

Draft Interim Staff Guidance for NUREG-1537, Part 1, Section 12.12

12.12 THE ENVIRONMENTAL REPORT

The National Environmental Protection Act of 1969 (NEPA), as amended, requires Federal agencies to disclose and consider environmental impacts for major Federal actions. NRC's environmental protection regulations in Title 10, Part 51 of the *Code of Federal Regulations* (10 CFR Part 51), implement these requirements. These regulations describe the type of actions for which NRC must conduct environmental reviews in order to disclose and consider the environmental impacts of a proposed action under NRC regulatory purview.

Environmental reviews for licensing actions fall into one of three categories: those identified as categorical exclusions, those requiring the preparation of an Environmental Assessment (EA), and those requiring the preparation of an Environmental Impact Statement (EIS). 10 CFR 51.20 describes several types of actions that would require an EIS. While an EIS or supplement to an EIS is required for construction permits and operating licenses for testing facilities, no similar requirement currently exists in 10 CFR 51.20 for medical isotope production facilities. Such activities may require an EA or an EIS, depending on the action's potential for significant impacts that may affect the quality of the natural and human environment. An EA is used to determine if the impacts from the proposed action may be significant and whether a finding of no significant impact (FONSI) can be made. If an EA concludes that the proposed action could result in significant impacts to the natural or human environment, then the NRC should prepare an EIS. In some cases, the NRC may decide to prepare an EIS, rather than an EA, if there is the potential for significant impacts to the natural or human environment or the proposed action involves a matter which the Commission, in the exercise of its discretion, has determined should be covered by an EIS.

The applicant or licensee shall submit an environmental report (ER) to assist the NRC in conducting an expeditious environmental review. The regulatory requirements for preparing an ER are provided in 10 CFR 51.41, 51.45, 51.49 and 51.50.

The applicant or licensee may benefit from a pre-application meeting with the NRC licensing and environmental project managers (PMs) to discuss the information needed to support the environmental review. The goal of such a meeting is to define the scope and detail of information that the applicant or licensee should provide in the ER. NUREG-1537, Part 2, Section 12.12 describes how the NRC staff uses the information in the ER to prepare an EA or EIS.

The information provided in the ER should address the likelihood of significant impacts to the natural and human environment posed by the proposed action. Likewise, the level of detail should be commensurate with the likelihood for significant impacts. For example, construction and operation of a new facility at a previously undisturbed site near sensitive environmental resources would require more detail than construction and/or modification and operation of a facility within an existing building at an industrial site. The ER should present a thorough description of each affected resource area for the evaluation of potential impacts to the environment. It may not be necessary for every resource to receive the same level of detailed review and every action may not require all the information discussed in this section. Likewise, the proposed action may present unique issues and may require additional information. This is consistent with some of the goals of NEPA, which is to concentrate on issues significant to the

proposed action and their potential environmental impacts as well as ensuring that affected resources are analyzed in proportion to their importance and the expected level of impact on them. The information that applicants or licensees should provide in each section of the ER is described in the following sections.

12.12.1 Introduction of the Environmental Report

The introduction should include a brief description of the proposed action, location of the proposed action, and relevant background information. Key dates and deadlines should also be identified to establish the time frame for the proposed action.

12.12.1.1 Purpose and Need for the Proposed Action

This section should explain the purpose and need for the proposed action and should not be written merely as a justification of the proposed action. Examples of purpose and need include a benefit provided if the proposed action is licensed and implemented or descriptions of the disadvantages that would be experienced without the proposed action. For instance, a description of how implementing the proposed action would satisfy global, national, or regional projected demands for isotope production, including as appropriate, quantifying the benefit in terms of the proposed production volume relative to the projected demand could support the purpose and need section.

12.12.1.2 Applicable Regulatory Requirements, Permits, and Required Consultations

As described in 10 CFR 51.45(d), this section should list and summarize the status of all applicable Federal, State, local and other regulatory requirements, permits, and consultations that would be required for the proposed facility to be constructed and operated. The applicant or the licensee should provide the following information in the ER, as applicable:

- Name of each regulatory agency involved in a consultation, review, approval, and authorization, and the applicable law, ordinance, or regulation;
- Activity to be covered by the consultation, review, approval, or authorization;
- Current status of each consultation, review, approval, and authorization;
- Potential administrative delays or other problems preventing agency consultation, review, approval, or authorization; and
- Summary of any surveys required to complete consultation (such as threatened and endangered species or archaeological surveys) and the status of such surveys.

12.12.2 Proposed Action

The applicant or licensee should describe the proposed action and briefly summarize the information provided in the ER, referring the reader to other sections for more detail. Depending on the scope of the proposed action and immediate environs, it may not be necessary for the evaluation of potential impacts from the proposed action to require all the information requested below:

- Detailed description of the proposed action, the general progression of the project and pre-operational, operational, and post-operation activities, as appropriate;
- Schedule of the major steps comprising the proposed action, such as start and completion dates of major construction, modifications, and operational activities;

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- Full names of all organizations sharing ownership of the proposed action.

Site Location and Layout

- Site location, including distance and direction from the nearest major city, nearby towns, nearby inhabitants, sensitive populations (e.g., schools, daycare facilities, retirement homes, etc.), and landmarks, including highways, rivers, or other bodies of water within 50 mi (80 km) of the facility;
- Facility latitude and longitude coordinates;
- Areal extent of the site and facility layout, including the site boundary;
- List of current or proposed buildings or areas used for chemical, oil, diesel fuel, and other hazardous material storage, waste management (radioactive and non-radioactive), vehicle cleaning, administration, operations and maintenance, shipping and receiving, generating electricity, health and security, parking, etc.;
- Underground storage tanks, wells, pipelines, water supply, sewage and stormwater systems;
- Identification of the type and quantity of radionuclides and hazardous materials associated with facility or in the vicinity;
- Summary of how materials would be stored, handled, utilized and disposed; and
- Air, groundwater, surface water, meteorological, and/or ecological monitoring stations or proposed monitoring stations.

Non-Power Reactor and Utilization Facility

Non-Power Reactor

- The number of units and a description of each reactor;
- Fuel description, total quantities of uranium, and percentage U-235 enrichment, and the planned average irradiation level of spent fuel; and
- A simplified flow diagram for the reactor-power conversion system.

Medical Isotope Production Facility

- A description of the medical isotope production system, including any relevant flow diagrams.

Other Systems

- A description of any other relevant production system, including any relevant flow diagrams.

Water Consumption and Treatment

- A narrative description and water-use diagram of the various facility water-use systems, their interconnections, and their operational interdependence and coordination including water sources and discharge locations;
- For water sources independent of a municipal or commercial supply, the data and narrative description for maximum water consumption, water consumption during periods of minimum water availability (e.g., low-flow conditions), and average operation by month and by facility operating status; and
- A description of water treatment systems used in the facility;
 - Identification, quantities, and points of addition of chemicals and additives to be used by each system;

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- Operating cycles for each water treatment system for normal modes of facility operation (e.g., full power operation, shutdown/refueling, and startup).

