# 3.0 General Questions Related to Environmental Review Topics

Responses in this section are related directly to the topic areas that the U.S. Nuclear Regulatory Commission (NRC) evaluates in the environmental impact statement (EIS), which include the need for power, socioeconomics, transportation, human health issues, transmission lines and human health impacts, alternatives to the proposed actions, accidents and their mitigation, and decommissioning.

## 3.1 Need for Power

### 3.1.1 Does the NRC evaluate the need for power?

**Night View of the United States Showing Power Use**

The NRC evaluates the need for power on a case-by-case basis. Title 10 of the *Code of Federal Regulations* (10 CFR) 52.17(a)(2) specifically states that an application for an early site permit need not include a need-for-power analysis. The applicant has an option to decide when to address the issue. Therefore, if the applicant submits the information in the environmental report at the early site permit stage, the NRC will consider the need for power at that time. If the early site permit environmental impact statement (EIS) has not addressed the issue, the NRC will take it up at the combined license stage.

### 3.1.2 Why does the NRC review the need for power?

As part of the NRC's compliance with the National Environmental Policy Act (NEPA), the need for power is addressed in connection with the construction of a new nuclear power plant so that the NRC may weigh the likely benefits (for example, electrical power) against the environmental impact of constructing and operating a nuclear power reactor. In considering the need for power, the NRC does not supplant the role of the States that have traditionally been responsible for assessing the need for power facilities and their economic feasibility, and for regulating rates and services.

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### 3.1.3 Why does the NRC evaluate the need for power?

The NRC's regulations (10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions") implementing NEPA require the NRC to evaluate the need for power in a combined license review, if such an evaluation has not already been performed by the NRC.

### 3.1.4 Doesn't expansion of nuclear power commit us to centralized (versus distributed) generation of energy for a long time to come?

The NRC has no authority or regulatory control over the ultimate selection of future energy alternatives. Moreover, since the NRC does not have any authority in the general area of energy planning, the NRC's identification of a superior alternative does not guarantee that such an alternative will be used instead of a specific nuclear plant under review. Likewise, the NRC cannot ensure that environmentally superior energy alternatives will be used in the future. The NRC makes its decision whether or not to issue a license based on safety and environmental considerations. The NRC's requirements to consider the environmental impacts of various alternatives are based on NEPA, which ensures that relevant agencies examine and disclose the potential environmental impacts of their actions before taking the action. NEPA is a procedural statute that does not dictate a decision based on relative environmental impacts. Utility, State, and Federal (non-NRC) decisionmakers make the final decision about whether or not to build and operate the nuclear plant based on economics, energy reliability goals, and other objectives over which other entities may have jurisdiction.

### 3.1.5 Why does the NRC evaluate alternatives, such as alternative energies and alternative sites, when it can only approve or deny a license for a nuclear power plant?

NEPA requires the evaluation of alternatives.

## 3.2 Socioeconomics

### 3.2.1 What percentage of jobs is filled by workers in the locality of the new plant?

The percentage of jobs filled by workers in the locality of a new plant varies based on two factors:

- the population within the region of the plant
- the skill base of local workers

The estimates also vary between the construction period and the period of plant operations.

EISs that have been completed for early site permits show an estimated number of total construction workers that ranges from 3,150 to 5,000 workers. For some of the nuclear power plant sites that are located within commuting distance to more populous metropolitan areas, estimates have figured that more than 80 percent of the construction labor pool would be drawn locally. In many cases, it is likely that workers in more highly specialized occupations, such as pipe fitters, nuclear operators, engineers, technicians, and supervisors with specific nuclear experience, would have to be recruited outside of the area.

Based on estimates from the four completed early site permit reviews, new nuclear plants would employ anywhere from 580 to 1,160 permanent workers during the period of plant operations, depending on the size, number of units and type of plant. In the four recent cases, the planned facilities would be co-located with existing facilities. The existing pool of administrative and support staff would be leveraged, and other existing staff would be efficiently distributed between the newer and existing plants as appropriate. If the facility were built at a new site some distance from any existing site owned by the same utility, the estimates would be expected to be higher. Because of the specialized skill requirements, estimates of the sources of permanent plant employees to operate the new plants vary dramatically, depending on the skill set of the local labor pool.

### 3.2.2 Is it true that siting a nuclear plant in an area will chase away other businesses?

Historically, the siting of a nuclear plant increases the number of businesses in the surrounding towns established to provide services to the additional workers and their families who move into the region to work at the site. Generally, with additions to the tax base from the nuclear power plant, more funds are available to improve public services, including education and recreational opportunities.

### 3.2.3 Does the NRC take into account the influx of workers and their effect on public services?

The NRC's regulations implementing NEPA require that the EIS describe the affected environment and the impact of the proposed action on the environment. This includes a discussion of socioeconomic impacts on community infrastructure and services such as education, water supply, waste treatment, police, and fire and emergency services. The impacts during the period of construction are evaluated in a separate chapter of the EIS from the impacts during the period of operation. The impacts will vary depending on the size of the surrounding population and whether new workers choose to commute from a larger city or live in a smaller rural setting.

### 3.2.4 How does the construction and operation of new nuclear plants affect the socioeconomic conditions of an area? For instance, is there a boom-bust effect?

*The impacts will vary depending on the size of the surrounding population and whether new workers choose to commute from a larger city or live in a smaller rural setting.*

The socioeconomic impacts from the construction and operation of new nuclear plants depend to a large degree on the location of the site and the population in the vicinity of the site.

In its four reviews for early site permits to date, the NRC has mostly considered the socioeconomic impacts to be small to moderate. Thus, although the effects are, in some cases, sufficient to be noticeable, they are not large enough to destabilize important attributes, as would be the case in a boom-bust cycle. However, small local municipalities may experience large impacts. In the case of the Grand Gulf plant, which is located in a rural area of Mississippi, the NRC estimated a large demographic impact for one specific community, presuming that the new rate of incoming workers and their families followed a pattern similar to that for the original plant construction on the site.

### 3.2.5 Constructing a new nuclear plant probably involves many specialized workers coming into an area. Is housing a problem?

*Although construction workers would outnumber operational workers, construction workers more often commute from further distances than do the operational workers because construction workers have a shorter average duration of employment at the plant. In addition, some relocated construction workers might bring mobile homes for the duration of their employment.*

The housing-related impacts from additional workers for the construction and operation of a new nuclear plant depend to a large degree on the location of the site and the existing housing market, especially the current number of vacant dwellings. Although construction workers would outnumber workers during plant operations, construction workers more often commute from further distances than do the operational workers because construction workers have a shorter average duration of employment at the plant. In addition, some relocated construction workers might bring mobile homes for the duration of their employment.

Housing impacts for the four completed environmental reviews for early site permits range from small to moderate, assuming that conservatively high numbers of workers reside in the communities least able to handle the influx.

### 3.2.6 Has deregulation reduced the amount of taxes added to localities' coffers from the siting of nuclear plants?

The effect of deregulation on the amount of taxes paid to localities differs between States and depends on how a State administers the taxes. For many States that are in the process of deregulating, the impacts are not yet known. The NRC has no regulatory control over the amount of taxes paid by a utility that owns a nuclear power plant. However, the environmental impact of taxes paid to the localities is discussed in the environmental impact statement as it relates to public services.

### 3.2.7 How does the NRC consider environmental justice in its environmental review?

*Although compliance with the executive order is not mandatory for independent agencies, the Commission has voluntarily committed to undertake environmental justice reviews as part of its National Environmental Policy Act responsibilities.*

On February 11, 1994, the President issued Executive Order 12898, "Federal Actions To Address Environmental Justice in Minority Populations and Low Income Populations." This order requires each Federal executive branch agency to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on minority and low-income populations resulting from its actions. The memorandum accompanying the Executive order directed Federal executive agencies to consider environmental justice. The President's Council on Environmental Quality provided guidance for addressing environmental justice. Although complying with the executive order is not mandatory for independent agencies, the Commission has voluntarily committed to undertake environmental justice reviews as part of its NEPA responsibilities. The Commission's "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions" contains guidance and information for addressing issues of environmental justice (Volume 69 of the *Federal Register*, page 52040 [69 FR 52040]). To perform a review of environmental justice in the vicinity of a nuclear power plant, the NRC staff examines the geographic distribution of minority and low-income populations within 50 miles of the site. The staff uses the most recent census data available. The staff also supplements its analysis with field inquiries to groups such as county planning departments, social service agencies, agricultural extension personnel, and private social service agencies. Once the locations of minority and low-income populations are identified, the staff evaluates whether any of the environmental impacts of the proposed action could affect these populations in a disproportionately high and adverse manner.

## 3.3 Transportation

### 3.3.1 What are the transportation impacts of a new plant? Will it require new roads and more aggressive maintenance of existing roads?

The transportation impacts of a new plant will depend largely on the location of the site and the current condition of the roads that lead to the site. Where new units are being built at existing sites, the transportation infrastructure has previously (during construction of the existing units) accommodated the large numbers of construction workers that are anticipated during the construction period. At some sites, improvements may need to be made to the access road leading to the site; for construction on a new site (greenfield), the access roads may not yet be in place. In some locations, the major impact will be additional congestion on roads, particularly if the roads already contain traffic bottlenecks and are already congested with traffic.

**Transportation Impacts**

During the construction period, a number of shipments of large components (reactor vessel, steam generators, etc.) are anticipated. Because of the size of these components, they are most likely to arrive via rail or barge. Many sites may need to upgrade the existing barge slip or rail spur into the site. For some sites, upgrades may be necessary, such as improving bridge supports, dredging shipping channels, or constructing a new barge slip.

### 3.3.2 Transportation accidents in shipping fuel and parts seem likely to occur. What has the NRC done to anticipate this possibility?

The NRC has conducted several transportation studies to evaluate the risks associated with transporting radioactive material. The NRC issued NUREG-0170, "Final Environmental Statement on the Transportation of Radioactive Material by Air and Other Modes," in December 1977 to support its rulemaking set forth in 10 CFR Part 71, "Packaging and Transportation of Radioactive Material." Based on this study, the NRC concluded that the transportation regulations are adequate to protect the public against unreasonable risks from the transport of radioactive materials, including spent fuel. The NRC sponsored another study, NUREG/CR-4829, "Shipping Container Response to Severe Highway and Railway Accident Conditions," issued February 1987, known as the "Modal Study." Based on the results of this study, the NRC staff concluded that NUREG-0170 overestimated spent fuel accident risks by about a factor of three. The NRC initiated another spent fuel study, issued as NUREG/CR-6672, "Reexamination of Spent Fuel Shipment Risk Estimates," in March 2000. This study focused on the risks of a modern spent fuel transport campaign from reactor sites to possible interim storage sites and/or permanent geologic repositories. This study concluded that accident risks were much less than those estimated in NUREG-0170 and that more than 99 percent of transportation accidents are not severe enough to impair the function of the NRC-certified spent fuel package. While very severe accidents could cause damage the package, the studies show that any release of material would be very small and pose little risk to the local population/public.

The NRC's regulations for the safe transportation of radioactive materials have evolved over the years; for example, the revisions in 2004 were made to achieve compatibility with International Atomic Energy Agency transportation safety standards. However, the basic specifications for shipping containers have largely not changed. For instance, shipping containers, such as those used for spent fuel, be tested to evaluate the effects of a 30-foot drop, 1-meter puncture, fire, and immersion. Generally, after these tests, the radiological dose rates from spent fuel packages are unchanged. While the NRC has changed some of the details in the regulations, the staff believes that the regulations properly account for the basic safety standards for the performance of shipping containers under normal conditions of transport and hypothetical accident conditions.

The NRC has sponsored studies to analyze the consequences of specific accident scenarios on rail and truck transportation packages carrying spent fuel. For example, the NRC undertook an investigation of a July 2001 accident that involved a freight train carrying hazardous materials that derailed and caught fire while passing through the Howard Street railroad tunnel in downtown Baltimore, MD, to determine the possible regulatory implications of this particular event for the transportation of spent fuel by railroad. The NRC assembled a team of experts from the National Institute of Standards and Technology, the Center for Nuclear Waste

Regulatory Analyses, and the Pacific Northwest National Laboratory to determine the thermal conditions that existed in the Howard Street tunnel fire and to analyze the effects of this fire on various spent fuel transportation package designs. The staff concluded that the spent fuel transportation packages analyzed would withstand a fire with thermal conditions similar to those that existed in the Baltimore tunnel fire event. No release of radioactive materials from the packages would result from such an event.

## 3.4 Human Health Issues

The most commonly asked questions relating to human health issues include the potential for radiation exposure to the public and the potential for adverse effects from such exposure. This section responds to commonly asked questions regarding radiation exposure and its effect on human health.

### 3.4.1 What is radiation and where does it come from?

Radiation is naturally present in our environment and has been since the planet was formed. Radiation is a form of invisible energy waves or particles emitted from unstable atoms as they change to become more stable. Such unstable atoms are termed "radioactive," and materials containing significant amounts of radioactive atoms are called "radioactive material." Life has evolved in an environment that has significant levels of ionizing radiation. It comes from outer space (cosmic), the ground (terrestrial), and even from within our own bodies. It is present in the air we breathe, the food we eat, the water we drink, and the construction materials we use to build our homes. Certain foods, such as bananas and Brazil nuts, naturally contain higher levels of radioactive material than other foods. Brick and stone homes have higher natural radiation levels than homes made of other building materials, such as wood. During the late 19th century, scientists discovered natural radioactive elements. In the early 20th century, scientists created radioactive elements from stable elements. In 1942, scientists were able to split atoms deliberately, which released the energy that was in the nucleus and created unstable atoms in the process. Although there are different types of energy and particles emitted from different types of radioactive material, there is no difference between natural and human-made radiation.

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Radiation dose is measured in a unit called a rem, which is based on the effect of radiation on the human body. It takes into account both the amount and type of radiation deposited in body tissues. Radiation dose is often measured in millirem, or one thousandth of a rem. The average person in the United States receives about 600 millirems of radiation a year. About 300 millirems are from natural sources and 300 millirems are from human-made sources. Approximately 50 percent of our total exposure to radiation comes from natural sources, including radon and thoron gas (approximately 37 percent of our exposure), the sun and outer space (5 percent), the earth's soil and rocks (3 percent), and the human body itself (5 percent). Two percent comes from consumer products. The remaining approximately 48 percent of our total radiation exposure comes from medical procedures. The nuclear fuel cycle is responsible for less than 1/100th of 1 percent of the total annual radiation dose to the average person (based on the calculated dose from all facets of the nuclear power cycle divided by the population of the United States). This information was discussed in the National Council on Radiation Protection and Measurements (NRCP) Report No. 160, Ionizing Radiation Exposure of the Population of the United States. The report provides a complete review of radiation exposures for 2006.

