immobilization alternative over the disposition campaign (for the highest accident scenario [criticality] at the potential disposition sites and 30 percent immobilization campaign: $1.7x10^{-8}$ at Hanford and $2.1x10^{-8}$ at SRS). For the immobilization of Pu through electrometallurgical treatment of spent fuels, the projected campaign risk to the population would be $3.5x10^{-7}$ for the accident scenario evaluated with the highest risk (a breach in the argon cell initiated by a design basis earthquake).

For the reactor alternative, the risk of cancer fatalities to the population located within 80 km (50 mi) of the accident release point for the MOX fuel fabrication facility would range from $4.6x10^{-16}$ to $4.3x10^{-4}$ for the campaign (for the highest accident scenario [fire on loading dock] at the potential disposition sites using for analysis purposes, approximately 70 percent disposition campaign: $5.2x10^{-5}$ at Hanford; $1.6x10^{-5}$ at INEL; $1.8x10^{-5}$ at Pantex; and $5.2x10^{-5}$ at SRS). The risk of cancer fatalities to the population located within 80 km (50 mi) of the accident release point for the MOX-fueled evolutionary LWR would range from $9.6x10^{-11}$ to $6.9x10^{-6}$. Under the Preferred Alternative, DOE would pursue the use of MOX-fueled LWRs. The incremental effects of utilizing MOX fuel in a reactor in place of UO_2 were derived from a quantitative analysis of severe accident release scenarios for MOX and UO_2 using the MACCS computer code and generic population and meteorology data. The analysis only considers severe accidents where sufficient damage would occur to cause the release of Pu or uranium. The risks of severe accidents were found to be in the range of plus 8 to minus 7 percent, compared to UO_2 fuel, depending on the accident release scenario. The incremental risk of cancer fatalities to a generic population located within 80 km (50 mi) of the severe accident release point would range from $-2.0x10^{-4}$ to $3.0x10^{-5}$ per year.

Waste Management. The reactor alternatives and the Preferred Alternative would be the only alternatives that would generate spent nuclear fuel. The Partially Completed LWR Alternative would generate the largest incremental increase in spent nuclear fuel. The Preferred Alternative would generate the lowest incremental increase of spent nuclear fuel among the reactor alternatives because the combination of disposition technologies would require less Pu to go through reactors. The reactor alternatives and the Preferred Alternative would also generate the most solid TRU, solid low-level, and solid hazardous waste among the alternatives.

Intersite Transportation. The Evolutionary LWR and Partially Completed LWR Alternatives would have the highest potential fatalities over the total campaign because they would require the most material transport. The Preferred Alternative and Electrometallurgical Treatment Alternative would have the lowest potential fatalities from transportation. Intersite transportation impacts would primarily be the result of nonradiological impacts such as fatalities from nonradiological highway accidents.

S.9 SUMMARY OF MAJOR ISSUES IDENTIFIED DURING THE COMMENT PERIOD AND CHANGES TO THE DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

S.9.1 ISSUES IDENTIFIED AND RESOLVED

The Department initially issued the Storage and Disposition PEIS as a draft for public comment for the period from March 8 through May 7, 1996. In response to public requests, DOE extended the comment period deadline to June 7, 1996. Public meetings on the Draft PEIS were held in March and April 1996 at the following locations:

Denver, CO	March 26, 1996
Las Vegas, NV	March 28–29, 1996
Oak Ridge, TN	April 2, 1996
Richland, WA	April 11, 1996

Idaho Falls, ID	April 15, 1996
Washington, DC	April 17–18, 1996
Amarillo, TX	April 22–23, 1996
North Augusta, SC	April 30, 1996

During the 92-day public comment period on the Storage and Disposition Draft PEIS, DOE received comments on the document by mail, fax, telephone recording, electronic mail, and orally at the public meetings. Altogether, DOE received approximately 8,700 written and recorded comments from individuals and organizations. All comments are presented in Volume IV of the Storage and Disposition Final PEIS, the *Comment Response Document.*

Approximately 80 percent of the comments received consisted of mail-in letter and postcard campaigns which expressed either support of or opposition to the use of various sites or alternatives. Many commentors encouraged DOE and the United States to become the world leader in the safe, secure, and timely disposition of Pu, and favored worldwide nonproliferation efforts for surplus Pu. The following highlights recurring comments, DOE's response, and the PEIS revisions in response to these comments.

