

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

12.12 THE ENVIRONMENTAL REPORT

The National Environmental Policy 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 under NEPA. 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. Construction permits and operating licenses for radioisotope production facilities are not specifically included in 10 CFR 51.20. 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 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 human environment, then an EIS should be prepared. 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 human environment or the proposed action involves a matter that the Commission, in the exercise of their discretion, has determined should be covered by an EIS.

This portion of the ISG describes the data that should be included in the environmental report(s) (ER) that are submitted as part of an application to construct, operate, or decommission a radioisotope production facility. The applicant should submit ER(s) to assist the NRC in conducting an expeditious environmental review. The regulatory requirements for preparing an ER are provided in 10 CFR 51.41 and 51.45. As described in 10 CFR 2.101(a)(5), an ER may be submitted up to six months before or after the rest of the construction permit application. In addition, an ER may be submitted with the application for the construction permit, and a separate ER may be submitted with the application for the operating license. Alternatively, one ER may be submitted that covers the potential impacts from construction, operations, and decommissioning. This ISG assumes one ER is submitted that describes the impacts of construction, operations, and decommissioning.

Because of the broad range of technologies, designs, and construction methods to build and operate radioisotope production facilities, the NRC staff wrote the ISG using a conservative approach that covers a range of potential technologies and construction methods. As such, certain data needs may not be applicable for some applications. The information provided in the ER should address the likelihood of significant impacts to the human environment posed by the proposed action. Consistent with NRC's regulations in 10 CFR 51.45(b)(1), impacts should be discussed in proportion to their significance. For example, construction and operation of a new nuclear 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 one of the goals of NEPA, which is to concentrate on issues significant to the proposed action and their potential environmental impacts, and further, that affected resources are analyzed in proportion with their importance and the expected level of impact to them.

The applicant 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 should be provided 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 that applicants/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 any other relevant background information.

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 for the proposed action. Examples of purpose and need include a benefit provided if the proposed action is licensed and implemented and/or descriptions of the disadvantages that would be experienced without the proposed action. For example, a description of the purpose and need can be supported by describing how the proposed action would satisfy global, national, or regional projected demands for the radioisotope products to be produced through implementation of the proposed action, including, as appropriate, quantifying the benefit in terms of the proposed production volume relative to the projected demand.

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 following information should be provided 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 should describe the proposed action and briefly summarize the information provided in the ER, referencing other sections for more detail. As described in the introduction to this ISG, the information requested below may not be applicable for all applications:

- Detailed description of the proposed action and the general progression of the project including construction, pre-operational, operational, and post-operational activities, as appropriate;
- A schedule showing the major phases of the proposed action, including construction (including existing facility modifications), pre-operational, operational, and post-operational activities;
- Estimated total amount of land that would be temporarily affected by construction activities (e.g., land clearing, material and equipment lay-down areas) and permanently affected by operational activities (e.g., building and support facility footprints) in acres or percent of total acreage at the site of the proposed action;
- Projected number of full-time onsite workers during each of the major phases of the proposed action including the number of construction workers (average and peak) as well as pre-operations, operations, and post-operations workers in full-time equivalents (FTEs);
- Estimated amount of materials (e.g., fuel oil, gasoline, construction and process materials) and equipment requirements including average number of truck deliveries and shipments of waste material offsite per day, week, or month during each of the major phases of the proposed action during construction, pre-operations, operations, and post-operations;
- 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 5 mi (8 km) of the facility;
- Facility latitude and longitude coordinates;
- Size in acreage of the site and/or sites and facility layout, including the site boundary;
- Any infrastructure improvements, including electrical and water supply, needed to support the proposed action (e.g., substations, onsite wells, treatment facilities);
- List of current or proposed buildings or areas used for chemical, oil, diesel fuel, and other hazardous material storage, waste management (radioactive and nonradioactive), vehicle cleaning, administration, operations and maintenance, shipping and receiving, generating electricity, health and security, parking, etc.;

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- Underground storage tanks, wells, pipelines, water supply, sewage and stormwater systems; and
- Air, groundwater, surface water, meteorological, and/or ecological monitoring stations or proposed monitoring stations.