Cooling and Heating Dissipation Systems

- System descriptions;
- Descriptions of anticipated operational modes and the estimated periods of time that the systems would operate in each mode;
 - For each anticipated operational mode, quantities of heat generated, dissipated to the atmosphere, and released in liquid or gaseous discharges; and,
 - For each anticipated operational mode, water source and quantities of water or gases withdrawn, consumed, and discharged for heating or cooling;
- In cases where water intake and discharge systems are proposed:
 - A drawing of the intake and discharge lines and structures showing the relationship of the inlets and outlets to the water surface, bottom geometry, and shoreline;
 - A description of any cooling water pumping facility;
 - A description of any trash racks, traveling screens, trash baskets, and fish return devices;
 - Performance characteristics (e.g., flow rates, intake and discharge velocities, and discharge temperature and temperature differential) for all operational modes;
 - The location and description of components for the addition of chemicals (e.g., corrosion inhibitors, antifouling agents) to the intake system.
- For heat-dissipation systems:
 - The location of heat dissipation system components relative to other site features;
 - The design details of heat dissipation system components affecting system performance; and,
 - Heat dissipation system performance characteristics for all operational modes, including abnormal conditions (e.g., accidents).

Waste Systems

- Descriptions of all (i.e., nonradioactive, radioactive, mixed, and hazardous waste materials) proposed and/or current waste systems, including quantities, composition, and frequency of waste generation [Effluent discharges do not need to be discussed here if they will be covered in other Sections in 12.12.3 (i.e., air effluents in Section 12.12.3.2 (Air Quality) and liquid effluents in Section 12.12.3.4 (Water Quality).];
- Information on proposed or current disposal activities including transportation, size and location of hazardous material disposal sites both on and offsite;
- Identification of all sources of radioactive liquid, solid, and gaseous waste material within the facility and nearby operating facilities;
- Identification of direct radiation sources stored on site or near the site (e.g., independent fuel storage, low-level radioactive waste storage, or storage of radiation equipment);
- A description of any pollution prevention and waste minimization program.

Storage, treatment, and transportation of radioactive and nonradioactive materials, including fuel, waste, medical isotopes, and any other materials

- The capacity of the onsite storage facilities to store target or reactor fuel materials, irradiated fuel, and medical isotope products, as applicable, and the storage time between removal from the reactor and transportation offsite;
- Identification of treatment and packaging procedures for radioactive and nonradioactive wastes and medical isotope products;
- Transportation packaging systems to be used for fresh fuel and targets, spent fuel, and other wastes and medical isotopes;
- The location and the estimated transportation distance from the fuel fabrication facility to the reactor and from the reactor to the facilities to which irradiated targets, fuel, radioactive and nonradioactive wastes, and medical isotopes would most likely be sent; and,
- Estimated transportation destination and distance, number of shipments, and mode of transportation that would be used to transport medical isotopes from the proposed facility to other purification and processing facilities.

12.12.3 Description of the Affected Environment

The affected environment describes baseline (existing) conditions at the site of the proposed action. Baseline conditions are used to measure changes in the affected environment caused by the proposed action, the impacts of which are discussed in Section 12.12.4. The applicant or licensee should provide descriptions of affected resources that are of sufficient detail to permit the evaluation of changes from baseline conditions because of the proposed action.

Depending on the scope of the proposed action and immediate environs, it may not be necessary for the evaluation of potential impacts from the proposed action to require all the information requested below.

12.12.3.1 Land Use and Visual Resources

The applicant or licensee should describe land use conditions on and in the vicinity of site. The applicant or licensee should provide the following information in the ER:

- Land uses, both on and offsite, that could be affected by the proposed action;
- Maps of the site showing current and proposed site boundaries, exclusion areas, site structures, restricted areas, and current and proposed facilities;
- Maps showing major land uses in the region, such as U.S. Geological Survey land use categories within 50 mi (80 km) of the facility;
- Special land use classifications (e.g., American Indian or military reservations, wild and scenic rivers, parks, forests, designated coastal zone areas, wildlife and wilderness areas, and U.S. Department of Agriculture Natural Resources Conservation Service (NRCS)-designated prime and important farmland soils) within 50 mi (80 km) of the facility;
- Federal facilities, including national parks, national forests, national wildlife refuges and wilderness areas, American Indian and/or Bureau of Indian Affairs lands held in trust for American Indians, and Indian tribes' lands and distances within 50 mi (80 km) of the proposed site;

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- Information from the NRCS on the relative value of the land acquired for the new facility if it involves farmland;
- Principal agricultural products within the area, facilities, agricultural practices, game harvests, or food processing operations;
- Mineral resources within the area;
- Description of the regional setting, transportation corridors, residential areas, airports, industrial and commercial facilities, and railroads; and,
- Land-use plans including current, future, and proposed plans.

Visual Resources

- Description of the visual setting (i.e., viewshed) of the area being affected;
- Identification and description of the height, color, shape and visibility of the tallest proposed structures, as well as direction and distances from which these structures would be visible;
- Identification of residents and visitors to the area who might be affected by the aesthetic impact of the proposed new facility, including any associated tourist or scenic areas of interest; and,
- Rating of the aesthetic and scenic quality of the site in accordance with the U.S. Bureau of Land Management (BLM) Visual Resource Management System.

12.12.3.2 Meteorology, Climatology, and Air Quality

The applicant or licensee should characterize atmospheric transport and diffusion processes at and near the site of the proposed action. The applicant or licensee should provide the following information in the ER:

- Description of the general climate of the region (e.g., climatological averages of parameters such as temperature, precipitation, and wind speed/direction);
- Summarized monthly and annual meteorological data (including averages, measured extremes, and diurnal range) as near as possible to the site for the most recent 5-year period;
- Summary of wind flow data on site and in the region;
- Discussion of severe weather phenomena (e.g., tornadoes, hurricanes, thunderstorms, atmospheric stagnation episodes) experienced in the region with expected frequencies of occurrence and measured extremes of parameters such as temperature, precipitation, and wind speed;
- Description of regional air quality, including the locations of mandatory Federal Class I areas and identification of pollutants which are in non-attainment or maintenance areas and the relationship of the site to these areas;
- Discussion and/or map of the region within a 50-mi (80-km) radius of the non-attainment and maintenance areas near the site; and,
- Description of programs or policies to reduce greenhouse gas emissions.

If appropriate meteorological data are not available specifically for the site, applicable data from nearby sources (e.g., airport, Federal or State-maintained ambient air quality station) may be used.

