
APPENDIX B METHODS FOR ASSESSING ENVIRONMENTAL IMPACTS— APPLICATION TO PRODUCTION OF TRITIUM IN COMMERCIAL LIGHT WATER REACTORS

This appendix describes the methods for assessing environmental impacts and addresses the application of those methods to the production of tritium in commercial light water reactors (CLWRs). The methods and applications are designed to comply with the Council on Environmental Quality and U.S. Department of Energy (DOE) regulations implementing the National Environmental Policy Act (NEPA). A summary of Federal environmental, safety, and health statutes, regulations, and orders applicable to relevant resource/issue areas is provided in Section B.13, Table B-1, and a list of relevant DOE Orders and U.S. Nuclear Regulatory Commission (NRC) guides is given in Section B.13, Table B-2 at the end of this appendix.

The following resources and issues are covered in this environmental impact statement (EIS):

- Land resources
- Air quality and noise
- Water resources
- Geology and soils
- Ecology
- Archaeological and historic resources
- Socioeconomics
- Public and occupational health and safety
- Waste management
- Transportation
- Spent fuel management
- Environmental justice.

The *Draft Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor* covers CLWR production of tritium in one or more of the following reactors:

- Watts Bar Nuclear Plant Unit 1 (Watts Bar 1)
- Sequoyah Nuclear Plant Units 1 and 2 (Sequoyah 1 and 2)
- Bellefonte Nuclear Plant Units 1 and 2 (Bellefonte 1 and 2).

The level of detail for the assessment of environmental impacts on each resource depends on the status of each reactor. For the currently operating reactors (Watts Bar 1 and Sequoyah 1 and 2), only the resources that would be affected by activities associated with tritium production are discussed and these impacts are evaluated in detail. For the partially completed reactors (Bellefonte 1 and 2), the impacts on all resources are evaluated in detail.

The assessment of the environmental impacts from the production of tritium in CLWRs is based on the following general assumptions:

- For Watts Bar 1 and Sequoyah 1 and 2, the impacts attributed to the production of tritium are those associated with the additional activities required to produce tritium that are beyond the current power operation activities.
- For Bellefonte 1 and 2, the impacts attributed to the production of tritium are: (1) impacts from the completion of construction of the facilities; and (2) full impacts from the operation of the reactors.

B.1 LAND RESOURCES

B.1.1 Land Use

The analyses of the impacts on land resources are based on the type and extent of land affected, the degree to which activities alter the land (including irretrievable usages), and the existing Federal, state, and local land use ordinances and policies (e.g., zoning).

B.1.2 Visual Resources

Visual resource assessments are based on the Bureau of Land Management's visual resource management method. A qualitative visual resource analysis, adapted from the Bureau of Land Management's visual contrast rating system (DOI 1986a, DOI 1986b), is conducted, as applicable, to:

- Identify key viewing positions (such as public travel routes, nearby residential/commercial areas, and public use facilities such as parks, recreation areas, and scenic areas)
- Assess the degree of visibility of new or modified facilities (buildings, stacks, access roads, parking areas, facility and perimeter lighting, steam and emission plumes) from these key viewing positions
- Assess the compatibility of such facilities with the existing setting

Sensitivity is assessed based on the potential for public concern about adverse effects on specific views within the affected environment.

B.2 AIR QUALITY AND NOISE

B.2.1 Air Quality

In currently operating reactors where the production of tritium is expected to result in some additional release of tritium to the atmosphere, the additional release is quantified and the expected concentration in air is calculated and compared with existing conditions and standards.

In partially completed reactors where construction activities would take place and the impacts of the full reactor operations are attributed to the production of tritium, assessments of air quality impacts include identification of applicable criteria for assessing impacts, development of emission inventories, and estimation of air pollutant concentrations. Ambient air monitoring data is used to determine background concentrations of pollutants for the specific site. The assessment of impacts is based on estimated pollutant concentrations, data on the existing environment, and assessment criteria. Human health effects due to air pollutant emissions are discussed in Section B.8; potential impacts of airborne radioactive and chemical releases are included.

Assessment criteria for pollutants include the U.S. Environmental Protection Agency's (EPA) primary and secondary National Ambient Air Quality Standards for criteria pollutants specified in 40 CFR 50 and those established by each state. The more stringent of either the EPA or state standards serves as the assessment criteria. The hazardous and toxic air pollutants include those listed in Title III of the 1990 Clean Air Act amendments, in the National Emission Standards for Hazardous Air Pollutants in 40 CFR 61, and in standards and guidelines proposed or adopted by the respective states. Site-specific emissions are modeled using the EPA-recommended ISCST3 model and the EPA's Guidelines on Air Quality Models (40 CFR 51, Appendix W).

