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ROBERT GARY
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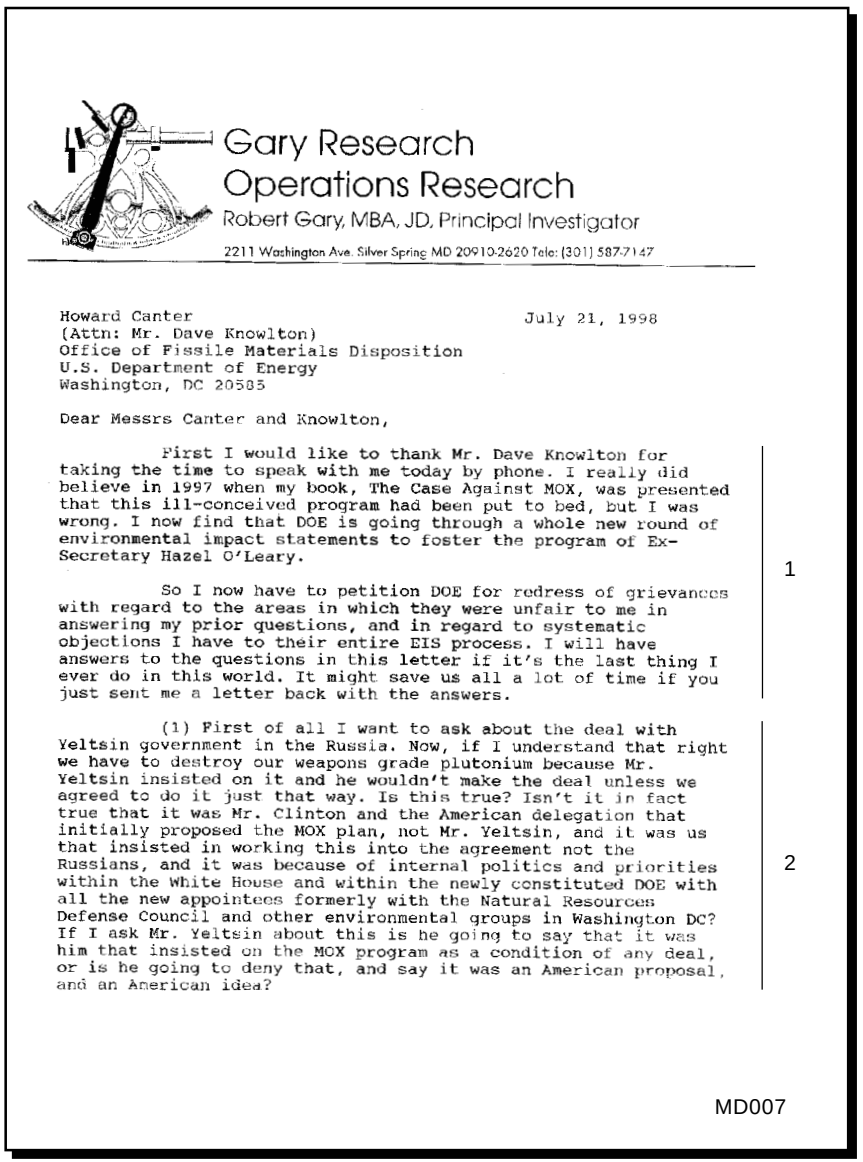

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Robert Gary, MBA, JD, Principal Investigator
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Howard Canter
(Attn: Mr. Dave Knowlton)
Office of Fissile Materials Disposition
U.S. Department of Energy
Washington, DC 20585

July 21, 1998

Dear Messrs Canter and Knowlton,

First I would like to thank Mr. Dave Knowlton for taking the time to speak with me today by phone. I really did believe in 1997 when my book, The Case Against MOX, was presented that this ill-conceived program had been put to bed, but I was wrong. I now find that DOE is going through a whole new round of environmental impact statements to foster the program of Ex-Secretary Hazel O'Leary.

So I now have to petition DOE for redress of grievances with regard to the areas in which they were unfair to me in answering my prior questions, and in regard to systematic objections I have to their entire EIS process. I will have answers to the questions in this letter if it's the last thing I ever do in this world. It might save us all a lot of time if you just sent me a letter back with the answers.

1

(1) First of all I want to ask about the deal with Yeltsin government in the Russia. Now, if I understand that right we have to destroy our weapons grade plutonium because Mr. Yeltsin insisted on it and he wouldn't make the deal unless we agreed to do it just that way. Is this true? Isn't it in fact true that it was Mr. Clinton and the American delegation that initially proposed the MOX plan, not Mr. Yeltsin, and it was us that insisted in working this into the agreement not the Russians, and it was because of internal politics and priorities within the White House and within the newly constituted DOE with all the new appointees formerly with the Natural Resources Defense Council and other environmental groups in Washington DC? If I ask Mr. Yeltsin about this is he going to say that it was him that insisted on the MOX program as a condition of any deal, or is he going to deny that, and say it was an American proposal, and an American idea?

2

MD007

MD007–1 **General SPD EIS and NEPA Process**

DOE makes every effort to respond to each comment in a fair and appropriate manner and regrets if previous responses were not satisfactory. DOE acknowledges the commentor's opposition to the MOX approach. The *Storage and Disposition PEIS* ROD outlines DOE's decision to pursue a hybrid approach to surplus plutonium disposition that would make the plutonium inaccessible and unattractive for weapons use. 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 weapons again.

MD007–2 **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. We must ensure that nuclear arms reductions cannot be easily reversed, politically or legally, by making such reuse technically difficult, time consuming, and very costly. Sensitive negotiations between the two countries have indicated that although 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. Close cooperation between the two countries is essential to achieve the objectives of nonproliferation and arms reduction and to ensure secure management of nuclear weapons materials.

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(2) From my conversation with Mr. Dave Knowlton this day, I understand that only the newer of the American reactors will be used to burn MOX fuel. This seems to be a concession to the fact that embrittlement is a genuine concern in using MOX pellets in a reactor core. Is that correct. If embrittlement is not a concern of any kind, then why not use old, middle aged, and new reactors? Why limit the MOX program to the newer reactors. If embrittlement is a concern and MOX pellets are placed in new reactors won't this fuel age them prematurely. Won't it cost the utilities money to replace parts and to take extra safeguards against embrittlement? Won't the utilities pass these costs on to somebody? Would that be the ratepayers or the shareholders? Americans either way right? 3

(3) I understand that there are estimates on the total volume of low level waste that the MOX program will entail. What are they? What is the scenario for dealing with these low level wastes. Are the Governors in the states where they are generated going to be stuck with them? Is the Federal government going to take responsibility for them? Where will they be placed, Yucca Mountain not being open, and Barnwell be available only to a small a select group of utilities. Will the governors have to fend for themselves somehow? 4

(4) NASA and DOE were very unfair to me in answering my issue about the potential value of Plutonium-239 as a propulsion source for interplanetary travel in the next century. Every effort was made to create confusions between Pu-238 and Pu-239. Additional efforts were then made to create confusions between propulsion systems and onboard electrical power systems. Finally my ideas were compared to matter and anti-matter systems which is to say they were written off utterly and placed in the file of ideas that had previously been written off. Then DOE turned around and told me that they were in regular consultation with NASA about any possible uses NASA might have for nuclear materials. Well, listen I can sympathize if you don't understand my ideas. There is the Library of Congress, there are many sources of information, go get information, learn the difference between a propulsion system and an RTG and a thermionic battery. But telling me you are in regular consultation with NASA over the issues I raise is plainly untrue and unfair. It's like saying, "Your consent is not required, we know what we are doing, we are having meetings with the right people, so but out". As you well know from our Declaration of Independence governments derive their just powers from the consent of the governed. When you treat me unfairly you take the government of the United States off the path of just powers and you divert it onto the path of violent usurpations. That is not your intent, I know. So pay attention to my points and answer them as if there was a possibility that they might contain some element of intelligence outside of your previous considerations. If in the 21st century this country has to go back a refine the Plutonium-239 that you are about to destroy so that interplanetary craft can be propelled around the solar system, your efforts in the MOX 5

MD007

MD007–3 **NRC Licensing**

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. Commercial reactors in the United States are capable of safely using MOX fuel. In fact, several reactors in Western Europe have been operating successfully with MOX fuel for over 10 years. Although MOX fuel results in a harder neutron spectrum than LEU fuel, and thus a greater fluence of high-energy neutrons on the pressure vessel, this effect is well understood and has been shown to be within the capability of pressure vessels to withstand. It is the remaining operational life of reactors which formed the basis for DOE's selection process. 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.

Reactor vessel embrittlement is a condition in which the fast neutron fluence from the reactor core reduces the toughness (fracture resistance) of the reactor vessel metal. Analyses performed for DOE indicated that the core average fast flux in a partial MOX fuel core is comparable to (within 3 percent of) the core average fast flux for a uranium fuel core. All of the mission reactors have a comprehensive program of reactor vessel analysis and surveillance in place to ensure that NRC reactor vessel safety limits are not exceeded.

MD007–4 **Waste Management**

Appendixes H.1.2.3, H.2.2.2, H.3.2.2, and H.4.2.3 provide estimates of the amounts of LLW that would be generated by operation of the MOX facility and describe the LLWs that would be at Hanford, INEEL, Pantex, and SRS, respectively. These sections also describe facilities that may be used to treat, store, and dispose of LLW. DOE would be responsible for disposition of waste generated by the surplus plutonium disposition program. 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. Yucca Mountain, Nevada, is being studied as a location for a potential geologic repository for HLW and spent fuel. There are no plans to place LLW in Yucca Mountain.

MD007–5 **Other**

As discussed in response MD007–1, DOE makes every effort to respond to each comment in a fair and appropriate manner and regrets if previous responses were not satisfactory. DOE acknowledges that there may be future uses of plutonium 239 as the commentor suggests, but the growing threat of nuclear proliferation is of immediate concern, requiring that attention be focused on ensuring the safe, secure, long-term storage and disposition of surplus weapons-usable fissile plutonium. The activities proposed in this SPD EIS would implement U.S. policy on disposition and nonproliferation of surplus plutonium.

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program will be regarded as a gargantuan piece of technology mismanagement. No one is going to want to hear about how Yeltsin made you do it -- which I expect he will deny. Ms. O'Leary will not be there to take responsibility as she is not there even now. 5

(5) The Pollyanna vision is that the MOX Program will somehow take weapons grade Plutonium out of this universe so that no bad people can make any bad bombs with it anymore. That myth may wash at the Unitarian Church but it is much too dumb for a serious government to believe or make into a basis for policy. The MOX process only destroys 40% of the Plutonium by fissioning it. The rest is still in the spent fuel. The French who are experts in reprocessing hot spent fuel just like that could and would in ten days make a contract with the U.S. to trade us weapons grade plutonium for spent fuel bundles. The Russians know this, everyone does. So the whole Pollyanna vision premise for the MOX program is a hoax. 6

(6) Another hoax is the environmental impact statement process. Here's why. When they want to know if anyone thinks the MOX program is a good idea they go to the five towns in this nation where hundreds and thousands of people will be employed, and paid, and be able to send their kids to college based on their work making MOX pellets. Of course anyone is free to come to these meetings and speak at Hanford, or at Pantex, etc, but it is a very biased crown that DOE knows is going to be there. They couldn't sell their case to a crowd that was on the level. They can only sell their case to the direct beneficiaries of the program. It would be like holding hearings on whether tobacco smoking is a good idea in Virginia. Now at the same time DOE makes sure that no information is released about which commercial nuclear power reactors are likely to get the MOX pellets. Why? Because that would tend to create a local constituency against the MOX program. People might say, "Well gee we have got enough to worry about with a nuclear reactor here we don't want to worry about taking plutonium out of nuclear bombs and putting it in the reactor." DOE says "We can't talk about what consortiums are interested in the request for proposals because that's in the RFP process". Usually the whole RFP process is public information as well it should be. But in this case it is secret information, and why? Could it be that DOE wants to have the fullest imaginable public input as long as they are singing to the choir at Hanford where people are going to make money out of MOX but DOE plans to keep the whole RFP thing secret and just slip a few MOX pellets into people's local nuclear reactors with no public input from anybody who might ~~a~~ harm a danger or an injury or a cost from the MOX Program. If that selective process of revealing an collecting information doesn't make the EIS process a hoax, what would? It does. DOE is spending millions of dollars publishing millions of pages of EIS documents when in fact it is avoiding all genuine public comment from anybody that might have a reason to oppose this ill-starred scheme. 7

MD007

MD007–6 **Nonproliferation**

It is true that in the MOX approach only a fraction of the plutonium would actually be consumed in the reactor; but the remainder would be an integral part of massive spent fuel assemblies that would meet 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 spent fuel assemblies would be so large and radioactive that any attempted theft of the material would require a dedicated team willing to suffer large doses of radiation, and substantial equipment for accessing and removing the spent fuel from the storage facility and carrying it away. Recovering the weapons-usable plutonium from spent fuel could be done in a reprocessing facility, as suggested; but it should be kept in mind, however, that approximately 726 t (800 tons) of plutonium exists in spent fuel in the world today. If weapons-usable plutonium were transformed to plutonium in spent fuel, it would become only one part of a much larger inventory and would not present a significantly more attractive target for diversion than the existing plutonium in spent fuel.

MD007–7 **General SPD EIS and NEPA Process**

To provide for public comment on the SPD Draft EIS, DOE conducted public hearings near the potentially affected sites and thus with the populations most directly concerned. Because it was known that not everyone wishing to comment on the proposed action could attend the hearings, DOE provided several other means for providing comments: mail, a toll-free telephone and fax line, and the MD Web site. All comments, regardless of how they were submitted, were given equal consideration.

The SPD Final EIS was not issued until the proposed reactors had been identified and the public had an opportunity to comment on the reactor-specific information. 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

It appears that the MOX program is very much alive and well at DOE, more's the pity. I want these questions answered, and I'll do what it takes to get them answered. Intellectual engagement is my only strategy for derailing this program. I don't plan to sue, to bring administrative proceedings, to call for Congressional hearings, to go to the papers, or to write a book. I only plan to talk to you, to petition you for the grievances arising from my past questions that have not been treated with respect, and to request firmly but fairly that you answer my present inquiries fully and candidly. You could not go wrong by assisting the informed consent process and supporting the idea that the powers you exercise are just powers. Snubbing me is not going to work. If it were going to work, it would have done so in the first five or ten or fifteen years of my career as an anti-nuclear lawyer. On the other hand, if you can satisfy my objections with reasonable answers, as you have sometimes done in the past, I will cease from them. If I cease, there will be very few other objectors that could or would plausibly stand in your way. 1

Sincerely,

Robert Gary
Attorney at Law

MD007

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.

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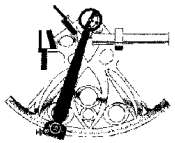

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Mr. Dave Knowlton
Office of Fissile Materials Disposition
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

July 23, 1998

Dear Dave Knowlton,

You know I object to the MOX program and that I want DOE to be responsive to my questions, and that I am ready to make that happen. It seems fair to me that you should have a better understanding of my premises than you might have based on the very short record of correspondence between us. So in fairness I should be more complete in stating my objections and their foundations.

You have my letter of two days ago (additional copy enclosed) so you know that some of my issues pertain to the matters of embrittlement and low level waste. You also know that I am very concerned about possible misrepresentations by DOE concerning the source of the whole MOX idea which was integrated into the deal we made with Yeltsin. If there's a valid treaty I as an American am bound to respect it, but if Yeltsin is just a cover for a hairbrained scheme that needs to be questioned, I am bound to question it. As the appointees from the Natural Resources Defense Council well know and would all affirm, it is natural for the outsiders to become the insiders and one must always be cautious in the treatment of this day's outsiders lest they become tomorrow's insiders.

