



NUREG/BR-0468

# **Frequently Asked Questions About License Applications for New Nuclear Power Reactors**

Office of New Reactors

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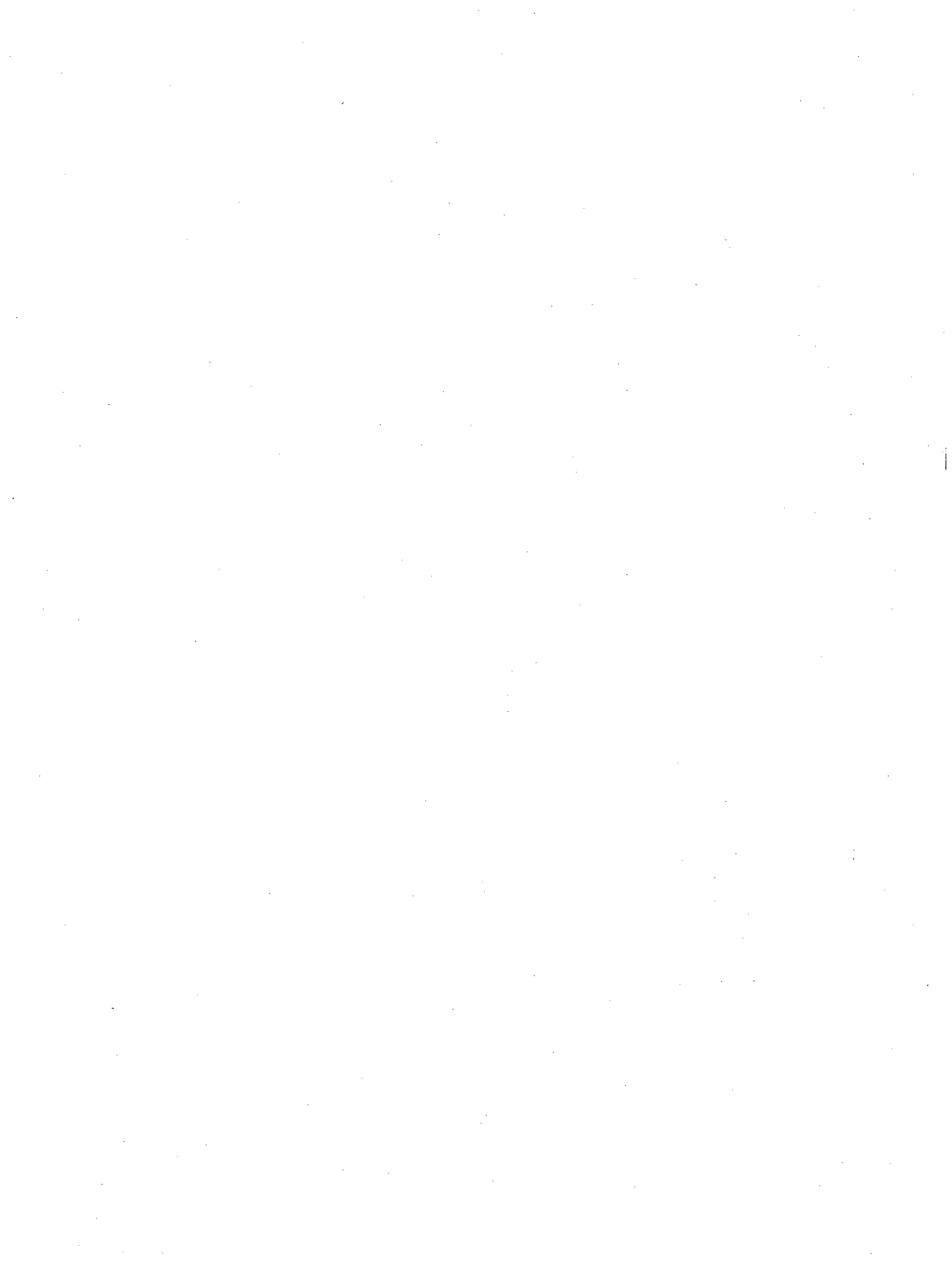
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# **Frequently Asked Questions About License Applications for New Nuclear Power Reactors**

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## **Abstract**

With the number of applications for new licenses for commercial nuclear power plants increasing, the staff of the U.S. Nuclear Regulatory Commission (NRC) realized that members of the public had similar questions related to the environmental review and licensing process. Therefore, this report uses a question-and-answer format to respond to frequently asked questions (FAQs) about these issues for new commercial nuclear power reactors. The questions were taken from a variety of sources, including public comments on the new licensing process, written inquiries to the NRC, and questions from informal discussions with NRC staff. The staff has attempted to provide answers in a clear and nontechnical form.

In addition to answering the FAQs, this document describes the NRC's licensing process, the types of reviews conducted on applications for new nuclear power plants, and the types of licenses an applicant can seek. It also describes the stages and issues examined during the environmental review, including the consideration of alternative sites, reviews of severe accident mitigation alternatives, and the processes of eventual decommissioning. Although this document focuses on the environmental review process, it also briefly addresses general questions about the impacts and risks of nuclear power. These topics include waste management, radiological safety, storage and disposal of waste, the effects of radiation on human health, and security concerns. Finally, the document covers questions about public involvement in the licensing and review process and how members of the public can obtain more information about the process.



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## Abbreviations

ABWR	Advanced Boiling-Water Reactor
ACR-700	Atomic Energy of Canada, Limited, Advanced CANDU Reactor
ACRS	Advisory Committee on Reactor Safeguards
ADAMS	Agencywide Documents Access and Management System
AP1000	Advanced Passive pressurized-water reactor (Westinghouse)
ASLB	Atomic Safety Licensing Board
CANDU	Canada Deuterium Uranium Reactor
CEQ	(President's) Council on Environmental Quality
CFR	<i>Code of Federal Regulations</i>
COL	combined license
CWA	Clean Water Act
DOE	U.S. Department of Energy
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ESBWR	Economic Simplified Boiling-Water Reactor
ESP	early site permit
ESRP	Environmental Standard Review Plan
FAQ	frequently asked question
FR	<i>Federal Register</i>
GE	General Electric
GPO	Government Printing Office
ICRP	International Commission on Radiological Protection
IPE	individual plant evaluation
IPEEE	individual plant evaluation of external events
IRIS	International Reactor Innovative and Secure
LWA	limited work authorization
MAB	maximum attainable benefit
mSv	millisievert
MWe	megawatt-electric
NCRP	National Council on Radiation Protection and Measurements
NEPA	National Environmental Policy Act

NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
PARS	Publicly Available Records System
PPE	plant parameter envelope
PSA	probabilistic safety assessment
SAMA	severe accident mitigation alternative
SRP	Standard Review Plan
Toshiba 4S	reactor design by Toshiba (Super Safe, Small and Simple)
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
U.S.	United States



## 1.0 Regulatory and Licensing Processes

Members of the public have asked similar questions about the U.S. Nuclear Regulatory Commission's (NRC's) regulatory and licensing processes. This section responds to frequently asked questions about the plant licensing and licensing review processes, types of licenses, and the regulatory basis for the reviews related to new commercial nuclear power reactors.

*The NRC's mission is to regulate the Nation's civilian use of byproduct, source, and special nuclear material to ensure adequate protection of public health and safety, to promote the common defense and security, and to protect the environment.*

### 1.1 Licensing Process

#### 1.1.1 What is the NRC's job in regulating nuclear power?

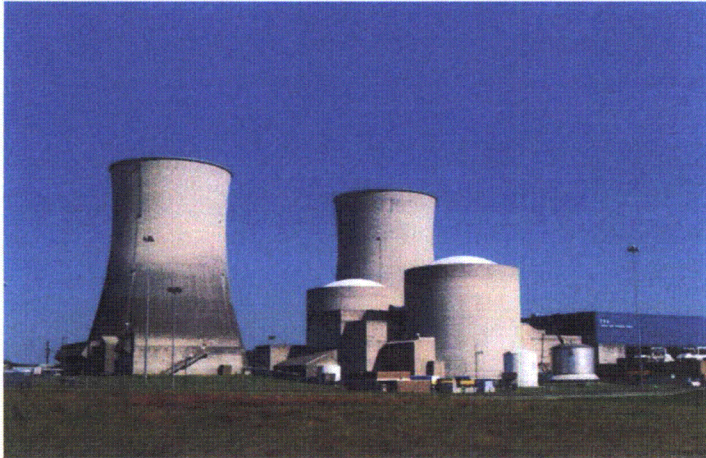
The NRC regulates the Nation's civilian use of byproduct, source, and special nuclear material to ensure adequate protection of public health and safety, to promote the common defense and security, and to protect the environment. The NRC carries out this mission through an extensive regulatory process with five main components: (1) developing regulations and guidance for applicants and licensees, (2) licensing or certifying applicants to use nuclear materials or operate nuclear facilities, (3) overseeing licensee operations and facilities to ensure that licensees comply with safety requirements, (4) evaluating operational experience at licensed facilities or involving licensed activities, and (5) conducting research.

#### 1.1.2 Why is the NRC starting to license new plants?

The NRC does not operate nuclear power plants and does not initiate the licensing of new nuclear power facilities. Instead, the NRC reviews applications for new licenses when they are submitted to the agency. The NRC performs new reactor licensing work in response to applications submitted by commercial utilities and power producers. The NRC staff is engaged in numerous other ongoing interactions with vendors and utilities regarding prospective new reactor applications and licensing activities. As of October 2009, the staff has received 18 applications (for a total of 28 new nuclear units) and is preparing to receive several more over the next few years.

#### 1.1.3 When was the last time a new reactor was licensed and built?

The NRC issued the most recent operating license for a power reactor in 1996, to the Watts Bar Nuclear Station, Unit 1, in Tennessee.



**Watts Bar Nuclear Station**

#### **1.1.4 Is the licensing process different than it was 40 years ago?**

In the past, the NRC licensed nuclear power plants under a two-step process described in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities." This process requires separate reviews for a construction permit and then for an operating license. The NRC licensed all of the currently operating reactors

under this process and the process is still a valid approach for licensing a nuclear power plant. In an effort to improve regulatory efficiency and increase the predictability of the process, in 1989 the NRC established alternative licensing processes in 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," including an option for an early site permit and a combined license.