B.2.2 Noise

Noise impacts are assessed on the basis of the potential change at residences near the site boundary. The potential for exposure of workers to noise and the measures taken to protect worker hearing are qualitatively discussed.

B.3 WATER RESOURCES

In currently operating CLWRs, tritium production is expected to result in some additional release of tritium as a liquid effluent. This additional release is quantified in the EIS, and the expected concentrations in the liquid environment are calculated and compared to existing conditions and standards. In partially completed CLWRs where construction activities would be required and the impacts of the full operation of the reactor are attributed to tritium production, comprehensive water resource and quality assessments are performed. As part of this assessment, water resource impacts (surface water, groundwater, and floodplain) are reviewed in relation to: the Clean Water Act, specifically Sections 402 (National Pollutant Discharge Elimination System [NPDES]), 307(b) (toxic and pretreatment effluent standards), and 316 (thermal discharge); the Safe Drinking Water Act; DOE Regulation 10 CFR 1022; Compliance with Flood Plains/Wetlands Environmental Review Requirements; Executive Order 11988, Floodplain Management; and applicable state water quality standards. Potential effects on surface water and groundwater availability and quality are assessed by considering whether the proposed action or alternatives can significantly affect the quantity or quality of water available for local consumption, as well as compliance with legislative or regulatory requirements, and the risk of flooding.

Surface Water

Impact assessments to surface water include the following factors:

- Changes in rate of water consumption and wastewater discharges for operation and construction phases (as applicable)
- Changes in chemical, physical, and thermal characterization of all wastewater discharges
- Changes in the annual low flows of surface water resulting from proposed withdrawals and discharges
- Existing water supply to support the demand [This is assessed by comparing projected increases with the capacity of the supplier and by considering existing water rights, agreements, and allocations.]

Water quality impacts are determined by reviewing current monitoring data reports for nonradiological effluents. Potential radiological impacts from the discharge of tritium are discussed in the Public and Occupational Health and Safety Section (see Section B.8). Water quality management practices at each site also are reviewed. Monitoring reports for discharges permitted under the NPDES program are examined for

compliance with permit limits and requirements. In most cases, current available data in the monitoring reports include information on the constituents present or the rate of discharge. A qualitative assessment of water quality impacts from wastewater (sanitary and process), stormwater runoff, stream channel erosion and sedimentation, stream bank flooding, and thermal impacts are identified.

Where possible, the proposed location is compared with the 500-year floodplain.

Groundwater

Tritium production is not expected to affect groundwater quality or groundwater resources for any of the alternatives. However, effluents are analyzed for effects on aquifers, groundwater usage, and groundwater quality within the regions. Available data on existing groundwater quality conditions are compared to Federal and state groundwater quality standards, effluent limitations, and safe drinking water standards. Additionally, Federal and state permitting requirements for groundwater withdrawal and discharge are identified. Impacts of groundwater withdrawals on existing contaminant plumes due to construction and facility operation are assessed to determine the potential for changes in their rates of migration and the effects of any changes in the plumes on groundwater users. Impacts are assessed by the degree to which groundwater quality, drawdown of groundwater levels, and groundwater availability to other users is affected.

B.4 GEOLOGY AND SOILS

Soil types at construction sites are described, and the capability for supporting construction is assessed. Shrinking or swelling of the ground as a result of landscaping, irrigation, or construction-related dewatering and soil erosion susceptibility also is addressed.

B.5 ECOLOGY

Ecological impacts are addressed as applicable for terrestrial resources, wetlands, aquatic resources, and threatened and endangered species. Sources of impacts considered include land use changes, salt drift (residual salts left behind as a result of the evaporation of cooling tower water), chemical or radionuclide emissions, water withdrawal, wastewater discharges, and human disturbance and noise. Potential impacts are assessed based on both the Federal and state protection regulations and standards and on the degree to which various habitats or species can be affected by the project.

Terrestrial Resources

The key considerations in assessing the effects on terrestrial resources are the presence and regional importance of affected habitats and the size of the habitat area to be disturbed by construction or operations. Impacts to wildlife are based on plant community loss, which is closely associated with animal habitat. The potential for disturbance, displacement, or loss of wildlife, in accordance with wildlife protection laws such as the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, is evaluated.