**Natural Radiation Comes from Space**

### 3.4.2 Is radiation harmful?

Health effects from exposure to radiation range from no effect at all to death; radiation exposure can be responsible for inducing diseases such as leukemia, breast cancer, and lung cancer. Very high (hundreds of times higher than a rem), short-term doses of radiation have been known to cause prompt (or early, also called acute) effects, such as vomiting and diarrhea, skin burns, cataracts, and even death. When radiation interacts within the cells of our bodies, several events can occur. First, the damaged cells can repair themselves and permanent damage does not result; this is the most common outcome for x-rays, gamma radiation, and beta radiation. Second, the cells may die, much like large numbers of cells do every day in our bodies, and dead cells may be replaced through normal biological processes. Third, the cells may either incorrectly repair themselves, resulting in a change in the cells' genetic structure that can mutate and subsequently be repaired without any effect, or can sometimes form precancerous cells that may become cancerous.

Radiation is only one of many agents with the potential for causing cancer, and cancer caused by radiation cannot be distinguished from cancer attributed to other causes, such as chemical carcinogens. The associations between radiation exposure and the development of cancer are primarily based on studies of populations exposed to relatively high levels of ionizing radiation (for instance, the Japanese atomic bomb survivors and the recipients of selected diagnostic or therapeutic medical procedures). Although radiation can cause cancers at high doses and high dose rates, currently there are no data to unequivocally establish the occurrence of cancer following exposures to low doses and dose rates below about 5 rems (5000 millirems). The chance of getting cancer from a low dose of radiation is not known precisely because the few cases that may occur cannot be distinguished from cancers occurring from other causes.

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The actual amount of radiation any member of the public receives from activities occurring at nuclear power facilities is so small that scientists have been unable to make empirically based estimates of radiation risk from such low levels of exposure with any precision. There are many difficulties involved in designing research studies that can accurately measure the projected small increases in cancer cases that might be caused by low exposures to radiation when compared to the normal rate of cancer. The best that scientists can do is to make an unsubstantiated assumption that any amount of radiation may pose some risk for causing cancer or having some hereditary effect and that the risk is higher for higher radiation exposures. This is called a linear, no-threshold dose response model, and it is used to describe the relationship between radiation dose and the occurrence of cancer. This model errs on the side of overestimating radiation risks. It suggests that any increase in dose above background levels, no matter how small, results in an incremental increase in risk above existing levels of risk. Although the NRC has accepted this approach as a conservative (i.e., cautious) model for determining radiation standards, the NRC, like other authoritative bodies, recognizes that this model probably overestimates radiation risk.

### 3.4.3 How much radiation is released from a nuclear power facility?

*The NRC has established strict limits on the amount of radioactive releases to the environment allowed from nuclear power facilities and the resulting exposure for members of the public.*

The NRC has established strict limits on the amount of radioactive releases to the environment allowed from nuclear power facilities and the resulting exposure for members of the public. These requirements appear in Table 2 of Appendix B, "Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage," to 10 CFR Part 20, "Standards for Protection against Radiation" (http://www.nrc.gov/reading-rm/doc-collections/cfr/part020/part020-appb.html). Whereas contaminants may be present and detectable offsite, the release limits have been designed and proven to be protective of the health and safety of the public (including sensitive populations) and the environment. The NRC sets limits on radiological effluents, requires monitoring of effluents and foodstuffs to ensure that those limits are met, and has set dose limits to regulate the release of radioactive material from nuclear power facilities. All reactor licensees monitor their effluents and calculate offsite doses caused by radioactive liquid and gaseous effluents and direct radiation. These calculations are performed to demonstrate the licensee's compliance with its technical specifications and NRC regulations. Requirements for redundancy in monitoring as well as the monitoring of various pathways that could result in the release of radioactive material to the environment ensure that unmonitored and unplanned releases are avoided. The licensee's Offsite Dose Calculation Manual provides for collection and analysis of a variety of samples such as soil, water, plants, and animals. Actual measurements are made of the liquid and airborne releases from the facility, and they are verified by the monitoring program described in the manual. As a result of these criteria, the average person (not including a radiation worker employed at the facility) living within 50 miles of a nuclear power facility receives less than 1 millirem per year of radiation dose from the nuclear power facility. This is compared to the approximately 300 millirems per year received from natural sources and 300 millirems per year from human-made sources, as discussed in the response to

Question 3.4.1. This dose can also be compared to the radiation received from the earth's crust, which ranges from 23 millirems per year along the Atlantic Coast to 90 millirems per year on the Colorado Plateau. Other sources of radiation that are common in our lives include airline flights, which give about 1 millirem of radiation dose per 1,000 miles flown. A round-trip cross-country airplane trip would give a dose of about 5 millirems. The dose from watching television is about 1 to 2 millirem per year, and from a single medical x-ray is about 40 millirems.

### 3.4.4 Does radiation from nuclear power facilities cause cancer?

The average annual dose to a member of the public from a nuclear power facility is in the range of less than 1/1,000th rem (1 millirem) per year. This is compared to the 5 rems (5000 millirems) discussed in the response to Question 3.4.2. At doses above 5 rems, a relationship between radiation and health effects can be observed. There are no data to clearly establish the occurrence of health effects or cancer following exposures to low doses at dose rates below 5 rem. Although there is a statistical chance that radiation levels that small could result in a cancer, it has not been possible to calculate with any certainty the probability of receiving cancer from a dose this small. Because many agents cause cancer, it is often not possible to say conclusively whether the cancer is radiation induced. At the request of Congress, the National Cancer Institute published a study in 1990 entitled, "Cancer in Populations Living Near Nuclear Facilities," which looked at cancer mortality rates around 52 nuclear power facilities, 9 U.S. Department of Energy facilities, and one former commercial fuel reprocessing facility. The study concluded that there is "no evidence that an excess occurrence of cancer has resulted from living near nuclear facilities." Additionally, the American Cancer Society has concluded that although reports about clusters of cancer cases in such communities have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do elsewhere in the population.

### 3.4.5 I have read reports stating that there are excess cases of a specific type of cancer in the vicinity of a specific nuclear facility. Doesn't that mean that radiation from nuclear power facilities causes cancer?

Authors of various reports have stated or implied that there are cause-and-effect relationships in the statistical associations between cancer rates and reactor operations. While it is true that cancer rates vary among locations, it is very difficult to ascribe the cause of a cluster of cancer cases to some local environmental exposure, such as radiation from a nuclear power facility. Statistical association alone does not demonstrate causation. Well-established scientific methods must be used to determine if two things that appear to be associated over time are indeed causally related so that it can be concluded that one causes the other. For example, a person could say, "In the winter I wear boots, and in the winter I get colds." While there is a strong statistical association between wearing boots and getting colds, it would be inappropriate to say that wearing boots causes colds. The scientific community adheres to several principles of good science that need to be used before a cause-and-effect claim can be made. These principles include whether the study can be replicated; whether the study considered all the data or was selective (e.g., in the population or in the years studied); whether it evaluated all possible explanations for the observations; whether the data were valid and reliable; and whether its conclusions were subjected to independent peer review, evaluation, and confirmation. A number of studies using these accepted scientific principles have been performed to examine the health effects around nuclear power facilities:

*While it is true that cancer rates vary among locations, it is very difficult to ascribe the cause of a cluster of cancer cases to some local environmental exposure, such as radiation from a nuclear power facility.*

- National Cancer Institute—In 1990, at the request of Congress, the National Cancer Institute conducted a study of cancer mortality rates around 52 nuclear power plants and 10 other nuclear facilities. The study covered the period from 1950 to 1984 and evaluated the change in mortality rates before and during facility operations. The study found no evidence of a causal link between nuclear facilities and excess deaths from leukemia or other cancers in populations living nearby.
- University of Pittsburgh—Investigators from the University of Pittsburgh found no link between radiation released during the 1979 accident at the Three Mile Island nuclear station and cancer deaths among nearby residents. For a period of 20 years, their study followed more than 32,000 people who lived within 5 miles of the facility at the time of the accident (Talbott et. al. 2003).
- Connecticut Academy of Sciences and Engineering—In January 2001, the Connecticut Academy of Sciences and Engineering issued a report on a study around the Haddam Neck nuclear power plant in Connecticut and concluded that exposures to radionuclides were so low as to be negligible and found no meaningful associations to the cancers studied.
- American Cancer Society—In 2004, the American Cancer Society concluded that although reports about cancer clusters in some communities have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere in the population. Likewise, there is no evidence that links the isotope strontium-90 with increases in breast cancer, prostate cancer, or childhood cancer rates. Radiation emissions from nuclear power plants are closely controlled and involve negligible levels of exposure for nearby communities.
- Florida Department of Health, Bureau of Environmental Epidemiology—In 2001, the Bureau of Environmental Epidemiology in Florida reviewed claims that there are striking increases in cancer rates in southeastern Florida counties caused by increased radiation exposures from nuclear power plants. However, using the same data to reconstruct the calculations on which the claims were based, Florida officials were not able to identify unusually high rates of cancers in these counties compared with the rest of the State of Florida and the Nation.
- Illinois Department of Public Health—In 2000, the Illinois Department of Public Health compared childhood cancer statistics for counties with nuclear power plants to those for similar counties without nuclear plants and found no statistically significant difference.

In summary, there are no studies to date that are accepted by the scientific community that show a correlation between radiation dose from nuclear power facilities and cancer incidence in the general public. The amount of radioactive material released from nuclear power facilities is well measured, well monitored, and known to be very small. The doses of radiation that are received by members of the public as a result of exposure to nuclear power facilities are so low that resulting cancers have not been observed and would not be expected.

### 3.4.6 How are radiation and releases of radioactive material regulated and monitored at nuclear power facilities?

NRC regulations require licensees to control and limit releases to the environment (the air and water) to very small amounts. As part of the NRC's requirements for operating a nuclear power facility, licensees must not only comply with radiation dose limits for the public as given in the regulations in 10 CFR Part 20, but they must also keep releases of radioactive material to unrestricted areas during normal operation as low as reasonably achievable (as described in 10 CFR 50.36a, "Technical Specifications on Effluents from Nuclear Power Reactors"). In addition, NRC regulations require licensees to maintain various effluent and environmental monitoring programs so that the impacts from plant operations are minimized and the extent of releases are accurately recorded and reported.

The control of releases is accomplished by barriers. One method used to control the release of radioactive material to the environment is to keep contaminated areas of the plant under negative pressure so that air leaks into the building, rather than out. In addition, exhaust pathways out of the building may be filtered to prevent the movement of radionuclides into the environment. Exhaust pathways are monitored so that material that may be leaving the plant is properly characterized. Workers in contaminated areas are also monitored, along with any tools or equipment that are moved from the building, in order to prevent the spread of radioactive material. The NRC requires licensees to report plant discharges and the results of environmental monitoring around their plants to ensure that potential impacts are detected and reviewed. Licensees must also participate in an interlaboratory comparison program, which provides an independent check of the accuracy and precision of environmental measurements. Licensees are required to keep accurate records of releases to the air and water. In annual reports, licensees identify the amount of liquid and airborne radioactive effluents discharged from plants and calculate associated doses. Licensees also must report environmental radioactivity levels around their plants annually. These reports, which are available to the public, include sampling from thermoluminescent dosimeters (which measure radiation dose levels); airborne radioiodine and particulate samplers; samples of surface, ground, and drinking water and downstream shoreline sediment from existing or potential recreational facilities; and samples of ingestion sources such as milk, fish, invertebrates, and broad-leaf vegetation. Most State radiological health departments also conduct radiological environmental monitoring programs around nuclear power plants.

The NRC conducts periodic onsite inspections of each licensee's effluent and environmental monitoring programs to ensure compliance with NRC requirements. The NRC documents licensee effluent releases and the results of their environmental monitoring and assessment activities in inspection reports that are available to the public. Over the past 25 years, radioactive effluents released from nuclear power facilities have decreased significantly. During the early part of that period, a significant contributor to the reduction was the addition of special systems (called augmented offgas systems) to boiling-water reactors. These systems process some of the noncondensible gases formed in the reactor to limit the radioactive gases released to the environment. In recent years, improved fuel performance and upgrades to licensee effluent control programs further contributed to reducing radioactive effluents.

### 3.4.7 What radiological monitoring is done around nuclear plants? What if something goes wrong?

Current NRC regulations require each commercial reactor site to have a radiological environmental monitoring program. The purpose of the radiological environmental monitoring program is to sample, measure, analyze, and monitor the radiological impact of reactor operations on four pathways: direct radiation, atmospheric, aquatic, and terrestrial. The results of the radiological environmental monitoring program are summarized each year in the Annual Environmental Radiological Operating Report. Effluent releases are summarized annually by the licensee in an annual radioactive effluent release report. The reports are submitted to the NRC and are available electronically from the Public Electronic Reading Room which is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. In addition, each site must monitor gaseous and liquid effluent in real time. Effluent monitors will alarm if routine release levels are exceeded.

*The purpose of the radiological environmental monitoring program is to sample, measure, analyze, and monitor the radiological impact of reactor operations on four pathways: direct radiation, atmospheric, aquatic, and terrestrial.*

### 3.4.8 How are standards set for safe levels of exposure to radiation?

The NRC ensures that effluents from operating plants under its oversight are within established limits. The purpose of radiation regulatory limits is to protect workers and the public from the harmful health effects of radiation on humans. The limits, including effluent release limits, are based on the recommendations of standards-setting organizations. Radiation standards reflect extensive ongoing study by national and international organizations (the International Commission on Radiological Protection [ICRP], National Council on Radiation Protection and Measurements [NCRP], and National Academy of Sciences) and are conservative to ensure that the public and workers at nuclear power plants are protected. The U.S. Environmental Protection Agency (EPA) has established a whole body dose limit of 25 millirem per year (see 40 CFR Part 190, "Environmental Radiation Protection Standards for Nuclear Power Operations"). The NRC's radiation exposure standards, which implement the EPA limits, and regulations related to radiological effluents and dose to the public are presented in 10 CFR Part 20 and are based on the recommendations in ICRP 26, "Recommendations of the International Commission on Radiation Protection," and ICRP 30, "Limits for Intakes of Radionuclides by Workers." Finally, Appendix I, "Numerical Guides for Design Objectives and Limiting Conditions for Operation To Meet the Criterion 'As Low as is Reasonably Achievable' for Radioactive Material in Light-Water-Cooled Nuclear Power Reactor Effluents," in 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," provides dose design objectives for exposure of the public to radioactive effluents from nuclear reactors. There is almost unanimous consensus among the scientific community on the adequacy of current radiation protection standards.

Regarding health effects to populations around nuclear power plants, the NRC relies on the studies performed by the National Cancer Institute. The National Cancer Institute conducted a study in 1990, entitled "Cancer in Populations Living Near Nuclear Facilities," to look at cancer mortality rates around 52 nuclear power plants, 9 U.S. Department of Energy facilities, and 1 former commercial fuel reprocessing facility. This study concluded from the evidence available that there is no suggestion that nuclear facilities may be linked causally with excess deaths from leukemia or from other cancers in populations living nearby. Additionally, the American Cancer Society had concluded that although reports about clusters of cancer cases in such communities have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere in the population.