Prior to yesterday's letter, I have also raised an objection based on setting a precedent for international conduct. According to the U.S. Navy I am a fully certified and qualified international lawyer and here's what I want you to know. If we play about with plutonium in power reactors then Libya and Pakistan and Syria and Sudan and Patagonia will come around tomorrow and tell us about their sovereignty and how they have a right to do the exact same thing, and the next day it will be North Korea and Cuba. Think about the situation then. You say it's not your job. But you are the man who is going to do this deed. If you have no connection with it and no responsibility for it who does? Nobody? So we catch these guys red handed with plutonium and they say it's part of their MOX program and then what? The world, you think, will be far more secure with 15 bad

1

MD149

MD149–1 **MOX Approach**

DOE acknowledges the commentor's opposition to the MOX 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 weapons again.

Specific domestic and international safeguards would be developed for the proposed surplus plutonium disposition facilities; these are the subject of ongoing sensitive negotiations between the United States and Russia. Because the surplus plutonium is weapons usable, the safeguards would include physical inventories as well as several active and passive measures to guard against theft and diversion.

DOE makes every effort to respond to each comment in a fair and appropriate manner. 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.

actor nations having the perfect cover story for their possession, transport, processing, and fabrication of plutonium in and around their nuclear reactors. You say IAEA has billions and trillions of inspectors that will straighten all of this out, separate the truth from the falsehood and undo the effects of our setting this stupid precedent. I say not. So we disagree. But you should know that the international law precedent is an issue with me even if the State Department has never thought about that, because there are more things in heaven and earth than the State Department has thought about or knows in its philosophy. 1

My ideas about space travel are truly far out. What I say is this. It is inconceivable that we could lift through the earth's atmosphere all the reaction mass needed for solar system development. If there is some valuable thing somewhere in the solar system we are going to need reaction mass from moon water and Europa water to get there, acquire it, and bring it back. But beyond that we are going to need the best energy source we know which is the hydrogen bomb. What's required is bombs the size of sandgrains made of plutonium-239, polonium, beryllium, and tritium, detonated by phased lasers at the gigawatt picosecond level. This is the heat source. The moon ice provides the reaction mass. Newton says you need both, and I'm telling you it is not possible to lift both through the atmosphere you can only lift the energy source and that has to be at least 50% plutonium 239 in sandgrain sized particles at the ends on fiberoptic laser conductors (like a hair with a grain of sand at the end). This goes into a block of ice and the whole assembly is detonated in a gattling gun arrangement at the rate of about 10 per minute to produce thrust. 2

Take away the plutonium and it doesn't work. You see plutonium is important for setting off tritium. This is the highest and best use of the stuff, not power reactors. The MOX program deprives the citizens of this country of a precious strategic mineral that they have paid for and taken risks to acquire. It takes away one of our opportunities in the 21st century.

Now, I recognize, and I did recognize when we spoke, that without plutonium you need uranium-235 to make a power reactor work, and that has to be refined at great cost and risk at the Y-12 plant at Oak Ridge, and that's not a minor consideration. So let's be candid on this one point. I know that the MOX program lends a whole new lease on life to the power reactor program in the U.S. I want the power reactors closed down based on their original lease on life and not the extended lease that the MOX program would give them. They are dangerous. They are dumb. They were an example of the same kind of "turning the bad into the good" technology mismanagement which is present in the MOX plan. What we have in the MOX plan is just a new Atomic Energy Act of 1957, and surprisingly enough the people pushing for it are not Yeltsin at all but the actual children of the scientists who pushed for the Atomic Energy Act of 1957. There are the real facts you see? 3

MD149

MD149–2 **MOX Approach**

DOE acknowledges that there may be future uses of plutonium 239 as the commentor suggests, but the growing threat of nuclear proliferation is of immediate concern, requiring that attention be focused on ensuring the safe, secure, long-term storage and disposition of surplus weapons-usable fissile plutonium. The activities proposed in this SPD EIS would implement U.S. policy on disposition and nonproliferation of surplus plutonium.

MD149–3 **MOX Approach**

DOE acknowledges the commentor's opposition to the MOX approach. Uranium is mined, milled, and converted to uranium hexafluoride before it is enriched in the 235 isotope at either the Portsmouth or Paducah gaseous diffusion plants operated by the United States Enrichment Corporation. Uranium is no longer enriched at Oak Ridge. The MOX approach is not intended to affect the viability of nuclear power. 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.

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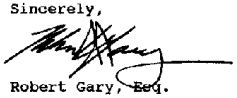
I want my questions answered not because I need information but because I want you to have the information, you and Ambassador Richardson, an intelligent man, a man with no record of managerial incompetence, quite the contrary, a man of proven good judgement. You answer the technical questions and let him make the policy decisions and don't be amazed if he comes out my way.

Jefferson wrote extensively on a concept that he had called the insolence of office. This is a feature that comes on bureaucrats who are just ordinary people but once elevated into office they really don't see why they should suffer the indignity of having the respond to mere citizens. I don't even have an affiliation with an environmental group, so I am the merest of citizens. But I want you to trust me and answer me fully, candidly, and in good faith. I sense that left to your own devices, you would do this. So please, just do it. Know that you are serving the nation at least as much by answering me as by forging ahead with the MOX program while disregarding my points. I've been doing this work for 15 years. I have 10 years of training in science and a 160 I.Q. I've put a lot of thought into the points I've presented and talked about them at some length with other thoughtful people including some at NRC. Please think of me as a colleague not an opponent. I have never gone to the press, never published a book or an article on this subject, never spoken to the Congress except on radioactivity as a medical issue. So give me the benefit of the doubt ---- and real answers. 1

Thank you for your time and consideration.

Sincerely,



Robert Gary, Esq.

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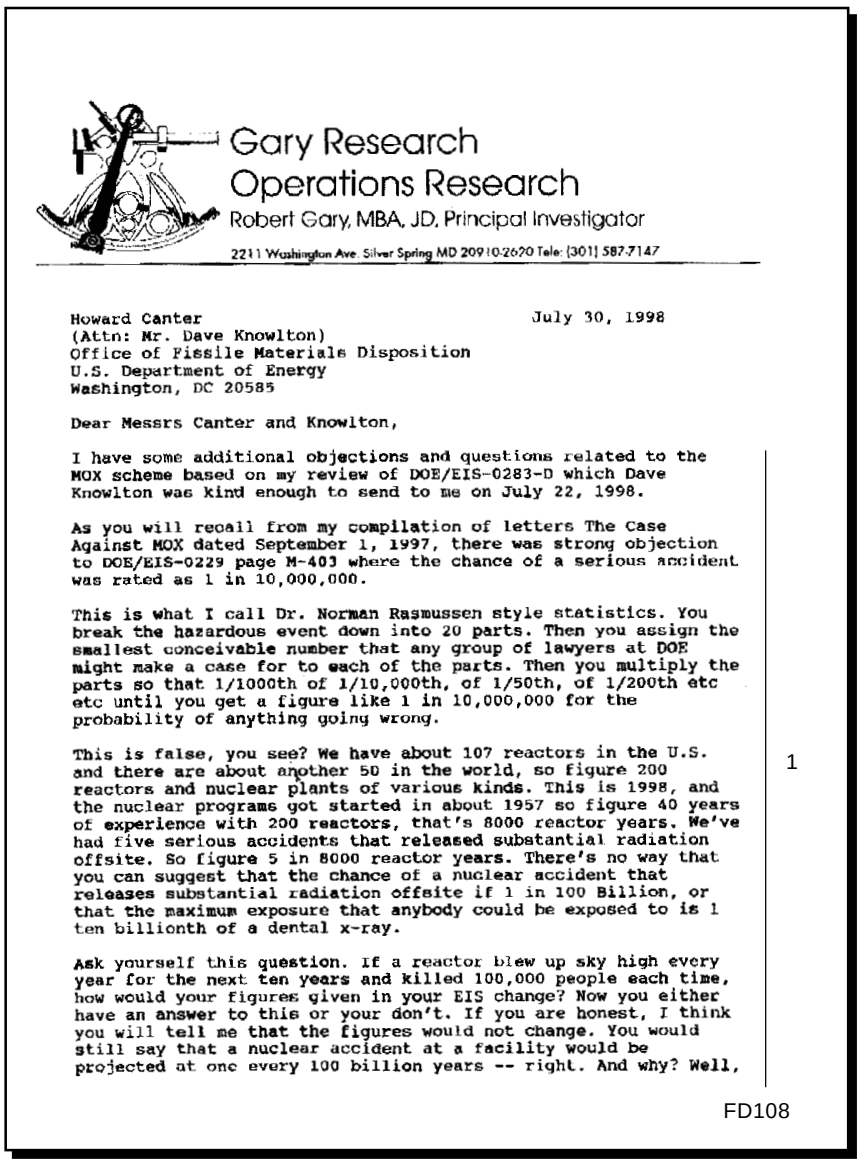

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Howard Canter July 30, 1998
(Attn: Mr. Dave Knowlton)
Office of Fissile Materials Disposition
U.S. Department of Energy
Washington, DC 20585

Dear Messrs Canter and Knowlton,

I have some additional objections and questions related to the MOX scheme based on my review of DOE/EIS-0283-D which Dave Knowlton was kind enough to send to me on July 22, 1998.

As you will recall from my compilation of letters The Case Against MOX dated September 1, 1997, there was strong objection to DOE/EIS-0229 page M-403 where the chance of a serious accident was rated as 1 in 10,000,000.

This is what I call Dr. Norman Rasmussen style statistics. You break the hazardous event down into 20 parts. Then you assign the smallest conceivable number that any group of lawyers at DOE might make a case for to each of the parts. Then you multiply the parts so that 1/1000th of 1/10,000th, of 1/50th, of 1/200th etc etc until you get a figure like 1 in 10,000,000 for the probability of anything going wrong.

This is false, you see? We have about 107 reactors in the U.S. and there are about another 50 in the world, so figure 200 reactors and nuclear plants of various kinds. This is 1998, and the nuclear programs got started in about 1957 so figure 40 years of experience with 200 reactors, that's 8000 reactor years. We've had five serious accidents that released substantial radiation offsite. So figure 5 in 8000 reactor years. There's no way that you can suggest that the chance of a nuclear accident that releases substantial radiation offsite if 1 in 100 Billion, or that the maximum exposure that anybody could be exposed to is 1 ten billionth of a dental x-ray.

Ask yourself this question. If a reactor blew up sky high every year for the next ten years and killed 100,000 people each time, how would your figures given in your EIS change? Now you either have an answer to this or your don't. If you are honest, I think you will tell me that the figures would not change. You would still say that a nuclear accident at a facility would be projected at one every 100 billion years -- right. And why? Well,

1

FD108

FD108–1 **Human Health Risk**

DOE acknowledges that risk can be defined and measured in different ways. The risk assessment methodologies and assumptions employed in this SPD EIS are prepared and reviewed by qualified professionals and are also subjected to independent review. DOE believes that these methodologies and assumptions adequately predict the risk of reactor accidents. Section 4.28 was revised to discuss the potential environmental impacts of operating Catawba, McGuire, and North Anna, the reactors that would use MOX fuel. Calculations are performed with codes that have been used and verified repeatedly over a period of several years. These codes are also periodically updated and calibrated.

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it's because your numbers have no relationship whatsoever to the real world or anything that has actually happened in the real world in the last 40 years. Your figures relate to hypothetical imaginings in the mind of Dr. Norman Rasmussen a person paid by the government to provide his version of the truth which reasonable persons of ordinary intelligence might well question. 1

Now comes the Department of Energy with it program that Dave Knowlton says is a $2 Billion program and which I say is going to cost $300 Billion. This program requires building a facility to create MOX pellets. This is a whole new venture for the USA. We don't have any plants like that. This would be a whole new kind of nuclear facility for us. 2

A concern that a reasonable person might have is, "What sort of health effects might be generated by such a novel venture?" "Could there be bad health effects?" "What is the likelihood of producing bad health effects, or maybe killing a few hundred thousand Americans by uptake of alpha emitting radionuclides, not that the government hasn't done this before, (see Johnsrud v Carter 620 F 2d 29 and Punnett v Carter 621 F 2d. 587). 3

Who carries the ball for the government on this point which no person of ordinary good sense would say is a detail. We look to Volume 1 Part B page 7-4 to discover that the Human Health Risk issue is handled by a person with a B.S. degree received in 1991.

Do I think that after collecting many trillions of dollars from U.S. citizens every year the government couldn't get a Ph.D. to say the same thing? No, I realize that in an "anything for money" world the government could get a veritable Niagara Falls of Ph.D.'s to say prosaically the same things that this very youthful Batchelor's degree holder has said, and I assume that he is operating in the best of good faith, and doing as he was taught in the best way he can. What I say is this. It's not adequate. DOE has no rational basis to do the calculations this way. There's not a trillionth of a billionth of a chance that one person could get a hundredth part of a dental x ray from this scheme and DOE knows it. This project is dangerous, and there's no way to know exactly how dangerous it is. 4

But consider this point. When Dr. Norman Rasmussen was setting the precedent for non-rational calculation of risks based on hypotheticals projected on hypotheticals projected on hypotheticals and with no regard whatsoever to actual experience in the real world, the one we live in, people were much more reliable than they are now. We live in a dysfunctional society. Over half of the jobholders in this country are marginally dysfunctional in one way or another. There's some part of their jobs that just doesn't get done, maybe they are slacking, or asleep at the switch, or corrupt nepots that got their jobs on a non-merit basis, or illiterates that weren't pick up in the training program, or one thing or another. Every serious nuclear accident so far has occurred by the dumbest and most 5

FD108

FD108–2 **MOX Approach**

It is true that MOX fuel has not been produced commercially in the United States. The fabrication of MOX fuel and its use in commercial reactors has been accomplished in Western Europe, and this experience would be used for disposition of the U.S. surplus plutonium.

Because cost issues are beyond the scope of this SPD EIS, this comment has been forwarded to the cost analysis team for consideration. The *Cost Analysis in Support of Site Selection for Surplus Weapons-Usable Plutonium Disposition* (DOE/MD-0009, July 1998) 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.

FD108–3 **Human Health Risk**

This SPD EIS identifies and analyzes potential human health impacts that might result from construction and normal operation of proposed surplus plutonium disposition facilities. The Human Health Risk and Facility Accidents sections in Chapter 4 of Volume I discuss the effects on the public due to potential radiological releases. DOE policy places public safety above other program goals, and requirements have been established to protect the safety and health of the public. The protection of members of the public against accidents is considered by DOE in the design, location, construction, and operation of its facilities. Additionally, independent external oversight of activities is provided by the congressionally mandated DNFSB. The MOX facility and the reactors selected to use MOX fuel would be licensed and monitored by NRC.

