The public doesn't need the plutonium in the reactors in Mecklenberg County. We have enough pollution. I would like to see my grandchildren grow up without cancer from the plutonium in the air. 1

The U.S. Department of Energy (DOE) presumes in this environmental impact statement (EIS) that anything meeting the regulatory requirements is justified. Yet the International Commission on Radiological Protection, in the formation of its recommendations on allowable exposures, states that one must come up with a justification for a practice first, then find out if it meets the regulations. This means that a standard or regulation cannot be used as the justification, yet that is all the public is given. The public cannot be expected to compare what happens in different reactors using different fuels and what are the outcomes. 2

I find it very interesting that the litany of concerns I have raised in previous meetings is almost quoted in the sections on process materials, but without supporting data and analysis. There is, moreover, no mention of nuclear laundries in terms of a comparison for fission products. Are those products increased in a laundry that is serving a plutonium fuel reactor or not? Questions such as these are basic; they relate to information the public has a right to know but has not received. That tritium is elevated is something that I have heard, but I can't go anywhere in this document and find that. 3

**WASHDC–1** **Reactors**

Section 4.28 was revised to discuss the potential environmental impacts of operating Catawba, McGuire, and North Anna, the reactors that would use the MOX fuel. There would be no expected releases of plutonium from the proposed reactors occurring from normal operating conditions. Annual doses to an MEI at each of the plants are estimated to be small—i.e., McGuire, 0.31 mrem; Catawba, 0.73 mrem; and North Anna, 0.37 mrem. All of these doses fall within stringent NRC 10 CFR 20 and 10 CFR 50 regulatory requirements and are much lower than radiation annually received from natural background sources.

**WASHDC–2** **Human Health Risk**

In Volume I the need for the proposed actions are summarized in Chapter 1. Within this chapter the "justification behind the proposed actions" is discussed in detail. Subsequently, in Chapter 4, analytical results are presented which are then compared against radiation protection standards. In essence, this approach is parallel with ICRP recommendations.

Section 4.28 presents an analyses of the impacts expected if MOX fuel were used in the proposed reactors. In the case of accidents, there are direct comparisons of the impacts of a partial MOX fueled reactor versus a traditional LEU core. Also doses from normal operations of the proposed reactors are compared to the current doses as presented in the affected environment section in Chapter 3 of Volume I.

**WASHDC–3** **Human Health Risk**

Under normal operating conditions, it is not expected that there would be any change in nuclear laundries due to the use of MOX fuel at the proposed reactors. The laundries could be affected in either of two cases. If there were a fresh fuel assembly received at the reactor sites that had a cladding defect and contamination on the outside of a rod, the anti-contamination clothing would have a higher alpha-contamination with MOX fuel than it would with LEU fuel. However, since the cladding is sealed and inspected as a pressure boundary at the MOX facility prior to shipment and the fuel is transported in specifically designed packages, the likelihood that a rod would be ruptured

I am concerned as to the clear and present danger of this material. I am concerned about my grandchildren. We can spend a lot of time arguing about this. As I see it, however, we have to do something with this material other than store it. We need to put this material in a form that makes it unavailable for weapons use. The United States is not talking about reprocessing the spent fuel; it is talking about doing something with the separated plutonium. I have not heard any positive editorials read today, although some people have expressed agreement with use of the North Anna plant. 4

This process is reprehensible. It is clear that the main driver of the dual-track approach is access by nuclear corporations to taxpayer dollars. The decision had been made well before it was announced. This makes people mad—not only people in the communities of the reactors but also those giving their taxpayer dollars. Taxpayers do not want to have to give money to the largest debiting corporations in the world; they see the main issue as not that this program is better or that it accomplishes its goals, but that nuclear corporations need money. 5

when received at the reactor sites is remote. The other case that could result in a different radioisotopic inventory is if a MOX fuel rod failed in service and a different radioisotopic inventory were communicated to the reactor purification system and then this was somehow communicated to a worker's protective clothing. Both Virginia Power Company and Duke Power Company use onsite laundries for re-usable anticontamination protective clothing. The laundry water is filtered and then released in accordance with effluent release regulations and site permits. Alpha contamination, indicating the presence of actinides, is very low and far below regulatory limits. The same condition is expected to hold true for partial MOX fuel cores.

As shown in Table K–27, by the end of core life, the presence of tritium is expected to decrease by 5 percent when a partial MOX core is used.

**WASHDC–4** **Purpose and Need**

DOE acknowledges the commentor's concern regarding the clear and present danger of surplus plutonium. The goal of the surplus plutonium disposition program 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. Converting the surplus plutonium into MOX fuel and using it in domestic, commercial reactors is an effective way to accomplish this. Section 4.28 was revised to discuss the potential environmental impacts of operating Catawba, McGuire, and North Anna, the reactors that would use the MOX fuel.

**WASHDC–5** **MOX Approach**

Use of MOX fuel in domestic, commercial reactors is not proposed in order to subsidize the commercial nuclear power industry. Rather, the purpose of this proposed action is to safely and securely disposition surplus plutonium by meeting the Spent Fuel Standard. The Spent Fuel Standard, as identified by NAS and modified by DOE, is to make the surplus weapons-usable plutonium as inaccessible and unattractive for weapons use as the much larger and growing quantity of plutonium that exists in spent nuclear fuel from commercial power reactors. The MOX facility would produce nuclear fuel that would displace LEU fuel that utilities would have otherwise purchased. If the effective

It is clear DOE can't meet its obligations, in particular the obligation to hold full and open public hearings. The local community will not have the information it needs if you don't talk to them. 6

I have a question about storage of plutonium at the Savannah River Site (SRS). I have heard that DOE is deferring construction of the Actinide Processing and Storage Facility (APSF) facility at SRS. I understand that plutonium would be stored in the K-Reactor building. If this program turned out to involve longer-term storage and the mixed oxide (MOX) fuel program did not go forward, could the goal of long-term storage be accomplished by the K-Reactor building alone—that is, without a dedicated facility? 7

value of the MOX fuel exceeds the cost of the LEU fuel that it displaced, then the contract provides that money would be paid back to the U.S. Government by DCS based on a formula included in the DCS contract.

DOE has identified as its preferred alternative the hybrid approach for the disposition of U.S. surplus plutonium, it is not a decision. Decisions on the surplus plutonium disposition program will be made in the SPD EIS ROD based on environmental analyses, technical and cost reports, national policy and nonproliferation considerations, and public input.

**WASHDC–6 General SPD EIS and NEPA Process**

Since the inception of the fissile materials disposition program, DOE has supported a vigorous public participation policy. It has conducted public hearings in excess of the minimum required by NEPA regulations to engender a high level of public dialogue on the program. The office has also provided the public with substantial information in the form of fact sheets, reports, exhibits, visual aids, and videos related to fissile materials disposition issues. Efforts were made to contact persons living near the selected reactor sites and inform them of the proposed use of MOX fuel. The *Supplement to the SPD Draft EIS* was mailed to those stakeholders who requested it as well as to those specified in the DOE *Communications Plan* (i.e., Congressional representatives, State and local officials and agencies, and public interest groups around the United States) and the utilities' contact lists. The utilities, Duke Power Company and Virginia Power Company, would operate the proposed reactors (located in North Carolina, South Carolina, and Virginia) should the MOX approach be pursued per the SPD EIS ROD. Additionally, various means of communication—mail, a toll-free telephone and fax line, and a Web site (http://www.doe-md.com)—have been provided to facilitate the public dialogue. It is DOE policy to encourage public input into these matters of national and international importance.

**WASHDC–7 Alternatives**

In August 1998, DOE amended the *Storage and Disposition PEIS* ROD to allow for the receipt and storage of non-pit, surplus weapons-usable plutonium at SRS, in advance of the completion of APSF. If DOE selects SRS

Have the problems with Defense Waste Packaging Facility processing material caused the Office of Fissile Materials Disposition to rethink the immobilization technique? | 8

as the immobilization site in the SPD EIS ROD, current plans are to ship material from RFETS to SRS and store it in shipping containers in Building 105–K (K Reactor) beginning in about 2000; material from Hanford would be shipped to SRS and stored in APSF. Before storage, the material would first be stabilized and packaged for long-term storage in accordance with DOE Standard-3013-96, *Criteria for Preparing and Packaging Plutonium Metals and Oxides for Long-Term Storage.*

Building 105–K is currently undergoing modifications to provide for the safe, secure storage of the RFETS surplus plutonium per decisions made in the amended *Storage and Disposition PEIS* ROD. These modifications include upgrades to safeguards and security features, installation of criticality monitoring devices, and removal of unused process equipment. DOE would also expand APSF, as planned in the *Storage and Disposition PEIS* ROD, to accommodate the storage of Hanford surplus plutonium pending disposition. Should DOE decide to build and operate APSF at SRS, a portion of the RFETS material could be transferred from Building 105–K to APSF in order to provide for operational flexibility. If APSF is not built, the development of additional storage space in Building 105–K or in other DOE facilities could be necessary in order to provide for storage of the balance of surplus plutonium materials; such an action would only be done after an appropriate NEPA review was completed.

**WASHDC–8** **Alternatives**

DOE is presently considering a replacement process for the in-tank precipitation (ITP) process at SRS. The ITP process was intended to separate soluble high-activity radionuclides (i.e., cesium, strontium, uranium, and plutonium) from liquid HLW before vitrifying the high-activity fraction of the waste in DWPF. The ITP process as presently configured cannot achieve production goals and safety requirements for processing HLW. Three alternative processes are being evaluated by DOE: ion exchange, small tank precipitation, and direct grout. DOE's preferred immobilization technology (can-in-canister) and immobilization site (SRS) are dependent upon DWPF providing vitrified HLW with sufficient radioactivity. DOE is confident that the technical solution will be available at SRS by using radioactive cesium from the ion exchange or small tank precipitation process. A supplemental EIS (DOE/EIS-0082-S2) on the operation of DWPF and associated ITP alternatives is being prepared.

Will any expected failures of the fuel rod process be considered in the licensing process? | 9

Is there any known analysis of the radionuclide profile of low-level waste (LLW) generated during operations with plutonium fuel at the proposed reactors? | 10

**WASHDC–9** **MOX RFP**

FRAGEMA's (a subsidiary of COGEMA and FRAMATOME) experience with fabricating MOX fuel indicates a leakage rate of less than one-tenth of 1 percent. FRAGEMA has provided 1,253 MOX fuel assemblies, with more than 300,000 fuel rods for commercial reactor use. There have been no failures and leaks have occurred in only 3 assemblies (a total of 4 rods). All leaks occurred as a result of debris in the reactor coolant system and occurred in 1997 or earlier. French requirements for debris removal were changed in 1997 to alleviate these concerns. Since that time, there have been no leaks in MOX fuel rods.

**WASHDC–10** **Waste Management**

No, there are not any current analyses of the radionuclide profile of LLW generated during operations with MOX fuel at the proposed reactors. There are differences in fission product inventories and activation products between an LEU and MOX core during a fuel cycle. However, the only time significant quantities of fission products could be released to the environment or end up in LLW would be in the event of a large-scale fuel leak. In regard to normal operations, FRAGEMA's (a subsidiary of COGEMA; one of the companies chosen to operate the proposed MOX facility) experience with fabricating MOX fuel indicates a leakage rate of less than one-tenth of 1 percent. FRAGEMA alone has provided 1,253 MOX fuel assemblies, with more than 300,000 fuel rods for commercial reactor use. As previously discussed, there have been no failures and leaks have occurred in only 3 assemblies (a total of 4 rods). FRAGEMA has also produced 43,826 LEU assemblies over the years and has experienced leaks in only 471 assemblies.