12.12.3.3 Geology, Soils, and Seismology

The applicant or licensee should identify the geological, seismological, and geotechnical characteristics of the site and vicinity. The applicant or licensee should provide the following information in the ER, as applicable:

- Stratigraphy and structures, including descriptions of geologic units, major structural and tectonic features (e.g., faults), and any other significant geological conditions;
- Geotechnical investigations conducted to characterize the site;
- Characteristics of soil, including a physical description of the soil units and descriptions of features related to soils at the site and nearby;
- Identification of soils that are prime, unique, or farmland of statewide or local importance on or in the vicinity of the site;
- Description of erosion potential at the site and current onsite erosion control and run-off best management practices;
- Description of seismic potential at the site and seismic history;
- Identify largest known historical regional earthquake and description of safe-shutdown for the facility;
- Analysis and evaluation of the local and regional seismicity data, volcanism, or any information that may indicate a geologic hazard at the site (e.g., earthquakes or tsunamis), including whether any identified geologic faults are “capable” (potentially active) per 10 CFR 100, Appendix A; and,
- Other geologic hazards such as nearby landslide areas, areas of land subsidence, karst features, and/or soils with a high shrink-swell potential, etc.

12.12.3.4 Water Resources

The applicant or licensee should describe site-specific and regional data on the physical and hydrological characteristics of surface water and groundwater in sufficient detail to provide the basic data for the evaluation of impacts on water bodies and aquifers in the area. The applicant or licensee should provide the following information in the ER:

- A water-use diagram for the reactor and processing facility showing flow rates to and from the various water systems (e.g., circulating water system, sanitary system, radwaste and chemical waste systems, service water systems), points of consumption, and source and discharge locations;
- For freshwater streams potentially affected by the proposed action:
 - Historic monthly flow information, including maximum, average-maximum, average, average-minimum, and minimum flow; and,
 - Historical drought stages and discharges by month, and the 7-day once-in-10-yr low flow;
- For lakes and impoundments potentially affected by the proposed action:
 - Elevation-area-capacity curves;
 - Reservoir operating rules, if applicable; and
 - Annual yield and dependability;
- For estuaries and oceans potentially affected by the proposed action:
 - Shoreline and bottom descriptions, including seasonal variations due to sediment transport; and,
 - Monthly river discharge including maximum, and minimum discharge and, for estuaries, flushing characteristics.

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- Groundwater characteristics for features that could be affected by the construction, modification, operation, and decommissioning of proposed facilities:
 - Historical and seasonal trends in groundwater elevation or piezometric levels;
 - Piezometric contour maps, water table contour maps, and hydraulic gradients (historical, if available, and current);
 - Depth to water table for unconfined aquifer systems;
 - Historical and current data from site wells (e.g., monitoring, background, corrective action, or other uses);
 - Hydrostratigraphy of the site, including cross sections and hydrostratigraphic unit descriptions; and,
 - Qualitative description of groundwater aquifers, including identification of U.S. Environmental Protection Agency (EPA)-designated sole-source aquifers.
- A description of present and reasonably foreseeable future surface water uses (withdrawals, consumption, and returns, including but not limited to, domestic, municipal, agricultural, industrial, mining, recreation, navigation, and hydroelectric power); groundwater withdrawals; and nonconsumptive water uses (e.g., recreational, navigational, instream, etc.) that may affect or be affected by construction, facility modifications, operations, and/or decommissioning of the reactor and processing facility, including any bodies of water or aquifers at distances close enough to affect or be adversely affected by the facilities;
- Descriptions of past, present, and reasonably foreseeable pollutant sources with discharges to water that may interact with the facility, including locations relative to the site and the affected water bodies, and the magnitude and nature of the pollutant discharges, including temporal variations.

12.12.3.5 Ecological Resources

The applicant or licensee should describe the ecological resources potentially affected by construction, modification, operation, and/or decommissioning. Ecological resources include members and attributes of aquatic, terrestrial, riparian, and wetland plant and animal communities. Wetlands and riparian habitats are the interface between aquatic and terrestrial habitats and are defined by EPA in 1993 as follows:

[Wetlands are] those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

[Riparian areas are] vegetated ecosystems along a water body through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent water body. These systems encompass wetlands, uplands, or some combination of these two land forms; they do not in all cases have all of the characteristics necessary for them to be classified as wetlands.

The applicant or licensee should provide the following information in the ER:

Region

The ER should describe the ecoregion (large areas of similar climate where ecosystems recur in predictable patterns), ecosystems, and habitats surrounding the site; the geomorphic or physiographic province; characteristic vegetation and animal species, including climax vegetation and typical succession in the area of the site; the ecological province of the ocean if the facility is located near an ocean or estuary; and the watersheds potentially affected by the proposed action.

Site and Vicinity

The ER should describe the local environment of the site; vegetation and animal communities; quantification and a description of physiographic habitats (such as upland forest, swamp marshes, wetlands, rivers, streams, etc.) on site and quantification of the extent of habitats to be directly affected by proposed construction, modifications, operation, and decommissioning, and the like. The ER should also include topographic maps and descriptions, as appropriate.

History

The ER should provide a short historical description of the ecological environment. This description should include major changes or modifications to the land and/or water bodies (e.g., channelization, navigation, pollution, habitat degradation or fragmentation, urbanization, development, and pond or reservoir creation). The ER should briefly describe major wildlife species and populations currently and historically living in the vicinity of the facility.

Places and Entities of Special Interest

The ER should provide the occurrence, location, and description of communities and habitats of special interest in the vicinity of the facility, such as wetlands, natural heritage areas and other areas of public or scientific interest, other areas that may be particularly sensitive or susceptible either directly or indirectly to the effects of the proposed construction, modification, operations, or decommissioning, important ecological systems that are especially vulnerable to change or that contain important species habitats, such as areas used for breeding, (nesting and nursery areas), feeding, resting, overwintering, or other areas containing seasonally high concentrations of individuals of important species.

Aquatic Communities and Potentially Affected Water Bodies

The ER should briefly describe the aquatic communities based on available information (e.g., present and past studies, Federal and State sources). This description should focus on a subset of representative and important species, such as those with the following characteristics: potential or reported susceptibility to construction or operational impacts; dominance, commonness, or rarity in numbers or biomass; importance to the structure and function of the ecosystem, such as keystone species (a species with a disproportionate effect on the ecosystem relative to the species abundance or biomass), important trophic links (predator-prey or herbivore relationships), potential for trophic cascade, or habitat formers (a species that constitutes the basis of a habitat type) or modifiers; indicators of water quality or "ecosystem health;" important recreational or commercial fishing and shell fishing; fish consumption advisories; and ecosystem services. The ER should describe the relative significance of various aquatic habitats in a regional context.

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The ER should describe the location of the site with respect to the principal nearby water bodies that it affects. The ER should also describe water bodies potentially affected by the proposed action. This section should describe any water body uses (e.g., withdrawal or discharges for cooling water).

Terrestrial Communities

The ER should describe the terrestrial communities briefly using available information (e.g., present and past studies, Federal and State sources) and include representative species of plants, mammals, birds, reptiles, amphibians, and insects. This description should note any endemic species, sensitive or indicator species, keystone species, or important recreationally hunted species. The ER should also describe bird species that nest within the area, migratory species, known migratory bird rookeries, and, if applicable, the location of the site in relation to any nearby flyways. Additionally, the ER should describe the types of vegetative communities found on and in the vicinity of the site, especially any delineated wetlands or potential wetland habitat. The ER should include any applicable correspondence with the U.S. Army Corps of Engineers or other Federal or State agencies regarding any applicable Clean Water Act 404 or other wetland-related permits. This section should summarize any available botanical surveys conducted on or in the vicinity of the site. The ER should describe the relative significance of various terrestrial habitats in a regional context.

