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Final Report: Analysis of Environmental Justice

Harambee House, Inc.

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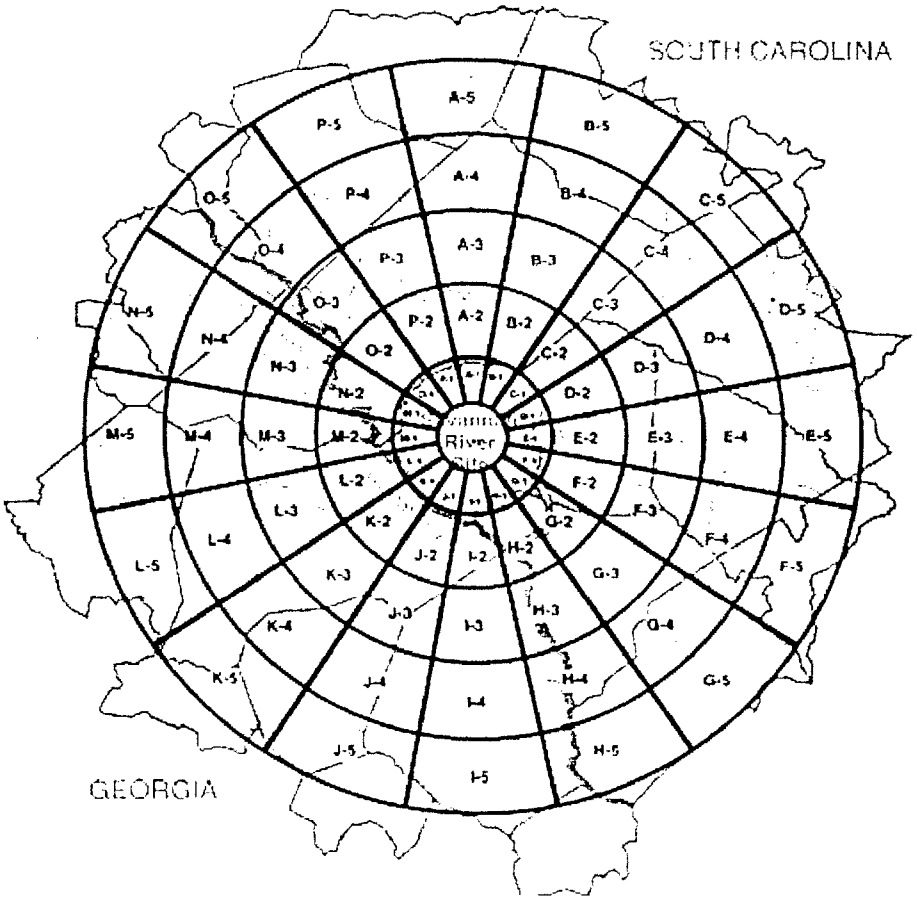
Analysis of Environmental Justice:
A Scientific and Technical Review of the Final Environmental Impact Statement processes on the Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel and the Surplus Plutonium Disposition program



Final Report (DRAFT)

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SUMMARY

The management of spent nuclear fuel (SNF) has been an integral part of the of the U.S. Department of Energy (DOE) mission. Until the early 1990s, SNF management consisted primarily of short-term onsite storage followed by processing in the SRS chemical separation facilities to produce strategic nuclear materials. With the end of the Cold War, the Department of Energy (DOE) decided in April 1992 to phase-out processing of SNF for the production of nuclear weapons materials. As a result, the management strategy for this fuel shifted from short-term storage and processing for the recovery of highly-enriched uranium and transuranic isotopes to stabilization, and when necessary, storage pending final disposition. Interim storage includes preparing SNF for disposal in a potential geologic repository. In addition to the fuel already in storage, DOE, in conjunction with the Department of State, decided to implement a new foreign research reactor spent fuel acceptance policy. Implementation of the new foreign research reactor spent fuel acceptance policy will involve acceptance of aluminum-based spent fuel, TRIGA spent fuel, and target material containing uranium enriched in the United States. This material will be accepted from the 41 countries. The spent fuel acceptance will involve approximately 19.2 MTHM (metric tons of heavy metal) of foreign research reactor spent fuel in up to 22,700 separate spent fuel elements and approximately 0.6 MTHM of target material. This amount of material is the amount that is currently in storage at the foreign research reactors, plus that which DOE estimates will be discharged over a ten-year period. Shipments of this spent fuel into the United States will be accepted over a 13-year period, beginning around May 1996. After having made the decision to store 15,000 spent nuclear rods at SRS, in December 1999, the DOE announced their decision to use the Savannah River Site as the site of choice for the major plutonium mission; which will include the use of the technology of immobilization and mixed oxide (MOX) fuel options associated with plutonium disposition.

The Department of Energy (DOE) decided to implement a program to provide for safe and secure storage of weapons-usable fissile materials (plutonium and highly enriched uranium [HEU]) and a strategy for the disposition of surplus weapons-usable plutonium. The fundamental purpose of the program is to maintain a high standard of security and accounting for these materials while in storage, and to ensure that plutonium produced for nuclear weapons and declared excess to national security needs is never again used for nuclear weapons. DOE will consolidate the storage of weapons-usable plutonium by upgrading and expanding existing and planned facilities and continue the storage of weapons-usable HEU. It has been decided that the strategy for disposition of surplus plutonium is to pursue an approach that allows immobilization of surplus plutonium in glass or ceramic material for disposal in a geologic repository, and burning of some of the surplus plutonium as mixed oxide (MOX) fuel in existing, domestic, commercial reactors, with subsequent disposal of the spent fuel in a geologic repository pursuant to the Nuclear Waste Policy Act.

The decision to take back foreign spent nuclear fuel and to dispose of plutonium has been debated for several years without the active participation and integral involvement of people of color living near the Savannah River Site federal facility under the jurisdiction of Department of Energy. These communities feel that they have been disenfranchised from the debate, the public involvement activities and the decision making process. Therefore they are left to wonder what the receipt of the spent nuclear fuel rods and the disposition of plutonium will mean for their neighborhoods, their health and their environment.

This is a scientific and technical review of the Department of Energy's Final Environmental Impact Statement on the Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (FRR-SNF). The receipt of FRR-SNF adds an additional and important component to DOE's programmatic Spent Nuclear Fuel (SNF) activities. This review also looks at the EIS processes associated with the revised Surplus Plutonium Disposition initiatives.

This analysis evaluates the EIS procedures associated with these two programs for consideration of NEPA requirements with particular emphasis on Environmental Justice. This review has identified deficiencies in DOE's EIS procedures and evaluates some of the problems arising there from. This review analyzed the adequacy of the environmental impact assessment and public participation approaches taken by Department of Energy (DOE) as part of decision-making on spent fuel and surplus plutonium.

From the standpoint of environmental justice issues and concerns, a primary conclusion of this analysis is that the DOE EIS process is a disappointment. The documents that were reviewed are all inadequate. On the basis of these shortcomings, and considerations of the limited descriptions of the environmental justice activities presented in the EISs and supporting primary reference documents, the review disagrees with DOE contention that estimates of the impacts on the environment, workers, and the public from implementing these program are "small and well within applicable regulatory limits", and that no disproportionate risk exist to surrounding communities. Furthermore, the results from this process is indicative of the fact that DOE is still lacking the necessary transparency required for public involvement and has still not considered NEPA requirements as significant to its daily operations. It is evident that over the last eight years has done little to incorporate the intent of EO 12898 in their policies.

INTRODUCTION

This is a scientific and technical review of the Department of Energy's Final Environmental Impact Statement on the Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (FRR-SNF). The receipt of FRR-SNF adds an additional and important component to DOE's programmatic Spent Nuclear Fuel (SNF) activities. This review also looks at the EIS processes associated with the revised Surplus Plutonium Disposition initiatives. This analysis evaluates the EIS procedures associated with these two programs for consideration of NEPA requirements with particular emphasis on Environmental Justice. This review has identified deficiencies in DOE's EIS procedures and evaluates some of the problems arising there from. This review analyzed the adequacy of the environmental impact assessment and public participation approaches taken by Department of Energy (DOE) as part of decision-making on spent fuel and surplus plutonium.

The decision to take back foreign spent nuclear fuel and to dispose of plutonium has been debated for several years without the active participation and integral involvement of people of color living near the Savannah River Site federal facility under the jurisdiction of Department of Energy. These communities feel that they have been disenfranchised from the debate, the public involvement activities and the decision making process. Therefore they are left to wonder what the receipt of the spent nuclear fuel rods and the disposition of plutonium will mean for their neighborhoods, their health and their environment. It is important to address these two (2) problems because the communities near SRS will have to live with the consequences of activities at the site. They deserve to know and understand what scientific basis DOE have used to make decisions. In addition, the management of nuclear waste is a long-term responsibility and demands community involvement, monitoring and civilian oversight. People must be empowered with the tools, skills and information that will facilitate their significant and substantive involvement in not only the decision making process as required by NEPA but in the overall stewardship of these materials. Communities of Color can no longer be kept out of the public participation activities and decision-making processes associated with nuclear waste management. These communities need to improve their understanding of the complex environmental problems created by nuclear weapons production and management.

This Report is a Scientific and Technical Review of the Environmental Impact Statement processes related to the Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel and the Surplus Plutonium Disposition programs at DOE, conducted in accordance with the responsibilities and requirements under Section 309 of the Clean Air Act, Section 102 (2)(C) of the National Environmental Policy Act (NEPA), Section 404 of the Clean Water Act (CWA), and Executive Order 12898 and the accompanying Presidential Memorandum, as well as CEQ environmental justice guidelines. In addition, this review takes into consideration the USDOE Environmental Justice Strategy. The purpose of this review is to analyze the adequacy of the environmental impact assessment and public participation approaches taken by DOE as part of its decision-making process on spent fuel and surplus plutonium, particularly, at the Savannah River Site (SRS). Particular emphasis is placed on the aspect of environmental justice to help stakeholders in the local affected communities in understanding the resulting impacts on their communities and DOE policy and practices for implementing the mandates of relevant environmental laws and regulations.

Collectively, there are five programs that are of significance to the scope of this review, two of these programs are programmatic and the others can be considered as addition tiering of those or new additions to the scope of existing programs. In any case they are concerned with the safe and efficient management of spent nuclear fuel and targets and weapons-grade plutonium at the Savannah River Site. Therefore, this review will focus on the spent fuel and plutonium disposition at SRS as representative of polices and practices of the two programs. A discussion of the programmatic SNF program can be found in the *Department of Energy Final Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement*, DOE/EIS-0203-F completed in April 1995. The Details of the proposed new policy on the nonproliferation of spent fuel can be found in U.S. Department of Energy *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel*, DOE/EIS-0218F issued in February 1996. as decided in the ROD and Notice of Preferred Alternative published in December 1995 (60 FR 65300), This proposed SNF new initiative will add to the current Spent Nuclear Fuel management program ongoing at the Savannah River Site. Therefore building on consideration in the interim Management of Nuclear Materials Final Environmental Impact Statement (DOE/EIS), DOE completed another SNF environmental impact statement (EIS) that takes the two above aspects into consideration. Details of this new program can be found in U.S. Department of Energy *Savannah River Site, Spent Nuclear Fuel Management Final Environmental Impact Statement*, DOE/EIS-0279F issued in March 2000. The information and comments contained here takes into consideration all aspects of the spent fuel program dealing with the managing of the department's spent fuel through the year 2035 but pays special attention to the NEPA EIS processes associated with it.

Secondly, The Department of Energy (DOE) has decided to implement a new strategy for the disposition of surplus plutonium *Surplus Plutonium Disposition Final Environmental Impact Statement* (DOE/EIS-283-F, 1999). DOE decided to implement this program to provide for safe and secure storage of weapons-usable fissile materials (plutonium and highly enriched uranium [HEU]) and a strategy for the disposition of surplus weapons-usable plutonium, as specified in the Preferred Alternative in the *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement* (S&D Final PEIS, DOE/EIS–229, December 1996). The fundamental purpose of the program is to maintain a high standard of security and accountability for these materials while in storage, and to ensure that plutonium produced for nuclear weapons and declared excess to national security needs is never again available for used in nuclear weapons. DOE's strategy for disposition of surplus plutonium is to pursue an approach that allows immobilization of surplus plutonium in glass or ceramic material for disposal in a geologic repository pursuant to the Nuclear Waste Policy Act, and burning of some of the surplus plutonium as mixed oxide (MOX) fuel in existing, domestic, commercial reactors, with subsequent disposal of the spent fuel in a geologic repository pursuant to the Nuclear Waste Policy Act.

Environmental and waste management strategies for all of the above mentioned programs as described in their respective EIS would be conducted within the framework of the revised mission outlined in the Department of Energy Environmental Restoration and Waste Management (EM) Programs (DOE/EM-0013P; 00097P).

Because this review was initiated at the request of the local communities surrounding the Savannah River Site (SRS) special consideration will therefore be given to that facility. In addition, this facility features prominently in the final decisions of both programs under consideration and therefore makes a good case study of DOE activities.

The U.S. Atomic Energy Commission, a DOE predecessor agency, established the SRS in the early 1950s. The SRS is located in west-central South Carolina and occupies an area of approximately 300 square miles (approximately 800 square kilometers) adjacent to the Savannah River, primarily in Aiken and Barnwell Counties. The Site is approximately 25 miles (40 kilometers) southeast of Augusta, Georgia, and 20 miles (32 kilometers) south of Aiken, South Carolina. All alternatives described in the EISs, including the possible construction of new facilities to implement some of the alternatives, would occur within existing industrial areas at SRS (Figure 1). For the past 40 years the SRS mission has been the production of special radioactive isotopes to support national programs. Historically, the primary Site mission was the production of strategic isotopes (plutonium-239 and tritium) for use in the development and production of nuclear weapons. The SRS produced other isotopes (e.g., californium-252, plutonium-238, americium-241) to support research in nuclear medicine, space exploration, and commercial applications. DOE produced these isotopes in the five SRS production reactors. After the material was produced at the SRS, it was shipped to other DOE sites for fabrication into desired forms.

In September 1993 as a part of the U.S. government new nonproliferation policy, DOE made the decision to take back foreign spent nuclear fuel. This decision had been debated for several years without the active participation and integral involvement of people of color living near the SRS. These communities (The Community Alliance on Savannah River Site includes the cities of Augusta, Keysville and Savannah, Georgia and Blackville and Beaufort, South Carolina) believe that they have been disenfranchised from the debate, the public involvement activities and the decision making process, as well as accessing information. As a result, they have been left to guess what kind of impact the receipt of additional spent nuclear fuel and the new surplus plutonium disposition program at SRS will have on their neighborhoods, health and environment.

The Environmental Justice Concept

Environmental Justice has been defined by a variety of people and organizations interested in the topic (environmental racism; economic racism etc.). The U.S. Environmental Protection Agency's Office of Environmental Justice uses the following definition: "The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies." This is the definition that will be considered throughout this document since it's the generally accepted definition used when addressing all federal activities. In the definition, the goal of "fair treatment" does not imply a shift risks from one population to another, but to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.

The focus of environmental justice concerns in this report will be broadly viewed from four vantage points:

1. *Whether the proposed activity/project is located in or impacts on a minority or low-income community*; it is necessary to establish the presence of such a community as defined by CEQ 1977. Special attention should be given to subgroups, especially, those that qualify as both.
2. *Whether there exists a potential for disproportionate risk*, this requires a thorough evaluation of the proposed action and associated potential risks.
3. *Whether the community currently suffers, or have historically suffered, from environmental and health risks or hazards*; this is a very important and much overlooked area of the EIS process. An analysis of most environmental justice concerns would show that they can trace their roots back to a period of time when minority and low-income communities had no say whatsoever in what was placed next door to them.
4. *Whether the community has been sufficiently involved in the decision-making process as outlined by NEPA*; the proposing agency have to remember that when dealing with environmental justice issues, the requirement by NEPA, CEQ and any other regulation or guidance is the inclusion of the impacted community at the earliest possible time. Special interest from outside the affected area serves as a form of public participation but does not meet the environmental justice criteria since they are, for the most part, not members of the impacted community.

Any reasonable environmental impact assessment in compliance with the intent of NEPA should contain detail answers to the above. This review therefore analyzes the adequacy of the environmental impact assessment and public participation approaches taken by the Department of Energy (DOE) as part of its decision-making on spent fuel and surplus plutonium with these considerations in mind. Because this review was initiated at the request of the local communities surrounding the Savannah River Site (SRS), special consideration is given to that facility. In addition, this facility features prominently in the final decisions of the two programs of primary interest and therefore makes for a good case study.

History and Background of Spent Nuclear Fuel Program

The proposed DOE action considered in SNF environmental impact statement (EIS) is to implement appropriate processes for the safe and efficient management of spent nuclear fuel and targets at the Savannah River Site (SRS) in Aiken County, South Carolina, including placing these materials in forms suitable for ultimate disposition (DOE/EIS-0279). Nuclear fuel contains some unused enriched uranium and radioactive fission products. Because of its radioactivity (primarily from gamma rays), it must be properly shielded. The fuel elements exist in many configurations. Generally, a fuel element is covered by a metal called cladding and is shaped into long rods, flat plates, or cylinders. Options to treat, package, and store this material were evaluated. The material included in the SNF EIS consists of approximately 68 metric tons heavy metal (MTHM) of spent nuclear fuel (20 MTHM of aluminum-based spent nuclear fuel at SRS, as much as 28 MTHM of aluminum-clad spent nuclear fuel from foreign and domestic research reactors to be shipped to SRS through 2035, and 20 MTHM of stainless-steel or zirconium-clad spent nuclear fuel and some Americium/Curium Targets stored at SRS.

Alternatives considered in the SNF EIS encompass a range of new packaging, new processing, and conventional processing technologies, as well as the No Action Alternative. The new packaging technologies include direct disposal/direct co-disposal and repackaging and prepare for shipment to another site. The new processing technology includes melt and dilute, mechanical dilution (press and dilute and chop and dilute), vitrification (plasma arc treatment, glass material oxidation and dissolution system and dissolve and vitrify) and electrometallurgical treatment. Conventional processing technology is also considered as an option. The preferred alternative is identified in which DOE would prepare about 97 percent by volume (about 60 percent by mass) of the aluminum-based fuel for disposition using a melt and dilute treatment process. The remaining 3 percent by volume (about 40 percent by mass) would be

managed using chemical separation. Impacts were assessed primarily in the areas of water resources, air resources, public and worker health, waste management, socioeconomic, and cumulative impacts (DOE/EIS-0279).

The management of spent nuclear fuel (SNF) has been an integral part of the mission of DOE at the Savannah River Site (SRS) for more than 40 years. Until the early 1990s, SNF management consisted primarily of short-term onsite storage followed by processing in the SRS chemical separation facilities to produce strategic nuclear materials. With the end of the Cold War, the U.S. Department of Energy (DOE) decided in April 1992 to phase-out processing of SNF for the production of nuclear weapons materials. As a result, the new management strategy for this fuel has shifted from short-term storage and processing for the recovery of highly-enriched uranium and transuranic isotopes to stabilization, when necessary, and interim storage pending final disposition (DOE/EIS-0279). Interim storage includes preparing SNF for disposal in any potential geologic repository.

In addition to the fuel already onsite, DOE, in conjunction with the Department of State, decided to implement a new foreign research reactor spent fuel acceptance policy, as specified in the Preferred Alternative in the Final EIS. Implementation of the new foreign research reactor spent fuel acceptance policy will involve acceptance of aluminum-based spent fuel, TRIGA spent fuel, and target material containing uranium enriched in the United States. This material will be accepted from the 41 countries. The spent fuel acceptance will involve approximately 19.2 MTHM (metric tons of heavy metal) of foreign research reactor spent fuel in up to 22,700 separate spent fuel elements and approximately 0.6 MTHM of target material. This amount of material is the amount that is currently in storage at the foreign research reactors, plus that which DOE estimates will be discharged over a ten-year period. Shipments of this spent fuel into the United States will be accepted over a 13-year period, beginning around May 1996. Either chartered or regularly scheduled commercial ships will ship the foreign research reactor spent nuclear fuel. The majority of the spent fuel will be received from abroad through the Charleston Naval Weapons Station in South Carolina (about 80%) and the Concord Naval Weapons Station in California (about 5%). Most of the target material and some of the spent fuel (about 15%) will be received overland from Canada. Shipment through Charleston began in the summer of 1996 and through Concord in mid-1997. Shipments from Canada were not scheduled at the time of the decision. After a limited period of interim storage, the spent fuel will be treated and packaged at the Savannah River Site and the Idaho National Engineering Laboratory as necessary to prepare it for transportation to a final disposal repository.

Foreign Research Reactor SNF

DOE, in consultation with the Department of State, decided to implement a new foreign research reactor spent fuel acceptance policy, as specified in the Preferred Alternative in the Final EIS. In summary, implementation of the new foreign research reactor spent fuel acceptance policy will involve acceptance of aluminum-based spent fuel, TRIGA spent fuel, and target material containing uranium enriched in the United States, as defined in the Final EIS. This material will be accepted from the 41 countries listed in Section III of this notice. The spent fuel acceptance will involve approximately 19.2 MTHM (metric tons of heavy metal) of foreign research reactor spent fuel in up to 22,700 separate spent fuel elements and approximately 0.6 MTHM of target material. This amount of material is the amount that is currently in storage at the foreign research reactors, plus that which DOE estimates will be discharged over the next ten years. Shipments of this spent fuel into the United States will be accepted over a 13-year period, beginning on the effective date of the policy. Either chartered or regularly scheduled commercial ships will ship the foreign research reactor spent nuclear fuel. The majority of the spent fuel will be received from abroad through the Charleston Naval Weapons Station in South Carolina (about 80%) and the Concord Naval Weapons Station in California (about 5%). Most of the target material and some of the spent fuel (about 15%) will be received overland from Canada. Shipment through Charleston will begin in

the summer of 1996 and through Concord in mid-1997. Shipments from Canada were not scheduled at the time the final EIS was published. After a limited period of interim storage, the spent fuel will be treated and packaged at the Savannah River Site and the Idaho National Engineering Laboratory as necessary to prepare it for transportation to a final disposal repository.

The SRS will receive SNF from foreign research reactors until 2009 and potentially could receive SNF from domestic research reactors until 2035. As a result, the safe and efficient management of SNF will continue to be an important SRS mission. A key element in the decisionmaking process for SNF management is a thorough understanding of the environmental impacts that may result from the implementation of the proposed action. The SNF EIS evaluates the potential environmental impacts of DOE's proposed plans for managing SNF assigned to SRS.

History and Background of the Surplus Plutonium Disposition Program

On May 22, 1997, DOE published a Notice of Intent (NOI) in the Federal Register (FR) (DOE 1997b) announcing its decision to prepare an environmental impact statement (EIS) that would tier from the analysis and decisions reached in connection with the *Storage and Disposition PEIS*. This EIS, the *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS), addresses the extent to which each of the two plutonium disposition approaches (immobilization and MOX) would be implemented and analyzes candidate sites for plutonium disposition facilities and activities (i.e., lead assembly fabrication and postirradiation examination), as well as alternative technologies for immobilization. In July 1998, DOE issued the SPD Draft EIS. That draft included a description of the potential environmental impacts of using from three to eight commercial nuclear reactors to irradiate MOX fuel. The potential impacts were based on a generic reactor analysis. In March 1999, DOE awarded a contract for MOX fuel fabrication and irradiation services. After this award, DOE issued a *Supplement to the SPD Draft EIS (Supplement)* (April 1999) that describes the potential environmental impacts of using MOX fuel at three proposed reactor sites and provides updated information on the proposed disposition program. These updates and site-specific analyses have been incorporated in the SPD Final EIS. The SPD EIS analyzes a nominal 50 metric tons (t) (55 tons) of surplus weapons-usable plutonium, which is primarily in the form of pits (the core element of a nuclear weapon's fission component), metals, and oxides. In addition to 38.2 t (42 tons) of weapons-grade plutonium already declared by the President as excess to national security needs, the material analyzed includes weapons-grade plutonium that may be declared surplus in the future, as well as weapons-usable, reactor-grade plutonium that is surplus to the programmatic and national defense needs of DOE.

There are seven locations of surplus plutonium within the DOE complex: the Hanford Site (Hanford) near Richland, Washington; Idaho National Engineering and Environmental Laboratory (INEEL) near Idaho Falls, Idaho; Lawrence Livermore National Laboratory (LLNL) in Livermore, California; Los Alamos National Laboratory (LANL) near Los Alamos, New Mexico; the Pantex Plant (Pantex) near Amarillo, Texas; the Rocky Flats Environmental Technology Site (RFETS) near Golden, Colorado; and the Savannah River Site (SRS) near Aiken, South Carolina. Under the hybrid alternatives, about 34 percent of the surplus plutonium analyzed in the SPD EIS is not suitable for fabrication into MOX fuel due to the complexity, timing, and cost that would be involved in purifying the material. The *Storage and Disposition PEIS* ROD determined that DOE would immobilize at least 8 t (9 tons) of the current surplus plutonium. Since issuance of the ROD, further consideration has indicated that 17 t (19 tons) of the surplus plutonium is not suitable for use in MOX fuel and should be immobilized. Therefore, fabricating all 50 t (55 tons) of surplus plutonium into MOX fuel is not a reasonable alternative and is not analyzed. The SPD EIS does, however, analyze the immobilization of all the surplus plutonium. (Section S.3 of the Summary) Given the variability in purity of the surplus plutonium to be dispositioned, some of the plutonium currently considered for MOX fuel fabrication may also need to be immobilized. The

incremental impacts that would be associated with a small shift in materials throughput are discussed in Chapter 4 of the SPD EIS.

In the *Storage and Disposition PEIS* ROD, DOE retained the option to use some of the surplus plutonium as MOX fuel in Canadian Deuterium Uranium (CANDU) reactors, which would have been undertaken only in the event that a multilateral agreement were negotiated among Russia, Canada, and the United States. Since the SPD Draft EIS was issued, DOE determined that adequate reactor capacity is available in the United States to disposition that portion of the U.S. surplus plutonium suitable for MOX fuel and, therefore, while still reserving the CANDU option, DOE is no longer actively pursuing it. DOE, in cooperation with Canada and Russia, proposes to participate in a test and demonstration program using U.S. and Russian MOX fuel in a Canadian test reactor. If Russia and Canada agree to disposition Russian surplus plutonium in CANDU reactors in order to augment Russia's disposition capability, shipments of the Russian MOX fuel would take place directly between Russia and Canada.