Wetlands

Most impacts on wetlands are related to displacement of wetlands by filling, draining, or clearing activities. Operational impacts to wetlands may occur from effluents, surface or groundwater withdrawals, or creation of new wetlands. The loss of wetlands resulting from construction and operation are addressed in the same way as for terrestrial plant communities—by comparing data on onsite wetlands to proposed land requirements. Sedimentation impacts are evaluated based on the nearness of wetlands to project areas, assuming standard

construction erosion and sedimentation control measures. Impacts resulting from increased flows are evaluated based on a comparison of expected discharge rates with present stream flow rates.

Aquatic Resources

Impacts to aquatic resources are assessed for sedimentation, increased flows, effluent discharge, impingement, entrainment, loss of spawning habitat, and introduction of waste heat and chemicals.

Threatened and Endangered Species

Potential impacts to threatened and endangered species are determined in a manner similar to that described for terrestrial and aquatic resources, since the impact sources are similar.

B.6 ARCHAEOLOGICAL AND HISTORIC RESOURCES

The archaeological and historic resources impact analyses determine the potential effects on prehistoric, historic, Native American, and paleontological resources.

B.7 SOCIOECONOMICS

Socioeconomic impacts are assessed for the region of influence in the areas of:

- Demographics (population growth)
- Economics (employment and income)
- Housing
- Public finance
- Public infrastructure (schools, transportation, hospitals, recreational facilities, etc.).

The region of influence is the area containing roughly 90 percent of the current and potential employees at the site. Local impacts from a concentration of activity or a relatively large change in activity are noted. Changes are projected over 40 years. Employment impacts are estimated using the Bureau of Economic Analysis' Regional Input-Output Multiplier System.

B.8 PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY

For the currently operating CLWRs where the production of tritium is expected to result only in some additional release of tritium to the environment under either normal operations or accident conditions, the incremental impacts to the public and facility workers are assessed by using the method in the facilities' environmental reports and the associated NRC final environmental statements, and by adding the effects of the increase in the amounts of released tritium.

For the partially completed CLWRs, the impacts of full reactor operations would be attributed to the production of tritium; therefore, the impacts to the public and facility workers are assessed using current NRC guidelines and practices.

The public and occupational health and safety analysis determines the potential adverse effects on human health from exposure to ionizing radiation and hazardous chemicals. Health effects are determined by identifying the types and quantities of additional material (radioactive and chemical) to which one may be

exposed, estimating doses, and then calculating the resultant health effects (latent cancer fatalities). The impacts from various releases during normal operation and the postulated accidents on the human health of workers and the public residing within 80 kilometers (50 miles) of each site are assessed. This assessment uses site-specific factors such as meteorology, population distribution, and agricultural production. Models are used to project the impacts on the health of workers and the public due to radiological and chemical releases during normal operation and postulated accidents. These models include:

- MACCS2 (SNL 1997) for radioactive material releases during beyond design-basis accidents
- GENII (PNL 1988) for all radioactive material releases during normal operations and other accidents (design-basis and TPBAR handling accidents)
- ISCST3 (EPA 1995) and ALOHA (NSC 1990) for hazardous chemical releases during normal operation and accident conditions

Health Impacts on Plant Workers During Normal Operation—Because radiation workers are individually monitored, experiences from past and current operations that are similar to future operation are used to estimate the radiological health impacts to workers. Health impacts from chemicals, if any, are discussed qualitatively. There are no individual exposure data on workers for chemicals. Therefore, it is assumed that individuals are exposed to low air chemical emission concentrations during an 8-hour day for a 40-hour week at a point (about 100 meters per 330 feet) downstream from the release point.

Health Impacts on the General Public During Normal Operation—Public health impacts from exposure to radiological or hazardous chemical materials released during operations are calculated. The effect is the sum of: (1) internal exposure resulting from breathing, eating, and drinking; and (2) external exposure resulting from standing on contaminated ground, being exposed to the air, and being submerged in water. The type and amount of material released are estimated, and the associated radiological and chemical doses are determined. These doses are converted to health effects using appropriate health risk estimators, both radiological (NRC/NAS 1990, NCRP 1993) and chemical (EPA 1997).