The use of MOX fuel would not be expected to result in any additional LLW from refuelings because the reactors would continue to operate on the same schedule as if they were using only LEU fuel. Before any LLW would be shipped from the reactors to a disposal site, analyses would be performed to ensure that the concentrations of radioisotopes fall within regulatory limits. All of the proposed reactors will continue to operate within stringent NRC (10 CFR 20) radionuclide release and dose requirements.

Because radioisotopic profiles are linked to fuel rod failure, any additional information on such failure in other countries would be helpful. 11

In regard to high-level nuclear waste repositories, what differences are known to exist between low-enriched uranium (LEU) fuel and MOX fuel at the point where they become what we call high-level nuclear waste? It seems to me that there is not enough information on such waste and its effects on the program? 12

On page K–3 of the EIS, the curium 244 fraction is given as 0.94, when it should be over 2. Also, the chart shows no delayed neutron precursors, in particular those of the bromine series; they should be added. The chart also does not show all of the reactor poisons, specifically samarium, nor all fission product gases. The buildup of these gases could lead to a bursting of the fuel rods. The tritium fraction should also be included, as should any other fraction of gases produced in quantity. 13

**WASHDC–11** **Facility Accidents**

This comment is addressed in response WASHDC–10.

**WASHDC–12** **Repositories**

This SPD EIS assumes, for the purposes of analysis, that Yucca Mountain, Nevada, would be the final disposal site for all immobilized plutonium and MOX spent fuel. As directed by the U.S. Congress through the NWPA, as amended, Yucca Mountain is the only candidate site currently being characterized as a potential geologic repository for HLW and spent fuel. DOE has prepared a separate EIS, *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, July 1999), which analyzes the environmental impacts from construction, operation and monitoring, related transportation, and eventual closure of a potential geologic repository. As described on page 2–2 of the *Yucca Mountain Draft EIS*, immobilized plutonium and MOX spent fuel generated by the surplus plutonium disposition program are included in the inventory analyzed in that draft EIS should the decision be made to proceed with the hybrid or immobilization-only approaches. Section A.2.4.5.1 of the *Yucca Mountain Draft EIS* describes the expected material characteristics of MOX spent fuel from the surplus plutonium disposition program including: mass and volume, amount and nature of radioactivity chemical composition, thermal output, and physical parameters. Section A.2.1.5 describes similar characteristics for commercial LEU spent fuel.

**WASHDC–13** **Facility Accidents**

The curium 244 inventories shown in Appendix K were extracted from the output for the ORNL Isotope Generation and Depletion Code (ORIGEN) cases. Because the rate of curium 244 production is strongly dependent on burnup, it has a higher inventory level in LEU assemblies that are left in the reactor for three cycles than MOX assemblies that are left in the reactor for a maximum of two cycles. As a result, at the end of a cycle the ratio of curium 244 in a 40 percent MOX core would be about 6 percent lower than the ratio of curium 244 in an LEU core because more of the LEU core would be made up of assemblies that have been used for three cycles (33 percent of the core versus 20 percent of the core for the proposed MOX core).

It is true that burnups of 40 GWD/t or more result in higher fission gas production than LEU fuel at the same burnup. However, this does not automatically result in higher doses from reactors operating with MOX fuel. MOX fuel assemblies are engineered to accommodate this additional gas. In the event of a leaker, the gas is released into the reactor coolant and scrubbed through a series of filters that capture nearly all of the radionuclides so that any impact on dose would be expected to be small. Appropriate MOX fuel burnup limits would be established in concert with NRC following a thorough safety review. It should be noted that reactors in Belgium and Germany typically use MOX fuel to burnups between 45 and 50 GWD/t and that while current French burnup limits are lower than that, French burnup limits for LEU fuel are also lower than those for U.S. reactors.

This SPD EIS analyzes offsite consequences and risks in terms of LCFs and/or prompt fatalities. Previous studies have determined that certain radioisotopes are primary contributors to offsite consequences due to their effects on humans and the environment. These radioisotopes are included in Table K–27. Radioisotopes bromine 87 through bromine 91 and iodine 137 through iodine 141 are not included in Table K–27 because they are not significant contributors to offsite consequences. Bromine 87 through bromine 91 and iodine 137 through iodine 141 are delayed neutron precursors with half-lives of less than 1 minute. They were included along with the hundreds of other isotopes in the ORIGEN analysis done to support this EIS.

Xenon 135, the most important reactor poison, with a thermal absorption cross-section 60 times greater than samarium 149 is included in Table K–27. Samarium 149, a stable (nonradioactive) isotope, is not included because it is not a significant contributor to offsite consequences.

Tritium is a significant contributor to offsite consequences. The MOX/LEU ratio for tritium was calculated to be 0.95. Since this value is lower for the MOX core than an LEU core, the current analysis is conservative with respect to tritium.

**WASHINGTON D.C.**
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I have a real objection to similar statements presented on pages 33 and K–2. The statement on page 33 reads as follows: "Although it has been suggested that the frequency of these accidents would be higher with mixed oxide fuel, no empirical data is available to support this." I have been trying to give you this information, the use of MOX fuel would involve a lower delayed neutron fraction; faster neutrons due to the higher thermal neutron absorption cross-section of plutonium, meaning a higher average neutron speed and thus both a reduction in control rod worth (a safety impact) and a shorter reactor period; different temperatures coefficients of reactivity; and more gas production, thus higher releases. 14

In Section 4.28.2.1 (page 31) of the EIS, it is stated that the estimated air pollutants resulting from operation of the proposed reactors would not be expected to increase due to the use of MOX fuel. It is my understanding that the gas production of MOX fuel is much higher—not just tritium, but also xenon and krypton—so I would assume that statement to be incorrect. I would like for you to respond to that. 15

**WASHDC–14** **Facility Accidents**

The commentor states that MOX fuel will have a lower delayed neutron fraction, harder neutron spectrum, lower control rod worth, a shorter reactor period, different reactivity coefficients, and higher gas generation rate. These are all factual statements. These parameters require that the nuclear core designers accommodate these differences using verified and validated codes that incorporate these affects. Such nuclear codes have been used successfully in Europe and would be adopted and utilized by fuel designers in the United States. Before any MOX fuel is used in the United States, NRC would have to perform a comprehensive safety review that would include information prepared by the reactor plant operators as part of their license amendment applications pursuant to 10 CFR 50.

**WASHDC–15** **Air Quality and Noise**

Section 4.28.2.1 discusses nonradiological air impacts of the proposed irradiation of MOX fuel. Radiological impacts are discussed in Section 4.28.2.4 which indicates that the radiation dose to the general public from normal operations would not be expected to change with the use of MOX fuel in the selected reactors.

For normal operating conditions, the emissions are the same. The only emission stream that might result from using MOX fuel that would result in a different radioisotopic mix than LEU fuel occurs in the event that there is a MOX fuel failure, in which there is an emission pathway from the core. Given the history and integrity of fuel, a failure may never occur during the limited fuel campaign to get rid of surplus plutonium. Notwithstanding, if there were a MOX fuel failure, the effect on the radioisotopic inventory in emissions would be practically indistinguishable because: (1) the inventories in MOX and LEU fuel are similar (as shown in Table K–27), and (2) the contribution of fuel failures to the total emissions from the reactor is small (other contributions to the site's effluents dominate).

In the last public meeting in Amarillo, I asked what exactly the temperature fuel coefficient of reactivity response curve is. I received no response, so I submitted a card again. 16

Plutonium has a lower melting point, which will reduce safety; the higher decay heat of spent nuclear fuel would seem to increase the likelihood of a waste accident; and concerns as to the criticality of MOX fuel in storage would appear to justify greater concern as to the risks of spent MOX fuel in storage. 17

**WASHDC–16** **Facility Accidents**

DOE is unsure what the commentor means by "temperature fuel coefficient of reactivity." DOE suspects that the commentor is interested in either the Doppler coefficient or the moderator temperature coefficient. For core designs similar to the ones DOE expects at the mission reactors, DOE has some illustrative data to provide. Moderator temperature coefficients are more negative for MOX cores than LEU cores. The beginning of life value for an "equilibrium MOX core" is approximately -12 pcm/F, which is more than twice as negative as the LEU number, which is about approximately -5 pcm/F. The temperature coefficient becomes more negative as a function of burnup and approximately linearly changes as a function of burnup until a burnup of approximately 20 GWD/t with a value of approximately -35 pcm/F. At this burnup, the coefficients for MOX and LEU merge and are approximately the same. (ANRCP-199-1, *Disposition in Weapons-Grade Plutonium in Westinghouse Reactors*, March 1998.) In the original question related to Doppler coefficient, DOE has an illustrative estimator of the parameter from *The Plutonium Disposition Study, Implementation of Weapons-Grade MOX Fuel in Pressurized Water Reactors* (Westinghouse Electric Corporation, August 30, 1996). At 100 percent power, the coefficient for an "equilibrium" MOX core is approximately -8.5 pcm/ percent-power which is slightly more negative than an LEU core at approximately -7.7 pcm/percent-power. These numbers are extracted from design studies performed under contract or grant from DOE for representative Westinghouse cores and may not be precise indicators for the actual mission reactors or mission fuel cycles. These more negative temperature coefficients would act to shut the reactor down more rapidly during a heatup transient.

**WASHDC–17** **Facility Accidents**

The plutonium in MOX fuel would be present as plutonium dioxide in ceramic-like fuel pellets, not elemental plutonium. Plutonium dioxide has a significantly higher melting point than pure plutonium metal. In any case the melting point of MOX fuel would be within the specifications for that type of reactor fuel.

Initially, when spent fuel is removed from the reactor, the MOX and LEU fuel would be about the same temperature and exhibit similar characteristics.

I was glad to see that the *Supplement* does not suggest, as original data suggested, that health effects go down—that is, that plutonium is good for local communities. However, I don't see any reflection of the information received at the Canadian meeting a month ago. At that meeting, the head of the regulating body acknowledged that alpha radiation may in fact have a quality factor of 2,000, not 20, which is what the U.S. Nuclear Regulatory Commission (NRC) provides for us. Credible work shows that the presence of plutonium in a reactor would double the impacts of a reactor accident. There are, however, no voices from the communities to let you know how they feel. 18

After about a year out of the reactor, however, the temperature of MOX spent fuel would exceed that of LEU fuel of the same age. Therefore, storage of MOX spent fuel would increase the thermal loading in a spent fuel pool over that for only LEU fuel. However, thermal load limitations are based on the amount of cooling that the entire spent fuel pool can accommodate, not on individual fuel assemblies within the pool. Therefore, the additional heat load would be accounted for in the calculations for the reactor spent fuel management plans.

Although the amount of fissile material would be higher in MOX spent fuel rods than in LEU spent fuel rods, rod spacing and boron content in the spent fuel pools would be adjusted as necessary to maintain criticality safety.

**WASHDC–18** **Facility Accidents**

The latest published version of 10 CFR 20.1004 (January 1, 1999) states that the quality factor for alpha particles is 20. This regulatory criteria (10 CFR 20) is established by NRC, and is therefore the official benchmark from which U.S. nuclear utilities are continually governed in the realm of radiation protection.