FD108–4 **Human Health Risk**

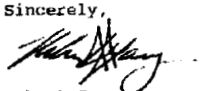
Risk assessment methodologies, assumptions, and personnel qualifications are addressed in response FD108–1.

unpredictable of human errors. But none of those people are going to be working in the MOX plant right? The MOX plant is going to be build in the Dr. Norman Rasmussen Utopia where all persons perform their functions within predictable guildlines for incompetence, stupidity, malice, and criminality. That's the world where there's a billionth of a trillionth of a chance that anybody could ever be exposed to as much a one dental x ray's worth of ionizing radiation because of the MOX scheme. 5

I have tried to be reasonable with DOE. I have offered to come and present my views in person and be questioned on them by expert members of DOE's staff. I have submitted protests against this ultra-hazardous program for three years, to no effect. I have suggested and in fact outlined in detail a higher and better use for the Plutonium-239 in question here. Furthermore, I have always supported DOE when they were right. I have vigorously supported the Yucca Mountain Project. I have vigorously supported the vitrification or filled canister or immobilization alternative (the part of the dual track that doesn't involve making MOX pellets and putting them in commercial power reactors near American cities where lots of Americans live -- so far). As a person of reason I can only appeal to other persons of reason. If I were a person of influence, perhaps I could appeal to persons of influence, but that avenue is not open to me, due to circumstances of life. 6

DOE is a law unto itself. It does what is decided by DOE. It is presently in transition because of the appointment of an extraordinarily able person -- Ambassador Richardson -- to be its Secretary. There is now an opportunity for the technology mismanagement errors of the past two Secretaries to be rectified by the use of judgement and reason and good sense, which Bill Richardson has in abundance and has proven on 100 occasions. So let's do it. Let's make changes. Let's put the red light to bad ideas of the past and let's go ahead with what's good. Please answer my questions. Please meet with me and hear me out. Please redress my grievances.,

Sincerely,



Robert Gary
Attorney at Law

cc: Ambassador Bill Richardson
Senate Energy Committee
Secretary Carol Browner

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FD108–5 **Human Health Risk**

The analysis and data in this SPD EIS and the supporting conclusions of minor impacts and sufficient safeguards have been prepared and reviewed by qualified professionals and also subjected to independent review. Calculations are performed with codes that have been used and verified repeatedly over a period of several years. These codes are periodically updated and calibrated. In regard to the MOX facility, DOE intends to design, construct, and operate it in such a fashion as to provide a level of safety that meets or exceeds applicable Federal, State, and local requirements. The 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.

FD108–6 **DOE Policy**

DOE acknowledges the commentor's support of Secretary Richardson, as well as interest and participation in the surplus plutonium disposition program. DOE's decisionmaking process takes into account all public input, and each comment received is given equal consideration.

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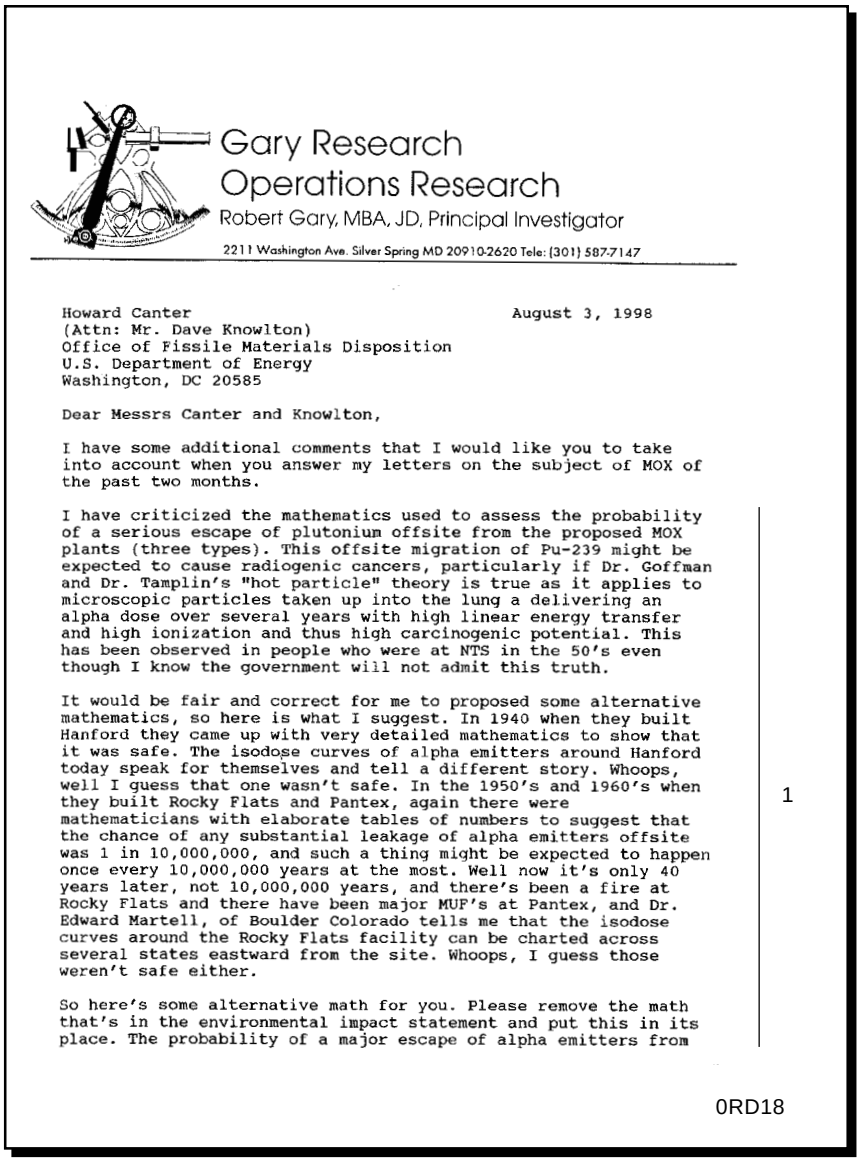

Gary Research
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Howard Canter August 3, 1998
(Attn: Mr. Dave Knowlton)
Office of Fissile Materials Disposition
U.S. Department of Energy
Washington, DC 20585

Dear Messrs Canter and Knowlton,

I have some additional comments that I would like you to take into account when you answer my letters on the subject of MOX of the past two months.

I have criticized the mathematics used to assess the probability of a serious escape of plutonium offsite from the proposed MOX plants (three types). This offsite migration of Pu-239 might be expected to cause radiogenic cancers, particularly if Dr. Goffman and Dr. Tamplin's "hot particle" theory is true as it applies to microscopic particles taken up into the lung a delivering an alpha dose over several years with high linear energy transfer and high ionization and thus high carcinogenic potential. This has been observed in people who were at NTS in the 50's even though I know the government will not admit this truth.

It would be fair and correct for me to proposed some alternative mathematics, so here is what I suggest. In 1940 when they built Hanford they came up with very detailed mathematics to show that it was safe. The isodose curves of alpha emitters around Hanford today speak for themselves and tell a different story. Whoops, well I guess that one wasn't safe. In the 1950's and 1960's when they built Rocky Flats and Pantex, again there were mathematicians with elaborate tables of numbers to suggest that the chance of any substantial leakage of alpha emitters offsite was 1 in 10,000,000, and such a thing might be expected to happen once every 10,000,000 years at the most. Well now it's only 40 years later, not 10,000,000 years, and there's been a fire at Rocky Flats and there have been major MUF's at Pantex, and Dr. Edward Martell, of Boulder Colorado tells me that the isodose curves around the Rocky Flats facility can be charted across several states eastward from the site. Whoops, I guess those weren't safe either.

So here's some alternative math for you. Please remove the math that's in the environmental impact statement and put this in its place. The probability of a major escape of alpha emitters from

1

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ORD18–1 **Human Health Risk**

Because a "serious escape of plutonium" from a MOX facility is not defined, it is assumed to be an amount that potentially causes LCFs among the population within 80 km (50 mi) of a site. Of all the MOX facility accidents analyzed with a scenario frequency of greater than 1 in 10 million per year (Appendix K), only the aircraft crash at Pantex and the beyond-design-basis earthquake at each of the sites would be expected to cause LCFs in the public. For the earthquake, there could be up to 24 cancer fatalities; for the aircraft crash, up to 27 cancer fatalities (Tables K–8, K–9, K–13, K–11, and K–19). The probability of a serious escape of plutonium off the site for these two accidents is quite small. The probabilities have been shown to be below 1 in 1 million per year for the airplane crash and below 1 in 10,000 per year for the earthquake, based on scientifically accepted prediction methods discussed in Appendix K.

The contention that the alpha particles would cause hundreds or even many thousands of cancers has no scientific basis. The potential impacts on people living in the areas of the candidate sites for the MOX facility have been calculated using models accepted within the scientific community. The MACCS2 computer program (Appendix K.1.4.2) was used with conservative input parameters. For example, it was assumed that the meteorological conditions at the time of the accident were so severe that they would only be exceeded about 5 percent of the time. The doses predicted by MACCS2 were converted to LCFs using the risk estimators discussed in Appendix K.1.4.3. These risk estimators are probably on the conservative side (i.e., they overpredict adverse health effects), but are accepted within the scientific community as reasonable, predictive values. The basis for the "high carcinogenic potential" is not accepted by the scientific community at large.

DOE acknowledges that past practices at its sites led to environmental contamination with some potential for health effects on local residents. However, no major adverse impacts to the public or workers as the result of operations at Hanford, NTS, Pantex, or RFETS—sites specifically cited by the commentor—have been demonstrated (refer to Sections 3.2.4 and 3.4.4 of this EIS for Hanford and Pantex and to Sections 3.3.9 and 3.8.9 of the

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the proposed MOX plant(s) over the next 50 years if they are built, is around 95% to 100%. The probability that substantial quantities of Pu-239 will be airborne, be suspended, and be resuspended over the course of decades after those quantities escape from the proposed MOX plant is 100%. The probability that those particles will cause cancer, specifically lung cancer, but also soft tissue cancers in hundreds, perhaps thousands, perhaps tens of thousands of Americans living in several states over the 50 year period is substantial, which is to say more than 50% at the low end of the range and more than 10% at the high end. 1

The probability that the safety assurance calculations that were given in 1940 for the Hanford Plant were correct is zero. The probability that the safety assurance calculations that were given for the Rocky Flats and Pantex Plants were correct is zero. The probability that the tables of numbers in your current EIS for the proposed MOX plant, based on the same Rasmussen style approach, are correct is close to zero.

Beyond the infirmity of its math, the EIS fails on several other points which I should make more explicit as well. I see no designs for the facilities that will contain the low level waste over the next 250,000 years. But when those hot particles get into the environment, if they do, harm is done, you see? Those millions of cubic yards of low level wastes have to be guarded too, for 250,000 years, otherwise they will be acquired by terrorists or other malefactors, or they might be, creating a national security threat, you see? That's where your $2 Billion project starts moving toward a $300 Billion project. You know when they built Hanford they said that was going to be a $2 Billion dollar project too, but we've spent $50 Billion there in 60 years and our costs there have only just begun. See your EIS is not for the whole system, it's just for the parts you wish to present, and of course there are hundreds of pages going on and on about the sociological economic and racial breakdown of the people around the proposed plants. You've done a marvelous job from a civil rights perspective, but a terrible job from an engineering perspective, but you see plutonium is very unforgiving stuff, it may respond reluctantly to our best engineering efforts but it cares not one whit about civil rights or environmental justice or any of our other fuzzy notions about what counts in disposing of it. 2

I have raised another point that I fear you will not be sensitive to. This is a macro-project. It takes place over many decades. It has consequences reaching well beyond the next century. I have said that we have a problem in that connection arising from failures in our educational system and in the entire process of inculcating ethics into young people. Included here would be the work ethic in the Puritan sense, but also the competence ethic, the truthfulness ethic, the drug-free ethic, and the scientific ethic. Our particular society is not producing the kind of people it produced from 1945 to 1969. You may think you can shrug that off, but it is an important point. It suggests that we should be 3

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Storage and Disposition PEIS for NTS and RFETS). A number of Federal and State agency agreements are in place to further reduce or eliminate sources of contamination, conduct additional research on health effects, and take corrective actions, as appropriate. DOE is committed to reducing any human health risks at its sites to ALARA levels, or levels agreed to with the appropriate regulatory agency. Any surplus plutonium disposition facilities would be designed, constructed, and operated to achieve these goals.

ORD18–2 **General SPD EIS and NEPA Process**

DOE acknowledges the commentor's concerns regarding LLW disposal. Chapter 4 of Volume I and Appendix H address impacts of the construction and operation of proposed surplus plutonium disposition facilities on the waste management infrastructure at the sites. DOE has existing arrangements for LLW disposal at all of the candidate sites. Generation of additional LLW by activities associated with surplus plutonium disposition is not expected to substantially impact these existing arrangements. Impacts at the waste disposal facilities that would be used are evaluated in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE/EIS-0200-F, May 1997) and other site-specific NEPA documents.

LLW disposal facilities do not require special security to avert the diversion or theft of waste; the very low concentrations of special nuclear materials in waste (less than 100 nCi/g) would not be an attractive source of bomb-making material.

ORD18–3 **General SPD EIS and NEPA Process**

DOE acknowledges and shares the commentor's concern regarding the availability of highly qualified technical personnel. Accordingly, it has initiated a number of programs in schools throughout the United States to encourage mathematics and science literacy and to promote entry into technical fields. Fortunately, many highly qualified and dedicated people, of all ages, work in the DOE complex to support the surplus plutonium disposition program and other DOE missions.

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leery about setting in motion projects that will require a lot of people over a long period of time to perform just like the pros did in America's decades of technological and engineering preeminence. You say that the Europeans have lots of experience with this sort of technology, and I agree they do, but let's look at the Europeans, and particularly the French in this connection. Everybody that touches any control element in a French reprocessing plant is a graduate of Ecole Polytechique. This means they are the cream of the French educational system, and they are all members of the military. The French may be to the left of us politically, but in this area they are a national security state. We stopped being a national security state when the Berlin Wall came down in 1989. Since then we have been a civil rights state. Our dedication to privacy of information is so intense that it overides every other consideration for almost every job in the country, even jobs at the CIA if the Ames and Pollard cases are any indication of what goes on there. Not only are we not producing capable people to manage this technology over the next five decades, but we are not producing reliable people, or to be more precise people whose reliability is known or can be ascertained to a very high degree of certainty. You can't even trust your bag to a luggage handler at an American airport -- when they get it out of sight they take anything they find of value. You can't trust an engineer of a train to stay awake, or a truck driver to stay off pills, or an HMO or nursing home to be honest in rendering their services. We, the great "service economy" are in fact becoming a nation of negligent, sloppy, careless, untruthful, and often lazy people. This matters because good technology management requires a match between the tasks to be accomplished and the personnel who will perform those tasks, and plutonium is very unforgiving stuff -- you think your boss doesn't take any excuses -- but plutonium is the sternest taskmaster of all -- it takes no excuses. We are rapidly becoming a country of sea-lawyers who spend half our days making excuses for the things we didn't do, or didn't do right. This creates a mismatch. The mismatch creates a reliability issue on which you have no numbers. No numbers from the past will do (even if they were right, and they are not). New era, new people, new strengths, weaknesses, threats and opportunities for technology, but MOX plants are not among the realistic opportunities from this point looking forward with all the discernment that an informed, observant, intelligent mind can marshall.

3

I'm trying to clarify my issues to make them easy for you to address and deal with. If you understand my points deeply, you might be affected by them -- which, after all, is the intent of the EIS process. But even if you just want to defend MOX right down the line, at least you will be able to honestly and squarely address the gravamen of the positions I've taken in opposition.