For purposes of the programs under review here, (SNF and SPD), the potential geologic repository candidate site at Yucca Mountain, Nevada, is assumed to be the final disposal site for all immobilized plutonium and spent fuel. It should be noted that currently there are no other locations under consideration as a geologic repository; Yucca Mountain is the only site being characterized as a potential geologic repository. In August 1999, DOE issued a separate EIS, the *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250D) (DOE 1999c), to analyze the site-specific environmental impacts of construction, operation and monitoring, and eventual closure of a potential geologic repository at Yucca Mountain. Shipments of spent fuel to a potential geologic repository are analyzed in the *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada* (DOE/EIS-0250D) (DOE 1999c). Transportation to a final disposal repository is still years off. To date, there are no final decisions on Yucca Mountain as a final geologic repository. While Yucca Mountain is currently the only site being considered, scientific research does not yet support this location as a geologic repository.

Purpose, Need and Scope of the Proposed Actions

The purpose of and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by conducting disposition of surplus plutonium in the United States in an environmentally safe and timely manner. Comprehensive disposition actions are needed to ensure that surplus plutonium is converted to proliferation-resistant forms.

Between 1993 and 1994, the White House issued new policies in response to the growing threat of nuclear proliferation. In accordance with these policies, the focus of the U.S. nonproliferation efforts would include ensuring the safe, secure, long-term storage and disposition of surplus weapons-usable fissile plutonium. Following publication of the SPD Draft EIS, the United States and Russia signed a 5-year agreement to provide the scientific and technical basis for decisions concerning how surplus plutonium will be managed and a statement of principles with the intention of removing approximately 50 t (55 tons) of plutonium from each country's stockpile. The SPD EIS addresses both the immobilization and MOX approaches to surplus plutonium disposition, which include the siting, construction, operation, and ultimate decontamination and decommissioning (D&D) of three types of facilities at one or two of four candidate DOE sites:

A facility for disassembling pits (a weapons component) and converting the recovered plutonium, as well as plutonium metal from other sources, into plutonium dioxide suitable for disposition. This facility, the

pit disassembly and conversion facility, is referred to in this document as the *pit conversion facility.* Candidate sites for this facility are Hanford, INEEL, Pantex, and SRS.

A facility for immobilizing surplus plutonium for eventual disposal in a geologic repository pursuant to the Nuclear Waste Policy Act (NWPA), the plutonium conversion and immobilization facility, is referred to as the *immobilization facility.* This facility would include a collocated capability for converting nonpit plutonium materials into plutonium dioxide suitable for immobilization. The immobilization facility would be located at either Hanford or SRS. DOE identified SRS as the preferred site for an immobilization facility in the NOI to prepare the SPD EIS, which was issued in May 1997. Technologies for immobilization are also discussed in the SPD EIS.

A facility for fabricating plutonium dioxide into MOX fuel, the MOX fuel fabrication facility, is referred to as the *MOX facility.* Candidate sites for this facility were Hanford, INEEL, Pantex, and SRS. Also included in the SPD EIS is a separate analysis of MOX lead assembly activities at five candidate DOE sites: Argonne National Laboratory–West (ANL–W) at INEEL; Hanford; LLNL; LANL; and SRS. DOE would fabricate a limited number of MOX fuel assemblies, referred to as lead assemblies, for testing in a reactor before commencement of fuel irradiation under the proposed MOX fuel program. Postirradiation examination activities at two sites, ANL–W and Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee, are also analyzed in the SPD EIS. The SPD EIS also analyzes a No Action Alternative, as required by the National Environmental Policy Act (NEPA). In the No Action Alternative, surplus weapons-usable plutonium in storage at various DOE sites would remain at those locations. The vast majority of pits would continue to be stored at Pantex, and the remaining plutonium in various forms would continue to be stored at Hanford, INEEL, LLNL, LANL, RFETS, and SRS.

In 1992, with the end of the "Cold War" and the decrease in need for strategic nuclear material that was produced at the SRS, the Secretary of Energy directed that processing operations be phased out throughout the DOE complex. This effectively halted the SRS mission to produce strategic nuclear materials such as plutonium-239. In addition to nuclear material production missions, another mission for the SRS was the receipt of SNF from DOE, domestic, and foreign research reactors. These reactors were operated by DOE, universities, and research institutions for educational and research purposes and to produce isotopes for nuclear medicine. Historically, SNF from these reactors was stored in the Receiving Basin for Offsite Fuel (RBOF) at SRS. In the past, much of the research reactor SNF was processed in the same manner as spent fuel from SRS production reactors. However, with the end of the Site's strategic nuclear materials production mission, SNF from research reactors has been accumulating in the Receiving Basin for Offsite Fuel and in the L reactor Disassembly Basin. Some of the research reactor spent nuclear fuel sent to SRS was not aluminum based. Because DOE did not have the capability to process that type of SNF at SRS, it was placed in wet storage at the Receiving Basin for Offsite Fuel, where it remains in storage. SNF and targets from previous production reactor irradiation cycles remained in storage at K-, L-, C-, and P-Reactor Disassembly Basins. By 1995 DOE was storing about 195 metric tons heavy metal (MTHM [metric tons heavy metal] – the mass of uranium in the fuel or targets, excluding cladding, alloy materials, and structural materials) – of aluminum-based SNF in the SRS reactor disassembly basins and the Receiving Basin for Offsite Fuel. DOE also was storing about 20 MTHM of non-aluminum-based SNF in the Receiving Basin for Offsite Fuel.

DOE has taken action to stabilize about 175 MTHM of the 195 MTHM of aluminum-based SNF that was in storage at SRS in 1995. DOE decision to stabilize this material following completion of the *Interim Management of Nuclear Materials Environmental Impact Statement* (DOE 1995a). The primary purpose of the actions described in that environmental impact statement (EIS) was to correct or eliminate potential health and safety vulnerabilities related to some of the methods used to store nuclear materials (including SNF) at SRS. The vulnerable SNF had been stored in wet storage basins with poor water quality. The

poor water quality resulted in corrosion and failure of the cladding on the fuel and subsequent releases of radioactive fission products to the water of the storage basins.
In 1996, SRS began stabilizing vulnerable aluminum-based uranium metal SNF in F Canyon. DOE has stated that that work is completed. Vulnerable aluminum-based SNF still is being stabilized in H Canyon and that work is expected to continue through 2002. In the *Interim Management of Nuclear Materials EIS* (DOE 1995a), DOE identified 20 MTHM (out of 195 MTHM) of aluminum-based SNF at SRS that was "stable," i.e., that likely could be safely stored for about 10 more years, pending decisions on final disposition. That 20 MTHM of aluminum-based SNF is included in this EIS.

In May 1995, DOE decided (60 FR 28680) under the *Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Final Environmental Impact Statement* to consolidate existing and newly generated SNF at three existing Departmental sites based on the fuel type, pending future decisions on ultimate disposition. Specifically, DOE decided that existing Hanford production reactor fuel would remain at Hanford, aluminum-based SNF (excluding the aluminum-based SNF at Hanford) would be consolidated at SRS, and nonaluminum-based SNF would be consolidated at the Idaho National Engineering and Environmental Laboratory (INEEL). DOE stated that decisions on preparing the SNF for final disposition would be made under site-specific National Environmental Policy Act evaluations. As a result of DOE's decision to consolidate SNF storage, DOE will transfer 20 MTHM of nonaluminum-based SNF from SRS to INEEL and will transfer about 5 MTHM of aluminum-based SNF at INEEL to SRS. DOE estimates these transfers could begin about 2009 and may be completed by 2017. Thus, the non-aluminum based SNF at SRS and the aluminum-based SNF from INEEL that will be transferred to the SRS are included in this EIS. Additionally, as a result of the consolidation decision DOE reached under the *Programmatic Spent Nuclear Fuel Management and Idaho mental Restoration and Waste Management Programs Environmental Impact Statement* (DOE 1995b), SRS could receive about 5 MTHM of aluminum-based SNF from domestic research reactors. Shipments from domestic research reactors could continue through 2035. Material expected to be received from domestic research reactors is included in this EIS.

In May 1996, DOE announced a decision (61 FR 25092) under the *Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel* (Nonproliferation Policy and Spent Fuel EIS) to accept about 18 MTHM of aluminum-based SNF containing uranium of United States origin from foreign research reactors for management in the United States at the SRS. The receipt of foreign research reactor SNF at SRS is now underway and receipts are scheduled to be completed by 2009. The 18 MTHM of foreign research reactor SNF that could be received at SRS is included in the scope of this EIS. (Recent decisions by some foreign research reactor operators have reduced the quantity of SNF expected to be shipped to SRS from about 18 MTHM to about 14 MTHM; however, the 18 MTHM projection is used for analysis purposes in this EIS because foreign research reactor operators still have the option to ship to the United States.)

In summary, the total quantity of aluminum based SNF at SRS that must be managed and prepared for disposition is as follows: 20 MTHM in existing SRS wet storage basins; about 10 MTHM to be received from INEEL and domestic research reactors; and about 18 MTHM to be received from foreign research reactors. Additionally, SRS must manage about 20 MTHM of non-aluminum-based SNF until it is transferred to INEEL.

DOE anticipates placing most of its aluminum-based SNF inventory in a geologic repository after treatment or repackaging. However, DOE does not expect any geologic repository to be available until at least 2010 and shipments from DOE sites would not begin until about 2015. Until a repository is available, the Department intends to develop and implement a safe and efficient SNF management strategy that includes preparing aluminum-based SNF stored at SRS or expected to be shipped to SRS for

disposition offsite. DOE is committed to avoiding indefinite storage at the SRS of this nuclear fuel in a form that is unsuitable for final disposition. Therefore, DOE needs to identify management technologies and facilities for storing and treating this SNF in preparation for final disposition.

DOE expects to make the following decisions on the management of SNF and preparation of SNF for ultimate disposition. Select the appropriate treatment or packaging technology to prepare for ultimate disposal of the aluminum-based SNF that is to be managed at SRS. Determine whether DOE should construct new facilities or use existing facilities to store and treat or package aluminum-based SNF that is expected to be managed at SRS in preparation for its ultimate disposition. Determine whether DOE should repackage and dry-store stainless-steel and zirconium-clad SNF pending shipment to INEEL, and whether DOE should repackage and dry-store americium/curium targets pending decisions on programmatic use. Repackaging and dry-storing these fuels would further DOE's plan to phase out the use of the Receiving Basin for Offsite Fuel at the SRS.

Spent Nuclear Fuel Groups

This section introduces the basic terminology for describing SNF and provides more information on the approximately 68 MTHM of SNF subject to analysis in this EIS. DOE has categorized the spent fuel considered in the EIS into six groups (Group A through Group F). The categorization is based on such characteristics as fuel size, physical or chemical properties, or radionuclide inventories. DOE grouped the fuel to distinguish how it could apply the management alternatives evaluated in the EIS (Section 2.2). Table 1-1 lists the fuel groups and the amount of fuel in each group. Appendix C provides more detailed information regarding fuel types, quantities, locations, radionuclide inventories, and curie content. The aluminum-based fuels currently stored at SRS include some fuels that were not originally aluminum-clad (EBR-II and Sodium Breeder Experimental Reactor Fuel). Additionally, the aluminum-based category consists of one element not yet received but due to be shipped to SRS (the Advanced Reactivity Measurement Facility Core Filter Block). Most of the fuels that were not originally aluminum-clad (but are included under this EIS's major category of aluminum-based fuel) have been declad and placed in aluminum cans. In their present form they can be processed at the SRS through the existing technologies on site. Other fuels at SRS which are non-aluminum-clad fuels cannot be processed in their existing form using the existing technologies and are characterized in this EIS as nonaluminum-based fuel. The Core Filter Block is included under the category of aluminum-based fuel since the most practical way of dealing with it (based on its unique configuration) is to process it utilizing the existing technology at SRS.

The purpose of and need for the proposed action is to reduce the threat of nuclear weapons proliferation worldwide by conducting disposition of surplus plutonium in the United States in an environmentally safe and timely manner. Comprehensive disposition actions are needed to ensure that surplus plutonium is converted to proliferation-resistant forms. In September 1993, President Clinton issued the *Nonproliferation and Export Control Policy* (White House 1993) in response to the growing threat of nuclear proliferation. Further, in January 1994, President Clinton and Russia's President Yeltsin issued a *Joint Statement Between the United States and Russia on Non-Proliferation of Weapons of Mass Destruction and the Means of Their Delivery* (White House 1994). In accordance with these policies, the focus of the U.S. nonproliferation efforts includes ensuring the safe, secure, long-term storage and disposition of surplus weapons-usable fissile plutonium. Following publication of the SPD Draft EIS, the United States and Russia signed a 5-year agreement to provide the scientific and technical basis for decisions concerning how surplus plutonium will be managed and a statement of principles with the intention of removing approximately 50 t (55 tons) of plutonium from each country's stockpile (see Appendix A). The disposition activities proposed in the SPD EIS will enhance U.S. credibility and flexibility in negotiations on bilateral and multilateral reductions of surplus weapons-usable fissile materials inventories. The United States will retain the option to begin certain disposition activities, whenever appropriate, in order to encourage the Russians and set an international example. The SPD EIS

addresses both the immobilization and MOX approaches to surplus plutonium disposition, which include the siting, construction, operation, and ultimate decontamination and decommissioning (D&D) of three types of facilities at one or two of four candidate DOE sites:
A facility for disassembling pits (a weapons component) and converting the recovered plutonium, as well as plutonium metal from other sources, into plutonium dioxide suitable for disposition. This facility, the pit disassembly and conversion facility, is referred to in this document as the *pit conversion facility.* Candidate sites for this facility are Hanford, INEEL, Pantex, and SRS.
A facility for immobilizing surplus plutonium for eventual disposal in a geologic repository pursuant to the Nuclear Waste Policy Act (NWPA), the plutonium conversion and immobilization facility, is referred to as the *immobilization facility.* This facility would include a collocated capability for converting nonpit plutonium materials into plutonium dioxide suitable for immobilization. The immobilization facility would be located at either Hanford or SRS. DOE identified SRS as the preferred site for an immobilization facility in the NOI to prepare the SPD EIS, which was issued in May 1997. Technologies for immobilization are also discussed in the SPD EIS.

A facility for fabricating plutonium dioxide into MOX fuel, the MOX fuel fabrication facility, is referred to as the *MOX facility.* Candidate sites for this facility are Hanford, INEEL, Pantex, and SRS. Also included in the SPD EIS is a separate analysis of MOX lead assembly activities at five candidate DOE sites: Argonne National Laboratory–West (ANL–W) at INEEL; Hanford; LLNL; LANL; and SRS. DOE would fabricate a limited number of MOX fuel assemblies, referred to as lead assemblies, for testing in a reactor before commencement of fuel irradiation under the proposed MOX fuel program. Postirradiation examination activities at two sites, ANL–W and Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee, are also analyzed in the SPD EIS. The SPD EIS also analyzes a No Action Alternative, as required by the National Environmental Policy Act (NEPA). In the No Action Alternative, surplus weapons-usable plutonium in storage at various DOE sites would remain at those locations. The vast majority of pits would continue to be stored at Pantex, and the remaining plutonium in various forms would continue to be stored at Hanford, INEEL, LLNL, LANL, RFETS, and SRS.

AUTHORITIES, POLICIES AND GUIDANCE RELEVANT TO ENVIRONMENTAL JUSTICE

The following information provides background on authorities, policies and guidance pertinent to environmental justice with the relevant environmental justice language specific to each source document.

Executive Order No. 12898 and Accompanying Presidential Memorandum (February 11, 1994)

Executive Order 12898 (EO), Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, and its accompanying Presidential Memorandum were issued on February 11, 1994. The EO contains the following provisions for each Federal agency to:

- Make environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects on minority populations and low-income populations (CEQ, § 1-101).

- Develop and implement an agency-wide environmental justice strategy (EO, § 1-103).

- Address diverse segments of the population when performing human health and environmental research and analysis. These analyses shall, whenever practicable and appropriate, identify multiple and cumulative exposures (EO, § 3-301).

- Collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish, vegetation, and/or wildlife for subsistence (EO, § 4-401).

- Ensure public participation and access to information (EO, § 5-5).

Executive Order 12898 and its accompanying memorandum have the primary purpose of ensuring that "each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations..." The Executive Order also explicitly called for the application of equal consideration for Native American programs. To meet these goals, the Order specified that each agency develop an agency-wide environmental justice strategy. The EO is "designed to focus Federal attention on the environmental and human health conditions in minority communities and low-income communities with the goal of achieving environmental justice" (Presidential Memorandum accompanying Executive Order 12898, February 11, 1994).

The Presidential Memorandum (which accompanied Executive Order 12898) emphasized the following provisions for each Federal agency to:

- Analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the National Environmental Policy Act of 1969 (NEPA, § 2.1.2; 42 U.S.C. § 4321 et seq.).

- Address, whenever feasible, significant and adverse environmental effects of proposed Federal actions on minority communities and low-income communities in mitigation measures identified as part of an EA's finding of no significant impact (FONSI) or an EIS's record of decision (ROD).

- Provide opportunities for effective community participation in the NEPA process, including consultation with the affected population when identifying potential effects, considering mitigation measures, or improving the accessibility of public meetings, crucial documents, and notices.

In reviewing other agencies' proposed actions under Section 309 of the Clean Air Act, EPA must ensure that the involved agency has fully analyzed environmental effects on minority communities and low-income communities, including human health, social, and economic effects when reviewing environmental effects of other Federal agencies' proposed actions (§ 309 of the Clean Air Act, 42 U.S.C. § 7609). Moreover, the EO is intended to "promote nondiscrimination in Federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment" (Presidential Memorandum accompanying Executive Order 12898, February 11, 1994). Ultimately, the EO and accompanying Presidential Memorandum serve to inform federal agencies review process to comment on and evaluate environmental justice content within other agencies' EISs.

National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. § 4331(b))

The following goals make clear that attainment of environmental justice is wholly consistent with the purposes of NEPA:

- To assure for all Americans safe, healthful, productive, and aesthetically and culturally pleasing surroundings (42 U.S.C. § 4331(b)(2)).
- To attain the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences (42 U.S.C. § 4331(b)(3)).
- To preserve important historic, cultural, and natural aspects of our natural heritage, and maintain, wherever possible, an environment which supports diversity and variety of individual choice (42 U.S.C. § 4331(b)(4)).

10 CFR Part 1021 establishes procedures that the Department of Energy (DOE) shall use to comply with section 102(2) of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4332(2)) and the Council on Environmental Quality (CEQ) regulations for implementing the procedural provisions of NEPA (40 CFR parts 1500-1508). This part supplements, and is to be used in conjunction with, the CEQ Regulations to achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities (42 U.S.C. § 4331(b)(5)).

A general framework for implementing NEPA requirements is presented in regulations (40 CFR Parts 1500 through 1508) promulgated by the CEQ. Federal agencies, in turn, have developed their own rules for NEPA compliance that are consistent with the CEQ regulations while addressing the specific missions and program activities of each agency. EPA has general statutory authority under the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.; Public Law 91-190, 83 Stat. 852), to review and comment on Federal actions affecting the quality of the environment. NEPA requires that all Federal agencies proposing major actions which significantly affect the quality of the human environment consult with other agencies having jurisdiction by law or having special expertise of relevant environmental factors, and prepare a detailed statement of these environmental effects. Since NEPA, through the EIS process, mandates taking into account the significant environmental effects of a proposed project, including its cumulative impact, and requires public participation as part of its process, it is a useful procedural device for considering environmental justice when making a decision.

Clean Air Act (1970) Section 309 (42 U.S.C. § 7609(a))

EPA has specific authority and responsibility to review and comment in writing on certain actions proposed by other Federal agencies that affect the quality of the environment under Section 309 of the Clean Air Act. It mandates that the EPA Administrator "review and comment in writing on the environmental impact of any matter relating to duties and responsibilities... of the Administrator contained in any (1) legislation proposed by any Federal department or agency, (2) newly authorized Federal projects for construction and any major Federal action [subject to §102(2)© of NEPA]...and (3) proposed regulations published by any department or agency of the Federal Government." In addition, EPA's written comments must be made public at the conclusion of any review. NEPA documents that EPA reviews under §309 should include a statement about whether the proposed action will have an impact on minority communities or low-income communities.

Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. § 2000d et seq.)

Title VI states that: "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Title VI itself prohibits intentional discrimination based on race, color, or national origin. While Title VI itself prohibits intentional discrimination, the agency-implementing regulations may also prohibit unintentional discriminatory effects. The Supreme Court has ruled, however, that Title VI authorizes federal agencies, including EPA, to adopt implementing regulations that prohibit discriminatory *effects*. Frequently, discrimination results from policies and practices that are neutral on their face but have the *effect* of discriminating. (see Department of Justice, Attorney General's Memorandum for Heads of Departments and Agencies that

Provide Federal Financial Assistance, *The Use of the Disparate Impact Standard in Administrative Regulations Under Title VI of the Civil Rights Act of 1964,* [July 14, 1994]).

The Presidential memorandum accompanying Executive Order 12898 directs federal agencies to ensure compliance with the nondiscrimination requirements of Title VI for all federally-funded programs and activities that affect human health or the environment. While Title VI is inapplicable to federal actions, Section 2-2 of the EO is designed to ensure that federal actions substantially affecting human health or the environment do not have discriminatory effects based on race, color, or national origin.

Relevant Guidance

Listed below are several manuals and guidance for use in evaluating federal actions and activities. The Environmental Protection Agency (USEPA) has general statutory authority under the National Environmental Policy Act of 1969 and the Council on Environmental Quality's (CEQ) implementing regulations, and has specific authority and responsibility under Section 309 of the Clean Air Act to conduct such reviews, comment in writing, and make those comments available to the public. The Council on Environmental Quality's guidance, *Environmental Justice: Guidance Under the National Environmental Policy Act (CEQ's EJ NEPA Guidance, December 10, 1997*), was developed for use by all federal agencies. It incorporates the Interagency Working Group (IWG) on Environmental Justice's guidance on key terms in Executive Order 12898. The reviewer should have a good understanding of the terms discussed in the IWG guidance.

EPA's *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA Compliance Analyses, (EPA's* EJ NEPA Guidance, April 1998*)* -- which highlights ways in which EPA-prepared NEPA documentation identifies and addresses environmental justice concerns-- is a detailed guidance of how EPA NEPA analysts should recognize, identify, and address environmental justice in any EPA actions subject to NEPA. The purpose of this guidance is to assist in identifying and evaluating disproportionately high and adverse human health or environmental effects in minority communities and low-income communities within the context of NEPA. Documents prepared by DOE for actions which EPA complies with the procedural requirements of NEPA (*e.g.*, research and development activities, facilities construction, wastewater treatment construction grants, EPA-issued National Pollutant Discharge Elimination System (NPDES) permits for new sources, and programs under the EPA Voluntary NEPA Compliance Policy), including instances where EPA satisfies its NEPA compliance obligation as a cooperating agency. It is also meant to improve the affected communities' access to the NEPA process.

EPA also has the *Final Guidance for Consideration of Environmental Justice in Clean Air Act 309 Reviews (July 1999)* for internal guidance. While this document is intended only for use by Environmental Protection Agency (EPA) reviewers, it can be of some benefit to others considering conducting a review. The document provides guidance on reviewing and commenting on other federal agencies National Environmental Policy Act (NEPA) documents to help ensure that environmental effects on minority communities and low-income communities have been fully analyzed.

EPA's *Policy and Procedures for the Review of Federal Actions Impacting the Environment, (October 3, 1984)*, is a manual that establishes policies and procedures for carrying out the Environmental Protection Agency's (EPA's) responsibilities to review and comment on Federal actions affecting the quality of the environment. These responsibilities have been combined into one process and are referred to throughout the manual as the Environmental Review Process. This manual contains EPA's policies and procedures for carrying out the Environmental Review Process, assigning specific responsibilities, and outlining mechanisms for resolving problems that arise in the Environmental Review Process. These documents

tend to supplement each other and can therefore be used in conjunction with each other, not withstanding the fact that they are not meant to be used as cookie cutters.

U. S. Department of Energy Environmental Justice Policy and Guidance Documents

The U. S. Department of Energy Office of Environmental Management published the *U. S. Department of Energy Environmental Justice Strategy Executive Order 12898, April 1995.* This document is the central Environmental Justice document which provides a structured framework of the Department of Energy's efforts to integrate feasible environmental justice principles set forth in Executive Order 12898 into their operations. The strategy is structured in the spirit of the administration's principles for reinventing government and is consistent with the principles set forth in the National Performance Review as it emphasizes a more responsive government and accountability by employees for achieving results. Individual strategies reflect a refocusing of policies and programs by departmental elements, more meaningful dialogue with stakeholders to address the impact of DOE's operations on communities, and the continuation of on-going programmatic activities with the infusion of a heightened sensitivity to the principles of environmental justice. Implementation of the strategy will be carried out mainly within current programmatic and budgetary provisions of existing Departmental elements.

The Department's environmental justice strategy identifies a list of programs, policies, and planning processes for possible revision, in order to ensure improved environmental quality and health standards within departmental operations. These include the use of policies and programmatic actions relating to: The National Environmental Policy Act of 1969 (NEPA) as it relates to "socio-economic impacts," "environmental consequences," and "affected environment;" DOE Order 5400.1 (General Environmental Protection); DOE Order 1600.6A (Prohibiting discrimination by recipients of Departmental financial assistance as it relates to Title VI of the Civil Rights Act;); DOE Order 4700.1 (Project Management System); Programmatic Environmental Impact Statements (PEIS); Environmental Impact Statements (EIS); Waste Minimization Pollution Prevention Awareness Plan; Risk Assessment Approaches; Future revisions of the Office of Civilian Radioactive Waste Management Strategic Plan; and Guidance and standards for worker and public health protection from unwarranted exposures.