Accident Analyses for Postulated Accident Scenarios—Risks to both an individual member of the public and the general population residing within the affected area are calculated. The magnitude and consequences of impacts associated with each alternative are determined using site-specific and/or reactor-specific safety analyses. Although the concepts used are analogous to a formal probabilistic risk assessment, the accident analyses involve less detail and only address a spectrum of beyond design-basis accidents (severe core disruptive reactor accidents) that represent high consequence events with a low probability of occurrences (often $\leq 1.0 \times 10^{-6}$ per year), and a spectrum of possible design-basis and other operational accidents that represent low-consequence events with a high probability of occurrences (frequency greater than 1.0×10^{-6} per year). These accidents are similar to those that have been postulated in the plant's environmental report and the corresponding NRC final environmental statement.

The accident risk to a noninvolved¹ worker is calculated for a hypothetical worker at 0.64 kilometers (0.4 mile) (or the site boundary, whichever is closer) from the facility release point. The risk to facility workers from radiological accidents is addressed qualitatively, since precise placement of the workers during accidents cannot be known.

¹Noninvolved workers are only applicable to DOE sites, since each DOE site usually contains many facilities. At a CLWR, there are no facilities that do not directly support reactor operation. Therefore, noninvolved workers, as defined in DOE documents, do not exist. For consistency, however, this calculation will be performed.

Uncertainties—The sequence of analyses needed to generate the radiological impact estimates from normal operations and facility accidents includes: (1) a selection of normal operational modes and accident sequences, (2) estimation of source terms, (3) estimation of environmental transport and uptake of radionuclides, (4) calculation of radiation doses to exposed individuals, and (5) estimation of health effects.

The analyses use conservative models and scenarios to bound the risks. As a result, even though the range of uncertainty in a quantity may be large, the value calculated for the quantity is close to the upper extreme in the range, so the chance of the actual quantity being greater than the calculated value (or the chance of the quantity being less than the calculated value if the criteria are such that the quantity has to be maximized) is low.

For the partially completed CLWRs, the impacts are evaluated using the total source terms (as opposed to incremental) associated with each accident.

B.8.1 Emergency Preparedness

Emergency preparedness plans exist for all operating reactor sites and are summarized in the EIS for each site. For nonoperating reactor sites, approximate plans need to be developed.

B.9 WASTE MANAGEMENT

The volumes of each waste type (low-level radioactive, low-level mixed, hazardous, nonhazardous, and high-level radioactive) are estimated. Methods of minimizing each of the waste streams are discussed. Impacts are assessed in the context of site practices for treatment, storage, and disposal. Wastes related to decontamination and decommissioning are also discussed. Decontamination and decommissioning can range from performing a simple radiological survey to completely dismantling and removing a radioactively contaminated facility.

B.10 TRANSPORTATION

The impacts of transporting program-related materials are described. The packages required for the shipment of materials are also described. For transporting irradiated TPBARs and radioactive waste, the following elements are considered: transport mode, weight of material, Curies, proximity dose rates (transport index), type of package, number of shipments, and distance. Road and railroad routes are identified using HIGHWAY (ORNL 1993a) and INTERLINE (ORNL 1993b) codes, respectively. Radiological transportation health impacts are calculated using RADTRAN and TICLD (SNL 1993) codes for both the incident-free and accident conditions. In addition to the radiological risks posed by the transportation activities, vehicle-related risks are assessed for nonradiological causes (i.e., causes related to the transport vehicles and not the TPBAR packages). Nonradiological risks during incident-free transportation conditions are caused by potential exposure to increased vehicle exhaust emissions. Nonradiological risks resulting from accident conditions unrelated to the shipment cargo are assessed using state-specific transportation fatality rates.

B.11 SPENT FUEL MANAGEMENT

“Spent fuel” is the terminology used for nuclear reactor fuel that has been irradiated to the point that it no longer contributes to the continued operation of the reactor. The spent fuel is removed from the reactor core and stored in the spent fuel storage pool or basin. The Nuclear Waste Policy Act of 1982, as amended, assigned the Secretary of Energy the responsibility for developing a repository for the disposal of high-level radioactive waste and spent fuel. When such a repository is available, spent fuel is transported for disposal

from the nuclear power reactors to the repository. Until a repository is available, spent fuel is stored in the reactor pools or in other acceptable, NRC-licensed storage locations. Because of the uncertainty associated with opening a repository, this EIS assumes that spent fuel is stored at the reactor facility for the 40-year duration of the proposed action.