Sincerely,

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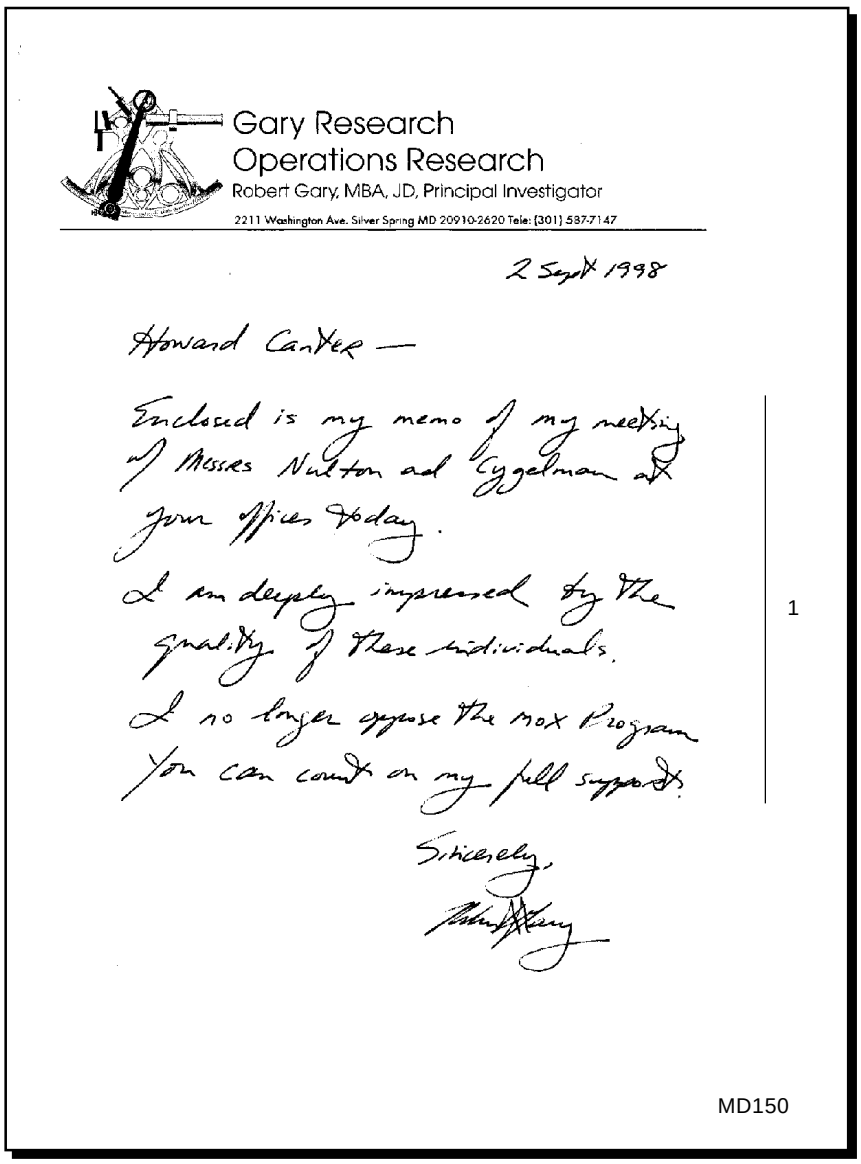

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2 Sept 1998

Howard Canter —

Enclosed is my memo of my meeting of Messrs Nutton and Eggelman at your offices today.

I am deeply impressed by the quality of these individuals.

I no longer oppose the MOX Program

You can count on my full support.

Sincerely,

1

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MD150–1 **MOX Approach**

DOE acknowledges the commentor's full support of the MOX approach. It is unclear what accident the commentor is referring to in his discussion of accident frequencies. However, it seems that the figure of 1 in 10,000,000 per year is from the *Storage and Disposition PEIS*, and not the SPD EIS. There are only three instances of a 1 in 10,000,000 per year figure being used in the Facility Accidents section of the SPD EIS. It is used to exclude SRS from assessment of consequences due to aircraft crash. This is in accordance with DOE-STD-3014-96, *Accident Analysis for Aircraft Crash into Hazardous Facilities*. It is used to exclude vault material from the assessment of aircraft crash consequences into the pit conversion and MOX facilities at Pantex. This is also consistent with DOE-STD-3014-96. Finally, it is used as a lower bound for the frequency range of total facility collapse as a result of a beyond-design-basis earthquake. The upper frequency bound for this accident is assessed to be 1 in 100,000 per year. Details on accidents developed for the SPD EIS can be found in Appendix K.

Memo of Meeting at DOE (1000 Independence Avenue)
2 September 1998 (1300 hours till 1400 hours)
between
Robert Gary, Esq.
and
Mr. J. David Nulton and Mr. Andre Cygelman (DOE)

1. On the issue concerning the origin of the MOX idea: The idea was around in DOE prior to the arrival of Bob Alvarez. It predated the Clinton Administration. The Russians actively selected the MOX idea over the canister and the bore hole ideas and said that it was the MOX alternative or no deal. So, we had the idea before the Clinton appointees got to DOE. The Russians knew about the MOX alternative in 1993. And they actively selected it as a basis for future negotiations to dispose of fissile materials. (This deals with interrogatories/requests 1-5)

2. On the low level waste issue it was pointed out that first the Federal government out of the Treasury would pay for on-site storage of low level wastes from the MOX plants, which are actually projected to be a fairly small volume. Low level waste from the reactors would be paid for by a consortium of utilities (indirectly by the ratepayers of participating utilities, I suppose). A second area of concern about low level waste was it use as a toxic material in the hands of terrorists. DOE representatives pointed out that for that sort of use it would be far cheaper to buy plutonium on the black market than to purloin it from a low level waste dump and then purify thousands of cubic feet of wipes, and gloves, to try to recover microscopic amounts of Plutonium. Also mentioned in this context was my position that the MOX security benefit was a chimera because the French could trade us metallic Pu for spent fuel bundles anytime, and they would make a deal to do so on 24 hours notice. This position was refuted by the fact that the reprocessed metallic Plutonium would contain Pu-240 which makes it useable for reactors but unusable for weapons. Pu-240 has an early releasing neutron which in a weapon would cause pre-detonation and thus a nuclear fizzle or misfire. The isotope Pu-240 would not be separated from Pu-239 in the French reprocessing as it currently exists. So the idea that we could trade our way back to weapons grade metallic plutonium anytime we wanted is false. Thus the security benefits of the MOX program are authentic, and I was wrong about this. (This deals with interrogatories/requests 6-12)

3. On the interplanetary propulsion issue it was pointed out that any needs that might exist in the 21st or 22nd century for plutonium-239 for interplanetary propulsion could be easily satisfied by recovering it from spent fuel using the advanced technologies that will be available in those centuries. The issue of quelling the Russian security threat posed by loose plutonium on the world market exists right now and is an immediate, clear and present danger. Therefore, since the intent of the MOX program is primarily to quell this immediate threat, which if not

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quelled will result in grave environmental consequences, it does not behoove us to worry about the precious national asset aspect of plutonium as a propulsion modality in the 21st or 22nd centuries right now. With new future technologies, we will have what we need for those (space propulsion) purposes. Right now, we need to dispose of this fissile material so that the Russians will do the same and it will not be available on a world black market. In this connection I responded, "Why not just buy the plutonium from the Russians?" DOE said, "The U.S. environmentalists don't want additional plutonium coming into the U.S." I suggested that an exchange of cash for Pu would be appropriate and any amount up to an including $100 Billion would be reasonable if it solved the problem. I also said that this would mean that we ramp up our MOX program, and it would make a Russian MOX program unnecessary (and a Russian sodium cooled breeder program impossible). [Note: I would have no objection to ramping up our MOX program if the program as practiced in the U.S were truly safe. I certainly would have no objection to bringing Russian bought Pu into the U.S. or the expenditure of funds required to do that, if the deal really got rid of the problem once and for all]. This general discussion disposed of interrogatories/requests 13 - 20.

4. On the subject of the 1 in 10,000,000 figure we had a conflict that was not resolved at this meeting. I suggested that the figure be revised in the final version of the EIS to read 1 in 1000 chance of a serious accident with significant offsite distribution of Pu. DOE said that much had been learned since the accidents at Hanford, Pantex, and the several fires a Rocky Flats, so that even though those prior accidents tend to indicate a higher probability of a major leak from the proposed MOX plants, that fact is partially offset by the fact that the way we develop safety systems and countermeasures and computer models and facility designs is by having accidents and then designing them out of new facilities. The borax experiments at the Idaho reactor were mentioned in this context. These involved intentional destructive testing of nuclear reactors -- letting them blow up in the desert to learn how and why that happens. Such experiments are not done today, but the same principle applies, which is that safety systems get better as a result of integrating data from past accidents. I said that the 1 in 10,000,000 figure was too high in light of the failures at Hanford, Pantex and Rocky Flats, and that as a prudential matter it would be unwise for DOE to present that figure to the Senate, or try to justify it. The most self-admitted non-expert Senator or staffer would feel completely comfortable rejecting that figure in light of past experience. I also said that a 1 in 1000 figure might just get by using the "better technology, better computer models, more real world experience" argument. I also said that the math should explicitly reflect a Bayesian analysis, (which is apparently the same as updating their benchmark codes), and that it should be signed off on by someone at MIT with 20 or so years of experience teaching post-docs, rather than a holder of a B.S. degree received in 1991. The math, in short, should be

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less astonishing, more intuitively credible, more explicitly presented, and presented by an authority that people feel is highly reliable. I mentioned Dr. Kemeny as an example of such a person. (This part of the discussion disposed on interrogatories 20 - 34).

One document was provided by DOE titled FY 1999 Congressional Budget Request -- Program Mission and which contains the following sentence: "The Administration will *not* construct new facilities for disposition of U.S. plutonium unless there is significant progress on plans for plutonium disposition in Russia." (emphasis added)

This was interpreted by DOE to mean that although a day for day pound for pound correspondence between the two programs was not required, the two programs were to be on parallel tracks, moving forward and making progress in parallel. This means some sort of rough equivalence of actual plutonium disposition, not day for day, pound for pound, but step by step, beginning by beginning type of parallel progress. Specifically it does not mean that the U.S. goes ahead with a facility in exchange for a Russian promise to go ahead with a facility (or otherwise dispose of their plutonium i.e. by selling it to us, for example). In other words the Russian progress is not "progress on plans" in the sense of progress in making plans, it is "progress on plans" in the sense of progress on implementing existing plans. [Note: It might be helpful to re-word the document, and future documents so that this potential semantic ambiguity is eliminated and replaced by crystal-like clarity]. The next sentence talks about "attaining reciprocal ***actions*** on the disposition of Russian surplus plutonium" (emphasis added)

The meeting with DOE was a success in the sense that it reduced five broad groups of objections down to one remaining objection (to the 1 in 10,000,000 figure). DOE's representatives left a strong impression of integrity, knowledge, and policy expertise. I was also impressed by the gravity of the consequences of not going ahead with MOX and by the "time is of the essence" aspect of the situation, which is obviously magnified by current developments in the past 10 days in Russia. DOE has basically converted an opponent to a supporter of the MOX program with the sole caveat that they clean up their numbers on the probability of a serious accident/offsite leak. It would be a good thing if the final version of the EIS said 1 in 1000, but DOE actually delivered a technology on the ground with a probability of 1 in 10,000 or 1 in 100,000. That way they say less but do more, and are the real good guys. I believe this is achievable. If so, it would be far better to scale the MOX program up, or extend its period of operation so that it could dispose of all U.S. and all Russian excess plutonium rather than embark on a world where the Russians start their own MOX program for light water reactors, or an even worse world where the Russians use their Plutonium in sodium cooled breeder reactors. It would be entirely fair for DOE to lay out the risks of those alternatives, and the risks of

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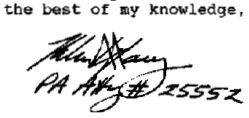
having Russian plutonium go on an international black market as part of the presentation on MOX and its relative merits. Whatever risks are present in MOX cannot be rationally assessed in isolation, but only in relation to the risks of the alternatives. The EIS document should be expanded to present these allelic risks even though they are not required to be presented in an ordinary EIS. This case is different. We are not the only actors in this environment, and our MOX program has as its basic purpose the control of the actions of one of the other actors whose actions might gravely affect the environment. Because of the unique circumstances in this case, the EIS should explicitly incorporate the full panoply risks and specifically the avoided Russian risks which acceptance of the U.S. MOX program entails. This would lay a foundation for the expansion of extension of the MOX program in the event that a Cash for Pu transaction with the Russians can be arranged. [Note: Time being of the essence, it might be reasonable for the President to open negotiations for such an exchange while he is in Moscow today, or in the diplomatic exchanges that will occur over the next 30 days implementing the statements made by President Clinton while he is Moscow i.e. "The U.S plans to give you money", or words to that effect -- the Russians have to stay on the course of free market reforms and sell their Pu to us for cash. They get what they need. We get what we need. MOX goes forward -- one program for all the planet earth, done by people who know what they are doing, and have been screen in a Personnel Reliability Program at the Rickover level based on a national security state not a civil rights state. Congress has to pass legislation that permits applicants to the MOX program to waive away all of their rights under all of the civil rights laws -- just like it was in Rickover's Navy. This danger of personnel unreadiness needs to be taken seriously. We don't have the same sort of people in the U.S. today as we had in 1945-1969. The culture has changed. MOX requires, not merely good people, but reliably competent people. Not merely reliably competent people, but people whose reliable competence can be established and verified to a very high degree of certainty in advance. This is impossible in a privacy oriented civil rights state. In other words if you want to build down the dangerous surplus plutonium left over from the days of the U.S. as a national security state, you need to create an enclave of people who are transported legislatively back in time to the rules, habits, laws, and rights of persons living at an earlier time -- say 1950. Only thus can the MOX program avoid the effects of modernity. Even thus recruitment will be extraordinarily difficult and hazardous from the perspective of making a reliability assessment error. The CIA and Naval Academy have already experienced this. Secretary Cohen is an expert on the subject, and I think would verify and confirm what I say here.

I affirm that this document, created from memory one hour after the meeting, is true and correct to the best of my knowledge, information and belief.



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ROBERT GARY
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Memo for David Nulton at DOE
Reiterating in writing some of the more important points from our PONCON this day September 18, 1998 approx 1500 hours
From Robert Gary, Esq.

1. The EIS documents currently being produced on the MOX Program are in full regulatory compliance with the rules and statutes governing such documents but they are inadequate nonetheless.

2. NEPA and the entire body of EIS regulations came into existence during a period in American history when environmental impacts could be considered on a project centered and national basis. We are now living at a time when environmental impacts must be considered on a problem centered and global basis. There is no issue where this is more clear than the issue of controlling weapons grade plutonium worldwide. Accordingly, where an international agreement focuses on the global problem of black market plutonium and the probable bad environmental and human health consequences from failure to manage the plutonium on a global basis, it is highly appropriate for the Environmental Impact Statement to give communications primacy to this fundamental reality. Specifically, it is legally, morally, and politically correct to outline in the plainest terms the environmental consequences of not solving the problem on a global playing field. In particular it is correct to portray the international black market in weapons grade plutonium, the sellers, the entrepreneurs, the buyers, and the ultimate users. Furthermore, it is highly appropriate and prudent to present in some detail the environmental and health effects likely to be produced by plutonium explosive devices in the 1 to 100 kiloton range if detonated in Washington DC, New York, Chicago, Dallas, San Francisco, Boston and Los Angeles. To permit ancient NEPA regulatory provisions designed to prescribe the minimum content of EIS documents several decades ago to be a limit and a maximum content for an EIS on today's MOX Program is to disenable the DOE from successfully marketing this vital program through its most prominent and most widely read communications device. If it is not an actual Federal crime to present DOE's strongest arguments and reasons in support of the MOX program in the EIS then it seems to me it is a moral, logical, and policy imperative to do so.

3. Persons from Greenpeace or other environmental organizations who have no responsibility of any kind except to salve their own sense of *moral* righteousness must be presented in the clearest terms with the fact that MOX is a program for world peace, and that peace is good for the environment and that nuclear detonations in the atmosphere are bad for the environment. Blowing up New York City would be a bad thing for the entire ecological web in the United States and other places. Owls, whales, and snail darters would be killed. The false and artificial distinction between what happens in the USA and what happens on planet Earth is one that environmentalists should not make for two reasons. First, it contradicts their own ethics,

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MD286–1 **General SPD EIS and NEPA Process**

DOE acknowledges the commentor's views on the rationale for the surplus plutonium disposition program and the value of a global focus in related communications. Section 1.2 discusses the purpose of and need for the proposed action, including some of the international aspects of surplus plutonium disposition. It is not the purpose of this SPD EIS to market DOE's program for the disposition of surplus plutonium. The NEPA process does provide an important mechanism for obtaining public input prior to disposition decisions. In compliance with NEPA and the rules that implement that act, DOE prepared this EIS by obtaining comparable data on all of the alternatives, analyzing the data in a consistent manner using established procedures, and presenting the results in a full and open manner.