In the case of activities involving Programmatic Environmental Impact Statements (PEIS), Environmental Impact Statements (EIS) and Environmental Assessments; The U. S. Department of Energy has produced several types of internal documents for governance of their activities. The Office of NEPA Oversight in May 1993 published a document referred to as the "Green Book", *Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements.* Later, they produced two other document, *Environmental Assessment Checklist* (August 1994) and (jointly with The Office of Environment, Safety and Health) the *NEPA Environmental Impact Statement Checklist* (November 1997). These three documents (Green Book and Checklists) can be considered a package when used together. they were developed with the intention of aiding in the preparation and reviewing of DOE's environmental assessments (EAs) and Environmental Impact Statements (EISs) prepared pursuant to the National Environmental Policy Act of 1969 (NEPA), CEQ NEPA regulations (40 CFR Parts 1500-1508), DOE NEPA Regulations (10 CFR Parts 1021), other CEQ and DOE guidance, and related federal environmental, safety, and health laws and regulations.

RELEVANT DOCUMENTS UNDER REVIEW

Over the past eight years, the Department of Energy has issued several major Environmental Impact Statements (EIS's) and a number of other documents relating to programmatic management of nuclear materials, nuclear spent fuel, and the management of the surplus plutonium left over from the arms race. Some of those documents were reviewed as part of this scientific and technical analysis of the Environmental Impact Statement (EIS) process for these programs as proposed at the Savannah River

Site. This report reflects an evaluation of DOE's Environmental Justice strategy as discussed in the following documents (where applicable, documents refer to all notice of intent, draft and final EISs and necessary supplements, and record of decision and revision to the record of decisions for each program).

National Environmental Policy Act Documents

Final Programmatic Spent Nuclear Fuel Management and Idaho National Engineering Laboratory Environmental Restoration and Waste Management Programs Environmental Impact Statement
DOE prepared this EIS (DOE 1995b) in compliance with a Court Order dated December 22, 1993, in the case of Public Service Company of Colorado v. Andrus, No. 91-0054-5-HLR (D. Idaho). The preferred alternative in the Final EIS, which DOE issued in April 1995, is Regionalization by Fuel Type. Volume 1 of this EIS analyzes at a programmatic level potential environmental impacts over the next 40 years of alternatives related to the transportation, receipt, processing, and storage of DOE-owned SNF. Volume 1 supports programmatic decisions on sites at which DOE will manage various types of SNF.
In the Record of Decision, which selected the preferred alternative for implementation (60 FR 28680), DOE decided to manage its SNF by type (fuel cladding and matrix material) at the Hanford Site, the Idaho National Engineering and Environmental Laboratory, and the SRS. Section C.1.2 in Appendix C of this SRS SNF Management EIS discusses its relationship to the programmatic SNF EIS.
An amendment to the Record of Decision (61 FR 9441) reflects the October 16, 1995 settlement agreement between DOE, the State of Idaho, and the Department of the Navy by reducing the number of proposed spent fuel shipments to Idaho.

Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor SNF
This EIS (DOE 1996a) analyzes the management of foreign research reactor SNF that contains uranium originally produced or enriched in the United States. It also analyzes appropriate ways to manage such fuel received in the United States, amounts of fuel, shippers, periods of time over which DOE would manage the fuel, modes of transportation, and ownership of the fuel. In its Record of Decision (61 FR 25091), DOE stated it would accept from 41 listed countries aluminum-based spent fuel, Training Research Isotope General Atomic (TRIGA) spent fuel, and target material containing uranium enriched in the United States. Over the life of the foreign research reactor SNF acceptance program, DOE could accept approximately 19.2 MTHM of foreign research reactor SNF in as many as 22,700 separate elements and approximately 0.6 MTHM of target material. Most of the fuel will arrive through the Charleston Naval Weapons Station in South Carolina (about 80 percent), with a very limited amount arriving through the Concord Naval Weapons Station in California (about 5 percent). Most of the target material and some of the fuel (about 15 percent) will arrive overland from Canada. Shipments through Charleston began in September 1996 and those through Concord began in July 1998. After a limited period of storage, DOE will process and package the fuel as necessary at the SRS and the Idaho National Engineering and Environmental Laboratory to prepare it for disposal in a geologic repository. Section C.1.2 in Appendix C explains the relationship of the Foreign Research Reactor SNF EIS to this EIS.

Final Environmental Impact Statement Interim Management of Nuclear Materials
This EIS (DOE 1995a) evaluates actions to stabilize SRS materials that represent environmental, safety, and health vulnerabilities in their current storage condition or that might represent a vulnerability within the next 10 years. DOE has published four decisions under this EIS. In the first (60 FR 65300), DOE decided to process plutonium-242 solutions to oxide; vitrify americium and curium solutions to glass; blend highly-enriched uranium solutions down to low enrichment; process the plutonium in Mark-31 target slugs; process plutonium and uranium material in vaults to metal, oxide, or glass, if necessary; and process failed Taiwan Research Reactor SNF and a failed canister of Experimental Breeder Reactor-II SNF. DOE decided that processing the EBR-II fuel in unbreached canisters was not immediately necessary.

EBR-II fuel is declad and reactive, but only when it is in contact with water. The fuel inside a storage canister will not corrode as long as the canister retains its integrity. A monitoring and inspection program is in place that would detect any change in the integrity of the storage canisters. Any canisters that failed would be detected and the fuel then processed under the provisions of the Record of Decision to stabilize the material. This monitoring and inspection program applies as well to other fuel types in storage.
In the first supplement to the Record of Decision (61 FR 6633), DOE decided to stabilize Mark-16 and -22 fuels by processing them in the SRS canyons and blending the resulting highly enriched uranium down to low enriched uranium; and to stabilize "other aluminum-clad targets" by dissolving them in the canyons. DOE will transfer the resulting nuclear material from the targets to the SRS high-level waste tanks for vitrification in the Defense Waste Processing Facility. The second supplement to the Record of Decision (61 FR 48474) contains decisions on vitrifying neptunium-237 solutions, and on the stabilization of plutonium-239 solutions by converting them to a metal using the F and H Canyons and FB-Line. In the third supplement to the Record of Decision (62 FR 17790), DOE decided to use the F Canyon and FB-Line to stabilize the remaining Taiwan Research Reactor SNF in the Receiving Basin for Offsite Fuel. These actions are relevant to the cumulative impacts assessment in this EIS (see Chapter 5).

Disposition of Surplus Highly Enriched Uranium Environmental Impact Statement
DOE prepared this EIS (DOE 1996b) because of the need to reduce the threat of nuclear weapons proliferation worldwide in an environmentally safe manner by reducing stockpiles of weapons-usable fissile materials, setting a non-proliferation example for other nations, and allowing peaceful, beneficial use of the material to the extent practical. In the Record of Decision (61 FR 40619), DOE stated it would implement a program that will gradually blend as much as 85 percent of the surplus highly enriched uranium to a uranium- 235 enrichment level of approximately 4 percent, and will blend the remaining surplus highly enriched uranium down to an enrichment level of about 0.9 percent for disposal as low-level waste. This will occur over 15 to 20 years. DOE could use different technologies at four potential blending facilities, including SRS and the Oak Ridge Reservation. Blending down of highly-enriched uranium would affect SRS operations and waste generation. This activity is relevant to the assessment of cumulative impacts (see Chapter 5).

Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement
DOE prepared this programmatic EIS (DOE 1996c) to evaluate a safe and secure strategy for the long-term storage of weapons-usable fissile materials, primarily plutonium-239 and highly enriched uranium, and the disposition of weapons-usable plutonium that was surplus to national defense needs. This EIS included the SRS inventory of plutonium-239, highly enriched uranium, and other weapons-usable materials. The Record of Decision (62 FR 3014) specified that DOE will expand or upgrade SRS facilities (i.e., the Actinide Packaging and Storage Facility) to consolidate weapons-usable plutonium, and will move plutonium pits now stored at the Rocky Flats Environmental Technology Site in Colorado to the Pantex Plant in Texas and nonpit plutonium materials to SRS. DOE will ship the non-pit plutonium to SRS only if a subsequent decision calls for the immobilization of plutonium at the Site. The DOE disposition strategy enables the immobilization of surplus plutonium in glass or ceramic material for disposal in a geologic repository, and the burning of some surplus plutonium as mixed oxide fuel in domestic commercial reactors with subsequent disposal of the spent fuel in a geologic repository in accordance with the Nuclear Waste Policy Act. DOE specified that it will determine the exact locations for disposition of these materials in site-specific EISs and in cost, technical, and nonproliferation studies. However, DOE has decided that it will locate a vitrification or immobilization facility (with a plutonium conversion facility) at either the Hanford Site in Washington or SRS, and that SRS is a candidate site for a potential mixed oxide fuel fabrication facility and a pit disassembly and conversion facility. The implementation of these decisions will require several years. The Programmatic Weapons-Usable Fissile

Materials EIS is also relevant in the assessment of cumulative impacts that could occur at the SRS (see Chapter 5).

The Department issued an Amended Record of Decision (63 FR 43386) to the environmental impact statement, *Storage and Disposition of Weapons-Usable Fissile Materials*, on August 6, 1998. In order to support the early closure of the Rocky Flats Environmental Technology Site (RFETS) and the early deactivation of plutonium storage facilities at the Hanford Site, DOE modified, contingent upon the satisfaction of certain conditions, some of the decisions made in its Storage and Disposition ROD associated with surplus plutonium storage pending disposition. Namely, DOE will take steps that allow: (1) the accelerated shipment of all non-pit surplus weapons- usable plutonium from the RFETS (about 7 metric tons) to the SRS beginning in about 2000, in advance of completion of the Actinide Packaging and Storage Facility in 2001, and (2) relocation of all Hanford surplus weapons usable plutonium (about 6.4 metric tons) to the SRS, between about 2002 and 2005, pending disposition. However, consistent with the Storage and Disposition PEIS ROD, DOE will only implement the movement of the RFETS and Hanford plutonium inventories to the SRS if the SRS is selected as the immobilization disposition site. DOE is preparing the *Surplus Plutonium Disposition EIS*, draft issued July 1998, as part of the decision-making process for determining the immobilization site. The action described in this EIS is relevant in the assessment of cumulative impacts that could occur at SRS (see Chapter 5).

Final Defense Waste Processing Facility Supplemental Environmental Impact Statement
DOE prepared a Supplemental EIS to examine the impacts of completing construction and operating the Defense Waste Processing Facility at the SRS. This document (DOE 1994) assisted the Department in deciding whether and how to proceed with the Defense Waste Processing Facility project, given the changes to processes and facilities that had occurred since 1982, when it issued the original Defense Waste Processing Facility EIS. The Record of Decision (60 FR 18589) announced that DOE would complete the construction and startup testing of the Defense Waste Processing Facility, and would operate the facility using the In-Tank Precipitation process after the satisfactory completion of startup tests. The alternatives evaluated in this EIS on the management of SNF could generate radioactive waste that DOE would have to handle or treat at facilities described in the Defense Waste Processing Facility Supplemental EIS and the SRS Waste Management EIS (see next paragraph). The Defense Waste Processing Facility Supplemental EIS is also relevant to the assessment of cumulative impacts (see Chapter 5) that could occur at SRS.

Savannah River Site Waste Management Final Environmental Impact Statement
DOE issued the SRS Waste Management EIS (DOE 1995c) to provide a basis for the selection of a sitewide approach to managing present and future (through 2024) wastes generated at SRS. These wastes would come from ongoing operations and potential actions, new missions, environmental restoration, and decontamination and decommissioning programs. The SRS Waste Management EIS includes the treatment of wastewater discharges in the Effluent Treatment Facility, F- and H-Area tank operations and waste removal, and construction and operation of a replacement high-level waste evaporator in the H-Area tank farm. In addition, it evaluates the Consolidated Incineration Facility for the treatment of mixed waste. The Record of Decision (60 FR 55249) stated that DOE will configure its waste management system according to the moderate treatment alternative described in the EIS. The SRS Waste Management EIS is relevant to this SNF Management EIS because it evaluates management alternatives for various types of waste that actions proposed in this EIS could generate. The Waste Management EIS is also relevant in the assessment of cumulative impacts that could occur at the SRS (see Chapter 5).

Environmental Impact Statement for a Geologic Repository for the Disposal of SNF and High-Level Radioactive Waste at Yucca Mountain, Nye County, Nevada
On August 13, 1999 DOE announced the availability (64 FR 44200) of a draft environmental impact statement for a geologic repository at Yucca Mountain for the disposal of SNF and high-level radioactive

waste, in accordance with the Nuclear Waste Policy Act of 1982. The DEIS evaluates site-specific environmental impacts from the construction, operation, and closure of the repository. It also evaluates reasonable alternatives for implementing such a proposal, and transportation-related impacts for shipments from across the United States. The DEIS also evaluates the consequences at SRS of continued SNF and high-level waste management assuming the repository is not constructed and operated. The repository decision will affect the ultimate disposal of SNF from SRS. The Final EIS is scheduled to be completed in fiscal year 2001.

Treatment and Management of Sodium-Bonded Spent Nuclear Fuel Environmental Impact Statement
DOE has published a draft environmental impact statement for the Treatment and Management of Sodium-Bonded Spent Nuclear Fuel (64 FR 8553 2/22/99). Alternatives to processing at the Idaho National Engineering and Environmental Laboratory (INEEL) include the use of the Plutonium-Uranium Extraction (PUREX) solvent extraction method currently in use at SRS and the melt and dilute technology that is being proposed under this EIS. The technologies would be applied to sodium-bonded spent nuclear fuel blanket assemblies, which are currently in storage at INEEL. There is approximately 22.4 MTHM of Experimental Breeder Reactor-II (EBR-II) blanket fuel and 34.2 MTHM of Fermi-1 blanket fuel to be processed. This EIS includes cumulative impacts of sodium-bonded spent nuclear fuel processing at the SRS based on estimates from conventional processing of Fuel Group A. Fuel Group A is mostly EBR-II fuel (16.7 MTHM out of 19 MTHM) and therefore provides a good basis for estimating impacts from processing of similar material at SRS. DOE estimates that the impacts for conventional processing would be sufficiently representative of impacts from melt and dilute for the purpose of presenting cumulative impacts.

Management of Certain Plutonium Residues and Scrub Alloy at the Rocky Flats Environmental Technology Site Final Environmental Impact Statement
In August 1998, the Department issued the Final EIS (DOE 1998a). In this EIS DOE proposed to process certain plutonium-bearing materials being stored at the Rocky Flats Environmental Technology Site Rocky Flats) located near Golden, Colorado. These materials are plutonium residues and scrub alloy remaining from nuclear weapons manufacturing operations formerly conducted by DOE at that site. In their present forms, these materials cannot be disposed of or otherwise dispositioned because they contain plutonium in concentrations exceeding DOE safeguards termination requirements. DOE has decided to ship approximately 7,450 pounds of sand, slag and crucible and plutonium fluoride residues (containing approximately 600 pounds of plutonium) and approximately 1,543 pounds of scrub alloy (containing approximately 440 pounds of plutonium) to SRS where these materials will be stabilized in F Canyon by chemically separating the plutonium from the remaining materials in the residues and scrub alloy. The separated plutonium will be placed in safe and secure storage, along with a larger quantity of plutonium already in storage at the Savannah River Site, until DOE has completed the *Surplus Plutonium Disposition Environmental Impact Statement* and made final decisions on the disposition of the separated plutonium. Transuranic wastes generated during the chemical separations will be sent to the Waste Isolation Pilot Plant for disposal. Other wastes generated during the chemical separations operations will be disposed of in accordance with the Savannah River Site's normal procedures for disposing of such wastes. The actions will occur between 1998 and 2002.

Final Environmental Impact Statement Accelerator Production of Tritium at Savannah River Site (DOE, 1998b)
DOE has proposed an accelerator design (using helium-3 target blanket material) and an alternate accelerator design (using lithium-6 target blanket material). If an accelerator is built, it would be located at SRS. In the Record of Decision DOE decided to use an existing commercial light-water reactor as the new tritium source. Therefore, the accelerator will not be built at SRS and impacts from construction and operation are not included in the cumulative impacts section of this EIS.

Final Environmental Impact Statement for the Construction and Operation of a Tritium Extraction Facility at the Savannah River Site (DOE 1998c)
As stated in the Record of Decision (64 FR 26369; 5/14/99), DOE will construct and operate a Tritium Extraction Facility on SRS to provide the capability to extract tritium from commercial TC light water reactor targets and targets of similar design. The purpose of the proposed action and alternatives evaluated in the EIS is to provide tritium extraction capability to support either accelerator or reactor production. The Tritium Extraction Facility EIS is relevant in the assessment of cumulative impacts that could occur at SRS (see Chapter 5).

Surplus Plutonium Disposition Final Environmental Impact Statement (DOE 1999)
This EIS analyzes the activities necessary to implement DOE's disposition strategy for surplus plutonium. Following completion of the EIS, SRS was selected (65.FR 1608) as the location for mixed oxide fuel fabrication and plutonium immobilization facilities that would be used for plutonium disposition, and for the plutonium pit (a component of nuclear weapons) disassembly and conversion facility. The projected impacts of these operations are incorporated in Chapter 5 of this EIS.

Savannah River Site, Spent Nuclear Fuel Management, Final Environmental Impact Statement, DOE/EIS-0279. Savannah River Operations Office, Aiken, SC, March 2000.
This EIS evaluates potential environmental impacts from managing SNF that currently is located or expected to be located at SRS. The evaluation includes impacts from the construction and operation of facilities (either new or modified existing facilities) that would be used to receive, store, treat, and package SNF in preparation for ultimate disposition. Onsite transportation impacts are considered, however, no impacts associated with transporting SNF to SRS are included, because these impacts have been covered in other EISs. In this EIS, DOE evaluated the management of about 48 MTHM of aluminum-based SNF for treatment and storage (20 MTHM of aluminum based SNF stored at SRS and about 28 MTHM of aluminum-based SNF from foreign and domestic research reactors that could be shipped to SRS until 2009 and from domestic research reactors that could be shipped to SRS until 2035). DOE also evaluated transferring 20 MTHM of non-aluminum-clad spent nuclear fuel currently stored in the Receiving Basin for Offsite Fuel at SRS to a new dry storage facility at SRS. This transfer would occur only if a dry storage facility were built as part of the implementation of a new treatment technology to prepare aluminum-based spent nuclear fuel for disposition (potential technologies are discussed in Section 2.2) and if the dry storage facility became operational before the non-aluminum-clad fuel was transferred to the INEEL. The transfer to dry storage would occur after the fuel had been relocated from the Receiving Basin for Offsite Fuel to the L-Reactor Disassembly Basin in support of activities necessary to phase out the use of the Receiving Basin for Offsite Fuel by fiscal year 2007.

Environmental Assessment of Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel, DOE/EA-0912. Washington, D.C. April 1994.
The EA analyzes the acceptance of fifteen full casts containing 409 spent fuel elements from eight foreign research reactors in Europe, plus the acceptance of an alternative numbers of spent fuel elements, ranging from 0 to 953. The shipment of the spent fuel by commercial or chartered vessel from Europe to one of five U. S. Ports and the transport of the spent fuel by truck to the SRS for wet-storage in the RBOF. It also evaluates overland transport by rail as an alternative mode of ground transportation. The proposed actions and alternatives were developed as a result of input received from reactor operators, citizens in the United States port cities and along potential transportation routes, shippers, public interest groups, and other interesting stakeholders.

Other Relevant Documents

In August 1997, DOE chartered the Nuclear Materials Processing Needs Assessment. The purpose of the assessment was to determine which, if any, additional nuclear materials within the Department of Energy

complex may require use of the SRS chemical separations facilities (F or H canyon) for stabilization or preparation for disposition prior to canyon de-commissioning. Chemical separations operations are occurring at SRS because DOE is using the canyons to stabilize nuclear materials that represent potential health and safety risks in their current storage configuration. The decisions to use processing capabilities have been documented in a number of Records of Decision, including those following the *F-Canyon Plutonium Solutions EIS*, the *Interim Management of Nuclear Materials EIS*, and the *Rocky Flats Plutonium Residues EIS*. These decisions are consistent with DOE's Implementation Plan for Defense Nuclear Facilities Safety Board Recommendation 94-1, wherein the Board recommended that DOE take steps, including use of the processing facilities, to stabilize nuclear materials that represented health and safety risks.

The Processing Needs Assessment evaluated four material categories that could require the canyons for stabilization or disposition: spent nuclear fuel, plutonium-239, uranium, and other special isotopes. The results of the assessment are being reviewed by DOE management to identify needed follow-on actions. Other materials under consideration for processing as SRS canyons include various components currently located at other DOE sites, including Oak Ridge, Rocky Flats, Los Alamos, and Hanford. These materials, which were identified during the Processing Needs Assessment, consist of various plutonium and uranium components. If DOE were to process these materials in the SRS separations facilities, additional NEPA reviews would need to be performed. This material has been considered in the cumulative impacts presented in Chapter 5.

Spent Fuel Working Group Report on Inventory and Storage of the Department's Spent Nuclear Fuel and other Reactor Irradiated Nuclear Materials and Their Environmental, Safety and Health Vulnerabilities, Volume 1, Assistant Secretary for Environmental Management, Washington, D.C. November 1993.

DEPARTMENT OF ENERGY ASSESSMENT OF ENVIRONMENTAL JUSTICE

The decision to take back foreign spent nuclear fuel and to dispose of plutonium has been debated for several years without the active participation and integral involvement of people of color living near the Savannah River Site federal facility under the jurisdiction of Department of Energy. These communities have been disenfranchised from the debate, the public involvement activities and the decision making process. Therefore they are left to wonder what the receipt of the spent nuclear fuel rods and the disposition of plutonium will mean for their neighborhoods, their health and their environment. After having made the decision to store 15,000 spent nuclear rods at SRS, in December 1999 the DOE announced their decision to use the Savannah River Site as the site of choice for the major plutonium mission; which will include the use of the technology of immobilization and mixed oxide (MOX) fuel options associated with plutonium disposition.

It is important to address these two (2) problems because the communities near SRS will have to live with the consequences of activities at the site. To be active participants in the dialogue, community residents deserve to know and understand what scientific basis DOE have used to make decisions. In addition, the management of nuclear waste is a long-term responsibility and demands community involvement, monitoring and civilian oversight. People must be empowered with the tools, skills and information that will facilitate their significant and substantive involvement in not only the decision making process as required by NEPA but in the overall stewardship of these materials. Communities of Color can no longer be kept out of the public participation activities and decision making processes associated with nuclear waste management. Our communities need to improve their understanding of the complex environmental problems created by nuclear weapons production. DOE has stated that it have complied with all of NEPA requirements during the preparation of their EIS. Following is a reproduction of the scope and extent of DOE environmental justice analysis carried out as part of the SNF and SPD EIS processes.

Environmental Justice in Areas Near the Candidate Ports of Entry

Under normal port activities associated with receipt of the spent nuclear fuel shipments - including harbor activities, unloading the ship, transfer of the spent nuclear fuel casks to truck or train, and movement out of the port city - the dominant radiological impacts were shown to be the exposures received by the workers in the immediate vicinity of the shipping cask (Section 4.2.2, DOE/EIS-0218F). These individuals include inspectors, shipping cask handlers, and truck drivers. Since the intensity of the radiation from the cask falls off with distance, the doses that might be received by other workers and members of the general population can theoretically be calculated, but would not generally be measurable or distinguishable from natural background radiation.

Potential radiological impacts to people residing near the port are associated with low probability (less than one in a million) accidents that are so severe that the spent nuclear fuel casks rupture and a fire would bum long enough around the cask that some of the radioactive material would be released. In this case, some of the radioactive spent nuclear fuel might be vaporized and lifted by the heat of the fire and carried downwind of the accident location. Where and how far this radioactive material would go before being deposited on the ground would depend on how high the heat from the fire lofts it and the particular weather conditions at the time. Most of this vaporized spent nuclear fuel would be expected to be deposited in the first few miles downwind of the fire but small amounts could be carried out for several tens of miles.

Because the particular details of both the accident conditions (such as the severity of the fire) and the weather conditions at the time of an accident could vary widely, a range of accident conditions and wind directions, wind speeds, and other weather conditions were examined during the evaluation of accident effects (see Section 4.2.2.3, DOE/EIS-0218F)). Population impact evaluations were performed for distances out to 80 km (50 mi). Risks of latent cancer deaths were found to range from about 0.003 to 0.000003 latent cancer fatalities (LCF). No latent cancer fatalities would be expected due to accidents at ports.

Containerized spent nuclear fuel casks shipped under the proposed policy would be transferred from the ship at commercial or military ports by personnel experienced in handling containerized cargo, and shipped by truck or rail to one of the five candidate interim management sites (DOE/EIS-0218F). Candidate ports may handle thousands of standard containers each month, unloaded from vessels which can carry up to several thousand casks. The number of casks to be handled would be small in comparison to routine cargo handling, thus having a negligible impact on normal port activities.

As part of the environmental justice analysis, distributions of minority populations and low-income households surrounding candidate ports of entry were estimated from 1990 census data. Although radiological health effects resulting from an accident are calculated at distances up to 80 km (50 mi), the largest radiological effects would usually be expected to occur within roughly a 16-km (10-mi) radius of the accident site. Thus, the distribution of minority and low-income populations is described for circular areas defined by a 16-km (10-mi) radius, centered at each candidate port of entry.

Distribution of Minority Populations Near the Candidate Ports

The minority population characteristics within 16 km (10 mi) of candidate ports of entry for foreign research reactor spent nuclear fuel are presented in Table A-1. For comparison, this table lists minority population features for regions surrounding the ports and for counties which lie partially within the 16-km (10-mi) radius centered at the port. Population characteristics shown in the table were extracted from 1990 census data available from the U.S. Bureau of the Census. The data resolves population characteristics at the "block group level," which generally consists of between 250 and 550 housing units.

With the exception of the Port of Wilmington and 2 military ports, MOTSU (Military Ocean Terminal, SUnny Point) and NWS (Naval Weapons Station) Concord, the percentage of minority populations residing within 16 km (10 mi) of candidate ports exceeds the percentage of minority populations residing within the state. Similarly, the percentage of minority populations residing near the candidate ports exceeds the percentage of minorities residing in counties surrounding the candidate ports. Ports at MOTSU, NWS Concord, Portsmouth, and Newport News are exceptions with larger percentages of minority populations in the surrounding counties.

