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IMPLEMENTATION PLAN FOR THE NEW PRODUCTION REACTOR CAPACITY ENVIRONMENTAL IMPACT STATEMENT



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IMPLEMENTATION PLAN FOR THE NEW PRODUCTION REACTOR CAPACITY ENVIRONMENTAL IMPACT STATEMENT

1. INTRODUCTION

The U.S. Department of Energy (DOE) proposes to site, construct, and operate new production reactor (NPR) capacity intended primarily to produce tritium and secondarily to produce plutonium for the U.S. nuclear weapons program. DOE studies show that this new capacity is needed to ensure reliable maintenance of the nation's nuclear weapons stockpile. It also is essential that these necessary nuclear materials be produced in a safe and environmentally sound manner.

The DOE has determined that this proposed action constitutes a major Federal action that may significantly affect the quality of the human environment; therefore, the DOE will prepare an environmental impact statement (EIS) to assess the potential impacts of the proposed action and reasonable alternatives on the human and natural environment. The EIS will be prepared in accordance with Section 102(2)(C) of the National Environmental Policy Act of 1969, as implemented in regulations promulgated by the Council on Environmental Quality (CEQ) (40 CFR 1500-1508) and as provided in the DOE NEPA Guidelines (52 FR 47662).

In accordance with Section A.4(e) of the DOE NEPA Guidelines, this EIS implementation plan (IP) includes a description of the proposed action, descriptions of alternatives, a summary of EIS assumptions, a list of environmental issues to be considered in the EIS (including those identified during public scoping activities), a list of proposed agency consultations, a schedule for EIS preparation and related activities, and an annotated outline for the EIS. It is the Department's intent that the EIS on the NPR capacity will serve as the programmatic National Environmental Policy Act (NEPA) review of modernization of DOE defense nuclear materials production of tritium and plutonium. The Department is currently developing a NEPA compliance strategy for modernization of the remainder of the nuclear weapons production complex, which will reference the EIS on NPR capacity.

2. PROPOSED ACTION AND PRINCIPAL ALTERNATIVES

The proposed action is the siting, construction, and operation of one or more new production reactors (NPRs) and associated facilities at one or more government-owned sites. The major reactor technologies to be evaluated include the light-water reactor (LWR) [including the conversion of the Washington Public Power Supply System's unfinished Nuclear Power Project Number 1 (WNP-1)], the modular high-temperature gas-cooled reactor (MHTGR), and the low-temperature heavy-water reactor (HWR). The proposed DOE sites for the reactors include the Hanford Site near Richland, Washington, the Idaho National Engineering Laboratory (INEL) near Idaho Falls, Idaho, and the Savannah River Site (SRS) near Aiken, South Carolina. The DOE has indicated that its preferred alternative for implementing the proposed action is constructing and operating an HWR and support facilities at the SRS and constructing and operating an MHTGR and support facilities at INEL (DOE 1988a). Alternatives to be considered in the EIS include the nine possible combinations of reactor technologies (HWR, LWR, MHTGR) and sites (Hanford, INEL, SRS).

Other possible alternatives, which are not considered "reasonable" within the context of NEPA, include other reactor technologies including the liquid-metal reactor (LMR), N-Reactor, research reactors, commercial power reactors; production alternatives such as accelerators or fusion technology; and finally, nonproduction alternatives including purchase from foreign governments, reduction of the nuclear weapons stockpile coupled with tritium recycle, and redesign of the weapons to reduce or eliminate the need for tritium.

As required by the CEQ NEPA regulations, the EIS analysis will include the "no-action" alternative (i.e., no construction of NPR capacity).

2.1 PROPOSED ACTION

Although designed primarily to meet tritium goal requirements for maintenance of the nation's nuclear weapons stockpile, the NPRs and associated facilities also would be capable of producing weapons-grade plutonium. Tritium goal requirements are the tritium production rate required by the DOE to meet national security requirements as stated in the *Nuclear Weapons Stockpile Memorandum* (a classified document).

Development of an NPR complex would include construction of a reactor, construction of cooling towers and other reactor-related support systems, and construction or modification of facilities for one or more of the following isotope-production support activities: (1) reactor-fuel fabrication, (2) tritium and plutonium target fabrication, (3) tritium extraction, and (4) fuel reprocessing and plutonium extraction.

Operations would include delivering to the NPR sites materials used to fabricate reactor fuel and targets. Materials for reactor fuel would be shipped to the site fuel-fabrication facility, where reactor fuel assemblies would be manufactured. Materials for targets would be shipped to the site target-fabrication facilities, where tritium and

plutonium targets would be manufactured. (Targets are composed of materials that produce a specific isotope, such as tritium, when bombarded with high-energy particles, such as neutrons, produced by nuclear fission within the reactor fuel.)

Both targets and fuel would be transported to an on-site area for assembly into fuel/target elements, and the elements would be placed into the reactor core. After a specified period of reactor operation, the fuel/target elements would be removed from the reactor core and separated into irradiated targets, spent nuclear fuel, reusable fuel, and scrap materials.

In the tritium-production mode, the tritium targets would be sent to the on-site tritium-extraction facilities, where the tritium would be removed and contained as a gas. This gaseous tritium would then be shipped to SRS, where it would be purified and loaded into warhead reservoirs. The spent fuel would be transported to an on-site storage facility or a reprocessing facility, where enriched uranium and weapons-grade plutonium might be recovered. Any enriched uranium not recycled to the fuel-fabrication facility would be shipped to Oak Ridge to meet other reactor fuel requirements. Weapons-grade plutonium would be assumed for the purpose of the EIS impact assessments to be shipped to the Rocky Flats Plant in Colorado or equivalent facilities for use in weapons programs.

In the plutonium production mode, both the plutonium targets and spent fuel would be transported to the on-site reprocessing facility, where enriched uranium would be recovered from fuel and plutonium would be recovered both from targets and fuel. Any enriched uranium not recycled to the fuel-fabrication facility would be shipped to Oak Ridge to meet other fuel requirements. Weapons-grade plutonium would be assumed for the purposes of the EIS impact assessments to be shipped to Rocky Flats for use in weapons programs.

Any wastes generated by these activities would be segregated into high-level wastes (HLW), low-level wastes (LLW), transuranic (TRU) wastes, mixed wastes, and hazardous wastes. Radioactive wastes would be treated on the site and either placed in interim storage for eventual disposal off the site (HLW and TRU wastes) or disposed of on the site (LLW). Hazardous and mixed wastes would be disposed of in appropriate, approved facilities.

Waste heat from reactor operations would be released to the atmosphere through cooling towers. Both the LWR and MHTGR alternatives operate at high temperatures; therefore, they could be designed and constructed with a steam cycle and generators able to produce electrical power. For purposes of the EIS, revenue-producing electrical power generation is reasonably foreseeable during reactor operations; hence, the EIS will broadly describe the potential impacts of such activities. However, the decision to produce or sell electrical power is not part of the proposed action. Such a decision would be the subject of more specific, subsequent NEPA review.

2.2 ALTERNATIVES

Alternatives to be considered in the EIS include no action and alternative technologies and sites for NPR operations. Reasonable alternatives for tritium production capacity include three alternative reactor technologies and three alternative sites.

2.2.1 No-Action Alternative

The no-action alternative would result if no new production capacity were developed. Under this condition, it will be assumed that the DOE will continue to rely on the existing production capacity of the P, K, and L reactors at SRS to meet the defense requirements for nuclear materials. Accordingly, in the EIS, assessment of the impacts of no action will include the impacts of operating the existing DOE production reactors at SRS at 100% capacity. The DOE is currently preparing an EIS related to the continued operation of P, K, and L reactors. The results of that EIS (if available in time) will be included in the NPR EIS by summary and reference.

2.2.2 Alternative Technologies

Technology alternatives for tritium production capacity were evaluated for inclusion in the EIS based on the ability to produce goal quantities of tritium, the ability to produce tritium in a safe and environmentally sound manner, the need for the highest possible certainty of technological development, cost considerations, and the urgency of the schedule.

2.2.2.1 Reasonable Technology Alternatives

Three types of nuclear reactors have been judged to be reasonable technology alternatives and will be considered in the EIS: the light-water reactor (LWR), the heavy-water reactor (HWR), and the modular high-temperature gas-cooled reactor (MHTGR). These reactor alternatives, as well as the associated fuel and target facilities necessary for nuclear material production, will be assessed in the EIS.

Light-Water Reactor

The referenced LWR is a high-temperature, pressurized-water reactor. It uses ordinary water (light water) both as the primary coolant and fission reaction moderator. The reactor and its associated steam supply system would be housed in a containment building. The basic LWR technology is widely used for commercial power reactors.

The LWR fuel is low-enriched uranium dioxide. Lithium aluminate pellets would be used as tritium target material. For the EIS analysis, the Washington Public Power Supply System's Nuclear Power Project Number 1 (WNP-1) reactor will be used as the LWR technology alternative for the Hanford Site, and the LWR alternative at other sites

will be based on this design. The high temperatures of the LWR permit it to be used for electric power generation.

Heavy-Water Reactor

The HWR operates at low pressure and low temperature. Instead of using light water (H_2O), the HWR uses heavy water (D_2O , containing the deuterium isotope of hydrogen) both as the primary coolant and fission reaction moderator. Highly enriched uranium/aluminum fuel and a lithium/aluminum target similar to that used in the existing HWR at SRS are proposed for the HWR technology. Unlike the existing SRS reactors, an NPR HWR would be housed in a containment building. Since the referenced HWR does not operate at high temperatures, it cannot be used for electric power generation.

Modular High-Temperature Gas-Cooled Reactor

The MHTGR uses graphite (a form of carbon) instead of water as the fission reaction moderator and helium as the coolant. To produce the goal quantity of tritium, a MHTGR would require eight reactor modules. The reactor design considered here has been modularized into two units, each having four reactor modules with shared support and power facilities. Each unit of four reactor modules would be housed in a manner providing containment. Highly enriched uranium fuel and the lithium-aluminate tritium target would be inserted into a core of graphite blocks. The fuel would consist of uranium dicarbide (UC_2) kernels coated with a graphite buffer, followed by layers of pyrolytic carbon, silicon carbide, and pyrolytic carbon. These successive carbon layers are designed to retain fission products within the fuel even under severe accident conditions. This same coating also would be used around the tritium target kernels. The high temperatures of the MHTGR permit it to be used for electric power generation.

2.2.2.2 Technologies Not Considered to Be Reasonable Alternatives

The EIS will briefly discuss other technologies that potentially could produce tritium. However, in the EIS, DOE intends to provide technical arguments to support its position that these technologies are not reasonable alternatives and therefore do not warrant detailed evaluation.

Liquid-Metal Reactor

The liquid-metal reactor (LMR) technology was considered for the NPR(s) by the Energy Research Advisory Board (ERAB) (1988). That study focused not on the capability of the LMR to produce the goal quantities of tritium, but rather on the potential for the successful development of the target technology.

The ERAB panel (ERAB 1988, pg. 4) noted the following weakness for the LMR technology:

- The target technology is at an early stage of development. Research, development, and qualification testing are required.
- There is considerable schedule and cost uncertainty, considering the scope of target development, concept development and selection, detail design, and construction of a first-of-a-kind complex.

These negative LMR aspects were reinforced in further discussions in the report. These points reflect the negative view of the LMR as a reasonable alternative for the NPR program from the engineering and design perspective. Additional bases for rejecting the LMR concept in favor of the other NPR concepts was provided by the report from the safety/environmental crosscut evaluation group. That group [Science Applications International Corp. (SAIC) 1988, pg. 4-9] found that:

For the LMR, the target design and, hence, the target fabrication with target, recovery, and processing steps, has not been defined. Liabilities for the target cycle likely include stainless-steel cladding (activation products), higher temperature recovery, and recycle of enriched lithium. Likewise, the fuel design and cycle are not specified. Safety concerns focus on the potential use of plutonium fuel, which will increase safety problems in fabrication and the use of electro-refining for reprocessing. Electro-refining will simplify the fuel reprocessing but will create a source of unaddressed safety concerns. A disadvantage for the LMR is the high radioactivity in recycled fuel. Also, the fuel/target cycle has not been demonstrated.

The technical bases for these conclusions is given in the report from the NPR Fuel Cycle and Target Technology Group (DOE 1988b, pp. 2-4 and 8).

The combination of the various weaknesses and negative aspects of the LMR technology provides the basic rationale for rejecting the LMR concept in favor of the HWR, MHTGR, and LWR concepts. Thus, the LMR is not considered a "reasonable alternative" for review in the EIS on NPR capacity.

Other Reactors

Tritium production in N-Reactor was demonstrated in the mid-1960s. N-Reactor could be restarted and operated to produce tritium; however, the tritium-production capacity of N-Reactor could not satisfy the tritium goal requirements. Under any operating mode, however, N-Reactor could operate for only a relatively short period of time before it would have to be shut down as a result of aging effects, such as growth and distortion of its graphite moderator. Consequently, N-Reactor cannot be counted on for the production of an assured long-term supply of tritium and, therefore, is not a reasonable alternative for consideration in the EIS.

The DOE has a number of other nonproduction, research, or test reactors, such as the Advanced Test Reactor, Experimental Breeder Reactor II, Engineering Test Reactor, Fast Flux Test Facility, and High Flux Isotope Reactor that conceivably could be used to produce tritium. However, these reactors would individually and collectively fall far short of providing goal quantities of tritium and would compete with important ongoing research programs and other missions and, therefore, are not a reasonable alternative for consideration in the EIS.

Tritium could be produced in commercial nuclear power reactors, in theory. In the past, Congress has required that the civilian nuclear power program be kept separate from the nuclear weapons production program, as reflected by Public Law 97-415. Further, operation of these facilities for tritium production would require review of their operating licenses by the NRC. Because of these institutional obstacles, use of operating commercial nuclear power reactors for tritium production is not considered a reasonable alternative for examination in the EIS. However, the DOE is considering the potential acquisition and conversion of the uncompleted WNP-1 reactor at the Hanford Site. This reactor has not been operated as a commercial power reactor. It is considered a reasonable light-water reactor alternative at the Hanford Site and will be evaluated in the EIS.

Other Technologies

The use of a linear particle accelerator to produce tritium has been suggested as an alternative to reactor production of tritium and has been evaluated by the DOE (Energy Research Advisory Board 1988; Los Alamos and Brookhaven National Laboratories 1989). An accelerator capable of producing goal quantities of tritium represents a large extrapolation in combined beam current and beam energy compared with existing accelerators, and an integrated facility does not now exist. This approach would require additional engineering development to design and demonstrate the major components, optimize reliability, improve efficiency, and ensure the operability of the integrated system. Although this technology might be developed by a highly aggressive research and development program within the NPR time frame, the development costs would be very high, and the end result at this time is uncertain. In addition, the availability and costs of the substantial electrical power necessary for operations is a major issue.