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very plainly stated since the days of Rachel Carson and Silent Spring. We have been talking for years about the use of pesticides like DDT in South America. South America is not part of the USA. And what about the rain forests in Brazil? Has Greenpeace taken the position that it's only what happens to rainforests in the USA that they are concerned about -- they don't care what happens in Brazil, or have they taken some other position? The record is clear. Second, the environmentalists are demonstrating the "ethics of intention" rather than the "ethics of responsibility" when they try to distinguish between plutonium in the USA and plutonium in Russia. They think that if their intentions can be construed as *good* from some perspective, then there is no responsibility that attaches to the policy implications and consequences of what they say. This is a sort of mystical approach to the management a pressing global life and death problem. It is the sort of approach taken by persons who do not expect to be listened to, and should not be. 1

4. After January of 1999, when the new Congress takes their seats, there will be very few people on Capitol Hill who will pay the slightest attention to Greenpeace or any environmentalists. Therefore DOE should not worry about trying to convert them to a pro-MOX position. MOX is a program for peace. Peace is good for the environment. Those messages need to be taken directly to reasonable people and they can be, but only by becoming much more creative with the EIS communications opportunity. The environmentalists need to be put to their proofs. They should have to show that the risks of the MOX program (if done entirely in the USA, as I suggest) are greater risks to human health and environmental integrity than the risks inherent in an uncontrollable international black market in weapons grade plutonium (Pu that is 96% free of Pu-240, Pu-241, and Pu-242). We know that terrorists have planted bombs at the World Trade Center and at the Murrah Federal Building. We know that the Lincoln Tunnel was also on their target list. What would the environmental consequences be if one of those bombs were say a 10 kiloton device? That information has a right to be in the EIS for the MOX program. Why? Because it is your best and strongest argument for the program. It tells the real story of why you want to do the program. Readers of the EIS have a right to get the real story of why you want to do the program. Decisionmakers have a right to get your first line argument, your varsity presentation, your alpha team rationale, not some watered down, desultory, detail driven, infodump created by blind, uncreative, and rigid adherence to what are imagined (by lawyers) to be the technical requirements of NEPA and other statutes governed EIS document. If it's not a crime for DOE to put out and effective and success-oriented document, then it's a crime against reason not to do so in this case. The fate of the world hangs in the balance. Furthermore, I don't think you should confine yourselves to documents. I would put a major effort into a 30 - 45 minute video designed for an informed senior staffer on the Hill (who has no time or attention to give to a 5000 page EIS). I would make the video a formal part of the EIS. I would allocate 5 or 10 2

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MD286–2 **General SPD EIS and NEPA Process**

DOE acknowledges the commentor's views on the environmental rationale for the surplus plutonium disposition program and the need for effective public education in that connection. Chapter 4 of Volume I presents the potential environmental impacts of each alternative for accomplishing the proposed action.

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minutes in the video to all the stuff that's in the existing EIS documents (ineffective in terms of advocacy). The balance of the time would focus on the important information concerning your real and best reason for wanting the MOX program. What does Bin Ladden look like? What sort of ideas are in his head. What about Saddam Hussein, and Muhammar Quadaffi? That sort of context is required in order to appreciate the significance of an international black market in weapons grade Pu-239. Once the predicament has been presented, the MOX program becomes evident as the most feasible and most reasonable way to prevent the predicament from becoming a case of mass casualties. You should show pictures of what mass casualties look like -- maybe some of the ABCC black and whites taken after Hiroshima and Nakasaki. Now you show that although the MOX program contains its own risks and costs, those risks and costs are far smaller than the risks and costs of not going ahead with it. This sets up the metes and bounds of any rational discourse about MOX. People who want to oppose you must show that they have a better and more viable and less risky idea -- something more cost effective --- something more ethical. If they can't do that, they have no traction in opposing MOX. Senators will not be attracted to mystical arguments based on feelgood rationales if they can compare such arguments to your best argument. Congressmen want to live. Policymakers, as a rule, want what's best for the USA. Their more intelligent senior staffsers are the same way. Anybody living in Washington DC is bound to have some visceral connection to your best argument, if only you put it forward, as you did with me.

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DOE must advocate effectively for this worthy program. It must disenthrall itself from the advice of lawyers whose only priorities are narrow bureaucratic compliance with outdated regulations unrelated to this unique program and its vital global goals. You need Mr. Ken Burns not Mr. Can't Do Bureaucrat. You need to communicate, not merely comply. EIS is your opportunity to do that. The foundation that has been laid so far is not wasted. You've gotten the narrow compliance part out of the way. Now it's time to put your real point across. If you could do it with me in 90 minutes, you can do it with any rational person, no matter how pro-environment or anti-nuclear they start out.

I recognize how intelligent you and Andre are, and how moral. I earnestly trust you will take to heart the things I say. Take them up, will you please, with Mr. Howard Canter. Given the opportunity, I would do more than talk about these things, I would make them happen.

Signed,

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Comments of the Institute for Energy and Environmental Research (IEER) on:

The Department of Energy's

Surplus Plutonium Disposition Draft Environmental Impact Statement

July 1998

DOE/EIS-0283-D

Anita Seth, Global Outreach Coordinator
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September 1998

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Background/Introduction

At the end of the Cold War, the United States and Russia face an unprecedented and unexpected problem: surpluses of plutonium and highly enriched uranium (HEU), the two key materials used to make nuclear weapons.

The more difficult of the two is the surplus plutonium and the question of converting it into forms not usable for making nuclear weapons. The two most technically advanced options to meet the spent fuel standard are to immobilize the plutonium in a ceramic or glass form with high level radioactive waste to form a radiation barrier to theft or to create nuclear reactor fuel with it and use it in a commercial reactor (MOX). It should be noted that the MOX option does not "burn" the plutonium destroy it. While some of the plutonium will be fissioned in the reactor, plutonium is also created through neutron irradiation of the uranium which forms the bulk of the reactor fuel (this occurs in reactors fueled with low-enriched uranium as well). In fact, in some cases the plutonium left in the spent fuel is greater than the amount put into the reactor.[1]

The commonly-used yardstick to measure the resistance to theft and diversion of the final form of plutonium after disposition is the so-called "spent fuel standard." This criterion was identified by the National Academy of Sciences in their 1994 report, and means that the plutonium should be as inaccessible to theft, diversion, and re-extraction as plutonium in stored commercial low-enriched spent fuel. Both immobilization and the MOX program were considered by the NAS to have met this standard. However, the "spent fuel standard" inherently assumes that the plutonium will remain in spent fuel (or whatever form it has been placed into)--that is, that it be slated for geologic disposal. Taking into account the desire of Russia to reprocess its spent fuel and the risk of creating a plutonium economy in both countries, it is clear that immobilization is a better option for meeting the standard.

Minatom has stated very clearly on numerous occasions that it intends to reprocess spent MOX fuel, rendering the "spent fuel standard" effectively meaningless over the long-term. The U.S. appears to ready to allow Minatom to reprocess spent MOX fuel from the plutonium disposition program. The joint report notes that ". . .Russia will ultimately recycle any plutonium left in the [MOX] fuel. The U.S. objective of plutonium disposition is satisfied when the isotopic composition of the weapons-grade plutonium have been altered by irradiation, the fuel attains a significant radiation barrier, and the fuel is stored for several decades before reprocessing."[2]

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DOE's Proposed Action

The Department of Energy analyzes 23 different alternatives in its *Surplus Plutonium Disposition Draft Environmental Impact Statement* to meet the spent fuel standard. The DEIS analyzes the disposition of a nominal 50 metric tons of plutonium (33 tons is contained in plutonium pits from weapons or in a metal form relatively free of

[1] See Table 6-1 of National Academy of Sciences, *Plutonium Disposition: Reactor-Related Options*. (Washington DC: National Academy Press, 1995).
[2] Joint study, p. WR-36-37.

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MD237–1 **Alternatives**

DOE acknowledges the commentors' support for the immobilization-only 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 weapons again.

It is true that Russia plans to reprocess the spent fuel resulting from the irradiation of MOX fuel from its surplus weapons-usable plutonium. However, the U.S. position in negotiations with the Russian government has been that Russia should not reprocess the MOX spent fuel until all of their surplus plutonium meets the Spent Fuel Standard. In addition, the future agreement between the United States and Russia would require that any Russian MOX spent fuel reprocessing program be conducted under the oversight of IAEA which is charged with verifying compliance with international nonproliferation policies.

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impurities while the rest is in various other forms). The various alternatives analyzed fall into two basic categories: Immobilization and Hybrid Approaches.[3]

The Immobilization approaches would encase the plutonium (after initial processing to render it into a suitable form – plutonium dioxide) in ceramic discs which would be placed in steel cans. These cans would then be vitrified (encased in glass) along with highly radioactive waste currently being vitrified as part of DOE clean-up operations. Placing the plutonium in a ceramic mixture and then encasing it in glass makes it difficult to extract (in fact, there is less experience with extracting plutonium from a glass or ceramic matrix than from spent fuel). Encasing it in glass which contains highly radioactive waste makes it resistant to theft as the radiation dose near the glass logs would be very high. It has already been determined that this method of immobilization would meet the spent fuel standard.

The hybrid approach would use the immobilization process for a portion of the plutonium surplus and would manufacture the rest into nuclear power reactor fuel for use in a commercial nuclear reactor. Ordinary reactor fuel used in U.S. light water reactors contains uranium oxide slightly enriched in the isotope Uranium-235 (usually about 3-5% with the rest of the Uranium oxide being mainly U-238).[4] The DOE proposes to produce fuel which would replace the 3-5% U-235 with approximately the same percentage of plutonium oxide. Since the fuel would now be a mixture of plutonium oxide and uranium oxide it is called MOX (Mixed OXide).

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The DOE's preferred alternative is a so-called hybrid approach. Approximately 33 metric tons of plutonium would be manufactured into MOX fuel. These 33 tons are currently in the form of weapon pits or metals mainly free of impurities and DOE believes these materials would meet the high purity standards required of MOX fuel. There are, however, some impurities in both the pits and clean metals which would need to be removed (namely gallium). The other 17 metric tons of material is in a variety of other forms. While they contain weapons-usable plutonium, these materials would require significantly more processing to meet the MOX requirements according to the DOE. Therefore, this 17 tons would be immobilized.

The preferred alternative would involve construction of a Pit Disassembly and Conversion Facility (PDCF) at either Pantex or the Savannah River Site. This facility would take apart the weapons pits, remove tritium if necessary, convert the plutonium to an oxide form and process it to remove gallium and other impurities. The PDCF would also convert the "clean" metal. The plutonium dioxide would then be transferred to a MOX fuel fabrication facility to be constructed at SRS (transportation would be either inter-site or intra-site depending on whether the PDCF is built at Pantex or SRS). Immobilization of the other 17t of plutonium in ceramic would occur at a new facility at SRS and the Defense Waste Processing Facility at SRS would be used for vitrification in high-level waste.

[3] The reason for the large number of alternatives is differences in siting and whether new facilities would be constructed for some parts of the mission or whether existing facilities can or would be utilized.
[4] Natural uranium contains about 0.711% U-235, 0.005% U-234 and the rest (99.284%) U-238. The enrichment of the U-235 is necessary in order for light water reactors to sustain a chain reaction.

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According to the DOE:

> Pursuing the hybrid approach provides the best opportunity for U.S. leadership in working with Russia to implement similar options for reducing Russia's excess plutonium in parallel. Pursuing the hybrid approach also sends the strongest possible signal to the world of U.S. determination to reduce stockpiles of surplus weapons-usable plutonium, as quickly as possible, in an irreversible manner. The construction of new facilities for the disposition of surplus U.S. plutonium would not take place unless there is significant progress on plans for plutonium disposition in Russia. (p. 1-9)

It is, therefore, apparently the Russian view of plutonium as a "national" treasure and their desire to use it in reactors which is driving the United States to use the MOX option. This rationale will be examined further below. 1

The decision by the DOE to pursue a hybrid approach ignores the clear advantages offered by immobilization and the serious consequences of initiating a MOX program in the United States. The DEIS also has clear deficiencies which need to be addressed including the lack of information on crucial components of the program. These will be outlined below after an overview of the relative costs and benefits of Immobilization versus MOX and a critique of Russia's role in the decision is presented.

MOX versus Immobilization

There are a number of technical difficulties associated with MOX that DOE has not adequately addressed. First, is the issue of Russian reactors, which is discussed in more detail below. Second, US MOX plans envision the large-scale use of weapons grade plutonium in light water reactors for the first time. While MOX proponents claim that European MOX programs provide ample experience for the US program, that experience is only using reactor-grade plutonium. Furthermore, full MOX cores, which are assumed in DOE's analysis, have never been used on a large scale. 2

The Record of Decision for this Environmental Impact Statement will establish whether the United States pursues an Immobilization only approach or a hybrid approach mixing both immobilization and MOX. There are a number of factors which DOE must consider in making a decision, including environmental consequences, cost, schedule for disposition, and proliferation consequences. Each of these major factors will be discussed below. It should be noted, however, that one of the original purposes for pursuing a hybrid approach was to have a back-up technology in case there were problems implementing either immobilization or MOX. However, MOX cannot handle the full spectrum of plutonium requiring disposition. Therefore, this rationale is severely undercut by the fact that immobilization is the only option capable of processing 17 of the 50 metric tons. Given the indispensability of the immobilization option, it would appear more prudent to concentrate energy and resources into this alternative. Back-up should be pursued by developing more than one immobilization option. 3

MD237–2 MOX Approach

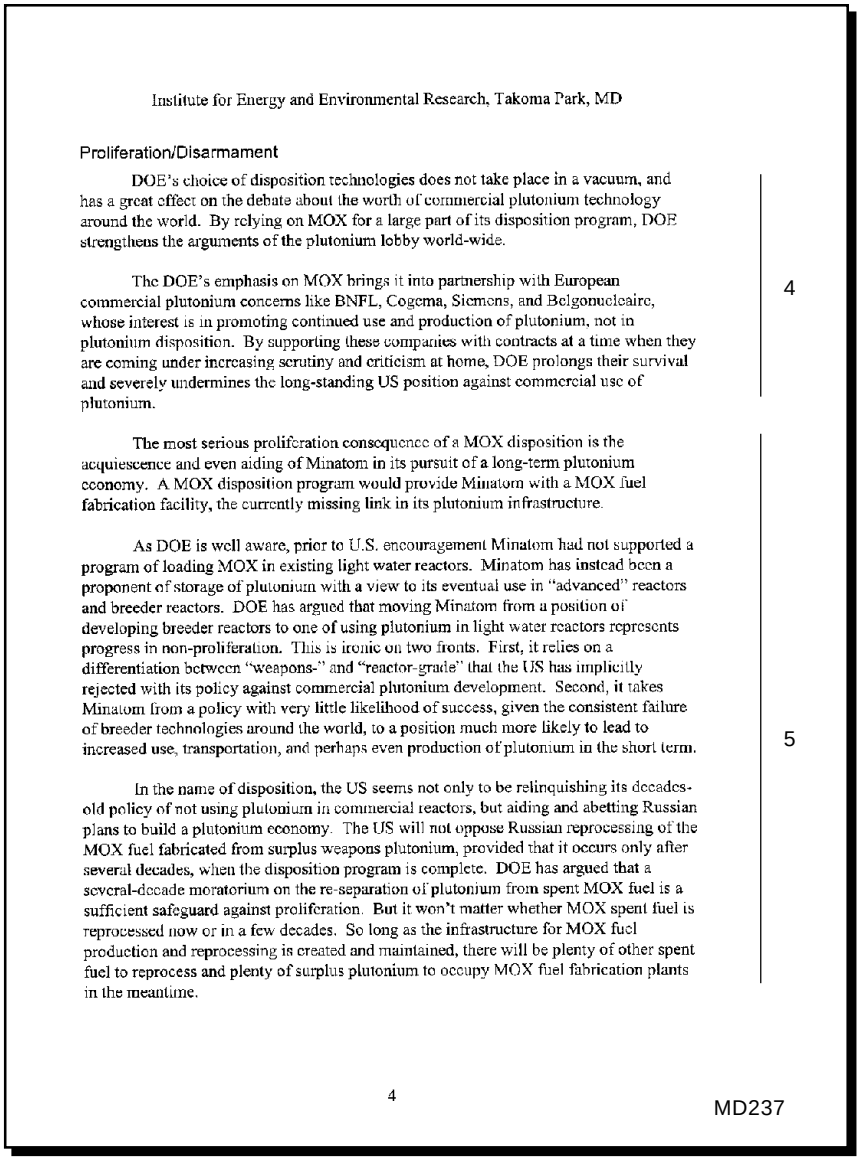
The operational experience for electricity generation from MOX fuel in Europe is relevant to the proposed use of surplus weapons-usable plutonium in U.S. domestic, commercial reactors. While plutonium from warheads may never have been used in MOX fuel, its behavior in fuel is essentially the same as that of non-weapons-origin plutonium. Plutonium from the different origins is chemically indistinguishable. The difference is isotopic: there is less plutonium 239 in non-weapons-origin plutonium. MOX fuel, regardless of the origin of the plutonium, has a higher flux than LEU fuel, and thus can cause more wear on the reactor than LEU fuel. However, this is taken into account when developing fuel management strategy.