#### **1.1.5 Who makes the decision to license a nuclear power facility?**

It is helpful to distinguish the act of "seeking a license (or permit)" or "applying for a license (or permit)" from "granting or denying a license (or permit)." The decision to seek a license or permit rests entirely with the utility that wishes to build and operate the facility. This decision is typically based on the perceived projected need for electrical energy, the anticipated economic benefit of the facility, and the investment necessary to build it and meet the NRC's safety and environmental requirements. The NRC makes the decision to grant or deny a license based on whether the applicant has demonstrated that the requirements in the NRC's regulations can be met during the construction and operation of the facility. If the applicant meets the requirements given in the regulations, then the NRC can be expected to approve the license.

*The NRC makes the decision to grant or deny a license, based on whether the applicant has demonstrated that the environmental and safety requirements in the NRC's regulations can be met during the construction and operation of the facility.*

#### **1.1.6 Who makes the final decision to grant or deny the license?**

The NRC Commission has delegated the authority to grant or deny licenses issued under 10 CFR Part 50 to the Director of the NRC's Office of Nuclear Reactor Regulation and the Director of the Office of New Reactors has authority for licenses issued or denied under 10 CFR Part 52.

### 1.1.7 Can the NRC refuse to grant a license?

Yes. As described in the NRC's regulations, based on the findings of the licensing board or the staff's review, the NRC can deny an application for a license. However, if an applicant meets the applicable requirements, then the NRC would grant a license

### 1.1.8 Has the NRC ever denied an application for a license?

During the 1980s, the NRC refused to issue operating licenses for the William H. Zimmer Nuclear Power Station, in Ohio. The NRC issued this ruling based on a charge that the plant had failed to meet construction and safety codes. Because of the high cost of completing the Zimmer facility and the uncertainty that it would eventually meet the Federal regulations, the utility, Cincinnati Gas and Electric, decided not to continue to pursue an operating license. In other cases, applicants elected to amend or revise their requests for approval in order to receive a license from the NRC and its predecessor, the Atomic Energy Commission.

### 1.1.9 Do other Federal agencies participate in the NRC's NEPA review? If so, which agencies?

The NRC is the lead agency for its NEPA review of an application for a new reactor. The NRC's environmental scoping process invites other governmental agencies to consider becoming a "cooperating agency" under the NRC's program for fulfilling its responsibility under the National Environmental Policy Act of 1969 (NEPA). The scoping process also invites agencies to identify their particular expertise on issues that may be valuable to the NRC or to play a consultation role under other statutes that may have a bearing on site-specific issues. The NRC has developed agreements with State and Federal agencies, such as the U.S. Army Corps of Engineers (Corps), where both parties believe that partnering is the most effective means of fulfilling each agency's mission.



Potential Cooperating Federal Agencies

Shortly after the NRC receives a license application, the agency posts a notice in the *Federal Register* that indicates where copies are available and how they can be obtained. The NRC issues a notice of intent to prepare an environmental impact statement (EIS) and conduct scoping, which alerts other agencies of the opportunity to take part in the scoping process. Other Federal agencies that are interested in reviewing the application can obtain a copy and provide comments to the NRC during the scoping process or after publication of the draft EIS.

During the preparation of the draft EIS and related analyses, the NRC staff consults with appropriate Federal agencies. The NRC usually contacts the U.S. Fish and Wildlife Service (U.S. Department of the Interior) and the National Marine Fisheries Service (U.S. Department of Commerce) regarding environmental issues related to the impact on any threatened or endangered species or critical habitat that may be in the vicinity of the proposed reactor and

that could be affected by the licensing action. The NRC also contacts other agencies if they have actions or jurisdiction over areas directly related to the review.

In addition to NRC-coordinated consultation, various Federal agencies review the draft EIS at their discretion, most commonly the U.S. Environmental Protection Agency (EPA), the Corps, and the Department of the Interior. The NRC considers the comments from these agencies and addresses them in the final EIS as the NRC deems appropriate. .

**1.1.10 I heard the U.S. Army Corps of Engineers can be a cooperating agency on an EIS. What does that mean?**

The Corps and the NRC have developed a memorandum of understanding (Volume 73 of the *Federal Register*, page 55546 [73 FR 55546]) to work together, with the NRC as the lead agency, to produce one EIS that meets the needs of both agencies. The memorandum streamlines the agencies' regulatory processes associated with the authorizations required to construct and operate nuclear power plants. The memorandum established a framework for early coordination and participation between these two organizations to ensure the timely review of proposed nuclear plant applications.

**1.1.11 When should an applicant engage the Corps?**

The applicant should engage the Corps and the NRC at the same time in the process. It is beneficial to the applicant to involve the Corps early in the process because the Corps requires applicants to avoid impacting wetlands to the maximum extent possible. If the applicant does not consult with the Corps before picking a spot on the site to build and performing its seismic and radiological analyses, the Corps may require the applicant to move the reactor and the support structures in order to avoid wetlands. If that scenario were to happen, a lot of work would need to be redone.

*It is beneficial to the applicant for the Corps to be involved early in the process because the Corps requires applicants to avoid wetlands to the maximum extent possible.*

**1.1.12 If an inland site is not near water (i.e., more than 5 miles from a river or lake) and outside of the 100-year flood zone, does the Army Corps still get involved?**

A Corps permit is required to discharge dredged or fill material into waters of the United States, including certain wetlands, and/or work in navigable waters of the United States. If the project will not result in impacts to waters of the United States, the Corps will not be involved.

**1.1.13 EPA has requirements under Clean Water Act (CWA) sections 316(a) and (b). How does the Corps interface with the NRC and EPA for these NEPA requirements?**

The Corps only deals with section 404 of the CWA under EPA regulations. The NRC's EIS evaluates the impacts of cooling water intake and discharge systems on the aquatic environment, including water use and water quality. The NRC does not have the authority to set limits on discharges; under the CWA that authority rests with EPA. In many cases, EPA has delegated the authority to issue such permits to States with adequate programs protecting water

resources. The burden is on the applicant to submit an application to EPA or the State for a National Pollution Discharge Elimination System (NPDES) permit.

#### **1.1.14 What does the Corps require under section 404(b)(1) of the CWA?**

The guidelines in 40 CFR Part 230, "Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material," state the following:

Except as provided under section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.

These guidelines for section 404(b)(1) of the CWA are based on the rebuttable presumption that a less environmentally damaging practicable alternative exists for projects that are not water dependent. A water-dependent project, such as a marina or a port, is one that must be built on the water in order to perform its function. A project where water can be piped to the project is not water dependent, because the project can be located away from the water or wetland areas, thereby avoiding impacts to wetlands. The applicant must demonstrate that there are no other practicable alternatives available. The least environmentally damaging practicable alternative under section 404(b)(1) cannot result in egregious environmental impacts (e.g., to human safety, endangered species) beyond aquatic impacts. This is one practical test for the rebuttable presumption. Remember that the purpose of and need for the project guide the analysis of the alternatives.

#### **1.1.15 Can State, county, local, Tribal, or other Federal (not NRC) agencies reject or not approve a license (or permit)?**

The Atomic Energy Act of 1954, as amended, delegates the licensing action to the NRC, so only the NRC can approve or deny the application to construct and operate a nuclear power plant. However, the NRC will consider any comments provided by the State, county, local, Tribal, or other Federal agencies during the period of the NRC's review and analysis. In addition, some of these agencies (such as EPA) have separate authorities to specify conditions or reject other permits that the applicant must obtain, such as the NPDES permit. The NRC will consider the views of any cooperating agency; however, the NRC is the lead agency and as such has responsibility to review the license application and develop the draft and final EISs.

#### **1.1.16 Who pays for the license application (or early site permit application) and the review of the application?**

The applicant pays for the preparation of the application. Once it submits the application to the NRC, the NRC recovers a fee for resources expended in the review. Applicants pay fees to the U.S. Treasury, not to the NRC, to reimburse the Government for the cost of the review. Congress provides funding for the NRC through annual appropriations. Thus, the applicant pays for the costs to develop the license application and to review it.

**1.1.17 Who actually builds the facility?**

The utility that applies for the license builds the facility and/or contracts out to construction and engineering firms to build the facility. The NRC inspects the work related to building the facility to ensure it meets applicable requirements.

**1.1.18 Who pays for building the facility?**

The applicant (usually a utility) will pay for the construction of the facility. The cost of building the facility may be included in the rates that are charged to electrical customers that use the power produced by the facility.

**1.1.19 What are the roles of the State and the NRC in reviewing the financial aspects of constructing, operating, and decommissioning a nuclear power plant?**

The NRC clearly recognizes the traditional responsibility of the States in regulating utilities for determining the need for the facility and the cost of the facility. The State Public Service Commission and the power producer generally exchange information and a hearing is held by the State Public Service Commission before the State can pass judgment on a request for a new power facility. The NRC does require that power producers ensure that they have the financial resources to construct and operate the facilities safely and to provide funds for decommissioning. Separately, the NRC performs a benefits assessment as part of its responsibilities under NEPA.

The NRC requirements in 10 CFR 50.33(f) differentiate between utilities, such as those whose rates are regulated by the State Public Service Commission and for whom adequate funding assurance is assumed, and independent power producers, who must provide information regarding the source of funding for construction, fuel, and operations. Under the NRC requirements in 10 CFR 50.33(k), 10 CFR 50.75, "Reporting and Recordkeeping for Decommissioning Planning," and 10 CFR 50.82, "Termination of License," the applicant must provide information regarding funding assurance for decommissioning activities.

*The licensee's quality assurance program includes all of the planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service.*

#### **1.1.20 How does the NRC make sure the facility is built correctly?**

Part of the NRC's responsibility in licensing applicants to build and operate nuclear facilities is to verify that the facility has been constructed in accordance with the approved design and the applicable regulations. This verification is performed by the NRC's construction inspectors. The licensee's quality assurance program includes all of the planned and systematic actions necessary to provide adequate confidence that a structure,

system, or component will perform satisfactorily when in service.

In addition to reviewing and inspecting applicant activities, the NRC reviews and inspects the quality assurance programs, including their implementation, for all nuclear suppliers, architect engineering firms, suppliers of safety-related and commercial-grade products and services, calibration and testing laboratories, and holders of NRC construction permits, operating licenses, and combined licenses in quality-related areas.