This SPD EIS analyzed several reactor accidents, including both design basis and beyond-design-basis accidents. For MOX fuel, as compared to LEU fuel, there is an increase in risk, about 3 percent, for the large-break loss-of-coolant accident (the bounding design basis accident). The largest increase in risk for beyond-design-basis accidents is approximately 14 percent for an interfacing systems loss-of-coolant accident at North Anna. In the unlikely event this beyond-design-basis accident were to occur, the expected number of LCFs would increase from 2,980 to 3,390 with a partial MOX core and prompt fatalities would increase from 54 to 60. Both of these accidents have an extremely low probability of occurrence. At North Anna, the likelihood of a large-break loss-of-coolant accident occurring is 1 chance in 48 thousand per year and the likelihood of an interfacing systems loss-of-coolant accident occurring is 1 chance in 4.2 million per year.

Efforts were made to contact persons living near the selected reactor sites and inform them of the proposed use of MOX fuel. The *Supplement to the SPD Draft EIS* was mailed to those stakeholders who requested it as well as

When the dual track was announced, I asked if anyone had looked into the impacts of reactor irradiation of plutonium fuel on the LLW from reactor operations, and the resulting impacts on the destination of that LLW, the low-level radioactive waste dump. An example would be the impact on Ward Valley of a waste stream from Palo Verde. Ward Valley has not been designated as an LLW site but could well be within the time allotted. A major concern as to Ward Valley is how much plutonium would be going into the site and whether it would jeopardize the Colorado River. Government officials and the citizens of South Carolina are concerned that Barnwell is leaking. 19

There is a need for analysis of DOE's new—and currently contested—standard on the release of contaminated metals to consumer products. What about effects of the release of metals from facilities using MOX rather than LEU fuel on consumer products developed from recycled metals? The public doesn't have the information it needs on this matter. 20

to those specified in the DOE *Communications Plan* (i.e., Congressional representatives, State and local officials and agencies, and public interest groups around the United States) and the utilities' contact lists. The utilities, Duke Power Company and Virginia Power Company, would operate the proposed reactors (located in North Carolina, South Carolina, and Virginia) should the MOX approach be pursued per the SPD EIS ROD. DOE provided various means for the public to express their concerns and provide comments: public hearing, mail, a toll-free telephone and fax line, and the MD Web site. Further, the communities near the proposed reactors and all other interested parties will likely have the opportunity to submit additional comments during the NRC reactor license amendment process.

**WASHDC–19** **Waste Management**

As described in Section 4.28.2.2, the volume of LLW generated at the reactor sites is not expected to increase as a result of the reactors using MOX fuel. There are differences in fission product inventories and activation products between an LEU and MOX core during a fuel cycle. However, as discussed in response WASHDC–10, the only time significant quantities of fission products could be released to the environment or end up in LLW would be in the event of a large-scale fuel leak. The amount of radioactivity that can be received at commercial LLW disposal sites is determined through the NRC licensing process for the particular site (e.g., Barnwell). This licensing process considers potential impacts on the environment near the disposal unit. Reactor wastes are only accepted if they meet the waste acceptance criteria of the disposal site. The LLW generated at the proposed reactors that would use MOX fuel is expected to meet the waste acceptance criteria.

**WASHDC–20** **Waste Management**

The reactors proposed for MOX fuel irradiation would not be operated by DOE. The reactors would continue to be operated by the utilities and regulated by NRC. Eventual D&D of the reactors, which may include recycling of metals, would be performed by the utilities in accordance with NRC regulations in force at that time. However, it is premature to assume that scrap metal at the reactors would be recycled as part of D&D.

I would like to see a table comparing the wastes associated with the use of MOX versus LEU fuel and another comparing the MOX and immobilization approaches to surplus plutonium disposition. This table would make matters clearer for the public. The public would see that the MOX approach involves more steps and thus more opportunities for something to go wrong, more expense, and more waste streams. The taxpayer dollar spent on these processes goes to someone, and it represents a kind of nuclear welfare. I think that the energy producers are going to start noticing that in a deregulated market some people are getting a handout. 21

The environmental analysis does not state the positive health and safety impacts of substituting MOX fuel for the LEU fuel. Once MOX fuel is used, you will see that the impacts of using LEU are worse. This will not clean up our entire area, but it will make an improvement. I wish everyone would look at both side of the issue and make a mature decision. 22

Is DOE planning to conduct a public meeting next week in Russia? Have public meetings ever taken place in Russia? 23

**WASHDC–21** **Alternatives**

This SPD EIS does not evaluate MOX, by itself, versus immobilization. Rather, this EIS evaluates hybrid alternatives (i.e., both immobilization and MOX) and immobilization-only alternatives. All of the surplus plutonium would not be made into MOX fuel because of the complexity, timing, and cost that would be involved in purifying the material to make it suitable for fabrication. A simple comparison of these approaches at the same site can be observed by comparing Alternative 2 to Alternative 11A in Table 2–4. This EIS does, however, look at the differences in operating the reactors with LEU and MOX fuel. Section 4.28 indicates that there is very little difference in the potential impacts of reactor operation, including waste generation, using MOX fuel in place of up to 40 percent of the LEU assemblies as proposed.

Use of MOX fuel in domestic, commercial reactors is not proposed in order to subsidize the commercial nuclear power industry. Rather, the purpose of this proposed action is to safely and securely disposition surplus plutonium by meeting the Spent Fuel Standard. The Spent Fuel Standard, as identified by NAS and modified by DOE, is to make the surplus weapons-usable plutonium as inaccessible and unattractive for weapons use as the much larger and growing quantity of plutonium that exists in spent nuclear fuel from commercial power reactors.

**WASHDC–22** **MOX Approach**

Section 4.28.3 was added to this SPD EIS to show an estimate of the environmental impacts that would be avoided if MOX fuel was substituted for LEU fuel at the proposed reactors.

**WASHDC–23** **General SPD EIS and NEPA Process**

DOE has no plans to hold a public hearing in Russia and has not held any public hearings there on this subject.

Why has DOE not held any meetings at any of the reactor communities? 24

The citizens of the United States do not have access to the radionuclide profile analysis from France. Under the National Environmental Policy Act (NEPA) process what can be done to enable public review of that information? What other information is being discussed that the public does not have access to? 25

**WASHDC–24 General SPD EIS and NEPA Process**

After careful consideration of its public involvement opportunities, including availability of information and mechanisms to submit comments, DOE decided not to hold additional hearings on *the Supplement to the SPD Draft EIS*. DOE felt there were sufficient other means provided for the public to express their concerns and provide comments: mail, a toll-free telephone and fax line, and the MD Web site. Efforts were made to contact persons living near the selected reactor sites and inform them of the proposed use of MOX fuel. The *Supplement* was mailed to those stakeholders who requested it as well as to those specified in the DOE *Communications Plan* (i.e., Congressional representatives, State and local officials and agencies, and public interest groups around the United States) and the utilities' contact lists. The utilities, Duke Power Company and Virginia Power Company, would operate the proposed reactors (located in North Carolina, South Carolina, and Virginia) should the MOX approach be pursued per the SPD EIS ROD. For those interested parties who could not attend the hearing on the *Supplement* in Washington, D.C., on June 15, 1999, DOE provided the various other means discussed above for the public to express their concerns and provide comments. Further, interested parties will likely have the opportunity to submit additional comments during the NRC reactor license amendment process.

**WASHDC–25 General SPD EIS and NEPA Process**

In accordance with CEQ implementing regulations (40 CFR 1506.6(f)), DOE has provided copies of reports and documents used in the preparation of this SPD EIS in DOE reading rooms and made them available on their Web site at http://www.doe–md.com. The radionuclide profile analysis referred to by the commentor was not used in this EIS but may be available from COGEMA. Information on COGEMA's environmental record can be found on their Web site at http://www.cogema.com or by contacting Ms. Christi A. Byerly. Her address is: 7401 Wisconsin Avenue; Bethesda, MD 20814. She may also be contacted by telephone at (301) 941-8367. Her fax number is (301) 652-5690, and her email address is cbyerly@cogema-inc.com.

I am confused as to where DOE is in the NEPA process. Has the public been given the information needed to assess the dual-track approach. Is it DOE's opinion that the public will be able to compare and comment on the impacts of the immobilization-only and dual-track approaches? 26

The affected communities have been ignored by DOE, NRC, and Duke. We are tired of being ignored. All you want to do to us is dump on us and use us. The public does not know about these issues and is being deceived. 27

**WASHDC–26 General SPD EIS and NEPA Process**

DOE is committed to providing the public with comprehensive environmental reviews of its proposed actions in accordance with NEPA and believes it provided numerous opportunities and means for public comment on the program. The SPD Draft EIS analyzed each environmental resource area in a consistent manner across all the alternatives to allow for a fair comparison among the alternatives and among the candidate sites for surplus plutonium disposition facilities. The comment period for the SPD Draft EIS was extended from 45 days to 60 days. During that time, DOE convened five public hearings to obtain oral and written comments from the public. These hearings were open to all individuals and organizations, and their format was intended to encourage public discussion and interaction.

As part of the procurement process, bidders were asked to provide environmental information to support their proposals. This information was analyzed in an Environmental Critique prepared for the DOE source selection board prior to award of the MOX fuel fabrication and irradiation services contract. DOE then prepared an Environmental Synopsis on the basis of the Environmental Critique, which was released to the public as Appendix P of the *Supplement to the SPD Draft EIS* in April 1999. This *Supplement* included a description of the affected environment around the three proposed reactor sites, and analyses of the potential environmental impacts of operating these reactors using MOX fuel (Sections 3.7 and 4.28 of this SPD EIS, respectively). During the 45-day period for public comment on the *Supplement*, DOE held a public hearing in Washington, D.C., on June 15, 1999, and invited comments. Responses to those comments are provided in Volume III, Chapter 4.

**WASHDC–27 General SPD EIS and NEPA Process**

DOE acknowledges the commentor's concern that they are being ignored, taken advantage of, and not kept informed. Efforts were made to contact persons living near the selected reactor sites and inform them of the proposed use of MOX fuel. The *Supplement to the SPD Draft EIS* was mailed to those stakeholders who requested it as well as to those specified in the DOE *Communications Plan* (i.e., Congressional representatives, State and local officials and agencies, and public interest groups around the United States) and the utilities' contact lists. The utilities, Duke Power Company and Virginia Power Company, would operate the proposed reactors (located in North

In regard to the public hearing process, DOE has made a good attempt, but not having meetings since the reactors were chosen and not having those meetings in the affected communities are like a slap in the face. DOE has an obligation to hold meetings in the reactor communities and to educate the public as to what is going to be used in the reactors. 28

I am opposed to use of plutonium in Duke reactors. 29

Carolina, South Carolina, and Virginia) should the MOX approach be pursued per the SPD EIS ROD. For those interested parties who could not attend the hearing on the *Supplement*, DOE provided various other means for the public to express their concerns and provide comments: mail, a toll-free telephone and fax line, and the MD Web site. Further, interested parties will likely have the opportunity to submit additional comments during the NRC reactor license amendment process.

To stay informed and involved on the progress of the surplus plutonium disposition program, request to be included on the mailing list by visiting the MD Web site at http://www.doe-md.com, or writing to the following address: Office of Fissile Materials Disposition, United States Department of Energy, P.O. Box 23786, Washington, DC 20026-3786. Another source of information is the public reading rooms located at each of the DOE sites.

**WASHDC–28 General SPD EIS and NEPA Process**

Although DOE decided not to hold additional hearings on the *Supplement to the SPD Draft EIS*, since the inception of the fissile materials disposition program, DOE has supported a vigorous public participation policy, including informing and educating the public. DOE has presented information about the disposition of fissile materials to the public in various forms: public hearing presentations, fact sheets, exhibits, technical reports, visual aids, and a video. Information has been distributed by such mechanisms as mail, email, fax, Web sites, telephone, and press interviews.