Non-Power Reactor and Utilization or Production Facility

Non-Power Reactor

- The number and description of each reactor;
- Fuel description, total quantities of uranium, percentage U-235 enrichment, and the planned average irradiation level of spent fuel;¹ and
- A simplified flow diagram for the reactor-power conversion system.

Radioisotope Production Facility

- A description of the radioisotope 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 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), water system interconnections and interdependence, points of consumption, and source 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 water consumption 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;
 - Operating cycles for each water treatment system for normal facility operation.

Cooling and Heating Dissipation Systems

- System descriptions;
- In cases where water intake and discharge systems are proposed, include:
 - 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;

¹ This may be considered used fuel for facilities that do not use reactor technology.

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- A description of any trash racks, traveling screens, trash baskets, and fish return devices;
 - Performance characteristics (i.e., flow rates, intake and discharge velocities, and discharge temperature and temperature differential) for normal facility operation; and
 - The location and description of components for the addition of chemicals (e.g., corrosion inhibitors, antifouling agents) to the intake and discharge system.
- For heat-dissipation systems, include:
 - 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 normal facility operation.

Waste Systems

- Descriptions of all (i.e., nonradioactive, radioactive, mixed, and hazardous waste materials) proposed 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 hazardous material 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 onsite or near the site (i.e., independent fuel storage, low-level radioactive waste storage, or storage of radiation facility equipment);
- Identification of the type and quantity of radionuclides and hazardous materials associated with the facility;
- Description of any pollution prevention and waste minimization program.

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

- A summary of how radiological and hazardous materials would be stored, handled, and utilized;
- The capacity of the onsite storage facilities to store target or reactor fuel materials, irradiated fuel, and radioisotope 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 radioisotope products;
- Transportation packaging systems to be used for fresh fuel and targets, spent fuel, and other wastes and radioisotopes;
- Estimated transportation distance from the fuel fabrication facility to the reactor and from the reactor to the facilities to which irradiated targets, fuel, radioactive waste, nonradioactive wastes, and radioisotopes would most likely be sent; and

- Estimated transportation distance, number of shipments, and mode of transportation that would be used to transport radioisotopes 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. Descriptions of affected resources should be 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. Consistent with NRC's regulations in 10 CFR 51, Appendix A (6) "Affected Environment," applicants should provide data and analyses commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced.

12.12.3.1 Land Use and Visual Resources

The applicant should describe existing on and offsite land use conditions and land cover. The following information should be provided in the ER:

Land Use

- Land uses, both on and offsite, that could be affected by the proposed action;
- Maps of the site(s) showing current and proposed site boundaries, exclusion areas, site structures, infrastructure, 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 5 mi (8 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 5 mi (8 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 5 mi (8 km) of the proposed site;
- Information from 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 involving the site(s) affected by the proposed action including current and future 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 any sensitive viewsheds that might be affected by the proposed action, 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 Air Quality and Noise

The applicant should characterize atmospheric transport and diffusion processes and the acoustic (noise) environment at and near the site of the proposed action. The following information should be provided in the ER, as applicable:

- 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, measured as near as possible to the site for the most recent 5-year period;
- Summary of wind flow data for the site, if available, or as measured at the nearest recording station (e.g., airport, national weather service office, etc.);
- Discussion of severe weather phenomena (e.g., tornadoes, hurricanes, thunderstorms, atmospheric stagnation episodes) 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;
- Description of programs or policies to reduce greenhouse gas emissions;
- Discussion of any current or past noise studies and analyses conducted at the proposed site or within an audible range of the site;
- List of the loudest noise generating facilities and activities at the proposed site or audible from the proposed site; and
- Description of sensitive noise receptors that could be affected by the proposed action.