#### **1.1.21 Once it issues the license (or permit), does the NRC just walk away from the process?**

The NRC oversees all nuclear power facilities from the time applications are submitted, through the operation of the facility, and through the decommissioning process until the residual radioactivity at the facility site has been reduced to a level that permits termination of the NRC license. In addition to regulating reactor siting and construction, the NRC regulates reactor operations through a combination of regulatory requirements, licensing, and oversight, including inspections.

#### **1.1.22 For how long are the licenses good?**

The Atomic Energy Act allows the NRC to issue licenses for commercial power reactors to operate for up to 40 years. This license is based on licensee adherence to the applicable regulations described in Title 10 of the *Code of Federal Regulations*. The 40-year limit on the licenses was imposed for economic and antitrust reasons, rather than technical limitations of the nuclear facility. Other licenses, such as early site permits, have different terms; the NRC can issue an early site permit for no less than 10 years and for no longer than 20 years.

#### **1.1.23 Can the utility renew the license?**

Yes, the NRC regulations allow the renewal of licenses for nuclear power facilities for up to an additional 20 years, depending on the outcome of an assessment to determine whether the nuclear facility can continue to operate safely and whether the protection of the environment can

be ensured during the 20-year period of extended operation. Neither the Atomic Energy Act nor the NRC's regulations contain specific limitations on the number of times a license may be renewed. The process of conducting the assessment and renewing the license, called "license renewal," includes a clear set of requirements. More information about license renewal appears in NUREG-1850, "Frequently Asked Questions on License Renewal of Nuclear Power Reactors," issued March 2006, which is available on the NRC's Web site at [http://www.nrc.gov/reactors/operating/licensing/sr1850\\_faq\\_lr.pdf](http://www.nrc.gov/reactors/operating/licensing/sr1850_faq_lr.pdf).

#### **1.1.24 What happens when the license expires?**

If an operating license or combined license expires without the utility taking action to renew it, the license would cease operation of the nuclear power plant and would begin decommissioning.

### **1.2 License Reviews**

#### **1.2.1 When does a license for new nuclear power plant need to be issued?**

*Before a nuclear power plant can be built and operated, the NRC must grant its approval.*

The NRC must issue a license before a nuclear power plant can be built and operated. The NRC's licensing processes allow the agency to maintain oversight of reactor siting and facility construction and operation throughout the facility's lifetime to ensure compliance with regulations for the protection of public health and safety, the common defense and security, and the environment.

#### **1.2.2 What is the licensing process for new reactors?**

Two types of licensing processes exist for nuclear power plants:

Two-step licensing process—Under this licensing process, the NRC reviews an application for a construction permit and, if it issues a construction permit, will review a second application for an operating license as construction nears completion. The NRC used this process to license all currently operating commercial nuclear power facilities. However, to increase regulatory efficiency and predictability in the licensing process, the NRC established an alternative process called a combined license.

- Combined license—A combined license includes both the construction authorization and the operating license into a single license. After the construction is complete; the required inspections, tests, and analyses performed; and the acceptance criteria met; the Commission authorizes the operation of the plant. A combined license application may reference an early site permit, a certified design, a final design approval, or a manufacturing license.

#### **1.2.3 What other types of licenses related to reactors does the NRC review?**

The NRC reviews and grants initial and renewed licenses for research reactors, as well as independent spent fuel storage installations. The NRC also reviews applications and grants



licenses for facilities related to the production of fuel for nuclear reactors or the storage or disposal of waste from reactor operations. The production facilities, which are located away from power reactor sites, include those that possess and use source material (e.g., uranium milling facilities that produce yellowcake or conversion facilities that produce uranium hexafluoride) or special nuclear material (e.g., enrichment and fuel fabrication facilities). Scrap recovery and low-level waste storage and disposal sites are other examples of facilities located away from power reactor sites that are licensed by the NRC.

### 1.3 Types of Licenses

This FAQ document focuses on the licensing process under 10 CFR Part 52. The NRC regulates the siting, construction, and operation of new commercial nuclear power facilities. The NRC is responsible for issuing combined licenses (COLs), early site permits (ESPs), design certifications, and limited work authorizations for commercial nuclear power facilities. Nuclear power facilities can license a facility solely with a COL, or they can combine licensing processes, such as by combining a COL with an ESP or a design certification.

## Combined License, Early Site Permit, and Design Certification

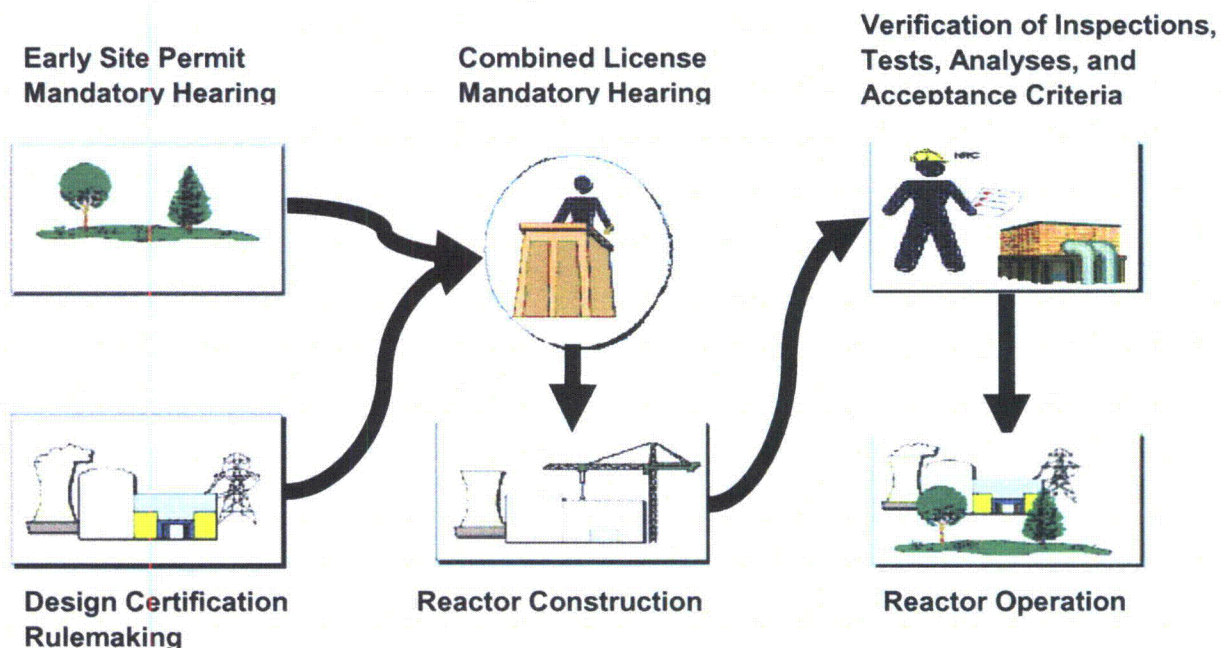


Figure 1.3-1 General Process for Licensing a New Reactor.

## **1.3.1 Combined License**

### **1.3.1.1 What is a combined license (COL)?**

A COL authorizes construction and conditional operation of a new nuclear facility. Once the required inspections, tests, and analyses are performed, and the acceptance criteria are met, the Commission can authorize the operation of the facility.

### **1.3.1.2 What is required of a COL applicant ?**

The specific requirements are contained in 10 CFR 52.79 and 10 CFR 52.80. The application for a COL for a new nuclear facility must address; the design, environmental impacts, site safety, financial and technical qualifications, emergency plans, security plans, quality assurance programs, and inspections, tests, analyses, and acceptance criteria. It must also include a final safety analysis report and the inspections, tests, and analyses that are necessary to demonstrate that the facility has been constructed and will operate in accordance with the licensed design.

### **1.3.1.3 How long does it take to complete the review of a COL application?**

Generally, the NRC performs an acceptance review in 60 days, followed by a nominal 30-month detailed review for an application that references a certified design. Non-certified designs would take 48 to 60 months to review. The NRC also allows 12 months for completion of the hearing process. There are many factors that could impact the review schedule, including requests from the NRC for additional information and the timely availability of that information from the applicant, and other factors outside the control of the NRC. The agency develops specific review schedules for each application based on its completeness and quality.

### **1.3.1.4 What happens during the review process?**

The NRC staff reviews the documents in the application to ensure that they demonstrate conformance with the NRC's regulations for a COL and that there is reasonable assurance that the facility will be constructed and operated in conformity with the license, the provisions of the Atomic Energy Act, and the Commission's regulations. During the review the NRC staff may also request additional information from the applicant in order to complete the review. In addition, the NRC holds numerous public meetings at various stages of the review process in the vicinity of the proposed site and at NRC Headquarters. Applicants and the NRC must comply with the Atomic Energy Act, NEPA, and NRC regulations.

### 1.3.1.5 How is the public involved in the application review process?

The public can take part in the application review process in several ways. One is to participate in public meetings that occur at various stages of the application process. Some meetings will be held in the local area near the proposed new reactor site, while others take place at NRC regional or headquarters offices. Another way the public can become involved is to review copies of the application, provide comments, and participate in the hearing process. In addition, the public can follow the progress of an application via the NRC external Web site (<http://www.nrc.gov>).

*Although not required by regulation, the NRC generally holds an introductory meeting near the proposed site before an application is submitted for a COL.*

### 1.3.1.6 How can the public find out about upcoming public meetings?

The simplest way for a member of the public to learn about upcoming meetings is to access the NRC external Web site (<http://www.nrc.gov>). The NRC may mail notices of local meetings to citizen's groups and civic and government leaders in the community and may advertise meetings in local newspapers. The agency also publishes notices of opportunities for involvement in the *Federal Register* (see the response to Question 5.2.6 for information on accessing the *Federal Register*).

### 1.3.1.7 What is the process for getting approval to build a nuclear reactor?

The NRC regulations in 10 CFR Part 52 specify the process for obtaining a COL license, shown below. Figure 3.1-1 shows the general licensing process. An applicant submits an application that contains all of the siting and design information, or references an ESP and/or a standard design certification. After the NRC reviews the application against the regulations and holds a hearing, the agency determines whether it is appropriate to grant the license. The Atomic Energy Act requires a hearing to take place before the NRC can issue the license; the agency also provides an opportunity for a contested hearing. FAQ 1.3.1.10 provides more detail on the hearing process. After construction, the NRC verifies that the applicant has completed the required inspections, tests, and analyses and has demonstrated that the acceptance criteria have been met. Upon verification that the acceptance criteria are met, the Commission may authorize operation of the reactor.