The proposed action assumes that MOX assemblies would be used for a partial, not full, core. Several U.S. commercial reactors are designed to use MOX fuel, and others can easily and safely accommodate a partial MOX core. Core load and safety analyses would be performed, and an NRC license amendment approved, before MOX fuel was introduced into any reactor. Section 4.28 was revised to provide reactor-specific analyses and discuss the potential environmental impacts of using a partial MOX core during routine operations and reactor accidents.

MD237–3 Alternatives

DOE has identified as its preferred alternative the hybrid approach of using both immobilization and MOX fuel fabrication. DOE has been studying, evaluating, and testing immobilization technologies for some time, and does not believe that it is necessary to develop more than one immobilization technology. DOE is confident that current development resources will lead to timely implementation of the can-in-canister immobilization technology.

The reasons DOE is pursuing the hybrid approach are addressed in response MD237–1.



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Proliferation/Disarmament

DOE's choice of disposition technologies does not take place in a vacuum, and has a great effect on the debate about the worth of commercial plutonium technology around the world. By relying on MOX for a large part of its disposition program, DOE strengthens the arguments of the plutonium lobby world-wide.

The DOE's emphasis on MOX brings it into partnership with European commercial plutonium concerns like BNFL, Cogema, Siemens, and Belgonucleaire, whose interest is in promoting continued use and production of plutonium, not in plutonium disposition. By supporting these companies with contracts at a time when they are coming under increasing scrutiny and criticism at home, DOE prolongs their survival and severely undermines the long-standing US position against commercial use of plutonium.

4

The most serious proliferation consequence of a MOX disposition is the acquiescence and even aiding of Minatom in its pursuit of a long-term plutonium economy. A MOX disposition program would provide Minatom with a MOX fuel fabrication facility, the currently missing link in its plutonium infrastructure.

As DOE is well aware, prior to U.S. encouragement Minatom had not supported a program of loading MOX in existing light water reactors. Minatom has instead been a proponent of storage of plutonium with a view to its eventual use in "advanced" reactors and breeder reactors. DOE has argued that moving Minatom from a position of developing breeder reactors to one of using plutonium in light water reactors represents progress in non-proliferation. This is ironic on two fronts. First, it relies on a differentiation between "weapons-" and "reactor-grade" that the US has implicitly rejected with its policy against commercial plutonium development. Second, it takes Minatom from a policy with very little likelihood of success, given the consistent failure of breeder technologies around the world, to a position much more likely to lead to increased use, transportation, and perhaps even production of plutonium in the short term.

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In the name of disposition, the US seems not only to be relinquishing its decades-old policy of not using plutonium in commercial reactors, but aiding and abetting Russian plans to build a plutonium economy. The US will not oppose Russian reprocessing of the MOX fuel fabricated from surplus weapons plutonium, provided that it occurs only after several decades, when the disposition program is complete. DOE has argued that a several-decade moratorium on the re-separation of plutonium from spent MOX fuel is a sufficient safeguard against proliferation. But it won't matter whether MOX spent fuel is reprocessed now or in a few decades. So long as the infrastructure for MOX fuel production and reprocessing is created and maintained, there will be plenty of other spent fuel to reprocess and plenty of surplus plutonium to occupy MOX fuel fabrication plants in the meantime.

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MD237–4 **DOE Policy**

The 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. DOE conducted a procurement process to acquire MOX fuel fabrication and irradiation services. The selected team, DCS, 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.

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. Furthermore, selection criteria for the reactors stipulates that they have sufficient operating life to complete the mission.

MD237–5 **Nonproliferation**

The reprocessing of MOX spent fuel in Russia is the subject of sensitive negotiations between the United States and Russia and is beyond the scope of this SPD EIS. 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. The principles include the acceptance of technology for transparency measures, including

Thus, the net result of the plutonium disposition program will have been for the United States to subsidize the very thing that it should be against: an infrastructure for a plutonium economy in Russia. A similar infrastructure would be created in the United States since a MOX plant would be built and since the U.S. appears increasingly reluctant to shut down its decades-old military reprocessing plants at the Savannah River Site in South Carolina. 5

Environmental

The DOE itself has already recognized that immobilization alone is preferable to the hybrid approach from an environmental standpoint. In the Record of Decision for the Storage and Disposition of Weapons-Usable Fissile Materials final Programmatic Environmental Impact Statement the DOE states:

> For normal operations, analyses show that immobilization would be somewhat preferable to the existing LWR and preferred alternatives, although these alternatives, *with the exception of waste generated*, would be essentially environmentally comparable.
>
> Severe facility accident considerations indicate that immobilization options would be environmentally preferable to the existing reactor and preferred alternatives, although the likelihood of occurrence of severe accidents and the risk to the public are expected to be fairly low. (p. 10, emphasis added)

The hybrid approaches would require at least one extra facility and possibly even two. Under the hybrid option the three facilities would be a Pit Disassembly and Conversion facility, the MOX Fuel Fabrication Facility, and the Immobilization Facility. Under Immobilization only alternatives, the MOX FFF would be eliminated. Furthermore, it appears technically feasible to design a single facility which could undertake both pit disassembly/conversion and immobilization (see below) and should have been one of the options analyzed. The environmental advantages of a reduction in facilities and operations have not been fully analyzed since a single facility alternative is not included in the DEIS. Furthermore, if the DOE decides to use the Defense Waste Processing Facility at SRS for vitrifying the cans in high level waste, the incremental environmental impacts of immobilization may be reduced further. There are no existing facilities which could be taken advantage of for MOX fuel fabrication. 6

Due to the high purity requirements of MOX fuel the conversion of plutonium pits and clean metal for MOX require additional processing steps which would be unnecessary for immobilization. At the moment the DOE plans to construct a conversion facility which would remove gallium (a major concern in MOX fuel) using a dry process.[5] If the dry process, which is still at the laboratory and pilot stage, does not meet the impurity removal specifications, the DOE proposes using an aqueous process it calls plutonium polishing. The analysis in the DEIS assumes these processes would occur even if the immobilization alternative is chosen, despite the fact they would be unnecessary. Therefore, the DEIS does not allow one to fully compare the environmental impacts of the MOX and immobilization options. A more detailed discussion of plutonium polishing and the DOE analysis of this process is presented below. 7

[5] See *Science for Democratic Action*, Vol. 5, No. 4 for more on the gallium problem.

appropriate international verification measures and stringent standards of physical protection, control, and accounting for the management of plutonium. The United States would not subsidize reprocessing capabilities or facilities in Russia.

The policy of discouraging the civilian use of MOX fuel has not changed as addressed in response MD237–4.

MD237–6 **Alternatives**

DOE acknowledges the commentor's concern over the greater cost, economically and environmentally, of the hybrid approach than the immobilization-only approach to surplus plutonium disposition. DOE believes its preference for the hybrid approach has a sound basis.

Section 2.3.1 of the SPD Draft EIS explained that a range of 23 reasonable alternatives remained after evaluating over 64 options against three screening criteria: worker and public exposure to radiation, proliferation concerns due to transportation of materials, and infrastructure cost. These 23 reasonable alternatives were evaluated in the SPD Draft EIS. Two separate facilities were combined in this SPD EIS to form the immobilization facility from those evaluated in the *Storage and Disposition PEIS*. No other combination of facilities was considered reasonable. After the SPD Draft EIS was issued, DOE eliminated as unreasonable the 8 alternatives that would involve use of portions of Building 221–F with a new annex at SRS for plutonium conversion and immobilization, thereby reducing the number of reasonable alternatives to the 15 that are analyzed in the SPD Final EIS. This SPD EIS analyzes the potential environmental impacts associated with implementing the proposed surplus plutonium disposition activities at the candidate sites including alternatives that would take advantage of DWPF at SRS. The results of these analyses, presented in Chapter 4 of Volume I and summarized in Section 2.18, demonstrate that under either the hybrid or the full immobilization approach, the activities would likely have minor impacts at any of the candidate sites.

The reasons DOE is pursuing the hybrid approach are addressed in response MD237–1.

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MD237–7 Plutonium Polishing and Aqueous Processing

Based on public comments received on the SPD Draft EIS, and the analysis performed as part of the MOX procurement, DOE decided to propose plutonium polishing as a component of the MOX facility to ensure adequate impurity removal from the plutonium oxide. Appendix N was deleted from the SPD Final EIS, and the impacts discussed therein were added to the impacts sections presented for the MOX facility in Chapter 4 of Volume I. Section 2.18.3 was also revised to include the impacts associated with plutonium polishing. No additional aqueous processing would be necessary to prepare the plutonium dioxide for immobilization.

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In addition to a larger number of operations and facilities, the MOX option also entails an extra transportation step. Under the DOE's preferred alternative, both MOX fuel fabrication and immobilization would occur at SRS. In the case of immobilization, the glass logs would be stored until shipment to a repository. However, for MOX the unirradiated fuel would have to be shipped to the reactor and then the spent fuel shipped to a repository after irradiation. 8

Cost

According to the DOE's July 1998 cost estimate report, the cost of MOX and immobilization disposition programs are approximately the same. However, this comparison fails to take into account a number of factors.

First, the DOE assumes that a fuel off-set will be provided by the reactor companies. The idea behind the fuel off-set is that the MOX fuel would be placed in the reactor instead of the low enriched uranium fuel the reactor operators would normally need to purchase. Thus, the DOE assumes that the bidding consortia would subtract this fuel off-set from the charges for constructing and operating the MOX fuel fabrication facility. DOE estimates this fuel off-set to be approximately one billion dollars. While in principle this is possible, there is no guarantee that the reactor companies will agree to provide the fuel off-set. There is already indication that the bidding consortia of reactor operators and nuclear fuel manufacturers do not intend to undertake this task without reaping a profit. 9

In fact, one reactor official has stated very explicitly the desire of the nuclear power companies (and by extension the consortium partners which would handle MOX fuel fabrication) to make a profit. Jack Bailey, Vice-president of the Palo Verde nuclear plants stated his company's requirements for added compensation in March 1996:

> We also stressed in our letters to DOE that any initiative should address potential benefits to ratepayers and shareholders…
> The benefits must be substantial. If not, the entire proposition is a non-starter.
> What I mean specifically is that any agreement involving Palo Verde would require more than the incremental costs associated with using MOX fuel instead of uranium. That kind of payment would be insufficient.[6]

Furthermore, the DEIS assumes that MOX fuel would be left in the reactor only long enough to meet the spent fuel standard, not for the maximum length of time a fuel rod would normally be in a reactor (p. 2-99). It is not clear what assumptions were made in the cost estimate as to the residence time of the fuel in the reactor. However, a shorter time in the reactor would mean less of the uranium fuel would be replaced over the timeframe of the disposition mission and would therefore reduce the fuel off-set. 10

Second, the cost estimate explicitly excludes a number of factors which could increase the cost of the MOX hybrid options. 11

[6] Jack Bailey, remarks made at the 3rd International Policy Forum: "Deploying the reactor/MOX Option for Plutonium Disposition within the Current System of U.S. and Canadian Nuclear Reactors – Regulatory, Policy Impediments," Landsdowne, VA., March 21, 1996.

MD237–8 **Transportation**

Additional transportation would be required for the shipment of unirradiated fuel from the MOX facility to the reactor. 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.

MD237–9 **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.

Because this comment relates directly to the cost analysis report, it has been forwarded to the cost analysis team for consideration. 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, is 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.

MD237–10 **MOX Approach**

As discussed in Chapter 2 of Volume I, MOX fuel would be left in the reactor for a full cycle. Under the current reactor options, there are no plans to leave it there only long enough to meet the Spent Fuel Standard.

MD237–11 **Cost Report**

Cost-related comments are addressed in response MD237–9.

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Costs that would remain the same, independent of where the facility is sited, are not included. Examples of costs that are not included in this report are research and development, environmental analyses, operation of the Defense Waste Processing Facility (DWPF), and nuclear reactor modifications and irradiation services. Total costs shown are, consequently, not full life-cycle costs.[7]

The only cost specific to the immobilization option is operation of DWPF. However, DWPF will operate whether or not plutonium disposition occurs. The costs specific to the MOX portion of the hybrid options are reactor modifications and irradiation services. As there has been no final decision taken about specific reactors to be used for the disposition program, it is not possible to determine how much it will cost to modify the reactors to handle MOX fuel (or if modifications will need to be made). As for irradiation services, it seems unlikely that irradiation service fees will not be part of any bid from the nuclear consortia. As stated above, there is every indication that these companies intend to make a profit from their involvement with this program. 11

Therefore, while DOE indicates that the MOX hybrid and immobilization options would be comparable in cost, it is painting a misleading picture by excluding significant costs of the MOX program. The one billion dollar fuel off-set may not be realized. This would raise the hybrid option costs by approximately 50%. Furthermore, the hybrid option costs can be expected to rise even higher due to reactor modifications and irradiation service fees.

Reactor Related Issues

The vast majority of LWRs were not designed to use plutonium as a fuel. While both plutonium-239 and uranium-235 are fissile materials that generate similar amounts of energy per unit weight, there are a number of differences between them as reactor fuels that affect reactor safety. The basic set of concerns relates to control of the reactor. The chain reaction in a reactor must be maintained with a great deal of precision. This control is achieved using control rods usually made of boron and (in pressurized water reactors) by adding boron to the water. Control rods allow for increases and decreases in the levels of reactor power and for orderly reactor shut-down. They prevent runaway nuclear reactions that would result in catastrophic accidents. 12

It should be noted that while all commercial LWRs have some amount of plutonium in them which is made during the course of reactor operation from uranium-238 in the fuel, the total amount of plutonium is about one percent or less when low enriched uranium fuel is used. When MOX fuel is used, the total amount of plutonium would at all times be considerably higher. It is this difference that creates most reactor control issues.