**WASHDC–29 Reactors**

DOE acknowledges the commentor's opposition to using MOX fuel in Duke reactors. The goal of the surplus plutonium disposition program 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. Converting the surplus plutonium into MOX fuel and using it in domestic, commercial reactors is an effective way to accomplish this. Section 4.28 was revised to discuss the potential environmental impacts of operating the Duke reactors (Catawba and McGuire) with MOX fuel.

The representative of COGEMA stated that information is sent to those who ask. What is the address? | 30

In view of the fact that you have no plans for holding meetings in the Southeast, my organization, the Nuclear Information and Research Service, will submit three videotapes of its hearings. We gave individual members of the public an opportunity to get information and make comments. There is a zero relationship between the tapes and public meetings. | 31

Who is the contractor chosen to complete the MOX fuel process? COGEMA has a vested interest in reprocessing technologies worldwide. | 32

**WASHDC–30** **MOX RFP**

Information on COGEMA's environmental record can be found on their Web site at http://www.cogema.com or by contacting Ms. Christi A. Byerly. Her address is: 7401 Wisconsin Avenue; Bethesda, MD 20814. She may also be contacted by telephone at (301) 941-8367. Her fax number is (301) 652-5690, and her email address is cbyerly@cogema-inc.com.

**WASHDC–31** **General SPD EIS and NEPA Process**

Videotapes of hearings hosted by the Nuclear Information and Research Service were not received by DOE.

For those interested parties who could not attend the public hearing on the *Supplement to the SPD Draft EIS,* DOE provided various other means for the public to express their concerns and provide comments: mail, a toll-free telephone and fax line, and the MD Web site. Equal consideration was given to all comments, regardless of how or where they were received. Further, interested parties will likely have the opportunity to submit additional comments during the NRC reactor license amendment process should the MOX approach be pursued per the SPD EIS ROD.

**WASHDC–32** **MOX RFP**

The contractor selected by DOE for MOX fuel fabrication and irradiation services, is DCS. They would design, request a license, construct, operate, and deactivate the MOX facility as well as irradiate the MOX fuel in domestic, commercial reactors. However, these activities are subject to the completion of the NEPA process. Should the decision be made to proceed with the hybrid approach, COGEMA would lend its expertise within the limits of the contract, which does not have any provisions for reprocessing.

U.S. policy dating back to the Ford Administration has prohibited the commercial, chemical reprocessing and separation of plutonium from spent nuclear fuel. The use of U.S. surplus plutonium in existing domestic, commercial reactors does not involve reprocessing (reprocessing is a chemical separation of uranium, transuranic elements [including plutonium], and fission products from spent reactor fuel and the reuse of the plutonium and uranium to produce new fresh fuel). The proposed use of MOX fuel is consistent with the U.S. nonproliferation policy and would ensure that plutonium which was

It is appalling that the consortium is relying on the operating experience of European reactors, which use different fuel, and that the safety records of the consortium have not been made available. 33

I understand it has been requested that some of the Federal budget money earmarked for APSF be moved to the SRS canyons project. Will this diversion of money affect the APSF project in the long term? 34

What types of activities or technologies can the United States provide to Russia before the U.S.–Russian agreement is in place in September? 35

produced for nuclear weapons and subsequently declared excess to national security needs is never again used for nuclear weapons.

**WASHDC–33** **MOX Approach**

Information gleaned from experience of European reactors is one of many factors taken into consideration in developing the strategy for using the MOX fuel in domestic, commercial reactors. The environmental, safety and health consequences of the MOX approach in the proposed reactors are addressed in Section 4.28. In addition, NRC would evaluate license applications and monitor the operations of both the MOX facility and reactors selected to use MOX fuel, to ensure adequate margins of safety. As discussed in the revised Section 4.28, the most recent performance assessments of the reactors selected to irradiate MOX fuel, completed in the first three months of 1999, were deemed acceptable by NRC. (In 1999, NRC began to perform plant performance reviews instead of the systematic assessments of licensee performance. At that time, NRC changed its rating system from adjectives of acceptable, good or superior, to one of acceptable or unacceptable.)

**WASHDC–34** **Other**

The funding of APSF is beyond the scope of this SPD EIS. Since it is uncertain whether APSF will be built, this SPD Final EIS does not take any credit for the presence of APSF and has revised any discussion of APSF to include the phrase "if built" to inform the reader of this uncertainty. This change is discussed in more detail in Chapter 1 of Volume I.

**WASHDC–35** **Nonproliferation**

The United States and Russia have been engaged in extensive ongoing cooperative research, small-scale tests, and demonstrations of plutonium disposition technologies under the auspices of the *Agreement on Scientific and Technical Cooperation in the Management of Plutonium.* Technical subjects addressed in these collaborative efforts include conversion of plutonium metal to an oxide form, use of weapons-grade plutonium in MOX fuel in various types of nuclear power reactors, and immobilization of plutonium into forms suitable for geologic disposal.

To date has any technology been transferred from the United States to Russia? There is a May 4, 1999, application on file with NRC, but it does not really say what would be transferred to Russia. Will this technology or information go forward before the agreement is finalized? 36

Is DOE sure that equipment can be exported before the U.S.–Russian agreement is in place? 37

MOX fuel does not meet the goals outlined by the Office of Fissile Materials Disposition. The Russians are really trying to pursue the reprocessing of plutonium, which is contrary to U.S. policy. Our leadership is always confused, and it seems that it may be getting manipulated. The clearest expression of our policy seems to be, "Follow us; we are right behind you." The relationship of our policy and our goals is confusing to Russia. Therefore, I question whether our policy is meeting the goals that the two countries share. 38

**WASHDC–36** **Nonproliferation**

Technology that has been transferred to date includes a code package for performing safety analyses on fast reactors, critical experiment data to validate computer safety codes, and data on irradiation of MOX fuel in commercial U.S. reactors. The May 4, 1999, NRC license application is intended to cover equipment for manufacturing fuel. The precise equipment list will be developed once Russia has selected the fuel fabrication methods it intends to use for this mission. Equipment and technology may be transferred to support work covered by the *Agreement on Scientific and Technical Cooperation in the Management of Plutonium* signed in July 1998. All transfers of equipment and technology completed to date were covered by individual licenses submitted on a case-by-case with the appropriate government organization.

**WASHDC–37** **Nonproliferation**

Yes, equipment may be transferred to support work covered by the *Agreement on Scientific and Technical Cooperation in the Management of Plutonium* signed in July 1998.

**WASHDC–38** **Nonproliferation**

The goal of the surplus plutonium disposition program 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. Converting the surplus plutonium into MOX fuel and using it in domestic, commercial reactors is an effective way to accomplish this.

The *Joint Statement of Principles* signed by Presidents Clinton and Yeltsin in September 1998 provide general guidance for achieving the objectives of a future bilateral agreement to disposition surplus plutonium in the United States and Russia. Sensitive negotiations between the two countries have indicated that the Russian government accepts the technology of immobilization for low-concentration, plutonium-bearing materials, but that the MOX approach would be considered for higher-purity feed materials.

Why run the security risk of MOX fuel fabrication and use? We have tried to discuss security with NRC with no avail. The United States has so many nuclear weapons that it is easy for people to get their hands on weapons-grade plutonium. The availability of plutonium, however, is not a good excuse for its use in MOX fuel. In fact, the use of MOX fuel will end nonproliferation as we know it. 39

Commercial nuclear power is already highly uneconomical, environmentally damaging, and dangerous. No new reactors have been built since Three Mile Island. Americans want renewable energy, not nuclear power, which produces radioactive waste for which there are no accommodations. Plutonium was made for bombs; using it in commercial reactors is dangerous. 40

**WASHDC–39** **Nonproliferation**

DOE acknowledges the commentor's concern for security of MOX fuel. The proposed DOE surplus plutonium disposition facilities are all at locations where plutonium would have the levels of protection and control required by applicable DOE safeguards and security directives and requirements. Safeguards and security programs would be integrated programs of physical protection, information security, nuclear material control and accountability, and personnel assurance. Physical barriers; heavily armed guards; access control systems; detection and alarm systems; procedures, including the two-person rule (which requires at least two people to be present when working with special nuclear materials in the facility); and personnel security measures, including security clearance investigations and access authorization levels, would be used to ensure that special nuclear materials stored and processed are adequately protected. Closed-circuit television, intrusion detection, motion detection, and other automated materials monitoring methods would be employed. Furthermore, the physical protection, safeguards, and security for the MOX facility and domestic, commercial reactors would be in compliance with NRC regulations. International inspections of the proposed facilities would be conducted strictly by procedure so as not to compromise security.

**WASHDC–40** **DOE Policy**

Use of MOX fuel in domestic, commercial reactors is not proposed in order to subsidize the commercial nuclear power industry or provide a new energy source. Rather, the purpose of this proposed action is to safely and securely disposition surplus plutonium by meeting the Spent Fuel Standard. The Spent Fuel Standard, as identified by NAS and modified by DOE, is to make the surplus weapons-usable plutonium as inaccessible and unattractive for weapons use as the much larger and growing quantity of plutonium that exists in spent nuclear fuel from commercial power reactors. The MOX facility would produce nuclear fuel that would displace LEU fuel that utilities would have otherwise purchased. The proposed use of MOX fuel is consistent with the U.S. nonproliferation policy and would ensure that plutonium which was produced for nuclear weapons and subsequently

There seems to be an implication in the viewgraphs that there are two options: one, immobilization of all 50 t (55 tons); the other, a combination of immobilization and the irradiation of MOX fuel. Are these in fact the options, and when will there be a decision as to going one way or the other? 41

What is aqueous polishing, and how is it incorporated into the surplus plutonium disposition process? Is there experience in other places with aqueous polishing. 42

Is part of the reprocessing process at La Hague? 43

declared excess to national security needs is never again used for nuclear weapons.

The use of renewable energy sources is beyond the scope of this SPD EIS.

**WASHDC–41** **Alternatives**

Section 2.3.1 explains the development of the 15 reasonable alternatives that were analyzed in this SPD EIS. Four of the alternatives (11A, 11B, 12A and 12B) provide the option to immobilize all the surplus plutonium while the other eleven provide facility siting options of the hybrid approach of using both immobilization and MOX fuel fabrication. DOE has identified as its preferred alternative a hybrid approach to disposition up to 50 t (55 tons) of surplus plutonium. Under this approach, approximately 33 t (36 tons) of clean plutonium would be used to fabricate MOX fuel, which would be irradiated in domestic, commercial reactors. The remaining 17 t (19 tons) of low-purity plutonium would be immobilized because it is not suitable for fabrication into MOX fuel due to the complexity, timing, and cost that would be involved in purifying those plutonium materials. Decisions on the surplus plutonium disposition program will be based on environmental analyses, technical and cost reports, national policy and nonproliferation considerations, and public input. DOE will announce its decisions regarding facility siting and approach to surplus plutonium disposition in the SPD EIS ROD no sooner than 30 days after publishing the SPD Final EIS.

**WASHDC–42** **Plutonium Polishing**

Aqueous polishing as proposed for surplus plutonium disposition is a process that removes gallium and other impurities that can affect the use of the plutonium as reactor fuel from the plutonium dioxide feed for the MOX facility. The process, described in Section 2.4.3.2, would dissolve plutonium dioxide in nitric acid, subject the solution to solvent extraction, then convert the solution back to an oxide powder through precipitation. Similar processes have been used at many DOE facilities including Hanford, LANL, and SRS.