Tritium production using a fusion concept is in the early stages of development. The fusion concept is based on an extension of fusion research experiments that indicated the feasibility of the approach. Development is considered to present significant technical risk because although the potential for tritium production is promising, it is not proven and involves uncertainties both in extrapolating physics over large ranges and in very challenging engineering associated with conceptual design. A significant research and development effort would be needed to develop a suitable tritium target.

To date, reactors remain the technologies with the lowest technological risk. Because of the significant technological uncertainties, accelerators and fusion technologies are not considered a reasonable alternative for consideration in the EIS. However, due to renewed interest in using accelerator technology for tritium production, on July 28, 1989, Secretary Watkins requested ERAB to evaluate the current status of

accelerator technology for tritium production and related target technology, and to estimate how soon accelerator technology could meet national tritium needs and at what cost. The ERAB was directed to evaluate accelerator technology using the same criteria, whenever possible, as were used in its assessment (ERAB 1988) of candidate reactor technologies for the NPR. Upon finalization of this report, DOE will reexamine whether accelerator technology remains an unreasonable alternative for consideration in the EIS.

Other Alternatives

Conceptually, the purchase of tritium from foreign governments could provide a fraction of tritium goal requirements. However, it is contrary to present U.S. national security policy to be dependent upon foreign governments for the supply of critical nuclear weapons materials.

Critics have suggested that nuclear weapons should be redesigned to use less or no tritium for "boosting" the power of the weapons. It has also been suggested that the nuclear weapons stockpile should be reduced (sometimes referred to as "build-down"), and the tritium recovered from obsolete or excess weapons could be reused (recycled) to maintain a smaller number of weapons. It was suggested that these alternatives would eliminate or delay the need for tritium production.

The concept of "boosting" from the use of tritium significantly improves the explosive yield of nuclear weapons and allows nuclear warheads to be smaller and lighter, enabling their use in intercontinental ballistic missiles and long-range cruise missiles. Redesigning weapons to use less tritium would require an extensive long-term nuclear test program, development of new missiles, and would likely require the use of more plutonium and other nuclear materials. Each year the Secretaries of Defense and Energy and the National Security Council jointly recommend to the President the size and composition of the nuclear weapons stockpile required to defend the United States. The approval of this *Nuclear Weapons Stockpile Memorandum* (a classified document) by the President and the subsequent authorization and appropriation of funds by Congress constitute the legal authority and mandate for DOE to produce the specified types and quantities of defense nuclear materials and weapons and to maintain the required production facilities and capabilities. Until international negotiations and agreements occur, or this nation develops or determines other protection strategies with which to assure our national security, reducing the protective measures afforded by the nuclear weapons stockpile through unilateral reductions could leave our national security vulnerable and make future arms negotiations more difficult. Therefore, neither "build-down" and recycle of tritium nor redesign of the weapons to reduce or eliminate tritium content are reasonable alternatives for consideration in the EIS.

2.2.3 Alternative Sites

Thirteen DOE-owned sites at which nuclear defense activities are conducted were initially considered as potential sites for deployment of new production reactor capacity. They are (1) the Feed Materials Production Center (FMPC), Fernald, Ohio;

(2) Hanford; (3) INEL; (4) the Lawrence Livermore National Laboratory (LLNL), Livermore, California; (5) the Los Alamos National Laboratory (LANL), Los Alamos, New Mexico; (6) the Mound site, Miamisburg, Ohio; (7) the Nevada Test Site (NTS), Las Vegas, Nevada; (8) the Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee; (9) the Pantex Plant, Amarillo, Texas; (10) the Pinellas Plant, Pinellas, Florida; (11) the Rocky Flats Plant (RFP), Boulder, Colorado; (12) the Sandia National Laboratory (SNL), Albuquerque, New Mexico; and (13) SRS.

The following three screening criteria were used to determine which of the potential sites were viable candidate sites (Jicha 1988).

1. Although the proposed NPR facilities would be designed to be comparable to the best commercial reactors, as an added measure of conservatism in siting these facilities, siting requirements will include remoteness from population centers and adequate exclusion area. The site shall be environmentally acceptable. The site shall also encompass emergency planning zone requirements.
2. The site shall have experience in large nuclear reactor programs.
3. The site shall have production level experience and facilities to support spent fuel and target processing and long-term, high-level waste (HLW) management.

A summary evaluation, based on a more complete description of these three criteria and an evaluation of the 13 DOE sites against them (Jicha 1988), is provided below.

Evaluation Against Criterion Number 1: Eight sites (SNL, LANL, ORNL, RFP, LLNL, FMPC, Mound, and Pinellas) were eliminated from consideration after applying the first criterion (remote areas, adequate exclusion area, environmental acceptability, and emergency planning). All eight sites are either located near population centers or are too small to contain a large production reactor with its associated exclusion area. Only Hanford, INEL, Pantex, NTS, and SRS met the first criterion.

Evaluation Against Criterion Number 2: Nine sites (LLNL, LANL, NTS, SNL, Mound, Pinellas, RFP, FMPC, and Pantex) failed to meet the second criterion of experience with a large reactor. These sites either have small test reactors or none at all.

Four sites (Hanford, INEL, ORNL, and SRS) met this criterion by having programs in place that comply with DOE Order 5480.1B, *Environmental Protection, Safety, and Health Protection Program for DOE Operation*, for Category A reactors. A number of production and test reactors have been designed and operated at the Hanford Site since its inception. The Hanford Site recently operated two reactors that meet the specified criterion: (1) the Fast Flux Test Facility and (2) the N-Reactor. INEL has had three reactors, all recently operated, that meet the specified criterion: (1) the Loss of Fluid Test Facility, (2) the Power Burst Facility, and (3) the Advanced Test Reactor. ORNL has two reactors that meet this criterion: (1) the Oak Ridge Research Reactor

and (2) the High-Flux Isotope Reactor. SRS has three production reactors in operation (L, K, and P Reactors). Therefore, the Hanford Site, INEL, ORNL, and SRS are the only sites that satisfy this criterion.

Evaluation Against Criterion Number 3: Ten sites (LLNL, LANL, NTS, SNL, Mound, Pinellas, RFP, FMPC, Pantex, and ORNL) failed to meet the third criterion of both experience with nuclear materials production and HLW management. These sites have limited waste-management programs, although some have developed spent-fuel-processing and HLW-handling techniques. However, these sites do not have in situ spent-fuel-processing facilities or production-level processing experience.

Hanford, INEL, and SRS met the third criterion by having production-level processing plants and HLW-processing programs planned or in place. The Plutonium Uranium Extraction Plant at the Hanford Site is being used to process fuels from N-Reactor to recover uranium and plutonium. The Plutonium Finishing Plant has also been utilized to process scrap, weapons-grade, and fuel-grade plutonium. INEL processes both test reactor and naval reactor programs fuel. INEL is also the selected site for the plutonium Special Isotope Separation Plant. SRS processes driver fuels from three production reactors and research reactor fuels. Tritium is also recovered in special facilities.

INEL has the New Waste Calciner to solidify HLW. The Defense Waste Processing Facility (DWPF) at SRS, which will vitrify HLW for permanent disposal, is nearing completion. Hanford's HLW Vitrification Plant, based on the DWPF process, is in the design phase.

Only the Hanford Site, INEL, and SRS meet all three screening criteria. A DOE Site Evaluation Team was charged with developing evaluation criteria and further evaluating the suitability of these three candidate sites (DOE 1988c). The team used the eight criteria listed below for evaluating potential sites. In conducting the evaluation process, members of the team visited each site to receive a briefing on the site's capability to accommodate new production reactor capability and to tour the support facilities and proposed location for new production reactor capacity. The criteria used in the evaluation are:

1. *Experience Base* -- The capability and experience of the site to perform the required tasks.
2. *Site Support Facilities* -- This includes fuel fabrication, target fabrication, fuel reprocessing, tritium recovery, target reprocessing, plutonium handling, waste management, and steam or electric power capability.
3. *Environment, Safety, and Health* -- The ability to meet environmental, safety, and health (ES&H) requirements and the potential for ES&H impacts from the siting decision.
4. *Transportation* -- The projected availability of adequate transportation, and the impacts on transportation facilities.

5. *Cost and Schedule* -- The impact of site conditions on cost or schedule, and the impact on the cost of providing support facilities.
6. *Safeguards and Security* -- Existing safeguards and security capability at the site, and additional requirements.
7. *Utilities* -- Availability of reliable power supply and an adequate water supply.
8. *Socioeconomic* -- The projected availability of adequate public facilities, local services, and infrastructure to support construction and operation.

In response to congressional guidance, the DOE also addressed the merits of the use of a second deployment site, thereby providing duality of production capability. In the course of its deliberations, the DOE engaged in consultations with several governmental agencies to obtain their views and recommendations regarding the acquisition strategy for replacement production capacity. The principal topics of concern were the requirements for assured supplies of tritium and plutonium and the concept of duality. Consultations took place with representatives from the Department of Defense, the Office of Science and Technology Policy, the National Security Council, the Nuclear Weapons Council, and the Office of Management and Budget. These agencies fully supported the evaluation approach utilized by DOE. The acquisition strategy is consistent with the objectives and particular interests of each agency with respect to requirements for tritium and plutonium, and production assurance. The consensus is that the achievement of production assurance on an urgent schedule and in a safe manner are the key elements in the acquisition strategy.

The DOE concluded that all three candidate sites -- Hanford, INEL, and SRS -- are suitable for new production reactor capacity (DOE 1988c). For the HWR technology, SRS enjoys the advantage of having in place adequate fuel-cycle and tritium-production facilities. The WNP-1 (a partially completed LWR reactor), located at the Hanford Site, provides the advantage of a 63% completed reactor. INEL has facilities in place to support high-temperature gas-cooled reactor and LMR development.

Each of the three alternative sites is in the process of selecting locations for facilities within the site. The EIS will describe the results of those studies, including the environmental and technical evaluations used for selection of facility locations.

2.2.3.1 Hanford Site

The Hanford Site is a DOE nuclear research and defense program site encompassing 560 square miles near Richland, Washington. Hanford was the first U.S. weapon materials production site and has produced special nuclear materials for more than 40 years. The existing facilities include a production reactor (N-Reactor, currently being maintained in cold standby), the Fast Flux Test Facility (FFTF), various nuclear

materials processing plants, waste-management facilities, and a fuel-fabrication facility. Development of new production reactor capacity at this site would include construction of new facilities or use of the existing Fuels and Materials Examination Facility (FMEF) for fuel fabrication, target fabrication, and tritium extraction and construction of a new reprocessing facility for recovery of plutonium and uranium from fuel and plutonium target rods and preparation of enriched uranium oxide for recycling to the fuel-fabrication facility (Table 1). Extracted tritium would be shipped to existing facilities at SRS, and weapons-grade plutonium would be shipped to Rocky Flats or equivalent facilities. Waste would be treated in on-site facilities, such as the Hanford Waste Vitrification facility and the Waste Recovery and Packaging facility, and would be placed in interim storage facilities until the Waste Isolation Pilot Plant (WIPP), the HLW repository, or other comparable facilities were available. Low-level radioactive waste would be disposed of on the site.

2.2.3.2 Idaho National Engineering Laboratory

The Idaho National Engineering Laboratory, located near Idaho Falls, Idaho, is a 890-square-mile site where various nuclear reactors and support facilities have been built and tested to demonstrate the applications of reactor technology, to conduct safety research, and to support defense programs. The existing facilities include a number of research and experimental reactors, waste-management facilities, and a chemical-processing plant (the Idaho Chemical Processing Plant, or ICPP) that serves as the primary facility for the recovery of uranium, plutonium, and other isotopes from U.S. government-owned or controlled reactor fuel. Development of new production reactor capacity at this site would include construction of new fuel-fabrication facilities, a new tritium-target-fabrication facility, a new plutonium-target-fabrication facility, a new head-end fuel-processing facility, a new plutonium-target-processing facility, and a new tritium-target-processing facility (Table 2). Existing and new facilities would be used to separate, recover, and process plutonium and uranium from plutonium targets and spent fuel. The tritium would be shipped to existing facilities at SRS, and weapons-grade plutonium would be shipped to Rocky Flats or equivalent facilities. Waste would be treated in existing on-site facilities and then placed in interim storage facilities until WIPP, the HLW repository, or other comparable facilities were available. Low-level radioactive waste would be disposed of on the site.

2.2.3.3 Savannah River Site

The Savannah River Site encompasses approximately 300 square miles near Aiken, South Carolina. The SRS has actively produced special nuclear materials for national defense programs for more than 30 years. The existing facilities include production reactors, chemical-processing plants, fuel- and target-fabrication plants, a tritium-recovery facility, and waste-management facilities. Development of an HWR at this site would make use of upgraded or modified existing facilities. An LWR or MHTGR at SRS would require constructing new tritium and plutonium fuel and target fabrication facilities (Table 3). Existing facilities would be used to recover plutonium from targets

TABLE 1 New and Existing Support Facilities Required for New Production Reactor Capacity at Hanford

Activity	HWR Alternative		LWR Alternative		MHTGR Alternative	
	Material ^a	Facility Requirement	Material	Facility Requirement	Material	Facility Requirement
Fuel Fabrication						
Tritium	Al [80% UAl]	New fuel-fabrication facility	Zircaloy-4 {8-12% UO ₂ }	FMEF, new fabrication line	Graphite (93% UC ₂ microspheres)	FMEF, new fabrication facility
Plutonium	Al [60% UAl]	Same as above	Zircaloy-4 {1.7% UO ₂ }	None (commercial vendor)	Same as above	Same as above
Target Fabrication						
Tritium	AL [LiAl]	New tritium-target-fabrication facility	Stainless steel [Li aluminate]	FMEF, new fabrication line	Graphite (LiAl microspheres)	New tritium-target-fabrication facility
Plutonium	Al [0.2% U]	New plutonium-target-fabrication facility	None	Separate targets not used for plutonium production	Graphite (0.2% UC ₂ microspheres)	New plutonium-target-fabrication facility
Target Processing						
Tritium	Irradiated tritium targets	FMEF, ^b new processing line	Irradiated tritium targets	FMEF, new processing line	Irradiated tritium targets	FMEF, new processing line
Plutonium	Irradiated plutonium targets	200 East area, new SFRC/MPB ^c	None	Separate targets not used for plutonium production	Irradiated plutonium targets	200 East area, new SFRC/MPB
Fuel Processing						
Tritium	Spent driver fuel	200 East area, new SFRC/MPB	Spent driver fuel	200 East area, new SFRC/MPB	Spent driver fuel	200 East area, new SFRC/MPB
Plutonium	Same as above	Same as above	Same as above	Same as above	Same as above	Same as above
Uranium Processing	Recovered uranium	200 East area, new SFRC/UPB ^d	Recovered uranium	200 East area, new SFRC/UPB	Recovered uranium	200 East area, new SFRC/UPB
Waste Management	HLW, TRU, LLW, other	HLW Vitrification facility and WRAP, ^e existing facilities	HLW, TRU, LLW, other	HLW Vitrification facility and WRAP, existing facilities	HLW, TRU, LLW, other	HLW Vitrification facility and WRAP, existing facilities

^aMaterials listed include the composition of the fuel or target, the items recovered from the fuel, and wastes. Fuel and target materials are surrounded by an outer coating; Al [80% UAl] is 80% enriched uranium aluminate surrounded by an aluminum coating; LiAl is lithium-aluminum alloy; UO₂ is uranium oxide; UC₂ is uranium carbide.