[7] DOE, *Cost Analysis in Support of Site Selection for Surplus Weapons-Usable Plutonium Disposition*, (DOE/MD-0009 Rev. 0) July 22, 1998. p. 3-1

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MD237–12 **MOX Approach**

DOE acknowledges the commentor's concern regarding the use of MOX fuel. Although no domestic, commercial reactors are licensed to use plutonium-based fuel, several are designed to use MOX fuel, and others can easily and safely accommodate a partial MOX core. The fabrication of MOX fuel and its use in commercial reactors have been accomplished in Western Europe. This experience would be used for disposition of the U.S. surplus plutonium. The environmental, safety, and health consequences of the MOX approach, as well as the production and disposal of any waste, are addressed in this SPD EIS (see revised Section 4.28 and other appropriate sections in Chapter 4 of Volume I). In addition, NRC would evaluate license applications and monitor the operations of both the MOX facility and the commercial reactors selected to use MOX fuel to ensure adequate margins of safety.

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Changing the fuel can affect the ability of the control rods to provide the needed amount of reactor control and modifications to the reactor may be required before the new fuel can be used.

Several differences between the use of MOX fuel and uranium fuel affect safety:

- The rate of fission of plutonium tends to increase with temperature. This can adversely affect reactor control and require compensating measures. This problem is greater with MOX made with weapons-grade plutonium than that made with reactor-grade plutonium.
- Reactor control depends on the small fraction of neutrons (called delayed neutrons) emitted seconds to minutes after fission of uranium or plutonium. Uranium-235 fission yields about 0.65 percent delayed neutrons, but plutonium yields only about 0.2 percent delayed neutrons. This means that provisions must be made for increased control if plutonium fuel is used, if present control levels and speeds are deemed inadequate.
- Neutrons in reactors using plutonium fuel have a higher average energy than those in reactors using uranium fuel. This increases radiation damage to reactor parts.
- Plutonium captures neutrons with a higher probability than uranium. As a result, a greater amount of neutron absorbers are required to control the reactor. 12
- The higher proportion of plutonium in the fuel would increase the release of plutonium and other transuranic elements to the environment in case of a severe accident.
- Irradiated MOX fuel is thermally hotter than uranium fuel because larger quantities of transuranic elements are produced during reactor operation when MOX fuel is used.

Overall, the issues related to reactor control, both during normal operation and emergencies, are the most crucial. Most independent authorities have suggested that only about one third of the fuel in an LWR can be MOX, unless the reactor is specifically designed to use MOX fuel. However, there are some operational problems associated with using partial-MOX cores since MOX fuel is interspersed with uranium fuel. Their differing characteristics regarding control, radiation and thermal energy mean that there are non-uniform conditions in the reactor that can render operation and control more complicated. Some reactor operators claim they can use 100 percent MOX cores without needing to make physical changes to the reactor or control rods. The safety implications of such claims need to be independently verified.

Russia only has eight reactors under consideration for loading of MOX fuel. There has been little publicly-available analysis about the safety of loading VVER-1000s with MOX fuel. Many of these reactors are old, and will be nearing the end of their 30-year license at the time MOX loading would begin. Current plans seem to envision potential operation of Russian reactors well beyond this 30-year period. Certainly, this 13

MD237–13 **Nonproliferation**

DOE acknowledges the commentor's concern regarding reactor safety and nuclear material safeguards in Russia. Close cooperation between the United States and Russia is essential in achieving the objective of nonproliferation and arms reduction, and to ensure secure management of nuclear weapons materials. To that end, in late July 1998, Vice President Gore and Russian Prime Minister Sergei Kiriyenko signed a 5-year agreement to provide the scientific and technical basis for decisions concerning how surplus plutonium will be managed. This agreement enables the two countries to explore mutually acceptable strategies for safeguarding and dispositioning surplus plutonium. Accordingly, the U.S. Congress appropriated funding for a series of small-scale tests and demonstrations of plutonium disposition technologies jointly conducted by the United States and Russia. During the first week of September 1998, Presidents Clinton and Yeltsin held a Moscow summit and signed a statement of principles with the intention of removing approximately 50 t (55 tons) of plutonium from each country's stockpile. Two of the seven principles that were agreed upon relate to financing arrangements and acceptable methods and technology for transparency measures, including appropriate international verification measures and stringent standards of physical protection, control, and accounting for the management of the plutonium.

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raises safety concerns to an even greater level. Similar problems surround plans to load the BN-600, located at Beloyarsk, with MOX fuel. By Minatom's own reckoning, there have been at least 30 sodium leaks at the reactor since its start of operation in 1980.[8] Numerous other incidents have also been documented.[9] Given the current political weakness and underfunding of regulatory forces in Russia, notably Gosatomnadzor, it is unlikely that they can guarantee proper regulation of Russian reactors. What would the US responsibility be in event of an accident at a reactor which occurred in the context of a program promoted by the US government over the wishes of the Russian nuclear establishment? If MOX fuel use in VVERs turns out to be unsafe and an accident occurs as a result, what would US liabilities be? What would be the responsibility of the US government to the Russian people who have already suffered so much from nuclear accidents in the past? Will the US be willing to assume responsibility for an accident due to this change in fuel? Would the US be willing to provide insurance against the increased risk of accidents due to the change in fuel? Furthermore, is the US prepared for the social upheaval that would accompany such an accident? The 1986 Chernobyl accident is widely acknowledged as a precipitating cause of the break-up of the Soviet Union (when combined with other factors). Given the social tensions caused by the current economic troubles, it is not hard to imagine that an accident would have a very serious impact on the stability of Russia, not to mention on the security of nuclear materials there. 13

Russia

The Russian public has been an important moderating force on Minatom's plans for a plutonium economy, consistently opposing large new plutonium projects. In this, DOE's non-proliferation interests coincide with the Russian public's desire to protect their health and environment. Given this important conjunction of interests, DOE ought to be promoting the Russian public's voice in disposition decisions. Instead, it seems inclined to ignore Minatom's violation of access to information, environmental, and public participation laws. 14

Finally, it is clear that Russia is unable to finance a disposition program without substantial outside help. As we have shown above, DOE's assertions that MOX and immobilization are approximately equal in cost are grossly misleading. MOX is by far the more expensive option, particularly when the potential costs of modifying reactors is added. The lack of money raises serious questions about the potential for large-scale Congressional appropriations, and he possibility of private investment. The latter is particularly troubling, however, because it implies potential commercial use of the MOX fuel fabrication facility and perhaps other plutonium facilities after the end of the disposition program. 15

[8] Joint United States- Russian Plutonium Disposition Study, September 1996, p. Sum-17.
[9] Leonid Piskunov, Yadernyi Ob'ekt za Okalitsei Uralskoi Stolitsy, Ekteerinburg: 1997.

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MD237–14 **Nonproliferation**

DOE will continue to maintain a close working relationship with Russia to develop technical solutions that take into consideration public health and the environment for surplus plutonium disposition.

MD237–15 **Nonproliferation**

Financing the Russian MOX fuel program, costs of the MOX fuel option, and reuse of the MOX facility are addressed in responses MD237–4, MD237–9, and MD237–13.

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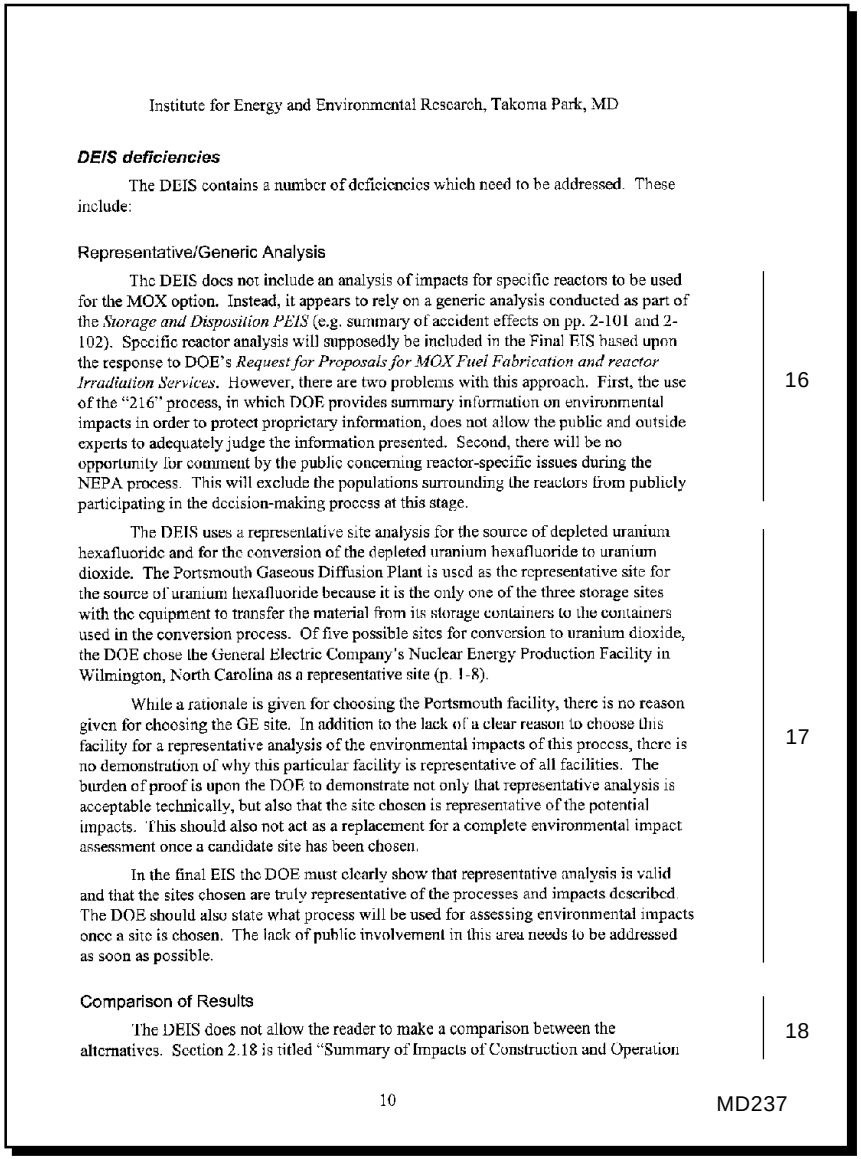

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DEIS deficiencies

The DEIS contains a number of deficiencies which need to be addressed. These include:

Representative/Generic Analysis

The DEIS does not include an analysis of impacts for specific reactors to be used for the MOX option. Instead, it appears to rely on a generic analysis conducted as part of the *Storage and Disposition PEIS* (e.g. summary of accident effects on pp. 2-101 and 2-102). Specific reactor analysis will supposedly be included in the Final EIS based upon the response to DOE's *Request for Proposals for MOX Fuel Fabrication and reactor Irradiation Services*. However, there are two problems with this approach. First, the use of the "216" process, in which DOE provides summary information on environmental impacts in order to protect proprietary information, does not allow the public and outside experts to adequately judge the information presented. Second, there will be no opportunity for comment by the public concerning reactor-specific issues during the NEPA process. This will exclude the populations surrounding the reactors from publicly participating in the decision-making process at this stage. 16

The DEIS uses a representative site analysis for the source of depleted uranium hexafluoride and for the conversion of the depleted uranium hexafluoride to uranium dioxide. The Portsmouth Gaseous Diffusion Plant is used as the representative site for the source of uranium hexafluoride because it is the only one of the three storage sites with the equipment to transfer the material from its storage containers to the containers used in the conversion process. Of five possible sites for conversion to uranium dioxide, the DOE chose the General Electric Company's Nuclear Energy Production Facility in Wilmington, North Carolina as a representative site (p. 1-8).

While a rationale is given for choosing the Portsmouth facility, there is no reason given for choosing the GE site. In addition to the lack of a clear reason to choose this facility for a representative analysis of the environmental impacts of this process, there is no demonstration of why this particular facility is representative of all facilities. The burden of proof is upon the DOE to demonstrate not only that representative analysis is acceptable technically, but also that the site chosen is representative of the potential impacts. This should also not act as a replacement for a complete environmental impact assessment once a candidate site has been chosen. 17

In the final EIS the DOE must clearly show that representative analysis is valid and that the sites chosen are truly representative of the processes and impacts described. The DOE should also state what process will be used for assessing environmental impacts once a site is chosen. The lack of public involvement in this area needs to be addressed as soon as possible.

Comparison of Results

The DEIS does not allow the reader to make a comparison between the alternatives. Section 2.18 is titled "Summary of Impacts of Construction and Operation 18

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MD237–16 General SPD EIS and NEPA Process

The SPD Final EIS was not issued until the proposed reactors had been identified and the public had an opportunity to comment on the reactor-specific information. 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 Washington, D.C., on June 15, 1999, and invited comments. Responses to those comments are provided in Volume III, Chapter 4.

MD237–17 General SPD EIS and NEPA Process

General Electric Company's Nuclear Energy Production Facility in Wilmington, North Carolina, was selected because its operations are typical of those of the candidate sites for the conversion of uranium hexafluoride to uranium dioxide. The analysis presented in Chapter 4 of Volume I indicates that no significant environmental impacts would result from the use of the Nuclear Energy Production Facility, and that there is no physical basis for an expectation of significant impacts at any other candidate facility or along transportation routes to and from facilities.

The methods used to obtain the results are described in Chapter 4 and the relevant appendixes. Regardless of the facility selected, DOE would comply with NEPA and all other applicable laws and regulations.

The comment process for the SPD EIS was open to all interested parties. No individual or organization was excluded from that process.

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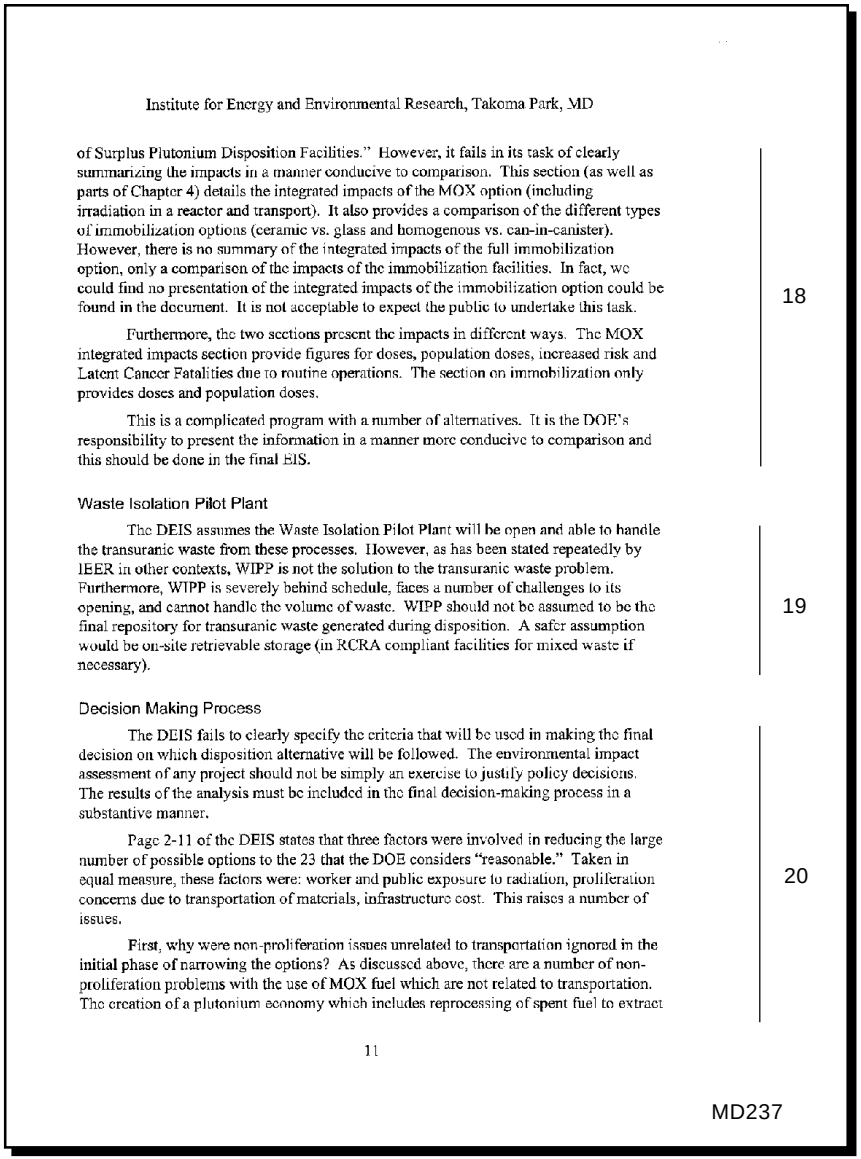

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of Surplus Plutonium Disposition Facilities." However, it fails in its task of clearly summarizing the impacts in a manner conducive to comparison. This section (as well as parts of Chapter 4) details the integrated impacts of the MOX option (including irradiation in a reactor and transport). It also provides a comparison of the different types of immobilization options (ceramic vs. glass and homogenous vs. can-in-canister). However, there is no summary of the integrated impacts of the full immobilization option, only a comparison of the impacts of the immobilization facilities. In fact, we could find no presentation of the integrated impacts of the immobilization option could be found in the document. It is not acceptable to expect the public to undertake this task. 18

Furthermore, the two sections present the impacts in different ways. The MOX integrated impacts section provide figures for doses, population doses, increased risk and Latent Cancer Fatalities due to routine operations. The section on immobilization only provides doses and population doses.