The racial and ethnic composition of minority populations residing near the candidate ports is shown in Table A-2. In the case of candidate ports located on the east coast, African Americans compose the largest portion of the minority population. Minority populations residing near the candidate ports on the west coast are comprised of a more uniform mixture of African Americans, Asians, Hispanics, and Native Americans. The minority population residing near the Port of Galveston on the Gulf of Mexico is predominately African American and Hispanic.

The spatial distribution of minority populations residing within 16 km (10 mi) of each of the candidate ports is shown in the maps of those ports as presented in Figures A-1 to A-11. The circle shown in each figure -has a 16-km (10-nii) radius, centered on the port. As indicated in the legend of each figure, geographical areas are shaded according to the percentage of minority population within the area. Resolution in the figures is at the census block group level. Due to variations in the populations of block groups, the geographical size of any particular block group area is not necessarily proportional to the numerical population. As an example, for ease of enumeration, the U.S. Bureau of the Census may define block group boundaries which actually extend into oceans, bays, or lakes. This allows inclusion in the census data of individuals who reside on boats or offshore houses, a situation particularly predominant in locations such as Galveston (see Figure A-3).

Distribution of Low-income Households Near the Candidate Ports

The number of low-income households near the candidate ports is shown in Table A-3. Except for the ports of MOTSU and Hampton Roads, the percentage of low-income households immediately surrounding the port is larger than the percentage of low-income households in the surrounding counties. Similarly, for most of the candidate ports, the percentage of low-income households near the port exceeds the percentage of low-income households in the surrounding state, although the ports of Charleston, MOTSU, Newport News, and NWS Concord are exceptions.

Distributions of low-income households near the candidate ports are shown in the maps of the ports presented in Figures A-12 through A-22. In these figures, geographical areas defined by census block group boundaries are shaded according to the percentage of low-income households within the block group. Since the number of households within a block group varies, the size of a shaded area is not necessarily proportional to the population within that area.

Environmental Justice Along Transportation Routes

The dominant radiological impacts associated with the normal or incident-free (accident-free) transportation activities would be the exposures received by the workers in the immediate vicinity of the cask, principally the truck drivers or train personnel. These individuals would be the only people receiving a measurable exposure during a routine spent nuclear fuel shipment (DOE/EIS-0218). The dose received by an individual near a spent nuclear fuel cask during shipment would be proportional to both the distance from the cask and the time of exposure. The radiation dose rate from a cask containing spent nuclear fuel decreases with distance from the cask. Individuals living along the transportation routes would therefore be expected to receive low exposures because of both their distance

from the cask and their short time of their exposure. While it is possible to make estimates of the collective dose of the population along a route, these minuscule doses would only be meaningful in the collective sense.

Ground and barge transportation accidents would be expected to result in no additional radiological impacts to the population in the vicinity of the accident (DOE/EIS-0218). Potential radiological impacts from low probability accidents, which vary considerably, would be dependent on the accident conditions (such as the severity of an associated fire) and the weather conditions at the time of an accident. Since shipping accidents could occur at any location along the routes, it is not possible to identify the racial and economic composition of the populations that might be impacted. In general, however, the principal radiological impacts would be limited to the area within a few miles of the accident location and could be expected to impact a broad mixture of the population in the area. Tables A-4 and A-5 show minority populations and low-income households, respectively, residing in 800-m (0.5-mi) wide corridors on each side of the road, rail, or barge routes from each of the candidate ports of entry to the Idaho National Engineering Laboratory and the Savannah River Site, both of which could receive spent nuclear fuel in the near term. In these tables, a county is called a "surrounding" county if its boundaries lie at least partially within the 800-m (0.5-mi) corridor.

As a general observation, percentages of minority populations residing along ground transportation routes (Column 7 of Table A-4) from candidate ports on the west coast to the Idaho National Engineering Laboratory are noticeably less than those for transportation from candidate east coast ports to the Savannah River Site. In addition, a higher percentage of minority individuals were found to reside along rail transportation routes than along truck transportation routes. The percentages varied from a minimum 12.5 percent for transportation by truck from Portland, Oregon to Idaho National Engineering Laboratory to a maximum of 81.9 percent for rail transportation from Savannah, Georgia to the Savannah River Site. As shown in Column 7 of Table A-5, similar observations are true for percentages of low-income households residing along ground transportation routes. In the case of low-income households, percentages varied from a minimum of 41.0 percent for truck transportation from Portland, Oregon and Charleston, South Carolina to the Savannah River Site and Idaho National Engineering Laboratory, respectively, to a maximum of 54.8 percent for rail transportation from Savannah, Georgia to the Savannah River Site.

Populations residing within 1.6 km of barge routes are numerically very small in comparison with those residing near ground transportation routes. Percentages of minority populations and low-income households residing near barge routes are similar to the percentages for ground transportation modes.

Environmental Justice in Areas Near the Candidate Management Sites

Under normal management site activities associated with receipt and storage of the spent nuclear fuel, the dominant radiological impacts have been shown to be the exposures received by the site workers in the immediate vicinity of the spent nuclear fuel cask. These individuals would be principally those working within the spent nuclear fuel storage facility. The racial and economic composition of these individuals at each management site that would receive the majority of the dose could vary considerably. Health effect due to normal operations and accidents at the five candidate management sites are presented in Section 4.2.4. No latent cancer fatalities or other fatalities would be expected to result from the handling and storage of spent nuclear fuel from foreign research reactors at the sites. At none of the sites would the radiological impacts of either normal releases or low probability accidental releases of spent nuclear fuel be expected significantly affect the general population outside the management site boundary, including minority and low-income populations. Consequently, there are no adverse impacts of the proposed action on these groups.

The potential impacts of transporting SNF to a geologic repository are discussed for completeness but no decision related to the transportation of SNF offsite was be made under this EIS. Transportation of SNF (and high-level waste) to a federal repository will be addressed in the EIS for a federal repository (see Section 1.6). The Yucca Mountain EIS is being prepared as part of the process to determine whether to recommend the Yucca Mountain site as the site of the Nation's first geologic repository for SNF and high-level radioactive waste. The SNF EIS does not evaluate the impacts of managing the non-aluminum-clad fuel at INEEL or of transporting the fuel to INEEL. These impacts were documented in the SNF programmatic EIS (PEIS) (DOE 1995b) and were evaluated as part of the process DOE used to decide to consolidate the storage of non aluminum-clad spent nuclear fuel at the INEEL.

The ground transportation alternatives (i.e., truck, rail and barge) are discussed in Section 2.2.1.7 of the Final EIS. The analyses in the Final EIS demonstrate that the impacts to the environment, workers, or the public, from any of these modes of ground transport (counting barge as a mode of "ground transport") would be small and within the applicable regulatory limits. Furthermore, the differences in potential impacts between the truck, rail and barge alternatives were not significant. Both the truck and rail transportation options have been used successfully to transport foreign research reactor spent nuclear fuel in the past. Truck transport was the predominant mode used for over twenty years, until the old "Off-Site Fuels Policy" lapsed in 1988. Rail was the mode used for both shipments under the Environmental Assessment of Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel. Since neither of the ports of entry (see item H below) can reasonably provide barge transport to either of the management sites, barge transport was not included in the preferred alternative.

The Final EIS demonstrates that the spent fuel and target material could be safely transported overland within the United States by either truck or rail, and DOE has decided that either transportation mode may be used. However, there appears to be a strong preference by some members of the public in the port areas for the use of rail. Therefore, in response to this preference, DOE has decided that it will seek to use rail for shipments from the ports of entry to DOE facilities at the Savannah River Site in South Carolina and the Idaho National Engineering Laboratory in Idaho as a general matter, subject to further discussions with the States, Tribes and local jurisdictions along the proposed transportation routes.
Table M–5 shows minority populations residing along 1.6-km (1-mi) corridors centered on routes that are representative of those that could be used for the transportation of nuclear materials under the proposed action or alternatives. Table M–6 shows similar data for low-income populations. Population data for Tables M–5 and M–6 were extracted from Tables P–12 and P–121 of the STF–3A files (DOC 1992). Distances from a given origin to a given destination are similar but not identical to corresponding distances shown in Appendix L. This is because distances listed in Appendix L were calculated with the HIGHWAY computer code, while distances shown in Tables M–5 and M–6 were obtained from a Geographical Information System analysis using Tiger Line data and STF3A files prepared by the Census Bureau. Both techniques use block group spatial resolution, and the differences are generally less than 5 percent.

Total and minority populations residing in the highway corridors are listed in Columns 4 and 5, respectively, of Table M–5. Column 6 shows minority populations residing within highway corridors as a percentage of the total population. Although total and minority populations residing within the corridors generally tend to increase with increasing distance, the relationship is clearly route dependent.
The SPD EIS analysis concluded that no radiological or nonradiological fatalities would be expected to result from accident-free transportation conducted under all alternatives. Nor would radiological or nonradiological fatalities be expected to result from transportation accidents. Thus, implementation of any one of the alternatives would pose no significant risks to the public, nor would implementation of any alternative pose significant risks to groups within the public, including the risk of disproportionately high and adverse effects on minority and low-income populations. As discussed in Appendix L of the SPD EIS, implementation of the proposed action or alternatives would not result in significant radiological or

nonradiological risks to populations residing along highway transportation routes. Although the percentage minority or low-income populations residing along highway routes can vary by as much as a factor of four, results of the analysis presented in Chapter 4 are independent of the racial and ethnic composition of populations within the corridors, as well as the economic status of populations at risk within the corridors. Implementation of the proposed action or alternatives is not likely to result in disproportionately high and adverse effects on minority or low-income populations residing within representative transportation corridors.

Distribution of Minority Populations Near the Candidate Management Sites

Environmental Effects on Minority and Low-Income Populations Residing Near Proposed Reactor Sites. The distribution of minority populations residing in various areas surrounding the candidate interim management sites is presented in Table A-6. This table shows minority populations within an 80-ki (50-mi) radius centered at the interim management site. For comparison, minority populations are also shown for the counties surrounding each site. A county was included in the analysis if its boundaries lie least partially within Ns circle. As shown in the table, minority populations surrounding the Nevada Test Site and the Idaho National Engineering Laboratory are numerically small in comparison with those surrounding the Hanford Site and the Savannah River Site. The minority population surrounding the Nevada Test Site is relatively large because the boundary of the county containing Las Vegas, NV within 80 km (50 mi) of the site. The Savannah River Site has the largest percentage of minorities in the surrounding area and surrounding counties.

The racial and ethnic composition of minorities surrounding the candidate interim management site, illustrated in Table A-7. Hispanics composed nearly 81 percent of the minority population surrounding the Hanford Site at the time of the 1990 census. The Hanford Site is also surrounded by a relatively large percentage (about 8 percent) of Native Americans due to the presence of the Yakama Indian Reservation and tribal headquarters in the State of Washington. The area surrounding the Idaho National Engineering Laboratory has the second smallest percentage of minorities of all the sites. The surrounding minority composition is primarily Hispanic, Native American and Asian. The Fort Hall Indian Reservation lies largely within 80 km (50 mi) of the candidate management site at the Idaho National Engineering Laboratory. Hispanics and African Americans compose nearly 85 percent of the minority population surrounding the Nevada Test Site. The total and minority populations residing within 80 km (50 mi) of the Nevada Test Site are ten times smaller than those of each of the other sites. The Oak Ridge Reservation is surrounded by the smallest percentage of minorities among the five candidate management sites. Minorities residing within 80 km (50 mi) of the site comprise approximately 6 percent of the total population, and African Americans make up nearly 75 percent of this minority population. The Savannah River Site has the largest surrounding minority population of the five candidate interim management sites: African Americans compose approximately 94 percent of the minority population residing within 80 km (50 mi) of this site.

Figures A-23 to A-27 show the distribution of minorities residing within 80 km (50 mi) of each of the candidate management sites. These illustrations were obtained from an analysis of 1990 census data using a geographical information system. The data were obtained from. U.S. Bureau of the Census Tiger Line files which contain political boundaries and geographical features, and Summary Tape Files which contain demographic information. Data were resolved to the block group level, usually 250 to 550 household units. In the legend of each figure, "P" denotes the percentage of the total population within block groups comprised of minority members. The most heavily shaded areas shown in these figures indicate block groups for which the minority population exceeds 50 percent.

The minority population residing near the Hanford Site is spread throughout the area with concentrations in directions northeast, southeast, and southwest of the site. By contrast, the minority population

surrounding the Idaho National Engineering Laboratory resides in quadrants northeast and southeast of the site. None of the block groups located within 80 km (50 mi) of the Nevada Test Site contained 50 percent of minority residents during the 1990 census. Due to the sparse population surrounding the site, block groups would be relatively large in geographical area. Minorities within 80 km (50 mi) of the Savannah River Site reside throughout the area with concentrations south of the site. As discussed above, no significant radiological health effects are expected for workers or the general population surrounding the five candidate interim management sites, including minority or low-income workers.

Distribution of Low-Income Households Near the Candidate Management Sites

Table A-8 demonstrates the number of low-income households in areas surrounding the candidate interim management sites. Except for the Nevada Test Site, the number of low-income households immediately surrounding the sites is typical of the corresponding number for surrounding counties. In the case of the Nevada Test Site, the percentage of low-income households in the area surrounding the site is noticeably larger than that for the relatively affluent nearby counties.

Figures A-28 through A-32 show the distribution of low-income households within 80 km (50 mi) of each of the candidate interim management sites. The symbol "P" in each legend represents the percentage of low-income households. The heaviest shading indicates where these households total 50 percent or more. For the Hanford Site, the Idaho National Engineering Laboratory, and the Nevada Test Site, block groups containing 50 percent or more low-income households lie largely south of the site. Low-income households reside throughout the 80-km (50-mi) radius, centered at the Savannah River Site. For the proposed action, no disproportionately high adverse effects are projected for low-income households in the vicinity of the interim management sites.

The analysis of environmental effects on populations residing within 80 km (50 mi) of the proposed reactor sites is presented in Chapter 4 of the SPD EIS. This analysis shows that no radiological fatalities are likely to result from implementation of the proposed action or alternatives. Radiological risks to the public are small regardless of the racial and ethnic composition of the population, and regardless of the economic status of individuals comprising the population. Nonradiological risks to the general population are also small regardless of the racial and ethnic composition or economic status of the population. Thus, disproportionately high and adverse impacts on minority and low-income populations residing near the various facilities are not likely to result from implementation of the proposed action or alternatives. Data for the analysis of minorities were extracted from Table P12 of Summary Tape File 3A published on CD ROM by the Census Bureau (DOC 1992). Data for the analysis of low-income populations were extracted from Table P121 of Standard Tape File 3A.

THE SAVANNAH RIVER SITE (SRS)

The SRS is in west-central South Carolina and occupies an area of approximately 800 square kilometers (approximately 300 square miles) adjacent to the Savannah River which forms the border between the states of Georgia and South Carolina. The Site is approximately 40 kilometers (25 miles) southeast of Augusta, Georgia, and 32 kilometers (20 miles) south of Aiken, South Carolina. (SRS is about 19 km (12 mi) south of Aiken, South Carolina,) primarily in Aiken and Barnwell Counties (Figure 2–5). There are more than 3,000 facilities at SRS, including 740 buildings with 511,000 sq m (5.5 million sq ft) of floor area. First established in 1950, SRS has been involved for more than 40 years in tritium operations and nuclear material production. Tritium recycling facilities at SRS empty tritium from expired reservoirs, purify it to eliminate the helium decay product, and fill replacement reservoirs for nuclear weapons. Filled reservoirs are delivered to Pantex for weapons assembly and directly to Department of Defense (DOD) to replace expired reservoirs. Historically, DOE has produced tritium at SRS, but none has been produced since 1988 (DOE 1996a: 3-228).

SRS processes nuclear materials into forms suitable for continued safe storage, use, or transportation to other DOE sites. In the past, the SRS complex produced nuclear materials. Today the site includes 16 major production, service, and R&D areas, not all of which are currently in operation (DOE 1996a: 3-228). The complex consisted of various plutonium storage facilities, five reactors (the C-, K-, L-, P-, and R-Reactors) (all inactive), a fuel and target fabrication plant, two chemical separation plants, a tritium-target processing facility, a heavy water rework facility, and waste management facilities. The K-Reactor (the last operational reactor) has been shut down with no planned provision for restart. SRS is still conducting tritium-recycling operations in support of stockpile requirements using retired weapons as the tritium supply source. The separations facilities and F- and H-Canyons are planned to be used through the year 2002 to complete DOE's commitment to the Defense Nuclear Facilities Safety Board regarding stabilization of inventories of unstable nuclear materials (DOE 1996a: 3-228). Major nuclear facilities at SRS include fuel and plutonium storage facilities and target fabrication facilities, nuclear material production reactors, chemical separation plants, a uranium fuel processing area, liquid HLW tank farms, a waste vitrification facility,

The Savannah River Technology Center provides technical support to all DOE operations at SRS. In this role, it provides process-engineering development to reduce costs, waste generation, and radiation exposure. SRS has an expanding mission to transfer unique technologies developed at the site to industry. SRS is also an active participant in the Strategic Environmental R&D Program formulated to develop technologies to mitigate environmental hazards at DOD and DOE sites (DOE 1996a: 3-228).
There are also several Non-DOE Activities ongoing at the SRS. These facilities and operations include the Savannah River Forest Station, the Savannah River Ecology Laboratory, and the Institute of Archaeology and Anthropology. The Savannah River Forest Station is an administrative unit of the U.S. Forest Service, which provides timber management, research support, soil and water protection, wildlife management, secondary roads management, and fire management to DOE. The Savannah River Forest Station manages 62,300 ha (154,000 acres), comprising approximately 80 percent of the site area. It has been responsible for reforestation and manages an active timber business. The Savannah River Forest Station assists with the development and updating of sitewide land use plans and provides continual support with site layout and vegetative management. It also assists in long-term wildlife management and soil rehabilitation projects (DOE 1996a: 3-228). The Savannah River Ecology Laboratory is operated for DOE by the Institute of Ecology of the University of Georgia. It has established a center of ecological field research where faculty, staff, and students perform interdisciplinary field research and gain an understanding of the impact of energy technologies on the ecosystems of the southeastern United States. This information is communicated to the scientific community, government agencies, and the general public. In addition to Savannah River Ecology Laboratory studies, the Institute of Archaeology and Anthropology is operated by the University of South Carolina to survey the archaeological resources of SRS. These surveys are used by DOE when planning new facility, additions or modifications (DOE 1996a: 3-229).

Environmental Justice at SRS Management Site

Environmental justice concerns the environmental impacts that proposed actions may have on minority and low-income populations, and whether such impacts are disproportionate to those on the population as a whole in the potentially affected area. In the case of SRS, the potentially affected area includes parts of Georgia and South Carolina.

The potentially affected area around the location of the proposed surplus plutonium disposition facilities in F-Area is defined by a circle with an 80-km (50-mi) radius centered at the Actinide Packaging and Storage Facility (APSF), if built, (lat. 33°17'32" N, long. 81°40'26" W). The total population residing within that area in 1990 was 614,095. The proportion of the population there that was considered minority

was 38.0 percent. Figure 3–30 illustrates the racial and ethnic composition of the minority population in the potentially affected area surrounding APSF, if built. At the time of the 1990 census, Blacks were the largest minority group within that area, constituting 35.7 percent of the total population. Hispanics constituted about 1.1 percent, and Asians, about 1 percent. Native Americans comprised about 0.2 percent of the population (DOC 1992).

A circle with an 80-km (50-mi) radius centered at DWPF (lat. 33°17'43" N, long. 81°38'25" W) defines the potentially affected area around S-Area. The total population residing within that area in 1990 was 626,317. The proportion of the population around this facility that was considered minority was 38.5 percent. Figure 3–30 illustrates the racial and ethnic composition of the minority population in the potentially affected area around the S-Area. At the time of the 1990 census, Blacks were the largest minority group within the potentially affected area, constituting 36.3 percent of the total population. Hispanics constituted about 1.0 percent, and Asians, about 1 percent. Native Americans constituted about 0.2 percent of the population (DOC 1992). The same census data show that the percentage of minorities for the contiguous United States was 24.1, and the percentages for the States of Georgia and South Carolina, 29.8 and 31.4, respectively (DOC 1992).

A breakdown of incomes in the potentially affected area is also available from the 1990 census data (DOC 1992). At that time, the poverty threshold was $9,981 for a family of three with one related child under 18 years of age. A total of 107,057 persons (18.0 percent of the total population) residing within the potentially affected area around F-Area at APSF, if built, reported incomes below the poverty threshold. The low-income population around S-Area at DWPF was 109,217 (18.0 percent of the total population). Data obtained during the 1990 census also show that of the total population of the contiguous United States, 13.1 percent reported incomes below the poverty threshold, and that Georgia and South Carolina reported 14.7 and 15.4 percent, respectively. All population data extracted for the determination of the existence of minority and low-income communities in the region of influence show the percentages that are greater than those for the states and the nation.

Analysis of Environmental Justice at SRS

This section examines whether minority or low-income communities as defined by CEQ, 1997 could receive disproportionately high and adverse human health and environmental impacts as a result of the actions described in the SPD final EIS. Even though DOE does not anticipate adverse health impacts from the options, it analyzed for the possibility of "disproportionately high and adverse human health or environmental effects on minority populations or low-income populations" (Executive Order 12898). Figures 3.5-1 and 3.5-2 show minority and low-income communities by census tract. This section discusses average radiation doses that individuals in those communities could receive and compares them to predicted doses that individuals in the other communities within the 80-kilometer- (50-mile) radius region could receive.

Figure 4.1-8 has SRS as the center of a circle with 22.5-degree sectors and concentric rings from 10 to 50 miles (16 to 80 kilometers) out from the center at 10-mile (16-kilometer) intervals. For this analysis, DOE calculated a fraction of the total population dose for each sector, laid the sector circle over the census tract map, and assigned each tract to a sector. If a tract fell in more than one sector, DOE assigned it to the sector with the largest dose value. DOE analyzed impacts by comparing the per capita dose that each type of community would receive to doses other types of communities in the same ring would receive. To eliminate the possibility of diluting and masking impacts to a low population community close to SRS with a high dose per person by including them with impacts to a high-population community farther from the Site, the analysis made comparisons in a series of concentric circles, the radii of which increase in 10-mile (16-kilometer) increments. To determine the radiation dose received per person in each type of community, the analysis multiplied the number of people in each tract by that tract's dose value to obtain

a total community population dose for each tract, summed these population doses in each concentric circle, and divided by the total community population in the circle to get a community per capita dose for each area of the circle. Because the per capita dose for communities (Table 4.1-19) would be constant for every alternative, the relative differences in impacts between communities would also be constant. Thus, Figure 4.1-9 and Table 4.1-19 indicate the distribution of per capita doses to types of communities in the 50-mile (80- kilometer) region. As shown in Figure 4.1-9, atmospheric releases would not disproportionately affect minority communities (population equal to or greater than 35 percent of the total population) or low income (equal to or greater than 25 percent of the total population) in the 50- mile region; that is; a comparison of per capita doses indicates that they do not vary greatly. For example, DOE used an annual total population dose of 1 person-rem to prepare Figure 4.1-9 and its supporting data in Table 4.1-19. In comparison, the maximum annual total population dose of 0.56 person-rem for the maximum impact alternative (see Section 4.1.2) would result in 56 percent of the impact shown in Figure 4.1-9 and Table 4.1-19. For any other population dose, the per capita dose for communities can be determined by multiplying that population dose by the values listed in Table 4.1-19.
The distribution of carcinogenic and criteria pollutant emissions from routine operations and of criteria pollutants from construction activities would be essentially identical to those described for airborne radiological emissions because the distribution pathways would be the same. As a result, nonradiological emissions from any option would not cause disproportionate impacts on minority or low-income communities. Because nonradiological pollutant emissions would cause minimal impacts for any option, and because there would not be disproportionate distribution of these impacts among types of communities, environmental justice concerns would not be associated with the alternatives.

Onsite Incident-Free Transportation Analysis [SRS]

The analysis assumed a crew of four engineers for each shipment and that the external dose rate 6.6 feet (2 meters) from the shipping cask was 100 millirem per hour (HNUS 1994a), which is the SRS procedurally-allowed maximum dose rate during onsite fuel shipments. Actual receptor dose rates would depend on receptor distance from the shipping cask (39.4 feet [12 meters]). The duration of exposure would depend on the transport vehicle speed. In addition, vehicle crew time would depend on the distance of each shipment. Table 4.1-20 summarizes the collective doses (person-rem) and health effects (latent cancer fatalities) associated with a single incident-free onsite shipment of SNF at SRS. To determine the incident-free transportation dose for management of all SRS spent nuclear fuel, it is necessary to calculate the total dose over all shipments. DOE has estimated that it would take approximately 150 rail shipments to de-inventory the Receiving Basin for Offsite Fuels (RBOF) to the L-Area Disassembly Basin.

THE ANALYSIS OF ENVIRONMENTAL JUSTICE

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,* directs Federal agencies to identify and address (mitigate), as appropriate, disproportionately high and adverse health or environmental effects of their programs, policies, and activities on minority and low-income populations. The Council on Environmental Quality (CEQ) has oversight responsibility for documentation prepared in compliance with the National Environmental Policy Act (NEPA) (40 CFR 1500 –1508). In December 1997, the CEQ released guidance on environmental justice (CEQ 1997). The CEQ's guidance was adopted as the basis for the analysis of environmental justice contained in the *Surplus Plutonium Disposition Environmental Impact Statement* (SPD EIS). EO 12898 also directs the Administrator of the Environmental Protection Agency (EPA) to convene an Interagency Federal Working Group (IWG) on Environmental Justice. The Working Group, made up of 13 federal agencies, is directed to provide guidance to its members on criteria for identifying disproportionately high and adverse human health or environmental effects on minority and low-income populations. It also gave federal agencies one year to submit their own environmental justice strategy

identifying specific projects that can be promptly undertaken to address particular concerns identified during the development of the proposed environmental justice strategy

Environmental Justice has been defined by a variety of organizations interested in the topic. EPA's Office of Environmental Justice offers the following definition: *"The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic group should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, and commercial operations or the execution of federal, state, local, and tribal programs and policies."* The goal of this "fair treatment" is not to shift risks among populations, but to identify potential disproportionately high and adverse effects and identify alternatives that may mitigate these impacts.