### 3.4.9 Aren't radiation protection dose limits and calculations based on "standard man?"

The NRC has based its dose limits and dose calculations on a descriptive model of the human body referred to as "standard man." However, the NRC has always recognized that dose limits and calculations based on "standard man" must be informed and adjusted in some cases for factors such as age. For example, the NRC has different occupational dose limits for declared pregnant women because the rapidly developing human fetus is more radiosensitive than an adult woman. NRC dose limits are also much lower for members of the public, including children and elderly people, than for adults who receive radiation exposure as part of their occupation. Finally, NRC dose calculation methods have always included age-specific dose factors for each radionuclide because they may used differently by infant, child, and teen bodies, which are also generally smaller than adult bodies. Additionally, the calculation methods have always recognized that the diets (amounts of different kinds of food) of infants, children, and teens are different from adults. (See Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, issued October 1977.)

### 3.4.10 I've heard that leakage of strontium-90 is a particular danger around nuclear plants. Is that true?

Strontium-90 is produced in roughly 5.8 percent of nuclear fissions in a reactor's fuel elements and undergoes radioactive decay with a half-life of almost 29 years. Strontium-90, and its radioactive decay product yttrium-90, are not harmful unless they are near or inside the body. They are easily shielded if outside the body, resulting in no radiation exposure. NRC licensees perform environmental monitoring for radionuclides, including strontium-90, in the vicinity of nuclear reactors. Based on the results of environmental monitoring programs, no elevated levels of strontium-90 attributed to plant operation have been detected in the environment.

### 3.4.11 Have there been studies showing an increase in strontium-90 radiation levels in baby teeth and corresponding cancer incidence as a result of releases of radioactive material from nuclear power plants?

In 2000, the Radiation and Public Health Project published a report entitled, "Strontium-90 in Deciduous Teeth as a Factor in Early Childhood Cancer." The report alleges that there has been an increase in cancer incidence as a result of strontium-90 released from nuclear power facilities. The report claimed that elevated levels of strontium-90 in deciduous (baby) teeth were evidence for cause of the increase in childhood cancer.

Three sources of strontium-90 exist in the environment: fallout from nuclear weapons testing, releases from the Chernobyl accident in Ukraine, and releases from nuclear power reactors. The largest source of strontium-90 is from weapons-testing fallout as a result of aboveground explosions of nuclear weapons (approximately 16.9 million curies of strontium-90) (United Nations Scientific Committee on the Effects of Atomic Radiation 2000). The Chernobyl accident released approximately 216,000 curies of strontium-90.

The total annual release of strontium-90 into the atmosphere from all U.S. nuclear power plants is typically 1/1,000th of 1 curie, which is so low that the only chance of detecting strontium-90 is sampling the nuclear power plant effluents themselves. The NRC regulatory limits from effluent releases and subsequent doses to the public are based on the radiation protection recommendations of international and national organizations such as ICRP and NCRP. Nuclear power facilities monitor gaseous effluent releases, and licensees report the results of their monitoring to the NRC annually. The NRC reviews the effluent release program and the licensee's monitoring programs during the environmental review of the license application.

In a report published in 2001, the American Cancer Society concluded that although reports about clusters of cancer cases in communities surrounding nuclear power plants have raised public concern, studies show that clusters do not occur more often near nuclear plants than they do by chance elsewhere in the population. NCRP has found no statistically significant excess of biological effects from strontium-90 exposures at levels characteristic of worldwide fallout, which is the greatest source of strontium-90 in the environment. Likewise, there is no new evidence that links strontium-90 with increases in breast cancer, prostate cancer, or childhood cancer rates. The American Cancer Society recognizes that public concern about environmental cancer risks often focuses on risks for which no carcinogenicity has been proven or on situations where known exposures to carcinogens are at such low levels that risks are negligible. The report states that "ionizing radiation emissions from nuclear facilities are closely controlled and involve negligible levels of exposure for communities near such plants."

The staff has concluded that the claims of elevated levels of childhood cancer in the vicinity of nuclear reactors in the United States caused by the release of strontium-90 during routine operations are questionable and without scientific basis to support the claims. No causal relationship has been established between the levels of strontium-90 being reported by the Radiation and Public Health Project in deciduous teeth and childhood cancer. Furthermore, there is almost unanimous consensus among the scientific community on the adequacy of current radiation protection standards.

### 3.4.12 I've heard that power plants release tritium into the water around the plants. What is tritium and how much is released?

Tritium is a naturally occurring radioactive form of hydrogen that is produced in the atmosphere when cosmic rays collide with air molecules. As a result, tritium is found in very small or trace amounts in water throughout the world. It is also a byproduct of the production of electricity by nuclear power plants.

Tritium emits a weak form of radiation. The radiation emitted from tritium is a low-energy beta particle that is similar to an electron. Moreover, the tritium beta particle does not travel very far in air and cannot penetrate human skin. Therefore, tritium must be ingested, inhaled, or absorbed through the skin to deliver a radiation dose to a human.

Nuclear power plants generate the heat to make steam through the process of atomic fission (atom splitting). The steam is used to generate electricity. Fission occurs when the nucleus of a heavy atom, such as uranium or plutonium, splits in two when struck by a neutron. Most of the tritium produced in a reactor is as a byproduct of the absorption of neutrons by a chemical known as boron. Boron is a good absorber of neutrons, which nuclear reactors use to help control the fission chain reaction. Tritium can also be produced (to a lesser extent) from the fission process itself, or when neutrons are absorbed by other chemicals in the coolant water.

Like normal hydrogen, tritium can bond with oxygen to form water. When this happens, the resulting water (called "tritiated water") is radioactive. Tritiated water is chemically identical to normal water, and the tritium cannot be filtered out of the water.

Nuclear power plants routinely and safely release dilute concentrations of tritiated water. These authorized releases are closely monitored by the utility and reported to the NRC. Information about these releases is made available to the public on the NRC's Web site at http://www.reirs.com/effluent/.

Recently, attention has been focused how much tritium is inadvertently released into the environment by spills or leaks into the soil or ground water. In response to concerns about tritium in ground water, nuclear power plants have instituted programs to minimize the potential for tritium leakage and have put in place more extensive groundwater monitoring programs.

### 3.4.13 How do people become exposed to tritium?

Tritium is almost always found as a liquid and primarily enters the body when people eat or drink food or water containing tritium or absorb it through their skin. People can also inhale tritium as a gas in the air.

Tritium generally enters the body as “tritiated water.” Much of the human body is made up of soft tissues that have a high water content, so the tritium generally disperses quickly and is uniformly distributed throughout the soft tissues. Some of the tritium can be become bound to hydrocarbons in the body and tends to reside in the body longer than the tritium bound to the water. Half of the tritium is excreted within approximately 10 days after exposure.

Everyone is exposed to small amounts of tritium every day, because it occurs naturally in the environment and the foods we eat. Workers in Federal weapons facilities; medical, biomedical, or university research facilities; or nuclear fuel cycle facilities may receive increased exposures to tritium.

### 3.4.14 Is tritium harmful to people?

The EPA drinking water standard allows up to 20,000 picocuries per liter of tritium in drinking water; a person drinking water with tritium at this concentration for a year would receive a dose of about 4 millirem. The tritium dose from nuclear power plants is much lower than the exposures attributable to natural background radiation and medical administrations. Humans receive approximately 50 percent of their annual radiation dose from natural background radiation, 48 percent from medical procedures (e.g., x-rays), and 2 percent from consumer products. Doses from tritium and nuclear power plant effluents are a negligible contribution to the background radiation to which people are normally exposed, and they account for less than 0.1 percent of the total background dose, consistent with EPA standards.

The NRC assumes that any exposure to radiation poses some health risk, and that risk increases as exposure increases in a linear, no-threshold manner. The linear, no-threshold assumption suggests that any increase in dose, no matter how small, incrementally increases risk. Conversely, lower levels of radiation proportionately decrease the risk, such that very small radiation doses have very little risk. The doses from tritium around nuclear power plants are very small; hence, any risk to human health is correspondingly very small. The NRC regulations set limits on the release of tritium to levels considered protective of human health.

### 3.4.15 I've read that the BEIR VII report says that there is no safe level of radiation. Doesn't that mean that nuclear power plants are unsafe because they emit radiation?

The National Academy of Sciences published its seventh Biological Effects of Ionizing Radiation (BEIR VII) report, entitled "Health Risks From Exposure to Low Levels of Ionizing Radiation," on June 29, 2005. This report examines the many uncertainties associated with low dose (less than 100 millisieverts [mSv] or 10 rem) radiation exposure. The report states that "At doses of 100 mSv or less, statistical limitations make it difficult to evaluate cancer risk in humans....The report concludes that the preponderance of information indicates that there will be some risk, even at low doses, although the risk is small." The most likely result from a radiation dose less than 100 millirem per year to any individual is no health impact.

The true implication of the linear, no-threshold theory (i.e., risk incrementally increases as exposure increases, no matter how small the dose) is that low doses are low risk. Much as driving 30 miles per hour is considered a much lower risk than driving 80 miles per hour, lower radiation doses are considered much lower risk than higher radiation doses. There is a point when the risks associated with anything we encounter in our lives are so low that we accept them or consider them safe, even though we are aware of the possible risks.

### 3.4.16 Does the NRC monitor the bodies of people living near nuclear power plants for radioactive substances? It seems that this might be one way to identify leaks that endanger the public.

The NRC does not monitor the bodies of people living near nuclear power plants for radioactive material. The amounts of radioactive materials are monitored in the effluents from the plants and in the environment near the plants, including the pathways for human exposure such as air, water, soil, milk, meat, and vegetables. These monitoring programs show that the doses to people living near plants are low, within the EPA standards and NRC limits. Therefore, it is very unlikely that monitoring the bodies of people would show significant levels of radioactive material from nuclear power plants.

Additionally, the interpretation of measurements of radioactive materials in people is difficult unless one knows what each individual was exposed to, when the exposures occurred, and by what routes they occurred (ingestion, inhalation, etc.). Radioactive substances may come from a variety of sources. In the case of strontium-90, for example, the primary source has always been fallout from atmospheric weapons tests (United Nations Scientific Committee on the Effects of Atomic Radiation 2000). Travel must be accounted for, because even a couple of days in a high-fallout area could swamp any effect of local exposures if inhalation were suspected to be a primary route. Finally, migration must be accounted for in interpreting measurements, because people may have lived somewhere else for the better part of their lives. Substances in the human body are dynamic, not static. This includes radioactive and nonradioactive substances. The dynamic processes include intake of material; uptake to systemic circulation from the gastrointestinal tract, respiratory tract, or skin; translocation throughout the body system; retention over time; and elimination via excretion and radioactive decay. Therefore, monitoring the bodies of people near nuclear plants to identify leaks that could endanger the public is not as accurate or effective as monitoring the effluents from the plant in the nearby environment including pathways for human exposure such as air, water, soil, milk, meat, and vegetables.

### 3.4.17 Does the NRC have any regulatory limits on safe doses for workers and the public at nuclear power plants?

The NRC has set regulatory limits related to the doses to workers and members of the public from radioactive materials released from nuclear power plants. The NRC ensures that effluents from operating plants under its oversight are within the established limits. The NRC regulations also incorporate, by reference, EPA's generally applicable environmental radiation standards in 40 CFR Part 190. The regulations are set to protect workers and the public from the harmful health effects of radiation on humans, with the understanding that if levels are kept this low, they would be appropriate for animals as well.

The nuclear power plant licensee verifies that the doses to the public from radioactive materials released to the environment are within the regulatory limits and documents this information in its annual Radioactive Effluent Release Report which is available through the NRC's Web site.

**Taking Field Radiation Measurements**

### 3.4.18 Has the NRC established dose limits for fish and wildlife?

*The NRC ensures that effluents from operating plants under its oversight are within the established limits.*

The NRC has not established radiation exposure standards for fish and wildlife. The NRC believes the radiation protection controls at nuclear power plants that ensure that human dose standards are met will also ensure the protection of fish and wildlife. National and international bodies that have examined the issue, including NCRP, ICRP, and the International Atomic Energy Agency, have upheld the validity of this belief. In EPA's proposed standards for environmental radiation protection for nuclear power operations (40 FR 23420), EPA discusses the basis for the dose limits for humans and adds that "Standards developed on this basis are believed to also protect the overall ecosystem since there is no evidence that there is any biological species sensitive enough to warrant a greater level of protection than that adequate for man."

The radiological environmental monitoring programs conducted around nuclear power plants have also substantiated this belief. These programs monitor air, water, soil, sediments, fish, milk, meat, and vegetation. The results of these programs show little or no accumulation of radionuclides in the environment around nuclear power plants.

### 3.4.19 Doesn't radioactive material tend to accumulate and concentrate in the environment?

Research studies have shown that radioactive materials can concentrate in the environment; radioactive and stable nuclides of the same chemical behave the same in the environment. NRC dose calculation methods include bioaccumulation factors that are specific to the nuclide and the environmental material of interest. For example, radioactive iodine concentrates in cow or goat milk.

Radiological environmental monitoring programs are conducted around all nuclear power plants to ensure the amount of bioaccumulation is within expected bounds. These programs monitor pathways for human exposure and other environmental media such as water, soil, air, sediments, plants, milk, meat, and fish. These monitoring programs generally find little or no bioaccumulation of radioactive material in the environment with the exception of tritium. Tritium does tend to concentrate in lakes, reservoirs, and other surface water impoundments into which nuclear power plants release liquid effluents. However, licensees monitor these concentrations to ensure they remain within the EPA drinking water standard of 20,000 picocuries per liter.

## 3.5 Transmission Lines and Human Health Impacts

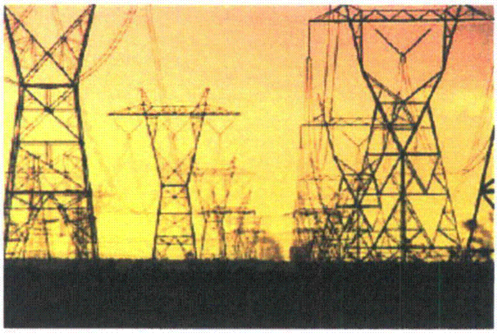
The impacts on the environment from transmission line construction and maintenance of transmission line corridors during operation are considered in the EIS, as are the impacts from these activities on human health.

### 3.5.1 Are the electromagnetic fields from transmission lines really safe?

The chronic effects of 60-hertz electromagnetic fields from power lines have been studied at length, but studies have failed to uncover consistent experimental and epidemiological evidence linking harmful effects with field exposures. The NRC will continue to monitor the issue until a consensus has been reached by appropriate Federal health agencies concerning health effects from electromagnetic fields.

## 3.6 Alternatives

The EISs for new reactor licenses contain a chapter related to alternatives to the proposed action. NEPA requires consideration of these alternatives. This section responds to questions regarding the selection and consideration of alternatives.



**Transmission System**

### 3.6.1 Why does the NRC consider alternatives to the action proposed by the applicant? Who proposes the alternatives for siting nuclear plants—the applicant or the NRC?