**WASHDC–43** **MOX RFP**

La Hague is a reprocessing facility. However, U.S. policy dating back to the Ford Administration has prohibited the commercial, chemical reprocessing

Immobilization is safer, faster, and cheaper. You have agreed to immobilize 17 tons of surplus plutonium, but probably only because it is not suitable for MOX fuel. All of the material could be immobilized, so why not immobilize all of it? Why resort to MOX fuel at all? 44

We find the MOX plan unacceptable, for it poses unreasonable risks to public health and the environment, undermines U.S. nonproliferation goals, and lacks a sound economic strategy. 45

and separation of plutonium from spent nuclear fuel. The U.S. surplus plutonium would be fabricated into MOX fuel at a secure DOE site that is owned by the U.S. Government and would be irradiated in the selected domestic, commercial reactors. This does not involve reprocessing (reprocessing is a chemical separation of uranium, transuranic elements [including plutonium], and fission products from spent reactor fuel and the reuse of the plutonium and uranium to produce new fresh fuel).

**WASHDC–44** **Alternatives**

DOE has identified as its preferred alternative the hybrid approach which includes both immobilization and MOX fuel. As shown in the cost report, *Cost Analysis in Support of Site Selection for Surplus Weapons-Usable Plutonium Disposition* (DOE/MD-0009, July 1998), it is expected that the hybrid approach would be more expensive than the immobilization-only approach. However, pursuing the hybrid approach provides the United States important insurance against potential disadvantages of implementing either approach by itself. The hybrid approach also provides the best opportunity for U.S. leadership in working with Russia to implement similar options for reducing Russia's excess plutonium in parallel. Further, it sends the strongest possible signal to the world of U.S. determination to reduce stockpiles of surplus plutonium as quickly as possible and in a manner that would make it technically difficult to use the plutonium in nuclear weapons again.

**WASHDC–45** **MOX Approach**

DOE acknowledges the commentor's opposition to the MOX approach to surplus plutonium disposition. DOE has identified as its preferred alternative the hybrid approach.

This SPD EIS identifies and analyzes the potential human health and environmental impacts from the construction and normal operation of the MOX facility, and irradiation of MOX fuel in the Catawba, McGuire, and North Anna reactors. The proposed use of MOX fuel is consistent with the U.S. nonproliferation policy and would ensure that plutonium which was produced for nuclear weapons and subsequently declared excess to national security needs is never again used for nuclear weapons.

The utilities are in this for money, and that money will be furnished by taxpayers. We need to forgo this endeavor and allow for the phaseout and shutdown of nuclear energy operations. Immobilization should be our focus. 46

Is the annual 10 million dollar cap stipulated in the Request for Proposals no longer applicable? 47

A separate cost report, *Cost Analysis in Support of Site Selection for Surplus Weapons-Usable Plutonium Disposition* (DOE/MD-0009, July 1998), which analyzes the site-specific cost estimates for each alternative, was made available around the same time as the SPD Draft EIS. This report and the *Plutonium Disposition Life-Cycle Costs and Cost-Related Comment Resolution Document* (DOE/MD-0013, November 1999), which covers recent life-cycle cost analyses associated with the preferred alternative, are available on the MD Web site at http://www.doe-md.com and in the public reading rooms at the following locations: Hanford, INEEL, Pantex, SRS, and Washington, D.C.

**WASHDC–46** **MOX Approach**

Use of MOX fuel in domestic, commercial reactors is not proposed in order to subsidize the commercial nuclear power industry. Rather, the purpose of this proposed action is to safely and securely disposition surplus plutonium by meeting the Spent Fuel Standard. The Spent Fuel Standard, as identified by NAS and modified by DOE, is to make the surplus weapons-usable plutonium as inaccessible and unattractive for weapons use as the much larger and growing quantity of plutonium that exists in spent nuclear fuel from commercial power reactors. The MOX facility would produce nuclear fuel that would displace LEU fuel that utilities would have otherwise purchased. If the effective value of the MOX fuel exceeds the cost of the LEU fuel that it displaced, then the contract provides that money would be paid back to the U.S. Government by DCS based on a formula included in the DCS contract. The commercial reactors selected for the MOX approach include only those reactors whose operational life is expected to last beyond the life of the surplus plutonium disposition program.

**WASHDC–47** **MOX RFP**

The $10,000,000 cap is no longer applicable. During negotiations it was clear that fluctuations in the price of LEU that the MOX fuel would replace, a variable that the contractor has no control of, has a significant impact on the economics. In order to ensure an equitable sharing of risk, a revised approach to the maximum Government liability was included in the final negotiated contract. The revised approach includes a consideration of market price of LEU as well as other variable factors affecting the fabrication of MOX fuel

Will there be disclosure to the taxpayers of how much utilities will be compensated, over and above their costs, for participation in this program? 48

Who is liable for environmental damage during the transportation and irradiation of MOX fuel? 49

Is the plutonium still Government material after it is converted to MOX fuel? 50

I am concerned about the dimensional stability of MOX fuel. If the fuel shrinks slightly, there is a loss of heat transfer between the fuel and the cladding, which can lead to fuel melting. If there is expansion, resulting pressure on the cladding can cause a rupture. It is my understanding that COGEMA has more experience with these processes. What is the consortium's track record? 51

such as throughput and escalation. The final methodology to determine the maximum cost to the Government for any given year is to be submitted by the contractor for DOE approval prior to commencement of fabricating MOX fuel.

**WASHDC–48** **MOX RFP**

The utilities would be compensated for all costs in excess of the cost associated with the use of LEU which are directly attributable to MOX fuel. These costs include, for example, increased NRC oversight costs; modification costs required for the proposed reactors to use MOX fuel; and increased costs for additional LEU enrichment. In addition, the utilities would receive the MOX fuel at a discounted price when compared to the price of the LEU fuel that the MOX fuel replaces. The exact amount of the discount is set in the contract. It is between 10 and 50 percent.

**WASHDC–49** **DOE Policy**

The reactor licensee is responsible for the MOX fuel once it is received at the reactor site. The transportation of special nuclear materials, including fresh MOX fuel is the responsibility of DOE's Transportation Safeguards Division. The transportation of the MOX spent fuel to the potential geologic repository for disposal would also be the responsibility of DOE.

**WASHDC–50** **DOE Policy**

DOE would own the MOX facility and MOX fuel until the fuel was received at the reactor site. At that point, the fuel would become the responsibility of the reactor licensee.

**WASHDC–51** **MOX RFP**

FRAGEMA's (a subsidiary of COGEMA and FRAMATOME) experience with fabricating MOX fuel indicates a leakage rate of less than one-tenth of 1 percent. FRAGEMA has provided 1,253 MOX fuel assemblies, with more than 300,000 fuel rods for commercial reactor use. There have been no failures (including fuel melts or ruptures) and leaks have occurred in only 3 assemblies (a total of 4 rods). All leaks occurred as a result of debris in the reactor coolant system and occurred in 1997 or earlier. The French requirements for

I am curious about your position on differences between MOX spent fuel and the low-level radioactive waste that is generated in the normal operation of the reactor, and about your estimation of the amounts of plutonium that would be released under recycle or clearance level rulemaking in which NRC is currently involved. I am defining "recycle" in terms of materials that can be converted into consumer products. 52

In performance of the health evaluations, what is the biological effectiveness rating used for alpha emitters? 53

According to the *Supplement*, the MOX fuel assemblies would only be irradiated for two cycles, whereas uranium is now irradiated for three 18-month cycles. What is the basis for making that change to operating procedures? Will accommodations for that change have any impact on existing fuel management? What is the highest rod burnup on discharge of the second-cycle fuel assemblies? What is the highest burnup for the second cycle that we can expect? Do you have any plans for transition to three cycles for MOX fuel in the course of the program? 54

debris removal were changed in 1997 to alleviate these concerns. Since that time, there have been no leaks in MOX fuel rods.

**WASHDC–52** **Waste Management**

There are differences in fission product inventories and activation products between an LEU and MOX core during a fuel cycle. However, the only way significant quantities of fission products could end up in LLW would be in the event of a large–scale fuel leak. As discussed in the previous response, there have been no failures and very few leaks in FRAGEMA's experience. The use of MOX fuel would not be expected to result in any additional LLW from refuelings because the reactors would continue to operate on the same schedule as if they were using only LEU fuel. Eventual D&D of the reactors, which may include recycling of metals, would be performed by the utilities in accordance with NRC regulations in force at that time. However, it is premature to assume that scrap metal at the reactors would be recycled as part of D&D and end up in consumer products.

**WASHDC–53** **Human Health Risk**

The latest published version of 10 CFR 20.1004 (January 1, 1999) states that the quality factor for alpha particles is 20, and this factor was used in the analysis performed for this SPD EIS. This regulatory criteria (10 CFR 20) is established by NRC, and is therefore the official benchmark from which U.S. nuclear utilities are continually governed in the realm of radiation protection.

**WASHDC–54** **MOX Approach**

The fuel management plan that would be used with the MOX assemblies does not reflect a change in operating procedures, other than the fact that some of the assemblies would be MOX rather than LEU. The DCS team utility companies currently use a typical 18-month fuel cycle, replacing approximately 40 percent of the fuel assemblies in a reactor at each refueling. Some assemblies are used for two cycles, some for three cycles. The utilities plan to maintain the current fuel management schemes and would use the MOX fuel assemblies for only two cycles. There are currently no plans to transition to three cycles for the MOX assemblies.

The EIS indicates that 0.25 mg of plutonium will be released annually into water and air at the fabrication facility. This seems like a very large amount. How much would be released into the air or water annually near the reactor communities? Will those numbers be written out somewhere? I want to know the numbers. My definition of significant might not be the same as yours.

55

I recently wrote a report criticizing the analysis of design basis accidents for reactors using MOX fuel. My criticism focused on the treatment of the emissions of plutonium and other alpha-emitting actinides in beyond-design-basis accidents at reactors, and the impacts of those emissions in terms of additional latent cancer fatalities. It is noteworthy that the *Supplement* reflects recalculations that are much closer to my figures. There are, however, some outstanding questions relative to those calculations. For example, it is not clear for how long into the future the dose is calculated. What are the assumptions? Will there be evacuation or cleanup? It is impossible for someone to make an independent check without knowing all of the parameters and assumptions. I hope that these will be provided in the SPD Final EIS. The document is still inadequate with regard to the discussion of potential differences in the consequences of accidents and the risks of severe accidents associated with the use of MOX fuel. There is still no discussion of very germane, unresolved fuel performance issues associated with the current generation of MOX fuel that have been noted in Europe; increased fission gas generation, increased fuel temperature, and the Cabri reactor test go unmentioned in the document. There is also no concrete discussion of the severe accident risks of the reactors that have been chosen. In particular, four of the six reactors have special ice condenser containments that are not representative of the fleet of U.S. pressurized water reactors, and NRC has outstanding concerns about their performance.

56

MOX fuel burnup is proposed at a maximum burnup of 45 GWD/t with peak pin burnup at 50 GWD/t. Actual MOX fuel burnup limits would be established in concert with the NRC following a thorough safety review. It should be noted that reactors in Belgium and Germany typically use MOX fuel to burnups between 45 and 50 GWD/t and that while current French burnup limits are lower than that, French burnup limits for LEU fuel are also lower than those for U.S. reactors.