Invasive Species

The ER should provide occurrences of aquatic and terrestrial invasive species in the vicinity of the facility and document any management activities undertaken by the facility to control such species.

Procedures and Protocols

The ER should describe management plans for aquatic and terrestrial ecosystems and best management practices (if applicable), including pesticides and herbicides used and ground-disturbing activities performed routinely to maintain the site.

Studies and Monitoring

The ER should briefly summarize any aquatic or terrestrial studies or monitoring programs on or in the vicinity of the site and include the location, dates, objective, methods, and results applicable to the application. The ER should also identify any data or data summaries that might be available for NRC review.

Cumulative Impacts

The ER should describe other current and reasonable foreseeable actions (Federal or non-Federal) that would have overlapping aquatic and terrestrial ecological impacts with the proposed action.

Threatened, Endangered, and Protected Species and Essential Fish Habitat

This section of the ER should include information on Federally or State-listed threatened and endangered species and essential fish habitat (EFH), as well as any species that are protected under other legislations, including the Marine Mammal Protection Act (MMPA), the Migratory Bird Treaty Act (MBTA), and the Bald and Golden Eagle Protection Act (BGEPA), as outlined below:

- The Endangered Species Act of 1973, as amended (16 USC 1531 et seq.) was enacted to protect threatened and endangered species and the ecosystems on which they

depend. In accordance with Section 7 of the Endangered Species Act, Federal agencies must review actions they undertake or support (such as issuing permits and licenses) to determine whether they may jeopardize the continued existence of any listed endangered or threatened species or their habitats.

If such review reveals the potential to adversely affect listed or candidate species, the Federal agency must consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service (NMFS) (collectively, the Services), as appropriate. The Services implement the interagency cooperation provisions of Section 7 at 50 CFR Part 402, "Interagency Cooperation— Endangered Species Act of 1973, As Amended."

The applicant should determine if Federally listed threatened, endangered, or candidate species, critical habitat, and/or State-listed species and habitat have the potential to occur on the site or in the vicinity of the site. For such species, the ER should provide sufficient information on historical occurrences, population size and trends, critical habitat, and potential habitat to aid the NRC in its biological assessment. The ER should discuss any activities, including construction, modification, operations, maintenance, transportation, or decommissioning activities, that may affect such species and habitats.

- Several Federal laws, including the Magnuson-Stevens Fishery Conservation and Management Act, MMPA, the MBTA, and the BGEPA, also mandate the protection of certain habitats and species. The applicant or licensee should discuss protected species that have the potential to occur on or in the vicinity of the site in the ER. The applicant or licensee should include documentation of related correspondence with the appropriate Federal and State agencies (e.g., as required by the Fish and Wildlife Coordination Act) and affected American Indian tribes in the ER.

12.12.3.6 Historic and Cultural Resources

The applicant or licensee should identify and describe all historic properties, including archaeological and cultural resources, located on or near the site of the proposed action. *Historic properties* means any prehistoric or historic districts, sites, buildings, structures, or objects included in, or eligible for inclusion on, the *National Register of Historic Places* (NRHP) (36 CFR 60) (e.g., more than 50 years old). Archaeological resources include artifacts, records, and remains that are related to and located in prehistoric or historic districts, sites, buildings, or structures. Properties of traditional, religious, and cultural importance to an American Indian tribe that meet the National Register criteria are also included.

Descriptions of historic properties and archaeological and cultural resources should be of sufficient detail to permit the assessment and evaluation of impacts from the proposed action. The applicant or licensee should provide the following information in the ER:

- Description of known archaeological and cultural resources conducted in the vicinity of the proposed action and provide an overview of the area's cultural history, including summaries of historical and cultural resource surveys conducted in the area and the types of resources discovered;

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- Summarized results of archaeological or historical surveys conducted at the proposed site, including the following:
 - Map and description of the physical extent of the survey, and/or the area of potential effect (APE). If the entire site was not surveyed, the basis for the limited survey is needed;
 - Brief description of the survey techniques used to conduct the survey;
 - Qualifications of the surveyors; and,
 - Survey findings in sufficient detail to permit an assessment of the potential impact of the proposed action on archaeological and historic resources;
- Description of any reconnaissance or pedestrian surveys of the proposed site, and consultation efforts with the State Historic Preservation Office (SHPO), American Indian Tribe(s), and/or members of the public used to assess the presence of historic and cultural resources within the APE;
- List of cultural and historic properties located within the proposed site or within the APE (These properties are included in State or local registers or inventories of historic and archaeological resources. Guidance can be found on the U.S. National Park Service website at <http://www.cr.nps.gov/nr/publications>);
- A statement of the significance or importance of each cultural resource potentially affected; and,
- Comments from SHPO, Tribal Historic Preservation Office (THPO), or any organizations and individuals contacted by the applicant/licensee who provided significant information concerning the location of cultural and historic properties.

12.12.3.7 Socioeconomics

The applicant or licensee should briefly describe socioeconomic conditions in the region (affected counties) around the proposed site including population, demographics (e.g., race and ethnicity), the economy (e.g., median and per capita income, civilian labor force, unemployment, and individuals and families living in poverty), housing availability, public services (e.g., public water supplies and public school enrollments), offsite land use, local transportation, and noise. Socioeconomic information should be of sufficient detail to permit the assessment and evaluation of impacts from the proposed action. The applicant or licensee should provide the following information in the ER:

General Socioeconomics

- U.S. Bureau of Census information and data on the affected counties, including:
 - Population and demographic information by race and ethnicity and historic and projected population growth rates by county;
 - Median household and per capita income;
 - Civilian labor force by county;
 - Unemployment;
 - Percent of individuals and families living below the Census poverty threshold;
 - Housing: total number of units, number of occupied units, number of vacant units, vacancy rate, and median value;
 - Transient (seasonal) population including students attending colleges and universities within 50 mi (80 km) of the facility;
- Public water supply system information: by source (groundwater or surface water, average daily production, system design capacity, and population served);

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- Information about local public schools: school district(s) and total enrollment;
- Map identifying places of significant population grouping, such as cities and towns;
- Information on local road networks used to access the proposed site and major regional transportation systems used for the transport of construction materials, production materials, and waste;
 - General condition of site access roads, average annual daily traffic volume and road capacity, if available;
- Tax payment information including information about local tax authorities (i.e., county, municipality, and public school district) that would be directly affected by the proposed action; and,
- A brief description of public recreational facilities, (e.g., distance from proposed facility, purpose of the recreational facility, etc.).

Noise

- Briefly discuss any current or past noise studies and analyses conducted in the vicinity of the proposed site;
- A list of the loudest noise generating facilities and activities in the vicinity of the proposed site; and,
- Distribution of sensitive noise receptors that could be affected by the proposed action.