^bFuels and Materials Examination Facility.

^cSpent Fuel Reprocessing Complex/Main Processing Building.

^dSpent Fuel Reprocessing Complex/Uranium Processing Building.

^eThe Hanford Waste Vitrification facility and Waste Receiving and Packaging (WRAP) facility will be constructed and operated whether or not an NPR is constructed and operated at Hanford.

TABLE 2 New and Existing Support Facilities Required for New Production Reactor Capacity at INEL

Activity	HWR Alternative		LWR Alternative		MHTGR Alternative	
	Material ^a	Facility Requirement	Material	Facility Requirement	Material	Facility Requirement
Fuel Fabrication						
Tritium	Al [80% UAl]	New fuel-fabrication facility	Zircaloy-4 [8-12% UO ₂]	New fuel-fabrication facility	Graphite (93% UC ₂ (microspheres) ²)	New fuel-fabrication facility
Plutonium	Al [80% UAl]	Same as above	Zircaloy-4 [1.7% UO ₂]	None (commercial vendor)	Same as above	Same as above
Target Fabrication						
Tritium	Al [LiAl]	New tritium-target-fabrication facility	Stainless steel [Li aluminate]	New tritium-target-fabrication facility	Graphite (LiAl microspheres)	New tritium-target-fabrication facility
Plutonium	Al [0.2% U]	New plutonium-target-fabrication facility	Zircaloy-4 [1.7% UO ₂]	None (commercial vendor)	Graphite (0.2% UO ₂ microspheres)	New plutonium-target-fabrication facility
Target Processing						
Tritium	Irradiated tritium targets	New tritium-target-processing facility	Irradiated tritium targets	New tritium-target-processing facility	Irradiated tritium targets	New tritium-target-processing facility
Plutonium	Irradiated plutonium targets	New plutonium-target-processing facility	Irradiated plutonium targets	New low-enriched-fuel-processing facility	Irradiated plutonium targets	New plutonium-target-processing facility
Fuel Processing						
Tritium	Spent driver fuel	FPF at ICPP ^b with new electrolytic head-end process	Spent driver fuel	New facility with chop-leach head-end process	Spent driver fuel	FPF with new head-end process
Plutonium	Same as above	Same as above	Same as above	New low-enriched-fuel-processing facility	Same as above	Same as above
Uranium Processing	Recovered uranium	FPF	Recovered uranium	New low-enriched-fuel-processing facility	Recovered uranium	FPF
Waste Management	HLW, TRU, LLW, other	Existing for all support roles ^c	HLW, TRU, LLW, other	Existing for all support roles	HLW, TRU, LLW, other	Existing for all support roles

^aMaterials listed include the composition of the fuel or target, items processed, uranium recovered from the fuel, and wastes. Fuel and target materials are surrounded by an outer coating; Al [80% UAl] is 80% enriched uranium aluminate surrounded by an aluminum coating; LiAl is lithium-aluminum alloy; UO₂ is uranium oxide; UC₂ is uranium carbide.

^bBy the time of NPR operations, INEL will have constructed a new Fuels Processing Facility (FPF) at the Idaho Chemical Processing Plant (ICPP). Construction and operation of this facility will occur whether or not an NPR is constructed and operated at INEL.

^cAll existing or planned INEL waste-treatment facilities have adequate capacity to process NPR-related wastes.

TABLE 3 New and Existing Support Facilities Required for New Production Reactor Capacity at SRS

Activity	HWR Alternative		LWR Alternative		MHTGR Alternative	
	Material ^a	Facility Requirement	Material	Facility Requirement	Material	Facility Requirement
Fuel Fabrication						
Tritium	Al [80% UAl]	Bldg. 321M	Zircaloy-4 [8-12% UO ₂]	New fuel-fabrication facility	Graphite (93% UC ₂ microspheres)	New fuel-fabrication facility
Plutonium	Al [80% UAl]	Bldg. 321M	Zircaloy-4 [1.7% UO ₂]	None (commercial vendor)	Same as above	Same as above
Target Fabrication						
Tritium	Al [LiAl]	Bldg. 320M	Stainless steel [Li aluminate]	New tritium-target-fabrication facility	Graphite (LiAl microspheres)	New tritium-target-fabrication facility
Plutonium	Al [0.2% U]	Bldg. 313M	Zircaloy-4 [1.7% UO ₂]	None (commercial vendor)	Graphite (0.2% UO ₂ microspheres)	New plutonium-target fabrication facility
Target Processing						
Tritium	Irradiated tritium targets	Bldgs. 245H, 232H	Irradiated tritium targets	Bldgs. 245H and 232H with new extraction cell	Irradiated tritium targets	Bldgs. 245H and 232H with new head-end and extraction cell
Plutonium	Irradiated plutonium targets	Bldg. 221F	Irradiated plutonium targets	Bldg. 221F with new head-end and UO ₃ reduction processes	Irradiated plutonium targets	Bldg. 221F with new head-end process
Fuel Processing						
Tritium	Spent driver fuel	Bldg. 221H	Spent driver fuel	Bldg. 221H with new head-end and UO ₃ reduction processes	Spent driver fuel	Bldg. 221H with new head-end process
Plutonium	Same as above	Bldg. 221F	Same as above	Bldg. 221F with new head-end and UO ₃ reduction processes	Same as above	Same as above
Uranium Processing	Recovered uranium	Included in fuel processing	Recovered uranium	Included in fuel processing	Recovered uranium	Included in fuel processing
Waste Management	HLW, TRU, LLW, other	DWPF, ^b existing facilities	HLW, TRU, LLW, other	DWPF, existing facilities	HLW, TRU, LLW, other	DWPF, existing facilities

^aMaterials listed include the composition of the fuel or target, items processed or recovered from the fuel, and wastes. Fuel and target materials are surrounded by an outer coating; Al [80% UAl] is 80% enriched uranium aluminate surrounded by an aluminum coating; LiAl is lithium-aluminum alloy; UO₂ is uranium oxide; UC₂ is uranium carbide.

^bDefense Waste Processing Facility (DWPF) is nearing completion.

and fuel. However, the existing FB-line (B line of Building 221F) is proposed to be upgraded or replaced in the 1990s in order to maintain the current plutonium program at SRS. Extracted tritium would be purified and loaded into warhead reservoirs at SRS, and weapons-grade plutonium would be shipped to Rocky Flats or equivalent facilities. Wastes would be treated at existing on-site facilities and then placed in interim storage facilities until WIPP, the HLW repository, or other comparable facilities were available. Low-level radioactive waste would be disposed of on the site.

2.3 REFERENCES CITED

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DOE, 1988b, *Final Report, NPR Fuel Cycle and Target Technology Group*, April 18.

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Energy Research Advisory Board, 1988, *Assessment of Candidate Reactor Technologies for the New Production Reactor*, Department of Energy Report DOE/S-0064, July.

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Los Alamos and Brookhaven National Laboratories, 1989, *Accelerator Production of Tritium, Executive Report*, Report BNL/NPB-88-143, March.

Science Applications International Corp. [SAIC], 1988, *New Production Reactor Technology Evaluation: Safety/Environmental Crosscut*, Report SAIC-88/1706, May 23.

3. BASIC ASSUMPTIONS FOR THE ENVIRONMENTAL IMPACT STATEMENT

A number of basic assumptions are necessary in order to carry out the analyses and impact assessments required for the EIS. The key assumptions that have been identified to date are summarized as follows:

1. The EIS will analyze, at a comparable level of detail, the impacts of each reactor technology (HWR, LWR, and MHTGR) at each of the three sites (Hanford, INEL, and SRS), resulting in nine technology/site combinations.
2. Tritium and weapons-grade plutonium production will be evaluated at a comparable level of detail.
3. The NPR facilities at any site would include the reactor(s), target- and fuel-fabrication facilities, target- and fuel-processing facilities, and waste-management facilities. For a situation where target and fuel might be fabricated elsewhere until on-site fabrication and processing facilities were operational, the potential impacts of transporting materials to the reactor site will be assessed. For a situation where heavy water might be transported to a site for processing, the potential impacts of transporting that material will be assessed. The NPR EIS will summarize or reference other available NEPA documentation.
4. All technologies will be evaluated at an operating capacity sufficient to provide the tritium goal requirement and for a weapons-grade plutonium production mode assuming full power operation.
5. Enriched uranium for fuel would be available from existing sources. The impacts of generation of enriched uranium fuel are not within the scope of this EIS; however, the EIS will identify potential sources and describe their reliability.
6. Tritium would be extracted at the NPR sites (other than SRS) and shipped to SRS, where facilities would be located for purifying the tritium and loading it into warhead reservoirs.
7. The impacts associated with spent-fuel reprocessing will be analyzed for all sites. Weapons-grade plutonium would be processed as a metal and shipped to Rocky Flats or other appropriate facility, should one become available. Any enriched uranium recovered from processing of uranium fuel would be recycled through the NPR fuel-fabrication process or shipped to Oak Ridge in the form of uranium oxide.

8. The description of the affected environment presented in the EIS will include the baseline environmental conditions during the construction period (years 1993-2000) and the estimated operation period (years 2000-2040). The baseline environmental conditions would include the effects of non-NPR facilities and activities expected during those periods. The construction impacts baseline conditions would represent the local and regional site characteristics before the start of NPR construction. The operations baseline would include the effects from operations of non-NPR facilities that would exist at the start of NPR operations. At SRS, the baseline environmental conditions assessed will include, for conservative estimating purposes, the operation of the DOE's existing production reactors (P, K, and L) at SRS. These reactors will be assumed to operate at 100% capacity. N-Reactor at Hanford would be assumed to remain in cold standby.
9. The impacts resulting from the no-action alternative would be the same as the baseline conditions described for the affected environment of the proposed action, including assumptions for operation of P, K, and L reactors at SRS and cold standby of N-Reactor at Hanford.
10. Two types of cumulative effects will be assessed in the EIS -- intrasite and intersite. The intrasite cumulative effects will be assessed by adding the incremental effects of combined NPR activities to the effects of other site activities. Intersite cumulative effects will be assessed by evaluating combined effects of operating two reactors, each at goal capacity and at different sites, where those combined effects would result in some environmental interaction.
11. The WIPP and the HLW repository, or other comparable facilities, would be operational within the time frame of the proposed action. It will be assumed that capacity would be available for interim storage of wastes at each site until WIPP and the HLW repository were available. Carbon blocks from MHTGRs would be treated as low-level waste and disposed of on the site. Effects of transporting wastes to WIPP and the HLW repository are assumed to be covered in NEPA documents prepared for those facilities. The results of those studies, if available, will be summarized in the NPR EIS.
12. To the extent that information is available, the EIS will evaluate impacts that may result from decontamination and decommissioning of existing and new facilities as a result of the proposed action.
13. The environmental consequences associated with construction and operation of electrical generation capacity will be analyzed.

However, the DOE has not entered into any agreement for the sale or use of by-product steam for those reactor alternatives capable of power production. Although the sale of steam for power is reasonably foreseeable, the conditions of such sale are highly uncertain. The EIS will provide generic discussion of power transmission impacts, including the distance to the nearest grid and whether constructing the transmission lines would present any unusual conditions (e.g., through areas of great sensitivity such as national parks or monuments). The regional socioeconomic effects of power production or transmission will be briefly discussed. Appropriate NEPA documentation would be prepared in connection with any future proposal for the sale of such steam for power generation.

14. Although the NPR(s) would be capable of producing other radioactive isotopes for civilian, space, and defense purposes, this is not part of the proposed action and will not be included in the EIS. Appropriate NEPA documentation would be prepared in connection with any future proposal for production of those isotopes.

The purpose of the new production capacity for tritium and plutonium is to provide the United States with an assured capability to produce these materials for national defense well into the 21st century. This new reactor capacity would replace DOE's current reactor capacity, which by the year 2000 would have been operating for more than 40 years. This existing capacity includes reactors P, K, and L at SRS. Although these reactors have undergone safety enhancements, there is an increasing risk to assurance of reliable production capacity. The DOE is responsible under the Atomic Energy Act of 1954 for the production of all nuclear materials and devices for the nation's defense and requires a modern, safe, environmentally acceptable production capability to be able to respond to the defense needs of the nation.

The environmental impacts of constructing and operating any of the three reactor types will be analyzed for each of the three potential sites. In addition, the cumulative environmental impacts analysis for the Savannah River Site will reflect the combined impact of an NPR and of continued operation of the existing P, K, and L reactors. This will bound the potential impacts if it becomes necessary to operate some or all of those reactors in order to provide an assured capacity during the several years of transition while the NPR project is in start-up evaluation, while NPR target and fuel processes are being completely evaluated, or to meet unanticipated national security requirements. However, for some potential socioeconomic impacts, such as changes in employment and related impacts, the EIS will analyze the range of effects from the hypothetical shutdown of P, K, and L reactors, as well as the continued operation of these reactors. This approach is intended to bound the potential beneficial and adverse socioeconomic impacts of the action.

4. ENVIRONMENTAL IMPACT ISSUES

The Notice of Intent (NOI) to prepare the EIS and hold public scoping meetings was published by the DOE in the Federal Register on September 16, 1988 (53 FR 36094-36097), and was amended on October 25, 1988 (53 FR 43003-43004) and November 17, 1988 (53 FR 46490). From November 10 through December 8, 1988, the DOE held 13 EIS scoping meetings at various locations in the states of Georgia, Idaho, Oregon, South Carolina, and Washington (Table 4). The public was invited to provide oral comments at the scoping meetings and to submit additional comments in writing to the DOE until the close of the EIS scoping period on December 15, 1988. The NOI also was sent to Federal and state agencies for their comments. The DOE received responses from 8,609 members of the public, interested groups, and Federal, state, and local officials. These responses contained 9,714 scoping comments that were used to identify the significant issues to be analyzed in depth in the EIS, as well as those issues that are not significant or have been covered in other environmental reviews and are eliminated from detailed study in the NPR EIS (Table 5).