B.12 ENVIRONMENTAL JUSTICE

Executive Order 12898, Federal Action to Address Environmental Justice in Minority Populations and Low Income Populations, requires an assessment of incidence and mitigation related to disproportionately high and adverse human health or environmental effects on minority and low-income populations. In May 1996, the Council on Environmental Quality released its initial guidance on environmental justice (CEQ 1996). This guidance forms the basis of the environmental justice analysis. The following definitions are used in the analysis:

- *Minority Individuals*—Persons self-designated as Hispanic (of any race), Native American, Asian or Pacific Islander, or Black
- *Minority Population*—The total number of minority individuals residing within a specified area
- *Low-Income Individuals*—Any persons whose income is below the poverty threshold
- *Low-Income Population*—The total number of low-income individuals residing within a specified area

Demographic data provided by the U.S. Bureau of the Census is used to quantify minority and low-income populations in the affected area, i.e., within a radius of 80 kilometers (50 miles) and 16 kilometers (10 miles) from the site. Poverty thresholds, which are a function of family size and the number of unmarried children under 18, are used to identify the low-income populations. To avoid significant uncertainties in the population estimate due to partial inclusions of geographic units (such as census tracts, block groups, and blocks) at the boundaries of potentially affected areas, the unit area of spatial resolution is significantly less than the affected area. Uncertainty bounds are calculated by total inclusion (the upper bound) and total exclusion (the lower bound) of the populations residing within the affected area.

As the analysis found no significant impacts on the general population, no further analyses of impacts on minority populations and low-income populations are required. Instead, the discussion states that no significant impacts are likely for the general population or any particular segment of the population.

B.13 APPLICABLE ENVIRONMENTAL LAWS, REGULATIONS, AND GUIDANCE

Tables B-1 and B-2 provide a summary of all environmental laws, regulations, and guidance applicable to the preparation of the CLWR EIS.

Table B–1 Federal Environmental Statutes, Regulations, and Executive Orders¹

Resource Category	Statute/Regulation/Order	Citation	Responsible Agency	Potential Applicability: Permits, Approvals, Consultations, and Notifications
Air Resources	The Clean Air Act, as amended	42 U.S.C. §§7401 <i>et seq.</i>	Environmental Protection Agency/State	Requires sources to meet standards and obtain permits to satisfy: NAAQS, state implementation plans, the Standards of Performance for New Stationary Sources, NESHAP, and Prevention of Significant Deterioration regulations.
	The National Ambient Air Quality Standards/ State Implementation Plans	42 U.S.C. §§7409 <i>et seq.</i>	Environmental Protection Agency/State	Requires compliance with primary and secondary ambient air quality standards governing sulphur dioxide, nitrogen oxides, carbon dioxide, ozone, lead, and PM ₁₀ and emission limits/reduction measures as designated in each state's implementation plan.
	Standards of Performance for New Stationary Sources	42 U.S.C. §7411	Environmental Protection Agency/State	Establishes control/emission standards and record keeping requirements for new or modified sources specifically addressed by a standard.
	The National Emission Standards for Hazardous Air Pollutants	42 U.S.C. §7412	Environmental Protection Agency/State	Requires sources to comply with emission levels of carcinogenic or mutagenic pollutants; may require preconstruction approval, depending on the process being considered and the level of emissions that will result from the new or modified source.
	Prevention of Significant Deterioration	42 U.S.C. §§7470 <i>et seq.</i>	Environmental Protection Agency/State	Applies to areas that are in compliance with NAAQS. Requires comprehensive preconstruction review and the application of Best Available Control Technology to major stationary sources (emissions of 100 tons per year) and major modifications; requires a preconstruction review of air quality impacts and the issuance of a construction permit from the responsible state agency setting forth emission limitations to protect the Prevention of Significant Deterioration increment.
	Noise Control Act of 1972	42 U.S.C. §§4901 <i>et seq.</i>	Environmental Protection Agency	Requires facilities to maintain noise levels that do not jeopardize the health and safety of the public.
Water Resources	The Clean Water Act	33 U.S.C. §§1251 <i>et seq.</i>	Environmental Protection Agency/State	Requires Environmental Protection Agency or state-issued permits and compliance with provisions of permits regarding discharge of effluents to surface waters.
	National Pollutant Discharge Elimination System (Section 402 of the Clean Water Act)	33 U.S.C. § 1342	Environmental Protection Agency/State	Requires permit to discharge effluents to surface waters and stormwaters; permit modifications are required if discharge effluents are altered.
	Dredged or Fill Material (Section 404 of the Clean Water Act)/Rivers and Harbors Appropriations Act of 1899	33 U.S.C. §1344/33 U.S.C. §§401 <i>et seq.</i>	U.S. Army Corps of Engineers	Requires permits to authorize the discharge of dredged or fill material into navigable waters or wetlands and to authorize certain structures.
	Wild and Scenic Rivers Act	16 U.S.C. §§ 1271 <i>et seq.</i>	FWS/Bureau of Land Management/ Forest Service/ National Park Service	Requires consultation before construction of any new Federal project associated with a river designated or under study as wild and scenic in order to minimize and mitigate any adverse effects on the physical and biological properties of the river.
	Safe Drinking Water Act	42 U.S.C. §§ 300f <i>et seq.</i>	Environmental Protection Agency/State	Requires permits for construction/operation of underground injection wells and subsequent discharging of effluents to ground aquifers.