12.12.3.8 Human Health

The applicant or licensee should describe existing public and occupational health issues. The applicant or licensee should provide the following information in the ER, as applicable:

- Maps, in an appropriate scale, showing the distances from the proposed action to the following points or areas for radial sectors centered on the cardinal compass directions:
 - Nearest site boundary;
 - Nearest full-time resident;
 - Nearest drinking water intake (see Section 12.12.3.4 Water Resources); and
 - Nearest sensitive receptors (e.g., schools and hospitals).
- Major sources and levels of background radiation exposure, including natural and man-made sources, express levels in mSv/yr (mrem/yr);
- A description of the radioactive and nonradioactive hazardous liquid, gaseous, and solid waste management and effluent control systems;
- Information on radioactive and nonradioactive effluents released into the environment;
- Radioactive and nonradioactive hazardous material stored on site or within the vicinity;
- Current onsite or nearby sources and levels of exposure to members of the public and workers from radioactive materials;
- Major onsite or nearby sources and levels of exposure to members of the public and workers from chemicals;
- Historical exposures to radioactive materials to both workers and members of the public;
- For facilities located near operating facilities:
 - A description of the radiological environmental monitoring program and environmental data (from the operating facility's annual Radiological Environmental Monitoring Reports);
 - Historical maximum individual doses to members of the public (from the operating facility's annual Radioactive Effluent Release Reports).

- Relevant occupational injury rates and occupational fatality rates; and,
- Summary of relevant health effects studies applicable to the proposed action.

12.12.4 Impacts of Proposed Construction, Facility Modifications, Operations, and Decommissioning

The applicant or licensee should describe the potential impacts of the proposed action for each resource area described in Section 12.12.3, *Affected Environment*. These impacts include the direct and indirect impacts of the proposed action and alternatives as well as the cumulative impacts of other past, present, and reasonably foreseeable future actions. When analyzing impacts, the applicant or licensee should consider resources separately, and if necessary, in combination with other resources or conditions (e.g., noise impacts on wildlife, or transportation impacts on land use).

The applicant or licensee should evaluate construction, modification, operation, and decommissioning activities under the proposed action in sufficient detail to determine the significance of potential impacts. In addition, the ER should summarize any mitigation measures that the applicant could take to reduce adverse impacts, and describe the anticipated cost-effectiveness of such mitigation measures in reducing adverse impacts.

In general, data needs that are described in Section 12.12.3, *Affected Environment*, are not repeated below. Data provided in Section 12.12.3 should be included in Section 12.12.4 to the extent necessary to describe impacts from the proposed action. It may not be necessary for the evaluation of potential impacts from the proposed action and alternatives to require all the information requested below.

12.12.4.1 Land Use and Visual Resources

This section describes land use and visual resources/aesthetic impacts caused by the proposed action. The applicant or licensee should provide the following information in the ER:

Land Use

- Description of on- and offsite land-use changes, including the number of acres and location of each land use type that would be disturbed and/or occupied on a short and long-term basis during construction, modification, operation, and decommissioning;
- Impacts to any special land-use categories, Federal facilities, or prime or other important farmland;
- Potential mitigation measures; and,
- Cumulative impacts with other past, present, or reasonably foreseeable Federal or non-Federal projects in the area.

Visual Resources/Aesthetics

- Photos of the site with the proposed action superimposed;
- Discussion of any significant visual impacts from the proposed action, including;
 - Physical facilities that are out of character with overall existing architectural features;
 - Structures that may partially or completely obstruct views of existing landscape;

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- Structures that create visual intrusions in the existing landscape character (e.g., radar towers, cooling towers, effluent stacks, etc.);
- Structures that may require the removal of natural or built barriers, screens or buffers, thus enabling lower quality views to be seen;
- Altering historical, archaeological or cultural properties, other areas of a special land-use category, or the character of the property's setting when that character contributes to the property's significance; and
- Structures that create visual, audible, or atmospheric elements that are out of character with the site or alter its setting;
- A determination if the visual impact is compatible or in compliance with regulations, ordinances, and requirements;
- Potential mitigation measures; and,
- Description of cumulative impacts to visual/scenic quality from other past, present, and reasonably foreseeable Federal and non-Federal projects.

12.12.4.2 Meteorology, Climatology, and Air Quality

This section presents key factors and guidance for evaluating meteorological conditions and air quality impacts. The applicant or licensee should provide the following information in the ER:

- Description of gaseous effluents (i.e., type, quantity, and origin), permits needed, and the status of those permits;
- Table comparing effluent (or emission) concentrations to regional air quality parameters (effluent or emission concentrations for both short- and long-term impacts);
- Release point characteristics (i.e., elevation above grade, inside vent or stack diameter, physical shape, flow rate, effluent temperature, exit velocity, release frequency, or other appropriate information to allow calculation of transport and diffusion);
- Description of gaseous effluent control systems;
- Detailed descriptions of the models and assumptions used to determine normalized concentration and/or relative deposition;
- Normalized concentration and/or relative deposition at points of potential maximum concentration outside the site boundary, at points of maximum individual exposure, and at points within a reasonable area that could be impacted;
- Description of visibility impacts (e.g., plume);
- Description of mitigative measures for air quality impacts;
- Description of design considerations for severe weather events;
- Greenhouse gas emissions, including both direct emission from construction, operation, and decommissioning of the proposed facilities and indirect emissions from activities such as commuting, etc.;
- Description of cumulative air quality impacts from other past, present, and reasonably foreseeable Federal and non-Federal projects.

12.12.4.3 Geology, Soils, and Seismology

This section presents key factors and guidance for evaluating site geologic and soils conditions and geologic resource impacts. The applicant or licensee should consider those geologic and soil resources and conditions that could be affected by construction, modification, operation, and decommissioning activities, as well as those geologic conditions and hazards that could

affect the proposed action and alternatives. Conditions that could affect the proposed action and specific facilities include large-scale geologic hazards (e.g., earthquakes, volcanic activity, landslides, land subsidence, and erosional processes) and local hazards associated with the site-specific attributes of the soil and bedrock beneath facility sites. The major analysis for seismic and other geologic hazards can usually be found in the Preliminary Safety Analysis Report (PSAR) or similar documentation and only needs to be summarized in this section of the ER. The applicant or licensee should provide a summary of management practices, design considerations, or policies that would minimize these impacts.

The applicant or licensee should provide the following information in the ER:

- Depth of excavation for below-grade portions of facilities and for such activities as trenching for utilities and piping, roadway construction, etc.;
- Depth of bedrock and whether blasting may be required;
- Estimate of the volume of geologic resources required for project activities (e.g., borrow for backfill, sand and gravel aggregate for construction, etc.);
- Impacts to any rare or unique geologic resources or to rock, mineral, or energy rights and assets (also see Section 12.12.4.1, Land Use);
- Potential mitigation measures; and,
- Cumulative impacts with other past, present, or reasonably foreseeable Federal or non-Federal projects in the area.