**WASHDC–55** **Human Health Risk**

From a scientific standpoint, an annual release of 0.25 mg of plutonium is a very small quantity. There would be no expected releases of plutonium isotopes from the proposed reactors occurring from normal operating conditions. Doses to an MEI at each of the plants are also expected to be small—i.e., McGuire, 0.31 mrem; Catawba, 0.73 mrem; and North Anna, 0.37 mrem. All of these doses fall within stringent NRC 10 CFR 20 and 10 CFR 50 regulatory requirements.

**WASHDC–56** **Facility Accidents**

The accident results in Section 4.28 have been revised to incorporate computer code corrections. The accident calculation is included in the Administrative Record for this SPD EIS. The calculation contains all of the input parameters including the MACCS2 computer files.

The particular "control rod ejection" scenario is a bounding postulated accident. None has ever occurred at a nuclear power plant. The Cabri RIA test program was designed to challenge typical fuel rods under conditions that are more extreme than conditions that would be experienced during a real pressurized water reactor control rod ejection. Out of the nine Cabri tests (six with uranium fuel, three with MOX fuel), two uranium fuel rods and one MOX fuel rod experienced failures. The MOX failure occurred at an energy deposition rate that is greater than can realistically be reached by high burnup fuel, even after an extremely unlikely worst case control rod ejection. These data, both for LEU and MOX fuel, will be used in ongoing fuel design studies.

While it is understood that there are differences from the use of MOX fuel versus LEU fuel, these differences are not expected to decrease the safety of

I have heard nothing about what will be done with the additional waste from this process. | 57

the reactors. All of the factors discussed by the commentor were evaluated by the proposed reactor licensees to ensure that the reactors, including those with ice condensers, can continue to operate safely using MOX fuel and will continue to be evaluated. Before any MOX fuel is used in the United States, NRC would have to perform a comprehensive safety review that would include information prepared by the reactor plant operators as part of their license amendment applications.

**WASHDC–57** **Waste Management**

As described in Section 4.28.2.2, the volume of waste generated is not expected to increase as a result of the reactors using MOX fuel. The wastes would continue to be handled in the same manner as they are today with no change required due to the use of MOX fuel at the reactors.

As described in Sections 2.18.3 and 4.28.2.8, additional spent fuel would be produced by using MOX fuel instead of LEU fuel in domestic, commercial reactors. Spent fuel management at the proposed reactor sites is not expected to change dramatically due to the substitution of MOX assemblies for some of the LEU assemblies. Likewise, the additional spent fuel would be a very small fraction of the total that would be managed at the potential geologic repository.

This SPD EIS assumes, for the purposes of analysis, that Yucca Mountain, Nevada, would be the final disposal site for all immobilized plutonium and MOX spent fuel. As directed by the U.S. Congress through the NWPA, as amended, Yucca Mountain is the only candidate site currently being characterized as a potential geologic repository for HLW and spent fuel. DOE has prepared a separate EIS, *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, July 1999), which analyzes the environmental impacts from construction, operation and monitoring, related transportation, and eventual closure of a potential geologic repository.

My principal concerns go to the well-known toxicity of plutonium. The only solution to the management of the radioactive waste generated by the production and use of plutonium in the weapons program would be isolation for the full hazardous life of the materials. It appears that the hazardous life is now far longer than we had previously understood. Recent research findings with respect to alpha emitters and alpha-related damage at the cellular and subcellular level indicate far greater risks of cancer and other health impacts than are currently considered in the setting of radiation protection standards. (Those standards are currently based on either the lifetime risk of fatal cancer or gross genetic defects in the first couple of generations.) We have been learning more in recent years about the impacts of low-dose irradiation, particularly as it may be received repeatedly over a period of time. The most recent studies show that DNA may be affected by exposures in the cytoplasm rather than the nucleus of a cell. There may also be a delayed mutational effect at the cellular level. This means that we may have underestimated the impacts of alpha emitters. At the Second International Symposium on Ionizing Radiation (held in Canada), a statement was made that rather than the range of biological effectiveness that was previously used, 2- to 20-fold, it may be necessary for us to consider a quality factor of 2,000 or more with respect to alpha emitters. Moreover, all of the international regulators attending that conference concurred that it is necessary to set protective standards for each distinctive component of the environment for its own sake. NRC was not represented at the conference. 58

Where are the transport corridors and what communities would be affected? Where are the results of that analysis? 59

**WASHDC–58** **Human Health Risk**

DOE acknowledges the commentor's concern of the toxicity of plutonium and its effects on human health. The latest published version of 10 CFR 20.1004 (January 1, 1999) states that the quality factor for alpha particles is 20, not 2000. This regulatory criteria (10 CFR 20) is published in coordination with NRC, and is the official benchmark from which U.S. nuclear utilities are continually governed in the realm of radiation protection.

**WASHDC–59** **Transportation**

The transportation of special nuclear materials is the subject of detailed planning with DOE's Transportation Safeguards Division. The dates and times that specific transportation routes would be used for special nuclear materials are classified information; however, the number of shipments that would be required, by location, has been included in Appendix L. The results of transportation analyses are presented in the transportation sections in Chapter 4 of Volume I. Additional details are provided in *Fissile Materials Disposition Program SST/SGT Transportation Estimation* (SAND98-8244, June 1998), which is available on the MD Web site at http://www.doe-md.com.

I am glad DOE will be using safe, secure transport. However, the communities the vehicles are to pass through will not know about the materials being transported. Can you tell me where it says in the law or regulations that these individuals do not have a right to this information? 60

Transportation has not been given enough emphasis. 61

There has not been adequate inclusion of the areas through which this material would be transported. Any terrorist who wants to find out where the material is can simply track the shipments. 62

**WASHDC–60** **Transportation**

The dates and times that specific transportation routes would be used for special nuclear materials are classified information; however, the number of shipments that would be required, by location, has been included in Appendix L. DOE Safeguard and Security Orders govern the handling and transport of fissile materials and can be found on the DOE Web site at http://www.explorer.doe.gov.

**WASHDC–61** **Transportation**

DOE acknowledges the commentor's concern that the transportation issue has not been given enough emphasis. The transportation requirements for the surplus plutonium disposition program are evaluated in this SPD EIS. Potential environmental impacts of transportation are presented in the transportation sections in Chapter 4 of Volume I and in more detail in Appendix L. The transportation of special nuclear materials is the subject of detailed planning with DOE's Transportation Safeguards Division. The dates and times that specific transportation routes would be used for special nuclear materials are classified information; however, the number of shipments that would be required, by location, has been included in Appendix L. Additional details are also provided in *Fissile Materials Disposition Program SST/SGT Transportation Estimation* (SAND98-8244, June 1998), which is available on the MD Web site at http://www.doe-md.com.

**WASHDC–62** **Transportation**

DOE has considered the inherent risks, including terrorist concerns, associated with transporting plutonium materials. While DOE prefers to minimize the transportation of plutonium that is still desirable for weapons use, plutonium is routinely and safely transported in the United States every day. As described in Appendix L.3.3, transportation of nuclear materials would be performed in accordance with all applicable DOT and NRC transportation requirements. Interstate highways would be used, and population centers avoided, to the extent possible. All shipments of surplus plutonium that have not been converted to a proliferation-resistant form would be made by DOE's SST/SGT system, as described in Appendix L.3.2.

Response WASHDC–59 provides additional information related to transportation concerns.

All of the communities on the transportation route are affected communities. I would like to call your attention to a DOE-commissioned study by Dr. Jenkin Smith at the University of New Mexico. This study very thoroughly documents public concerns with the transport of any type of nuclear materials. The public is discerning as to whether it wants to take a risk, and as to the causes and goals of the risk. Nevertheless, there are those in the community who have more to say before a decision is made—some of them in support of immobilization at SRS. I believe, furthermore, that there are those out there in the general public who can distinguish one goal from another. They are aware, for example, that the transportation of plutonium would be more complicated—i.e., involve more steps—for the MOX fuel option than for immobilization. Because all persons in the transportation areas would be affected, all should be included in this information exchange on the issue of transportation. 63

The people of Southeast know little of this program and have no access to the relevant information. How many DOE persons are available to come down to the reactor communities and attend meetings like this one? 64

**WASHDC–63** **Transportation**

Transportation would be required for both the immobilization and MOX approaches to surplus plutonium disposition. Transportation of special nuclear materials, including fresh MOX fuel, would use DOE's SST/SGT system. Since the establishment of the DOE Transportation Safeguards Division in 1975, the SST/SGT system has transported DOE-owned cargo over more than 151 million km (94 million mi) with no accidents causing a fatality or release of radioactive material.

DOE acknowledges the commentor's concern that all persons along the transportation routes be included in the information exchange. Since the inception of the fissile materials disposition program, DOE has supported a vigorous public participation policy. It has conducted public hearings in excess of the minimum required by NEPA regulations to engender a high level of public dialogue on the program. The office has also provided the public with substantial information in the form of fact sheets, reports, exhibits, visual aids, and videos related to fissile materials disposition issues. It hosts frequent workshops, and senior staff members make presentations to local and national civic and social organizations on request. Additionally, various means of communication—mail, a toll-free telephone and fax line, and a Web site (http://www.doe-md.com)—have been provided to facilitate the public dialogue. It is DOE policy to encourage public input into these matters of national and international importance.

**WASHDC–64** **General SPD EIS and NEPA Process**

Efforts were made to contact persons living near the selected reactor sites and inform them of the proposed use of MOX fuel. The *Supplement to the SPD Draft EIS* was mailed to those stakeholders who requested it as well as to those specified in the DOE *Communications Plan* (i.e., Congressional representatives, State and local officials and agencies, and public interest groups around the United States) and the utilities' contact lists. The utilities, Duke Power Company and Virginia Power Company, would operate the proposed reactors (located in North Carolina, South Carolina, and Virginia) should the MOX approach be pursued per the SPD EIS ROD. For those interested parties who could not attend the meeting on the *Supplement*, DOE

I am glad to hear that additional meetings are going to be considered. We have been told of the 80 meetings that you as an office have held. We would like to get a list of those meetings showing when and where they were held, how they were announced, and what topics were discussed. Laura Holgate did not stay to hear the earlier comments or questions, and she is not here this afternoon. How serious can this be taken if the Director does not stay?

65

provided various other means for the public to express their concerns and provide comments: mail, a toll-free telephone and fax line, and the MD Web site. After careful consideration of its public involvement opportunities, including the availability of information and mechanisms to submit comments, DOE decided not to hold additional hearings on the *Supplement*. DOE felt there were sufficient other means provided for the public to express their concerns and provide comments as discussed above. Further, interested parties will likely have the opportunity to submit additional comments during the NRC reactor license amendment process.

Since the inception of the fissile materials disposition program, DOE has supported a vigorous public participation policy, including informing and educating the public. DOE has presented information about the disposition of fissile materials to the public in various forms: public hearing presentations, fact sheets, exhibits, technical reports, visual aids, and a video. Information has been distributed by such mechanisms as mail, email, fax, Web sites, telephone, and press interviews. To learn more about the surplus plutonium disposition program or request to be included on the mailing list, visit the MD Web site at http://www.doe-md.com, or write to the following address: Office of Fissile Materials Disposition, United States Department of Energy, P.O. Box 23786, Washington, DC 20026-3786. Information on the program is also available in the public reading rooms located at each of the DOE sites.