Communities and other organizations involved in Environmental Justice argues –with good reason--that poorer people in general and people of color in particular, *face risks*—from their proximity to hazardous facilities and waste sites—that are disproportionate to their numbers in the population. Public comments during DOE scoping for these programs show a widespread concern for public health and safety because of the inherent dangers, along with the fact that spent nuclear fuel and plutonium is highly radioactive. Two related environmental documents (DOE/EIS-0203, 1995 and DOE/EIS-0912, 1994) have been published recently, which purported to have addressed the safety and potential health issues associated with the transportation and storage of spent nuclear fuel. DOE claims that based on an analysis of radiological health effects in those documents as well as in the SNF final EIS demonstrate that the expected health effects are small. In the case of spent nuclear fuel from foreign research reactors, no fatalities are expected due to radiological exposure or traffic accidents. No significant health effects are expected for the general population. Consequently, there would be no disproportionately high or adverse human health effects imposed on any population segment. In the sections below, minority and low-income populations are identified in the areas near potential candidate ports of entry, potential transportation routes, and potential interim management sites. The 1990 census data (DOC, 1992) were used as the basis of the analyzing the existence and location of minority and low-income populations. This allowed for equal comparison of data between the candidate ports, sites, and routes in different states.

In April 1995 the Department of Energy published its environmental justice strategy, which outlines a structured framework of efforts to integrate feasible environmental justice principles into their operations as required by EO 12898. The significance of this document lays in the fact that section 1-103 (e) of EO 12898 "each federal agency shall finalize its environmental justice strategy..." when published the DOE document stated that it was an incomplete "living" document which didn't include guideline for proceeding. This lack of guidance has translated into a very sluggish effort at addressing environmental justice concerns in the communities where DOE facilities are sited. In addressing environmental justice concerns it is required for the initiating agency to establish whether the proposed project is located in will be located in or impacts on a minority or low-income community; whether there exists a potential for disproportionate risk; whether the community currently suffers, or have historically suffered, from environmental and health risks or hazards; and whether the community has been sufficiently involved in the decision-making process. To this end, the agency must establish working definitions for such determinations. Without this, the whole Environmental Impact Statement (EIS) process and resulting Record of Decision (ROD) arising out of that process would have to be considered as inappropriate and problem of adequacy of the EIS would arise.

U.S. Department of Energy issued the Environmental Assessment of Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel (DOE/EA-0912) in April 1994, and in June 1994, the Department of Energy Programmatic Spent Nuclear Fuel Management and Idaho National Engineering

Laboratory Environmental Restoration and Waste Management Programs Draft Environmental Impact Statement (DOE/EIS-0203-D), in both instances, environmental justice issues were given only cursory notice during the process. By 1996, The IWG had not yet finalized the guidance directed by EO 12898, although it had developed working draft definitions. In the absence of final guidance, the definitions and approaches used by DOE varied. For example, the FRR SNF Final EIS and the Programmatic SNF&INEL EIS present demographic characterizations obtained from the same Census Bureau database, but use different definitions and assumptions. The differences in the definitions and assumptions between the Programmatic SNF&INEL EIS and the Foreign Research Reactor (FRR) Spent Nuclear Fuel (SNF) Final EIS are as follows:

Although both of these EISs use the same 1990 U.S. Census Bureau database, the Programmatic SNF&INEL EIS uses data aggregated at the census tract level (2,500 to 8,000 persons) while the FRR SNF Final EIS uses data aggregated at the block group level (250 to 550 housing units). This is critical to the results of and analysis. In some cases, census blocks or tracts lie partly within the area being analyzed (i.e., within the 80-km (50-mi) radius circle around a potential spent nuclear fuel management site). Since the exact distribution of the populations within such blocks or tracts is not available, the data is insufficient to allow a precise count. To address this situation, the Programmatic SNF&INEL EIS includes a low-income or minority population in its analyses if 50 percent or more of the tract falls within an 80-km (50-mi) radius around the site being considered. In similar situations, the FRR SNF Final EIS assumes that the general population and the minority population are distributed uniformly throughout a block group, and includes the fraction of the low-income or minority population that corresponds to the fraction of the census block group area that falls within the 80-km (50-mi) radius circle.

The Programmatic SNF&INEL EIS defines low-income populations as those in a poverty status as determined annually by the U.S. Census Bureau, based on the Consumer Price Index, and aggregated by the thresholds set forth by the Census Bureau (i.e., a group of people and/or a community experiencing common conditions of exposure or impact, in which 25 percent or more of the population is characterized as living in poverty), a method used by the U.S. Environmental Protection Agency. The FRR SNF Final EIS uses the definition of low-income community established by the U.S. Department of Housing and Urban Development. Both definitions are permitted under the draft guidance developed by the Interagency Working Group. These different definitions and assumptions have resulted in differences in the characterization of low-income and minority populations. The two sets of data were summarized and the most significant differences are discussed below.

The minority populations identified are reasonable consistent between the Programmatic SNF&INEL EIS and the FRR SNF Final EIS, except for results obtained at the Nevada test Site (the largest proportional difference) and the Hanford Site (the largest difference in numbers of individuals). The range in the results for both locations is due to the different aggregations of the demographic data used (census tracks vs. blocks), and the differences in the methods used to account for the population of tracks or groups lying only partly within the area being partly within the area being analyzed, as discussed above. For example, both sites are located in rural or sparsely populated regions so that census tracts surrounding the sites are relatively large in geographical area. In addition, the outskirts of Las Vegas, Nevada begin approximately 80 km (50 mi) from the Nevada Test Site, making the analysis particularly sensitive to differences in treatment of census tracts or block groups that lie partly within a circle of an 80-km (50-mi) radius centered at that site. Most areas within the zone of impact of the Nevada Test Site are restricted access and unpopulated land.

As a result of the different definitions used for identification of low-income populations, the results of these analyses are markedly different. Both sets of data are correct. They simply reflect the fact that different definitions and assumptions can result in different characterizations of low-income populations. There is a similar difference in definitions between the SNF and SPD EISs. As pointed out by DOE

(DOE/EIS-0218F, 1996), the approach to evaluating environmental justice used in the FRR SNF and subsequently, the SNF EIS document may change as a result of future guidance issued by the Interagency Working Group or DOE. However, it is DOE's contention that the current SNF EIS process has demonstrated that despite the different approaches discussed above, the conclusions are not expected to change because the impacts resulting from the proposed action under all alternatives present no significant risk to the potentially affected populations, and as a result, no disproportionately high and adverse effects would be expected for any particular segment of the population, including minority and low-income populations.

It is apparent that DOE recognizes that characterization of minority and low-income populations residing within a geographical area is sensitive to the basic definitions and assumptions used to identify them when conducting environmental justice analysis. However, they seem to have a serious problem with the ability to include this information in their EIS evaluation. This observation is bourn out by the fact that the March 2000 Savannah River Site Spent Nuclear Fuel Management FEIS document only briefly alluded to an environmental justice analysis. DOE needs to move quickly towards implementing its stated environmental justice strategic goals. A particularly relevant part of this review concerns DOE's persistent refusal to incorporate an ecosystem approach to understanding the long-term consequences of its activities.

Determination of Minority and/or Low-Income Population

In December 1997, the CEQ released guidance on environmental justice (CEQ 1997) that included a new set of definitions. The new definitions were more detail and presented better working definitions; therefore, DOE adopted them for the SPD EIS. Those definitions were used in this document and are included below.

Minority:

Individual(s) who are members of the following population groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

Minority Population:

Minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. In identifying minority communities, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a geographically dispersed/transient set of individuals (such as migrant workers or American Indians), where either type of group experiences common conditions of environmental exposure or effect. The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood, census tract, or other similar unit that is to be chosen so as to not artificially dilute or inflate the affected minority population. A minority population also exists if there is more than one minority group present and the minority percentage, as calculated by aggregating all minority persons, meets one of the above-stated thresholds. There should always be some basic framework is to assist in determining whether there is a minority community or low-income community that may be addressed in the scope of the EIS.

The first part of the guidance on minority population provided by the IWG provides a numeric measure: over 50 percent of the affected area. The remainder of the guidance calls for the use of best judgment in evaluating the potential for EJ concerns. It is important that the EIS consider both the circumstances of any groups residing within the affected area, as well as the percentage of the affected community that is

composed of minority peoples. Within its guidance, the IWG explains that a minority population may be present if the minority population percentage of the affected area is "meaningfully greater" than the minority population percentage in the general population or other "appropriate unit of geographic analysis." The term "affected area," although not defined by the guidance, is interpreted as that area which the proposed project will or may have an effect on. For all DOE activities and programs the affected area is the 80 km (50 mi) circle considered the site's region of influence. The IWG guidance also advises agencies not to "artificially dilute or inflate" the affected minority population when selecting the appropriate unit of geographic analysis. Clearly, a key element here is the selection of the appropriate level of geographic analysis; that is, selecting a comparison population to which the population in the affected area will be compared to identify if there are "meaningfully greater" percentages.

Low-income population:

Low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the U.S. Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty. In identifying low-income populations, agencies may consider as a community either a group of individuals living in geographic proximity to one another, or a set of individuals (such as migrant workers or Native Americans), where either type of group experiences common conditions of environmental exposure or effect. In conjunction with census data, the preparer of EIS evaluation should also consider state and regional low-income and poverty definitions as appropriate. In identifying low-income populations, agencies may consider as a community a group of individuals living in geographic proximity to one another or set of individuals (such as migrant workers or Native Americans) where either type of group experiences common conditions of environmental exposure. As with the identification of minority communities, the level of aggregation of available data is an issue of concern when seeking to determine whether one or more low-income communities may be affected by a project. Also as with minority communities, "pockets" of low-income individuals may be masked by aggregated data. The level of aggregation of data, as well as how current the available data are, should be taken into account by the EIS.

Determining the existence and location of low-income and minority communities within the reaches of a projects' influence can be a difficult task. Several means of gathering this information are available; however, it is up to the EIS analyst to ascertain which techniques will best suit the project at hand. Further, the EIS analyst must be flexible and open to consider additional avenues which may be unique to select projects or geographic areas. The use of national decennial census data in depicting low-income/poverty and minority statistics is one of the most common methods used. While the census provides valuable information for the EIS analyst, there are often many gaps associated with the information. Therefore, it may be necessary for the EIS analyst to validate this information with the use of additional sources. The additional methods available in locating the populations of interest include contacting local resources, government agencies, commercial database firms, and the use of locational/distributional tools. Local resources should be sought for local and up-to-date knowledge of a given area and its inhabitants as well as a lead to other sources of information. Examples of local resources include: community and public outreach groups, community leaders, and state universities (i.e., economic departments). State government agencies such as the Department of Economic Development, Planning and Development Department, State Minority Business Office, and State Enterprise Zone Offices are also valuable resources to contact. For example, if an area is designated as an "enterprise zone", unique economic and demographic data may exist in that particular area, access to which could enhance the EIS ability to assess the economic situation of a given area.

Local resources and state governments can both be contacted for information regarding factors that are characteristic of low-income communities and which may assist in identifying these communities. These factors may include: limited access to health care, an inadequate, overburdened or aged infrastructure, and particular dependence of the community, or components of the community, on subsistence living (*e.g.*,

subsistence fishing, hunting, gathering or farming). In some cases, these factors can be evaluated directly from traditional information sources. For example, the age and condition of water treatment facilities and presence of lead service lines should be available from municipal utilities. Outreach to community groups may be the most reliable data collection method in other cases, such as those where the degree to which the cultural and dietary habits of low-income or minority families and their economic condition dictate subsistence living. Consequently, where the community median household income may exceed that of the poverty line, conditions generally associated with low-income communities may be present, resulting in cumulative effects that may meet the threshold for environmental justice concerns.

Commercial database firms are often capable of tailoring census data information of human communities and income/poverty level to specified areas of geographic detail. For example, by manipulating specified census bureau tract data with customized buffer areas, statistics can be generated to accommodate current growth estimates from local government agencies or planning departments. Locational/distributional tools are also capable of determining the locations of certain human communities. Examples include maps, aerial photographs, and geographical information systems (GIS). Further explanations of these tools are presented in Chapter 5.

Population Estimates

Table M–1 shows total populations, minority populations, and percentage minority populations that resided within 80 km (50 mi) of the various sites at the time of the 1990 census. The 80-km (50-mi) distance defines the radius of potential radiological effects for calculations of radiation dose to the general population (see Chapter 4 of the SPD EIS). Tables M–2 and M–3 show similar data for projected populations in 1997 and 2010.

As discussed above, minority populations residing in potentially affected areas in 1990 were adopted as a baseline. Populations in 1997 and 2010 were then projected from the baseline data under the assumption that percentage changes in the majority and minority populations residing in the affected areas will be identical to those projected for State populations. The Census Bureau estimates that the national minority percentage will increase from approximately 24 percent in 1990 to 27 percent in 1997, and nearly 33 percent by 2010 (Campbell 1996). Percentage minority populations residing within 80 km (50 mi) of facilities at Hanford and SRS are projected to exceed the national percentage by year 2010. Percentage minority populations surrounding facilities at INEEL and Pantex were less than the national minority percentage in 1990 and are projected to remain so through the year 2010. In Tables M–1 through M–3, the sum of percentages shown in even-numbered columns beginning in column 6 may total slightly more or less than 100 percent due to roundoff.

Table M–4 illustrates the uncertainties in the population estimates for the year 2010 due to the partial inclusion of block groups within the boundaries of potentially affected areas. Column 2 of the table lists the number of block groups that are partly within the circle of 80-km (50-mi) radius centered at the various facilities. Column 3 shows the number of block groups that lie completely within the circle. Potentially affected areas surrounding Hanford and SRS include two States. Columns 2 and 3 show the number of partial or total inclusions for the affected States. Column 4 of the table, denoted as "T/P," shows the number of totally included block groups divided by the number of partially included block groups. In order to minimize the uncertainties in the population estimate, it is desirable that this ratio be as large as possible. Column 5 shows upper bounds for the estimates of the total population listed in column 6. As discussed above, upper bounds were obtained by including the total population of all block groups that lie at least partially within the affected area. Lower bounds for the estimate of total population shown in column 7 were obtained by including only the populations of totally included block groups. Analogous statements apply to columns 8 through 10.

As would be expected from the value of T/P shown in column 4, uncertainties in the total population estimate for Pantex were the smallest among the four sites (+2.4 percent and 2.7 percent), as were the uncertainties in the estimate of the minority population at risk near Pantex (+1.9 percent and 1.9 percent). Uncertainties in the population estimates for INEEL were the largest among the four sites (+17.2 percent and 15.2 percent for total population; +17.3 percent and 15.0 percent for minority population). None of the uncertainties shown in Table M–4 are large enough to noticeably affect the conclusions regarding radiological health effects or environmental justice.

The selection of a unit of analysis is critical, different analytical units generally result in different findings. Units of analysis can be selected as approximated by data constructs of single observational units (like zip code areas and census tracts), or else composed of observational units aggregated together (e.g., radial zones created by a Geographic Information System (GIS) around a toxic site). Framing an analytical unit for EJ research entails conceptualizing the group that is affected and then operationalizing, or empirically defining how to measure, the impacted group. In the composite observational units aggregated together, the analytical units are not coextensive with observational units, but are composed from them and thereby can be labeled as composite units of analysis. For DOE's EIS analysis the Data constructs include radial zones drawn around the hazardous site (DOE's Region of Influence at processing facilities), and aggregated zones made of clusters of observational units that are adjacent to the observational unit in which the hazardous site is located, in this case, the transportation routes would fit this category. The use of the radial zone as an analytical unit is theoretically justified because it enhances the way the effects—especially health effects—of a hazardous site can be probe. It allows for a more focused analysis of how effects might be experienced by the population under study. For example, although a hazardous facility may lie within one census tract or county, it may nonetheless lie closer, radially speaking, to other tracts or counties. The populations from the other areas, thus, might be situated nearer to the facility than many of those in the tract or county in which the facility is actually located. DOE uses the boundary of the circle with an 80-km (50-mi) radius centered at the operating site as the radial unit. For the purpose of determining risks from transportation minority and low-income populations residing within a 1.6-km (1-mi) corridor centered on representative transportation routes were selected. In all DOE's EIS, radiological health effects due to an accident at one of the disposition facilities or reactor sites are evaluated for persons residing within a distance of 80 km (50 mi) of the accident site. In general, the boundary of the circle with an 80-km (50-mi) radius centered at the accident site will not coincide with boundaries used by the Census Bureau for enumeration of the population in the potentially affected area. Some block groups lie completely inside or outside the area included in the calculation of health effects. However, block groups intersecting the boundary of the potentially affected area are only partly included.

Data for the analysis of minorities were extracted from Table P12 of Summary Tape File 3A published on CD ROM by the Census Bureau (DOC 1992). Data for the analysis of low-income populations were extracted from Table P121 of Standard Tape File 3A. For the purposes of enumeration and analysis, the Census Bureau has defined a variety of areal units (DOC 1992). Areal units of concern in the DOE documents include (in order of increasing spatial resolution): States, counties, census tracts, block groups, and blocks. The "block" is generally the smallest of these entities and offers the finest spatial resolution. This term refers to a relatively small geographical area bounded on all sides by visible features such as streets and streams, or by invisible boundaries such as city limits or property lines. Potentially affected areas examined in the SPD EIS include the areas surrounding proposed facilities for plutonium disposition located at four candidate DOE sites: Hanford (the Hanford Site, Richland, Washington), INEEL (the Idaho National Engineering and Environmental Laboratory, Idaho Falls, Idaho), Pantex (the Pantex Plant, Amariilo, Texas), and SRS (the Savannah River Site, Aiken, South Carolina). Other potentially affected areas examined include the areas surrounding proposed reactor sites for mixed oxide (MOX) fuel irradiation: Catawba Nuclear Station, McGuire Nuclear Station, and North Anna Power

Station. There is sufficient determination that both minority and low-income populations exist within the SRS Region of Influence (ROI).

In the SPD EIS, health effects were calculated for populations projected to reside in potentially affected areas during 2010 and 2015. Extrapolations of the total population for individual States are available from both the Census Bureau and various State agencies (Campbell 1996). The Census Bureau also projects populations by ethnic and racial classification in 1-year intervals for the years from 1995 to 2025. Minority populations determined from the 1990 census data were taken as a baseline. It was then assumed that percentage changes in the minority and majority populations of each block group for a given year (compared with the 1990 baseline data) would be the same as percentage changes in the State minority and majority populations projected for the same year. An advantage to this assumption is that the projected populations are obtained with consistent methodology regardless of the State and associated block group involved in the calculation. The Census Bureau uses the cohort-component method to estimate future populations for each State (Campbell 1996). The Census Bureau does not project populations of individuals who identified themselves as "Other Race" during the 1990 census. This population group is less than 2 percent of the total population in each of the States. In order to project total populations in the environmental justice analysis, population projections for the "Other Race" group were made under the assumption that the growth rate for the "Other Race" population will be identical to the growth rate for the combined minority and White (non-Hispanic) populations. DOE conclude that none of the uncertainties associated with the population projections are large enough to noticeably affect the conclusions regarding radiological health effects or environmental justice. There are problems with these assumptions. First, as DOE points out, the methodology is insensitive to localized demographic changes that could alter the projection for a specific area but, secondly, and more importantly, in any environmental justice analysis there are the questions arising out of process inequity and outcome inequity. What are the factors giving rise to the community current demographic character and how do they influence future projections? The following definitions were used in the analysis of environmental justice (CEQ 1997):

Minority and Low-Income Population Estimates

Table M–7 shows total populations, minority populations, and percentage minority populations that resided within 80 km (50 mi) of the various sites at the time of the 1990 census. The 80-km (50-mi) distance defines the radius of potential radiological effects for calculations of radiation dose to the general population. Table M–8 shows similar data for projected populations in 2015. As discussed in Appendix M.4, minority populations residing in potentially affected areas in 1990 were adopted as a baseline. Populations in 2015 were then projected from the baseline data under the assumption that percentage changes in the majority and minority populations residing in the affected areas will be identical to those projected for State populations. The Census Bureau estimates that the national minority percentage will increase from approximately 24 percent in 1990 to nearly 34 percent by 2015 (Census 1996). In Tables M–7 and M–8, the sum of percentages of the different populations may total slightly more or less than 100 percent due to roundoff.

Table M–9 illustrates the uncertainties in the population estimates for the year 2015 due to the partial inclusion of block groups within the boundaries of potentially affected areas. Column 2 of the table lists the number of block groups that are partly within the circle of 80-km (50-mi) radius centered at the various facilities. Column 3 shows the number of block groups that lie completely within the circle. Potentially affected areas surrounding all three of the proposed reactor sites include two States. Columns 2 and 3 show the number of partial or total inclusions for the affected States. Column 4 of the table, denoted as "T/P," shows the number of totally included block groups divided by the number of partially included block groups. In order to minimize the uncertainties in the population estimate, it is desirable that this ratio be as large as possible. Column 5 shows upper bounds for the estimates of the total

population listed in column 6. As discussed above, upper bounds were obtained by including the total population of all block groups that lie at least partially within the affected area. Lower bounds for the estimate of total population shown in column 7 were obtained by including only the populations of totally included block groups. Analogous statements apply to columns 8 through 10.

As would be expected from the value of T/P shown in column 4, uncertainties in the total population estimate for McGuire were the smallest among the three proposed reactor sites (+3.7 percent and 2.4 percent), as were the uncertainties in the estimate of the minority population at risk near Catawba (+5.7 percent and 3.3 percent). Uncertainties in the population estimates for North Anna were the largest among the three sites (+6.5 percent and 4.5 percent for total population; +5.9 percent and 4.2 percent for minority population). None of the uncertainties shown in Table M–9 are large enough to noticeably affect the conclusions regarding radiological health effects or environmental justice.

An estimate of the percentage of low-income persons living within 80 km (50 mi) of the proposed reactor sites in 2015 was obtained using a linear projection of low-income data from the 1980 census and the 1990 census. In 1990, the percentage of low-income persons (i.e., those with reported incomes below the poverty threshold) residing in the contiguous United States was 13.1 percent. The percentage of low-income persons living within 80 km (50 mi) of the proposed reactor sites was lower than the national average in every case. Around Catawba, the percentage of low-income persons living within 80 km (50 mi), in 1990, was 10.5 percent. At McGuire, the percentage was 9.8 percent, and around North Anna, the percentage was 6.9 percent.

The estimated number of low-income persons living within 80 km (50 mi) of Catawba in 2015 is 157,477 or 7.0 percent of the projected population. The estimated number of low-income persons living within 80 km (50 mi) of McGuire in 2015 is 171,182 or 6.6 percent of the projected population. The estimated number of low-income persons living within 80 km (50 mi) of North Anna in 2015 is 110,531 or 5.4 percent of the projected population. Figures M–10 through M–15 show geographical distributions of minority and low-income populations residing with 80 km (50 mi) of the proposed reactor sites.

The Selection of an Appropriate Unit of Analysis

For the purposes of enumeration and analysis, the Census Bureau has defined a variety of areal units (DOC 1992). Areal units of concern in this document include in order of increasing spatial resolution: States, counties, census tracts, block groups, and blocks. The "block" is the smallest of these entities and offers the finest spatial resolution. This term refers to a relatively small geographical area bounded on all sides by visible features such as streets and streams, or by invisible boundaries such as city limits or property lines. During the 1990 census, the Census Bureau subdivided the United States and its territories into 7,017,425 blocks. For comparison, the number of counties, census tracts, and block groups used in the 1990 census were 3,248; 62,276; and 229,192; respectively. While blocks offer the finest spatial resolution, economic data required for identification of low-income populations are not available at the block-level of spatial resolution. In the analysis below, block groups are used throughout as the areal unit. Block groups generally contain between 250 and 500 housing units (DOC 1992:A-4).

During the decennial census, the Census Bureau collects data from individuals and then aggregates the data according to residence in geographical areas such as counties or block groups. Boundaries of the areal units are selected to coincide with geographical features, such as streams and roads, or political boundaries, such as county and city borders. Boundaries used for aggregation of the census data usually do not coincide with boundaries used in the calculation of health effects. As discussed in Chapter 4 of the SPD EIS, radiological health effects due to an accident at one of the disposition facilities or reactor sites are evaluated for persons residing within a distance of 80 km (50 mi) of the accident site. In general, the boundary of the circle with an 80-km (50-mi) radius centered at the accident site will not coincide with

boundaries used by the Census Bureau for enumeration of the population in the potentially affected area. Some block groups lie completely inside or outside the area included in the calculation of health effects. However, block groups intersecting the boundary of the potentially affected area are only partly included. This figure shows the block group structure near Idaho Falls, Idaho. The 80-km (50-mi) radius shown in this figure denotes the boundary used for calculation of health effects in the event of a radiological release at the Fuel and Materials Examination Facility (FMEF) at INEEL. Block groups that are unshaded in Figure M–1 lie within an 80-km (50-mi) radius centered at FMEF, and the total population of these block groups is included in the population count. Block groups shaded in gray lie outside of the circle, and the population of the shaded block groups is excluded from the population count. However, block groups such as those that are cross-hatched in Figure M–1 lie only partly within the circle. Because the geographical distribution of persons residing within a block group is not available from the census data, partial inclusions introduce uncertainties into the estimate of the population at risk.

In order to evaluate populations at risk in partially included block groups, it was assumed that residents are uniformly distributed throughout the area of each block group. For example, if 85 percent of the area of a block group lies within 80 km (50 mi) of the accident site, then it was assumed that 85 percent of the population residing in that block group would be at risk. An upper bound for the population at risk was obtained by including the total population of partially included block groups in the population at risk. Similarly, a lower bound for the population at risk was obtained by excluding the population of partially included blocks from the population at risk. A problem with this is that without a breakdown of the population data there is no way to determine the degree of risk that would support DOE findings. What DOE did was to determine population totals; this method assumes that the entire population present is equally susceptible. As a general rule, if the areas of geographic units defined by the Census Bureau are small in comparison with the potentially affected area, then the uncertainties due to partial inclusions will be relatively small. Uncertainties in the estimates of populations surrounding disposition facilities and reactor sites are described below.