*A hearing is mandatory before a COL is granted.*

### 1.3.1.8 What must a COL application include?

The COL application must include financial information, the technical qualification of the applicant, and an assessment of the need for power. The application also must describe the inspections, tests, analyses, and acceptance criteria that are necessary to ensure that the plant has been properly constructed and will operate safely.

A COL application can reference an ESP, a standard design certification, both, or neither. If an application does not reference an ESP and/or a standard design certification, the applicant must provide an equivalent level of information in the COL application.

A COL application must include an environmental report; if an ESP is referenced, then the application must demonstrate that the design of the plant is compatible with the ESP. The application also must include information about the site-related issues that may have been deferred at the ESP stage, such as the need for power from the proposed plant, and all matters that were not resolved in the ESP. If the application does not reference an ESP, then the applicant must provide the site information that would have been included in an ESP and also must include a complete emergency plan. A COL application must also include a safety analysis report and a security plan.

The application can also reference a standard design certification or an application for a standard design certification (at its own risk). If it does, then the applicant must include the inspections, tests, and analyses, and acceptance criteria from the certified design and supplement it with inspections, tests, and analyses, and acceptance criteria for the site-specific design features. If the application does not reference a standard design certification, the applicant must provide complete design information, including the information that would otherwise have been resolved with a standard design certification.

**1.3.1.9 What is the NRC's review process for a COL? What kinds of documents must the applicant submit?**

During its review of a COL application, the NRC evaluates the applicant's safety analysis report, which contains the design information and criteria for the proposed reactor and comprehensive data for the proposed site. This report also discusses the safety features of the plant that prevent or reduce the consequences of accidents. The NRC reviews the application to determine whether the plant design and the site meets all of the applicable regulations. When the NRC completes its review, it prepares a safety evaluation report documenting that the design meets the regulations. The NRC staff also performs an environmental review to fulfill its responsibility under NEPA. The NRC issues a draft EIS that addresses the potential environmental impacts and benefits of the proposed facility. After receiving comments from the appropriate Federal, State, Tribal, and local agencies as well as the public, the agency issues a final EIS that addresses all the comments.

After the final safety evaluation report and final environmental impact statement are issued, a hearing is held. Following the hearing the license is either issued or denied by the NRC.

### 1.3.1.10 What opportunities are there for public meetings and hearings during a COL review?

The NRC reaches out to the public by holding meetings near the proposed site for the COL. The staff uses these meetings to familiarize the public with the safety and environmental aspects of the application, the planned location for the plant(s), the regulatory process, and opportunities for public participation in the licensing process. During these meetings the staff seeks comments from the public on the scope of the NRC's environmental review. The NRC uses those comments from the public to inform the scope of issues evaluated in the draft EIS. The NRC holds another public meeting to receive comments on the draft EIS, and then responds to the comments in the final EIS. Although not required, these meetings provide an important platform for public participation and for NRC interaction with the public and local officials. During the safety review, a number of public meetings are held with the applicant that are open to the public. In addition, public meetings are held before the Advisory Committee on Reactor Safeguards. Most Committee meetings are open to the public, and any member of the public may request an opportunity to make an oral statement during the meeting.



**Public Meeting**

Following the completion of the final safety evaluation report and the final environmental impact statement a hearing is held. In the hearing, the Commission or its Atomic Safety and Licensing Board reviews the applicant's final safety analysis report, together with the NRC staff's related safety evaluation report and the NRC staff's final EIS. The public is also given the opportunity to petition for a hearing. A hearing is required for each COL.

### 1.3.1.11 What happens after the NRC issues a COL? Can the utility just start operating the facility?

After issuing a COL, the Commission will only authorize operation of the facility after verifying that the licensee has completed the required inspections, tests, and analyses and that the acceptance criteria have been met. The NRC will consider petitions for a second hearing if the petitioner demonstrates that the licensee has not met or will not meet the acceptance criteria. Before a plant can operate, the Commission must make a finding that the acceptance criteria have been met.

### 1.3.1.12 How many COL reviews has the NRC performed?

The NRC has not yet completed a COL review. As of October 2009, the NRC was reviewing 18 COL license applications for 28 units. The NRC staff is also engaged in ongoing interactions with vendors and utilities regarding prospective new reactor applications and licensing activities. Based on these interactions, the staff expects to receive several more COL applications over the next few years.

## 1.3.2 Early Site Permits

### 1.3.2.1 What is an early site permit (ESP)? And why would a utility apply for an ESP rather than just a COL?

An ESP is a licensing option provided under 10 CFR Part 52 that allows an applicant to obtain approval for a reactor site without specifying the design of the reactor(s) that could be built there. An ESP resolves issues involving site safety and environmental characteristics and emergency preparedness that are independent of a specific nuclear reactor design. This permitting approach provides an applicant with an opportunity to “bank” a site for up to 20 years, reduces licensing uncertainty, and resolves siting issues before construction.

Although not required by regulation, the NRC generally holds an introductory or public outreach meeting near the proposed site before an application is submitted for an ESP. The staff uses this meeting to familiarize the public with the safety and environmental aspects of a typical ESP review, the planned location for the plant(s), the regulatory process, and opportunities for public participation in the licensing process.

*The NRC documents its findings regarding site safety characteristics and emergency planning in a safety evaluation report, and findings regarding environmental protection issues in draft and final environmental impact statements.*

### 1.3.2.2 What is the NRC's process for reviewing an ESP request?

The NRC staff reviews the ESP application in three areas: site safety, environmental protection, and emergency planning. The review determines whether the application meets NRC regulations, the requirements of the Atomic Energy Act, and any other applicable regulations. The NRC documents its findings regarding site safety and emergency planning in a safety evaluation report and findings regarding environmental protection issues in draft and final EISs.

The staff's safety evaluation report documents its conclusions about whether there is reasonable assurance that the site can safely host a future nuclear power reactor or reactors. In addition, the report contains a determination regarding emergency planning based on the level of detail in the information provided by the applicant. The applicant has several options for the level of emergency planning detail that can be submitted with an ESP application. If the information submitted by the applicant is relatively limited, the staff's finding on emergency planning will focus on whether there are significant impediments to the development of emergency plans. If the applicant also includes the major features of the emergency plans, the staff will make a determination regarding the adequacy of those features. If the applicant submits complete emergency plans, the staff will determine whether these plans provide reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. If the ESP application does not include complete emergency plans, then the COL application that references the ESP must address the remaining issues. The NRC reviews the emergency planning information in consultation with the Federal Emergency Management Agency.



### **Varied Environments**

and the locations of the nearest population centers

- an evaluation of alternative sites to determine whether there is any obviously superior site
- the proposed general location of each plant on the site
- the number, type, and power level of the plants, or a range of possible plants planned for the site
- the maximum radiological and thermal effluents expected
- the type of cooling system expected to be used
- radiological dose consequences of hypothetical accidents
- plans for coping with emergencies

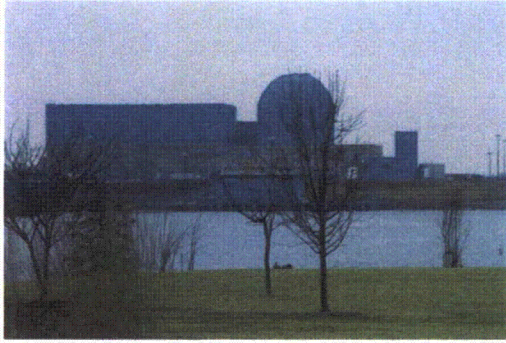
In terms of the emergency plans, the application must identify physical characteristics of the site (such as a drawbridge) that could significantly hinder the development of a complete emergency

The NRC staff also will prepare an EIS in accordance with NEPA and 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." The EIS will focus on the environmental effects of construction and operation of a nuclear power plant or plants whose design characteristics fall within the site characteristics and design parameters identified in the ESP application. In addition, it will include an evaluation of alternative sites to determine whether there is any obviously superior alternative to the proposed site.

#### **1.3.2.3 What must be included in an ESP application?**

The ESP application must address the safety and environmental characteristics of the site and evaluate potential physical impediments to developing an acceptable emergency plan. The application contains the following information:

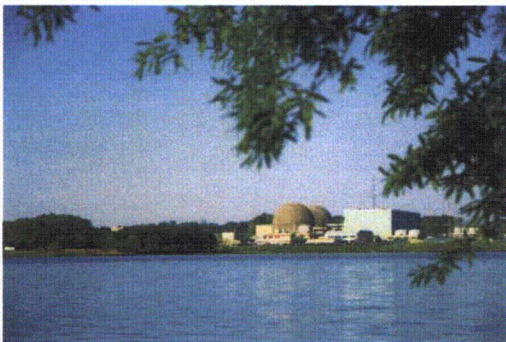
- the site's boundaries, including a discussion of the exclusion area, where the applicant has the authority to remove persons or property
- site characteristics, including seismic, meteorological, hydrologic, and geologic data
- the location and description of any nearby industrial, military, or transportation facilities and routes
- the existing and projected future population of the area surrounding the site, including a discussion of the expected low-population zone around the site



**Clinton**



**Grand Gulf**



**North Anna**

plan. The application also must describe contacts and arrangements made with local, State, and Federal government agencies with emergency planning responsibilities, or at least show that the applicant has made a good-faith effort to obtain the participation of these organizations in the emergency planning process. The application may include major features of the emergency plan or a complete emergency plan.

**1.3.2.4 How can the NRC assess environmental impacts without knowing what kind of reactor will be built?**

If an applicant has decided on a reactor design, its ESP application may reference that specific reactor design. An ESP applicant may elect to provide, as a surrogate for actual reactor design information, a set of values for plant design parameters that it expects will bound the design characteristics of any reactor or reactors that might be constructed at the site. This set of values, called a plant parameter envelope (PPE), may reflect the attributes of several different designs. This approach allows an ESP applicant to defer its decision on what design to build until it is prepared to apply for a license to construct and operate the plant.

Because the PPE values do not reflect a specific design, the NRC's decision to grant an ESP does not indicate agency approval of the site for any specific plant or type of plant. In addition to the emergency preparedness and environmental impact findings, site approval will be contingent on the staff's ability to find that a reactor or reactors having design characteristics that fall within the PPE can be constructed and operated without undue risk to public health and

safety.