4.1 ISSUES IDENTIFIED BEFORE PUBLIC SCOPING

The issues listed on page 22 were initially proposed in the NOI for analysis and assessment in the EIS. This list applies to all facilities associated with NPR(s), including those for fuel and target fabrication, fuel reprocessing, and tritium target processing, waste handling, and the electric power generation options for the LWR and MHTGR

TABLE 4 Locations and Dates of Scoping Meetings

Location	Date (1988)	Location	Date (1988)
Twin Falls, Idaho	November 10	Augusta, Ga.	December 1
Idaho Falls, Idaho	November 14	Moscow, Idaho	December 2
Boise, Idaho	November 16	Savannah, Ga.	December 5
Chubbock, Idaho	November 18	Portland, Ore.	December 6
Richland, Wash.	November 29	Columbia, S.C.	December 7
Aiken, S.C.	November 29	Seattle, Wash.	December 8
Spokane, Wash.	December 1		

TABLE 5 Numbers of Scoping Comments and Issues Raised^a

Category/Issue	Number of Comments
Topical or Issue-Oriented Comments	
Need for the project	
Need for tritium	5,638
Production capability or capacity	101
Conflicts with other societal needs	184
Other	43
Cost/benefit	388
Project description	128
Alternatives	287
Geology and seismology	90
Air quality	77
Noise	2
Water resources	385
Fish and wildlife	56
Wetlands and floodplains	9
Threatened and endangered species	4
Historical, archaeological, and cultural resources	4
Health and safety	613
Waste management	742
Transportation	93
Socioeconomics	421
Psychological impacts	48
Land use	23
Cumulative, long-term non- radiological effects	10
Institutional issues	223
Emergency preparedness	45
Regulatory compliance	100
Total	<u>9,714</u>
Statements of Support or Opposition	
Support	6,977
Opposition	1,154
No Declaration of Position	478

^aA total of 8,609 individuals, groups, or agencies submitted comments. Included were 6,311 who sent cards, 912 who sent letters, 21 who submitted petitions, and 1,365 who provided testimony.

technologies. All of these issues also were identified during public scoping and will be analyzed in the EIS:

Public and Occupational Safety -- The radiological and nonradiological impacts of routine operations and potential accidents, including projected effects on workers and the public.

Water Resources -- The qualitative and quantitative effects on water resources and on other water users in the region.

Air Quality -- The effects of radiological and nonradiological air emissions.

Regulatory Compliance -- Compliance with all applicable Federal, state, and local statutes and regulations and DOE Orders.

Wildlife Areas -- The disturbance or destruction of habitat of important wildlife species, including potential effects on threatened or endangered species of flora and fauna.

Aquatic Species -- The potential for entrapment or impingement of aquatic organisms on surface water intake structures and impacts to aquatic habitats, floodplains, and wetlands.

Waste Management and Transportation -- The environmental effects of generation, treatment, transport, storage, and disposal of radioactive, hazardous, mixed, and solid wastes.

Socioeconomics -- The socioeconomic impacts in affected communities from large construction and operation labor forces and support services.

Cultural Resources -- The potential impacts on historical, archaeological, scientific, or culturally important sites.

Transportation -- Impacts of the transportation of major NPR-related supplies, materials, equipment, products, and wastes on the site and to off-site locations.

Decontamination and Decommissioning (D&D) -- The EIS will broadly evaluate impacts that may result from decontamination and decommissioning of existing and new facilities as a result of the proposed action. However, a separate NEPA review will be prepared that specifically deals with D&D when DOE makes a proposal to retire NPR facilities.

4.2 ISSUES RESULTING FROM PUBLIC SCOPING

This section identifies the issues raised during the public scoping process and describes the relationship of these issues to the content of the EIS. Comments received by the DOE during the scoping meetings or by correspondence are grouped below according to the major subsections of the annotated EIS outline presented in the Appendix to this document. Copies of scoping meeting transcripts and comment letters are available at public libraries in the towns and cities where scoping meetings were held (Table 4).

All topics identified in the NOI will continue to be evaluated in the EIS; the scoping process resulted in the identification of seven topics not included in the NOI that will be analyzed in the NPR EIS (Table 6). Table 7 identifies the planned level of detail of the analyses in the EIS. Throughout the following text, the treatment of topics in the EIS is framed as being discussed "briefly" or in "detail" to give the reader a relative impression of the anticipated depth of analysis to which these topics will be subjected in the EIS. The depth of analysis ultimately performed on a given topic will not necessarily be constrained by this preliminary plan.

TABLE 6 Issues to Be Analyzed in the EIS

Issues Identified in the NOI

Public and occupational health and safety
 Water resources and use
 Air quality
 Regulatory compliance
 Wildlife, threatened and endangered species
 Aquatic species, floodplains, wetlands
 Transportation
 Waste management
 Cultural resources
 Decontamination and decommissioning
 Socioeconomics

Issues Added as a Result of Public Scoping

Need for the project
 Geology and seismology
 Noise
 Land use
 Institutional issues
 Emergency preparedness and response
 Regional effects of power sale and transmission

TABLE 7 Planned Level of Assessment Detail

Issues to Be Analyzed in Detail

Purpose and need for new production capacity
 No-action alternative
 Air quality
 Water resources
 Health and safety
 Transportation
 Waste management
 Socioeconomic impacts
 Land use
 Long-term, radiological cumulative effects
 Regulatory compliance

Other Issues to Be Analyzed

Costs of the proposed action
 Geology and seismology
 Noise
 Fish and wildlife
 Wetlands and floodplains
 Threatened and endangered species
 Archeological, historical, and cultural resources
 Institutional issues
 Emergency preparedness
 Incremental environmental impacts of new production capacity in an environment that includes existing production capacity
 Regional effects of power sale and transmission
 Long-term, nonradiological cumulative effects
 Psychological impacts

Issues Outside the Scope of the EIS

Need for tritium and plutonium or for nuclear weapons
 Conflict with societal needs, comparative cost/benefit
 DOE non-NPR waste-management activities
 Environmental effects of use of nuclear weapons
 Explicit comparison of environmental impacts of new production capacity with impacts of existing production capacity
 NRC licensing requirements

4.2.1 Need for the Project

The DOE received 5,966 comments related to the need for the project. Most of these comments raised issues about the need (1) for tritium or for nuclear weapons (5,638 comments), (2) for production capacity or capability (101 comments), or (3) to spend money for new tritium production capacity when there are other important societal needs, such as social programs, health programs, and waste cleanup (184 comments). Miscellaneous comments in this category related to national security and safety of existing production facilities (43 comments).

Some commenters asked the DOE to clean up its existing sites rather than construct new sources of wastes. Commenters also (1) asked why the United States could not achieve national security using existing supplies, thus eliminating the need for the project; (2) questioned whether nuclear weapons enhance national security; and (3) suggested that the United States take this opportunity to reduce or eliminate nuclear weapons. Other commenters stated that tritium and/or nuclear weapons were necessary for national defense and that new production reactor capacity is essential for national security. Some commenters suggested that other sources of tritium should be sought and that tritium in existing weapons should be recycled. It was suggested that the United States should resume using only plutonium-based weapons. Many commenters questioned the need for nuclear weapons and/or pointed out the adverse consequences of use of nuclear weapons. Several commenters maintained that an NPR would increase nuclear weapon capabilities, thus increasing the chance of nuclear war and its adverse effects.

4.2.1.1 Issues Included in the EIS

The EIS will discuss the need for new production reactor capacity and the role of that capacity in supporting the nation's nuclear weapons stockpile. The alternatives section of the EIS will discuss the feasibility of relying on other sources of tritium and the feasibility of recycling existing tritium supplies.

4.2.1.2 Issues Not Included in the EIS

The need for nuclear materials, such as tritium and plutonium, is based on the current policy of the United States to maintain nuclear weapons as a deterrent to war. Whether this policy is justified, morally acceptable, or capable of accomplishing its goal are issues outside the scope of the NPR EIS, which is limited to an examination of the environmental impacts of the proposed action and reasonable alternatives.

Since the requirements for nuclear materials are determined by the President in the *Nuclear Weapons Stockpile Memorandum* (a classified document), a discussion of the need for tritium and plutonium is outside the scope of the EIS. Similarly, the EIS will not discuss whether elimination or reduction of tritium-containing weapons is feasible, nor will it assess the consequences of relying only on weapons-grade plutonium for nuclear weapons.

The socioeconomic sections of the EIS will include the costs of the proposed action and will discuss the socioeconomic impacts and benefits of the project. However, the benefits of expending those funds for other purposes will not be included in the EIS. The funding of national social and health programs and waste cleanup is at the discretion of Congress and is not directly related to DOE's implementation of the proposed action.

The DOE is currently evaluating waste cleanup and disposal activities at its sites under separate programs. The results of those studies (see Sec. 6 for a partial list) are available through those programs and will not be included in the NPR EIS, unless they directly relate to NPR activities. The relationship of construction and operation of the NPR(s) to site waste management will be addressed in the waste-management sections of the EIS. However, the DOE does not propose to complete all waste cleanup activities before implementing the proposed action. On January 11, 1989, President Reagan submitted a nuclear weapons complex modernization plan to Congress. That plan is being reviewed by Congress and the Administration, and no decisions have been made. To the extent that any proposed actions resulting from future decisions related to the modernization plan may relate to the NPR(s), they will be addressed in the NPR EIS if possible.

Although the DOE produces nuclear weapons, deployed weapons are under the control of the Department of Defense. Since the use of these weapons is highly speculative and would be the result of political and military actions, rather than changes in production capacity, an assessment of the environmental effects of the use of tritium- and plutonium-based weapons is beyond the scope of the NPR EIS.

4.2.2 Cost/Benefit

Cost of the project was the subject of 388 comments, in addition to cost-related comments on other topics of the EIS. These comments included statements that (1) one of the site or reactor alternatives would be less or more costly or of less or more benefit than another site or reactor alternative, (2) funding for waste cleanup or social programs would have greater benefits, (3) cost estimates for reactors have been historically inaccurate, leading to cost overruns, and (4) the EIS should evaluate the economic benefits of cogeneration of electrical power.

4.2.2.1 Issues Included in the EIS

The NPR EIS will use the most recent cost estimates available to compare the costs of the technology and site alternatives. These costs would include constructing and operating new facilities, using existing facilities (where appropriate), conducting associated waste-management activities, and carrying out eventual decontamination and decommissioning of the NPR facilities. These costs also will be used in the socioeconomics sections to assess in detail the impacts of the proposed action and alternatives on local and regional economies, including community services, employment, population growth, public financing, housing, and the reasonably foreseeable impacts to existing facilities that may result from the proposed action, such as the eventual shutdown of P, K, and L reactors at SRS. The impacts of the electric power

requirements for the NPR(s) on local utilities will be assessed briefly, and impacts, including environmental, of power generation and transmission by NPR facilities will be treated in a generic fashion.

4.2.2.2 Issues Not Included in the EIS

The EIS will not compare the costs of NPR facilities with alternative actions, such as waste cleanup or social programs, cleaning up existing facilities not related to NPR(s), nor the costs of alternative programs (see also Sec. 4.2.1.2). The EIS will not examine the history of the accuracy of cost estimation.

4.2.3 Project Description

The DOE received 128 comments related to description of the proposed action. These comments stressed the need to consider safety and reliability in the EIS. Commenters requested that standards of design and assessment be used that are at least comparable to the standards used for commercial reactors. Commenters requested that designs include reactor containment. The use of WNP-1 for production of tritium was both supported and questioned on the basis of feasibility, safety, and past reactor experience. Many commenters were uncertain whether use of WNP-1 to provide tritium-production capacity would be compatible with the Nuclear Nonproliferation Treaty. Commenters both supported and questioned the development of a MHTGR on the basis of safety and of past reactor experience with commercial HTGRs. Commenters also felt that new production reactor capacity should be used to replace existing reactor capacity, which was perceived as less safe than new facilities built to the most recent engineering standards.

4.2.3.1 Issues Included in the EIS

The health and safety aspects of reactors and support facilities will be analyzed in detail in the EIS, as explained in Sec. 4.2.14. Safety and reliability as derived from generic design data will be included in supporting studies. Those studies will describe the design of the reactor concepts, including modifications necessary for WNP-1, and identify potential reactor accidents and the source terms for releases of radioactive materials. These source terms will be based on past experience with the different types of reactors, but also will include the latest requirements for control technology. The approach being taken to reactor safety analysis for the NPR EIS is similar to the analysis used for commercial reactors. Reactor containment is being considered for all reactor types. The reactor accident scenarios will be based on a probabilistic risk assessment approach, similar to the approach used for commercial reactor licensing. Most dose calculations and health effect assessments will not be classified and will be presented in the EIS. If necessary, a classified appendix will be prepared. The issue of the relationship of the Nuclear Nonproliferation Treaty to the use of WNP-1 for new production capacity will be discussed in the institutional issues section of the EIS.

A similar approach will be taken to evaluate the impacts of the support-facility technologies. The accident scenarios will be based on past experience with each category of facility and current guidance for evaluation of accidents in such facilities. The source terms will be based on a combination of past operating experiences and application of current requirements for control technology. The resulting impacts will represent bounding cases of risk from operation of these facilities.

The main text of the EIS will include a brief description of reactors and associated support facilities. This material will be supported by an appendix describing project features in greater detail. All three reactor technologies will be described at a comparable level of detail.

4.2.3.2 Issues Not Included in the EIS

The DOE currently is preparing an EIS related to the operation of P, K, and L reactors at SRS. As indicated elsewhere in this plan, the operation of these reactors will be assumed to be part of the baseline for the existing environment. The NPR EIS will not compare operation of NPR(s) with operation of P, K, and L reactors; however, the EIS will identify the incremental effect of NPR(s) on an environment that includes the effects of P, K, and L reactors operating at full power.

4.2.4 Alternatives

The DOE received 287 comments related to alternatives to the proposed action, including the no-action alternative. Comments were received in favor of the location of NPR capacity at each of the three alternative sites -- Hanford, INEL, and SRS. The technical bases for these comments included geology, hydrology, transportation, economics, safety, societal benefit, and presence of existing facilities. Commenters were concerned that the siting decision should be based on technical merits of the sites, scientific evaluation of alternatives, and sound economic bases, rather than on political considerations.

Commenters stated that the DOE should consider means of tritium supply that do not involve new production reactors. Suggested alternative sources of tritium were (1) restart or upgrade of existing production reactors, (2) tritium production by commercial reactors, (3) recycling of existing supplies, (4) nonreactor production, and (5) purchase from other countries. These issues, and others related to need for production capacity, will be discussed in the EIS section analyzing the need for the project (see Sec. 4.2.1.1).