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 Geologic Environment

The applicant should identify the geological, seismological, and geotechnical characteristics of the site and surrounding area. The following information should be provided 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;
- Summary of 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;
- Identify any soils that are prime, unique, or farmland of statewide or local importance on or adjacent to the proposed site, which may be less than 5 mi (8 km);
- 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;
- Summary of the historical local and regional seismic activity, volcanism, or any information that may indicate a geologic hazard at the site (e.g., tsunamis), including whether any identified geologic faults are “capable” (potentially active) per 10 CFR 100, Appendix A; and
- Other geologic hazards such as onsite or 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 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 waterbodies and aquifers within the potentially affected area. The following information should be provided in the ER, as applicable:

- For freshwater streams potentially affected by the proposed action, provide the following:
 - 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, provide the following:
 - Elevation-area-capacity curves;
 - Reservoir operating rules, if applicable; and
 - Annual yield and dependability;
- For estuaries and oceans potentially affected by the proposed action, provide the following:
 - 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.
- For facilities that would use water from a public water supply system, provide the following:

- The amount of water that would be obtained from the public water supply system;
 - Current supply system capacity; and
 - Other major water users of the public water supply system.
- The following groundwater characteristics should be provided for features that could be affected by the construction, 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, operations, and decommissioning. This should include 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 waterbodies, and the magnitude and nature of the pollutant discharges, including temporal variations.

12.12.3.5 Ecological Resources

The applicant should describe the ecological resources potentially affected by construction, 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 as 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 waterbody 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 waterbody. 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 following information should be provided in the ER, as applicable:

Offsite

The ER should describe:

- the ecoregion, 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; and the ecological province of the ocean if the facility is located near an ocean or estuary.

Onsite

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.) onsite and quantification of the extent of habitats to be directly and indirectly affected by proposed construction, operation, and decommissioning.

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 waterbodies (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 within the potentially affected area .

Places and Entities of Special Interest

The ER should provide the occurrence, location, and description of communities and habitats of special interest within the potentially affected area, 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, 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 Waterbodies

The ER should describe the relative significance of various aquatic habitats in a regional context. Additionally, the ER should briefly describe the aquatic communities within potentially affected waterbodies 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, important trophic links, potential for trophic cascade, or habitat formers or modifiers;
- indicators of water quality or “ecosystem health;”
- important recreational or commercial fishing and shell fishing
- those species with fish consumption advisories; and
- those species that provide unique ecosystem services.

Terrestrial Communities

The ER should describe the terrestrial communities briefly using available information (e.g., present and past studies, federal and state sources). This description should include:

- a summary of representative species of plants, mammals, birds, reptiles, amphibians, and insects;
- a description of endemic species, sensitive or indicator species, keystone species, or important recreationally hunted species;
- a description of bird species that nest within the potentially affected area, migratory species and their seasonal use of habitat within the affected area, known migratory bird rookeries within the affected area, and, if applicable, the location of the site in relation to any nearby flyways;
- a description of the types of vegetative communities, especially any delineated wetlands or potential wetland habitat found within the potentially affected area;
- 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;
- any available botanical surveys conducted within the potentially affected area, within an area with similar vegetation as the proposed site, or within an area recommended by local, State, or Federal natural resource agencies; and
- a description of the relative significance of various terrestrial habitats in a regional context.

Invasive Species

The ER should provide occurrences of aquatic and terrestrial invasive species within the potentially affected area. The ER should 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 within the potentially affected area or within an area that has similar aquatic or terrestrial resources as the proposed site. The summary of surveys should include the location, dates,

objective, methods, and results applicable to the application. The ER should also identify any data or data summaries that may be available for NRC review.