This combination of site characteristics and PPE values will comprise the ESP bases. The NRC will compare the design proposed in any COL application for the site against the ESP bases. COL applicants who reference an ESP bear the risk that the design ultimately selected for the approved site might fall outside of the terms and conditions of the ESP.



#### **1.3.2.5 Has the NRC ever reviewed an ESP application?**

The NRC staff has issued four Early Site Permits (Exelon Generation Company, LLC, for the Clinton site in Illinois; System Energy Resources, Inc., for the Grand Gulf site in Mississippi; Dominion Nuclear, LLC, for the North Anna Site in Virginia; and Southern Nuclear Operating Company, Inc., for the Vogtle Electric Generating Plant in Georgia).

#### **1.3.2.6 What are the opportunities for public meetings and hearings during an ESP review?**

The NRC reaches out to the public by holding meetings near the proposed site for the ESP. The staff uses these meetings to familiarize the public with the safety and environmental aspects of the application, the planned location for the plant(s), the regulatory process, and opportunities for public participation in the licensing process. During these meetings the staff seeks comments from the public on the scope of the NRC's environmental review. The NRC uses those comments from the public to inform the scope of issues evaluated in the draft EIS. The NRC holds another public meeting to receive comments on the draft EIS, and then responds to the comments in the final EIS. Although not required, these meetings provide an important platform for public participation and for NRC interaction with the public and local officials. During the safety review, a number of public meetings are held with the applicant that are open to the public. In addition, public meetings are held before the Advisory Committee on Reactor Safeguards. Most Committee meetings are open to the public, and any member of the public may request an opportunity to make an oral statement during the meeting.

Following the completion of the final safety evaluation report and the final environmental impact statement a hearing is held. In the hearing, the Commission or its Atomic Safety and Licensing Board reviews the applicant's final safety analysis report, together with the NRC staff's related safety evaluation report and the NRC staff's final EIS. The public is also given the opportunity to petition for a hearing. A hearing is required for each ESP.

#### **1.3.2.7 For how long is the ESP valid?**

An ESP is initially valid for no less than 10 years and for no more 20 years; it can be renewed for 10 to 20 years.

### 1.3.3 Design Certification

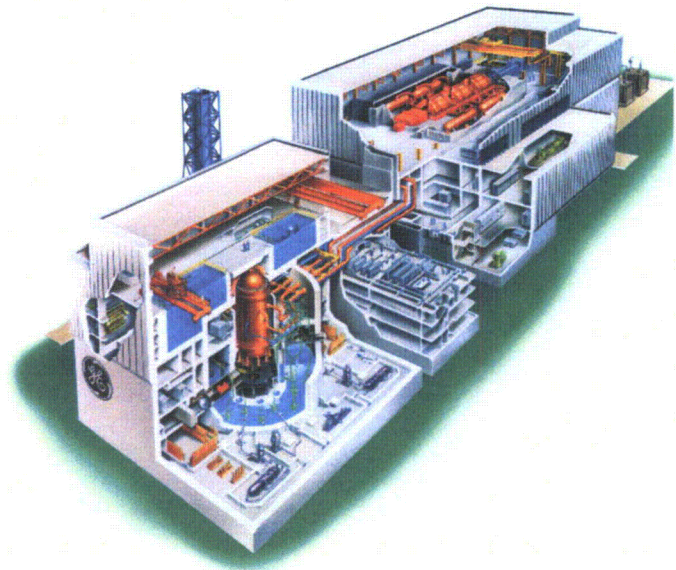
#### 1.3.3.1 What is a design certification?

A design certification approves a standard nuclear power plant design, independent of a site approval application or an application to construct or operate a plant. A standard reactor design certification is valid for 15 years and can be renewed for additional 15-year periods.

A design certification application describes the design basis and the limits of reactor operation. It also includes a safety analysis of the structures, systems, and components of the facility. The level of detail included in the design certification application is equivalent to the level of detail found in a final safety analysis report for a currently operating plant. This information must demonstrate that the design complies with applicable NRC regulatory safety standards (10 CFR Parts 20, 50, 52, 73, and 100). The application must also include proposed inspections, tests, analyses, and acceptance criteria for the standard design and a detailed risk analysis of the design's vulnerability to certain accidents or events (probabilistic risk assessment) and an evaluation of design alternatives to mitigate the potential impacts of severe accidents (severe accident mitigation design alternatives).

The NRC reviews the application to address safety issues for an essentially complete nuclear power plant design at an unspecified generic site. The NRC staff prepares a safety evaluation report that describes its review of the plant design and demonstrates how the design meets applicable regulations. When the design certification application review is complete, the NRC will commence rulemaking. As part of the rulemaking process, the public has an opportunity to submit comments, and the comments will be addressed in the final rule which will certify the standard design in an appendix to 10 CFR Part 52.

An applicant for a combined license to build and operate a nuclear reactor that references a certified design must (1) demonstrate that the proposed site for the reactor falls within the bounds of the generic site referenced in the design certification review, (2) provide site-specific design features, (3) address interface requirements, (4) describe any departures from the certified design, and (5) update the probabilistic risk assessment to account for site-specific design features. The license application may incorporate the standard design certification final safety analysis report by reference.



**Advanced Boiling-Water Reactor**

### 1.3.3.2 What is required in the application for a design certification?

Design certification applicants must provide the technical information necessary to demonstrate compliance with the applicable safety standards set forth in NRC regulations (refer to 10 CFR 52.46 and 52.47). An application must contain design information at a level of detail sufficient to enable the NRC to reach a final conclusion on all safety questions associated with the standard design. In general terms, a design certification application should provide an essentially complete nuclear plant design, with the exception of site-specific design features such as intake structures and the ultimate heat sink.

Applicants also must provide information to close out unresolved and generic safety issues, as well as issues that arose after the Three Mile Island accident in 1979. The application must include a detailed analysis of the design's vulnerability to certain accidents or events and inspections, tests, analyses, and acceptance criteria to verify the key design features.

The application presents the design basis, the limits on operation, and a safety analysis of the structures, systems, and components of the facility. The scope and contents of the application are equivalent to the level of detail found in a final safety analysis report for a currently operating nuclear plant.

*In general terms, a design certification application should provide an essentially complete nuclear plant design, with the exception of site-specific design features such as intake structures and the ultimate heat sink.*

### 1.3.3.3 What types of designs have been certified?

The Commission has certified the following four reactor designs that can be referenced in an application for a nuclear power plant:

- Advanced Boiling-Water Reactor design by General Electric (GE) Nuclear Energy (May 1997)
- System 80+ design by Westinghouse Electric Company (formerly ABB-Combustion Engineering) (May 1997)
- AP600 design by Westinghouse (December 1999)
- AP1000 design by Westinghouse (February 2006)

### 1.3.3.4 What types of designs are currently being reviewed for certification?

As of July 2009, the NRC staff is reviewing GE's Economic Simplified Boiling-Water Reactor (ESBWR), AREVA's Evolutionary Power Reactor, Westinghouse's amended AP1000 reactor, and the US-Advanced Pressurized-Water Reactor from Mitsubishi Heavy Industries, Ltd.



**Westinghouse AP1000**

sponsored by the U.S. Department of Energy

- Toshiba 4S (Super Safe, Small and Simple), a 10-MWe reactor with a compact core design by Toshiba

The NRC staff is performing pre-application reviews for the following:

- Pebble Bed Modular Reactor sponsored by PBMR (Pty) Ltd.
- International Reactor Innovative and Secure (IRIS) by Westinghouse
- NuScale, a 40-megawatt-electric (MWe) natural-circulation design

*The new designs are expected to increase plant availability, operating capacity, safety, and reliability. Some designs contain passive safety systems, simplified system designs, and redundant systems.*

Pre-application discussions occur before the certification application is submitted. These discussions identify major safety issues that could require NRC policy guidance, major technical issues, and any research needed to resolve identified issues.

#### **1.3.3.5 What makes these new designs better?**

The new designs reflect evolutionary and advanced features and enhancements as compared to the designs of currently operating reactors. For example, several new designs use improved electronics, computer, turbine, and fuel technologies. The designs are expected to increase plant availability, operating capacity, safety, and reliability. Some designs contain passive safety systems, simplified system designs, and redundant systems.

#### **1.3.3.6 What is the design certification process like?**

Upon receipt of an application for design certification, the NRC staff performs an acceptance review to determine if the application is acceptable for docketing and, if so, reviews the application against the applicable regulations. The NRC staff prepares a safety evaluation report that describes its review of the plant design. The safety review of the application is based primarily on design information submitted by the applicant.

The Commission's Advisory Committee on Reactor Safeguards reviews each application for design certification, together with the NRC staff's safety evaluation report and issues a report to the Commission. After receiving the report from the Advisory Committee on Reactor Safeguards, the Commission determines if the application meets the relevant standards and requirements of the Atomic Energy Act and the Commission's regulations. Following the determination, the Commission proposes a rule to certify the standard design as an appendix to the regulations set forth in 10 CFR Part 52. After considering public comments on the proposed rule, the Commission issues a final rule. The design certification then becomes a part of these regulations. The NRC can certify a reactor design for 15 years, independent of a specific site.

Codifying the design certification in the NRC's regulations provides finality for the safety issues resolved in a design certification rulemaking. That is, a certified design can only be modified if one of the requirements in 10 CFR 52.63(a) is met.

### 1.3.3.7 What are the opportunities for public meetings and hearings during a design certification review?

The rulemaking process for drafting and justifying final regulations includes a public comment period. In addition, the Commission may hold public meetings on the rulemaking.

## 1.3.4 Limited Work Authorizations

### 1.3.4.1 What is a limited work authorization (LWA)?

An NRC-issued LWA allows holders of ESPs, as well as COL applicants, to perform certain limited construction activities before the issuance of the COL, at their own risk.

### 1.3.4.2 What construction activities are included in an LWA?



**Construction Workers**

Construction activities that could be covered by an LWA are specified in 10 CFR 50.10(d) and include the driving of piles, subsurface preparation, placement of backfill, concrete or permanent retaining walls within an excavation, and installation of the foundation, including placement of concrete.