4.2.4.1 Issues Included in the EIS

The EIS will evaluate, at a comparable level of detail, the consequences of implementing the proposed action for each of the nine reactor complex (HWR, MHTGR and LWR) and site (Hanford, INEL, SRS) alternatives. The nine reactor/site alternatives will be compared on the basis of a technical analysis of predicted consequences of

implementing the proposed action. The EIS also will evaluate the impacts of the no-action alternative. No action will assume continued operation of the P, K, and L reactors and support facilities at SRS and maintenance of the N-Reactor at Hanford in cold standby. The DOE is preparing an EIS on existing production reactor operation at SRS, and the results of that evaluation (if available) will be summarized and incorporated by reference into the NPR EIS. The EIS will include a brief analysis of the ability of commercial reactors and nonreactor technologies to provide the needed tritium production capacity. However, these are not considered to be reasonable alternatives for the proposed action (see Sec. 2.2.2) and will be briefly discussed and dismissed from further consideration.

4.2.4.2 Issues Not Included in the EIS

The NPR EIS is being prepared to assist DOE decision-makers responsible for the NPR project. The EIS will address the environmental effects of the alternatives and present the life-cycle costs of the project; however, political considerations are outside the scope of the EIS.

4.2.5 Geology

The DOE received 90 comments on geological issues. These comments addressed safety-related seismic risk, safety-related volcanic risks, regional geological conditions, groundwater movement, and existing radioactive contamination of soils and groundwater.

4.2.5.1 Issues Included in the EIS

The geology sections of the EIS will include a brief discussion of regional geologic setting, stratigraphy, and geologic structures (including those related to seismicity). Further, any naturally occurring or man-made radioactivity found in groundwater, soils, and parent rocks will be reviewed (see also Sec. 4.2.8.1). The EIS will assess the potential risk from seismic and volcanic activity in sufficient detail to evaluate the potential effectiveness of safety factors related to reactor design.

4.2.5.2 Issues Not Included in the EIS

All geological issues identified during the public scoping process will be covered in the EIS.

4.2.6 Air Quality

Seventy-seven comments identified issues related to air quality, including radioactive emissions, radiological impacts from air emissions, and nonradioactive emissions.

Comments on nonradiological air quality impacts of the NPR(s) included general comments relative to potential downwind locations, such as Yellowstone National Park, Jackson Hole, and Craters of the Moon National Monument. Concerns also were expressed as to how ambient air quality would be protected and about the adequacy and thoroughness of the methodology to be used for assessment. Requests were made to consider cumulative air quality impacts.

4.2.6.1 Issues Included in the EIS

All the comments on air quality identified above will be addressed in detail in the EIS. Radioactive emissions and their potential health effects will be addressed in the health and safety sections of the EIS. The impacts from normal operation of the reactors and support facilities will be assessed using the EPA-approved AIRDOS computer modeling code. The radiological impacts of releases from a severe reactor accident will be assessed using the Melcor Accident Consequence Code System (MACCS) modified to include the radioisotopes carbon-14 (from the MHTGR) and tritium.

The PAVAN computer code, or a similar code, will be used to evaluate radioactive releases from the support facilities and other reactor accidents. The impacts from transportation accidents also will be assessed using the PAVAN code. The impacts from normal (nonaccident) transport will be calculated using the RADTRAN computer code.

Nonradiological air quality impacts will be addressed in the air quality sections of the EIS. The descriptions of ambient air quality presented in the affected environment sections will include emissions from existing site operations and from regional sources. Calculated air quality impacts will in essence be estimates of cumulative impacts, because the predicted air quality resulting from construction and operation of the NPR(s) would include the incremental effects of NPR(s) and the effects of other emission sources.

The air quality sections will identify all significant nonradioactive air pollutant sources occurring during construction and operations of the NPR(s). Emission-control technologies will be described, and compliance with applicable emission-control-technology requirements will be evaluated. Emission rates of EPA-defined criteria and noncriteria pollutants, their precursors, and toxic air contaminants will be estimated; and compliance with all applicable emission standards will be evaluated. Air quality impacts to the environment surrounding the NPR facilities will be estimated using appropriate computer models, including those recommended by the EPA. The assessment methodology will take into account the impacts from existing emissions sources, as well as background concentrations of the emissions. Appropriate meteorological, climatological, and topographical data required or recommended by the EPA modeling guidelines or other criteria will be used in modeling. All applicable ambient standards, regulations, and compliance potentials will be evaluated.

4.2.6.2 Issues Not Included in the EIS

All air quality issues identified during the scoping process will be covered in the NPR EIS.

4.2.7 Noise

The DOE received two comments expressing concerns about potential noise impacts and the effectiveness of any proposed noise-reduction measures.

4.2.7.1 Issues Included in the EIS

Off-site noise impacts from on-site activities will be covered only briefly, because all locations being evaluated are well within the boundaries of existing government-owned sites, and public residences would be several miles from the nearest NPR noise source. Noise impacts of transportation will be covered in greater detail, as will occupational noise impacts. Noise impacts will be estimated using computer models recommended by the EPA and other appropriate models in conjunction with data required or recommended by EPA modeling guidelines or other criteria. Compliance with applicable ambient guidelines, standards, or regulations will be evaluated.

4.2.7.2 Issues Not Included in the EIS

All noise issues identified during scoping will be covered in the EIS.

4.2.8 Water Resources

The DOE received 385 comments identifying issues related to groundwater and surface water. Nearly half of the comments identified issues dealing with existing contamination of water resources. The second largest group of comments related to potential contamination of water resources from operation of NPR(s). The remaining comments addressed potential impacts of construction on water resources, impact mitigation, cumulative impacts, economic impacts, compliance with standards, and regulatory issues. Comments related to existing radiological contamination of water resources at the sites included the extent, severity, and rate of migration of contamination.

Concerns regarding the Hanford Site included contamination in the Columbia River (which flows through the Hanford Site), the effects of water contamination on fishing and recreational activities; and the health effects of consuming contaminated fish. Specific comments identified the potential impact of Hanford Site development on the Portland, Oregon, emergency water supply wells located near the Columbia River; impacts of intake and discharge structures on the Columbia River; and water availability and water rights.

Concerns regarding INEL included existing and potential contamination of the Snake River aquifer by tritium and other pollutants. Specific comments mentioned impacts of groundwater withdrawal on water supply, health risk of water contamination, transport of radioactive materials by the Snake and Columbia River, impact of waste-injection wells, and the request to characterize all waste streams and evaluate waste-disposal methods.

With respect to SRS, contamination of the "Tuscaloosa" (Blackcreek-Middendorf) and shallower aquifers was the major groundwater issue raised by the commenters. Concerns regarding surface water at the SRS included the impacts of the project on sedimentation, water use, and floodplains; the need to identify waste types, disposal methods, and mitigation methods; chemical, thermal, and radioactive contamination of the Savannah River and effects on water users downstream (including coastal areas); containment of current contamination at SRS; effect of the NPR project on implementation of the proposed recirculating cooling water tower for K reactor; and impact of water usage at local, state, and regional levels.

4.2.8.1 Issues Included in the EIS

All the above issues will be addressed in detail in the EIS. The extent and severity of existing water contamination will be included in the description of the affected environment and in the assessment of the no-action alternative. The no-action alternative will address the conditions of the proposed sites without the NPR project through the year 2040, including the effects of any significant system modifications, such as new projects coming on-line and environmental restoration plans. Potential impacts of the NPR project on surface water and groundwater will be addressed. All of the site-specific scoping comments described above will be considered in the assessment process.

4.2.8.2 Issues Not Included in the EIS

All water resource issues identified during the scoping process will be covered in the EIS.

4.2.9 Fish and Wildlife

Fifty-six comments were received related to fish and wildlife resources. Commenters requested that the EIS address (1) loss of fish due to water withdrawals and discharges, (2) magnitude of impacts to fish and wildlife, (3) protection of fish and wildlife habitat, (4) deformity of fish in the Columbia River, (5) impacts on desert environments, and (6) contamination of fish and wildlife resources.

Several comments related specifically to the Columbia River adjacent to the Hanford Site. One commenter suggested that the EIS should identify how the siting, construction, and operation of an NPR at the Hanford Site would relate to all the protective alternatives for the Hanford Reach of the Columbia River. One commenter asked that the EIS assess any potential impacts from construction and operation of a nuclear reactor on the purpose and intent of the United States-Canada Salmon Interception Treaty. Another commenter requested that the EIS identify and assess any impacts to wildlife refuges managed by the U.S. Fish and Wildlife Service.

4.2.9.1 Issues Included in the EIS

The status of fish and wildlife protection for the Hanford Reach of the Columbia River will be described in the affected environment section of the EIS. The potential impact of the proposed action on fish and wildlife and their habitats on the Columbia River and Savannah River also will be briefly addressed in the EIS. Any impacts to these resources that are identified will be assessed with respect to existing and proposed protective measures. The EIS also will identify recommended mitigative measures for any fish and wildlife impacts.

The EIS will briefly describe any affected Federal or state fish and wildlife refuges and will assess in detail the significance of any impacts of the project on fish and wildlife resources of these refuges. The EIS will also briefly identify any direct or indirect land use impacts to Federal or state fish and wildlife refuges. Any impacts predicted to occur to salmon in the Columbia River would be briefly discussed with respect to the United States-Canada Salmon Interception Treaty.

4.2.9.2 Issues Not Included in the EIS

All fish and wildlife issues identified during the scoping process will be covered in the EIS.

4.2.10 Wetlands and Floodplains

The DOE received nine comments related to wetlands and floodplains. These comments requested that (1) all aspects of the project affecting these environments be identified, (2) contamination of wetland foodchains be addressed, and (3) impacts to these habitats be minimized.

4.2.10.1 Issues Included in the EIS

Unless potentially significant wetland or floodplain impacts are identified, the EIS will briefly assess impacts to wetlands and floodplains, assess the effects of these impacts on fish and wildlife, and recommend measures for minimizing wetland and floodplain impacts. If any potentially significant impacts are identified, more detailed coverage will be provided in the EIS. Potential for contamination of the human foodchain will be part of the health risk assessment for both normal operations and accidents.

4.2.10.2 Issues Not Included in the EIS

All wetland and floodplain issues identified during scoping will be covered in the NPR EIS.

4.2.11 Threatened and Endangered Species

The DOE received four comments related to threatened and endangered species. These comments requested that the EIS assess the presence of, and potential impacts to, any such species in areas that would be affected by the project.

4.2.11.1 Issues Included in the EIS

Unless the assessment conducted for the EIS identifies potential impacts to threatened or endangered species, the EIS will briefly identify the habitats of any federally or state-listed species at the alternative sites. It will also briefly discuss the status of any candidate species. The EIS will identify whether any potential exists for impacts to these species or their critical habitat. If such potential does exist, a detailed assessment will be provided. The EIS will include the results of consultations with the U.S. Fish and Wildlife Service concerning federally listed species.

4.2.11.2 Issues Not Included in the EIS

All threatened and endangered species issues identified during the scoping process will be covered in the EIS.

4.2.12 Archaeological, Cultural, and Historical Resources

Archaeological, cultural, or historic resources were mentioned in four comments. These comments were general in nature and included the request that the EIS address the issue of cultural-resource identification.

4.2.12.1 Issues Included in the EIS

Regional prehistory, history, and ethnography will be described in the EIS. Also included will be a brief assessment of impacts of construction and operations on significant cultural resources by category (archaeological sites, historic structures, Native American cultural resources, and paleontological localities). Any necessary mitigative measures will be discussed.

4.2.12.2 Issues Not Included in the EIS

All issues identified during the scoping process related to archaeological, cultural, and historical resources will be covered in the EIS.

4.2.13 Health and Safety

During public scoping, the DOE received 613 comments related to health and safety risks associated with the proposed action. Most of these comments dealt with radiological risks and health effects, although nonradiological occupational safety also was mentioned. Commenters requested that the genetic effects of tritium be included in the assessment of health risks.

Many commenters expressed concern that the EIS should address the cumulative radiological impacts of the proposed action combined with impacts from past and existing operations at the alternative sites. Many expressed concern about potential accidents at reactors and associated support facilities. Some felt that the potential impacts of such accidents must be assessed for areas beyond the site boundaries. Others expressed concern about the effects of accidents on workers.

One commenter requested that the EIS evaluate both radiological and non-radiological impacts of the proposed action on indigenous people who rely heavily on local food sources (i.e., fish, game, wild plants).

Several commenters stated that the EIS should include the radiological and cost impacts of decontamination and decommissioning (D&D) of the proposed reactors. It was also requested that the D&D of existing production reactors be included in the NPR EIS.

4.2.13.1 Issues Included in the EIS

The EIS will assess in detail the risks and potential health effects to workers and the public both from radiological and nonradiological sources during construction and operation of the NPR(s). All potential pathways of exposure will be assessed, including direct exposure, air contamination, water contamination, and food contamination. The long-term genetic effects of tritium will be addressed in the assessment of health risks. The codes and models that will be used for this assessment are identified in Sec. 4.2.6.

The EIS will assess in detail the impacts to workers and the general public from appropriate bounding accidents, design-basis accidents, and/or severe accidents. The risk to workers at the alternative NPR sites will be evaluated based on a combination of experience at nuclear facilities, standard analytical techniques (e.g., failure modes and effects analyses, design-basis analyses, probabilistic analyses where the probabilities are supportable), and current DOE and commercial industry guidance addressing facility accident scenarios and potential source terms. This evaluation will include radiological and nonradiological hazard potentials from the NPR(s) and adjacent non-NPR facilities; risks to workers both in NPR and non-NPR facilities within the site boundaries; and risks from the accidents evaluated and for cleanup of postulated accidents. When insufficient information is available to assess quantitative worker impacts, the EIS will discuss (1) why such quantitative information is not essential to a reasoned choice among alternative technologies, (2) which accident scenarios are most likely, and (3) how the DOE safety analysis and review system and operational safety programs will function to ensure adequate protection for facility workers.

Where air-pathway doses from accidents are predicted to extend beyond the site boundary, these doses to the public will be predicted for the air pathway for a distance of 50 miles, except in the case of severe accidents, for which predictions will extend beyond 50 miles. Water-pathway doses will be assessed for the location of the highest impact to water users. As a minimum, this assessment will include users closest to the point of discharge or to a distance downstream at which the contaminant concentrations are within applicable standards, whichever is the greatest distance. The baseline dose against which the radiological impacts of the project will be assessed will include the radiological dose from past and existing operations. Thus, the dose due to baseline radiation plus the dose predicted for the NPR project will represent the total expected cumulative dose.