Resource Category	Statute/Regulation/Order	Citation	Responsible Agency	Potential Applicability: Permits, Approvals, Consultations, and Notifications
Water Resources (cont'd)	Executive Order 11988: Floodplain Management	3 CFR, 1977 Comp., p. 117	Water Resources Council/Federal Emergency Management Agency/CEQ	Requires Federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.
	Executive Order 11990: Protection of Wetlands	3 CFR, 1977 Comp., p. 121	U.S. Army Corps of Engineers/ FWS	Requires Federal agencies to avoid the long- and short-term adverse impacts associated with the destruction or modification of wetlands.
	Compliance with Floodplain/Wetlands Environmental Review Requirements	10 CFR 1022	DOE	Requires DOE to comply with all applicable floodplain/wetlands environmental review requirements.
Hazardous Wastes and Land Resources	Resource Conservation and Recovery Act/Hazardous and Solid Waste Amendments of 1984	42 U.S.C. §§6901 <i>et seq.</i> PL 98-616	Environmental Protection Agency/State	Requires notification and permits for operations involving hazardous waste treatment, storage, or disposal facilities. Changes to site hazardous waste operations could require amendments to RCRA hazardous waste permits involving public hearings.
	Farmland Protection Policy Act of 1981	7 U.S.C. §§4201 <i>et seq.</i>	Soil Conservation Service	Requires avoidance of any adverse effects to prime and unique farmlands.
	Federal Facility Compliance Act of 1992	42 U.S.C. §6961	States	Requires waivers of sovereign immunity for Federal facilities under RCRA and requires DOE to develop plans and enter into agreements with states as to specific management actions for specific mixed waste streams.
Ecology (Biotic Resources)	Fish and Wildlife Coordination Act	16 U.S.C. §§661 <i>et seq.</i>	Fish and Wildlife Service	Requires consultation on the possible effects on wildlife if there is construction, modification, or control of bodies of water in excess of 10 acres in surface area.
	Bald and Golden Eagle Protection Act	16 U.S.C. §§668 <i>et seq.</i>	Fish and Wildlife Service	Requires consultations to be conducted to determine if any protected birds are found to inhabit the area. If so, DOE must obtain a permit prior to moving any nests due to construction or operation of project facilities.
	Wilderness Act of 1964	16 U.S.C. §§1131 <i>et seq.</i>	Department of Commerce/ Department of Interior	Requires consultations with the Department of Commerce and Department of Interior to minimize impact.
	Migratory Bird Treaty Act	16 U.S.C. §§703 <i>et seq.</i>	Fish and Wildlife Service	Requires consultation to determine if there are any impacts on migrating bird populations due to construction or operation of project facilities. If so, DOE will develop mitigation measures to avoid adverse effects.
	Wild Free-Roaming Horses and Burros Act of 1971	16 U.S.C. §§1331 <i>et seq.</i>	Department of Interior	Requires consultation with the Department of Interior to minimize impact.
	Endangered Species Act of 1973	16 U.S.C. §§1531 <i>et seq.</i>	Fish and Wildlife Service/National Marine Fisheries Service	Requires consultation to identify endangered or threatened species and biological opinions and, if necessary, develop mitigation measures to reduce or eliminate adverse effects of construction or operation.
Cultural Resources	National Historic Preservation Act of 1966, as amended	16 U.S.C. §§470 <i>et seq.</i>	President's Advisory Council on Historic Preservation	Requires consultation with the State Historic Preservation Office prior to construction to ensure that no historical properties will be affected.
	Archaeological and Historical Preservation Act of 1974	16 U.S.C. §§469 <i>et seq.</i>	Department of Interior	Requires authorization for any disturbance of archaeological resources.
	Archaeological Resources Protection Act of 1979	16 U.S.C. §§470aa <i>et seq.</i>	Department of Interior	Requires authorization for any excavation or removal of archaeological resources.
	Antiquities Act	16 U.S.C. §§431-33	Department of Interior	Requires compliance with all applicable sections of the Act.