### 1.3.4.3 What construction activities are not included in an LWA?

The activities listed below are preconstruction activities and do not require any permit from the NRC and therefore can be conducted at any time, before during or after the issuance of any NRC permit or license. However other Federal agencies may require an environmental impact statement before allowing activities that would require a permit from their agency. In accordance with 10 CFR 50.10, "License Required; Limited Work Authorization," the definition of "construction" does not include the following:

- changes for temporary use of the land for public recreational purposes
- site exploration, including necessary borings to determine foundation conditions or other preconstruction monitoring to establish background information related to the suitability of the site
- preparation of a site for construction, including clearing of the site; grading; installation of drainage, erosion, and other environmental mitigation measures; and construction of temporary roads and borrow areas
- erection of fences and other access control measures

- excavation
- erection of support buildings (such as construction equipment storage sheds, warehouse and shop facilities, utilities, concrete mixing plants, docking and unloading facilities, and office buildings) for use in connection with the construction of the facility
- building of service facilities, such as paved roads, parking lots, railroad spurs, exterior utility and lighting systems, potable water systems, sanitary sewage treatment facilities, and transmission lines
- procurement or fabrication of components or portions of the proposed facility occurring at locations other than the final, in-place location at the facility
- manufacture of a nuclear power reactor under a manufacturing license under Subpart F, "Manufacturing Licenses," of 10 CFR Part 52 to be installed at the proposed site and to be part of the proposed facility

In accordance with 10 CFR 50.10(a)(2)(ii), the NRC does not consider site investigations required by 10 CFR 100.23(c) to be construction. In addition, the definition of construction given above excludes excavation. Excavation includes the removal of any soil, rock, gravel, or other material below the final ground elevation to the final parent material. Thus, all of these excavation activities may be conducted without a COL, LWA, or ESP authorizing LWA activities or any NRC permit.

However, these activities may require permits from other Federal agencies, such as the Corps if wetlands are impacted or if dredging is needed (section 404 of the CWA), and from State agencies under section 401 of the CWA. The NRC and the Corps signed a memorandum of understanding in which the agencies agreed that the NRC will be the lead agency for writing the EIS for nuclear power facilities and the Corps will be a cooperating agency. The Corps may require issuance of a final EIS before allowing preconstruction activities that impact wetlands. Therefore, before conducting preconstruction activities, the project owner should consult with the State and Federal regulatory bodies that have authority over preconstruction activities. During the pre-application period, the NRC encourages the project owner to engage in early interaction with all regulatory bodies that are required to issue permits.

#### **1.3.4.4 What is required in an application for an LWA?**

The requirements for a request for an LWA include:

- a safety analysis for the activities requested
- a detailed description of the activities requested
- design and construction information for portions of the facility affected by the requested activities
- an environmental report in accordance with 10 CFR 51.49, "Environmental Report—Limited Work Authorization"
- a plan for redress of the activities performed under the LWA

- inspections, tests, analyses, and acceptance criteria for the requested activities, as necessary, per 10 CFR 52.80(a)
- the applicant's technical qualifications to perform the activities authorized.

#### 1.3.4.5 What type of review does the NRC conduct on an LWA?

The NRC performs both a safety review and an environmental review of an application for an LWA. The safety review process includes acceptance review, requests for information, public meetings, safety evaluation, and ACRS review. The environmental review process and the number and scope of EISs prepared by the NRC staff will depend on the requests in the LWA application and the approach chosen by the applicant. The basic environmental review process will remain the same: acceptance review, scoping, public scoping meeting, draft EIS, public meeting on the draft EIS, resolution of comments on the draft EIS, and final EIS. The safety and environmental review process for a stand-alone LWA application is expected to be narrower in scope and shorter in duration than the process for a COL application.

*The environmental review process and the number and scope of environmental impact statements prepared by the NRC staff will depend on the requests in the application for limited work authorization and the approach chosen by the applicant.*

#### 1.3.4.6 What regulations cover LWAs?

The NRC sets forth the requirements for an LWA in 10 CFR 50.10. The agency amended this section on October 9, 2007, as published in the *Federal Register* (72 FR 57416). The revised LWA rule went into effect on November 8, 2007. The major change to the LWA rule involved the definition of construction.

### 1.4 Regulatory Basis for the Review

*The NRC welcomes public participation in the rulemaking process.*

#### 1.4.1 How does the NRC develop its regulations?

The NRC develops regulations through the rulemaking process. In addition, as discussed above, design certifications require a rulemaking. Usually, the NRC's technical staff initiates a change to a regulation because of a safety or environmental concern, an improvement in technical understanding, or an improvement in the regulatory process. The Commission may also direct changes to the regulations. However, any member of the public may petition the Commission under 10 CFR 2.802,

"Petition for Rulemaking," to develop, change, or rescind a regulation.

The rulemaking process has several steps. In a rulemaking initiated by the NRC, the rule is proposed after the NRC decides on the need for and general framework of a rule. The proposed rule, published in the *Federal Register*, usually contains background information, an address for submitting comments, a date by which comments should be received in order to guarantee their consideration by the staff, an explanation of why the regulation change is

thought to be needed, and the proposed changes to the text of the regulation. Usually, the public has 75 to 90 days to provide written comments. Once the public comment period is closed, the staff analyzes the comments, makes any needed revisions to the proposed rule, and forwards the final rule for the Commission's approval and publication in the *Federal Register*. Once approved, the final rule is published in the *Federal Register* and usually becomes effective 30 days after publication.

The NRC does not issue all rules for public comment. Generally, rules not published for comment are related to NRC organization, procedures, or practices; are interpretations of rules; or of a nature that delaying their publication to receive comments would be impracticable, unnecessary or contrary to the public interest.

#### **1.4.2 What if you disagree with the regulations? How do you get the regulations changed?**

The NRC welcomes public participation in the rulemaking process. There are several ways for the public to participate in rulemaking:

- The public may provide comments in response to *Federal Register* notices. The NRC publishes notices of rulemaking activities in the *Federal Register* to solicit public comment, and it may also publish a notice of a meeting or workshop to be held regarding a rule. The *Federal Register* notice contains information about how to provide specific comments on a proposed rule to the NRC.
- The [NRC's Rulemaking page](#) facilitates public participation in the rulemaking process by providing a means for members of the public to access NRC rulemaking documents. The page links to proposed rules and petitions for rulemaking recently published by the NRC in the *Federal Register* and to other types of documents related to rulemaking proceedings. Members of the public can send questions to the NRC staff via Web form, <http://www.nrc.gov/about-nrc/regulatory/rulemaking/contact-us.html>. NRC Rulemaking documents can also be found on the [Regulations.gov](#) website. This site provides access to a government-wide, on-line database that includes NRC's public dockets for its rulemaking actions. The dockets include publicly-available documents such as NRC-issued Federal Register Notices, supporting documents, public comments, and other related documents.
- Members of the public may petition the NRC to develop, change, or rescind a rule by filing a petition for rulemaking in accordance with the regulations at 10 CFR 2.802. Information about the petition for rulemaking process is located at <http://www.nrc.gov/about-nrc/regulatory/rulemaking/petition-rule.html>.



## 2.0 The NRC Environmental Review

The U.S. Nuclear Regulatory Commission (NRC) review of an applicant's license application includes determining the environmental effects of constructing and operating the proposed nuclear power facility on a particular proposed site. The Commission determined that the NRC would prepare an environmental impact statement (EIS) for each major Federal action to fulfill its responsibilities under the National Environmental Policy Act of 1969 (NEPA). The Commission may also prepare an EIS for other actions when it determines that it furthers the purpose of NEPA. NEPA requires that all Federal agencies consider environmental values in conducting their work. This section provides responses to frequently asked questions about NEPA and the related environmental review process.



**Wildlife Refuge**

### 2.1 What is the National Environmental Policy Act (NEPA)?

NEPA defined a national policy for the environment and established the basis for considering environmental issues in the conduct of Federal activities.

The Act establishes a national policy that

- encourages productive and enjoyable harmony between man and his environment
- promotes efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man
- enriches the understanding of the ecological systems and natural resources important to the Nation.

The legal citation for NEPA in the United States Code is 42 U.S.C. 4321 et seq. The text can be found in Public Law 91-190, 42 U.S.C. 4321–4347, January 1, 1970, and in its subsequent amendments (Public Law 94-52, July 3, 1975; Public Law 94-83, August 9, 1975; and Public Law 97-258, paragraph 4(b), September 13, 1982). NEPA also established the President's Council on Environmental Quality (CEQ). On November 29, 1978, CEQ issued regulations (Title 40 of the *Code of Federal Regulations* [CFR] Part 1500, "Purpose, Policy, and Mandate") implementing NEPA. These regulations became effective for and binding upon all Federal executive branch agencies within a year after their publication. The regulations direct Federal agencies on matters related to environmental policy, including the public scoping process, use

of lead agencies, and selection of alternatives. The NRC is an independent executive agency and is not in the executive branch of the Federal Government. In establishing its own regulations, the Commission has announced its policy to voluntarily take into account CEQ's 1978 regulations, subject to certain conditions (see 10 CFR 51.10, "Purpose and Scope of Subpart; Application of Regulations of Council on Environmental Quality").

The NRC's regulations at 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," implement NEPA. The NRC uses these regulations as the basis for developing EISs or conducting environmental assessments in support of NEPA.

### **2.1.1 What does NEPA require?**

NEPA requires all Federal agencies considering a major Federal action to take the following actions:

- Use a systematic, interdisciplinary approach for decision-making on actions that may have an impact on the environment.
- Inform and involve the public in the decision-making process.
- Consider significant environmental impacts associated with the action.
- Consider alternatives and their impacts on the proposed action.

### **2.1.2 Why does the NRC conduct an environmental review?**

The NRC performs an environmental review of an applicant's license application to determine the environmental effects of constructing and operating the proposed nuclear power facility on a

*The NRC performs an environmental review of an applicant's license application to determine the environmental effects of constructing and operating the proposed nuclear power facility on a particular proposed site.*

particular proposed site. The NRC conducts an environmental review because it recognizes a continuing obligation to implement its domestic licensing and regulatory functions in a manner that is both receptive to environmental concerns and consistent with the NRC's responsibility, as an independent executive agency, to protect the radiological health and safety of the public.