Protected Species and Habitats

This section of the ER should include information on species and habitats protected under the Endangered Species Act of 1973, as amended (ESA), habitat protected under the Magnuson-Stevens Fishery Conservation and Management Act, as amended through 2007 (MSA), as well as any species that are protected under other legislations, including State regulations, 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 ESA was enacted to protect threatened and endangered species and the ecosystems on which they depend. In accordance with Section 7 of the ESA, 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 ER should describe the action area (all areas that would be affected directly or indirectly by the proposed action, as defined at 50 CFR 402.02) that the applicant considered for its ESA analysis. The applicant should then determine if Federally listed, proposed, or candidate species; or designated or proposed critical habitat, occurs or have the potential to occur within the action area. For such species and habitats, the ER should provide sufficient information on the species' life history, historical occurrences, population size and trends, critical habitat, and potential habitat to aid the NRC in developing its biological assessment. The ER should discuss any activities, including construction, operations, maintenance, transportation, or decommissioning activities, that may directly or indirectly affect such species and habitats. The ER should reference applicable studies and surveys conducted within the action area and available scientific literature on the specific species.

- The MSA includes provisions to protect essential fish habitat (EFH). Federal agencies must consult with NMFS for actions that they authorize, fund, or undertake, or that may adversely affect EFH.

The applicant should determine if designated EFH exists within the affected area, or within an area recommended by NMFS. For those species with EFH, the ER should provide sufficient information on the species' life history, historical occurrences, population size and trends, the location and description of EFH to aid the NRC in developing its EFH Assessment. The ER should discuss any activities, including

construction, operations, maintenance, transportation, or decommissioning activities, that may directly or indirectly affect designated EFH. The ER should reference applicable studies and surveys conducted within the action area and available scientific literature on the specific species.

- Each state promulgates its own regulations to protect state-endangered, threatened, and rare species. The ER should identify state-listed species that occur or have the potential to occur in the action area. Include information on these species similar to that provided for ESA-listed species and habitats.
- Several additional federal laws, including the MMPA, the MBTA, and the BGEPA, also mandate the protection of certain habitats and species. Protected species that have the potential to occur within the affected area, or within an area recommended by local, state, or federal natural resource agencies, should be discussed in the ER. Documentation of related correspondence with the appropriate Federal and State agencies should be included in the ER.

12.12.3.6 Historic and Cultural Resources

The applicant should identify and describe all historic and cultural resources located on or near the site of the proposed action. Historic and cultural resources include, but are not limited to: prehistoric era and historic era archaeological sites, artifacts, and remains; historic sites, districts, and buildings; and traditional cultural properties (TCPs) that are important to a group, such as an Indian Tribe, for maintaining their culture. The applicant should also identify any historic property that is eligible for listing on the *National Register of Historic Places* (NRHP). “Historic property” is the legal term for a historic and/or cultural resource that is eligible for listing on the NRHP (36 CFR 60) (e.g., more than 50 years old). TCPs can also meet National Register criteria and can be considered historic properties.

Descriptions of historic properties and historic and cultural resources should be of sufficient detail to permit the assessment and evaluation of impacts from the proposed action. The following information should be provided in the ER, as applicable:

- Describe known historic and cultural resources within the affected area 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;
- Summarize the results of any archaeological or historical surveys conducted at or near the proposed site(s), including the following:
 - Map and description of the physical extent of the survey, and/or the area of potential effect (APE). The APE is the area that may be impacted by construction, operational, or decommissioning activities associated with the proposed action. The APE typically encompasses the facility site and its immediate environs including the viewshed. The APE may extend beyond the facility site if these activities may affect historic properties. This determination is made irrespective of land ownership or control.
 - 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 historic and cultural resources;
- Provide a description of any reconnaissance or pedestrian surveys of the proposed site and consultation efforts with the State Historic Preservation Office (SHPO), Tribal Historic Preservation Offices (THPO), 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 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>);
- Provide a statement of the significance or importance of each historic property potentially affected; and
- Provide comments from SHPO, THPO, or any organizations and individuals contacted by the applicant who provided significant information concerning the location of historic properties.

12.12.3.7 Socioeconomics

The applicant should briefly describe socioeconomic conditions in the region (affected counties where construction and operations workers would reside) around the proposed site.