The health and safety sections will briefly assess the effects of ingestion of fish, game, and wild plants in conjunction with the assessment of the health effects of normal operations and potential accidents at the NPR facilities. In addition, the historical, archaeological, and cultural resources sections of the EIS will briefly identify native people's traditional food gathering areas in the vicinity of the proposed sites. The socioeconomic analysis will include a brief assessment of whether any of the potential project impacts to ecological resources could affect tribal economies or religious practices.

The EIS will broadly evaluate impacts that may result from decontamination and decommissioning of existing and new facilities as a result of the proposed action. However, a separate NEPA review will be prepared that specifically deals with D&D when DOE makes a proposal to retire NPR facilities. Since the existing P, K, and L production reactors at SRS may continue in operation for some period after start of NPR operations, the D&D of existing reactors will not be included in the NPR EIS. Such D&D activities would constitute a separate proposal, not related to the NPR project, and subject to separate NEPA review. The D&D of the eight surplus reactors at the Hanford Site is currently being evaluated in a separate draft EIS.

4.2.13.2 Issues Not Included in the EIS

All NPR-related health and safety issues identified during the scoping process will be covered in the EIS.

4.2.14 Waste Management

The DOE received 742 comments on waste-management issues. Most of the comments dealt with existing wastes, including references to past waste practices, current levels of environmental contamination due to existing wastes, existing rates of waste generation, and waste-disposal capacities. Several commenters raised the issue of disposal of waste heat. Several of the comments were related to mercury-containing wastes and environmental contamination from mercury. Several commenters requested that the DOE evaluate its waste-management practices on a programmatic basis and finish cleaning up existing wastes and related contamination before constructing new facilities that would generate more wastes.

4.2.14.1 Issues Included in the EIS

The EIS will address wastes from the NPR(s) and NPR support facilities, including estimates of the types, quantities, and forms of wastes that would be generated by all of the NPR facilities. Waste-management facilities, waste-treatment practices (including waste minimization), waste-management capacity, and waste inventories will be described for each site. The water resources sections will identify existing levels of water contaminants and will include a brief assessment of environmental impacts from mercury and other hazardous chemicals. The disposal of hazardous and mixed wastes will be assessed in detail in the waste-management sections. The EIS will address the relationship between hazardous and mixed waste disposal practices and the types of permits needed to comply with Federal and state requirements. The EIS will also briefly assess the disposal of nonhazardous solid wastes.

All three reactor-complex alternatives would have cooling towers designed to meet thermal-effluent discharge standards. The potential meteorological and air quality impacts of these towers, as well as the thermal or other effects of any cooling-tower blowdown on surface waters, will be assessed in detail. The EIS will describe the waste-treatment processes proposed for an NPR complex and will assess in detail the impacts of NPR waste generation in the context of existing waste-management plans and practices of the sites. Life-cycle cost estimates for the project would include the costs of waste management.

The EIS will assume that WIPP, with a follow-on operational program phase, and the HLW repository, or other appropriate facilities, would be available to receive NPR wastes sometime during the life of the NPR project. It is assumed that interim on-site storage would be provided until such facilities were available, and potential impacts of such storage would be included in the EIS. It is assumed that carbon blocks from the MHTGR alternative would be classed as low-level waste and would be disposed of on the site. Such disposal will be assessed in detail in the EIS.

4.2.14.2 Issues Not Included in the EIS

The EIS will not include treatment and disposal of wastes from other sources nor cleanup of environmental contamination from other non-NPR or support facility sources.

The EIS will not examine the DOE's programmatic waste-management responsibilities, except as they are directly related to the proposed action. Environmental documentation related to non-NPR waste issues is available through the DOE program offices with waste-management responsibilities. The proposed action includes the treatment, storage, and disposal of NPR-generated wastes, but does not include treatment and disposal of wastes from other sources nor cleanup of environmental contamination from other sources.

4.2.15 Transportation

The DOE received 93 comments related to transportation issues. These comments addressed transportation of radioactive and hazardous materials, transportation of workers to the site, and transportation of construction materials and other nonradioactive cargo.

4.2.15.1 Issues Included in the EIS

The EIS will include transportation plans assumed for both on-site and off-site activities. The health risks of transporting radioactive and hazardous substances will be assessed in detail both for normal transportation and for transportation accidents. Off-site transportation would include shipment of extracted tritium to SRS, where final tritium-purification and -loading facilities would be located. Transportation of weapons-grade plutonium to Rocky Flats also will be assessed. Since useful quantities of enriched uranium may be recovered from highly enriched fuels, the EIS will assess the transportation impacts of shipment of any excess uranium oxide to Oak Ridge.

The EIS will (1) assess in detail the ability of highway systems to serve the site, (2) evaluate transportation routes, (3) assess impacts of commuter traffic on local transportation systems, and (4) evaluate compliance with transportation laws and regulations.

4.2.15.2 Issues Not Included in the EIS

Transportation of wastes to WIPP or the HLW repository will not be addressed in detail in the NPR EIS, because transportation of wastes to these disposal sites is or will be described and assessed in the national transportation plans and NEPA documentation for those facilities. All other transportation issues identified during the public scoping process will be covered in the EIS.

4.2.16 Socioeconomics

The DOE received 421 comments on socioeconomic issues. These comments covered the topics of (1) general socioeconomic benefits and liabilities, (2) employment, (3) regional and local economies, (4) costs and comparative benefits, (5) community services, (6) utility infrastructure and impacts on utilities, (7) demography, (8) housing, (9) transportation, (10) recreation and tourism, (11) agricultural economies, (12) cumulative effects of socioeconomic and employment impacts, and (13) transportation. The most frequent comments concerned employment impacts and regional/local economic impacts.

4.2.16.1 Issues Included in the EIS

The EIS will address all of these topics in detail. Impacts of the reactor/site alternatives on employment will be assessed both for the regional and local levels. The latest and best available life-cycle cost estimates will be used in the assessment of potential NPR impacts. The socioeconomic assessment will consider the impacts of natural-resource utilization (identified in the fish and wildlife sections) on tribal economies, local economies, and the fishing industry. Since changes in employment influence many other socioeconomic parameters, the socioeconomic analysis will focus first on construction employment, then on permanent employment added by the NPR(s) operations and D&D employment, if available. Socioeconomic impacts of the no-action alternative will also be briefly characterized. These separate employment estimates will be used in a regional input-output analysis to estimate multiplier effects.

The EIS will evaluate the effects of the proposed action on local and regional population growth. The population changes will be analyzed by age group so that impacts on schools, health care and human services, police and fire protection, parks and recreation, utilities (water and electricity), and other community services and facilities can be assessed. Potential impacts of NPR construction and operation activities on utilities also will be assessed.

The construction schedule and operational requirements of the proposed action will be used to assess impacts on employment by industry, race/ethnicity, income level, and location. Impacts on housing, including requirements for both temporary and permanent housing, will be assessed, and housing data will be used to assess the potential negative effects on housing under severe accident scenarios. Because changes in local employment can affect local finances, impacts on property and sales taxes will be assessed. Local area agricultural statistics, including the value of farm commodities and acreages planted, will be used to identify impacts on farm income from restrictions on the sale of agricultural products in the event of a severe accident.

4.2.16.2 Issues Not Included in the EIS

The regional socioeconomic impacts of generation and transmission of NPR-produced power will only be briefly (not in detail) addressed, because conditions of sale and regional use of that power are highly uncertain, although reasonably foreseeable. Appropriate NEPA documentation would be prepared in connection with any future proposal for the sale of steam or power production.

4.2.17 Psychological Impacts

The DOE received 48 comments concerning the fear of nuclear weapons, public acceptance of the project, and community and individual psychological well-being. Nine of these comments specifically requested that the EIS address the psychological impacts of the project.

4.2.17.1 Issues Included in the EIS

NEPA requires consideration of all primary and secondary environmental effects that have a close causal relationship based on changes to the physical environment. Insofar as psychological impacts meet these criteria, they will be briefly analyzed in the EIS.

4.2.17.2 Issues Not Included in the EIS

The psychological impacts associated with fear of nuclear weapons, nuclear war, nuclear reactors, or risk of accidents are examples of potential effects with no apparent link to changes in the physical environment as a result of the proposed action. Only those impacts that have a close causal relationship to changes in the physical environment will be considered in the EIS.

4.2.18 Land Use

Twenty-three comments regarding land use issues were received. These comments requested that the EIS assess (1) impacts on native Indian lands, (2) impacts of the project on recreational activities, tourism, and agriculture; and (3) disease-vector-control provisions.

4.2.18.1 Issues Included in the EIS

The NPR EIS will briefly assess whether the project would have any impacts on native Indian lands or treaty rights. Impacts of the proposed action on recreational activities, tourism, agriculture, and disease-vector control will be similarly treated. The EIS also will address impacts of the project on land use planning and zoning and on any designated Federal, state, or local special-use lands (see also Sec. 4.2.9).

4.2.18.2 Issues Not Included in the EIS

The EIS will evaluate the potential changes in property values caused by construction and operation of the NPR(s) to the extent that such impacts can be assessed with some certainty. Where such changes are highly uncertain and may be the result of subjective perceptions of project acceptability and risk, impacts on property values will not be assessed.

4.2.19 Cumulative, Long-Term Effects

The DOE received ten comments related to cumulative, long-term non-radiological effects of the NPR(s). In addition, radiological cumulative effects were frequently mentioned in the health and safety comments (see Sec. 4.2.13). These comments were primarily nonspecific, although one commenter requested that the EIS

assess contamination of the Savannah River system, and another requested a list of all nonradiological releases during the past five years.

4.2.19.1 Issues Included in the EIS

The EIS will include a brief analysis of the incremental effects of an NPR combined with the effects of continued operation of the existing P, K, and L reactors at SRS. This will be accomplished by including operation of the P, K, and L reactors as part of the affected environment of SRS. This ensures that the assessment of the consequences of new production reactor capacity at SRS includes the potential cumulative effects. In cases where the new and existing reactors depend on the use of the same facilities, such as on-site transportation and waste-management facilities, cumulative impacts will be presented in the appropriate EIS sections. In addition, the health and safety sections will discuss the impacts of normal operations and accidents at one facility on other, adjacent facilities. Where appropriate for air quality and hydrological analyses, existing releases and past releases will be included as part of the baseline environmental conditions.

Since the DOE has announced a preference for developing two reactors, each at a different site, the cumulative effects of this strategy will be addressed in the cumulative impacts subsection of the alternatives section. The discussion will include transportation of extracted tritium to SRS.

Depending on final site selection, construction of NPR facilities may result in impacts to wetlands. Any such impacts also will be discussed in cumulative perspective in the cumulative impact sections of the EIS.

4.2.19.2 Issues Not Included in the EIS

All NPR-related issues regarding cumulative, long-term effects identified during the scoping process will be covered in the EIS.

4.2.20 Institutional Issues

The DOE received 223 comments related to institutional issues. These comments covered such topics as (1) role of politics in NPR decisions, (2) mistrust of the DOE and site management, (3) need for independent oversight of the DOE or of site activities, (4) accessibility of information to the public, (5) conversion of a commercial facility to defense programs, (6) Indian treaty rights at the sites, (7) NRC licensing of NPR facilities, and (8) the need for an epidemiological research project and monitoring program.

4.2.20.1 Issues Included in the EIS

The EIS, and the information on which it is based, will be available to the general public. To the greatest extent possible, the NPR impact assessments will be

unclassified. The draft EIS and supporting documents will be available for public review. The archeological, historic, and cultural resources sections of the EIS will discuss Indian tradition and religious issues. The alternative of converting WNP-1 from potential commercial use to defense materials production will be briefly discussed within the context of the Nuclear Nonproliferation Treaty. Potential construction and operation of an NPR at the Hanford Site will be briefly analyzed in relationship to the United States-Canada Salmon Interception Treaty.

4.2.20.2 Issues Not Included in the EIS

Issues related to public distrust of Federal agencies and need for independent oversight of the DOE are outside the scope of the EIS. Establishment of epidemiological research is outside the scope of the proposed action, and thus of the EIS. The EIS will not include specifications for epidemiological monitoring programs; however, the EIS will describe or reference the site monitoring programs, which may include epidemiological monitoring programs. DOE defense facilities are not subject to NRC regulatory requirements; however, each alternative technology shall be evaluated to provide a level of safety at least equivalent to the best present commercial nuclear plants. Standards pertaining to such comparability will be established under the DOE safety review process now being developed.

4.2.21 Emergency Preparedness

The DOE received 45 comments related to emergency preparedness, notification, and response.

4.2.21.1 Issues Included in the EIS

The EIS will describe current emergency preparedness plans and procedures for each site. Requirements for NPR facilities will be identified, and any changes from existing plans and procedures will be discussed. These changes will be briefly assessed with respect to potential impacts to the public and to state and local institutions and public services.

The requirements for emergency preparedness for NPR(s) will be discussed in light of new DOE Orders currently being developed. These new Orders require DOE sites to have emergency preparedness plans similar to those required for commercial reactors. The emergency preparedness sections also will discuss how the DOE would respond to a transportation accident both inside and outside the site boundaries.

4.2.21.2 Issues Not Included in the EIS

All NPR-related emergency preparedness issues identified in the public scoping process will be covered in the NPR EIS.

4.2.22 Regulatory Compliance

Regulatory compliance issues were mentioned in 100 comments. These comments included issues in the area of health and safety requirements; EPA regulations; compliance with Federal, state, and local laws and regulations; compliance with NRC licensing requirements; and legal or regulatory issues at sites other than the alternative NPR sites.

4.2.22.1 Issues Included in the EIS

The EIS will include a discussion of the applicable Federal, state, and local environmental laws, regulations, standards, and executive orders applicable to construction or operation. The discussion will include:

- The authorities and functions of the statutes,
- A description of the impacts expected from the project and how they will effect the various compliance requirements,
- Significant compliance issues,
- A listing of projected agency consultations under the applicable statutes, and
- A determination of when in the process specific permitting or compliance will be completed.

4.2.22.2 Issues Not Included in the EIS

Regulatory issues at sites not affected by the proposed action are outside the scope of the NPR EIS. Although DOE has committed to designing these reactors to be comparable to the best commercial reactors, compliance with NRC licensing requirements will not be addressed in the EIS, because these requirements do not apply to DOE facilities (see also Sec. 4.2.20.2).

4.3 MARGIN OF CONSERVATISM

The NOI, as amended on October 25, 1988, indicated that the EIS analysis of environmental effects will assume a margin of 25% over calculated source terms to provide a conservative bounding case for each reactor technology. This margin was selected to ensure that the environmental impacts analysis would allow a measure of conservatism for the uncertainty in source terms. The DOE has decided to forgo this rigid margin of conservatism in favor of relying upon the conservative assumptions that are traditionally incorporated into specific source-term calculations as well as in various dispersion modeling and health effect computer codes. These "case-by-case" conservative assumptions are intended to adequately bound the potential releases and impacts from proposed NPR facilities.