The NRC's regulations for implementing NEPA require that environmental reports for new reactor licensing discuss alternatives to the proposed action (10 CFR 51.45(b)(3)). The alternatives analysis must take into account the purpose of and need for the proposed project. For example, if the purpose of and need for the project is to supply baseload electricity within a defined service area within a certain timeframe, then the alternatives would need to be able to fulfill that need. Therefore, the NRC evaluates three types of alternatives to the applicant's proposed action:

- Alternative Energy Sources—NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants" (referred to as the ESRP), directs the staff's analysis, evaluation, and comparison of alternative means of generating electricity with the proposed project. A competitive alternative is one that is feasible and compares favorably with the proposed project in terms of environmental and health impacts. If the proposed project is intended to supply baseload power, a competitive alternative would also need to be capable of supplying baseload power. A competitive alternative could be composed of combinations of individual alternatives. The scope of the review is limited to those alternative energy sources that are available to the applicant and potentially competitive with the proposed project. The NRC has no authority to require an applicant to use an alternative energy source.

- Alternative Systems—In the same way, the ESRP also directs the staff to analyze alternatives to certain proposed systems. Again the alternative systems analyzed must be feasible, competitive, and available to the applicant.

- Alternative Sites—NRC regulations (10 CFR 52.17, "Contents of Applications; Technical Information) require an applicant for an early site permit or combined license to evaluate alternative sites to determine whether there is any obviously superior alternative to the site proposed. Not all possible alternative sites must be considered, just a "reasonable" subset of possible alternatives. The review process used by the NRC involves a two-part sequential test outlined in the ESRP. The first stage of the review uses reconnaissance-level information to determine whether there are environmentally preferable sites among the alternatives. If environmentally preferable sites are identified, the second stage of the review considers economic, technological, and institutional factors for the environmentally preferred sites to see if any of these sites is obviously superior to the proposed site. If an alternative site is found to be obviously superior to the proposed site the staff would recommend denial of the permit or license.

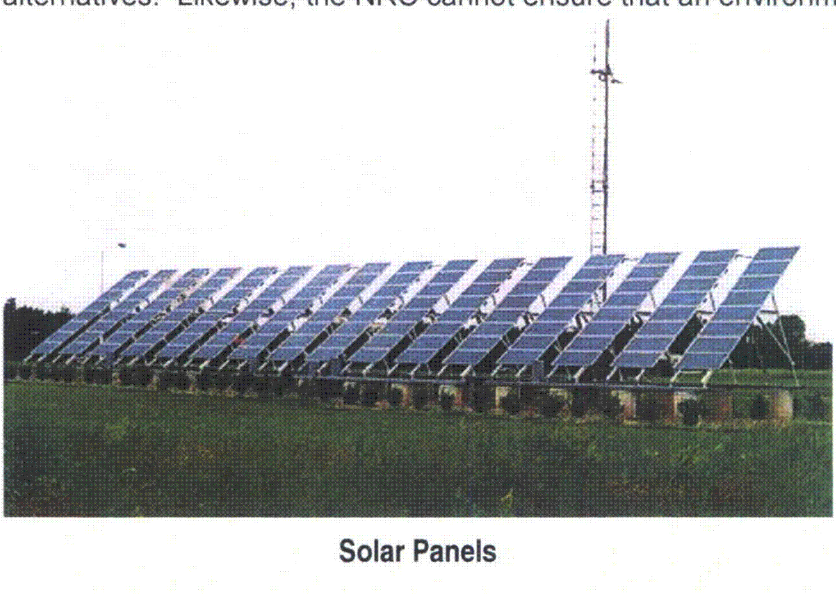
*Not all possible alternative sites must be considered, just a "reasonable" subset of possible alternatives.*

### 3.6.2 Why doesn't the NRC encourage conservation or green alternative energy sources such as solar or wind power?

The NRC's responsibility is to ensure the safe operation of nuclear power facilities and not to formulate energy policy or encourage or discourage conservation or the development of specific alternative power generation. The staff's evaluation of alternatives in an EIS is limited to assessing their environmental impact rather than recommending energy alternatives.

### 3.6.3 If an alternative is found that clearly has less environmental impact, why doesn't the NRC require the applicant to pursue the alternative?

The NRC's requirement to consider the environmental impacts of various alternatives is based on NEPA. The purpose of NEPA is to ensure that relevant agencies examine and disclose the potential environmental impacts of their actions before taking the action. NEPA is a procedural statute that does not dictate a decision based on relative environmental impacts. Furthermore, the NRC has no authority or regulatory control over the ultimate selection of future energy alternatives. Likewise, the NRC cannot ensure that an environmentally superior energy alternative or site is used in the future. The NRC makes a decision to license a facility based on safety and environmental considerations. The NRC can only approve or deny the request for the license. The applicant and State and Federal (non-NRC) decisionmakers make the final decision about whether or not to operate the nuclear facility based on economics, energy reliability goals, and



**Solar Panels**

other objectives over which other entities may have jurisdiction. Moreover, given the absence of the NRC's authority in the general area of energy planning, the NRC's identification of an obviously superior alternative would not guarantee that such an alternative would be used.

### 3.6.4 How much attention has been given to energy-generation alternatives?

NRC regulations implementing NEPA provide for the consideration of alternatives (10 CFR 51.71(d)). The NRC regulations (10 CFR 51.10(a)) also provide that the Commission will take into account voluntarily the regulations of the Council on Environmental Quality (CEQ), published November 29, 1978 (43 FR 55978–56007), subject to certain conditions. Although the CEQ regulations are not binding on the NRC when the agency has not expressly adopted them, they are entitled to considerable deference (see Limerick Ecology Action, Inc., v. the NRC, 869 F.2d 719, 725, 743 [3d Cir. 1989]). CEQ advises that when faced with a potentially very large number of alternatives, an EIS must analyze and compare only a reasonable number of examples, covering the full spectrum of alternatives (46 FR 18027; March 23, 1981). It would not be practical for an EIS prepared in conjunction with an application for an early site permit to analyze all potential sites for wind and solar energy development in the applicant's region of interest.

### 3.6.5 How are potential (alternative) sites compared for suitability?

The review process involves the two-part sequential test outlined in the ESRP. At the first stage of the review, the NRC staff uses reconnaissance-level information to determine whether there are environmentally preferable sites among the alternatives. If the NRC identifies environmentally preferable sites, then during the second stage of the review, it considers economic, technological, and institutional factors for the environmentally preferred sites to see if any of these sites is obviously superior to the proposed site. The NRC staff performs an independent analysis of the applicant's review. If an alternative site is not found to be obviously superior to the preferred site, it does not mean that the alternative site cannot be considered for future nuclear development.

### 3.6.6 Can the NRC require the applicant to use an alternative site?

No, the NRC staff cannot require an applicant to use an alternative site

### 3.6.7 Can the NRC require the applicant to use an alternative energy source?

No.

## 3.7 Accidents and Severe Accident Mitigation Alternatives Review

The environmental review of an application for a combined license includes an analysis of severe accident mitigation alternatives (SAMAs); it is not required for an early site permit. This section defines SAMAs and explains why they are included in the environmental review. It also discusses the process used to evaluate SAMAs and the types of changes that may occur in the plant as a result of the analysis.

### 3.7.1 Accidents can cause environmental impacts, so does the environmental review consider accidents?

The environmental review does take into account the environmental effects of postulated plant accidents that might occur during plant operation. It also includes a review of the alternatives to mitigate severe accidents if this has not previously been evaluated for the applicant's plant. This consideration ensures that plant changes (i.e., hardware, procedures, and training) with the potential for improving severe accident safety performance are identified, evaluated, and, if appropriate, implemented. In this way, the NRC considers the impacts of accidents within the scope of the environmental review.

### 3.7.2 What is a severe accident mitigation alternatives (SAMAs) review?

*The SAMAs review is an evaluation of alternatives to mitigate severe accidents. Severe accidents are those that could result in substantial damage to the reactor core, whether or not there are serious offsite consequences.*

The SAMAs review is an evaluation of alternatives to mitigate severe accidents. Severe accidents are those that could result in substantial damage to the reactor core, whether or not there are serious offsite consequences. The NRC staff reviews and evaluates SAMAs to ensure that changes that could improve severe accident safety performance are identified and evaluated. Potential improvements could include hardware modifications, changes to procedures, and changes to the training program.

### 3.7.3 What is the process for the SAMAs review?

The evaluation of SAMAs is a four-step process, as shown in Figure 3.1. The first step is to characterize overall plant risk and the leading contributors to that risk. This typically involves the extensive use of a plant-specific probabilistic safety assessment (PSA) study. The PSA identifies the different contributors, in terms of system failures and human errors, that would be required for an accident to progress either to core damage or to containment failure. The second step is to identify potential improvements that could reduce the risk. Information from the PSA, such as dominant accident sequences, equipment failures, and operator actions, is used to identify plant improvements that would have the greatest impact in reducing risk. Improvements identified in other NRC and industry studies, as well as SAMAs analyses for other plants, are also considered in this process.

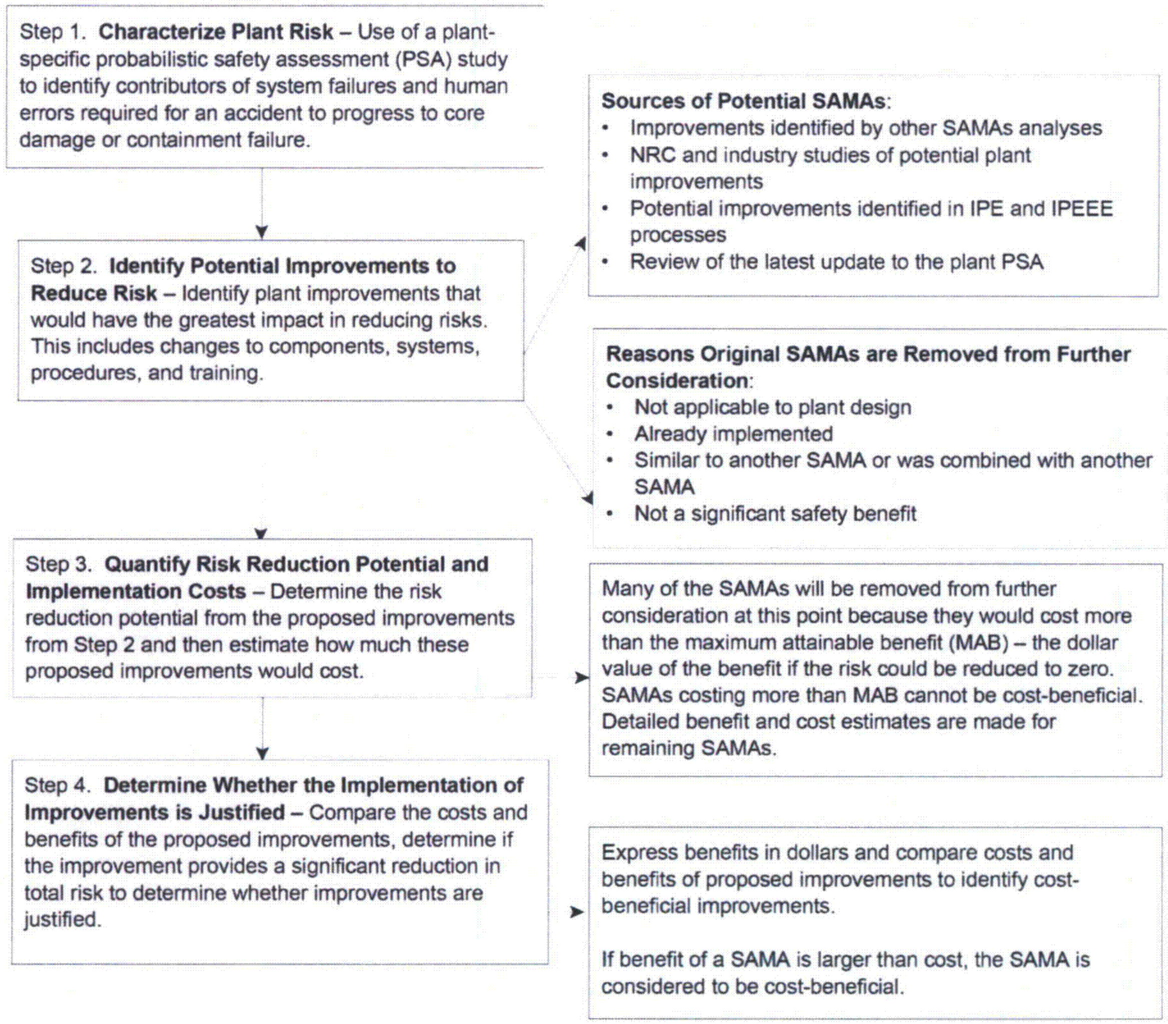



**Figure 3.1.** Generalized Process for Identifying and Evaluating Potential Severe Accident Mitigation Alternatives (SAMAs)

The third step is to quantify the risk-reduction potential and the implementation cost for each of the improvements. The risk reduction is typically estimated using a conservative analysis that generally overestimates the risk-reduction potential by assuming that the plant improvement is completely effective in eliminating the accident sequence that the improvement is intended to address. Implementation costs are generally underestimated by neglecting certain cost factors, such as maintenance costs or surveillance costs associated with the plant modification. Overestimating the risk-reduction potential and underestimating the implementation costs in this step make it more likely that a potentially useful safety improvement would be retained for further consideration in the final step.

The final step makes use of the risk-reduction potentials and the implementation cost estimates to determine whether implementation of any of the improvements is justified. In determining whether the improvement is justified, the NRC staff looks at two factors: (1) whether the improvement is cost-beneficial; in other words, whether the estimated benefit is greater than the estimated implementation cost of the SAMA; and (2) whether the improvement provides a significant reduction in total risk; in other words, whether it eliminates a sequence or containment failure mode that contributes to a large fraction of plant risk.

### 3.7.4 What is the outcome of the review?

The outcome of the SAMAs analysis is a list of plant improvements that meet the criteria of being cost-beneficial and providing a significant reduction in total risk.

### 3.7.5 Who would pay for an accident, if one were to happen? What is the Price-Anderson Act?

The Price-Anderson Act, which became law on September 2, 1957, was designed to ensure that adequate funds would be available to satisfy liability claims of members of the public for personal injury and property damage in the event of a catastrophic nuclear accident. The legislation helped encourage private investment in commercial nuclear power by placing a cap, or ceiling, on the total amount of liability each holder of a nuclear power plant license faced in the event of a catastrophic accident. Over the years, the "limit of liability" for a catastrophic nuclear accident has increased the insurance pool to over $10 billion.

Under existing policy, utilities that operate nuclear power plants pay a premium each year for $300 million in private insurance for offsite liability coverage for each reactor unit. This primary insurance is supplemented by a second policy. Because virtually all property and liability insurance policies issued in the United States exclude nuclear accidents, claims resulting from nuclear accidents are covered under the Price-Anderson Act. It includes any accident (including those that come about because of theft or sabotage) in the course of transporting nuclear fuel to a reactor site; in the storage of nuclear fuel or waste at a site; in the operation of a reactor, including the discharge of radioactive effluent; and in the transportation of irradiated nuclear fuel and nuclear waste from the reactor. The Energy Policy Act of 2005 extended the Price-Anderson Act to December 31, 2025.

## 3.8 Decommissioning Review

The EIS includes information related to the costs and impacts of decommissioning a facility. Common questions from the public related to decommissioning include those addressed here.