Socioeconomic information should be of sufficient detail to permit the evaluation of impacts from the proposed action. The following information should be presented in the ER, as applicable:

- 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 5 mi (8 km) of the facility;
- Provide local public water supply system information by source (groundwater or surface water, average daily production, system design capacity, and population served);
- Provide information about local public schools: school district(s) and enrollment;
- Map identifying places of significant population grouping, such as cities and towns;
- Provide information on local road networks used to access the proposed site and major regional transportation systems used for the transport of construction materials, radioisotopes, and waste;
 - General condition of site access roads, average annual daily traffic volume and road capacity, if available;

- Provide applicant's 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
- Provide a brief description of public recreational facilities, (e.g., distance from the site, purpose of the recreational facility, etc.).

12.12.3.8 Human Health

The applicant should describe existing public and occupational health issues. The following information should be provided 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, expressed in mrem/yr (mSv/yr);
- 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;
- 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 proposed facilities located near operating facilities using radioactive materials:
 - A description of the radiological environmental monitoring program and environmental data (from the applicant's annual Radiological Environmental Monitoring Reports);
 - Historical maximum individual doses to members of the public (from the applicant'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, Operations, and Decommissioning

The applicant should describe the potential impacts of the proposed action for each resource area described in Section 12.12.3, *Affected Environment*. Environmental impacts, or effects, including direct effects, indirect effects, and cumulative effects. The Council on Environmental Quality (CEQ) regulations at 40 CFR Part 1508, "Terminology and Index," define the three types of effects. In particular, 40 CFR 1508.7, "Cumulative Impact," provides the following definition:

“Cumulative impact” is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

In addition 40 CFR 1508.8, “Effects,” defines direct and indirect effects as follows:

“Effects” include:

- a. Direct effects, which are caused by the action and occur at the same time and place
- b. Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.

Construction, operation, and decommissioning activities under the proposed action should be evaluated in sufficient detail to determine the significance of potential impacts. Resources should be considered separately, and if necessary, in combination with other resources or conditions (e.g., noise impacts on wildlife, or transportation impacts on land use). 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.

As described above, due to the wide range of potential designs, technologies, and operational methods to build and operate radioisotope production facilities, certain data needs may not be applicable for some applications. Consistent with 10 CFR 51.45(b)(1), impacts should be discussed in proportion to their significance. If any applicant has questions regarding the scope of the data needs for its ER, the applicant may benefit from a pre-application meeting with the NRC licensing and environmental PMs to discuss the information needed to support the environmental review.

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 following information should be provided in the ER:

Land Use

- Description of any on- and offsite land-use changes caused by the proposed action, including the number of acres and location of each land use type that would be changed on a temporary and permanent basis during construction, operation, and decommissioning;

- Impacts to any special land-use categories, Federal facilities, or prime or other important farmland; and
- Description of mitigation measures that reduce or minimize adverse impacts.

Visual Resources (Aesthetic Impacts)

- Photos or illustrations of changes to the site caused by the proposed action superimposed on the current viewshed;
- Description of any significant visual changes, including:
 - Facilities that would be out of character with existing architectural features;
 - Structures that may partially or completely obstruct views of existing landscape;
 - Structures that create visual intrusions in the existing landscape character (e.g., radar towers, cooling towers, effluent stacks, etc.);
 - Features of the proposed action that may require the removal of natural or built barriers, screens, or buffers; and
 - Structures that create visual, audible, or other 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 any regulations, ordinances, and requirements; and
- Description of mitigation measures that reduce or minimize adverse impacts.

12.12.4.2 Air Quality and Noise

This section presents key factors and guidance for evaluating air quality and noise impacts caused by the proposed action, including consideration of associated meteorological and climatological conditions. The following information should be provided in the ER:

Air Quality

- 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 should be provided for both short- and long-term impacts);
- Estimates of onsite and offsite vehicle and other emissions resulting from construction, operations, and decommissioning, including fugitive dust;
- 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);
- 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.; and
- Description of mitigation measures that reduce or minimize adverse impacts.

Noise

- Predicted noise levels using the decibel A-weighted (dBA) scale;
- Major sources of noise, including all models, assumptions, and input data;
- Comparison to appropriate standards or guidelines;
- Potential impacts to sensitive receptors (e.g., hospitals, schools, residences, wildlife); and
- Mitigation measures to reduce or minimize adverse impacts.