A number of commentors expressed the opinion that the surplus Pu should remain in present locations for future energy or weapons use, or until new technologies are available for disposition. In response to these concerns, DOE expanded the discussion on the need for the proposed Pu disposition action in the PEIS. Disposition is necessary to implement the President's *Nonproliferation and Export Control Policy* in a safe, reliable, cost-effective, and timely manner.

Some commentors also stated that DOE should consider additional disposition alternatives, including the use of FFTF, deep burn reactors, and mononitride reactors. The use of advanced reactors such as deep burn reactors and mononitride reactors was considered but eliminated due to the technical immaturity, attendant costs, and lengthy development and demonstration efforts required to bring the technologies to a viable, practical status and enable disposition options to be initiated with certainty. The FFTF would be considered for Pu disposition if first selected for tritium production. The FFTF is not a reasonable, stand-alone alternative because it is in a standby status awaiting shutdown and because it could not satisfy the criterion of completing the disposition mission within 25 years. A discussion of FFTF for this purpose is included in Appendix N. In all, thirty-seven different alternative options were considered by DOE for disposition of Pu. DOE has made revisions to the Summary and Chapter 2 of the PEIS to clarify how the screening process was used for selection of reasonable alternatives.

Commentors noted that transportation of fissile materials is one of their major concerns with the Program. The ground transportation between sites, in the event a consolidation alternative was selected, could increase the potential for traffic accidents. International transportation for specific border crossings for the shipment of MOX fuel to Canada for the CANDU Reactor Alternative was also identified as a concern. DOE acknowledges the public's concern, and in response, the transportation analysis in Section 4.4 and Appendix G of the Draft PEIS was expanded. The revisions address security measures for land and sea transport, emergency preparedness, and clarify the results of analyses performed.

One frequently recurring comment presented by the public relates to the technical, cost, schedule, and nonproliferation analyses to support DOE's ROD. Many of the commentors suggested that DOE should make information available for public review. Since issuance of the Draft PEIS, DOE has prepared both the *Technical Summary Report for Long-Term Storage of Weapons-Usable Fissile Materials* (DOE/MD-0004 Rev. 1) and the *Technical Summary Report for Surplus Weapons-Usable Plutonium Disposition* (DOE/MD-0003 Rev. 1). These two reports summarize representative technical, cost, and schedule data for the reasonable alternatives being

considered for long-term storage and surplus Pu disposition, respectively. In July and August 1996, these documents were initially distributed for public review and comment. After taking the public's comments into consideration, DOE revised and re-issued both reports in November and December 1996. In October 1996, DOE issued the *Draft Nonproliferation and Arms Control Assessment of Weapons-Usable Fissile Material Storage and Plutonium Disposition Alternatives*, which analyzes the nonproliferation and arms reduction implications of the alternatives addressed in the PEIS for Pu and HEU storage and the disposition of surplus Pu. From October through early November 1996, the public was asked to review and comment on the draft nonproliferation document; this process included a series of 10 public meetings held nationwide. Public comments received are being taken into consideration in revising the report, which is scheduled for re-issue in late 1996. This report, in conjunction with the Final PEIS, the technical summary reports previously described, and public input, will form the basis for DOE's decisions, which will be discussed in a ROD to be issued no sooner than 30 days after publication of the Environmental Protection Agency's Notice of Availability of the Final PEIS.

Commentors also stated that the U.S. Nonproliferation Policy does not encourage the civil use of Pu or Pu processing for either nuclear power or nuclear explosive purposes. The commentors requested that the PEIS address the possibility that the MOX option would have an adverse effect on U.S. nonproliferation policy by encouraging its use in civil nuclear power programs and by encouraging Pu reprocessing and recycling. DOE acknowledges the public concern for nonproliferation. As discussed in the PEIS, the reactor option would utilize a once-through fuel cycle. Spent fuel from disposition would be disposed of with other commercial reactor spent fuel. This is consistent with U.S. policy since no Pu in the spent fuel would be recycled. Revisions to the Summary and Chapter 1 of the PEIS were made to expand and clarify this issue.