12.12.4.4 Water Resources

This section presents key factors and guidance for evaluating impacts on water use and water quality for each alternative to include impacts for both radiological and nonradiological effluents.

The applicant or licensee should consider surface water and groundwater uses that could affect or be affected by the construction, modification, operation, and/or decommissioning of the proposed facility. Other water uses may include, but are not limited to, domestic, municipal, agricultural, industrial, mining, recreation, navigation, and hydroelectric power. The applicant or licensee should also consider impacts on the physical, chemical, and biological water-quality characteristics of surface water and groundwater. Because water quality and water supply are interdependent, the applicant or licensee should consider changes in water quality simultaneously with changes in water supply. The applicant or licensee should provide the following information in the ER:

General Water Resources

- Identification of potentially impacted ground and surface waters, including those receiving effluents and the expected average and maximum flow rates, physical characteristics (e.g., temperature, sediment load, velocities), and composition of radiological and nonradiological pollutants in these effluents;
- Impacts on surface water and groundwater quality including comparison of predicted effluent and receiving-water quality with applicable effluent limitations and water quality standards for both radiological and nonradiological constituents (include conclusions regarding project compliance with these standards, the physical impacts of consumptive water uses [e.g., groundwater depletion] on other water users, and adverse impacts on

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surface-oriented water users [e.g., fishing, navigation, etc.] resulting from facility activities);

- Identification of hydrological system impacts, onsite and offsite (e.g., water quantity and availability, water flow, and movement patterns), and erosion, deposition, and sediment transport, water drainage characteristics, the flood handling capability of the floodplains, flow and circulation patterns, subsidence resulting from groundwater withdrawal, and erosion and sediment transport;
- Withdrawals and returns of surface and groundwater during construction, modification, operation, and decommissioning;
- Descriptions of any proposed best management practices and measures to control impacts to water quality and/or quantity (e.g., protection of natural drainage channels and water bodies, protection of shorelines and beaches, restrictions on access to and use of surface water, protection against saltwater intrusion, and handling of fuels, lubricants, oily wastes, chemical wastes, sanitary wastes, herbicides, and pesticides); and,
- Identification of cumulative effects on water resources from other past, present, and reasonably foreseeable Federal and non-Federal projects.

Monitoring

- For water quality monitoring, a description of the applicable monitoring plans, including the following:
 - Chemical and physical parameters to be measured;
 - Number and location of sample collection points, measuring devices used, and pathway sampled or measured;
 - Sample size, sample collection frequency, and sampling duration;
 - Method and frequency of analysis including lower limits of detection;
 - Quality assurance procedures.

12.12.4.5 Ecological Resources

This section presents key factors and guidance for evaluating terrestrial and aquatic ecological impacts from the proposed action. The applicant or licensee should provide the following information in the ER:

General Ecological Resources

- Site map showing proposed buildings, land to be cleared, areas to be cleared along stream banks, areas proposed for dredge material, areas to be dredged, and waste disposal areas;
- Total area of temporary and permanent impacts for each habitat type, and an estimate of the amount of these habitats that would be impacted relative to the total amount present in the region;
- Area to be used on a short-term basis during construction or facility modification, and plans for restoration of this land;
- Maintenance practices such as use of chemical herbicides, roadway maintenance, and mechanical clearing that are anticipated to effect biota;
- Estimate of the potential impacts of elevated construction equipment or structures on species (e.g., birds collisions, nesting);
- Tolerances and/or susceptibilities of important biota to physical and chemical pollutants;

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- Clearing methods, erosion, run-off and siltation control methods (both temporary and permanent), dust suppression methods, and other construction practices to control or minimize adverse impacts to ecological resources;
- Special maintenance practices used in important habitats (e.g., marshes, natural areas, bogs) including those that result in unique beneficial effects on specific biota;
- Wildlife management practices;
- Practices and procedures or alternative designs to minimize adverse impacts; and,
- Identification of cumulative effects on ecological resources from other past, present, and reasonably foreseeable Federal and non-Federal projects.

Special Status Species

Special status species include State and Federally threatened, endangered, proposed, or candidate species, or a species of special concern, as defined by the Federal or State agency. Fish and shellfish with Essential Fish Habitat (EFH) near the facility are also considered special status species.

In addition to the information described above that would be relevant to Special Status Species, the applicant or licensee should provide:

- Documentation of consultations with the FWS and National Oceanic and Atmospheric Administration (NOAA) on the impact of the proposed action on endangered and threatened species and critical habitat;
- Documentation of consultations with State and local agencies and tribes regarding the impact of the proposed action on important species;
- Any proposed activities expected to impact communities or habitats that have been defined as rare or unique or that support threatened and endangered species;

Monitoring

- For ecological monitoring, provide a description of the applicable monitoring plans, including the following:
 - Maps showing major ecological communities, important habitats, and sampling stations and monitoring locations;
 - List of monitoring program elements or parameters including action or reporting levels for each element;
 - Sampling design, such as the type, frequency, and duration of observations or samples to be taken at each location;
 - Sampling equipment to be used;
 - Method of chemical analyses, as applicable;
 - Data analysis, statistics or other biological indices that would be calculated as part of the proposed sampling program, and reporting procedures;
 - A summary of the quality assurance procedures;
 - Documentation of applicant consultations with the FWS, appropriate State agencies (e.g., fish and wildlife agency), and American Indian tribal agencies; and,
 - Documentation of the environmental monitoring programs in policy directives designating a person or organizational unit responsible for reviewing the program on an ongoing basis.

12.12.4.6 Historic and Cultural Resources

This section presents key factors and guidance for evaluating impacts on historic properties and cultural resources. Adverse effects occur when a proposed action's effect on a cultural resource diminishes the integrity of its location, design, setting, materials, workmanship, feeling or association. Adverse effects include, but are not limited to: (i) physical destruction, damage, or alteration of all or part of the historic property; (ii) isolation of the property from or alteration of the character of the historic property's setting when that character contributes to the historic property's qualification for listing on the *National Register of Historic Places*; (iii) introduction of visual, audible or atmospheric elements that are out of character with the historic property or alter its setting; (iv) neglect of an historic property resulting in its deterioration or destruction; and (v) transfer, lease or sale of the historic property.

The applicant or licensee should provide the following information in the ER:

- Map showing historic and archeological sites that could be impacted by the proposed action;
- Discussion of impacts to historic and cultural resources during construction, modification, operation, or decommissioning, including impacts resulting from land use and visual changes or denial of access;
- Documentation of consultations with the SHPO and/or THPO, as appropriate, concerning the impact of the proposed action on historic properties and other cultural resources and any conclusions resulting from the consultations;
- Discussion of any State laws and plans for historic preservation, if available;
- Discussion of the potential for and the process to be followed upon the discovery of human remains at the proposed site;
- Practices and procedures or alternative designs that could be used to minimize adverse impacts. Mitigation measures could include: (i) limiting the scale of the project; (ii) modifying the project through redesign, reorientation or construction on the proposed action; (iii) repair, rehabilitation, or restoration of an affected historic property as opposed to demolition; (iv) preservation and maintenance operations involving historic properties; (v) documentation [e.g., drawings, photos, histories] of building or structures that would be destroyed or substantially altered; (vi) relocation of historic properties; and (vii) salvage of archaeological or architectural information and materials; and,
- Description of cumulative impacts on historic and cultural resources from other past, present, and reasonably foreseeable Federal and non-Federal projects.