12.12.4.3 Geologic Environment

This section presents key factors and guidance for evaluating site geologic and soils conditions and geologic resource impacts. The applicant should consider those geologic and soil resources and conditions that could be affected by construction, 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. A summary of management practices, design considerations, or policies that would minimize these impacts should be provided.

In addition to the summary of the analysis of the potential impacts of seismic and other geological hazards the applicant 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.;
- Description of the potential for exposing contaminated soil and proposed methods to remediate and/or dispose of any encountered soil contamination;
- 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); and
- Description of mitigation measures that reduce or minimize adverse impacts.

12.12.4.4 Water Resources

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

The applicant should consider surface water and groundwater uses that could affect or be affected by the construction, 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 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, changes in water quality should be considered simultaneously with changes in water supply.

The following information should be provided in the ER:

- 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 surface-oriented water users [e.g., fishing, navigation, etc.] resulting from facility activities);
- Identification of hydrological system impacts both onsite and offsite, such as:
 - Water quantity and availability, water flow, and movement patterns
 - Erosion and sediment transport,
 - Water drainage characteristics, the flood handling capability of the floodplains, and flow and circulation patterns, and
 - Subsidence resulting from groundwater withdrawal, and erosion and sediment transport;
- Withdrawals and returns of surface and groundwater during construction, operation, and decommissioning;
- For facilities that would use water from a public water supply system, discuss whether the amount of water required for the proposed action is available from the public water supply system; and
- Descriptions of mitigation measures that reduce or minimize adverse impacts, such as proposed best management practices and measures to control impacts to water quality and/or quantity (e.g., protection of natural drainage channels and waterbodies, 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).

Monitoring

- Monitoring plans should be commensurate with the importance of the potential impacts and consider the results of consultation with local, state, and other federal agencies. For water quality monitoring, provide 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 following information should be provided in the ER:

- 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;
- 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; and
- Description of mitigation measures that reduce or minimize adverse impacts, such as best management practices or alternative designs to minimize adverse impacts.

Protected Species and Habitats

In addition to the information described above that would be relevant to protected species and habitats, the applicant should provide:

- Documentation of consultations with the FWS and NMFS on the impact of the proposed action on protected species and habitats, especially those protected under the ESA and MSA;
- Documentation of consultations with State and local agencies 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 protected species or habitats;

Monitoring

- Monitoring plans should be commensurate with the importance of the potential impacts and include the results of consultation with local, state, and other federal agencies. 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, NMFS, 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 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 following information should be provided 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, 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;
- Discuss the potential for and the process to be followed upon the discovery of human remains at the proposed site; and
- Description of mitigation measures that reduce or minimize adverse impacts, such as 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.

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, and offsite land use from the proposed action. The following information should be provided in the ER:

Socioeconomics

- Description of impacts to housing, public services (i.e., water supply), public education, and local transportation;
- Description of any tax revenue-related impacts;
- Discussion of methodology used to determine impacts; and
- Description of mitigation measures that reduce or minimize adverse impacts.

Transportation

- Description of construction and/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(s) and mode for conveying construction material, equipment, and workers to the proposed site;
- Traffic pattern impacts (e.g., impacts from any increase in traffic during construction or shift changes); and
- Description of mitigation measures that reduce or minimize adverse impacts.

12.12.4.8 Human Health

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

Nonradiological Impacts

The following information should be presented 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;

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- 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;
- The calculated exposure to the workforce including all models, assumptions, and input data in order to determine compliance with Occupational Safety and Health Standards (OSHA) 29 CFR 1910;
- For facilities located near operating industrial facilities using radioactive materials:
 - A description of the nonradiological environmental monitoring program and environmental data (from the applicant's Environmental Monitoring Reports or other source document).
- A description of the environmental monitoring program; and
- Description of mitigation measures that reduce or minimize adverse impacts.

Radiological Impacts

This section describes the public and occupational health impacts from radioactive material.