### 3.8.1 What is decommissioning?

The definition given in 10 CFR 50.2, “Definitions,” states that decommissioning is the safe removal of a facility from service and the reduction of residual radioactivity to a level that permits termination of the NRC license.

*Decommissioning costs vary, based on plant size and design, local labor and radiological waste burial costs, and the specific process that is being used for decommissioning.*

### 3.8.2 Is decommissioning considered during the review of new reactor licenses or early site permit applications?

The EIS considers the impacts from decommissioning.

### 3.8.3 What are the costs of decommissioning?

The total cost of decommissioning depends on many factors, including the sequence and timing of the various stages of the program, location of the facility, current radioactive waste burial costs, and plans for spent fuel storage. The minimum amounts that are required to provide a reasonable assurance of funds for decommissioning are $290 million for pressurized-water reactors and $370 million for boiling-water reactors (NUREG 1628, Staff Responses to Frequently Asked Questions Concerning Decommissioning of Nuclear Power Reactors). These costs are in 1999 dollars and are adjusted annually, as further specified in the regulations. These are minimum amounts to show reasonable assurance, rather than estimates, of what it would cost to decommission a specific nuclear reactor. Actual site-specific costs incurred and estimated costs of decommissioning give a better indication of the cost of the process:

- The Fort St. Vrain nuclear plant, which was a 330-megawatt-electric (MWe) high-temperature gas-cooled reactor, ceased power operations in 1989 and underwent immediate decontamination and dismantlement. Decommissioning ended in late 1996, and the license was terminated. The total cost of decommissioning was $189 million.
- The cost for decommissioning the Trojan nuclear plant (a 1,130-MWe pressurized-water reactor) was estimated to be on the order of $210 million in 1993 dollars, which did not include $42 million for nonradioactive site remediation or $110 million for the independent spent fuel storage installation and related fuel management. The Trojan nuclear plant planned an immediate decontamination and decommissioning from shutdown in 1993 to license termination in 2002.
- The estimated cost for decommissioning the Haddam Neck nuclear plant, a 619-MWe pressurized-water reactor, was $344.4 million in 1996 dollars, not including $82.3 million in spent fuel storage costs (for a total of $426.7 million).
- The estimated cost for decommissioning Maine Yankee, an 830-MWe pressurized-water reactor, was $274.9 million in 1997 dollars. This did not include costs for spent-fuel management ($53.4 million) or for site restoration ($49.2 million), for a total of $377.6 million.
- The estimated cost for decommissioning Big Rock Point, a 67-MWe boiling-water reactor, was $290 million in 1997 dollars.
- The estimated cost for decommissioning Yankee Rowe, a 175-MWe pressurized-water reactor, was $306.4 million in 1995 dollars.

Decommissioning costs vary, based on plant size and design, local labor and radiological waste burial costs, and the specific process that is being used for decommissioning.

The U.S. Department of Energy commissioned the "Study of Construction Technologies and Schedules, O&M Staffing and Cost, and Decommissioning Costs and Funding Requirements for Advanced Reactor Designs," issued in 2004, to support the development of advanced reactors for the production of electric power and to establish the requirements for providing reasonable assurance that adequate funds for performing decommissioning will be available at the end of plant operations. The study estimates the costs to decommission four advanced reactor designs following a scheduled cessation of plant operations: the Toshiba and General Electric (GE) Advanced Boiling-Water Reactor (ABWR), the GE Economic Simplified Boiling-Water Reactor (ESBWR), the Westinghouse Advanced Passive pressurized-water reactor (AP1000), and the Atomic Energy of Canada, Limited, Advanced Canada Deuterium Uranium Reactor (CANDU) Reactor (ACR-700). The cost analysis described in the study is based upon the prompt decommissioning alternative, or DECON as defined by the NRC. The DECON alternative is also the basis for the NRC funding regulations (10 CFR 50.75, "Reporting and Recordkeeping for Decommissioning Planning"), and the use of the DECON alternative for the advanced reactor designs facilitates the comparison with the NRC's own estimates and financial provisions.

The projected cost for Southern Nuclear Operating Company, Inc., to decommission one AP1000 using the DECON alternative is estimated to be $427.4 million, as reported in 2006 dollars. The minimum certification amounts were calculated using the formula delineated in 10 CFR 50.75(c)(1) and escalation indices provided in NUREG-1307, Revision 11, "Report on Waste Burial Charges: Changes in Decommissioning Waste Disposal Costs at Low-Level Waste Burial Facilities," issued June 2005, for both waste recycling and burial-only options. The funding levels calculated for the AP1000, in 2006 dollars, are $340.6 million for the waste recycling option and $664.1 million for the burial-only option.

### 3.8.4 If the first estimate of decommissioning costs is made at the time that the facility is licensed, are there methods for adjusting for inflation?

NRC regulations provide an adjustment factor for cost escalation that takes into account escalation factors for labor, energy, and waste burial. The labor and energy escalation factors are obtained from regional data issued by the U.S. Department of Labor's Bureau of Labor Statistics. The waste-burial cost escalation factor is taken from NUREG-1307.

### 3.8.5 How can the NRC be sure the money will still be available when the plant permanently ceases operation?

The NRC regulations at 10 CFR 50.33(k) require that applicants for combined licenses must provide a report indicating how reasonable assurance will be provided that funds will be available to decommission the facility. The report must contain an estimate of the minimum amounts that are required to demonstrate reasonable assurance of funds for decommissioning. It also must contain a certification that financial assurance will be provided in an amount not less than that estimated. Tables for estimating the minimum amount appear in 10 CFR 50.75 and are based on the type of reactor and the power level.

According to the regulations, financial assurance is provided by the following methods:

*The regulations in 10 CFR 50.33(k) require that applicants for combined licenses must provide a report indicating how reasonable assurance will be provided that funds will be available to decommission the facility.*

- Prepayment—In this case, at the start of operations, the licensee deposits into an account enough funds to pay the decommissioning costs. The account is segregated from the licensee's other assets and remains outside of the licensee's administrative control of cash or liquid assets. Prepayment may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities.
- External sinking fund—An external sinking fund is a fund established and maintained by setting licensee funds aside periodically into an account segregated from licensee assets and outside of the licensee's administrative control. The total amount of these funds would be sufficient to pay decommissioning costs at the time that it is anticipated that the licensee will cease operations. An external sinking fund may be in the form of a trust, escrow account, government fund, certificate of deposit, or deposit of government securities.
- Surety method, insurance, or other guarantee method—A surety method may be in the form of a surety bond, letter of credit, or line of credit. Any surety method or insurance used to provide financial assurance must be open-ended or, if written for a specific term, such as 5 years, must be renewed automatically. An exception is allowed when the issuer notifies the Commission, the beneficiary, and the licensee of its intent not to renew within 90 days or more preceding the renewal date. The surety or insurance must also provide that the full face amount be paid to the beneficiary automatically preceding the expiration date without proof of forfeiture if the licensee fails to provide a replacement acceptable to the Commission within 30 days after receipt of notification of cancellation. In addition, the surety or insurance must be payable to a trust established for decommissioning costs, and the trustee and trust must be acceptable to the Commission. The surety method or insurance must remain in effect until the Commission has terminated the license.

### 3.8.6 Who pays for decommissioning and where does the money come from?

The particular licensee that holds the license for the facility pays for decommissioning. Subject to the public utilities commission that regulated the utility, the money for decommissioning is collected as part of the price of electricity; thus, the funds for decommissioning are ultimately paid by the ratepayer in the electric bill. As the electric utility industry deregulates, many States are choosing to require payment of decommissioning costs through the imposition of a nonbypassable charge as part of a customer's electric bill.

# 4.0 Issues Not Considered in the Scope of the Environmental Review

This section answers questions related to the U.S. Nuclear Regulatory Commission (NRC) safety review process, security, emergency preparedness, and storage and disposal of spent nuclear fuel, all of which fall outside of the scope of the environmental review process.

## 4.1 Understanding Scope and Getting Answers to Out-of-Scope Questions

### 4.1.1 Why are there limits on the scope of the environmental review?

The scope of the environmental review consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement. The purpose of scoping is to identify the significant issues related to a proposed action. Scoping also identifies and eliminates from detailed study those issues that are not significant or have been covered by a prior environmental review. Having a defined scope for the environmental review allows the NRC to concentrate on the essential issues for actions under consideration rather than on issues that may have been or are being evaluated through different regulatory review processes, such as a safety review.

*Having a defined scope for the environmental review allows the NRC to concentrate on the essential issues for actions under consideration rather than on issues that may have been or are being evaluated through different regulatory review processes, such as a safety review.*

### 4.1.2 How do I get answers to my questions that fall outside the scope of the environmental review from the NRC?

Members of the public have three ways to receive answers to questions that fall outside the scope of the environmental review:

- Public meetings—Members of the public are invited to plant-specific public meetings (see the response to Question 5.1.3), where NRC staff members are available to answer any questions related to NRC-regulated activities, including those that are outside the scope of the environmental review.
- NRC Web site—Answers to many questions that are outside the scope of the environmental review also appear on the NRC Web site, http://www.nrc.gov. The NRC has posted a number of "frequently asked questions" documents, informational brochures, and fact sheets that address issues that are of concern to the public.
- NRC environmental project manager—For plant-specific questions that are outside the scope of the environmental review, members of the public can contact the environmental project manager assigned by the NRC for that plant's license review. The agency provides the telephone number for each of the NRC environmental project managers on the NRC Web site, in *Federal Register* notices, and at the public meetings. The NRC environmental project manager can either answer questions or direct callers to the appropriate person in the agency for responding to their questions that are outside the scope of the review.

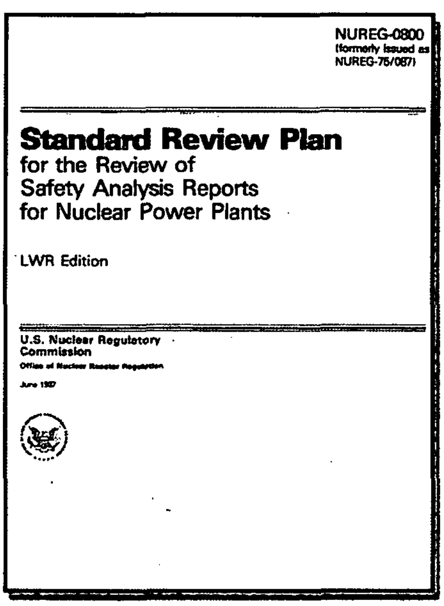
## 4.2 NRC Safety Review

This section answers key questions about why a safety review is performed, how it is conducted, and what type of public involvement occurs as a part of the safety review process.

### 4.2.1 Why are safety issues outside the scope of the environmental review?

The National Environmental Policy Act (NEPA) process focuses on environmental impacts rather than on issues related to the safety of an operation. Safety issues become important to the environmental review when they could result in environmental impacts. Because the NEPA regulations do not include a safety review, the NRC has codified the regulations for preparing an environmental impact statement separately from the regulations for reviewing safety issues. The regulations governing the environmental review are set forth in Title 10 of the *Code of Federal Regulations* (10 CFR) Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," and the regulations covering the safety review are in 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." For this reason, the license process includes an environmental review that is distinct and separate from the safety review. Because the two reviews are separate, operational safety issues are considered outside the scope of the environmental review, just as environmental issues are not considered part of the safety review. However, the staff forwards safety issues that are raised during the environmental review to the appropriate NRC organization for consideration and appropriate action.

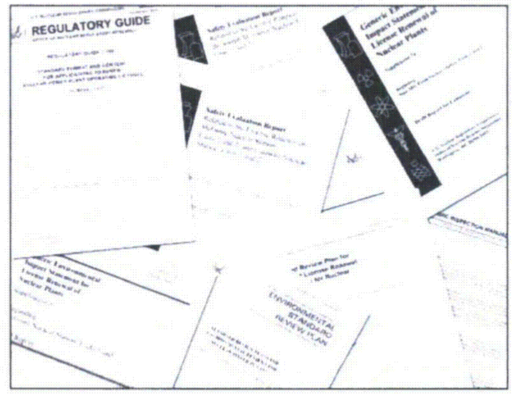
### 4.2.2 What is the basis for the NRC's safety review of a new reactor?


NUREG-0800
Standard Review Plan
for the Review of
Safety Analysis Reports
for Nuclear Power Plants
LWR Edition
U.S. Nuclear Regulatory Commission

**Safety Standard Review Plan**

The regulations in 10 CFR Part 52 provide the basis for the NRC's safety review, while NUREG-0800, "Standard Review Plan for Review of Safety Analysis Reports for Nuclear Power Plants" (referred to as the SRP), gives detailed guidance on the NRC's safety review. The purpose of the SRP is to ensure the quality and uniformity of staff reviews. The SRP is also intended to make information about regulatory matters widely available and to improve communication between the NRC, interested members of the public, and the nuclear power industry, thereby increasing understanding of the NRC's review process. The SRP is the most definitive basis available for specifying the NRC's interpretation of an acceptable level of safety for light-water reactor facilities.

In 2005, the Commission directed the staff to revise applicable sections of the SRP and other guidance documents to ensure that up-to-date guidance would be available for the next generation of staff who would be responsible for reviewing and licensing new sites and new reactors. The NRC published the revised SRP in March 2007 and makes it available in the NRC electronic reading room or on the NRC's Agencywide Documents Access and Management System (ADAMS) http://www.nrc.gov/reading-rm/adams.html. The NRC continues to update and clarify its review guidance, as necessary, and issues Interim Staff Guidance (ISG) documents for this purpose. The guidance included in these ISGs will ultimately be incorporated into the SRPs. These ISGs are available on the NRCs web site (http://www.nrc.gov/reading-rm/doc-collections/isg/col-app-design-cert.html).




**NRC Guidance Documents**

### 4.2.3 How is the safety review performed?

The SRP is intended to be a comprehensive and integrated document that provides the NRC reviewer with guidance that describes methods or approaches that the staff has found acceptable for meeting NRC requirements. Implementation of the criteria and guidelines contained in the SRP by staff members in their review of applications provides assurance that a given design will comply with NRC regulations and provide adequate protection of public health and safety. The SRP also makes the staff's review guidance for licensing nuclear power plants publicly available; it is intended to improve industry and public stakeholder understanding of the staff's review process. It should be noted that the SRP is not a substitute for NRC regulations, and compliance with the SRP is not required.

In addition to documenting current methods of review, the SRP provides a basis for the orderly modification of the review process. The NRC disseminates information regarding current safety issues and proposed solutions through various means, such as generic communications and the process for treating generic safety issues. When current issues are resolved, it is necessary to determine the need, extent, and nature of the revision that the staff should make to the SRP to reflect new NRC guidance.

### 4.2.4 What documents are reviewed during the NRC staff's safety review? What documents are generated during the NRC staff's safety review?

To construct and operate a nuclear power plant, an applicant must submit a final safety analysis report to the NRC for review and approval. This document contains detailed information about the design of structures, systems, and components of the proposed facility, and comprehensive data about the proposed site. It also discusses various hypothetical accident situations and the safety features of the plant that prevent accidents or, if accidents should occur, lessen their effects. Other subject areas in the final safety analysis report include the reactor and fuel design, electric power, radioactive waste management, radiation protection, accident analysis, and quality assurance.

