) presentation of the staff's conclusions relative to alternative circulating water systems.

The reviewer should prepare input describing the review and analysis of each alternative intake system, discharge system, water supply, and water treatment system. If desired, each input may be prepared as a separate EIS section (e.g., 9.4.2.1, "Alternative Intake Systems"). Each input to the EIS should normally describe (1) those alternatives considered, (2) those alternatives rejected by the staff as being inappropriate for the proposed site or judged environmentally inferior to the proposed system, (3) the staff's

analysis and comparison of potentially environmentally preferable alternatives to the proposed system, and (4) the staff's conclusions for consideration of alternative systems.

The reviewer should discuss briefly those alternatives rejected because of specific deficiencies and should state why the alternative system was rejected. The reviewer should also identify those alternatives judged environmentally inferior to the proposed system, and therefore removed from further consideration. The use of tables similar to Table 9.4.2-1 through 9.4.2-5 to present the staff's comparison of potentially acceptable alternative circulating water systems is recommended. When the reviewer has concluded that an alternative is environmentally preferable and should be considered as a preferred circulating water system, sufficient additional detail should be presented to justify the alternative both environmentally and on a benefit-cost basis.

V. IMPLEMENTATION

The method described in this ESRP should be used by the staff in evaluating conformance with NRC 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, Appendix A, "Format for Presentation of Material in Environmental Impact Statements."

10 CFR 51.45, "Environmental report."

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

40 CFR 122, "EPA Administered Permit Programs: The NPDES Pollution Elimination System."

40 CFR 125, "Criteria and Standards for the National Pollutant Discharge Elimination System."

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 (FWPCA), 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, 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 for the Regulation of Nuclear Power Plants Between NRC and the Army Corps of Engineers, 40 *Federal Register* 37110 (August 25, 1975).

Rivers and Harbors Appropriation Act of 1899, 33 USC 401.

U.S. Nuclear Regulatory Commission (NRC). 1976. *Preparation of Environmental Reports for Nuclear Power Stations*. Regulatory Guide 4.2, 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.

Table 9.4.2-1. Comparison of Alternatives to the Proposed Intake System

	Proposed System	Alternative Systems	Design Modifications	Intake Locations	Operating Procedures
Construction Impacts					
Aquatic Impacts					
Water-Use Impacts					
Compliance with Regulations					
Total Annual Costs					

Table 9.4.2-2. Comparison of Alternatives to the Proposed Water Discharge System

	Proposed System	Alternative Systems	Design Modifications	Alternative Locations
Construction Impacts				
Impacts on Aquatic Ecology				
Water-Use Impacts				
Compliance with Regulations				
Total Costs				

Table 9.4.2-3. Comparison of Alternatives to the Proposed Water Supply

	Proposed Water Body	**Alternative Water Body 1**	**Alternative Water Body 2**	**Alternative Water Body 3**
Impacts to Aquatic Ecology				
Land-Use Impacts				
Water-Use Impacts				
Compliance with Regulations				
Total Costs				

Table 9.4.2-4. Comparison of Alternatives to the Proposed Water Treatment System

	Proposed System	**Alternative Treatment System**	**System Modifications**	**Alternative Operating System**
Chemicals Used (types and amounts)				
Impacts on Aquatic Ecology				
Land-Use Impacts				
Water-Use Impacts				
Compliance with Regulations				
Total Costs				

Table 9.4.2-5. Screening of Alternative Circulating Water Systems

Factors Affecting System Selection	Alternative 1	Alternative 2	Alternative 3
System description: Intake Discharge Water Supply Water Treatment			
Plant Water Requirements			
Land Land Relationship to Water Bodies Site Terrain Considerations			
Other Water Use			
Ecological Effects			
Legislative Restrictions			
Is this a suitable alternative circulating water system? (Yes/No)			