The following information should be presented 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, describing or showing 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 levels at the site. Measured radiation dose rates, airborne radioactivity concentrations, and waterborne radioactivity concentrations at specific current locations where environmental radiological monitoring data exist;
- 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; and
- Description of mitigation measures that reduce or minimize public and occupational exposures to radioactive material.

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 following information should be presented 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, provide a general description of the in-plant 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, provide 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.

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, and dispose of the waste.

The following information should be presented 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 plans for the waste (i.e., transfer to an offsite waste disposal facility, treatment facility, or storage onsite); and
- Description of waste-minimization plan(s) to reduce or minimize the generation of waste.

12.12.4.10 Transportation

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

The following information should be presented 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 of the radioactive waste, nonradioactive waste, and radioisotopes;
- Estimated transportation distance from the originating site to the projected destinations

- of the radioactive waste, nonradioactive waste, and radioisotopes;
- Treatment and packaging for radioactive and nonradioactive wastes;
- 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 postulated accidents at the facility. The type of data and information needed in the ER will depend on site and plant-specific factors, and the anticipated magnitude of the potential impacts.

The following information should be presented 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 accidents having a potential for releases into the environment (see Section 13, Accident Analysis); and
- An analysis of the radiological and nonradiological consequences from the postulated accidents.

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, 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, operations, and decommissioning. The descriptions to be provided by this review should be of 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 following information should be provided 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 within 5 mi (8 km) of the proposed site;
- 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 as well as multiple-hazard and cumulative hazard conditions; and
- A description of mitigation measures that reduce or minimize adverse impacts.

12.12.4.13 Cumulative Effects

Discuss any past, present, or reasonably foreseeable future actions that could result in cumulative impacts when combined with the proposed action. Cumulative impact is defined by the CEQ in 40 CFR 1508.7. In addition, CEQ's "Considering Cumulative Effects Under the National Environmental Policy Act," dated January 1997, provides additional guidance on considering cumulative effects.

Actions to be considered in cumulative impact analyses include proposed and continuing activities that are conducted, regulated, or approved by a federal agency or a non-federal entity. The cumulative impacts analysis takes into account all actions, however minor, since impacts from individually minor actions may be significant when considered collectively over time. The ER should identify other actions (including related and nonrelated federal and non-Federal actions) that could contribute to cumulative impacts, such as:

- Information about current or planned local economic development programs or projects (e.g., commercial, industrial, and/or residential); and
- Information about current or planned infrastructure improvements (e.g., transportation, electric and water utility).

12.12.5 Alternatives

12.12.5.1 No-Action Alternative

10 CFR 51.45(b)(3) 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 or operating license is 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 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 should summarize the history and process used to formulate the reasonable alternatives. Reasonable alternatives may include, but is 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 transportation methods. If new construction is proposed, at least one alternative location should be analyzed. Additional sites should be analyzed depending on the context, degree, and intensity of potential impacts.

The following information should be provided to summarize the process used to formulate the reasonable alternatives:

- Describe the process used to determine reasonable alternatives to the proposed action;
- Describe all alternatives considered;
- Indicate which alternatives were eliminated from further study and which alternatives are described in further detail; and
- Briefly describe any alternatives considered that would reduce or avoid adverse effects.

The following information should be provided for each reasonable alternative, as applicable:

- A description of the alternative;
- The major direct, indirect, and cumulative impacts, similar to the impacts assessed in 12.12.4; and
- A description of mitigation measures that reduce or minimize adverse impacts.

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 should also provide assumptions and uncertainties in the analyses. The following information (major costs and benefits) should be provided in the ER:

- Qualitative discussion of environmental degradation (e.g., impacts to air and water quality, biotic and aesthetics resources, 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 (e.g., lost tax revenue, decreased recreational value, transportation, as

- appropriate);
- Qualitative discussion of the environmental benefits (comparable to the discussion of cost and 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 should present the impacts of the proposed action and alternatives (including the no-action alternative) in a summary chart or table.

12.12.6 Conclusions

The following information should be provided 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 References

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