The staff develops a safety evaluation report to document its review of the safety analysis report.

*The results of the staff's safety review are available to the public. However, the highly technical nature of the staff's safety review does not lend itself to a public involvement process such as that used for the environmental review.*

#### 4.2.5 Is the public provided the opportunity to comment on the NRC staff's safety review?

During the safety review process, the staff meets with the applicant to discuss the review of the application. The public is invited to observe and has the opportunity to comment at the conclusion of the technical portion of the meeting.

The results of the staff's safety review are available to the public. However, the highly technical nature of the staff's safety review does not lend itself to a public involvement process such as that used for the environmental review. As a result, there is no notification in the *Federal Register* related to an opportunity to comment on the safety review before its issuance. However, a safety evaluation report is available electronically from the Publicly Available Records System (PARS) component of the NRC's ADAMS. The ADAMS Public Electronic Reading Room is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html. Additionally, the public can provide comments to the Advisory Committee on Reactor Safeguards (ACRS) on the staff's review of the application in advance of the ACRS meeting. Additionally, the staff presents its safety review to the Advisory Committee on Reactor Safeguards (ACRS) during a series of public meetings. The staff's safety review is made available to the public in ADAMS in advance of the ACRS meetings and the public can provide comments on the staff's review of the application to the ACRS in advance of the ACRS meeting or during the meeting.

#### 4.2.6 What is the Advisory Committee on Reactor Safeguards (ACRS) and how is it involved in the safety reviews for new reactors?

ACRS, an independent group that provides advice about reactor safety to the five-member Commission, reviews each application to construct or operate a nuclear power plant. The Committee has three primary purposes:

- to review and report on safety studies and reactor facility license applications
- to advise the Commission on the hazards of proposed and existing reactor facilities and the adequacy of proposed reactor safety standards
- to initiate reviews of specific generic matters or nuclear facility safety-related items

ACRS is independent of the NRC staff and reports directly to the Commission, which appoints its members. ACRS is composed of technical experts recognized in their fields. It is structured so that experts representing many technical perspectives can provide independent advice, which can be factored into the Commission's decisionmaking process. 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.

The ACRS review begins early in the licensing process, and the Committee meets with the applicant and the NRC staff at appropriate times in the review process. When ACRS has completed its review, it submits its recommendations on the safety aspects of the application in a report to the Commission via a letter to the NRC Chairman. The ACRS mandate does not include NEPA reviews.

## 4.3 Security

### 4.3.1 Why are security issues outside the scope of the environmental review?

The environmental impact statement for a new license does not include security issues, such as physical protection and the capability to respond to an external attack. The NRC staff considers them as part of the safety review, separately from the environmental review. Some of the detailed information pertaining to security is considered to be safeguards information; as such, it cannot be shared with the public for security reasons. After the license is issued, security issues are periodically reviewed, inspected and updated at every operating plant. These reviews continue throughout the period of an operating license, whether it is for the original or renewed license. If issues related to security are discovered at a nuclear plant, they are addressed immediately, and any necessary changes are reviewed and incorporated under the operating license.

### 4.3.2 Why are acts of terrorism considered outside the scope of the environmental review?

The NRC and other Federal agencies have heightened vigilance to acts of terrorism and have implemented initiatives to evaluate and respond to possible threats posed by terrorists, including the use of aircraft against commercial nuclear power facilities and independent spent fuel storage installations (as discussed in the response to Question 4.3.3). Malevolent acts are beyond the scope of a NEPA review. The NRC routinely assesses threats and other information provided by other Federal agencies and sources. The NRC also ensures that licensees meet specific security-level requirements. The NRC will continue to focus on preventing, deterring and mitigating terrorist acts for all nuclear facilities and will not perform site-specific evaluations of environmental impacts resulting from terrorist acts.

**Access Control Terminal**

### 4.3.3 What is the NRC doing to address the threat of terrorism?

The NRC is devoting substantial time and attention to terrorism-related matters, including coordination with the U.S. Department of Homeland Security. As part of its mission to protect public health and safety and the common defense and security pursuant to the Atomic Energy Act of 1954, as amended, the NRC staff is conducting vulnerability assessments for the domestic use of radioactive material. In the time since the terrorist events of September 11, 2001, the NRC has identified the need for license holders to implement compensatory measures, has issued several orders imposing enhanced security requirements, and has completed a significant update of the security rules that apply to nuclear power plants. Finally, the NRC has taken actions to ensure that applicants and license holders maintain vigilance and a high degree of security awareness. Major NRC actions include the following:

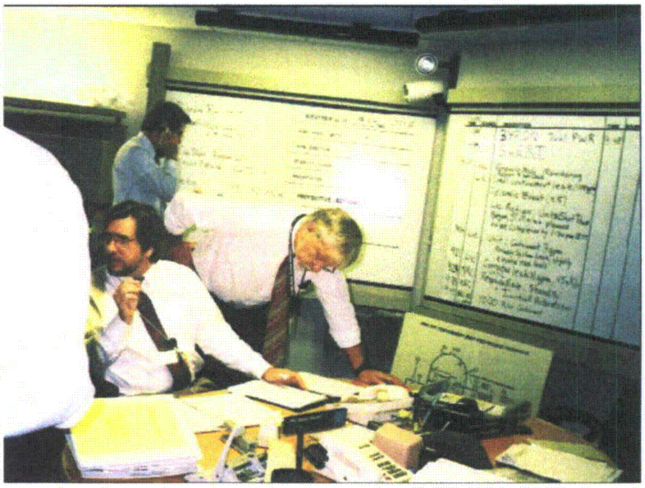
- ordering plant owners to sharply increase physical security programs to defend against a more challenging adversarial threat
- requiring more restrictive site access controls for all personnel
- enhancing communication and liaison with the intelligence community
- improving communication among military surveillance personnel, the NRC, and its licensees to prepare power plant operators and to effect safe shutdown if necessary
- ordering plant owners to improve their capability to respond to events involving explosions or fires
- enhancing the readiness of security organizations by strengthening training and qualifications programs for plant security forces
- requiring vehicle checks at greater stand-off distances
- enhancing force-on-force exercises to provide a more realistic test of plant capabilities to defend against an adversary force
- improving liaison with Federal, State, and local agencies responsible for the protection of the national critical infrastructure through integrated response training
- working with national experts to predict the realistic consequences of terrorist attacks on nuclear facilities, including one from larger commercial aircraft
- completed a significant update to the security rules

*The NRC routinely assesses threats and other information provided by other Federal agencies and sources.*

The NRC will continue to consider measures to prevent and mitigate the consequences of acts of terrorism in fulfilling its safety mission.

### 4.3.4 What has the NRC done to improve security as a result of the terrorist attacks on September 11, 2001?

Before September 11, 2001, the security measures in place provided high assurance that public health and safety would be protected in the event of an attack that involved radiological sabotage. The security measures were designed to protect against the threats described in 10 CFR 73.1, "Purpose and Scope." However, since September 11, 2001, the defensive capability of the nuclear power industry has been significantly enhanced. The NRC issued orders requiring security enhancements, conducted a three-phase audit of licensees' security programs in the weeks following the terrorist attacks, improved the process for conducting background investigations of new employees at nuclear power facilities, initiated a number of studies related to the protection of nuclear material and facilities, and completed a significant update to the security rules applicable to nuclear power plants. The NRC completed a number of studies on the effects of a crash of a large commercial aircraft into a nuclear power plant. In addition, the NRC issued a new rule requiring new applicants for design certifications to perform an assessment of the effects on the facility of the impact of a large, commercial aircraft. The NRC has issued more than 60 advisories to its licensees describing changes in the threat environment and providing guidance on ways to enhance security.



**Security Exercise**

In addition, the NRC works with a variety of other Federal agencies, in particular the Department of Homeland Security and the Homeland Security Council, to ensure that security around nuclear power plants is well coordinated and that responders are prepared if a significant event occurs. If an event were to occur, the Federal Bureau of Investigation (FBI) would lead the response and would coordinate the resources of more than 18 Federal agencies including Federal Emergency Management Agency (FEMA) and the NRC in response to any radiological emergency.

### 4.3.5 Is the security of the nuclear waste stored onsite being reviewed?

Since the events of September 11, 2001, the NRC has conducted a comprehensive evaluation, including the consideration of potential consequences of terrorist attacks. The precise amount of contamination resulting from a release depends on many factors, such as the type and amount of damage to the pool or dry cask storage facility, the location of the damage, the proximity of the storage facility to populated areas, and the meteorological conditions at the time of the event. As part of this evaluation, the NRC will consider the need for additional requirements to enhance licensee security and public safety.

#### 4.3.6 Are onsite storage facilities secure from terrorist attacks?

The NRC considers spent fuel storage facilities to be robust. Unlike the structures that were destroyed on September 11, 2001, spent fuel pools and dry storage casks are not constructed of flammable material that would fuel fires of long duration. If an attack were to occur, licensees have approved emergency plans, tested biennially, that coordinate local, State, and Federal government responses. The NRC believes that the health and safety of the public are well protected.

#### 4.3.7 Has the NRC revised its requirements regarding aircraft impacts on nuclear reactors?

The NRC amended its regulations to require applicants after July 13, 2009, for design certifications and COL, among others, to perform a design-specific assessment of the effects on the facility of the impact of a large, commercial aircraft. Using realistic analyses, the applicant shall identify and incorporate into the design those design features and functional capabilities to show that, with reduced use of operator actions 1) The reactor core remains cooled, or the containment remains intact; and 2) Spent fuel cooling or spent fuel pool integrity is maintained.

### 4.4 Emergency Preparedness

#### 4.4.1 Does the NRC evaluate emergency preparedness before licensing a new reactor?

Yes. NRC regulations (10 CFR 50.47) prohibit the issuance of a operating license or a combined license unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency. The NRC bases it finding on review of the Federal Emergency Management Agency findings, and on the NRC's assessment of the applicant's onsite emergency plans.

#### 4.4.2 Is emergency preparedness part of the environmental review?

Emergency preparedness is not part of the environmental review. The NRC documents its findings related to emergency planning in the safety evaluation report, along with the findings regarding site safety characteristics.

### 4.5 Storage and Disposal of Spent Nuclear Fuel

Although the storage and disposal of spent fuel or high-level waste are not within the scope of environmental issues pertaining to a new license, the NRC frequently receives questions about these topics during public meetings and other opportunities for public comment. To give a full picture of the issues associated with nuclear power facilities, this section provides information about the Nuclear Waste Policy Act, the status of Yucca Mountain as a repository for spent nuclear fuel from commercial reactors, and the storage of spent fuel at nuclear power facilities.

*Every 1 to 2 years, approximately one-third of the nuclear fuel in an operating reactor needs to be unloaded and replaced with new fuel. The used fuel is commonly called "spent nuclear fuel." Nuclear power facilities have temporary storage for spent fuel in steel-lined concrete pools that are filled with water (spent fuel pools).*

### 4.5.1 What is the Nuclear Waste Policy Act?

The Nuclear Waste Policy Act and amendments thereto, establishes the Federal Government's responsibility to provide a place for the permanent disposal of high-level radioactive waste and spent nuclear fuel and the responsibility of the generators (commercial nuclear power facilities) to bear the costs of permanent disposal. The Act authorizes and requires the U.S. Department of Energy (DOE) to locate and build a permanent repository and an interim storage facility (as needed), and to develop a transportation system to safely link nuclear plants to the repository and interim storage facility. President Ronald Reagan signed the Act into law on January 7, 1983. The Act obligated DOE to begin disposal of spent fuel and high-level radioactive waste from commercial nuclear facilities by January 31, 1998. In June 2008, DOE applied to the NRC for an authorization to construct a repository at Yucca Mountain.

### 4.5.2 What is the status of Yucca Mountain?

In June 2008, DOE submitted a license application to the NRC to construct a repository. The NRC staff is reviewing the application. In accordance with the Nuclear Waste Policy Act as amended, the NRC has 3 years to review the application; however, the agency could request a fourth year from Congress, if needed, to make its determination on licensing. If licensed, the next step is construction of the facility. If construction is authorized and completed, DOE would then need to apply to the NRC for permission to receive and dispose of spent fuel and high-level waste in order to operate the facility.

### 4.5.3 If the repository is not yet finished, where is the spent nuclear fuel being stored for plants that are operating now?

Every 1 to 2 years, approximately one-third of the nuclear fuel in an operating reactor needs to be unloaded and replaced with new fuel. The used fuel is commonly called "spent nuclear fuel."

Current nuclear power facilities have temporary storage for spent fuel in steel-lined concrete pools that are filled with water (spent fuel pools). The water acts as a natural barrier for radiation from the fuel assemblies and keeps the fuel thermally cool while it decays and becomes less radioactive. Because the designers of the current nuclear power facilities originally anticipated that the spent fuel would be reprocessed (see the response to Question 4.5.8), they designed the nuclear facilities to store about a decade's worth of used fuel.

However, at this time, commercial reprocessing is not being pursued. As the storage capacity of the spent fuel pool is approached, licensees may consider alternatives, such as aboveground dry storage casks. In dry storage casks, spent fuel is surrounded by inert gas inside a sealed metal cylinder that is enclosed within a metal or concrete outer shell. Depending on the design of the casks, they are either placed horizontally or vertically on a concrete pad. The pad, casks, and associated security infrastructure are called an independent spent fuel storage installation. The NRC approves the design of the casks after conducting a technical review to ensure that the casks are safe and secure for use at nuclear power facilities. The NRC has approved 16 cask designs for use. By the beginning of 2009, independent spent fuel storage installations were in use at the following locations:

- 39 nuclear power reactor sites
- 8 decommissioned or decommissioning nuclear power reactor sites
- 2 storage facilities operated by DOE at the Idaho National Engineering and Environmental Laboratory near Idaho Falls, ID
- 1 pool independent spent fuel storage installation at the General Electric Morris facility in Illinois

### 4.5.4 What will happen if Yucca Mountain is never finished or approved for storing nuclear waste?

The NRC's Waste Confidence Rule, found in 10 CFR 51.23, "Temporary Storage of Spent Fuel after Cessation of Reactor Operation—Generic Determination of No Significant Environmental Impact," states the following:

> The Commission has made a generic determination that, if necessary, spent fuel generated in any reactor can be stored safely and without significant environmental impacts for at least 30 years beyond the licensed life for operation of that reactor at its spent fuel storage basin or at either onsite or offsite independent spent fuel storage installations. Further, the Commission believes there is reasonable assurance that...sufficient repository capacity will be available within 30 years beyond the licensed life for operation of any reactor to dispose of the commercial high-level waste and spent fuel originating in such reactor and generated up to that time.