Commentors indicated that the isotopic composition of the residual Pu in the final waste forms is an inappropriate criterion by which to assess proliferation risks because it perpetuates a myth that reactor-grade Pu cannot be used to make workable weapons. In the opinion of these commentors, isotopic degradation does not constitute a compelling argument in favor of the MOX option. DOE acknowledges that, although it may be possible to make a nuclear weapon from spent commercial reactor fuel, this can only be done with extreme difficulty by individuals with a great deal of experience in handling and processing nuclear materials. DOE believes that the disposition of weapons Pu through the use of MOX fuel in reactors would meet the Spent Fuel Standard in creating a radiological barrier that makes the Pu as difficult to retrieve and reuse in weapons as Pu in spent commercial fuel. The use of this technology would allow for the Pu to be disposed in a geologic repository, the same as for spent commercial fuel. Revisions to Chapter 1 of the PEIS were made to clarify this issue.

S.9.2 CHANGES MADE TO THE DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

This section identifies changes made since the issuance of the Draft PEIS. The Final PEIS includes the Preferred Alternative, which is a combination of other alternatives and is described in Section S.2 and Section 1.6. Other changes, after considering public comments, are described below.

Appendix N, which in the Draft PEIS summarized the operational aspects of the multipurpose reactor, has been revised for the Final PEIS to provide information on the costs and benefits of conducting separate tritium production and Pu disposition missions versus the costs and benefits of carrying out one multipurpose mission. Included in Appendix N is a cost comparison of using new Advanced LWRs or Modular Helium Reactors, and a discussion of issues regarding the use of the FFTF (a liquid metal reactor at Hanford) for tritium production and Pu disposition.

Appendices O, P, Q, and R were added to the Final PEIS to help clarify alternative issues as they relate to the Preferred Alternative. Appendix O describes two can-in-canister technology concepts at SRS, which are variants of the Vitrification and Ceramic Immobilization Disposition Alternatives described in Chapter 2. This

information was added based on public interest in these concepts during the Draft PEIS comment period, and also because of DOE's reconsideration of this technology as being a viable approach for Pu disposition through immobilization.

Appendix P provides a description of using the Manzano Weapons Storage Area (WSA) near Albuquerque, NM to store Pu pits. This appendix was added because DOE's Preferred Alternative separates the storage of pits from non-pit materials, in which case Manzano WSA no longer appears unreasonable under the Preferred Alternative for pit storage. However, since DOE's preferred site for interim storage of pits is Pantex (as described in the Pantex EIS) and since the majority of pits are already located in storage at Pantex, the Preferred Alternative proposes the long-term storage of Pu pits at Pantex. Weapons assembly/disassembly would continue at Pantex in any case. Construction of a new storage facility at Manzano would create needless expense and transportation risk.

Appendix Q describes the operations and human (radiological) health impacts associated with Pu pits being transferred from RFETS to Pantex, repackaged in Zone 12 South, and placed in storage in Zone 4 West at Pantex, as part of the Preferred Alternative for long-term storage. The information presented in this appendix is based on the Pantex EIS analysis of storing the Pu pits already at Pantex.

Appendix R discusses aircraft crash and radioactive release probabilities for proposed storage and disposition facilities at Pantex.

Section 1.2 of the Final PEIS has been revised to reflect the cooperative effort between the United States and Russia to study different options for managing excess Pu (including secure storage, conversion of Pu weapons components to other forms, and stabilization of unstable forms of Pu), and options for disposition of excess Pu (deep borehole, immobilization, and reactors). The results of this study have been documented in the *Joint United States/Russian Plutonium Disposition Study* report, completed in September 1996. This study and the options considered will provide decisionmakers from both countries with a set of jointly evaluated alternatives for Pu disposition and help build further trust and cooperation in the area of fissile material disposition.