The selection of the appropriate unit of geographic analysis may be a governing body's jurisdiction, a neighborhood census tract, or other similar unit. This is done to prevent artificial dilution or inflation of the affected minority population. The EIS should use the potentially affected population under various alternatives as a benchmark for comparison wherever possible. In addition, a simple demographic comparison to the next larger geographic area or political jurisdiction should be presented to place population characteristics in context and allow others to judge whether alternatives adequately distinguish among populations. For example, all preliminary locations for a project could fall in minority neighborhoods; therefore, a comparison among them would not reveal any population differences. Consequently, an additional alternative would be necessary to allow any disproportionately high and adverse effects to be identified.

An area of concern in data analysis using census data is the fact that census data can only be disaggregated to certain prescribed levels (*e.g.,* census tracts, census blocks). This would suggest that pockets of minority or low-income communities, including those that may be experiencing disproportionately high and adverse effects, may be missed in a traditional census tract-based analysis. Additional caution is called for in using census data due to the possibility of distortion of population breakdowns, particularly in areas of dense Hispanic or Native American populations. In addition to identifying the proportion of the population of individual census tracts that are composed of minority individuals, one should attempt to identify whether high concentration "pockets" of minority populations are evidenced in specific geographic areas.

The IWG guidance advises agencies to consider both groups of individuals living in geographic proximity to one another, or a geographically dispersed/transient set of individuals, where either type of group "experiences common conditions" of environmental exposure or effect within the guidance provided for

minority population. This can result from cultural practices, educational backgrounds, or the median age of community residents (*e.g.,* disproportionate numbers of elderly residents, children, or women of child bearing age may be more susceptible to environmental risks).

A significant factor that should be considered in assessing the presence of a minority community is that a minority group comprising a relatively small percentage of the total population surrounding a DOE facility may experience a disproportionately high and adverse effect. This can result due to the group's use of, or dependence on, potentially affected natural resources, or due to the group's daily or cumulative exposure to environmental pollutants as a result of their close proximity to the source. The data may show that a distinct minority population may be below the thresholds defined in the IWG key terms guidance on minority population. However, as a result of particular cultural practices, that population may experience disproportionately high and adverse effects. For example, the construction of a new treatment plant that will discharge to a river or stream used by subsistence anglers may affect that portion of the total population. Also, potential effects to on- or off-reservation tribal resources (e.g., treaty-protected resources, cultural resources and/or sacred sites) may disproportionately affect the local Native American community and implicate the federal trust responsibility to tribes.

The EIS analysis should look at each situation on a case-by-case basis to determine if there may be disproportionately high and adverse effects on a minority population. The analysis should make every effort to identify the presence of distinct minority communities residing both within, and in close proximity to DOE sites, and to identify those minority groups which utilize or are dependent upon natural resources that could be potentially affected by these proposed action. Non-traditional data gathering techniques, including outreach to community-based organizations and tribal governments early in the screening process, may be the best approach for identifying distinct minority communities and/or tribal interests within the study area.

Potentially affected areas examined in the SPD EIS include the areas surrounding proposed facilities for plutonium disposition located at four candidate DOE sites: the Hanford Site (Hanford), Idaho National Engineering and Environmental Laboratory (INEEL), the Pantex Plant (Pantex), and the Savannah River Site (SRS). Other potentially affected areas examined include the areas surrounding proposed reactor sites for mixed oxide (MOX) fuel irradiation: Catawba Nuclear Station, McGuire Nuclear Station, and North Anna Power Station. Minority and low-income populations residing within a 1.6-km (1-mi) corridor centered on representative transportation routes were also included in the evaluation of environmental justice. Potentially affected areas examined in the SNF EIS (including FRR SNF) pertains to one location, the Savannah River Site (SRS) in Aiken County, South Carolina, However, The following potential Port(s) of Entry for Foreign Research Reactor Spent Nuclear Fuel were selected for analysis because they met basic criteria designed to identify the most appropriate ports for use in accepting foreign research reactor spent fuel; Charleston, SC (includes Charleston Naval Weapons Station and Wando Terminal, Mt. Pleasant), Concord Naval Weapons Station, CA others under consideration were Galveston, TX, Hampton Roads, VA (includes Terminals at Newport News, Norfolk, and Portsmouth, VA), Jacksonville, FL, Military Ocean Terminal Sunny Point, NC, Portland, OR, Savannah, GA, Tacoma, WA, and Wilmington, NC.

The potential impact of ground transport was contingent upon the basic implementation of Management Alternative 1 which would involve transporting casks containing foreign research reactor spent nuclear fuel by truck, rail, or barge from the ports of entry or Canadian border crossings to potential management sites. The analysis considered five potential management sites for Foreign Research Reactor Spent Nuclear Fuel Management, selected to be consistent with the management sites evaluated in the Programmatic SNF&INEL EIS (i.e., the Savannah River Site in South Carolina, the Idaho National Engineering Laboratory, the Oak Ridge Reservation in Tennessee, the Hanford Site in Washington State, and the Nevada Test Site). The Record of Decision for the Programmatic SNF&INEL EIS subsequently

eliminated the last three sites from consideration as management sites for spent nuclear fuel from foreign research reactors.

Geographic Distribution of Minority and Low-Income Populations

Figures M–2 through M–9 show the geographical distributions of minority and low-income populations at risk in the vicinity of the candidate DOE sites. Distributions shown in these figures are based on baseline population data for 1990. Even-numbered figures show the geographical distribution of minority populations in potentially affected areas within a distance of 80 km (50 mi) of candidate facilities. Block groups are shaded to indicate the percentage of the total population comprised of minorities. According to the decennial census of 1990, minorities comprised 24.2 percent of the total population of the contiguous United States. Block groups unshaded in the even-numbered figures are those for which the percentage of minority residents is less than the national percentage minority population. Areas shaded in gray show block groups for which the percentage of minority residents exceeds the national minority percentage by less than a factor of two. Diagonally hatched block groups shown in the even-numbered figures are those for which the percentage of minority residents exceeds the national minority percentage by a factor of two or more.

Odd-numbered figures show the geographical distribution of low-income populations potentially at risk from implementation of the proposed action or alternatives. According to the decennial census of 1990, 13.4 percent of the population of the contiguous United States reported incomes less than the poverty threshold. Block groups unshaded in Figures M–1, M–5, M–7, and M–9 are those for which the percentage of low-income residents is less than the national percentage of persons reporting an income less than the poverty threshold. Areas shaded in gray show block groups for which the percentage of low-income residents exceeds the national low-income percentage by less than a factor of two. Diagonally hatched block groups shown in the odd-numbered figures are those for which the percentage of low-income residents exceeds the national low-income percentage by a factor of two or more.

Population Projections

The SPD EIS calculated health effects for populations projected to reside in potentially affected areas during 2010 and 2015. Extrapolations of the total population for individual States are available from both the Census Bureau and various State agencies (Campbell 1996). The Census Bureau also projects populations by ethnic and racial classification in 1-year intervals for the years from 1995 to 2025. Data used to project minority populations in the SPD EIS were extracted from the Census Bureau's Web site. Minority populations determined from the 1990 census data were taken as a baseline. It was then assumed that percentage changes in the minority and majority populations of each block group for a given year (compared with the 1990 baseline data) would be the same as percentage changes in the State minority and majority populations projected for the same year. An advantage to this assumption is that the projected populations are obtained with consistent methodology regardless of the State and associated block group involved in the calculation. A disadvantage is that the methodology is insensitive to localized demographic changes that could alter the projection for a specific area.

The Census Bureau uses the cohort-component method to estimate future populations for each State (Campbell 1996). The set of cohorts is composed of: (1) age groups from 1 year or less to 85 years or more (in 1-year intervals), (2) male and female populations in each age group, and (3) the following racial and ethnic groups in each age group—Hispanic, non-Hispanic Asian, non-Hispanic Black, non-Hispanic Native American, and non-Hispanic White. Components of the population change used in the demographic accounting system are births, deaths, net State-to-State migration, and net international migration. If $P(t)$ denotes the number of individuals in a given cohort at time t, then:

$$P(t) = P(t) + B - D + DIM - DOM + IIM - IOM$$

Where:

P(t) = cohort population at time t < t, where t denotes the year 1990.
B = births expected during the period from t to t.
D = deaths expected during the period from t to t.
DIM = domestic migration expected into the State during the period from t to t.
DOM = domestic migration expected out of the State during the period from t to t.
IIM = international migration expected into the State during the period from t to t.
IOM = international migration expected out of the State during the period from t to t.

Estimated values for the components shown on the right side of the equation are based on past data and various assumptions regarding changes in the rates for birth, mortality, and migration (Campbell 1996). The Census Bureau does not project populations of individuals who identified themselves as "Other Race" during the 1990 census. This population group is less than 2 percent of the total population in each of the States. In order to project total populations in the environmental justice analysis, population projections for the "Other Race" group were made under the assumption that the growth rate for the "Other Race" population will be identical to the growth rate for the combined minority and White (non-Hispanic) populations.

CONSIDERATION OF ENVIRONMENTAL AND HUMAN HEALTH RISK ASSESSMENTS

Executive Order 12898 provides for agencies to determine if a proposed action will result in disproportionately high and adverse effects to minority or low-income populations. Due to the fact that the characteristics of these populations may differ significantly from the characteristics of the larger affected population, analyses should address both the minority or low-income population and the comparison populations. There are several different methodologies for conducting formal environmental and health risk assessments. In determining whether there exists a potential for disproportionate risk, EPA uses a risk analysis processes such as those used by EPA which consists of two separate but interrelated processes: risk assessment and risk management. Risk assessment characterizes the likelihood for a chemical or some other dangerous substance to cause adverse health effects to humans and can provide a means for assessing the possible impacts on a population, if exposure occurs. Risk assessment provides an estimate of the probability that human exposure to a chemical agent will result in an adverse health effect to the exposed individual, or an estimate of the incidence of the effect upon an exposed population. Risk management is the process whereby it is decided what actions are appropriate, given an estimate of potential risks and due consideration to other relevant factors. Information developed in the risk assessment process is used to guide decision makers in determining the appropriate action to take within the risk management process.

When making risk management decisions in the context of environmental justice, a number of factors should be considered along with human health risk calculations or evaluations. These include social concerns, economic concerns, and more importantly, acceptance of the proposed action by the affected communities. Here, community involvement is critical because acceptable levels of exposure and risk can mean different things to those proposing the action and those impacted by the action. Within the context of risk management, there is an opportunity to consider relevant environmental justice issues. In the risk management process, decisions are made regarding acceptable levels of exposure and risk.
Risk assessment, as conducted by EPA, conforms to the Agency's published guidelines that include four distinct parts: Hazard Identification, Dose-Response Analysis, Exposure Assessment, and Risk Characterization. These four parts provide the analytical tools for identifying disproportionately high and adverse effects. During the risk management process, criteria must be developed to guide the weighing of

information. These criteria provide the basis for risk-based decisions with regard to disproportionately high and adverse effects. For example, risk assessments usually do not account for exposure traits of racial and ethnic groups or accurately account for actual environmental harm to human health where the population density is low (*e.g.*, rural communities, Indian Country). Human activity patterns governed by customs, social class, and ethnic and racial cultures may be introduced and considered during the risk management process to allow for the identification of disproportionately high and adverse effects.

To ensure that environmental justice concerns are considered within the risk management process, risk assessments should be conducted to determine exposure pathways and potential effects and the affected community should be involved in the development and implementation of the process. This is a fundamental requirement for any EIS considering EJ concerns none of this information is included in any of the DOE documents under review. This information can then be overlaid with information obtained from locational analyses using GIS and census data during the risk management process to identify minority or low-income populations that are located within the identified exposure pathways. Racial, ethnic, and cultural information can then be used to further refine the risk management process to account for disproportionately high and adverse effects.

To enhance the analysis of disproportionately high and adverse effects within EPA's health assessment studies, several efforts are underway to make relevant health and exposure information available to these studies. EPA's Office of Research and Development is currently developing the National Human Exposure Assessment Survey (NHEXAS). This survey is designed to generate a human exposure database to address some of the geographic and demographic questions relevant to environmental justice issues. NHEXAS will address exposure concerns by providing information on the magnitude, extent, and causes of human exposure.

EPA's Office of Policy, Planning, and Evaluation is currently developing an environmental justice database that will integrate health effects data from the National Health and Nutrition Examination Survey III (NHANES-III), demographic data from the 1990 Census, environmental data from air monitoring stations, and the Toxic Release Inventory database. This database integration can assist interesting parties in developing disease correlations with air exposure data in high impact populations. Ecological assessments conducted as components of EAs and EISs generally involve identifying the natural resources (*e.g.*, air, water, soils) that will be impacted by proposed project or activity and the potentially affected environments (*e.g.*, watersheds, wetlands, wildlife habitats) that may be impacted by the proposed project (including alternatives). After a general cataloging and description of the surrounding environmental and ecological resources is compiled, the potential changes and impacts of the proposed action and alternative actions are assessed. Often, these analyses do not fully substantiate the beneficial or adverse effects on the surrounding geographical area or communities within the area. Instead, impacts may be described generally, with an assumption that they are distributed equally across all communities or residents within the affected region or area. As a consequence, the analysis may overlook or ignore environmental justice concerns. If adverse impacts are not quantified, then special consideration should be given to whether potential impacts could be borne by minority communities or low-income communities residing within the larger area and, if necessary, separate analyses should be designed and conducted to assess this. As discussed above, GIS systems can sometimes be used to identify such populations and to characterize the environments where the populations reside. In addition, county and state planning agencies and housing authorities may be useful sources of information for characterizing the unique aspects and vulnerabilities of these populations.

If environmental, ecological, or human health impacts to the affected geographical area are quantified, the distribution of such impacts should be assessed. The EIS analysis should attempt to estimate the proportion of impacts borne by low-income and/or minority populations within the area of the program's impact compared to the general population in and around the program's region of influence. While

traditional risk modeling may not always be used in the NEPA process, impact assessments and risk management tools should be tailored to reflect the characteristics of these communities and study assumptions should reflect the characteristics of the individuals residing in low-income communities and minority-populated communities (*i.e.,* model assumptions should reflect the general health of these individuals and their general living conditions and unique locations relative to pollutant sources). When tailoring risk management tools to consider the distribution of impacts to low-income and/or minority communities, differential patterns of subsistence consumption of natural resources should be considered, including differences in rates of consumption for fish, vegetation, water, and wildlife among ethnic groups and among cultures. Furthermore, it should be recognized that land and water resources not predominantly used by the general population may be important sources of consumption, economy, cultural use, and/or recreation for minority and/or low-income communities. Degradation of these resources may result in direct and disproportionately high and adverse effects to minority and/or low-income communities.

Risk Perception and Behavior

In the long and at times contentious discussion on environmental risks, perception and reality seems to be opposite end of the argument. However, human perception and the behavior that results from it is very important to the EIS process and in no way should be diminished. The long and difficult history of federal attempts to provide storage for SNF, HLW, transuranic wastes, and low-level radioactive wastes has provided substantial evidence that states, communities, and citizens throughout the country have (with reason) a very adverse response to such facilities. The evidence to date suggests that HLW facilities are most likely to provoke strong and determined opposition and strong individual and community desires to avoid hosting them ( ). DOE's EIS should account for this long and obvious history and its potential for producing adverse socioeconomic impacts on host communities, counties, and states. The EIS process is an opportunity to highlight public understandings of environmental quality with the hope of generating insights that might improve the sophistication of community's necessary search for sustainable and acceptable visions of environmental justice. Ultimately, that community's ability to define and negotiate an agreement requires a sophisticated discussion of environmental justice. Participants in the discussion need to agree on definitions of environmental justice, outcome and impact of processes, even if they don't agree on degree or significance. Arising out of this process is the need to also analyze how to build the capacity of African-American and other disenfranchised communities to access and understand the technical data relating to the storage, disposal and management of nuclear waste at SRS.

These EIS should define and describe how public perceptions of SNF and SPD including MOX fuel fabrication at the SRS, including the planned ancillary facilities and activities, could be associated with geographical locations, and how these public associations would result in either positive (prestige) or negative (stigma) impacts on any vulnerable economic or social sector.

- It should show how positive and negative messages about places with HLW facilities are formed, amplified, transmitted, and subsequently influence significant public behaviors. Estimate the potential stigma impacts for vulnerable places, such as states, counties, communities, and social/cultural groups or organizations.

- Describe the range of possible responses to stigma impacts, including how negative impacts would be mitigated or compensated for when and if they occur. This impact assessment should consider the use of insurance and other compensation programs, along with such administrative matters as the distribution of compensation to those individuals, organizations, or public sectors negatively impacted. Plans to mitigate and minimize cases of HLW stigma should be explained in enough detail so that costs and final impact outcomes can be estimated.

- Describe plans and programs for providing proper compensation to communities and states that are burdened with HLW facilities. These activities would be designed to rectify any adverse conditions of equity and fairness that result from imposition of a repository program. The EIS should define the specific points of equity and fairness that are to be addressed and show how the federal response compensates for the conditions imposed by the repository program.

Health Impact Risk Assessment

Environmental impact statements (EIS) frequently do not sufficiently address human health impacts. Often the EIS process includes only partial health assessments using qualitative or cursory quantitative techniques. However, that is the old way of conducting assessments, recent efforts ensure that EIS assessments be more quantitative and rigorous in their evaluation of environmental and health impacts. These are the requirements of the policies and regulations behind environmental justice. For the SPD and SNF Projects, radiological health impacts are of concern from the release of carbon-14 and tritium into the atmosphere and from long-term leaching of other radionuclides into the regional groundwater system. This, coupled with the basic purpose of NEPA being to "stimulate human health," is adequate reason for the SPD and SNF EISs to comprehensively assess potential health impacts using a scientifically-based risk assessment technique.

A health impact prediction and assessment methodology should be founded on specific means for estimating the predicted impacts and for integrating the components of risk assessment with the routine activities conducted in an environmental impact study. There are several reasons basic to the need for applying health impact prediction and assessment methodology:

- describing the proposed project and the need for it;
- reviewing and analyzing pertinent health-related information;
- identifying potential impacts on human health from alternatives within the projects, from construction and operation, and after completion of the programs;
- preparing a description of the affected environment that focuses on health-related characteristics such as radiological pathway analysis;
- predicting impacts;
- interpreting the predicted impacts based on standards and risk quantification;
- identifying and evaluating mitigation measures to minimize undesirable health impacts;
- selecting proposed alternatives, such as thermal loading scenarios, based on health impacts as a decision factor;
- documenting the EIS process focused on considering human health; and
- monitoring environmental indicators indicative of health during construction and operation, and after conclusion of the programs.

The conceptual framework for this approach to health impact risk assessment (Environmental Professional 14: 204-219, 1992; 15: 125-138, 1993).

Environmental Exposure

Executive Order 12898 provides that environmental human health research, whenever practicable and appropriate, shall include diverse segments of the population in epidemiological and clinical studies, including segments at high risk from environmental hazards, such as minority and low-income populations and workers who may be exposed to substantial environmental hazards. The Executive Order further states that environmental human health analyses, whenever practicable and appropriate, shall identify multiple and cumulative exposures. In addressing the term "environmental hazard" for the purpose of research, data collection and analysis provisions in the Executive Order, the IWG Key Terms guidance states that it is "a chemical, biological, physical or radiological agent, situation, or source that

has the potential for deleterious effects to the environment and/or human health." The IWG points out that the factors that may be important in defining a substantial environmental hazard are the likelihood, seriousness, and the magnitude of the impact. The IWG Key Terms provides guidance for "multiple environmental exposure" and "cumulative environmental exposure." An assessment of such potential risks should then be used to determine whether disproportionately high and adverse effects may be borne by minority communities or low-income communities.

Urban Community Impacts

The assessment of socioeconomic impacts within major metropolitan areas presents difficulties that must be addressed in order to provide an adequate EIS. The definition of significance for some project-generated effects is important. In many cases, this will depend upon the level of analysis - neighborhoods, jurisdictions, or the metro area as a whole - and upon the ability to identify geographical, social-cultural, political, and economic sector impacts. The EIS should address residential locations of direct, indirect, and induced employment, spending, and public service demands within the urban area. The location of urban area transportation routes and the potential for property value effects and quality of life impacts, as well as, identification of key stakeholder groups and their interactions in regard to these programs. In addition, characterization of the culture of the surrounding communities, its changing profile, and the ways in which this culture is likely to respond to the full range of potential impacts, including accidents and stigmatization. Evaluation of how the program contributes to community cooperation and/or conflict. Assessment of the quality of life impacts of the program, including the conditions of psychological stress and its effects upon community behaviors. Impacts of the SNF and SPD program from the SRS will be manifested at the community level and will ultimately affect the quality of life for community residents.

Rural Communities Impacts

By the same token, rural communities need to be individually understood and their potential impacts assessed. The histories of rural communities can be expected to strongly influence the impacts of the program. In addition, the location of these communities relative to the program site, ancillary sites used for handling HLW, transportation routes, and administrative, inspection, or support activities are likely to impose differential effects and potential impacts. In addition, the economic structure of rural communities, as well as their potential for development in the future, will influence their vulnerability to stigma impacts. Quality of life impacts may be amplified or attenuated by the prevailing attitudes and opinions of the rural communities to the program as well as by past experiences with regard to radioactive exposures (e.g., people residing downwind or downstream, as is the case for the city of Savannah) and the trust and confidence the communities have in the proposed (SNF and SPD) project management.

The assessment of socioeconomic impacts for rural communities should address residential locations of direct, indirect, and induced employment, spending, and public service demands within the rural communities. The location of rural area transportation routes, the potential for accidents and emergency response to accidents. This will require a detailed assessment of emergency response capabilities and the costs associated with implementing adequate emergency response capabilities within and among rural communities. It should also address the structure and potential of rural community economies including the role of visitors and tourists. This will allow for the assessment of potential stigma impacts and the willingness of rural communities to accept repository health and environmental risks.

Identification of the rural community social and cultural conditions and a description of how these conditions affect local responses and behaviors in regard to the proposed action is also needed, as well as the effect of the program on intergovernmental relations, especially between rural communities and state and county governments, because the role of public services may be especially important for rural communities since unincorporated communities must depend upon county or state services. Evaluation of

how the program contributes to cooperation and/or conflict in the rural community and assessment of the quality of life impacts of the program, including the conditions of psychological stress and its effects upon community behaviors are also important factors for consideration (see State of Nevada-NOI comments, 1995).

IDENTYFYING AND ASSESSING DISPROPORTIONATELY HIGH AND ADVERSE IMPACTS

In general, the EIS should determine if the action agency identified any adverse impacts on minority populations and/or low-income populations as a result of a proposed action or identified alternatives to the proposed action. The action agency should identify and document all environmental and human health impacts that may have a disproportionately high impact on minority populations or low-income populations. Analysis of such impacts should determine the nature and severity of the impacts (e.g., singular, cumulative or multiple impacts.) This includes whether the health and environmental effects impact minority populations or low-income populations in a disproportionately high and adverse way (*e.g.*, whether the risk and rate of exposure from environmental hazards is significant and/or appreciably higher to minority populations and/or low-income populations than for the general population or comparison group).

If disproportionately high and adverse impacts are identified in the draft EIS, the review should also evaluate how the agency analyzed and documented the distribution of environmental and health effects within the community. EPA should determine what methods were used by the agency to document findings and evaluate whether those methods adequately and accurately characterized the impacts on the community. Methods useful for identifying whether a minority population and/or low-income population is disproportionately and adversely affected by a proposed action and its alternatives include locational/distributional tools (*e.g.*, GIS), ecological and human health risk assessments, and socioeconomic analyses. The EIS should ensure that the agency informed the public by providing sufficient and comprehensible information on any disproportionately high and adverse impacts and the rationale for the agency's conclusions about the impacts. Where possible, the public should be involved in providing input and information to identify the impacts.

Determination of Disproportionately High and Adverse Effects

During the initial "Environmental Assessment of Urgent-Relief Acceptance of Foreign Research Reactor Spent Nuclear Fuel (DOE/EA-0912)" completed in April 1994, DOE identified several applicable environmental justice concerns arising out of that initial Environmental Assessment (EA). These issues were for the most part not considered in the initial EA process. The subsequent Notice of Intent (NOI) filed 12/30/96 (FR Doc. 96-33131) for the preparation of an EIS (DOE/EIS-0279) listed 11 of these issues for further investigation during that subsequent process. Included on that list (issue #5) was the Potential for disproportionately high or adverse human health or environmental impacts on minority and low-income populations and (issue #10) Cumulative impacts from the proposed action and other past, present, and reasonably foreseeable actions at the Savannah River Site. Section 3-301 of Executive Order 12898 provides for agencies to determine if a proposed action will result or has resulted in disproportionately high and adverse effects to minority or low-income populations. It also provides in sect. 3-301 (b) for the analyses of multiple and cumulative exposures. Due to the fact that the characteristics of these populations may differ significantly from the characteristics of the larger affected population, analyses should address both the minority or low-income population and the comparison populations. Therefore, a major criterion for determining whether disproportionate risk exist or not would be to compare the affected region to a similar non-affected region. Comparison of the ROI is important so as to establish some kind of reasonable benchmark. In addition, establish a detailed characterization of the affected

minority or low-income population. This is a significant aspect missing from all of the Department of Energy Environmental Impact Statements.

Disproportionately high and adverse effects encompass both human health and environmental effects. The IWG's guidance suggests the need for the analyst to exercise informed judgments as to what constitutes "disproportionate" as well as "high and adverse." This, in turn, suggests some level of comparative analysis with the conditions faced by an appropriate comparison population. As noted above, alternatives need to be drawn so that the potentially affected populations under various alternatives are distinctive and allow disproportionality to be assessed. It is necessary to establish a working definition which encompasses the full meaning of the term "disproportionately high and adverse human health or environmental effects," currently, DOE uses the following definitions in their analysis of environmental justice (CEQ 1997):

Disproportionately high and adverse human health effects:

When determining whether human health effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practical:
a. Whether the health effects, which may be measured in risks and rate, are significant (as employed by NEPA), or above generally accepted norms. Adverse health effects may include bodily impairment, infirmity, illness, or death;
b. Whether the risk or rate of hazard exposure by a minority population or low-income population to an environmental hazard is significant (as employed by NEPA) and appreciably exceeds, or is likely to appreciably exceed, the risk or rate to the general population or other appropriate comparison group; and
c. Whether health effects occur in a minority or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.