The staff is confident that there eventually will be a licensed high-level waste repository. If the site near Yucca Mountain is eventually found to be unsuitable, then alternative sites will be considered. Until a permanent high-level waste repository is operational, the spent nuclear fuel will be safely stored either onsite or at offsite interim storage facilities. On October 9, 2008 (Volume 73 of the *Federal Register*, page 59551 [73 FR 59551]), the Commission proposed an update of its Waste Confidence Decision. The Commission proposes that sufficient repository capacity can reasonably be expected to be available within 50 to 60 years beyond the licensed life for operation of any reactor, and that spent fuel generated in any reactor can be stored safely without significant environmental impacts for at least 60 years beyond the licensed life for operation.

### 4.5.5 Who is paying for the storage of spent fuel now and who will pay for the transportation to and storage of spent fuel at Yucca Mountain?

Licensees, and ultimately their electricity consumers, pay for the storage of spent fuel onsite (either in a spent fuel pool or an independent spent fuel storage installation). The transportation and disposal of spent fuel at a centralized repository (such as Yucca Mountain) is also funded by electricity consumers. The Nuclear Waste Policy Act established the Nuclear Waste Fund as a means to pay for a permanent repository, an interim storage facility (if needed), and the transportation of used fuel. Since 1982, electricity consumers have paid into the fund a fee of one tenth of one cent for every nuclear-generated kilowatt-hour of electricity consumed. By the end of 2008, more than $20 billion had been paid into this fund.

### 4.5.6 What is low-level waste and how will the Barnwell closure affect low-level waste disposal?

**Yucca Mountain**

Low-level wastes, generally defined as radioactive wastes other than high-level wastes and wastes from uranium recovery operations, are commonly disposed of in near-surface facilities rather than in a geologic repository (like Yucca Mountain) that is required for high-level wastes. Low-level waste includes items that have become contaminated with radioactive material or have become radioactive through exposure to neutron radiation. From nuclear power plants, this waste typically consists of contaminated protective shoe covers and clothing, wiping rags, mops, filters, reactor water-treatment residues, equipment, and tools. Low-level waste may also arise from the use of radioactive material in medicine, research, and industry. Such waste includes luminous dials, medical tubes, swabs, injection needles, syringes, and laboratory animal carcasses and tissues. The radioactivity can range from just above background levels found in nature to much higher levels in certain cases, such as parts from inside the reactor vessel in a nuclear power plant.

Low-level waste is classified in accordance with NRC regulations (10 CFR Part 61, “Licensing Requirements for Land Disposal of Radioactive Waste”), from least to greatest hazard, as Class A, B, C, and Greater than Class C. The first three classes can be disposed of at licensed commercial disposal facilities. By law, DOE is responsible for the disposal of low-level waste that is classified as greater than Class C.

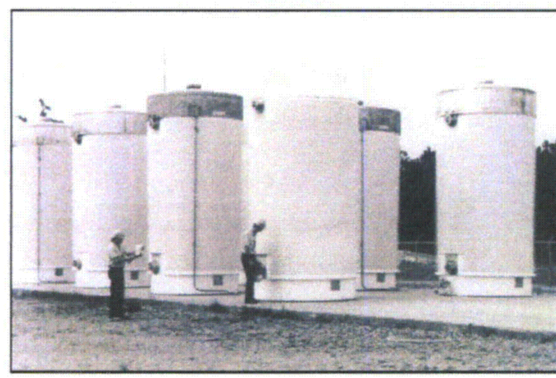
Licensees typically store low-level waste onsite, either until it has decayed away (as is the case for much short-lived waste generated by medical and research users) and can be disposed of as ordinary trash, or until amounts are large enough for shipment to a low-level waste disposal site in containers authorized by the U.S. Department of Transportation.

The Barnwell low-level waste disposal facility, located in South Carolina, is one of four commercial low-level waste disposal facilities currently operating in the United States. Because of declining disposal capacity and other concerns, the State of South Carolina said that, as of July 1, 2008, the site would only accept waste from States that are members of the Atlantic low-level waste compact (South Carolina, New Jersey, and Connecticut). The closure of Barnwell left licensees in 36 States with no disposal options for Class B and C waste. About 95 percent of Class B and C waste is generated by nuclear power plants, which have the space, expertise, and experience needed to store radioactive wastes for extended periods. Most Class A low-level waste is eligible for disposal at a commercial disposal facility in Utah.

### 4.5.7 How is an onsite storage facility licensed?

The NRC's process for licensing onsite storage facilities for spent fuel and high-level waste is separate from the reactor licensing process. The NRC authorizes the storage of spent nuclear fuel at an independent spent fuel storage installation under two licensing options: a site-specific license or a general license. Under a site-specific license, an applicant submits a license application to the NRC and the NRC performs a technical review of all the safety aspects of the proposed independent spent fuel storage installation. If the application is approved, the NRC issues a site-specific license that is valid for 20 years. The spent fuel storage license contains technical requirements and operating conditions (fuel specifications, cask leak testing, surveillance, and other requirements) and specifies what the licensee is authorized to store at the site. The site-specific license is a stand-alone license, independent of the NRC license issued to possess and operate a nuclear power facility.

*The cask certificate expires 20 years from the date of issuance. Licensees are required to perform evaluations of their sites to demonstrate that the site is adequate for storing spent fuel in dry casks.*



**Independent Spent Fuel Storage Installation**

A general license authorizes a nuclear power plant licensee to store spent fuel in NRC-approved casks at an existing site that is licensed for operating a power reactor under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities." An NRC-approved cask is one that has undergone a technical review of its safety aspects and been found to meet all of the NRC's requirements in 10 CFR Part 72, "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste." The NRC issues a Certificate of Compliance for a cask design to a cask vendor after an NRC rulemaking determines the design's technical adequacy. The cask certificate expires 20 years from the date of issuance. Licensees are required to perform evaluations of their sites to demonstrate that the site is adequate for storing spent fuel in dry casks. These evaluations must show that the conditions in the Certificate of Compliance, technical specifications, and safety analysis report can be met. The licensee also must review its security program, emergency plan, quality assurance program, training program, and radiation protection program and make any necessary changes to incorporate the independent spent fuel storage installation at its reactor site.

Onsite storage of low-level waste arising from plant operations can be accomplished in accordance with a license issued under 10 CFR Part 50.

### 4.5.8 What is the policy of the United States concerning reprocessing?

Reprocessing (or recycling) of spent nuclear fuel involves the chemical treatment of the fuel to separate unused fissionable material from radioactive fission products to be used in new fuel assemblies. When most U.S. nuclear plants were built, the industry, with the Federal Government's encouragement, planned to recycle or reprocess used nuclear fuel. In 1979, President Jimmy Carter decided to ban commercial nuclear fuel reprocessing because of concerns about possible proliferation of weapons-grade material. President Reagan lifted the reprocessing ban in 1981; however, the nuclear industry had little or no interest in pursuing this option, at that time. In 2008, NRC received three letters of interest from the nuclear industry to pursue licensing of reprocessing facilities. These letters indicated license application submittal in the 2012-2014 timeframe. The NRC staff responded by providing a gap analysis identifying the regulatory gaps that exist for licensing reprocessing facilities (SECY-09-0082). Staff is currently pursuing the technical basis development that would support rulemaking for licensing reprocessing facilities.

### 4.5.9 What is the NRC's position on the onsite storage of spent fuel?

In its original Waste Confidence Decision, the Commission found reasonable assurance that safe independent onsite or offsite spent fuel storage will be made available if such storage capacity is needed. Recently, the Commission proposed to update its Waste Confidence Findings. The notice of this update, published in the *Federal Register* (73 FR 59551) states the following:

> The Commission finds reasonable assurance that, if necessary, spent fuel generated in any reactor can be stored safely without significant environmental impacts for at least 60 years beyond the licensed life for operation (which may include the term of a revised or renewed license) of that reactor in a combination of storage in its spent fuel storage basin and either onsite or offsite independent spent fuel storage installations.

Regarding the onsite storage of low-level waste, the Commission believes that permanent disposal is a superior management alternative. However, as discussed above, a disposal option is not available in some cases. Therefore, the Commission has updated guidance to continue to ensure the safe, secure storage of low-level waste for which no disposal option is available.

### 4.5.10 What is the NRC's policy on high-level waste management, such as is required for waste generated by operating nuclear power plants?

The regulations in 10 CFR 51.23 (the Waste Confidence Rule) set forth the Commission's policy on high-level waste. The NRC has evaluated the safety and environmental effects of the long-term storage of spent fuel onsite and, as set forth in the Waste Confidence Rule, has generically determined that such storage can be accomplished without significant environmental impact. In the Waste Confidence Rule, the Commission determined that spent fuel can be stored onsite for at least 30 years beyond the licensed operating life, which may include the term of a renewed license. The NRC is currently in the process of updating this rule (see Question 4.5.9).

*The NRC has evaluated the safety and environmental effects of long-term storage of spent fuel onsite and, as set forth in the Waste Confidence Rule, has generically determined that such storage can be accomplished without significant environmental impact.*

DOE has submitted an application to obtain a license from the NRC to construct a high-level waste repository. In the interim, onsite spent fuel storage in pools and in dry-cask storage facilities continues in accordance with NRC regulations. The NRC has a certification process for such casks, as set forth in 10 CFR Part 72, and has evaluated the environmental effects of the long-term storage of spent fuel onsite. As set forth in the Waste Confidence Rule (see 10 CFR 51.23), the NRC generically determined that such storage can be accomplished without significant environmental impact.

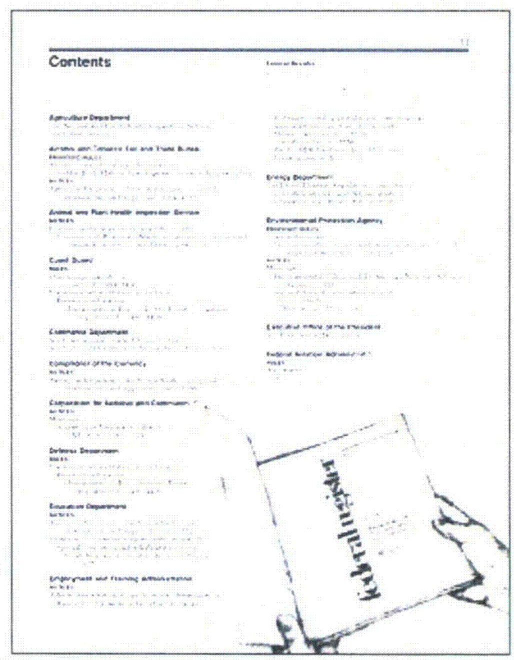
# 5.0 Public Involvement during New Reactor Licensing

Public involvement is a very important part of the NRC evaluation of a new reactor licensing application. This section discusses the means by which members of the public may participate in the licensing process. It also describes how members of the public can access the documents upon which the U.S. Nuclear Regulatory Commission (NRC) bases its evaluation.

## 5.1 Public Involvement

### 5.1.1 How does a member of the public know that a utility is applying for a license to build and operate a new nuclear power plant?

Many members of the public obtain information about upcoming licensing reviews for new nuclear plants from articles published in local and regional newspapers many months before the NRC receives the application. The NRC also routinely holds an informational meeting in the vicinity of the future facility several months before it receives the application. This gives the NRC an opportunity to inform the public about the process for reviewing the application and gives the public the opportunity to ask questions about the review process. After it receives an application for a new license, the NRC will also notify the public through the *Federal Register*, press releases, and local advertisements. The agency routinely places a notice in the *Federal Register* within 1 month after receiving the application.




***Federal Register***

Applicants notify the NRC of their plans to submit an application for a license often years in advance of their submittal. The advance notice assists the NRC in planning its workload and ensures that staff will be available to review the application upon its arrival. The NRC currently posts a list of expected new nuclear power plant applications and updates it every 2 to 3 weeks. The list appears on the NRC's "New Reactor" Web page located at http://www.nrc.gov/reactors/new-reactors.html.

### 5.1.2 Where do I find information related to a new reactor licensing action for a specific nuclear power facility?

The NRC posts the status of new reactor licensing activities on the NRC Web site at http://www.nrc.gov/reactors/new-reactors/col.html.

The staff adds the following information to the Web site when available:

- contact information for the NRC safety and environmental project managers
- a copy of the application
- the review schedule
- a list of meetings that are open to members of the public, along with the agenda for the meetings
- a transcript or meeting summary (as appropriate), copies of slides that were used at the meeting, or copies of inspection reports, if pertinent
- the draft and final environmental impact statement (EIS)
- the safety evaluation report
- any license or permit issued

### 5.1.3 What are the kinds of meetings that the public can be involved in and how does the public find out about them?

The NRC holds three types of public meetings with different purposes and varying degrees of public participation. The first type of meeting (Category 1) is commonly held with the applicant for a specific plant. Category 1 meetings provide the public with an opportunity to observe the NRC's interactions with the applicant, obtain information that assists the public in understanding regulatory issues, and offer constructive comments. The public is invited to observe the meeting and has the opportunity to speak with the NRC staff before the end of the meeting. Although most questions can be answered at the meeting, some questions may require followup by telephone or e-mail.

**Public Meeting for Turkey Point Nuclear Plant**

Category 2 meetings are typically held with a group of representatives of industry, licensees, vendors, or nongovernmental organizations, such as public interest and citizen groups, and focus on issues that could apply to several facilities.

Category 3 meetings are typically open to all external stakeholders, including representatives of nongovernmental organizations, private citizens or interested parties, and various businesses or industries. The NRC actively seeks public participation in Category 3 meetings to obtain a range of views, information, concerns, and suggestions about regulatory issues. This type of meeting provides the public the widest participation opportunities. Category 3 meetings include environmental scoping meetings or the public meeting to discuss a draft EIS.

For a typical license application, the following meetings are open to the public, listed in the order in which they occur for most reviews:

- meetings with the applicant to provide the NRC staff an overview of the license application (Category 1)
- an outreach meeting to introduce the public to the NRC and present an overview of the licensing process (Category 3)
- meetings with the applicant and members of the public to discuss the environmental review scoping process (Category 3)
- meetings with the applicant and members of the public to discuss and receive comments on the draft EIS (Category 3)
- meetings with the applicant to discuss issues related to the safety evaluation report (Category 1)
- a meeting with the Advisory Committee on Reactor Safeguards to discuss the safety review for a specific facility (Category 1).

### 5.1.4 What are the opportunities for public participation during the environmental review of the new reactor application?

Although the NRC invites and encourages public involvement and comments throughout the environmental review for a particular site, the agency specifically appreciates input at two critical stages during the environmental review of the early site permit or combined license application. The first stage is during the scoping process for the draft EIS. This begins approximately 3 months after the applicant has submitted its application for a new license. The NRC notifies the public at the beginning of the scoping process through the publication of a *Federal Register* notice, a meeting notice on the NRC Web site, advertisements placed in local newspapers in communities near the nuclear power facility, and flyers distributed throughout the local community. The agency conducts the scoping process to define the proposed action, determine the scope of the EIS, and identify the

*Although the NRC invites and encourages public involvement and comments throughout the environmental review for a particular site, the agency specifically appreciates input at two critical stages during the environmental review of the early site permit or combined license application.*

significant issues to be analyzed in depth. The NRC Web site, *Federal Register* notice, and advertisements provide addresses for written comments to be submitted, by mail, or electronically. Scoping comments can also be given orally or submitted in writing at the public meetings. In addition, the notice contains the time and location of the public scoping meetings (see Question 5.1.5) that occur in the vicinity of the nuclear plant.