5. AGENCY CONSULTATION

Consultation with certain Federal and state agencies is a necessary part of NEPA activities. In addition, many Federal and state agencies have responsibility for certain geographical areas, natural resources, or regulations for environmental protection that will be addressed in the EIS. The DOE will request consultations with those and other interested agencies. Table 8 identifies such consultations.

TABLE 8 Agency Consultations

Subject Area	Legislation	Agency
Endangered species	Endangered Species Act of 1973, as amended; state laws	U.S. Fish and Wildlife Service, state agencies
Migratory birds	Migratory Bird Treaty Act	U.S. Fish and Wildlife Service
Bald and golden eagles	Bald and Golden Eagle Protection Act	U.S. Fish and Wildlife Service, state agencies
Archaeological, historical, and cultural preservation	National Historic Preservation Act of 1966; Archaeological Resources Protection Act; Antiquities Act; American Indian Religious Freedom Act of 1978	State Historic Preservation Office, President's Advisory Council, Tribes
Discharge of pollutants to water	Clean Water Act; Safe Drinking Water Act	U.S. Environmental Protection Agency, state agencies
Work in navigable waters of the United States	Section 404 of Clean Water Act; Rivers and Harbors Act	Corps of Engineers
Prime and unique farmlands	Farmland Protection Policy Act of 1981	Soil Conservation Service
Floodplains	Executive Order 11998; Fish and Wildlife Coordination Act	Corps of Engineers, U.S. Fish and Wildlife Service, state agencies
Wetlands	Executive Order 11990; Fish and Wildlife Coordination Act; Section 404 of Clean Water Act	Corps of Engineers, U.S. Fish and Wildlife Service, state agencies

TABLE 8 (Cont'd)

Subject Area	Legislation	Agency
Water body alteration	Fish and Wildlife Coordination Act	U.S. Fish and Wildlife Service, state agencies
River status	Wild and Scenic Rivers Act; Anadromous Fish Conservation Act; Hanford Reach Study Act	U.S. Department of the Interior
Air pollution	Clean Air Act	U.S. Environmental Protection Agency, state and local agencies
Water use and availability	Water Resources Planning Act of 1965; Safe Drinking Water Act; others	U.S. Environmental Protection Agency, Office of Water Policy, state agencies
Noise	Noise Pollution and Abatement Act of 1970; Noise Control Act of 1972	U.S. Environmental Protection Agency, state agencies
Siting and planning	State siting acts; county zoning regulations	State and county agencies
Waste management and transportation	Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act and the Hazardous and Solid Waste Amendments of 1984; Comprehensive Environmental Response, Compensation, and Liability Act; Emergency Planning and Community Right to Know Act	U.S. Environmental Protection Agency, U.S. Department of Transportation, state agencies

6. RELATED ENVIRONMENTAL DOCUMENTATION

6.1 NEPA DOCUMENTS

The DOE has prepared a number of facility and operational environmental impact statements regarding the sites being considered as alternatives for location of NPR facilities. In addition, the DOE has prepared environmental impact statements related to reactor technologies and waste-management activities. Such documents that assess the impacts of existing facilities or activities at the sites will be incorporated by reference into the NPR EIS. When current NEPA documentation on existing facilities does not exist, the NPR EIS will derive and summarize existing information on the impacts of those facilities as part of the existing baseline conditions at the sites. The impacts of the NPR project will be assessed as the incremental impact of the proposed action alternatives compared with this existing baseline. The following NEPA documents include environmental reviews of sites, activities, or facilities that may be incorporated into the NPR proposed action.

Alternative Cooling Water Systems for C- and K-Reactors and the D-Area Power House at Savannah River Plant, Final Environmental Impact Statement, Department of Energy Report DOE/EIS-0121, Oct. 1987.

Decommissioning of Eight Surplus Production Reactors at the Hanford Site, Richland, Washington, Draft Environmental Impact Statement, Department of Energy Report DOE/EIS-0119D, March 1989.

Defense Waste Processing Facility, Savannah River Plant, Aiken, South Carolina, Final Environmental Impact Statement, Department of Energy Report DOE/EIS-0082, 1982.

Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, Final Environmental Impact Statement, Hanford Site, Washington, Department of Energy Report DOE/EIS-113, Dec. 1987.

Double-Shell Tanks for Defense High-Level Radioactive Waste Storage, Savannah River Plant, Aiken, South Carolina, Final Environmental Impact Statement, Department of Energy Report DOE/EIS-0062, April 1980.

Double-Shell Tanks for Defense High-Level Radioactive Waste Storage, Final Environmental Impact Statement Supplement, Department of Energy Report DOE/EIS-0063, April 1980.

Draft Environmental Statement Related to the Construction of Skagit/Hanford Nuclear Project, Units 1 and 2, Nuclear Regulatory Commission and Washington State Energy Facility Site Evaluation Council Report NUREG-0894, 1982.

Fast Flux Test Facility, Richland, Washington, Environmental Statement, Atomic Energy Commission Report WASH 1510, 1972.

Final Environmental Statement Related to the Construction of Washington Public Power Supply System Nuclear Projects 1 and 4, Nuclear Regulatory Commission Report NUREG-75/012, 1975.

Fuel Processing Restoration at the Idaho National Engineering Laboratory, Environmental Assessment, Department of Energy Report DOE/EA-0306, Aug. 1987.

Fuel Production Facility, Savannah River Plant, Environmental Assessment, Department of Energy Report DOE/EA-0319, Nov. 1986.

Fuels and Materials Examination Facility, Hanford Site, Richland, Washington, Environmental Assessment, Department of Energy Report DOE/EA-0116, July 1980.

Grouting and Near-Surface Disposal of Phosphate Sulfate Hanford Facilities Waste, Environmental Assessment, Department of Energy Report DOE/EA-0312, Nov. 1986.

High Performance Fuel Laboratory, Final Environmental Impact Statement, Energy Research and Development Administration Report ERDA-1550, Sept. 1975.

L-Reactor Operation, Savannah River Plant, Final Environmental Impact Statement, Aiken, S.C., Department of Energy Report DOE/EIS-0108, May 1984.

Management Activities for Retrieved and Newly Generated Transuranic (TRU) Waste, Savannah River Plant, Environmental Assessment, Department of Energy Report DOE/EA-0315, Aug. 1988.

Management of Commercially Generated Radioactive Wastes, Final Environmental Impact Statement, Department of Energy Report DOE/EIS-0046F, Oct. 1980.

New Tritium Loading Facility, Bldg. 233-H, Savannah River Plant, Environmental Assessment, (Classified) Department of Energy Report DOE/EA-0297, April 1986.

Operation of PUREX and Uranium Oxide Plant Facilities, Hanford Site, Richland, Washington, Draft Environmental Impact Statement, Department of Energy Report DOE/EIS-0089D-0084, May 1982, with Addendum (final), Feb. 1983.

Process Facility Modifications Project, Draft Environmental Impact Statement, Hanford Site, Richland, Washington, Department of Energy Report DOE/EIS-0115D, April 1986.

Rocky Flats Plant Site, Golden, Jefferson County, Colorado, Final Environmental Impact Statement, Department of Energy Report DOE/EIS-0064, April 1980.

Savannah River Plant Long-Term Management of Defense High-Level Radioactive Wastes, Aiken, South Carolina, Final Environmental Impact Statement, Department of Energy Report DOE/EIS-0023, Nov. 1979.

Special Isotope Separation Project, Final Environmental Impact Statement, Idaho National Engineering Laboratory, Idaho Falls, Idaho, Department of Energy Report DOE/EIS-0136, Nov. 1988.

Waste Isolation Pilot Plant, Final Environmental Impact Statement, Department of Energy Report DOE/EIS-0026, Oct. 1980; and *Draft Supplement to the Final Environmental Impact Statement*, Department of Energy Report DOE/EIS-0026-DS, April 1989.

Waste Management Operations for Groundwater Protection at the Savannah River Plant, Final Environmental Impact Statement, Department of Energy Report DOE/EIS-0120, Dec. 1987.

Waste Management Operations, Hanford Reservation, Richland, Washington, Final Environmental Impact Statement, Energy Research and Development Administration Report ERDA-1538, 1975.

Y-12 Plant, Oak Ridge, Tennessee, Environmental Assessment, Department of Energy Report DOE/EA-0182, Dec. 1982.

6.2 OTHER RELATED DOCUMENTS

In addition to the NEPA documents listed above, the DOE has prepared several other reports related to technology and site-selection issues relevant to the proposed NPR project. These reports are listed below.

Accelerator Production of Tritium, Executive Report, Los Alamos National Laboratory and Brookhaven National Laboratory Report BNL/NPB-88-143, March 1989.

Acquisition Strategy for New Production Reactor Capacity, Report to Congress by the Secretary of Energy, Aug. 1988.

Assessment of Candidate Reactor Technologies for the New Production Reactor; A Report of the Energy Research Advisory Board to the United States Department of Energy, Report DOE/S-0064, July 1988.

Defense Waste and Transportation Management Program Implementation Plan, Department of Energy Report DOE/DP-0059, Aug. 1988.

Environment, Safety, and Health Needs of the United States Department of Energy, Vols. 1-2, Department of Energy Report DOE/EH-0079, Dec. 1988.

Site Evaluation Report for the New Production Reactor, submitted by the Department of Energy Site Evaluation Team to the Chairman of the Energy Systems Acquisitions Advisory Board (ESAAB) and the Acting Assistant Secretary for Defense Programs, Department of Energy Report DOE/DP-0053, July 1988. [Attachment A: Hanford Site Presentation Material, Report DOE/DP-0054; Attachment B: Savannah River Site Presentation Material, Report DOE/DP-0056; and Attachment C: Idaho Site Presentation Material, Report DOE/DP-0055.]

Reference Repository Location, Hanford Site, Washington, Environmental Assessment, Department of Energy Report DOE/RW-0070, 1986.

7. ENVIRONMENTAL IMPACT STATEMENT PREPARATION

Because the EIS will address several complex issues and alternatives, it is anticipated that the document will exceed the CEQ-recommended limit of 150 pages but will be under the recommended maximum of 300 pages (excluding appendices). The format recommended by the CEQ will be generally followed. An annotated outline for the draft EIS is provided in the Appendix at the end of this document, and the procedures and tentative milestone schedule to be followed in preparing the EIS are summarized below.

7.1 DEVELOPMENT PROCEDURES

Argonne National Laboratory (ANL) has been selected as the lead contractor by the DOE to prepare the EIS on new production reactor capacity and to support all EIS procedural requirements. ANL will prepare the EIS and supporting documentation using information provided by the DOE, other Federal agencies, state agencies, DOE operations office contractors, and others. Any use of such information will be contingent upon ANL's independent review and assessment that the information meets quality assurance requirements for use in the EIS process. The DOE is responsible for the scope and content of the EIS and supporting documents and shall furnish direction to ANL and all participants, as appropriate, in the preparation of these documents. "No-conflict-of-interest statements" from ANL and subcontractors are on file at the DOE's Office of New Production Reactors, Office of Environment, Washington, D.C.

Project descriptions, engineering studies, source-term development, and baseline environmental description are being developed by the DOE. The organizations performing this work are as follows:

1. Department of Energy, Office of New Production Reactors, Office of Systems Engineering, assisted by Science Applications International, Inc.; and Argonne National Laboratory, Special Projects Office (ANL/SPO).
2. Department of Energy, Richland Operations Office, assisted by Pacific Northwest Laboratories (operated for DOE by Battelle Memorial Institute) and Westinghouse Hanford Co.
3. Department of Energy, Idaho Operations Office, assisted by EG&G Idaho, Inc.
4. Department of Energy, Savannah River Operations Office, assisted by NUS Corp., Savannah River Laboratory, and Westinghouse Savannah River Co.

7.2 SCHEDULE

The proposed NPR schedule, including NEPA milestones, is as follows:

<u>NEPA Milestone</u>	<u>Date</u>
Notice of Intent to prepare EIS published	Sept. 16, 1988
Revised Notice of Intent to prepare EIS published	Oct. 25, 1988, and Nov. 17, 1988
Scoping meetings conducted	Nov. 10, 1988- Dec. 8, 1988
EIS scoping period closed	Dec. 15, 1988
DEIS released (public review period begins)	Jan. 21, 1991
Public review and comment period closed	March 22, 1991
Revisions to EIS and responses to comments prepared	March 23, 1991- Oct. 31, 1991
FEIS released	Nov. 29, 1991
Record of Decision issued	No earlier than Dec. 31, 1991
 <u>Project Milestone*</u>	
Design	Through mid-1996
Construction	Early 1992 -- 2000
Operations	2000 and beyond

*The dates for these project milestones are intended to encompass the approximate range of potential start and finish dates among the reasonable technology alternatives.

APPENDIX:**ANNOTATED OUTLINE FOR THE NPR DRAFT
ENVIRONMENTAL IMPACT STATEMENT**

This appendix presents an outline for the NPR draft EIS and includes annotations briefly describing section contents. It should be noted that the outline presented here is tentative and subject to refinement and revision as preparation of the EIS progresses.

COVER SHEET

List of responsible agencies
Title of the proposed action
Person who can supply further information
Designation as draft
Abstract
Date by which comments must be received

SUMMARY

Major conclusions
Areas of controversy
Issues to be resolved

FRONT MATTER

Table of contents
List of figures
List of tables
List of acronyms

1 PURPOSE AND NEED FOR THE ACTION**1.1 Introduction**

[This section will summarize assumptions and explain the structure of the EIS and the rationale for that structure.]

1.2 Proposed Action

[This section will briefly describe the proposed action, including NPR fuel-cycle activities, duration, defense nuclear materials produced, and references to general supporting studies and other NEPA documentation.]

1.3 Purpose

[This section will discuss the role of NPR capacity in support of the nation's nuclear weapons stockpile, other sources of production capacity, and tritium recycling.]

1.4 Need

[This section will discuss the need for NPR capacity and the relationship of that capacity to existing production activities.]

1.5 Costs

[This section will describe life-cycle costs and briefly summarize and compare NPR costs and benefits.]

2 ALTERNATIVES, INCLUDING THE PREFERRED ALTERNATIVE

2.1 Description of Alternatives

2.1.1 Alternative Technologies

[The following sections will include generic descriptions of the reactor technologies and facilities used to produce tritium and plutonium; source terms for normal operations; containment capabilities; potential accidents; and probabilities of both design-basis and severe accidents. The rationales for why some accidents are listed and others are not will be included. For each reactor technology at each site, the site-dependent characteristics will be described, including requirements for construction, production activities, on-site and off-site transportation, waste-disposal plans, and utilities and infrastructure. Site-dependent source terms will be described, to include all effluents, wastes, and areas of site disturbance. These descriptions will be supported by an appendix.]