### **2.1.3 Which actions (licenses or permits) require an environmental review?**

The NRC defines the actions requiring an environmental review in the regulations at 10 CFR 51.20, "Criteria for and Identification of Licensing and Regulatory Actions Requiring Environmental Impact Statements," and 10 CFR 51.21, "Criteria for and Identification of Licensing and Regulatory Actions Requiring Environmental Assessments." In summary, the NRC prepares an EIS if the proposed action is (1) a major Federal action significantly affecting the quality of the human environment, and (2) a matter that the Commission has determined should be covered by an EIS, such as issuance of a permit to construct a nuclear power reactor. In 10 CFR 51.20(b), the NRC lists the matters that the Commission has determined should be specifically covered. The NRC prepares an

environmental assessment for any licensing or regulatory action that is not specified by 10 CFR 51.20(b) as requiring an EIS, or that is not identified in 10 CFR 51.22(c) and 10 CFR 51.22(d) as an action that will not have a significant environmental effect and can be categorically exclude from the environmental review. Early site permits, combined license applications, and limited work authorizations require an environmental review in the form of an EIS. Design certifications require an environmental assessment for severe accident mitigation alternatives, since these alternatives are most effectively considered at the time the NRC is reviewing the design for certification.

#### **2.1.4 What is not required by NEPA?**

NEPA does not require that the Federal agency choose the alternative with the least impact; instead, the agency must disclose all potential impacts so that it can make a fully informed decision. NEPA does not provide for adjudication of contested actions. Each agency's administrative procedures specify the conditions under which it holds administrative hearings.

NEPA does not require the review or re-analysis of actions other than the action being considered. For example, the NEPA review for a combined license would not include an environmental review of an existing facility located on the same site, a review of an independent spent fuel storage installation being built nearby, or an analysis of a waste repository, each of which has or would have its own separate NEPA review.

#### **2.1.5 What is an environmental impact statement (EIS)?**

An EIS is a written analysis of the reasonably foreseeable effects of an activity on the environment, including the air, water, animal life, vegetation, and natural resources, and on any property of historic, archaeological, or architectural significance. The review evaluates cumulative, economic, social (including environmental justice), cultural, and other impacts. The preparation of an EIS includes the following:

- publication of a notice of intent to prepare the EIS
- scoping, that is, preliminary analysis and consultation with other agencies and stakeholders (including the public) to determine the scope of the EIS, defining the range of actions, alternatives, and impacts to be considered
- analysis leading to a draft EIS
- public review and comment, NRC responses to the comments, and possibly further analyses, amendments, or revision of the draft EIS
- publication of a final EIS that includes discussion of the comments made during the public review period for the draft EIS

*An environmental impact statement (EIS) is a written analysis of the reasonably foreseeable effects of an activity on the environment, including the air, water, animal life, vegetation, and natural resources, and on any property of historic, archaeological, or architectural significance.*

## 2.1.6 How does the NRC implement NEPA?

The NRC implements NEPA according to its regulations in 10 CFR Part 51. The agency uses these regulations as the basis for preparing EISs or environmental assessments in support of NEPA.

## 2.1.7 Does any other governmental agency review the EISs written by the NRC?

Section 309 of the Clean Air Act gives EPA the responsibility to review EISs that are prepared by other Federal agencies (including the NRC). In addition to reviewing the EIS for adequacy, EPA also provides the sponsoring agency (in this case, the NRC) with an assessment of each EIS as a measure of the NRC's adherence to NEPA. EPA provides its comments to the NRC to use in developing on future EISs. Additionally, EPA comments on draft EISs under its statutory areas of responsibility, such as clean water and clean air. The NRC also invites other Federal agencies to participate in the scoping process and gives them the opportunity to review and comment on the draft EISs.

## 2.1.8 What other environmental laws or, regulations, are involved in building a new reactor?

The following are some of the laws and regulations that potentially apply to a new reactor,:

- Endangered Species Act of 1973, with respect to protecting threatened and endangered species and critical habitats and initiating formal or informal consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service
- Federal Water Pollution Control Act of 1972 (commonly called the Clean Water Act), requiring the restoration and maintenance of the chemical, physical, and biological integrity of water resources
- Fish and Wildlife Coordination Act of 1958, ensuring consideration of fish and wildlife resources in the planning of development projects that affect water resources
- Migratory Bird Treaty Act, as amended, controlling the endangerment or taking of migratory birds
- Coastal Zone Management Act of 1972, with respect to natural resources and land or water use of the coastal zone
- Marine Mammal Protection Act of 1972, requiring the protection of marine mammals
- Marine Protection, Research and Sanctuaries Act of 1972, controlling the dumping of dredged material into the ocean
- Rivers and Harbors Appropriations Act of 1899, controlling the deposition of debris in navigable waters or tributaries to such waters
- National Historic Preservation Act of 1966, related to the protection and preservation of significant historic properties during construction, refurbishment, and operation of a plant
- Native American Graves Protection and Repatriation Act of 1990, related to disturbance of Native American burial grounds and cultural sites

*In addition to reviewing the EIS for adequacy, EPA also provides the sponsoring agency with an assessment of each EIS.*

- National Electrical Safety Code, regulating shock hazards from transmission lines
- 40 CFR Part 122, "EPA Administered Permit Programs: The National Pollutant Discharge Elimination System," and 40 CFR Part 124, "Procedures for Decision-making," implementing the National Pollutant Discharge Elimination System permit conditions for discharges, including storm water discharges
- 40 CFR Part 125, "Criteria and Standards for the National Pollutant Discharge Elimination System," addressing water quality standards
- 40 CFR Part 165, "Pesticide Management and Disposal"
- 40 CFR Part 403, "General Pre-Treatment Regulations for Existing and New Sources of Pollution," regulating waste effluents
- 40 CFR Parts 700–716, defining practices and procedures for managing toxic chemicals

### 2.1.9 Does the NRC coordinate or consult with other Federal agencies as part of its environmental reviews?

One of the first requirements for developing an EIS is to publish, in the *Federal Register*, a notice of intent to prepare the EIS and conduct scoping. This *Federal Register* notice alerts other agencies (including other Federal agencies) that may have an interest in participating in the review or wish to participate in the scoping process. The NRC and the U.S. Army Corps of Engineers (Corps) signed a memorandum of understanding that establishes a framework for early coordination and participation among the agencies. During the analysis and preparation of the EIS, the NRC staff consults with appropriate Federal agencies. The NRC usually contacts the U.S. Fish and Wildlife Service (U.S. Department of the Interior) and the National Marine Fisheries Service (U.S. Department of Commerce) for environmental issues related to the impact on any threatened or endangered species that may be in the vicinity of the site or on any critical habitat that could be affected by the licensing action. The NRC also consults with State and Tribal Historic Preservation Officers on issues related to historic preservation. If other agencies have actions or jurisdiction over areas directly related to the review, the NRC would also contact them directly.



**Green Turtle**

In addition to NRC-coordinated consultation, various Federal agencies review the draft EIS at their discretion. For example, at the Federal level, the draft EISs for combined licenses and early site permits are most commonly reviewed by EPA, the Advisory Council on Historic Preservation, and the Department of the Interior. The NRC considers the comments from these agencies and includes them in the final EIS, as appropriate.

## 2.2 The NRC's Environmental Review Process

### 2.2.1 What steps does the NRC take before receiving an application?



**NRC Reviewer Examining a Site**

There are no regulatory requirements for the NRC to perform pre-application activities. However, the NRC encourages prospective applicants to discuss with the NRC regarding their plans for submitting an application. The purpose of the pre-application activities is to prepare the appropriate NRC staff resources needed to conduct an environmental review for combined license and early site permit applications. At the request of the applicant, the NRC conducts a number of readiness assessments at the proposed site. These activities determine the readiness of the application to be submitted on

the date forecasted by the prospective applicant. These pre-application assessments include a tour of the site, discussions with key staff that are familiar with the site and are involved in developing the environmental report and the process for selecting sites, and a records assessment of the environmental portions of the application. Pre-application activities may begin as early as 2 years before submission of the application, although the NRC commonly conducts them 6 months to 1 year before the review.

### 2.2.2 What steps does the NRC have to take to complete the environmental review after the application has been submitted?

The environmental review begins when an applicant sends its license application to the NRC. One part of the application, the applicant's environmental report, serves as the starting point for the NRC staff's environmental review. The following activities occur after the NRC receives the license application:

- The NRC staff places a notice in the *Federal Register* that it has received the application. The notice tells the public how to access copies of the application.
- The NRC staff places another notice in the *Federal Register* if the staff determines that the information in the application is sufficient and acceptable to begin the review. Either this notice or yet a third notice placed in the *Federal Register* establishes a 60-day period for interested persons to file a request to participate in a hearing.
- The NRC staff places another notice in the *Federal Register* generally about 1 month after accepting the application. This notice informs the public of the NRC's intent to prepare an EIS and provides information about the scoping process. The scoping process defines the proposed action, determines the scope of the EIS, and identifies the significant issues to be analyzed in depth. One or more public scoping meetings take place near the proposed site of the nuclear power reactor. The *Federal Register* notice provides the time and location of the public scoping meeting(s).

- Approximately 30 days after publishing the notice of intent, the NRC staff usually hosts one or more public scoping meetings within the vicinity of the proposed nuclear power reactor. The NRC generally advertises the meeting in local papers, through a press release, and through outreach to public interest groups to ensure that interested members of the public are aware of the public scoping meeting. The NRC staff considers the written comments and meeting transcript comments and then determines which comments are within the scope of the environmental review; comments on safety matters are sent to the safety reviewers. The staff then issues a scoping report, which defines the scope of the EIS and the range of actions, alternatives, and impacts to be considered.
- The NRC staff typically conducts an audit at the site and in the surrounding area. This visit familiarizes the NRC and its contractor team with the site and its environs and helps the agency determine whether it should investigate additional issues as part of the environmental evaluation. The NRC/contractor team is composed of experts in the fields pertinent to the environmental review.
- The NRC staff also conducts an audit of the alternative sites that were considered in the environmental report to aid in determining whether there is any obviously superior alternative to the site proposed.
- The NRC publishes the draft EIS after the agency completes its detailed reviews, approximately 1 year after accepting the application. The NRC staff places a notice of availability in the *Federal Register* telling the public and other interested parties how to obtain copies. The NRC also sends copies to all individuals on facility distribution lists and provides individual copies to members of the public upon request. The notice requests public comments on the draft EIS, usually within a 75-day period. This period reflects the required 45-day comment period and two 15-day extensions to ensure that the public and other organizations have adequate time to participate. The notice also alerts the public to one or more public meetings to be held in the vicinity of the proposed nuclear power plant. The NRC also issues a press release so that local media are aware of the draft EIS and the meetings and can report on them. The meeting(s) present an overview of the draft EIS and give the public a forum to comment on the document. Transcripts of the public meeting(s) are made available to the public. The NRC gives comments received at these transcribed meetings the same consideration as those provided in written form.
- After the receipt of the comments from the public, the applicant, and any interested local, State, Tribal, or Federal agencies, the NRC staff considers the comments and makes any appropriate changes which are incorporated into the final EIS. The agency then publishes the final EIS, including the list of the comments and the NRC staff's resolution of each comment. The NRC usually issues the final EIS approximately 2 years after accepting the application. The NRC staff includes a recommendation in the final EIS regarding the environmental review to the Commission or its designee.