Disproportionately high and adverse environmental effects:

When determining whether environmental effects are disproportionately high and adverse, agencies are to consider the following three factors to the extent practical:
a. Whether there is, or will be, an impact on the natural or physical environment that significantly (as employed by NEPA) and adversely affects a minority or low-income population. Such effects may include ecological, cultural, human health, economic, or social impacts on minority communities or low-income communities, when those impacts are interrelated to impacts on the natural or physical environment;
b. Whether environmental effects are significant (as employed by NEPA) and are or may be having an adverse impact on minority populations or low-income populations that appreciably exceeds, or is likely to appreciably exceed, those on the general population or other appropriate comparison group; and
c. Whether the environmental effects occur, or would occur, in a minority population or low-income population affected by cumulative or multiple adverse exposures from environmental hazards.

Mitigation of Disproportionately High and Adverse Impacts

When a disproportionately high and adverse impact to minority populations and low-income are identified, can those impacts be mitigated? The EIS should determine whether the DOE has described mitigation measures to avoid, minimize, rectify, reduce, or eliminate the proposed action's impact(s) on potentially affected minority and/or low-income populations. It should ensure that any decisions implementing mitigation measures reflect a process of public involvement wherein affected community members had an opportunity to provide input in the public participation processes. In cases where it is found that the proposed action would have a more significant adverse/disproportionate impact on

minority populations and/or low-income populations than the alternatives, it may be appropriate to discuss with the DOE, various alternatives that would result in a reduced impact on the community.

Key Considerations

There are several conclusions in DOE EIS pertaining to this area. 1) In the FRR-SNF, DOE has maintained throughout the process that estimates of the impacts on the environment, workers, and the public from implementing this acceptance program are "small and well within applicable regulatory limits". 2) Even though there is no option for managing DOE spent fuel or for surplus plutonium disposal that is without inherent risks, it is DOE contention that all the management technologies considered are proven technology that would have no more than "small" impacts, completely within applicable regulatory limits. 3) It is DOE intention to manage/store this additional (~ 68 MTHM) of spent fuel from foreign research reactors at the SRS for a limited period of time. DOE have raised a gray area by using the term " limited" period of time for interim storage. The SRS have been used to store SNF since 1980, given this history; this practice of long-term storage is the most likely scenario that would result. 4) that construction under all alternatives (Alternative 2 –12) would pose no significant health risks to the public. The risks would be negligible regardless of the racial or ethnic composition or the economic status of the population. Therefore, construction activities at any of the chosen sites (Hanford, INEEL, Pantex, SRS) under all alternatives would have no significant impacts on minority or low-income populations. 5) that routine operations conducted under all alternatives would pose no significant health risks to the public. No radiological or nonradiological fatalities would be expected to result from accident-free transportation conducted under all alternatives. Nor would radiological or nonradiological fatalities be expected to result from transportation accidents.

Throughout this process, DOE has maintained that estimates of the impacts on the environment, workers, and the public from implementing these programs are non-existent, small, or well within applicable regulatory limits. This address the issue of "significant" impact but does not address the question of whether impacts to the minority populations and low-income populations are disproportionately high and adverse as compared to the general population or the comparison group. There are other areas where DOE environmental justice analysis is inadequate, For example, in the analysis for environmental justice DOE is required to consider multiple exposure sources and paths of pollutants and health data for populations in question, but there is no evidence that anything remotely close to this was considered. The data DOE used to establish the presence of minority and low-income populations was taken from DOC census records, but no further characterization of the populations of interest outside of determining the amounts present in the respective areas of concern was evaluated. Health considerations require an analysis of risk. Because DOE never considered this as a part of the process, detailed dose assessment procedures together with pathway parameters, critical group dose calculations methods and the calculation results of any or all nuclide groups (e.g. tritium, noble gases, Carbon-14, Iodine-131 and particulates) are not included. For example, in the comments received related to the methodologies used in the preparation of the EIS, one commenter asked what environmental impact would result from the release of cesium into the atmosphere in the event that the filtration system does not capture all the cesium. Another commenter stated that DOE had minimized impacts in the Cumulative Impacts Chapter and only used a limited amount of available information regarding actual operating experience. DOE Response was that the Environmental Protection Agency (EPA) had commended it on its method of segregating spent fuel by type and then applying the appropriate treatment methodology as the best way to proceed. Impacts in the EIS are estimated from the best available information, including operational data whenever possible. When operations data do not exist, a practice at SRS was to rely on experience and inventory of material was based on recent studies completed by DOE. While this practice may be true it does not support DOE conclusion above that no disproportionately high and adverse effects would be expected for any particular segment of the population, including minority and low-income populations.

One of the main concerns of this review is the effect of these initiatives on women living in the impacted areas. It is puzzling and even disturbing to see that in the radiological analysis, such variables as breast-fed baby, fetus, and pregnant woman in particular, but women in general are not considered to be separate critical receptors. Yet a fetus is known to be more sensitive to radiation than an infant. In fact, a fetus is susceptible to an entirely different category of harm—developmental effects—in addition to the carcinogenic and genetic effects normally ascribed to ionizing radiation. Past studies have shown that developmental abnormality such as mental retardation is the most likely type to appear in the human species. The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR 1988) has stated that the most probable type of developmental effect experienced by a fetus exposed to ionizing radiation in utero, is mental retardation—yet this effect is nowhere mentioned in DOE's Cumulative Effects Assessment. In essence, analysis as a function of time showed that the probability of radiation-induced mental retardation is essentially zero with exposure before 8 weeks from conception, is at a maximum with irradiation between 8 and 15 weeks, and decreases between 16 and 25 weeks." The U.S. National Academy of Sciences has reported, "In humans, mental retardation is the best documented of the developmental abnormalities following radiation exposure.... In those irradiated between weeks 8 and 15 the prevalence of mental retardation appeared to increase with dose in a manner consistent with a linear, non-threshold response although the data do not exclude a threshold." (BEIR V, 1989, p.362; UNSCEAR, 1988, p.37)

A conclusion of this study "Until an exposure has been clearly established below which even subtle damage does not occur, it seems prudent not to subject the abdominal area of women of child-bearing age to quantities of radiation appreciably above background, unless a clear health benefit to the mother or child from such an exposure can be demonstrated." This is a useful consideration when dealing with low levels of ionization radiation. In light of such findings, DOE conclusion that since the determined impacts resulting from the proposed action under all alternatives presents no "significant" risk to the potentially affected populations, no disproportionately high and adverse effects would be expected for any particular segment of the population, including minority and low-income populations may be an example faulty reasoning. The extent of their analysis was to determine radiological risk recorded as latent cancer fatalities (LCF). Under the SPD program, DOE conclusion is that routine operations conducted under all alternatives would pose no significant health risks to the public. The likelihood of a LCF for the MEI residing near Hanford would be approximately 1 in 10 million; whereas, the likelihood for the MEI residing near SRS would be essentially zero. The number of LCFs expected among the general population residing near Hanford and SRS from accident-free operations would only increase by approximately 0.034 and 1.3×10^{-5}, respectively. These results show that the impact is numerically small, but the question remains, how many communities across the nation will be subjected to one cancer death for every million residents from increased radiation exposure over the next 50 years? Thus, the position that implementation of anyone of the alternative evaluated during all of the EIS processes above would pose no significant risks to the public, nor would implementation of any alternative pose significant risks to groups within the public, including the risk of disproportionately high and adverse effects on minority and low-income populations, for all intents and purposes, cannot be a justifiable one. This is a major shortcoming of the DOE process as reflected in the documents. Key assumptions such as those pertaining to the environmental and health impacts are not well explained or justified. There is simply not sufficient basis for such assumption, because there was no risk analysis on the affected population that took into consideration where individual members of that group were located, direct and indirect impact, cumulative and synergistic impact or any study that takes into consideration the history of exposures and future exposures of the population of interest over the duration of this program.

Cumulative and Indirect Effects

To meet the National Environmental Policy Act (NEPA) requirements to evaluate cumulative effects, the EIS must contain an analysis of the cumulative environmental and radiological risks and hazards for all

current and proposed radioactive wastes and special nuclear materials proposed for storage and/or disposal at SRS, and surrounding environs. Such an assessment must focus on the cumulative impacts to affected workers, the public and sensitive ecosystems. To accomplish this, the SNF/SPD EIS must include consideration of all radioactive wastes and special nuclear materials that currently exist, or are being considered for transport, treatment, storage, and/or disposal at the proposed facility, and surrounding environs. The EIS must consider the cumulative effects on a community by addressing the full range of consequences of a proposed action as well as other environmental stresses which may be affecting the community. One of the primary responsibilities of the EIS process is to determine whether the community currently suffers, or have historically suffered, from environmental and health risks or hazards in general, not only from the proposed action, but from other actions similar to the one being proposed. Source data, including historical, existing, and projected sources, yielding projected effects in concert with that from the resulting proposed action should be analyzed with respect to minority or low-income receptors including cultural, health and occupation-related variables.

Cumulative impacts are defined in 40 CFR 1508.7, as "the incremental impact(s) of the action when added to other past, present, and reasonably foreseeable future actions...." For example, when considering a project that will have a permitted discharge to the surrounding surface waters, it may be of concern to populations who rely on subsistence living patterns (*i.e.,* fishing) and already receive public water through lead service lines; the cumulative effects associated with both the discharge and the lead service lines must be taken into account. In such cases, mitigation measures need to be developed and analyzed to reduce an adverse cumulative effect. In addition, minority populations and low-income populations are often located in areas or environments that may already suffer from prior degradation. The EISs need to place special emphasis on other sources of environmental stress within the region, including those that have historically existed, those that currently exist, and those that are projected for the future.

The EIS process must consider the number and concentration of point and nonpoint release sources, including both permitted and non-permitted. There are several counties surrounding SRS in both Georgia and South Carolina that ranks high on the states TRI database for the amount of permitted releases and point source discharges without taking non-permitted discharges into consideration. The Savannah River corridor from Augusta/North Augusta 200 miles downstream to the city Savannah has a long and outstanding history of catering to the chemical industry, either as a storage location, transshipment point or home to one of the numerous chemical manufacturing facilities. The presence of listed or highly ranked toxic pollutants with high exposure potential (*e.g.,* presence of toxic pollutants included within EPA's 33/50 program) have always been an area of concern to local residents. DOE's EIS process has to not only reflect its contribution to this added environmental stress, but to include measures to mitigate this situation. This situation has become so much a part of day-to-day life that in Savannah, there is something called "the toxic tour".

Synergism is always of concern when dealing with chemical agents, also, historical exposure sources and/or pathways and multiple exposure sources and/or paths for the same pollutant or several different pollutants. The analysis must consider the potential for aggravated susceptibility due to existing air and noise pollution found in urban areas, lead poisoning, the existence of abandoned toxic sites (old industrial facilities), brownfields, and RCRA and CERCLA NPL facilities. Collectively, areas that are characterized as locally undesirable land use (LULU), factor significantly when dealing with environmental justice concerns simply because of their nature and origin. The EIS have to consider the frequency of impacts, communities around SRS experience a continuous impact, one they have been living with, which includes low radiation dosage, degraded water and degraded air, for the past 50 years.

There have been no meaningful analysis of the population data DOE used the two programs of interest here, or for that matter, any of DOE's programs at SRS. The analysis is lacking basic health data (*e.g.,* abnormal cancer rates, infant and childhood mortality, low birth weight rate, blood-lead levels) that are

reflective of the impacted communities. With the exception of worker exposure directly related to SNF or SPD there have been no analyses of occupational exposures to other environmental stresses, which may exceed those experienced by the general population. In addition, no consideration of lifestyle activities such as diet, or differential patterns of consumption of natural resources, which may suggest the potential increased exposures to environmental pathways presenting potential health risk.

Again, it is the responsibility of the EIS to attempt to identify the point at which stress levels become too great, exceeding risk thresholds. A lack of a definitive threshold should encourage the prepares of the EIS to compare the cumulative effects of multiple actions with appropriate community, regional, state, or national goals, standards, etc. to determine whether the total effect is significant. With respect to natural resources, analysts should look to the community's dependence on natural resources for its economic base (*e.g.*, tourism and cash crops) as well as the cultural values that the community and/or Indian Tribe may place on a natural resource at risk. Further, it is essential for the EIS to consider the cumulative impacts from the perspective of these specific resources or ecosystems which are vital to the communities of interest.

Several methods for determining cumulative effects are described within CEQ's January 1997 handbook entitled, "*Considering Effects Under the National Environmental Policy Act.*" DOE preparers should consider these methods in assessing cumulative effects on low-income and/or minority communities. Although cumulative effects analyses commonly involve assumptions and uncertainties, exhausting all applicable analyses will provide the greatest likelihood of accurately depicting the possibility of disproportionately high and adverse effects on low-income and/or minority communities. Decisions should be supported by the best data currently available and/or the best data gathering techniques in conjunction with all appropriate analyses.

EISs and EAs must also address indirect impacts [40 CFR 1502.16(b), 1508.8(b) 1508.9], which are characterized as those that are caused by the action and are reasonably foreseeable, but that occur later in time and/or at a distance. Indirect effects include growth effects related to induced changes in the pattern of land use; population density and/or changes to infrastructure; or growth rates and related effects to the air, water and other natural systems, including ecosystems. Increased urbanization may occur around a new facility due to increased employment or due to transportation system upgrades. This may result in disproportionately high and adverse effects to low-income communities due to increased air pollution; lower housing values, and reduced access to fishing/farming locations. In addition, recreational lands and water may be indirectly affected by government actions. In the case of activities potentially affecting Native Americans, potential impacts, both direct and indirect, can occur to sacred sites and/or other natural resources used for cultural purposes. For example, the loss of a sacred site, or other impacts to larger areas of religious and spiritual importance may be so absolute that religious use of the site abruptly ceases—a direct impact. However, discontinued use may result in other indirect impacts. Proposed actions may also result in business failures, and associated unemployment, erosion of tax bases, and reduced public services. These types of effects may be exacerbated for low-income communities and minority communities due to an inability to relocate, to travel long distances to find alternative means of employment, or to attract new industry or commerce. The potential for indirect impacts to affect a community is best understood when the analytical team is thoroughly familiar with the local community. It is important that the EIS outline a full understanding of potential cultural impacts to the community. This is best accomplished through direct communication using effective public participation and consultation. Some conclusions regarding the present efforts at a cumulative impact assessment can be drawn.

In light of the foregoing information, particularly regarding the treatment of critical receptors in the environmental impact assessments, impacted communities are determined that these issues be

openly and fully discussed. They hope and trust that the process will now afford them such a forum, through means of public hearings. They believe that this issue of cumulative assessment of radioactive contaminant discharges from the SRS concerns all residents in the ROI, and indeed South Carolina, Georgia, and elsewhere. The discussion of cumulative impacts in the EISs are, it's find to our concern, limited to mechanical and cursory mention, and descriptive treatment to varying degrees, of various spatial, temporal, radiological and socio-economic considerations. Most of the cumulative effects that are significant to environmental justice are minimized, and it is hard to believe from this analysis that the proposed SNF and SPD proposals are part of a highly invasive, socially contentious and problem-plagued broader industry at all and also that this assessment process was not disposed to the particular outcome.

The actual assessment in the EIS has been undertaken in isolation from full consideration of the environmental and social effects of the nuclear fuel cycle of which it is part. This nuclear fuel cycle obviously includes the production of nuclear waste in reactors at the Savannah River Site (SRS) and the subsequent permanent storage or "disposal" of nuclear waste elsewhere (for example in deep geological facilities at Yucca Mountain), not to mention other aspects of the nuclear fuel chain from uranium mining to nuclear weapons. This failure to fully embrace cumulative analysis is unacceptable, because the public must be made fully aware of how this proposal fits into the nuclear "big scheme of things". In addition, it is essential that these matters be assessed as a composite whole, which they obviously are, rather than at a disaggregated level. It should be emphasized that minimal increase in exposure to ionization radiation in an already degraded environment can increase likelihood of negative health impacts. It is evident that these programs do not address these types of concerns. It is the understanding that the intent of the requirement for cumulative impact assessment in the EIS process as required by NEPA and EO 12898, is to consider things as a whole. That requirement is consistent with our approach to the environment, our traditional laws, and respect for the Earth.

PUBLIC PARTICIPATION UNDER NEPA

Adequate public participation is crucial to incorporating environmental justice considerations into DOE's NEPA actions, both to enhance the quality of the analyses and to ensure that potentially affected parties are not overlooked and excluded from the process. Public participation under NEPA involves two-way communications, with DOE receiving feedback in the form of information, comments, and advice from interesting stakeholders, as well as disseminating information on possible approaches, analyses, and decisions. This is particularly important when there is potential environmental justice issues involved. To sufficiently and adequately address potential environmental justice concerns and communicate with potentially affected communities, the analysis should include one or more persons who are familiar with environmental justice issues and appropriate communications strategies.

There are established procedures for public participation in NEPA actions and decision-making processes. However, these procedures have not always been successful in informing or gaining participation by minority communities and low-income communities. Although they may be most affected, they may be the least informed, simply because of the means of communications used; this can be for any number of obvious reasons, such as language, culture, educational level or geographic location. In most cases, relatively simple approaches—well within the purview of "standard" public participation techniques—can overcome most barriers to informing and seeking involvement of interested or affected communities. This in turn can ensure that all federal decisions, including those made by the Department of Energy, are consistent with Executive Order 12898 and enhance the actual and perceived fairness of their actions.

Public participation is one of the hallmarks of NEPA, and is reflected in NEPA related regulations. According to 40 CFR 6.400(a), "EPA shall make diligent efforts to involve the public in the environmental review process...." There are several clearly defined steps in public participation under NEPA. CEQ regulations require "scoping" following the publication of a notice of intent to prepare an EIS, but before the EIS is prepared. CEQ regulations define scoping as "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 CFR 1501.7). In general, scoping has three broad purposes: identifying public and agency concerns with a proposed action, defining issues and alternatives to be examined in detail, and saving time by ensuring that relevant issues are identified early and drive the analyses (see 40 CFR 1500.4(g), 1500.5(d)). Public meeting are held during scoping, with notice of the meetings made in the *Federal Register*, local newspapers, and utilizing other means of announcing public meetings, depending on case-specific circumstances. CEQ has indicated that the scoping process ends "once the issues and alternatives to be addressed in the EIS have been clearly identified," usually "during the final stages of preparing the draft EIS..." (see CEQ "Guidance Regarding NEPA Regulations"). However, it is emphasized that public participation does not end here, but continues throughout the NEPA process and even beyond.

As with scoping, CEQ and EPA NEPA regulations clearly specify the means by which the public is involved in reviewing draft and final EISs. DOE regulations require at least one public meeting on all draft EISs (40 CFR 6.400©). The meeting is generally announced in the *Federal Register* and in local newspapers and by other means. Regulations also provide other means of soliciting comments and information. Comments must be solicited from other appropriate federal, tribal, state, and local agencies, and from the public, specifically including a request for comments from "those persons or organizations who may be interested or affected" (40 CFR 1503.1(a)(4)). The proposing agency (in this case DOE) then has to consider and address all comments received on the draft EIS in preparing the final EIS, and final EISs must include responses to comments. As with draft EISs, final EISs are noticed in the *Federal Register* and elsewhere. Again, stakeholders and other interested parties may submit comments on final EISs prior to DOE's final decisions.

Even though scoping for EAs is not addressed in either CEQ or EPA regulations, in practice, EA scoping do take place and can range from a process more or less identical to that used for EISs, to relatively minimal involvement of outside parties. EAs must be made available to the public (40 CFR 1506.6: C.E.Q. 40 Questions, #38). A combination of methods may be used to provide notice of availability; the methods should be tailored to the needs of particular cases. Traditionally there has been limited public involvement before and during EA preparation unless there is a question of significance (*i.e.*, some question as to whether an EIS is necessary) or some particular public interest.

Records of Decision on EISs must be disseminated to all those who commented on the draft or final EIS (40 CFR 6.400(e)). No public review is required prior to or after issuance of the ROD. Findings of No Significant Impact on EAs, in contrast, must be made available for public review before they become effective (40 CFR 6.400(d)), and this involves at least local notice and advertising. The FONSI and "attendant publication" must state that comments disagreeing with the decision may be submitted, and any such comments must be considered by DOE (40 CFR 6.400(d)). The following section partly chronicles the DOE EIS NEPA information process with respect to the two programs under review.

Spent Nuclear Fuel Program

The National Environmental Policy Act of 1969 (NEPA), as amended, provides Federal decisionmakers with a process to use when considering potential environmental impacts of proposed actions. Following this process, DOE announced, on December 31, 1996 in the *Federal Register* its intent to prepare an EIS

(61 FR 69085) and to establish a public comment period on the scope of the EIS that lasted until March 3, 1997. DOE accepted all comments received, even those received beyond the closing date. A public scooping meeting was held in North Augusta, South Carolina on January 30, 1997. Forty-one members of the public attended the meeting with 22 presenting comments or asking questions. In

The Department of Energy (DOE) announced its intent to prepare an Environmental Impact Statement (EIS) on the management of a portion of the aluminum-clad spent nuclear fuel at the Savannah River Site. The Department's objective is to identify and implement appropriate actions to safely and efficiently manage all aluminum-clad spent nuclear fuel and targets assigned to the Savannah River Site, including placing these materials in forms suitable for disposition. Aluminum-clad spent nuclear fuel is nuclear reactor fuel that has been withdrawn from a reactor following irradiation, the constituent elements of which have not been separated. The "spent nuclear fuel" consists primarily of the fuel (usually enriched uranium), fission products, and the aluminum structural material that serves as cladding. For the purposes of the SRS Spent Nuclear Fuel Management EIS, spent nuclear fuel also includes uranium/neptunium target materials, blanket subassemblies, pieces of fuel, and debris. To this end, this EIS will cover that portion of the aluminum-clad spent nuclear fuel inventory currently in storage at the Savannah River Site, as well as aluminum-clad foreign, domestic and government research reactor aluminum-clad spent nuclear fuel that has been assigned to, but has not yet been received at the Savannah River Site. The spent nuclear fuel included in this EIS consists of approximately 62 metric tons heavy metal of spent nuclear fuel: 34 metric tons currently at the Savannah River Site and 28 metric tons, foreign and domestic, to be shipped to the Savannah River Site. The Notice of Intent briefly described the proposed DOE action and alternatives, announces the schedule for the public scoping meeting, and solicited public involvement. Approximately 188 metric tons of spent nuclear fuel and targets currently stored at the SRS are not considered within the scope of the current SNF EIS because a management strategy for these materials has already been decided by the Department of Energy.

DOE invited comments on the proposed scope of the SRS Spent Nuclear Fuel Management EIS from the public. Comments must be postmarked or submitted by fax or electronic mail by March 3, 1997 to ensure consideration in the preparation of the draft EIS. DOE stated that it will consider late comments to the extent practicable. DOE will conduct an informational workshop and public scoping meeting on January 30, 1997, from 1:00 p.m. to 4:00 p.m. and 6:00 p.m. to 9:00 p.m., at the North Augusta Community Center, 101 Brookside Drive, North Augusta, South Carolina. The purpose of the workshop and scoping meeting is to discuss spent nuclear fuel management issues at the SRS and provide an opportunity for the public to assist the Department in determining the appropriate scope of the EIS. The date, time and location of the workshop and scoping meeting that appear in the Notice was announced in the SRS Environmental Bulletin and local newspapers in advance of the meeting.

DOE issued the Draft Spent Nuclear Fuel Management EIS on December 24, 1998, and held a formal public comment period on the EIS through February 8, 1999. In preparing the Final EIS, DOE considered comments received via mail, fax, electronic mail, and transcribed comments made at public hearings held in Columbia, S.C. on January 28, 1999, and North Augusta, S.C. on February 2, 1999. Completion of the Final EIS has been delayed because DOE has performed additional analyses of the melt and dilute technology, discussed in Chapter 2 and Appendix G of the draft. Comments received and DOE's responses to those comments are found in Appendix G of the EIS.

The U.S. Department of Energy (DOE) and the Department of State jointly issued the Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (the Final EIS, DOE/EIS-218F) on February 16, 1996. In the SNF Final EIS, DOE and the Department of State considered the potential environmental impacts of a proposed policy to manage spent nuclear fuel from foreign research reactors. After consideration of the Final EIS, public comments submitted on the Draft EIS and concerns expressed following issuance of the

Final EIS, DOE, in consultation with the Department of State, decided to implement the proposed policy identified in the Preferred Alternative contained in the Final EIS, subject to additional stipulations specified in Section VII of this Record of Decision. The implementation involved acceptance of approximately 19.2 MTHM (metric tonnes of heavy metal) of foreign research reactor spent fuel and approximately 0.6 MTHM of target material into the United States over a 13 year period, beginning on the effective date of the policy. The spent fuel will be received from abroad through the Charleston Naval Weapons Station in South Carolina (about 80%) and the Concord Naval Weapons Station in California (about 5%). Most of the target material and some of the spent fuel (about 15%) will be received overland from Canada. Shipment through the port of Charleston is expected to begin in the summer of 1996 and through Concord in mid-1997. Shipments from Canada have not been scheduled at this time. The Final EIS demonstrates that the spent fuel and target material could be safely transported overland within the United States by either truck or rail, and DOE has decided that either transportation mode may be used. Nevertheless, based on initial input from the public near the ports of entry indicating a preference for shipment by rail, DOE will generally seek to use rail for shipments from the ports of entry to DOE facilities at the Savannah River Site and the Idaho National Engineering Laboratory. The particular mode of transportation to be used will be determined after further discussions between DOE and State, Tribal and local officials. After a limited period of interim storage, the spent fuel will be treated and packaged, or chemically separated, at the Savannah River Site and Idaho National Engineering Laboratory as necessary to prepare it for transport to a final disposal repository.

DOE, in consultation with the Department of State, has decided to implement a new foreign research reactor spent fuel acceptance policy as specified in the Preferred Alternative contained in the Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (the Final EIS, DOE/EIS-218F of February 1996), subject to additional stipulations specified in Section VII of this Record of Decision. The new policy applies only to aluminum-based and TRIGA (Training, Research, Isotope, General Atomics) foreign research reactor spent nuclear fuel and target material containing uranium enriched in the United States. The purpose of the acceptance policy is to support the broad United States' nuclear weapons nonproliferation policy calling for the reduction and eventual elimination of the use of highly enriched (weapons-grade) uranium in civil commerce worldwide. The new policy set forth in this Record of Decision is effective upon being made public May 13, 1996, in accordance with DOE's NEPA implementation regulations (10 CFR Sec. 1021.315).