12.12.4.7 Socioeconomics

This section describes impacts to regional socioeconomic conditions, such as changes in the population, the economy, housing availability, public services, offsite land use, and noise from the proposed action. The applicant or licensee should provide the following information in the ER:

Socioeconomics

- Estimated number of construction, operations, and decommissioning workers;
- Impacts to housing, public services (i.e., water supply), public education, and local transportation;

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- Tax impacts;
- Discussion of methodology used to determine impacts; and,
- Description of cumulative impacts to socioeconomic factors from other past, present, and reasonably foreseeable Federal and non-Federal projects.

Transportation

- Description of construction or modification of any access roads, railroads, or other transportation infrastructure that would be utilized to support construction, operations, and decommissioning (see Section 12.12.4.1, Land Use);
- Transportation route and mode for conveying materials for construction and operations, equipment, and workers to the proposed site;
- Traffic pattern impacts (e.g., impacts from any increase in traffic during construction or operations);
- Impacts from transportation associated with construction such as fugitive dust, scenic quality, and noise;
- Mitigation measures and consultations with Federal, State, and local agencies; and,
- Description of transportation related cumulative impacts from other past, present, and reasonably foreseeable Federal and non-Federal projects.

Noise

- Predicted noise levels using the dBA scale;
- Major sources of noise, including all models, assumptions and input data;
- Comparison to appropriate standards or guidelines;
- Potential impacts to sensitive receptors (i.e., hospitals, schools, residences, wildlife);
- Mitigation measures to reduce impacts of noise; and,
- Description of noise-related cumulative impacts from other past, present, and reasonably-foreseeable Federal and non-Federal projects.

12.12.4.8 Human Health

This section describes public and occupational health impacts from both nonradiological and radiological sources.

Nonradiological Impacts

The applicant or licensee should provide the following information in the ER. It may not be necessary for the evaluation of potential impacts from the proposed action to require all the information requested below:

- A description of nonradioactive chemical sources (location, type, strength);
- A description of the nonradioactive liquid, gaseous, and solid waste management and effluent control systems;
- Information on nonradioactive effluents released into the onsite and offsite environment;
- Calculated chemical exposure to the public or calculated average annual concentration of nonradioactive releases to air and water; including all models, assumptions, and input data in order to determine compliance (e.g., 40 CFR 50, 59, 60, 61, 122, 129, 131, etc.);
- An assessment of the physical occupational hazards;

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- The calculated exposure to the workforce including all models, assumptions, and input data in order to determine compliance with 29 CFR 1910;
- A description of the environmental monitoring program;
- Discussion of mitigation measures; and,
- Description of nonradiological cumulative health impacts to the public and workers from other past, present, and reasonably foreseeable projects in the local area.
- For facilities located near operating industrial facilities:
 - A description of the nonradiological environmental monitoring program and environmental data (from the applicant's Environmental Monitoring Reports or other source document).

Radiological Impacts

This section describes the public and occupational health impacts from radioactive material. The applicant or licensee should provide the following information in the ER. It may not be necessary for the evaluation of potential impacts from the proposed action to require all the information requested below:

- Physical layout of the site, including the location of radioactive materials that are expected to be present;
- Characteristics of radiation sources and expected radioactive effluents (i.e., radioactive liquid, gaseous, and solid wastes);
- Baseline radiation of the site. Measured radiation dose rates, airborne radioactivity concentrations, and waterborne radioactivity concentrations at specific current locations where environmental radiological monitoring data exist;
- Compliance with 10 CRF 20.1301 by applying one of the following methods:
 - Calculated radiation dose rates, annual averaged airborne radioactivity concentrations, and annual averaged waterborne radioactivity concentrations at the site boundary, including a description of the methodology and assumptions; or
 - Calculated annual total effective dose equivalent to a maximally exposed member of the public in the unrestricted area, including a description of the methodology and assumptions;
- Calculated annual dose to the maximally exposed worker, including a description of the methodology and assumption;
- Description of any mitigation measures to minimize public and occupational exposures to radioactive material; and,
- Description of the cumulative impacts to public and occupational radiological exposure from other past, present, and reasonably foreseeable sources (i.e., hospitals and other licensed users of radioactive material) in the vicinity of the proposed facility.

Radiological Monitoring

This section describes the monitoring programs used to monitor radioactive effluents released from the proposed facility and to obtain data on measurable levels of radiation and radioactive materials in the environment.

The applicant or licensee should provide the following information in the ER. It may not be necessary for the evaluation of potential impacts from the proposed action to require all the information requested below:

Radiological Effluent Monitoring

- For radiological effluent monitoring, a general description of the in-facility monitoring plan, including the following:
 - Number and location of sample points, type of measuring devices, and pathways sampled or measured.

Radiological Environmental Monitoring

- For radiological environmental monitoring, a general description of the onsite and offsite monitoring plan, including the following:
 - Number and location of sample collection points, type of measuring devices, and pathways sampled or measured.

Note: For additional guidance regarding acceptable radiological environmental monitoring programs, refer to the Branch Technical Position on “An Acceptable Radiological Environmental Monitoring Program” (ADAMS Accession No. ML010710060) and NUREG-1301 “Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors.”

12.12.4.9 Waste Management

This section describes the types of radiological and nonradiological waste expected to be generated and the management program used to safely handle, process, store, and dispose of the waste.

The applicant or licensee should present the following information in the ER. It may not be necessary for the evaluation of potential impacts from the proposed action to require all the information requested below:

- Description of the sources, types, and approximate quantities of solid, hazardous, radioactive, and mixed wastes expected from the proposed action;
- Description of proposed waste management systems designed to collect, store, and process the waste;
- Anticipated disposal or waste management plans (i.e., transfer to an offsite waste disposal facility, treatment facility, or storage on site); and,
- Description of a waste-minimization plan to minimize the generation of waste.

12.12.4.10 Transportation

This section describes the transportation of nuclear and non-nuclear materials, including radioactive waste and nonradioactive waste, and medical isotopes and the associated potential impacts.

The applicant or licensee should provide the following information in the ER. It may not be necessary for the evaluation of potential impacts from the proposed action to require all the information requested below:

- Transportation mode (i.e., truck, plane, rail, or barge) and projected destinations;
- Estimated transportation distance from the originating site to the projected destinations;
- Treatment and packaging for radioactive and nonradioactive wastes; and,

- Calculated radiological dose to members of the public and workers from incident-free transportation scenarios.

12.12.4.11 Postulated Accidents

This section describes the radiological and nonradiological impacts from design basis accidents (DBAs). The type of data and information needed in the ER will depend on site, facility-specific factors, and the anticipated magnitude of the potential impacts.