**WASHDC–65 General SPD EIS and NEPA Process**

Although DOE decided not to hold additional meetings on the *Supplement to the SPD Draft EIS,* other means have been provided for the public to express their concerns and provide comments: mail, a toll-free telephone and fax line, and the MD Web site. Further, interested parties will likely have the opportunity to submit additional comments during the NRC reactor license amendment process should the MOX approach be pursued per the SPD EIS ROD.

Laura Holgate regrets she was not able to attend the entire hearing but she was required to meet with the State Department in preparation for her trip to Russia. Dave Nulton, the program manager since the inception of MD in 1994, is well versed in the surplus plutonium disposition program and has acted on

the behalf of Ms. Holgate on many occasions. DOE is entrusted with implementing the U.S. nonproliferation policy and takes that responsibility very seriously.

The following is the list of meetings and hearings detailing the dates and location, by topic, of previous public meetings and hearings held by DOE that addressed the fissile materials disposition program. These meetings and hearings were advertised to the public through newspaper advertisements, special mailings, or public service announcements. Scoping meetings and hearings on draft NEPA documents included two complete sessions for each date given (usually one in the afternoon and one in the evening; and in Washington, D.C., one in the morning and one in the afternoon).

## DOE PUBLIC MEETINGS AND HEARINGS RELATING TO THE STORAGE AND DISPOSITION OF WEAPONS-USABLE FISSILE MATERIALS PROGRAM

**Pre-Scoping Meetings for *Storage and Disposition of Weapons-Usable Fissile Materials PEIS***

| Date | Location |
|---|---|
| 4/21/94 | Washington, DC[1] |
| 5/4/94 | Arlington, VA[1] |
| 5/5/94 | Arlington, VA[1] |
| 8/5/94 | Washington, DC (Public Interest Groups) |
| 9/30/94 | Washington, DC (Industry Groups) |

[1] DOE provided travel and living expenses for representatives from various organizations to attend this meeting (nongovernmental organizations; tribal representatives; Citizens Advisory Board members, etc.).

**Scoping Meetings for *Storage and Disposition of Weapons-Usable Fissile Materials PEIS***

| Date | Location |
|---|---|
| 8/17/94 | North Augusta, SC |
| 8/24/94 | Chicago, IL |
| 8/24/94 | Denver, CO |
| 8/31/94 | Richland, WA |
| 9/7/94 | Amarillo, TX |
| 9/14/94 | Boston, MA |
| 9/14/94 | Las Vegas, NV |
| 9/21/94 | Idaho Falls, ID |
| 9/28/94 | Oak Ridge, TN |
| 9/28/94 | Livermore, CA |
| 10/5/94 | Los Alamos, NM |
| 10/12/94 | Washington, DC |

**Remove HEU from Scope of *Storage and Disposition of Weapons-Usable Fissile Materials PEIS***

| Date | Location |
|---|---|
| 11/10/94 | Oak Ridge, TN |

**Review Hearings for *Disposition of Surplus Highly Enriched Uranium Draft EIS***

| Date | Location |
|---|---|
| 11/14/95 | Knoxville, TN |
| 11/16/95 | Augusta, GA |

**Plutonium Disposition Option Meeting**

| Date | Location |
|---|---|
| 12/13/94 | Washington, DC |

**Review Hearings for *Storage and Disposition of Weapons-Usable Fissile Materials Draft PEIS***

| Date | Location |
|---|---|
| 3/26/96 | Denver, CO |
| 3/28/96 | Las Vegas, NV |
| 3/29/96 | Las Vegas, NV |
| 4/2/96 | Oak Ridge, TN |
| 4/11/96 | Richland, WA |
| 4/15/96 | Idaho Falls, ID |
| 4/18/96 | Washington, DC |
| 4/22/96 | Amarillo, TX |
| 4/23/96 | Amarillo, TX |
| 4/ 30/96 | North Augusta, SC |

| Date | Location |
|---|---|
| 7/23/96 | Austin, TX |
| 7/25/96 | Palo Alto, CA |
| 7/29/96 | Chicago, IL |
| 7/31/96 | Boston, MA |
| 8/1/96 | Washington, DC |

**Proposed Nonproliferation Assessment Outline**
**Review of *Draft Nonproliferation Assessment***

| Date | Location |
|---|---|
| 10/28/96 | Oakland, CA |
| 10/28/96 | Las Vegas, NV |
| 10/28/96 | Idaho Falls, ID |
| 10/30/96 | Richland, WA |
| 10/30/96 | Portland, OR |
| 11/1/96 | Washington, DC |
| 11/4/96 | Amarillo, TX |
| 11/6/96 | North Augusta, SC |
| 11/6/96 | Oak Ridge, TN |
| 11/8/96 | Denver, CO |

**Scoping Meetings for *Surplus Plutonium Disposition EIS***

| Date | Location |
|---|---|
| 6/10/97 | Idaho Falls, ID |
| 6/12/97 | Amarillo, TX |
| 6/19/97 | North Augusta, SC |
| 7/1/97 | Richland, WA |

**MOX Procurement Meetings**

| Date | Location |
|---|---|
| 8/28/97 | Chicago, IL |
| 12/11/97 | Chicago, IL |
| 5/20/98 | Atlanta, GA |
| 5/21/98 | Atlanta, GA |

**Immobilization Conference**

| Date | Location |
|---|---|
| 5/12/98 | Washington, DC |

**Review Hearings for *Surplus Plutonium Disposition Draft EIS***

| Date | Location |
|---|---|
| 8/4/98 | Richland, WA |
| 8/11/98 | Amarillo, TX |
| 8/13/98 | North Augusta, SC |
| 8/18/98 | Portland, OR |
| 8/20/98 | Idaho Falls, ID |

**Review Hearing for *Supplement to the Surplus Plutonium Disposition Draft EIS***

| Date | Location |
|---|---|
| 6/15/99 | Washington, DC |

**National Dialogue Meetings**

| Date | Location |
|---|---|
| 7/23–24/96 | Chicago, IL |
| 11/18–19/96 | Washington, DC |
| 9/6/97 | Knoxville, TN |
| 9/9–10/97 | Boise, ID |
| 10/20/97 | Portland, OR |
| 10/21/97 | Richland, WA |
| 10/22/97 | Spokane, WA |
| 10/23/97 | Seattle, WA |
| 6/22–23/98 | San Diego, CA |
| 6/25–26/98 | Chicago, IL |

**DOE Citizens Advisory Boards**[2]

| Date | Location |
|---|---|
| 2/24/98 | Amarillo, TX |
| 6/27/98 | Aiken, SC |

**FISSLE MATERIALS DISPOSITION PROGRAM PARTICIPATION IN PUBLIC MEETINGS SPONSORED BY OTHER ORGANIZATIONS**

**National Tribal Plutonium Forum**

| Date | Location |
|---|---|
| 4/30/96 | Seattle, WA |

**Public Meeting Sponsored by South Carolina State Senator Leventis**

| Date | Location |
|---|---|
| 6/24/99 | Columbia, SC |

**Military Production Network/Alliance for Nuclear Accountability**

| Date | Location |
|---|---|
| 5/96 | Washington, DC (DC Days) |
| 5/94 | Washington, DC (DC Days) |
| 1/22/98 | Washington, DC |
| 5/98 | Washington, DC (DC Days) |

[2] MD briefed DOE Citizens Advisory Board meetings upon request. More briefings were provided than those listed.

Is the Brockett report available, and how would I get a copy of it? This report goes back a couple of decades. | 66

I have a concern about COGEMA. In the United States we can ask for information under the Freedom of Information Act and typically get answers from the appropriate agency—NRC, for example. With COGEMA, however, we don't have this opportunity. COGEMA has extensive experience with MOX fuel in its country. Will we have full access to its information on MOX fuel use? How would I go about getting this? | 67

What kind of access do we have to COGEMA's experimental database on the use of MOX fuel? | 68

What was the reason for announcing the Chicago Operations Office address. What information will we receive from that office? I don't think it will be the contract itself. How will we know the quantitative outcome of the new negotiations, which will include replacement of the only compensation rate that the public is aware of? | 69

Will speakers be able to review their comments before they are submitted for publication in the SPD Final EIS? | 70

**Speakers Bureau Presentations Given by DOE Personnel**

| Date | Location |
|---|---|
| 3/25/99 | Oklahoma City (Conference of Southern County Associations) |
| 7/19/99 | Kansas City (Conference of Southern Legislators) |

**WASHDC–66** **General SPD EIS and NEPA Process**

DOE was unable to identify the requested report.

**WASHDC–67** **MOX RFP**

Information on COGEMA's environmental record can be found on their Web site at http://www.cogema.com or by contacting Ms. Christi A. Byerly. Her address is: 7401 Wisconsin Avenue; Bethesda, MD 20814. She may also be contacted by telephone at (301) 941-8367. Her fax number is (301) 652-5690, and her email address is cbyerly@cogema-inc.com.

**WASHDC–68** **MOX RFP**

See response WASHDC–67 for contact information at COGEMA.

**WASHDC–69** **General SPD EIS and NEPA Process**

Copies of the redacted contract for MOX fuel fabrication and irradiation services is available from the Chicago Operations Office and were handed out at the June 15, 1999 hearing. Additional copies can be requested by contacting Mr. Robert Selby at (603) 252-2067 or by email, Robert.Selby@ch.doe.gov. This will provide all information on the contractual arrangement between DCS and DOE.

**WASHDC–70** **General SPD EIS and NEPA Process**

Notetakers captured the main points of issues or concerns raised by the commentors; therefore, the comments presented here are not a verbatim transcript of the hearing. In the interest of finalizing this SPD EIS it would not be practical to have each speaker review their comments prior to publishing

The Blue Ridge Environmental Defense League opposes the use of plutonium fuel in commercial reactors for the reasons stated in the written comment by Lou Zeller, and for other reasons as well. The planned use of MOX fuel establishes a dangerous precedent in the nuclear industry by needlessly exposing people to the risks of plutonium. DOE will be engaging in a crapshoot if it moves forward with the MOX fuel plan. 71

The public must bear in mind that NRC is proposing to eliminate or curtail adjudicative license proceedings, the only opportunity we have as citizens for access to the judicial system. 72

I resent having to drive—in my case from North Carolina—to a meeting with persons outside the affected area. When the Chicago Operations Office handled a meeting in the Southeast, it was a real formal meeting with a real transcript. Those who held the meeting were patient people who did not pretend that they were in charge; it was a public meeting, and we were in charge. The move to an interactive meeting, even though it may seem to be more polite, diminishes the public's role. In this format the public is not listened to. There must be a more open process and better access to information. Several people are working today and cannot come to the meeting. My democratic rights are threatened due to fact that all relevant information—i.e., proprietary and other corporate information—has not been provided. 73

the Comment Response Document. DOE and the notetakers have made every effort to ensure the essence of each participant's comment(s) has been presented in a clear, concise, and accurate manner. Written comments were accepted at the hearing and have been submitted via fax, mail, or Web site. Equal consideration was given to all comments, regardless of how or where they were received.

**WASHDC–71** **MOX Approach**

DOE acknowledges the commentor's opposition to the use of MOX fuel in commercial reactors. DOE has identified as its preferred alternative the hybrid approach. Pursuing both immobilization and MOX fuel fabrication provides the United States important insurance against potential disadvantages of implementing either approach by itself. The hybrid approach also provides the best opportunity for U.S. leadership in working with Russia to implement similar options for reducing Russia's excess plutonium in parallel. Further, it sends the strongest possible signal to the world of U.S. determination to reduce stockpiles of surplus plutonium as quickly as possible and in a manner that would make it technically difficult to use the plutonium in nuclear weapons again.