Resource Category	Statute/Regulation/Order	Citation	Responsible Agency	Potential Applicability: Permits, Approvals, Consultations, and Notifications
Cultural Resources (cont'd)	American Indian Religious Freedom Act of 1978	42 U.S.C. §1996	Department of Interior	Requires consultation with local Native American Indian tribes prior to construction to ensure that their religious customs, traditions, and freedoms are preserved.
	Native American Graves Protection and Repatriation Act of 1990	25 U.S.C. §3001	Department of Interior	Requires consultations with local Native American Indian tribes prior to construction to guarantee that no Native American graves are disturbed.
	Executive Order 11593: Protection and Enhancement of the Cultural Environment	3 CFR 154, 1971-1975 Comp., p. 559	Department of Interior	Requires agencies to aid in the preservation of historic and archaeological data that may be lost during construction activities.
Public and Occupational Health and Safety	Occupational Safety and Health Act	5 U.S.C. §5108	Occupational Safety and Health Administration	Requires agencies to comply with all applicable worker safety and health legislation (including guidelines of 29 CFR Part 1960) and to prepare, or have available, Material Safety Data Sheets.
	Standards for Protection Against Radiation	10 CFR 20	Nuclear Regulatory Commission	Establishes standards for protection of workers and the general public against radiation hazards arising out of activities under licenses issued by the Nuclear Regulatory Commission.
	Occupational Radiation Protection	10 CFR Part 835	Department of Energy	Establishes radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from conduct of DOE activities.
	Hazard Communication Standard	29 CFR 1910.1200	Occupational Safety and Health Administration	Requires agencies to ensure that workers are informed of, and trained to handle, all chemical hazards in the workplace.
Other	Atomic Energy Act of 1954	42 U.S.C. §2011	Department of Energy	Requires DOE to follow its own standards and procedures to ensure the safe operation of its facilities.
	National Environmental Policy Act	42 U.S.C. §§4321 <i>et seq.</i>	Department of Energy	Requires DOE to comply with NEPA implementing procedures in accordance with 10 CFR Part 1021.
	Toxic Substances Control Act 15	U.S.C. §§2601 <i>et seq.</i>	Environmental Protection Agency	Requires compliance with inventory reporting requirements and control provisions of TSCA to protect the public from the risks of exposure to chemicals; TSCA imposes strict limitations on use and disposal of polychlorinated biphenyls-contaminated equipment.
	Hazardous Materials Transport Action Act	49 U.S.C. §§1801 <i>et seq.</i>	Department of Transportation	Requires compliance with the requirements governing hazardous materials and waste transportation.
	Hazardous Materials Transportation Uniform Safety Act of 1990	49 U.S.C. §1801	Department of Transportation	Restricts shippers of highway route-controlled quantities of radioactive materials to use only permitted carriers.
	Emergency Planning and Community Right-To-Know Act of 1986	42 U.S.C. §§11001 <i>et seq.</i>	Environmental Protection Agency	Requires the development of emergency response plans and reporting requirements for chemical spills and other emergency releases, and imposes right-to-know reporting requirements covering storage and use of chemicals which are reported in toxic chemical release forms.
	Pollution Prevention Act of 1990	42 U.S.C. 11001 - 11050	Environmental Protection Agency	Establishes a national policy that pollution should be reduced at the source and requires a toxic chemical source reduction and recycling report for an owner or operator of a facility required to file an annual toxic chemical release form under Section 313 of SARA.