2.1.1.1 Heavy-Water Reactor and Associated Facilities

2.1.1.2 Light-Water Reactor and Associated Facilities

2.1.1.3 Modular High-Temperature Gas-Cooled Reactor and Associated Facilities

2.1.1.4 Other Alternatives

[This section will briefly discuss, and dismiss as unreasonable, other reactors, other technologies, and other tritium sources.]

2.1.2 Alternative Sites and Facility Locations

2.1.2.1 Alternative Sites

[This section will identify the three alternative sites and briefly discuss how they were selected from 13 candidate sites.]

2.1.2.2 Facility Locations within Sites

[This section will identify the locations of facilities within each site and describe the process, including environmental and technical evaluations, used for selection of facility locations.]

2.1.3 Preferred Alternative

[This section will describe the preferred alternative: a heavy-water reactor at the Savannah River Site and a modular high-temperature gas-cooled reactor at the Idaho National Engineering Laboratory. For the purpose of bounding impacts, each reactor complex will be assumed to be capable of producing tritium goal requirements.]

2.1.4 No-Action Alternative

[This section will describe the alternative of not developing the NPR(s), including assumptions on continued operations of P, K, and L reactors at SRS.]

2.2 Comparisons of Alternatives

2.2.1 Alternative Technologies

[These comparisons will be summaries of impacts presented in the environmental consequences chapter. All comparisons will be at a comparable level of detail.]

2.2.2 Alternative Sites

[These comparisons will be a summary of impacts presented in the environmental consequences chapter. All comparisons will be at a comparable level of detail.]

2.2.3 Cumulative Impacts of Multiple Development, Including Preferred Alternative

[For each impact area, the range of impacts possible with two reactor/two site alternatives will be described.]

2.3 Mitigation, Monitoring, and Emergency Preparedness

2.3.1 Existing

[This section will present a brief summary of the monitoring and emergency preparedness sections of the affected environment chapter.]

2.3.2 Design-Basis

[This section will describe features of the reactor/site alternatives that were designed to mitigate impact.]

2.3.3 Planned

[This section will describe mitigation resulting from impact assessments performed for the EIS.]

3 AFFECTED ENVIRONMENT

[Annotations are presented for only Secs. 3.1.1 through 3.1.13; however, they also will apply to corresponding subsections of Secs. 3.2 and 3.3.]

3.1 Hanford Site

[The first paragraphs in this section will present a brief introductory site description, including site location and topography.]

3.1.1 Geology

[This section will describe the regional geologic setting, stratigraphy, geologic structures, nonanthropogenic radioactivity found in soils and parent rocks, seismicity and volcanism, and soils.]

3.1.2 Air Quality and Noise

[This section will describe site climatology, meteorology, and air quality and noise conditions. Included will be information on hazards from extreme winds, tornados, and hurricanes. Descriptions of air quality will include ambient conditions, attainment status for all criteria pollutants, and any Prevention of Significant Deterioration increments consumed on the site and at nearby locations. Brief descriptions of existing emissions will include on-site stationary emission sources, off-site emission sources, mobile emission sources, and historical data on accidental releases of toxic air pollutants. Brief descriptions of ambient noise levels, sources, nearby incompatible development,

and compliance with regulations and standards also will be presented.]

3.1.3 Water Resources

[This section will describe surface-water and groundwater resources (including rivers, streams, lakes, ponds, wetlands, flood-plains, and aquifers). The description of surface water will include information on water quality, use, and monitoring. The groundwater description will include hydrostratigraphy, recharge of aquifers, and groundwater quality, use, and monitoring. Current and planned mitigation activities through the year 2040, water rights, and applicable water quality standards and compliance also will be discussed.]

3.1.4 Land Use, Recreation, Visual Resources

[This section will describe land use patterns and recreational opportunities adjacent to the site and in the surrounding region. Visual resources will be briefly described.]

3.1.5 Biotic Resources

[This section will contain a brief description of fauna and flora, fish and game, important habitats, threatened and endangered species, and wetlands. The description of wetlands will be supported by a more detailed discussion in a wetlands appendix.]

3.1.6 Historical, Archaeological, and Cultural Resources

[This section will include a description of regional prehistory, history, and ethnography; a description of the inventory of cultural resources; an evaluation of the status of cultural resources with respect to the National Register of Historic Places; and a discussion of the American Indian Religious Freedom Act as it relates to the site.]

3.1.7 Health and Safety

[This section will describe background radiation and existing radiological and nonradiological contamination at the site. Discussions will include information on applicable safety criteria and their bases that could be used for NPR design to ensure public and worker health and safety. Site health and safety programs and monitoring of radiological and hazardous materials also will be discussed.]

3.1.8 Socioeconomics

[This section will describe local and regional socioeconomic factors, including population characteristics, employment and income, industry and agriculture, housing, public and community services, education, health care and human services, police and fire protection, parks and recreation, and utilities.]

3.1.9 Transportation

[This section will describe the existing rail, road, and river transportation networks, as well as traffic flow at the site.]

3.1.10 Existing Facilities

[This section will describe the operations of existing site facilities not connected with the NPR project. Included will be a description of the risk of accidents at these facilities.]

3.1.11 Waste Management

[This section will describe the waste-management facilities at the site; waste-management capacity and use rates; waste-management plans, including waste-minimization plans; off-site disposal; and remedial activities.]

3.1.12 Monitoring

[This section will describe monitoring and mitigation programs currently being conducted at the site.]

3.1.13 Emergency Preparedness

[This section will describe the current emergency preparedness plans for the site.]

3.2 Idaho National Engineering Laboratory

- 3.2.1 Geology
- 3.2.2 Air Quality and Noise
- 3.2.3 Water Resources
- 3.2.4 Land Use, Recreation, Visual Resources
- 3.2.5 Biotic Resources
- 3.2.6 Historical, Archaeological, and Cultural Resources
- 3.2.7 Health and Safety
- 3.2.8 Socioeconomics
- 3.2.9 Transportation
- 3.2.10 Existing Facilities
- 3.2.11 Waste Management

- 3.2.12 Monitoring
- 3.2.13 Emergency Preparedness

3.3 Savannah River Site

- 3.3.1 Geology
- 3.3.2 Air Quality, and Noise
- 3.3.3 Water Resources
- 3.3.4 Land Use, Recreation, Visual Resources
- 3.3.5 Biotic Resources
- 3.3.6 Historical, Archaeological, and Cultural Resources
- 3.3.7 Health and Safety
- 3.3.8 Socioeconomics
- 3.3.9 Transportation
- 3.3.10 Existing Facilities
- 3.3.11 Waste Management
- 3.3.12 Monitoring
- 3.3.13 Emergency Preparedness

4 ENVIRONMENTAL CONSEQUENCES

[For each major technical area (geology, for example) for each site, impacts (including those from accidents) will be assessed for both the construction and operation periods of the proposed action. For each site and each technical area, these impacts will be assessed for each of the three reactor technologies — heavy-water reactors, light-water reactors, and modular high-temperature gas-cooled reactors. For the sake of clarity, these technologies are not shown in the outline. Annotations are presented only for the Hanford Site, but they would apply to the corresponding sections for the other sites as well.]

4.1 Hanford Site

4.1.1 Geology

[This section will address safety-related seismic and volcanic risks.]

4.1.2 Air Quality and Noise

Air Quality *[This subsection will identify emissions from construction and assess their impacts, identify new sources, describe emission rates of EPA criteria pollutants and toxic materials during operations, identify mobile emission sources, discuss release of pollutants during accidents, assess air quality impacts of routine and accidental releases of air pollutants, assess meteorological and drift impacts of cooling tower operations, evaluate compliance with applicable ambient criteria and standards, and describe any planned mitigation.]*

Noise [This subsection will described proposed new noise sources, potential impacts to nearest residents, compliance with applicable noise regulations and standards, and any planned mitigation.]

4.1.3 Water Resources

[Impacts of construction on surface waters, including soil erosion, sedimentation, and water quality will be assessed. Assessment of normal operations will include impacts on surface waters and groundwaters from releases of hazardous and radioactive materials and from increased on-site water use. Analysis of water consumption by the project will include an assessment of water availability and water rights and allotments. Impact assessments of accidents will include analysis of the risk of migration of contaminated surface waters or groundwaters beyond the site boundary and the effects of such migration on water quality and water use. Compliance with water-quality standards will be discussed for both construction and operation. Any mitigation measures planned for protection or enhancement of water quality or water availability will be included.]

4.1.4 Land Use, Recreation, and Visual Resources

[The EIS will determine whether the project would have any impact on tribal lands or off-reservation treaty rights due to off-site impacts to air, water, and human health. Both normal operations and accidents will be included in the analysis. Impacts to local land use off the site will be described. Impacts of both normal operations and accidents will be determined for such features and activities as fish and wildlife refuges, outdoor recreation, tourism, agriculture, and disease-vector control. Visual impacts will be briefly described.]

4.1.5 Biotic Resources

Terrestrial Resources [Assessments will include impacts of the project on habitats, important flora and fauna, and national and state wildlife refuges. Mitigation procedures to reduce or offset impacts will be included.]

Aquatic Resources [Assessments will include loss of fish and larvae in cooling water intake structures, uptake of contaminants by aquatic organisms, effects of thermal and other effluents, and long-term effects of construction and operations on important fish resources and the relationship of these effects to existing mitigation efforts. Mitigation procedures to reduce or offset impacts will be included.]

Wetlands and Floodplains [Loss of or impacts to wetlands and floodplains will be described, and mitigation procedures to avoid or offset impacts will be identified. If significant impacts are identified, this assessment will be supported by more detailed information in wetlands and floodplain appendices.]

Threatened and Endangered Species [This section will identify threatened and endangered flora and fauna and species proposed for listing that could potentially be affected by the proposed project. The section also will identify any project impacts to the habitats of such species. The results of consultation with the Fish and Wildlife Service and the states regarding listed species at the sites will be included in an attachment to the EIS and summarized in this section. Both Federally and state-listed species will be included in the analysis.]

4.1.6 Historical, Archaeological, and Cultural Resources

[This section will include discussions of any adverse effects of the project to significant cultural resources and of mitigative measures. Assessment will include impacts to archaeological sites, historic structures, native American cultural resources, and paleontological localities.]

4.1.7 Health and Safety

[This section will evaluate radiological and nonradiological risks and occupational safety. Radiological risk assessment will include information on doses to workers and the general public and health effects from normal operations, accidents, and transportation of radioactive materials. Pathways of exposure to be examined include direct radiation, inhalation, absorption, and ingestion of food and water. Air-pathway impacts from normal operations and design-basis accidents will be assessed to 50 miles from the facility boundary, but water pathways will be assessed for as far as contamination is predicted to exceed water quality standards. Air-pathway impacts for severe accidents will be assessed beyond 50 miles from facility boundaries. Assessment of health effects will include the long-term genetic effects of tritium, if any.]

4.1.8 Socioeconomics

[This section will include assessments of the fiscal impacts on finances, population growth, community services, health care and human services, schools, police and fire protection, housing, parks and recreation. Changes in local area finances, property taxes,

and sales taxes also will be assessed. Agricultural impacts of severe reactor accidents will be predicted.]

4.1.9 Transportation

[Impacts of the project on roads and highways, site access, traffic patterns and congestion, and transportation accident rates will be included in this section. The effects of transporting reactor fuel and target materials and radioactive wastes will be addressed in the health and safety section.]

4.1.10 Waste Management

[This section will assess the effects of NPR waste streams on the site's waste-management facilities and capacity. Impacts of the project on off-site HLW facilities also will be assessed.]

4.1.11 Institutional Issues

[This section will discuss institutional issues, such as the Nuclear Nonproliferation Treaty and its relationship to NPR use of WNP-1 and the relationship of any impacts to other international treaties, including the United States-Canada Salmon Interception Treaty.]

4.1.12 Emergency Preparedness

[This section will describe the effects of operation of NPR facilities on the site's emergency preparedness requirements and plans. These impacts will be assessed relative to proposed changes in DOE Orders dealing with this subject.]

4.2 Idaho National Engineering Laboratory

4.2.1 Geology

4.2.2 Air Quality and Noise

4.2.3 Water Resources

4.2.4 Land Use, Recreation, and Visual Resources

4.2.5 Biotic Resources

4.2.6 Historical, Archaeological, and Cultural Resources

4.2.7 Health and Safety

4.2.8 Socioeconomics

4.2.9 Transportation

4.2.10 Waste Management

4.2.11 Institutional Issues

4.2.12 Emergency Preparedness

4.3 Savannah River Site

- 4.3.1 Geology
- 4.3.2 Air Quality and Noise
- 4.3.3 Water Resources
- 4.3.4 Land Use, Recreation, and Visual Resources
- 4.3.5 Biotic Resources
- 4.3.6 Historical, Archaeological, and Cultural Resources
- 4.3.7 Health and Safety
- 4.3.8 Socioeconomics
- 4.3.9 Transportation
- 4.3.10 Waste Management
- 4.3.11 Institutional Issues
- 4.3.12 Emergency Preparedness

4.4 No-Action Alternative

[This section will describe the effects of no action.]

5 DECONTAMINATION AND DECOMMISSIONING

[This section will include brief descriptions of the activities necessary for decontamination and decommissioning of each of the reactor types considered. The descriptions will include preliminary estimates of costs, schedule, radiological inventory, radiological exposure to workers, and actions (if any) that can be taken to minimize adverse impacts.]

6 ENVIRONMENTAL COMPLIANCE AND PERMIT REQUIREMENTS

[This section will include brief descriptions of applicable Federal laws, regulations, and permits; state regulations and permits; and DOE Orders as they apply to the proposed action.]

- 6.1 Federal Laws, Regulations, and Permits
- 6.2 State Regulations and Permits
- 6.3 DOE Orders

7 REFERENCES

8 LIST OF PREPARERS

9 LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE EIS ARE SENT

10 ATTACHMENTS

11 GLOSSARY

- APPENDIX A: Reactor and Support Facility Descriptions**
- APPENDIX B: Air Quality and Noise Impact Assessments**
- APPENDIX C: Radiological Assessments**
- APPENDIX D: Transportation of Radioactive Materials and Wastes**
- APPENDIX E: Hydrological Assessments**
- APPENDIX F: Floodplains Assessments (if required)**
- APPENDIX G: Wetlands Assessments (if required)**
- APPENDIX H: Classified Information (if necessary)**