This SPD EIS identifies and analyzes the potential human health and environmental impacts from the construction and normal operation of the MOX facility. Section 4.28 was revised to discuss the potential environmental impacts of operating Catawba, McGuire, and North Anna, the reactors that would use the MOX fuel.

**WASHDC–72** **DOE Policy**

NRC requirements for adjudicative license proceedings are beyond the scope of this SPD EIS.

**WASHDC–73** **General SPD EIS and NEPA Process**

DOE acknowledges the commentor's concern that the hearing format does not allow the public to be listened to and that the process should be more open, with easier access to information. Since the inception of the fissile materials disposition program, DOE has supported a vigorous public participation policy. It has conducted public hearings in excess of the minimum

required by NEPA regulations to engender a high level of public dialogue on the program. The office has also provided the public with substantial information in the form of fact sheets, reports, exhibits, visual aids, and videos related to fissile materials disposition issues. Efforts were made to contact persons living near the selected reactor sites and inform them of the proposed use of MOX fuel. The *Supplement to the SPD Draft EIS* was mailed to those stakeholders who requested it as well as to those specified in the DOE *Communications Plan* (i.e., Congressional representatives, State and local officials and agencies, and public interest groups around the United States) and the utilities' contact lists. The utilities, Duke Power Company and Virginia Power Company, would operate the proposed reactors (located in North Carolina, South Carolina, and Virginia) should the MOX approach be pursued per the SPD EIS ROD. Additionally, various means of communication—mail, a toll-free telephone and fax line, and a Web site (http://www.doe-md.com)—have been provided to facilitate the public dialogue. It is DOE policy to encourage public input into these matters of national and international importance.

Based on the feedback from participants in previous public hearings, DOE used an interactive hearing format. This format facilitates open discussions and better understanding of the proposed actions associated with surplus plutonium disposition. It also provides an opportunity for the participants to meet one another, exchange information, and share concerns. Notetakers captured the main points of issues or concerns raised; these comments, along with the written comments submitted and the phone messages recorded during the public comment periods, were analyzed and responded to. Equal consideration was given to all comments, regardless of how or where they were received.

DOE has also placed copies of data reports and documents used in the preparation of this SPD EIS in DOE reading rooms. DOE is not permitted to disseminate proprietary or classified information, although as much information as possible (e.g., redacted copies of the contract with DCS) has been made available to the public. To learn more about the surplus plutonium

I have a videotape of testimony by people from the reactor community, but have been denied permission to play this tape at the meeting today. I was told there was no opportunity. These people are not being heard. In my view, sane-looking people are making an insane proposal. The Southeast will not be victimized any further by the Federal Government. 74

The proposed reactors have been operated very safely. In fact, nuclear reactors are inherently an environmentally safe source of energy. The only truth told by the antinuclear advocates today is that nuclear power is expensive. That is due to construction costs. Nuclear power does have a role to play. I can't understand why persons have these concerns when the citizens of Lake Anna do not seem to have a problem. 75

Public meetings should be held in the Southeast, and the comment period should be extended to accommodate those meetings. 76

disposition program; DCS, the team selected to fabricate the MOX fuel and irradiate it; request to be included on the mailing list; or to contact the program office, visit the MD Web site at http://www.doe-md.com. Written requests for information on the program can be addressed to: Office of Fissile Materials Disposition, United States Department of Energy, P.O. Box 23786, Washington, DC 20026-3786.

**WASHDC–74 General SPD EIS and NEPA Process**

In the interest of stimulating discussions and providing opportunities for the participants to speak, it was not possible to show the proceedings of other public hearings contained on the videotape. The comments from the videotape and their responses are addressed in the responses identified as DCR005A and DCR005B presented in the State of North Carolina in Volume III, Chapter 4.

**WASHDC–75 MOX Approach**

DOE acknowledges the commentor's belief that nuclear power reactors are a source of safe energy and have a role to play in the disposition of surplus plutonium. Based on the analyses of the potential environmental impacts presented in the revised Section 4.28, DOE believes using MOX fuel in domestic, commercial reactors is an effective way to accomplish the goal of the program. The goal of the surplus plutonium disposition program 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. Because the reactors selected to use MOX fuel already exist, the expense to build new reactors is avoided.

**WASHDC–76 General SPD EIS and NEPA Process**

DOE acknowledges the commentor's request for additional public hearings in the Southeast and extension of the comment period. After careful consideration of its public involvement opportunities, including information availability and mechanisms to submit comments, DOE decided not to hold additional hearings on the *Supplement to the SPD Draft EIS*. However, interested parties will likely have the opportunity to submit additional comments during the NRC reactor license amendment process should the MOX approach be selected. In addition to the public hearing on the

What is the role of Nuclear Fuel Services in Irwin, Tennessee, on the contractor team? 77

On page 1 of the *Supplement*, it is stated that no construction would begin until the Record of Decision for the *Surplus Plutonium Disposition Environmental Impact Statement* was issued. When you look at the Federal budget request, however, you can see that in 1999 there were appropriations for construction in the amount of 48 million, and 28 million of that was for a MOX fuel fabrication facility. This looks like design, not construction. Will this be changed in the next budget request? It is getting a little confusing. 78

There are problems in fabricating test fuel at the Los Alamos National Laboratory (LANL). A report indicates that to date 14 batches of MOX fuel test pellets have failed to meet technical specifications or have experienced other problems. I would encourage DOE to address this in the SPD Final EIS. I was thinking that it would be helpful to know if this could affect the time line in a general or specific way. 79

*Supplement* held in Washington, D.C., DOE provided various other means for the public to express their concerns and provide comments: mail, a toll-free telephone and fax line, and the MD Web site. Although it did not extend the comment period, DOE did consider all comments received after the close of that period. All comments were given equal consideration and responded to.

**WASHDC–77** **MOX RFP**

Nuclear Fuel Services will lend support in the area of safeguards and security based on its experience as a NRC fuel fabrication plant licensee.

**WASHDC–78** **DOE Policy**

The money included in the fiscal year 1999 budget request was for the MOX facility design. The terminology used in preparing the budget has been set by the U.S. Congress and Office of Management and Budget. DOE does not have the ability to change this terminology.

**WASHDC–79** **MOX Approach**

Fuel fabrication R&D at LANL was sponsored in order to fabricate test fuel for irradiation in the Advanced Test Reactor at INEEL. Fuel for the first irradiation test was fabricated successfully. The second irradiation test was canceled based on technical input from DCS, the team that was selected to fabricate MOX fuel and irradiate it. Fuel R&D continues at LANL because further development is useful to DOE in the event that a lead assembly fabrication facility is needed and for other programmatic purposes, especially related to characterizing the feed powder from the pit conversion facility.

The difficulties encountered with fabrication of MOX test fuel at LANL are due neither to the lack of MOX fuel fabrication capability at LANL nor to generic technical difficulties associated with weapons-grade plutonium. These difficulties are primarily due to switching the uranium oxide used in the MOX test fuel. LANL had successfully fabricated MOX test fuel for the first irradiation test using an uranium oxide commercially supplied by CAMECO. To begin fabrication of the MOX test fuel for the second irradiation test, an uranium oxide from the ammonium uranyl carbonate process was used.

There are some issues I am uneasy about. We (the United States) have a 50-year history of attempting to separate the military and commercial uses of nuclear power, but this MOX approach far more effectively combines the two than anything in the past. It also does not incorporate any means of disposal. The State of Pennsylvania has had a little experience with an experimental reactor that features a partial plutonium core. Over the period during and immediately after its operation, a level of leukemia six times higher than expected was seen in the nearby community. However, these findings were dismissed as insignificant. The people in the environs of the facility are concerned both about the materials remaining in the area and about the impact of releases prior to facility shutdown. 80

Although LANL is involved in this process, along with Pantex, the citizens in the area have been fighting the Waste Isolation Pilot Project (WIPP). WIPP is now open, probably illegally, but that is how you people do business. We don't want any more waste shipped throughout the country, and we particularly don't want to see more waste coming to WIPP or LANL, making it more of a "bomb plant." DOE has made promises of a cleanup but has only been creating more waste. There is no reason to make this MOX fuel. No one wants nuclear power anymore; the nuclear power plants now operating are old and are not being replaced. There is no reason for the Government to get involved in providing fuel to a dead industry that is going to kill us all. 81

**WASHDC–80** **DOE Policy**

Consistent with the U.S. policy of discouraging the civilian use of plutonium, a MOX facility would be built and operated subject to the following strict conditions: construction would take place at a secure DOE site, it would be owned by the U.S. Government, operations would be limited exclusively to the disposition of surplus plutonium, and the MOX facility would be shut down at the completion of the surplus plutonium disposition program**.** For reactor irradiation, the NRC license would authorize only the participating reactors to use MOX fuel fabricated from surplus plutonium, and the irradiation would be a once-through cycle with no reprocessing. After irradiation, the MOX fuel would be removed from the reactor and managed with the rest of the spent fuel from the reactor, eventually being disposed of at a potential geologic repository built in accordance with the NWPA.

Under normal operating conditions, it is not expected that the makeup of the discharges will change significantly from those associated with non-MOX (LEU) fuel. Electricité de France reactors in France have seen little or no impact from the use of MOX fuel on radionuclide releases in effluents. The use of MOX fuel in U.S. reactors is analyzed in Section 4.28. No LCFs would be expected from normal operations.

Furthermore, annual doses to an MEI at each of the plants are estimated to be small—i.e., McGuire, 0.31 mrem; Catawba, 0.73 mrem; and North Anna, 0.37 mrem. All of these doses fall within stringent NRC 10 CFR 20 and 10 CFR 50 regulatory requirements and are much lower than radiation annually received from natural background sources.

**WASHDC–81** **MOX Approach**

The goal of the surplus plutonium disposition program 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. Converting the surplus plutonium into MOX fuel and using it in domestic, commercial reactors is an effective way to accomplish this. The commercial reactors selected for the MOX approach include only those reactors whose operational life is expected to last beyond the life of the surplus plutonium disposition program**.**

This is the first time DOE has gone through NRC in regulating DOE facilities. DOE is paying for the licensing processes. Are you also paying for licensing of the tritium process? | 82

The operation of WIPP has been subject to NEPA review, EPA certification, and legal challenge. NEPA documentation for the operation of WIPP was completed in 1997 with the publication of the *WIPP Disposal Phase Final Supplemental EIS* (DOE/EIS-0026-S-2, September 1997) and ROD. The operation of WIPP received EPA certification in May 1998. Despite continued legal challenges, Judge John Garrett's March 22, 1999, ruling paved the way for WIPP to receive its' first waste shipment on March 26, 1999.

Transportation would be required for both the immobilization and MOX approaches to surplus plutonium disposition. Transportation of special nuclear materials, including fresh MOX fuel, would use DOE's SST/SGT system. Since the establishment of the DOE Transportation Safeguards Division in 1975, the SST/SGT system has transported DOE-owned cargo over more than 151 million km (94 million mi) with no accidents causing a fatality or release of radioactive material. The transportation requirements for the surplus plutonium disposition program are also evaluated in this SPD EIS.

Response WASHDC–80 provides additional information on doses at each of the proposed reactors.

**WASHDC–82** **NRC Licensing**

The use of TVA commercial reactors to produce tritium for DOE is addressed in the *Final EIS for the Production of Tritium in a Commercial Light Water Reactor* (DOE/EIS-0288, March 1999). DOE anticipates reaching an agreement concerning license amendment costs associated with this proposal.