Resource Category	Statute/Regulation/Order	Citation	Responsible Agency	Potential Applicability: Permits, Approvals, Consultations, and Notifications
Other (cont'd)	Executive Order 12843: Procurement Requirements and Policies for Federal Agencies for Ozone-Depleting Substances	April 21, 1993	Environmental Protection Agency	Requires Federal agencies to minimize procurement of ozone depleting substances and conform their practices to comply with Title VI of the Clean Air Act Amendments (stratospheric ozone protection) and to recognize the increasingly limited availability of Class I substances until final phaseout.
	Executive Order 12856: Federal Compliance with Right-To-Know Laws and Pollution Prevention Requirements	August 3, 1993	Environmental Protection Agency	Requires Federal agencies to achieve 50 percent reduction of agency's total releases of toxic chemicals to the environment and offsite transfers; to prepare a written facility pollution prevention plan not later than 1995; to publicly report toxic chemicals entering any waste stream from Federal facilities, including any releases to the environment; and to improve local emergency planning, response, and accident notification.
	Executive Order 12873: Federal Acquisition, Recycling, and Waste Prevention	October 20, 1993	Environmental Protection Agency	Requires Federal agencies to develop affirmative procurement policies and establishes a shared responsibility between the system program manager and the recycling community to effect use of recycled items for procurement.
	Executive Order 12898: Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	February 11, 1994	Environmental Protection Agency	Requires Federal agencies to identify and address, as appropriate, the disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.
	Executive Order 12088: Federal Compliance with Pollution Control Standards	3 CFR, 1978 Comp., p. 243	Office of Management and Budget	Requires Federal agency landlords to submit to the Office of Management and Budget an annual plan for the control of environmental pollution and to consult with the Environmental Protection Agency and state agencies regarding the best techniques and methods.
	Executive Order 11514: Protection and Enhancement of Environmental Quality	3 CFR, 1966-1970 Comp., p. 902	Council on Environmental Quality	Requires Federal agencies to demonstrate leadership in achieving the environmental quality goals of NEPA; provides for DOE consultation with appropriate Federal, state, and local agencies in carrying out their activities as they affect the environment.
	Nuclear Waste Policy Act of 1982	42 U.S.C. §§10101 <i>et seq.</i>	Department of Energy	Requires DOE to dispose of radioactive waste per 40 CFR 191 standards.
	Low-Level Radioactive Waste Policy Act	42 U.S.C. §§2021b -2021d	Nuclear Regulatory Commission	Requires DOE to dispose of low-level radioactive waste per compacts of the states in which it operates.

PM₁₀ = Particulate matter smaller or equal to 10 microns.

¹ The applicability of these may vary depending on the reactor and options under consideration.

Acronyms used in this table are listed below.

- CEQ = Council on Environmental Quality
- CFR = Code of Federal Regulations
- DOE = Department of Energy
- FWS = U.S. Fish & Wildlife Service
- NAAQS = National Ambient Air Quality Standards
- NEPA = National Environmental Policy Act
- NESHAP = National Emission Standards for Hazardous Air Pollutants
- RCRA = Resource Conservation and Recovery Act
- SARA = Superfund Amendments and Reauthorization Act
- TSCA = Toxic Substances Control Act
- U.S.C. = United States Code

Table B–2 Relevant DOE Orders and NRC Guides

<i>DOE Order</i>	<i>DOE Order Title</i>
151.1	Comprehensive Emergency Management System
225.1	Accident Investigation
231.1	Environment Safety and Health Reporting
232.1	Occurrence Reporting and Processing of Operations Information
420.1	Facility Safety
425.1	Startup and Restart of Nuclear Facilities
440.1	Worker Protection Management for DOE Federal and Contractor Employees
451.1	National Environment Policy Act Compliance Program
460.1A	Packaging and Transportation Safety
470.1	Safeguards and Security Program
1230.2	American Indian Tribal Government Policy
5400.5	Radiation Protection of Public and Environment
5480.30	Nuclear Reactor Safety Design Criteria
5610.12	Packaging and Offsite Transportation of Nuclear Components, and Special Assemblies Associated with the Nuclear Explosion
<i>NRC Guide No.</i>	<i>NRC Guide Title</i>
1.101	Emergency Planning and Preparedness for Nuclear Power Reactors
1.109	Calculation of Annual Dose to Man from Routine Releases of Reactor Effluents for the Purposes of Evaluating Compliance with 10 CFR Part 50, Appendix I
1.111	Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors
1.112	Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Light-Water-Cooled Reactors
1.113	Estimating Aquatic Dispersions of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I
1.145	Atmospheric Dispersion Models for Potential Accident Consequences Assessments at Nuclear Power Plants

B.14 REFERENCES

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