The Department of Energy (DOE), pursuant to 10 CFR Sec. 1021.315, and in consultation with the Department of State, is revising the Record of Decision issued on May 13, 1996 (61 Fed. Reg. 25092) on the Final Environmental Impact Statement on a Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel (the Final EIS, DOE/EIS-218F of February 1996), to allow the United States to take title to spent nuclear fuel and target material from foreign research reactors located in countries with other-than-high-income economies, as defined in the Final EIS, at locations other than the port of entry into the United States. The revision to the Record of Decision is effective July 22, 1996. The revision of the Record of Decision set forth in this Notice complies with the requirements of the National Environmental Policy Act (42 U.S.C. section 4321 et seq.) and its implementing regulations at 40 CFR Parts 1500-1508 and 10 CFR Part 1021. Because there are no environmental impacts associated with changing the title transfer location, no further environmental review is required under the National Environmental Policy Act or Executive Order 12114 (January 4, 1979) in order to effectuate the revision.

Surplus Plutonium Disposition Program

The Department of Energy (DOE) announces its intent to prepare an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) on the disposition of United States'

weapons-usable surplus plutonium. This EIS is tiered from the Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement (Storage and Disposition PEIS) (DOE/EIS-0229), issued in December 1996, and the associated Record of Decision (62 FR 3014), issued on January 14, 1997. The EIS will examine reasonable alternatives and potential environmental impacts for the proposed siting, construction, and operation of three types of facilities for plutonium disposition. The first is a facility to disassemble and convert pits (a nuclear weapons component) into plutonium oxide suitable for disposition. As explained in the January 1997 Record of Decision, this pit disassembly and conversion facility will be located at either DOE's Hanford Site, Idaho National Engineering and Environmental Laboratory (INEEL), Pantex Plant, or Savannah River Site (SRS). The second is a facility to immobilize surplus plutonium in a glass or ceramic form for disposition in a geologic repository pursuant to the Nuclear Waste Policy Act. This second facility will be located at either Hanford or SRS, and include a collocated capability to convert non-pit plutonium materials into a form suitable for immobilization. The EIS will discuss various technologies for immobilization. The third type of facility would fabricate plutonium oxide into mixed oxide (MOX) fuel. The MOX fuel fabrication facility would be located at Hanford, INEEL, Pantex or SRS. MOX fuel would be used in existing commercial light water reactors in the United States, with subsequent disposal of the spent fuel in accordance with the Nuclear Waste Policy Act. Some MOX fuel could also be used in Canadian deuterium uranium (CANDU) reactors depending upon negotiation of a future international agreement between Canada, Russia, and the United States. The EIS will also discuss decommissioning and decontamination (D&D) of the three facilities. This Notice of Intent describes the Department's proposed action, solicits public input, and announces the schedule for the public scoping meetings.
Comments on the proposed scope of the Surplus Plutonium Disposition EIS (SPD EIS) are invited from the public. To ensure consideration in the draft EIS, written comments should be postmarked by July 18, 1997. Comments received after that date will be considered to the extent practicable. DOE will hold interactive scoping meetings near sites that may be affected by the proposed action to discuss issues and receive oral and written comments on the scope of the EIS. The locations, dates and times for these public meetings are included in the Supplementary Information section of this notice and will be announced by additional appropriate means. Calling and leaving a message on an answering machine or faxing them to a toll free number, or by mailing them stakeholders could submit comments and questions concerning the plutonium disposition program. Comments may also be submitted electronically by using the Office of Fissile Materials Disposition's web site.

The Surplus Plutonium Disposition Draft EIS was issued in July 1998, which resulted in numerous public comments. In August 1998, DOE held five public hearings at locations in the vicinity of the four candidate DOE sites and at one regional location. The comment period ran from July 17, 1998, through September 16, 1998, although DOE considered all comments submitted after the close of the 60-day comment period. DOE received comments on the SPD Draft EIS by mail, a toll-free telephone and fax line, the Office of Fissile Materials Disposition Web site, and at the public hearings. Altogether, DOE received approximately 3,400 comment documents from individuals and organizations. All comments are presented in Volume III, Parts A and B, of the Comment Response Document of the SPD Final EIS. Approximately 65 percent of the comments received consisted of mail-in postcard campaigns that expressed either support of or opposition to the use of various sites or technologies. About 12 percent were collected during public hearings, 10 percent were in letters received by mail, 10 percent were received by fax, 2 percent were received by telephone, and 1 percent were received through the Web site. In April 1999, DOE issued the Supplement to the draft SPD EIS and received public comments. The comment period ran from May 14, 1999, through June 28, 1999, although DOE considered all comments received after the close of the 45-day comment period. On June 15, 1999, DOE held a public hearing in Washington, D.C. DOE received approximately 77 comment documents from individuals and organizations, which are presented in Volume III, Part B, of the Comment Response Document of the SPD Final EIS. Approximately 21 percent of the comments received were collected during the public

hearing, 34 percent were contained in letters received by mail, 26 percent were received by fax, 5 percent were received by telephone, and 14 percent were received through the Web site.

The Department of Energy (DOE) has decided to implement a program to provide for safe and secure storage of weapons-usable fissile materials (plutonium and highly enriched uranium [HEU]) and a strategy for the disposition of surplus weapons-usable plutonium, as specified in the Preferred Alternative in the Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement (S&D Final PEIS, DOE/EIS–229, December 1996). The fundamental purpose of the program is to maintain a high standard of security and accounting for these materials while in storage, and to ensure that plutonium produced for nuclear weapons and declared excess to national security needs (now, or in the future) is never again used for nuclear weapons.

DOE will consolidate the storage of weapons-usable plutonium by upgrading and expanding existing and planned facilities at the Pantex Plant in Texas and the Savannah River Site (SRS) in South Carolina, and continue the storage of weapons-usable HEU at DOE's Y–12 Plant at the Oak Ridge Reservation (ORR) in Tennessee, in upgraded and, as HEU is dispositioned, consolidated facilities. After certain conditions are met, most plutonium now stored at the Rocky Flats Environmental Technology Site (RFETS) in Colorado will be moved to Pantex and SRS. Plutonium currently stored at the Hanford Site (Hanford), the Idaho National Engineering Laboratory (INEL), and the Los Alamos National Laboratory (LANL) will remain at those sites until disposition (or movement to lag storage at the disposition facilities).
DOE's strategy for disposition of surplus plutonium is to pursue an approach that allows immobilization of surplus plutonium in glass or ceramic material for disposal in a geologic repository pursuant to the Nuclear Waste Policy Act, and burning of some of the surplus plutonium as mixed oxide (MOX) fuel in existing, domestic, commercial reactors, with subsequent disposal of the spent fuel in a geologic repository pursuant to the Nuclear Waste Policy Act. DOE may also burn MOX fuel in Canadian Deuterium Uranium [CANDU] reactors in the event of an appropriate agreement among Russia, Canada, and the United States, as discussed below. The timing and extent to which either or both of these disposition approaches (immobilization or MOX) are ultimately deployed will depend upon the results of future technology development and demonstrations, follow-on (tiered) site-specific environmental review, contract negotiations, and detailed cost reviews, as well as nonproliferation considerations, and agreements with Russia and other nations. DOE's program will be subject to the highest standards of safeguards and security throughout all aspects of storage, transportation, and processing, and will include appropriate International Atomic Energy Agency verification.

Due to technology, complexity, timing, cost, and other factors that would be involved in purifying certain plutonium materials to make them suitable for potential use in MOX fuel, approximately 30 percent of the total quantity of plutonium (that has or may be declared surplus to defense needs) would require extensive purification to use in MOX fuel, and therefore will likely be immobilized. DOE will immobilize at least 8 metric tons (MT) of currently declared surplus plutonium materials that DOE has already determined are not suitable for use in MOX fuel. DOE reserves the option of using the immobilization approach for all of the surplus plutonium. The exact locations for disposition facilities will be determined pursuant to a follow-on, site-specific disposition environmental impact statement (EIS) as well as cost, technical and nonproliferation studies. However, DOE has decided to narrow the field of candidate disposition sites. DOE has decided that a vitrification or immobilization facility (collocated with a plutonium conversion facility) will be

Community's Reaction to DOE Actions

The Department of Energy's decision to dispose of surplus weapon's grade plutonium using immobilization and Mixed Oxide fuel fabrication has been accompanied with an outcry from the Black community that has been disenfranchised from the Department of Energy's decisionmaking process

relative to many of its programs and continued activities at the Savannah River Site. For decades Black people, indigenous people and other people of color who lived near former nuclear weapons production sites, have been silent and have had no access to the path of influencing decisions that impact their lives and their communities. The creation of EO 12898 eight years ago has changed this in theory. The momentum of people of color getting involved and exercising their democratic right in the nuclear arena has increased and is being demonstrated in a variety of ways, but the degree to which this is reflected in DOE's activities is minimal.

The decision of the DOE to utilize the Savannah River Site as the facility to dispose of plutonium has caused African Americans communities in Georgia and South Carolina to join forces with others around the country to speak out against several of the decided technologies, specifically, the MOX fuel fabrication process. After much study and deliberation it is the belief of these communities that using the MOX as an option at Savannah River Site is not sound and represents a serious danger to their well being, given that health dangers associated with management of nuclear materials are inseparable from environmental dangers. Negative environmental effects impacting the soil (food), water, air ultimately affects the human being. "We cannot be separated from the environment". The African American community believes it is fighting to protect "lives and genes", and the lives and health of its children and our future generations. It is to this end that they oppose the MOX fuel fabrication process at Savannah River Site.

In December 1999 the Department of Energy announced its decision to use the Savannah River Site as the facility to dispose of plutonium using immobilization and MOX fuel fabrication. As far as public participation is concerned, the decision was left up to the community to hold educational sessions as a way to give voice to people who felt they had been left out of the process, as minimal efforts had been made by DOE to include them in the decisionmaking process as required by the 1969 National Environmental Policy Act. Even though the minority community (African Americans make-up 39 %) had been trying of follow the Environmental Impact Statement process associated with plutonium disposition, the December announcement brought shock, frustration, fear and anger. Residents felt that the Department of Energy was operating on its old work ethic; *first Decide, then Announce, and then, do their best to Defend.*

This is openly evident in both EIS processes under consideration in this review. The primary sentiment in the affected minority community is that the voices of the business community and pro-nuclear forces had won their campaign to bring the plutonium disposition mission to Savannah River Site without any sensitivity to community residents who may have lacked an understanding of 1. the issues, 2. the potential danger and 3. the possible impacts to the environment, ecology and their health. The decision to focus on MOX fuel fabrication was made because community residents felt that it posed the greatest danger and that they lacked understanding about this process versus immobilization. In addition, it represent DOE vigorous self-serving efforts to continue its activities at SRS without further consideration of the dangerous conditions created for minorities and low-income communities which by far constitute the majority of people living within the SRS region of influence.

Use of MOX would add to the nation's immense radioactive waste burden, and would make it more difficult to find scientifically defensible solutions to the HLW problems. As a result of a set of identified concerns, the CASRS concluded that the MOX fuel fabrication process should not be conducted at the Savannah River Site. As communities who have looked at the data presented by government (DOE) and other environmental organizations, our analysis leads us to believe this process would add to the burden at Savannah River Site, which ultimately impacts the community. There is no general consensus to support immobilization; however, there is a significant sector of the community who identified immobilization as a more preferable technology.

The question on the adequacy of the EIS scoping process and meetings outlined above remains whether the community has been sufficiently involved in the decision-making process. The Community Alliance on the Savannah River (CASRS) has raised some objections to the manner in which the scoping process has been handled; both in SRS impact area and elsewhere. The CASRS is very concerned that the notices of the scoping meetings did not adequately describe the proposed action and its implications for people along transportation routes. DOE failed to indicate the true national scope of the high-level waste program and deliberately chose not to make people aware of the potential transportation routes through their communities - and the consequent risks from spent nuclear fuel (SNF) and surplus weapons-grade plutonium (SPD) shipments - as part of the notices for scoping meetings. Failure to adequately inform potentially affected citizens of possible consequences of the proposed action for their communities created a situation where public participation in the EIS scoping process was suppressed, as evidenced by the poor turnout at most of the EIS scoping meetings.

In addition to DOE's failure to adequately notice the meetings and inform people along potential transportation routes of the possibility that they could be affected by transportation of spent fuel and high-level waste, the information contained in the NOIs and DOE's information presentations at the beginning of each scoping meeting misrepresented and, in certain instances, distorted the SNF and SPD programs and their possible impacts. For example, no information was provided on the possible unfavorable conditions present at the Savannah River Site. Inadequate information was provided on the relationship between regional (i.e., Georgia-South Carolina region of impact) and national transportation impacts and analyses; and misleading information was provided regarding transportation regulations, waste volumes required to be transported, and the possible modes and routes for SNF and HLW transportation. All of this resulting from the fact that no transportation analysis was done relating to these two programs. Public participation is one of the hallmarks of NEPA, and is reflected in CEQ's and EPA's NEPA regulations. According to 40 CFR 6.400(a), "EPA shall make diligent efforts to involve the public in the environmental review process...." There are several clearly defined steps in public participation under NEPA, and these are described below. The consensus of the communities is that we strongly oppose MOX fuel fabrication at Savannah River Site and call upon the Department of Energy to enhance and improve their methodology of doing outreach to African American and other disenfranchised communities living near and downstream from the site. The community representatives feel the Department of Energy is in violation of the spirit of National Environmental Policy Act, which is a legal mandate to include communities in public activities. It is felt that the Department of Energy does not care about the input of stakeholders who may oppose or have problems with their decision; and that the efforts of local stakeholders groups such as Citizens for Environmental Justice were too small to have any significant impact in the two states associated with Savannah River Site. An overwhelming concern was identified relating to host communities that would receive the fuel being uninformed and that it was left to the private enterprise to provide forums for information dissemination and public involvement. The belief is the MOX fuel fabrication strategy should not be implemented.

Major Environmental Justice Concerns

According to the Nuclear Information and Resource Service, MOX doesn't get rid of plutonium; it just creates nuclear waste. Inside a nuclear reactor, only some of the plutonium in MOX fuel gets "fissioned" or converted into other radioactive elements. These include such deadly elements as Strontium-90, Cesium-137, Iodine-129 and many, many more. While some plutonium is split by fission, new plutonium is being made in the reactor. This is because every commercial nuclear reactor produces plutonium as a waste product of its operation; the average commercial reactor produces some 500 pounds of plutonium per year (it takes about 20 pounds to make a Nagasaki-size bomb). Use of MOX fuel fails as a means of getting rid of plutonium. Instead, the plutonium just becomes part of the lethal soup of ingredients termed "high-level nuclear waste" which every reactor creates, and for which there is no means of safe long-term storage. Plutonium-239 itself is hazardous for 240,000 years. In addition, MOX would make reactors

even more dangerous, use of MOX fuel attacks commercial nuclear reactors where they are the weakest. Many reactors are aging prematurely, and cracks are appearing in vital reactor components. Most atomic reactors were not originally designed to use MOX fuel and MOX makes key reactor components age even faster. Because of its high "neutron flux" levels, the reactor pressure vessel can become embrittled and fail during accident conditions. A nuclear accident involving MOX fuel could cause a meltdown more serious than Three Mile Island or Chernobyl, because the levels of radiation inside a reactor using MOX are even higher than in a normal nuclear reactor.

Among other concerns is the belief that MOX would be an economic bailout for a failed industry. There are valid alternatives to the use of MOX fuel technology. Thus the Department of Energy's program-and the nuclear utilities' willingness to participate in this program-makes little sense until one understands that the DOE intends to pay nuclear utilities tax dollars to use MOX fuel. Not only is this an unconscionable use of our money, but also it creates a subsidy to allow uneconomical nuclear reactors to continue to operate when otherwise they would have to compete with other electricity sources under utility deregulation. Nuclear reactors that aren't economical should close, not be propped up by unnecessary, dangerous federal programs.

The selection of SRS for the MOX fuel fabrication program over other possibly more appropriate or more remote sites raises environmental justice concerns in the surrounding minority and low-income communities. There also seemed to be many questions about why SRS was sited where it was in the first place some 50 years ago. The appearance is that the government took advantage of a politically disempowered community and forced this facility with all its associated programs upon it. There were several immediate concerns, such as: (1) Inadequate understanding of the health and environmental impacts from past operations, much less of how the new proposed program would impact health, safety and the environment, (2) Inadequate assurances on protection from possible radiation releases from plutonium transportation and concern that the public is not notified of such shipments, (3) Affect of ongoing plutonium missions at SRS on the youth: what kind of environment are they growing up in? How might it be harming them? How is it also affecting the older population, and others who may be vulnerable?

There are also some issues that have not been sufficiently addressed like the existence of contamination in drinking water, the Savannah River, and in fish and other aquatic life in the watershed, and how this is impacting those who eat that fish. The belief that the new plutonium missions at SRS that are not related to clean-up could very well lead to even more new plutonium processing missions in the future and therefore new contamination. Adequacy of any plutonium processing technology (even if it is for clean-up, such as immobilization) in ensuring there are no releases to the environment that workers are protected, and that safety is assured. The city of Savannah and other downstream communities are being asked (or forced) once more to bear the burden of a destructive, polluting industry when it will mean little or no profit or benefit to them, but for which they will pay by having a less clean environment and increased risks to their health. Members of the minority community have expressed a compromise; if SRS and DOE by extension has a legitimate mission for cleaning up high-level nuclear waste and plutonium including addressing environmental justice concerns, then they would consider allowing for the additional risks of transportation and handling that would be required to accomplish those missions. That is not the case, however, if the mission of these programs is for industry profit or continued production of highly dangerous substances for which there are presently no scientifically sound clean-up solutions and which should not be produced ever again. The community is aware of the severe problems associated with nuclear weapons and nuclear power production and of the threat posed by the MOX mission at SRS. Over the duration of the SNF and SPD EIS process there have been strong condemnation of nuclear industries in general or the MOX program in particular within affected minority communities. This fact is not evident in these documents. The African American community has issued a written statement outlining their position that expresses their strong opposition to the MOX program at SRS.

The Impacted Community Positions and Recommendations

The African American community, the Community Alliance on the Savannah River (CASRS), and other impacted communities opposes the production of mixed-oxide fuel at Savannah River Nuclear Site and believe that any production activities related to the mission should stop. The community believes that past DOE activities at SRS has had a negative impact on surrounding communities and that the MOX program will add further contamination to the area way into the future. There are still questions as to whether SRS was the best location for MOX fabrication and local stakeholders were not satisfied that the answers DOE gave addressed this issue satisfactorily. In addition, there are concerned that politics dictated the decision more than concern for the health and well being of the surrounding environment. A concern that the government took advantage of people in the Southeast because those in the Northwest (in reference to the decision making process for the selection between Hanford and SRS as the site of choice) were more "informed" was mentioned. Community residents are also wary as to how MOX fuel was going to be used, in addition to concern over transportation, security, and possible nuclear reactor accidents. More research regarding the transportation of radioactive waste, whether it pertains to SNF, MOX or some other activity, should occur and be made public. Both MOX fuel fabrication and immobilization will require the transport of radioactive materials across the country and throughout Georgia and South Carolina. The primary concern with MOX is that transportation risks may never cease-since materials will be transported to SRS, MOX will then be transported from SRS to nuclear power plants, and then it is likely that the wastes will be sent back to SRS for reprocessing, and the transportation cycle would continue. Currently, the community has determined that the DOE has failed to contact communities along transportation routes to inform them of the hazards involved. Additionally, small communities are likely not to have the proper training or personnel to properly respond to an emergency that could occur in case of an accident. A clear safety network have not been outlined, approved, and implemented prior to pursuing any option. It was suggested that training sessions be held for the safety of the workers and residents during transportation. Additionally, the training of the Emergency Response Team should be intensified.

There is also a central concern about the young people--especially women, in the impacted communities--that they have not been properly involved in the discussions nor have the health impacts upon them been studied in depth. SRS is currently contaminated site that continues to affect local populations. As a future consideration DOE should carry out more comprehensive scientific research at and around SRS with environmental justice as the focus to better assess the overall health impacts of past and present operations on affected communities. This request includes a chronological assessment of prior accidents at SRS and research for proper assessment of the contamination to the groundwater supply on which many community members close to and downstream relies. The assessment should also study the toxic air releases and the problems that could arise from that exposure. The community knows that SRS has negatively impacted the health of SRS workers, the surrounding environment, and nearby communities including those downwind and downstream and does not feel that production missions should be undertaken when so many technical questions have yet to be considered and explained clearly and honestly to the community. Short of this there is no reason to put future generations at greater risk by proceeding with both the SNF and SPD programs. Central to the concept of environmental justice is that DOE garner the support of the impacted community; to proceed without such backing would be just doing business the old way.

There is also the belief that the production timeline as proposed by the DOE cannot be guaranteed-therefore MOX could impact the community well beyond the projected dates. Additionally, because the local community was not contacted to help in the process of choosing a location, they believe that MOX production should not occur since the impacted communities were never properly considered prior to the DOE and NRC decision to choose SRS as required by NEPA. Clean up and containment of past and

current releases is a mission of DOE EM and needs to occur before accepting additional programs at SRS. The community is supportive of preventing further contamination and exposure to dangerous wastes before pursuing new missions at SRS. The community does not feel that SRS has properly begun the task of remediation. For instance, some downstream communities rely on fish and seafood for their livelihood. That resource needs to be first protected not decimated by SRS. Groundwater has been contaminated and should be cleaned before pursuing missions that may add to the already existing problem. Air quality throughout the region has decreased and the impacts of SRS on that trend should be discussed.

Local community members are concerned with what they perceive as a total disregard of the taxpayer by the DOE. Taxpayer are being forced to support programs that they were not effectively informed about and to pay for facilities that will just generate more waste and cause more contamination. That the taxpayer, once again, will have to ultimately pay for clean up associated with a mission that could negatively impact their health with the only compensation provided them being the DOE's reassurance. The cost estimates associated with the immobilization option were less and yet the DOE was pursuing MOX. Immobilization should be further researched as the best candidate for dealing with surplus plutonium should. Though the community agreed that there are many important unanswered questions regarding this method, they acknowledged that immobilization appears to have less negative impacts on their communities. Additionally, from a global perspective they believe it is the more responsible method for dealing with the world's abundant plutonium supply. Funding should be increased to pursue this option. A re-examination of the costs associated with the MOX production mission needs to occur. A request was made to place a rider within the SRS budget to pursue the exploration of a safer energy source. Then MOX wouldn't be necessary to use as a fuel to provide energy. Note: the community also objected to their tax dollars being used to fight a racial discrimination lawsuit that was filed against SRS and it's contractors by African-American workers. Members objected to the DOE providing their tax money to contractors to fight such lawsuits. An independent cost analysis comparing the MOX mission to immobilization should be conducted before committing the limited resources of the taxpayer.

CONCLUSIONS

A well written environmental impact assessment that takes the tasks of environmental justice into consideration, and is in full compliance with the intent of NEPA should address in detail the questions, issues, and concerns pointed out above. This review analyzed the adequacy of the environmental impact assessment and public participation approaches taken by Department of Energy (DOE) as part of decision-making on spent fuel and surplus plutonium. From the standpoint of environmental justice analyses, the DOE EIS process is a disappointment. The documents are inadequate and lacking in scope. Based on the review of the limited discussion of the environmental justice concept presented in the EISs and the supporting primary reference documents, one can only but conclude that DOE has not presented a sufficient basis to support their findings. In light of this, the review disagrees with DOE contention that estimates of the impacts on the environment, workers, and the public from implementing these program are "small and well within applicable regulatory limits". Furthermore, this process is indicative of the fact that DOE is still lacking the necessary transparency required for public involvement and has still not considered NEPA requirements as significant to its daily operations and over the last eight years has done little to incorporate the intent of EO 12898 in their policies. DOE has only paid token services to environmental justice efforts. For example, DOE has included in its documents the idea that "NEPA analysis cannot be reduced to a single formula... Each DOE proposal presents unique circumstances and potential impacts...yet still DOE did not find it necessary to conduct health studies or transportation impact associated with these programs.

The combination of inadequate notices for the scoping meetings and the incomplete and often erroneous or misleading information presented by DOE in the NOIs and at the meetings is serious enough to warrant requiring DOE to extend the scoping period and hold the scoping meetings again, this time giving

adequate notice about how these projects might affect people along transportation routes and providing complete and accurate information about these projects and the actions covered by the NOIs. It is important that DOE take steps to encourage and facilitate more active participation by low-income communities and minority communities in its NEPA process. This goal can be accomplished through careful identification of target audiences and aggressive community outreach beyond the traditional forms.

DOE should do whatever it could to come up with a satisfactory solution to the environmental justice concerns pertaining to its spent fuel and surplus plutonium programs because, according to the impacted community, they are tired of hearing about all of these government plans "after-the-fact", and it is imperative that they have a say in what happens to them. The call has gone out to DOE, SRS and Westinghouse to meet with the concerned communities particularly the African American (this is the largest minority community impacted) and attempt to (1) Resolve identified issues (2) Develop and implement a strategic plan that would address real community involvement and public participation activities and (3) expand the education and outreach capacity of the local impacted communities. Finally, the Department of Energy has to come to grips with the fact that 32 years after the passage of NEPA and eight years after Executive Order 12898 ordered the implementation of an environmental justice strategy DOE has not done anything of substance to show that they are serious about incorporating a meaningful environmental justice strategy into their programs. If nothing else, DOE should reevaluate all its programs with an eye on its responsibility to the communities located close to its facilities. For SRS considerations, it should make special effort to consider and address those issues relevant the impacted community. SRS is significant to the socioeconomic development of the surrounding areas, and therefore it is important that it recognizes its status as a point source for environmental perturbations and work with the community to mitigate the impact. It is important for all concerned, especially policy managers, to understand that the principles and concepts outlined above are adaptable and applicable to several scales and focuses. They represent a viable starting point for a critically needed new effort at moving away from an old and outdated way of thinking and embracing efforts at environmental (ecological) sustainability.

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