The applicant or licensee should provide the following information in the ER. It may not be necessary for the evaluation of potential impacts from the proposed action to require all the information requested below:

- A list of credible DBA accidents having a potential for releases into the environment; and,
- An analysis of the radiological and nonradiological consequences from the postulated DBAs.

12.12.4.12 Environmental Justice

On February 11, 1994, the President signed Executive Order 12898 “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” which directs all Federal agencies to develop strategies for considering environmental justice in their programs, policies, and activities. Environmental justice is described in the Executive Order as “identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations.” On December 10, 1997, the Council on Environmental Quality (CEQ) issued, *Environmental Justice Guidance Under the National Environmental Policy Act*. The Council developed this guidance to, “further assist Federal agencies with their National Environmental Policy Act (NEPA) procedures.”

On August 24, 2004, the Commission issued a *Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions* (69 FR 52040), which states, “the Commission is committed to the general goals set forth in E.O. 12898, and strives to meet those goals as part of its NEPA review process.” The following guidance is consistent with this policy statement.

The scope of this section should include an analysis of impacts on minority and low-income populations and the location and significance of any environmental impacts from the proposed action including proposed facility construction, modification, operations, and decommissioning. The applicant or licensee should provide sufficient detail to permit the assessment and evaluation of human health and environmental effects, in particular whether these effects are likely to be disproportionately high and adverse to minority and low-income populations.

The applicant or licensee should provide the following information in the ER:

- Map showing the location of minority and low-income populations and/or communities, including American Indian and Hispanic populations (as appropriate), as well as any American Indian reservations and other special communities in the vicinity of the proposed site;

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- A discussion of the methods used to identify the location of these populations and/or communities;
- An assessment (qualitative or quantitative, as appropriate) of the degree to which minority or low-income population could be disproportionately affected during construction, operations, or decommissioning as compared to the effect on the general population;
- An assessment (qualitative or quantitative, as appropriate) of whether the human health and environmental effects on minority and low-income populations are significantly high and adverse. Significance is determined by considering the disproportionate exposure to environmental hazards from the proposed project as well as multiple-hazard and cumulative hazard conditions;
- A discussion of any mitigation measures; and,
- Description of related cumulative impacts from other past, present, and reasonably foreseeable Federal and non-Federal projects that could also result in disproportionately high impacts to low-income and minority populations.

12.12.5 Alternatives

The applicant or licensee should describe the environmental impacts of reasonable alternatives to the proposed action, including the no-action alternative. These impacts include the direct and indirect impacts of each alternative for each resource area discussed in Section 12.12.4. In addition, the applicant or licensee should identify alternatives eliminated from detailed study and how the applicant identified and selected alternatives to the proposed action.

The applicant or licensee should evaluate the impacts of construction, modification, operation, and decommissioning activities under the proposed action in sufficient detail to determine the significance of potential impacts. In addition, the ER should contain a summary of any mitigation measures that the applicant could take to reduce adverse impacts, and describe the anticipated cost-effectiveness of such mitigation measures in reducing adverse impacts.

12.12.5.1 No-Action Alternative

10 CFR 51, Subpart A, Appendix A, explicitly requires analysis of the no-action alternative. For applications to construct and operate a new non-power reactor, the no-action alternative usually considers the environmental impacts if the Construction Permit and/or Operating License are denied. In such case, the environmental impacts would generally be the same as the status quo.

The depth and extent of the discussion in the ER should include a description of the alternative and the expected results from taking no-action, including the potential and reasonably foreseeable programmatic consequences of taking no-action relative to the proposed action.

12.12.5.2 Reasonable Alternatives

The applicant or licensee should summarize the history and process used to formulate the reasonable alternatives. Reasonable alternatives may include, but are not limited to, alternative sites, alternative siting within a proposed site, modification of existing facilities versus construction of an entirely new facility, alternative technology(s), and/or alternative

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transportation methods. If new construction is proposed, the applicant or licensee should analyze at least one alternative location. The applicant or licensee should analyze additional sites depending on the context, degree, and intensity of potential impacts.

The applicant or licensee should provide the following information to summarize the process used to formulate the reasonable alternatives:

- Description of the process used to determine reasonable alternatives to the proposed action;
- Description of all alternatives considered;
- Indication of which alternatives were eliminated from further study and which alternatives are described in further detail; and,
- Brief description of any alternatives considered that would reduce or avoid adverse effects.

The applicant or licensee should provide the following information for each reasonable alternative, as applicable:

- A description of the alternative;
- The major direct, indirect, and cumulative impacts, similar to the impacts assessed in 12.12.3 and 12.12.4;
- Measures used to mitigate impacts;
- Restoration and management actions, if applicable; and,
- Proposed monitoring.

12.12.5.3 Cost Benefit of the Alternatives

This section should discuss the costs and benefits of each alternative and the proposed action, including a qualitative discussion of environmental impacts. The applicant or licensee should also provide assumptions and uncertainties in the analyses. The applicant or licensee should provide the following information (major costs and benefits) in the ER:

- Qualitative discussion of environmental degradation (e.g., impacts to air and water quality, biotic resources, and aesthetics, as well as socioeconomic impacts such as noise, traffic congestion, increased demand for public services, and land use changes) and effects on public health and safety;
- Other costs as appropriate (e.g., lost tax revenue, decreased recreational value, transportation);
- Qualitative discussion of the environmental benefits (comparable to the discussion of environmental degradation);
- The average annual production of commercial products;
- Expected increase (if any) of tax payments to State and local tax jurisdictions during (1) the construction period and (2) operations;
- Creation and improvement of transportation infrastructure and other facilities; and,
- Other benefits.

12.12.5.4 Comparison of the Potential Environmental Impacts

The applicant or licensee should present the impacts of the proposed action and alternatives in a summary chart or table.

12.12.6 Conclusions

The applicant or licensee should provide the following information in the ER:

- Unavoidable adverse environmental impacts of the proposed action;
- The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity; and,
- Irreversible and irretrievable commitments of resources used to support the proposed action.

12.12.7 List of Preparers

The applicant or licensee should list the name, educational background, and summary of work experience for all personnel who had a role in preparing the ER.

12.12.8 References

The applicant or licensee should provide full citations for all references cited throughout the ER.

List of Acronyms

APE	area of potential effect
BGEPA	Bald and Golden Eagle Protection Act
BLM	U.S. Bureau of Land Management
CFR	<i>Code of Federal Regulations</i>
EA	Environmental Assessment
EFH	essential fish habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ER	environmental report
FONSI	finding of no significant impact
FWS	U.S. Fish and Wildlife Service
km	kilometer
MBTA	Migratory Bird Treaty Act
mi	mile
MMPA	Marine Mammal Protection Act
NEPA	National Environmental Protection Act of 1969
NMFS	National Marine Fisheries Services
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRC	U.S. Nuclear Regulatory Commission
PM	project manager
SHPO	State Historic Preservation Office
THPO	Tribal Historic Preservation Office