The deadline for scoping comments is usually 60 days after the publication of the notice in the *Federal Register.* The NRC evaluates the comments received and considers them in preparing the site-specific analysis, as appropriate. An appendix to the draft EIS lists the comments considered to be in scope and provides the NRC staff's decision about whether it will further evaluate the comment as part of the analysis during the preparation of the draft EIS.

The second opportunity for public participation occurs after the NRC publishes the draft EIS, which occurs approximately 1 year after receipt of the application. To notify the public, the NRC staff places a notice of availability in the *Federal Register* (and on the NRC Web site) with instructions on how the public and other interested parties can obtain copies. The agency also sends a copy of this notice, along with a copy of the draft EIS, to those persons attending the public scoping meeting who place their names on a list to receive further information about the licensing process for that specific plant. The notice requests comments on the draft EIS and provides addresses for delivering and sending the comments to the appropriate NRC staff member by mail or electronically. The NRC allocates 75 days for the public to review the document and submit comments.

The NRC staff holds a public meeting near the nuclear plant to provide an overview of the draft EIS and to accept additional public comments about the document. Again, the public receives notification through a *Federal Register* notice, a meeting notice on the NRC Web site, advertisements placed in local newspapers in communities near the nuclear power facility, and flyers distributed throughout the local community. The *Federal Register* notice provides the time and location of the public meeting(s). The NRC staff considers every comment received and, if appropriate, incorporates it into the final document. An appendix to the final EIS lists all of the comments on the draft EIS, along with the NRC staff's decision about whether the comment was within the scope of the review and, if appropriate, where the staff changed the text of the final EIS in response to the comment.

### 5.1.5 What happens during the public meetings held during the environmental review process?

The NRC holds two types of public meetings during the environmental review process. At scoping meetings, the NRC staff orally presents an outline of the proposed action and regulatory process being undertaken. Then, the staff opens the meeting to any members of the public who wish to state their comments. For meetings about draft EISs, the NRC staff will orally present the findings stated in the EIS and then open the meeting to any members of the public who wish to state their concerns regarding the draft EIS. A court reporter transcribes both types of public meetings, and the NRC addresses comments submitted at the meeting either in a scoping report (for scoping meetings) or in the final EIS (for meetings about the draft EIS).

### 5.1.6 When can I submit written or electronic comments and concerns during the environmental review?

*Public scoping meetings are held near the nuclear plant that is seeking a license. Members of the public are invited to provide comments orally or in writing during these meetings.*

Although the NRC invites and encourages public involvement and comments throughout the environmental review for a particular site, the agency solicits both written and oral comments from members of the public at two particular times during the review. The first period of time is during the scoping process (see the response to Question 2.2.4), which is conducted to define the proposed action, determine the scope of the EIS, and identify significant issues to be analyzed in depth. Public scoping meetings take place near the nuclear plant that is seeking a license. The NRC invites members of the public to provide comments orally or in writing during these meetings.

The NRC staff publishes a *Federal Register* notice that provides the times and locations of scoping meetings. It also places a notice in newspapers in communities near the plant and on the NRC's Web site for the specific plant undergoing review. The notices provide addresses for written comments to be submitted in person, by mail, or electronically. The deadline for comments is usually 60 days after the NRC publishes in the *Federal Register* the notice of intent to conduct scoping.

The NRC also solicits written comments from members of the public after publication of the draft EIS. The NRC staff places a notice in the *Federal Register* and on the NRC Web site stating that it has issued the draft EIS and providing instructions for the public and other interested parties on obtaining copies. Copies of the draft EIS are also available on the NRC Web site or can be obtained as discussed in the response to Question 5.2.9. The agency also sends a copy of the notice and the draft EIS to those people from the first meeting who requested a copy. The notice requests comments on the draft EIS and provides addresses for delivering or sending the comments to the appropriate NRC staff member. Usually, the NRC allows 75 days for the public to review and submit comments. The NRC then holds a second set of public meetings in the vicinity of the nuclear facility to present the results of the draft EIS to the public and to obtain public comments, both oral and written.

### 5.1.7 Does the NRC do anything to ensure that members of the public who oppose nuclear power know about the review?

The NRC attempts to notify all stakeholders of any upcoming reviews. This includes Federal, State, and local agencies, as well as the applicant's staff, and members of the public or citizen advocacy groups that have previously expressed an interest in the regulatory activities related to a specific nuclear power facility. This also includes members of the public and organizations that oppose nuclear power. In addition to notices placed in the *Federal Register,* advertisements in local newspapers, and flyers distributed throughout the local community, the NRC staff notifies stakeholders (including members of the public or representatives of groups) who have previously attended public meetings related to a specific nuclear power facility or to license applications. Frequently, these groups also receive a courtesy telephone call to ensure that they have been notified of public meetings on scoping and of the preliminary conclusions in a draft EIS.

### 5.1.8 Does the NRC hold a hearing for each plant that requests a new license?

Yes. Hearings on license applications are mandatory; that is, the NRC automatically holds hearings.

### 5.1.9 As a member of the public, how do I request intervention in the proceedings for a new license? What is the timetable?

A member of the public must follow the instructions in the notice of the opportunity to request a hearing. This notice will be published in the Federal Register soon after the NRC dockets the application and generally provides 60 days to request a hearing.

### 5.1.10 What must be included in the request for a hearing or the petition to intervene?

The regulations (10 CFR 2.309) provide that a request for a hearing or a petition for leave to intervene must show the interest of the petitioner in the proceeding and how that interest may be affected by the results of the proceeding. The petition must specifically explain the reasons that intervention should be permitted, with particular reference to the following factors: (1) the nature of the petitioner's right to be made a party to the proceeding, (2) the nature and extent of the petitioner's property, financial, or other interest in the proceeding, and (3) the possible effect of any order that may be entered in the proceeding describing the petitioner's interest. The petition also must set forth the contentions sought to be raised in accordance with 10 CFR 2.309.

*The petitioner must provide sufficient information to show that a genuine dispute exists with the applicant on a material issue of law or fact. Contentions must be limited to matters within the scope of the license application (the action under consideration).*

### 5.1.11 How do I bring safety and security issues to the attention of the NRC?

There are two methods of reporting safety or security concerns to the NRC. The choice depends on whether the concern is considered an emergency or not. Emergency concerns include any accident involving the following:

- a nuclear reactor
- a nuclear fuel facility
- radioactive materials
- lost or damaged radioactive materials
- any threat, theft, smuggling, vandalism, or terrorist activity involving a nuclear facility or radioactive materials

Members of the public reporting an emergency concern should call the NRC's 24-hour Headquarters Operations Center at (301) 816-5100. Collect calls are accepted. All calls to this number are recorded. Nonemergency concerns should be brought to the attention of the NRC project manager assigned to a specific plant. The list of NRC project managers is located at http://www.nrc.gov/reactors/operating/project-managers.html#pwr. This page also contains a link to the NRC telephone directory. You can also give your concern to any NRC employee, who will pass it to the responsible person.

## 5.2 Obtaining Additional Information

### 5.2.1 Where are documents kept that the applicant submitted for review?

NRC Offices in Rockville, MD

The NRC places all documents and correspondence related to the application in the Agencywide Documents Access and Management System (ADAMS) and the NRC Public Document Room located in Rockville, MD. The NRC issues a press release to the media near the proposed plant announcing the receipt of the application and sends copies of the announcement to Federal, State, and local officials. The NRC publishes a notice of receipt of the application in the *Federal Register*.

### 5.2.2 Are documents locally available during the license application review?

The NRC makes hard copies of documents pertinent to the environmental review for the new reactor licensing application available to the public at one or more local community libraries in the vicinity of the facility. The documents include a copy of the licensee's application containing its environmental report and other associated documents (for example, the site safety analysis report or final safety analysis report, emergency plan, and site redress plan if applicable) and a copy of the pertinent draft EIS. The location of the libraries appears in the *Federal Register* notices related to the environmental review; it can also be obtained by calling the environmental project manager listed on the NRC Web site for each specific facility.

### 5.2.3 May I add my name to a list to receive information during the environmental review?

Members of the public may add their names to a list to receive information, including a copy of the draft and final EISs for the new reactor licensing review. A signup sheet is available in the lobby outside of the public meetings related to the environmental reviews. Members of the public may also contact the NRC's environmental project manager listed on the NRC Web site for each specific facility.

### 5.2.4 Does the NRC have a Web site?

Yes, the NRC has a Web site that is updated almost daily. The Web site address is http://www.nrc.gov.

### 5.2.5 What kind of information about new reactor license applications can I get from the NRC's Web site?

Information about new reactor licensing can be found on the NRC Web site at http://www.nrc.gov. The new reactor page, which is linked to the home page, provides information about combined license applications, early site permits, and design certifications, as well as regulations and guidance regarding the new reactor process. In addition, the site provides links to opportunities for public involvement in the EIS process and rulemaking. Schedules and full applications, including the environmental reports and safety evaluation reports, are also available from the NRC Web site.

### 5.2.6 What is the *Federal Register* and how can I get a copy of it?

The *Federal Register* is the official daily publication for rules, proposed rules, and notices of Federal agencies and organizations, as well as Executive orders and other Presidential documents. It is published by the Office of the *Federal Register*, National Archives and Records Administration. The public can search the *Federal Register* database online at http://www.gpoaccess.gov/fr/index.html. This site contains volumes of the *Federal Register* published since 1994 (Volume 59).

*Federal Register* citations are commonly given in a form that states the volume first and then, after the acronym FR, the page number (e.g., 60 FR 22461, indicating that it is Volume 60 and page 22461). Searches on the Government Printing Office (GPO) Access Web site can be conducted by *Federal Register* date, volume, and page or by key word (http://www.gpoaccess.gov/index.html). Other options for obtaining the *Federal Register* include purchasing a subscription (instructions are on the GPO Web site) or viewing issues from a local Federal depository library. The GPO Access Website also provides the addresses of such libraries.

The NRC Web site posts announcements of the publication of *Federal Register* notices that deal with new reactor licensing at http://www.nrc.gov/reactors/new-reactors.html. They are listed by the name of each facility that has applied for an early site permit or a combined license. The date and purpose of the *Federal Register* notice are provided and can be used to search for the actual *Federal Register* notice on the GPO Web site.

### 5.2.7 How can I get a copy of the *Code of Federal Regulations* dealing with new reactor license applications?

The regulations for new reactor licensing reviews are in Title 10, "Energy," of the *Code of Federal Regulations*, which can be viewed and printed from the NRC Web site at http://www.nrc.gov/reading-rm/doc-collections/cfr/. In addition, copies of the *Code of Federal Regulations* may be purchased from GPO or the National Technical Information Service:

The Superintendent of Documents
U.S. Government Printing Office
Mail Stop SSOP
Washington, DC 20402-0001

Internet: http://bookstore.gpo.gov
Telephone: 202-512-1800
Fax: 202-512-2250

or

The National Technical Information Service
Springfield, VA 22161-0002
Internet: http://www.ntis.gov
Telephone: 1-800-553-6847 or, locally, 703-605-6000

### 5.2.8 How does a member of the public obtain a copy of a license application for a proposed nuclear power plant?

The *Federal Register* notice that indicates that the NRC has received an application from a specific site also provides information on how the public can access the application. Copies of the application are available electronically on the NRC Web site at http://www.nrc.gov/reactors/new-reactors.html.

The application is also available electronically from the NRC's Agency-wide 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.html.

In addition, a copy or copies are available to local residents at one or two local libraries in the vicinity of the facility. The *Federal Register* notice related to the environmental review identifies the local library at which copies are available, as discussed previously in the response to Question 5.2.2.

### 5.2.9 How do I get a copy of the draft EIS related to a specific facility?

A single copy of each NRC draft EIS is free, to the extent of availability, upon written request to the following address:

Office of the Chief Information Officer,
Reproduction and Distribution Services Section
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

E-mail: distribution@nrc.gov
Fax: 301-415-2289

Members of the public who sign up at the public scoping meeting for a copy of the draft EIS for that specific facility will automatically receive a copy once the draft EIS is published. A copy is also available to local residents at the local libraries identified in the *Federal Register* notice, as discussed in the response to Question 5.2.2.

In addition, the draft EIS is available for review from the NRC Web site at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/.

### 5.2.10 How do I get a copy of the staff's safety evaluation report related to a specific facility?

A copy of the staff's safety evaluation report is available electronically from the NRC's Agency-wide 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.html. In addition, copies of the safety evaluation report related to a specific facility are available electronically on the NRC Web site at http://www.nrc.gov/reactors/new-reactors.html. When the staff finalizes its safety evaluation report, that final safety evaluation report (FSER) will also be available electronically in ADAMS and will be available on the NRC web site. In addition, the FSER will be published in a NUREG that will also be available electronically from ADAMS or can be obtained in hardcopy from the NRC (see the response to Question 5.2.9 above).

### 5.2.11 How can I get answers to additional questions that this document did not address?

*The NRC has developed a number of "frequently asked questions" documents, as well as informational brochures and fact sheets, all of which can be accessed from http://www.nrc.gov/reading-rm/faqlist.html.*

Members of the public are invited to plant-specific public meetings, where NRC staff members are available to answer both generic and site-specific questions (see also the responses to Questions 5.1.3–5.1.5). In addition, many answers to questions that are not included in this document can be found on the NRC Web site at http://www.nrc.gov. The NRC has developed a number of "frequently asked questions" documents, as well as informational brochures and fact sheets, all of which can be accessed from http://www.nrc.gov/reading-rm/faqlist.html.

For plant-specific safety and environmental questions related to new reactor applications, members of the public can contact the safety and/or environmental project manager assigned by the NRC for the license review for the specific plant. The name for each of the NRC safety and environmental project managers is given on the NRC Web site, and their telephone numbers can be obtained from the telephone directory on the NRC Web site. In addition, contact information is provided in the appropriate *Federal Register* notices and at the public meetings. The NRC safety and environmental project managers can either answer questions or direct callers to the appropriate person at the NRC

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10 CFR Part 20. "Standards for Protection Against Radiation." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

10 CFR Part 50 "Domestic Licensing of Production and Utilization Facilities." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

10 CFR Part 51. "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

10 CFR Part 52. "Early Site Permits; Standard Design Certifications; and Combined Licenses for Nuclear Power Plants." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

10 CFR Part 60. "Disposal of High-Level Radioactive Wastes in Geologic Repositories." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

10 CFR Part 71. "Packaging and Transportation of Radioactive Material." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

10 CFR Part 72. "Licensing Requirements for the Independent Storage of Spent Nuclear Fuel, High-Level Radioactive Waste, and Reactor-Related Greater than Class C Waste." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

10 CFR Part 73. "Physical Protection of Plants and Materials." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

10 CFR Part 100. "Reactor Site Criteria." *Code of Federal Regulations*, U.S. Nuclear Regulatory Commission.

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40 CFR Part 190 "Environmental Radiation Protections Standards for Nuclear Power Plant Operations." *Code of Federal Regulations* U.S. Environmental Protection Agency

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