### 2.2.3 What is scoping?

Scoping is one of the steps in preparing an EIS. The NRC's regulations (10 CFR 51.28 and 29) direct the staff to engage in a scoping process is to determine the range of actions, alternatives, and impacts that should be considered in the EIS. Scoping is intended to ensure that problems are identified early and are properly studied, that issues of little significance do not consume time and effort, that the draft EIS is thorough and balanced, and that delays because of an inadequate draft EIS are avoided.

*Scoping is intended to ensure that problems are identified early and are properly studied, that issues of little significance do not consume time and effort, that the draft EIS is thorough and balanced, and that delays occasioned by an inadequate draft EIS are avoided.*

An effective scoping process can help reduce unnecessary paperwork and time delays in preparing and processing the EIS by clearly identifying all relevant issues and procedural requirements. NEPA does not require public meetings during scoping but leaves it up to the individual agency to decide its method for seeking public input. For new reactor licensing, the NRC has elected to conduct public meetings as a part of the scoping process. These meetings take place in the vicinity of the power reactor facility early in the review process. The NRC invites the public to attend the meetings to provide its insights on the scope of the environmental assessment.

### 2.2.4 Why does the NRC have a scoping process and what information is it specifically looking for during this process?

The NRC conducts the scoping process to define the proposed action, determine the scope of the environmental review, and identify the significant issues to be analyzed in depth. A scoping meeting is held in the vicinity of the proposed project to receive input from the public on the scope of the review. Specifically, the scoping process accomplishes the following:

- defines the proposed action
- determines the scope of the EIS and identifies the significant issues to be analyzed in depth
- identifies and eliminates from detailed study those issues that are peripheral or that are not significant
- identifies any environmental assessments and other EISs that are being or will be prepared that are related to but are not part of the scope of the EIS
- identifies other environmental review and consultation requirements related to the proposed action



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- indicates the relationship between the timing of the preparation of environmental analyses and the NRC's tentative planning and decisionmaking schedule
- identifies any cooperating agencies and, as appropriate, allocates assignments for EIS preparation, and determines schedules for completing the EIS
- describes how the EIS will be prepared, including any contractor assistance to be used

### **2.2.5 What technical areas are included in the environmental review?**

The NRC performs reviews of the environmental impacts of license applications in accordance with NEPA and the NRC's requirements in 10 CFR Part 51. The review commonly includes the following technical areas:

- land use
- ground and surface water use and quality
- air quality
- aquatic resources
- terrestrial resources
- threatened and endangered species
- radiological impacts
- socioeconomic factors
- environmental justice issues
- historical and archaeological resources
- related Federal project activities
- postulated accidents
- uranium fuel cycle and solid waste management
- decommissioning
- alternative sites
- alternative energy sources (not required for an ESP)
- system design alternatives
- cumulative impacts
- need for power (not required for an ESP)
- cost-benefit analysis (not required for an ESP)
- irreversible or irretrievable resource commitments

The review may include other areas as a result of information obtained during the NRC staff's review or from public comments received during or after meetings held in the vicinity of the proposed nuclear power reactor.

### **2.2.6 What geographical area is considered in the review?**

The NRC considers environmental impacts at the site itself and in surrounding areas that the project could affect. The NRC also evaluates the facility's contribution to impacts from nonfacility-related activities as cumulative impacts.

### **2.2.7 Who actually performs the environmental review?**

The environmental review is performed by a team of experts, including NRC staff members supported by contractor staff from national laboratories and other contractors. The team consists of experts in a variety of fields, including the following:

- atmospheric science
- hydrology (surface and ground water use and quality)
- terrestrial ecology
- aquatic ecology
- land use
- archaeology/cultural resources
- socioeconomics/environmental justice
- radiation protection
- accident analysis
- nuclear safety
- regulatory compliance

### **2.2.8 Which State, Tribal, county, or local agencies does the NRC contact during the review of the application and the development of the EIS?**

The NRC staff contacts State offices for input during its analysis of the license application. These offices include organizations dealing with health and human services, cultural resources, and environmental protection and natural resources. The NRC staff also contacts county or local agencies, specifically those that may provide the staff with cultural and historic or socioeconomic information related to the staff's review of the application. The NRC staff also contacts recognized Tribal nations that may have ties to the land in the vicinity of the proposed plant. Although the NRC does not provide copies of the application to State, Tribal, county, or local agencies, the applicant may provide it directly to specific offices, and the NRC makes it available electronically via the NRC's public web site (<http://www.nrc.gov>). The NRC publishes a notice in the *Federal Register* indicating the receipt of the license application shortly after it receives the application. The notice indicates where hard copies are available and how they can be obtained. The NRC makes arrangements to have a hard copy of the application available at a public library close to the site.

### 2.2.9 Where does the NRC publish the results of the environmental review?

The NRC first publishes the results of the review as a draft EIS, which includes the NRC's analysis of the environmental impacts of the proposed action and the alternatives to the proposed action. The draft EIS also includes a preliminary recommendation concerning the license based on the NRC staff's consideration of the information about the environmental impacts of the proposed action and the alternatives contained in the EIS. The staff issues a final EIS after considering public comments on the draft EIS. Both the draft and final EISs are available on the NRC's Agencywide Documents Access and Management System (ADAMS). The ADAMS Public Electronic Reading Room is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams>.. The NRC provides copies of the draft and final EIS to libraries in the vicinity of the proposed power plant.

### 2.2.10 What are cumulative impacts, and how does NRC evaluate them?

*Cumulative impacts can result from individually small impacts that become significant when taken collectively over a geographic area or a period of time.*

Cumulative impacts on the environment result when impacts of an action are added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually small impacts that become significant when taken collectively over a geographic area or a period of time. Any agency (Federal or non-Federal) or

private entity can contribute to cumulative effects through its actions or approval of actions. These combined impacts are defined as "cumulative" and include individually minor but collectively significant actions taking place over a geographic area or a period of time. The NRC evaluates cumulative effects during the site visit and scoping process by identifying the impacts that have affected the environment surrounding the facility. For example, the close proximity of another nuclear reactor or another industrial facility that also discharges warm water into the same river may have a cumulative impact on aquatic ecology that is greater than the impact of just one facility. The staff would take into consideration the potential for cumulative impacts from both facilities. The staff considers preconstruction activities in its cumulative impact analysis.

### **2.2.11 What is mitigation?**

According to CEQ regulations at 40 CFR 1508.20, "Mitigation," mitigation can include the following:

- avoiding the impact altogether by not taking a certain action or parts of an action
- minimizing impacts by limiting the degree or magnitude of the action and its implementation
- rectifying the impact by repairing, rehabilitating, or restoring the affected environment
- reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action
- compensating for the impact by replacing or providing substitute resources or environments

As defined in NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," mitigation is the process of modifying a design or practice (either a construction practice or an operating procedure) to lessen its impacts. Typically, the impacts are environmental in nature, but mitigation also applies to historical and cultural resources, and environmental justice. In terms of the impacts during the construction or operation of the facility, this definition can include activities such as using best management practices to mitigate the impact of dredging; relocating a project, such as additional storage or lay-down yards to avoid impacting an historic or archaeological site; reconfiguring intake structures to reduce impingement or entrainment of fish and shellfish larvae; and making structural changes to equipment to mitigate the potential for severe accidents.

During the review process, the applicant makes the first attempt to identify areas needing mitigation and the specific mitigation actions to be taken. The NRC then assesses the validity of those strategies and determines whether the applicant identified all necessary areas for mitigation.

### **2.2.12 What issues are precluded from consideration?**

The NRC does not consider a number of issues in its environmental reviews for licensing actions, including, but not limited to, safety, operational issues that require a separate NEPA review (such as an independent spent fuel storage installation), security and safeguard issues, emergency preparedness (including distribution of potassium iodide), spent fuel disposal and storage after cessation of reactor operations (10 CFR 51.23, "Temporary Storage of Spent Fuel after Cessation of Reactor Operation—Generic Determination of No Significant Environmental Impact"), and economic feasibility. The NRC addresses safety, security, and emergency preparedness issues in the safety review that the agency conducts in parallel with the environmental review. The NRC conducts a benefit-cost analysis during the environmental review. It requires financial assurance for decommissioning for all applicants, who also must carry nuclear accident insurance under the Price-Anderson Act. However, the final decision about whether to build the facility remains with the utility.

### **2.2.13 How are environmental impacts categorized?**

To guide its assessment of environmental impacts for a proposed action or alternative actions, the NRC has established a standard of significance for impacts using CEQ guidance in 40 CFR 1508.27, "Significantly." Using this approach, the NRC has established three levels—small, moderate, or large—that provide a common framework for each of the technical disciplines assessed in the EIS. Once the impacts are evaluated and analyzed, they are categorized. The three levels are defined below:

- **SMALL** – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- **MODERATE** – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.
- **LARGE** – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

### **2.2.14 Does the NRC only review information provided by the applicant in the environmental report? Can it introduce new information in the review process?**

The applicant's environmental report is intended to assist the Commission in complying with NEPA. The NRC staff may make extensive use of the environmental report as a starting point for its review. However, the NRC staff independently evaluates information contained in the environmental report. In addition, through its scoping process, the NRC gathers information from the public and from State and Federal agencies. Ultimately, the NRC staff is responsible for the reliability of any information used in the EIS.