This is a complicated program with a number of alternatives. It is the DOE's responsibility to present the information in a manner more conducive to comparison and this should be done in the final EIS.

Waste Isolation Pilot Plant

The DEIS assumes the Waste Isolation Pilot Plant will be open and able to handle the transuranic waste from these processes. However, as has been stated repeatedly by IEER in other contexts, WIPP is not the solution to the transuranic waste problem. Furthermore, WIPP is severely behind schedule, faces a number of challenges to its opening, and cannot handle the volume of waste. WIPP should not be assumed to be the final repository for transuranic waste generated during disposition. A safer assumption would be on-site retrievable storage (in RCRA compliant facilities for mixed waste if necessary). 19

Decision Making Process

The DEIS fails to clearly specify the criteria that will be used in making the final decision on which disposition alternative will be followed. The environmental impact assessment of any project should not be simply an exercise to justify policy decisions. The results of the analysis must be included in the final decision-making process in a substantive manner.

Page 2-11 of the DEIS states that three factors were involved in reducing the large number of possible options to the 23 that the DOE considers "reasonable." Taken in equal measure, these factors were: worker and public exposure to radiation, proliferation concerns due to transportation of materials, infrastructure cost. This raises a number of issues. 20

First, why were non-proliferation issues unrelated to transportation ignored in the initial phase of narrowing the options? As discussed above, there are a number of non-proliferation problems with the use of MOX fuel which are not related to transportation. The creation of a plutonium economy which includes reprocessing of spent fuel to extract

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MD237–18 General SPD EIS and NEPA Process

Chapter 4 of Volume I describes the environmental impacts of those alternatives (Alternatives 11 and 12) under which up to 50 t (55 tons) of surplus plutonium would be immobilized. Included are impacts incurred during the construction of new facilities and during facility operation. All categories of impacts are addressed, including those attributable to normal operation, accidents, and transportation.

For each alternative except No Action, the analysis in Chapter 4 shows radiological impacts on the population residing within 80 km (50 mi) of the facilities, the MEI, and the average exposed individual. The analysis of each alternative, including those that involve immobilization only, includes estimates of the population dose, the annual dose to the maximally exposed and average exposed individual, and the LCF risk of a 10-year exposure.

Section 2.18 summarizes the environmental impact information provided in Chapter 4. For ease of comparison, identical summary information is provided for each alternative (see Table 2–4). This information includes impacts on air quality, waste management, employment, and land disturbance, as well as human health risks, the LCF risk from the most severe design basis accident, and transportation risks.

A focused comparison of the preferred alternative (Alternative 3) and the immobilization-only alternative (Alternative 12A) at SRS is provided in the table below.

MD237–19 Repositories

The management of TRU waste generated by the proposed surplus plutonium disposition facilities is evaluated in this SPD EIS. DOE alternatives for TRU waste management are evaluated in the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste* (DOE/EIS-0200-F, May 1997) and the *WIPP Disposal Phase Final Supplemental EIS* (DOE/EIS-0026-S-2, September 1997). WIPP began receiving shipments of TRU waste for permanent disposal on March 26, 1999. As described in Appendix F.8.1, and the Waste Management sections

Comparison of Alternative 3 with Alternative 12A at SRS

Summary of Impacts	Alternative	
	3	12A
Air quality		
(incremental pollutant concentrations in μg/m³)[a]		
Carbon monoxide	0.37	0.246
Nitrogen dioxide	0.0634	0.0529
PM_{10}	0.00423	0.00364
Sulfur dioxide	0.124	0.0852
Waste management (m³)[b]		
TRU	1800	1500
LLW	2400	1700
Mixed LLW	50	20
Hazardous	940	910
Employment (direct)[c]		
Construction	1968	1196
Operations	1120	751
Land disturbance (ha)[d]	32	20
Human health risk (dose in person-rem)[e]		
Construction (workforce)		
Dose	4.1	2.9
LCFs	1.6×10^{-3}	1.2×10^{-3}
Operations		
Dose		
Public	1.8	1.6
Workers	456	446
LCFs		
Public	9.0×10^{-3}	8.0×10^{-3}
Workers	1.8	1.8
Facility accidents[f]		
Tritium release at pit conversion facility	5.0×10^{-2}	5.0×10^{-2}
Transportation[g]		
LCFs	8.1×10^{-2}	0.152
Traffic fatalities	5.3×10^{-2}	8.1×10^{-2}
Kilometers traveled (millions)	4.3	4.4
Additional risk of LCFs at Pantex	8.3×10^{-2}	8.3×10^{-2}

[a] Values represent the incremental criteria pollutant concentrations associated with surplus plutonium disposition operations for the annual averaging period for nitrogen dioxide, particulate matter with an aerodynamic diameter smaller than or equal to 10 microns (PM_{10}), and sulfur dioxide, and for the 8-hr averaging period for carbon monoxide.

[b] Values are based on a construction period of approximately 3 and 10 years of operation.

[c] Values are for the peak year of construction for each site and for the annual operation of all facilities for each alternative.

[d] Values represent the total land disturbance at each site from construction and operations.

[e] Values for Alternative 1 represent impacts over 50 years of operation under No Action. Those for the remaining alternatives are for the period of construction and 10 years of operation. Public dose values represent the annual radiological dose (in person-rem) to the population within 80 km (50 mi) of the facility for the year 2030 under Alternative 1, or for 2010 under Alternatives 2 through 12. Worker dose values represent the total radiological dose to involved workers at the facility (in person-rem/year). Public LCFs represent the 50-year LCFs estimated to occur in the population within 80 km (50 mi) for the year 2030 under Alternative 1, or the 10-year LCFs estimated to occur for the year 2010 under Alternatives 2 through 12. Worker LCFs represent the associated 50- or 10-year LCFs estimated to occur in the involved workforce.

[f] The most severe design basis accidents (based on 95 percent meteorological conditions) is used to obtain the population LCF.

[g] For alternatives that involve more than one site, the transportation impacts for the entire alternative are shown in the first site listed in the alternative. LCFs are from the radiological exposure associated with incident-free operation, radiological accidents, and fatalities expected as a result of vehicle emissions. Traffic fatalities are from nonradiological vehicle accidents. LCFs at Pantex are associated with repackaging requirements if the pit conversion facility is located elsewhere.

Key: LCF, latent cancer fatality; LLW, low-level waste; TRU, transuranic.

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plutonium will be harder to counter internationally if the United States is using MOX fuel. The desire of the Russian government in particular to eventually extract the plutonium from the spent fuel raises serious non-proliferation concerns.

Second, the choice of a dual-track strategy as the preferred alternative indicates that these criteria were not considered the most important. As discussed above, immobilization provides advantages from an environmental and human health perspective as well as cost savings and the capability of a faster completion of the mission. This does not even take into account the much greater proliferation and policy consequences of a MOX program which should have been included as a criteria. 20

Third, if these criteria were suitable for an initial screening of options, are they used as the basis for a final decision? What further factors will be used in the final decision?

The final EIS should answer these questions and lay out the criteria for a decision in this program.

Single Facility Analysis

The DEIS fails to analyze an alternative which is "reasonable." It is technically feasible to convert and immobilize all 50 tons of plutonium in a single facility, including pit disassembly and conversion. The pit disassembly and conversion facility transforms the plutonium into an oxide form which is necessary for the ceramification process. However, it also includes processes only necessary for the MOX option, the main one being gallium removal. Under the current planning the facility would be constructed and operated with gallium removal even if the decision is made to immobilize all the plutonium.

However, the immobilization facility also includes the capability to convert plutonium to an oxide form (which is necessary for the 17 tons of non-pit material which is slated for immobilization). It would be possible to expand this capability in the immobilization facility and dispense with the separate Pit Disassembly and Conversion Facility entirely. We do not know what effect this would have on the environmental impacts. However, such a facility would not include the gallium removal process or the plutonium polishing process which is being kept as an option if certain impurities cannot be removed. It would therefore require less overall processing and handling than the current plans. 21

The DOE has stated that a single immobilization facility should be technically feasible but that the obstacle would be keeping the facility open to IAEA inspection.[16] Under current plans the immobilization facility will be open to inspection by the IAEA. At issue is the fact that the plutonium pits are classified until they are converted into an oxide. However, this argument is disingenuous. It would not be difficult to design the facility in such a way that IAEA inspectors would not have access to the processing

[16] Notes of Hisham Zerriffi taken at the Aug. 20 Idaho Falls hearing on the Surplus Plutonium Disposition Draft Environmental Statement.

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in Chapter 4 of Volume I, it is conservatively assumed that TRU waste would be stored at the candidate sites until 2016, at which time it would be shipped to WIPP in accordance with DOE's plans. Expected TRU waste generated by the proposed facilities is included in the *WIPP Disposal Phase Final Supplemental EIS* cumulative impacts estimates, as well as in the *National TRU Waste Management Plan* (DOE/NTP-96-1204, December 1997).

MD237–20 **Alternatives**

The decision to pursue a hybrid approach to surplus plutonium disposition is reflected in the *Storage and Disposition PEIS* ROD. The three screening criteria described in Section 2.3.1 were used to establish the siting alternatives for the hybrid and immobilization-only approaches, not the alternative technologies. After their application in selecting the reasonable range of alternatives, these criteria were no longer useful as discriminators for the selection of preferred alternatives.

DOE does not agree with the commentor's assertion that the MOX fuel approach does not provide the degree of proliferation resistance that immobilization does. As explained in the *Storage and Disposition PEIS*, DOE's Office of Arms Control and Nonproliferation, with MD support, prepared a report, *Nonproliferation and Arms Control Assessment of Weapons-Usable Fissile Material Storage and Excess Plutonium Disposition Alternatives* (DOE/NN–0007, January 1997), to assist in development of the ROD. This report, which concerns the nonproliferation and arms reduction implications of alternatives for the storage of plutonium and HEU and the disposition of excess plutonium, makes it clear that in regard to nonproliferation issues unrelated to transportation, none of the disposition technologies evaluated is clearly superior to another.

Russia's plans for MOX fuel are addressed in response MD237–1.

MD237–21 **Alternatives**

It would be technically possible to perform pit disassembly and conversion in the same facility as plutonium conversion and immobilization. However, given the different composition of pit and nonpit plutonium, and the different security issues, it is not clear that there would be any cost or other advantage

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sections which contain classified pits, but would have access to the rest of the facility. Indeed, DOE is already designing such a facility. The Pit Disassembly and Conversion Facility layout presented in the DEIS clearly shows a Classified section where pits are received and a non-classified section after they have been processed. There are even IAEA offices clearly labeled in the non-classified section. There is no reason this could not be done in a single pit disassembly, conversion, and immobilization facility. In fact, on p. 2-20 the DEIS discusses the possibility of collocating the pit disassembly and immobilization functions in an existing facility. If this can be done in an existing facility, it surely can be done in a new facility which is specifically designed to allow for both classified and unclassified sections. 21

The failure of this DEIS to analyze a reasonable alternative which would appear to meet their screening criteria is a fundamental flaw. The needs to be addressed before an informed decision can be made as to the relative costs and benefits of the various alternatives.

Worker Risks in Accidents

The DEIS explicitly excludes analyzing the radiological effects of accidents on involved workers (those workers actually involved in a process when an accident occurs). The analysis is limited to non-involved workers 1000 meters away, the maximally exposed individual and the general public within 80 kilometers. The rationale for excluding workers actually involved in an accident is provided in K.1.4.1 which states:

> Consequences to workers directly involved in the processes under consideration are addressed generically, without attempt at an scenario-specific quantification of consequences. This approach to in-facility consequences was selected for two reasons. First, the uncertainties involved in quantifying accident consequences become overwhelming for most radiological accidents due to the high sensitivity of dose values to assumptions about the details of the release and the location and behavior of the impacted worker. Also, the dominant accident risks to the worker of facility operations are from standard industrial accidents as opposed to bounding radiological accidents. (p. K-7) 22

This rationale is not sufficient to exclude those workers likely to bear the brunt of an accident during processing of plutonium. While it may be true that the models employed have problems below 1000 meters, this does not excuse this omission. Models have been developed for use in such circumstances. Alternatively, an attempt to modify the model could have been made or the uncertainty in the model results expanded to reflect the greater uncertainty in modeling workers close to the accident. Assumptions could be made about worker patterns (similar to the way assumptions are made concerning the general population).

The problem is exacerbated greatly by the presentation of the data on the noninvolved worker. The table which summarizes accident impacts for each alternative does not provide an estimate for the number of Latent Cancer Fatalities for non-involved workers despite providing this information for the general public. It should not be difficult for this estimate to be made as DOE presents numbers on how many badged workers are on-site. This omission is repeated in the summary of impacts presented on

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in doing so, even if all 50 t (55 tons) of the surplus plutonium were to be dispositioned through immobilization. Pit and nonpit plutonium would have to be converted to an oxide in separate, totally segregated processes. The pits would be classified, and access to the plutonium and process byproducts would have to be strictly limited. Moreover, the plutonium from the pits would be much purer; most of the nonpit plutonium would be contaminated with a variety of other materials, and the conversion processes would have to be tailored to address that. Services such as access control, shipping, and receiving (including truck bays) could conceivably be shared to some extent. However, because of the classification of almost all pit conversion activities, pit conversion and immobilization processes and spaces would have to be maintained and serviced largely independently of one another. The overall impacts, therefore, would not likely be substantially different from those of two separate but collocated facilities, a condition bounded by the analyses reflected in this SPD EIS.

MD237–22 **Facility Accidents**

There are a number of factors behind the decision to report worker consequences in the manner presented in this SPD EIS. First, as the commentor has stated, is the inability to calculate radiological doses to the involved worker in a meaningful way given the enormous dependency of calculated dose results on the values of highly uncertain parameters, such as those associated with the particular release mechanisms (e.g., the precise puff distribution of powder for a spill, explosion, or other accident, which depends on drop height, explosion phenomenology, the spatial and temporal failure profile of the can, glove, glovebox), and the assumptions defining the involved worker (e.g., inhaling versus exhaling, location, response to accident). The second factor is that for most accidents with a significant radiological consequence to the involved worker, this consequence is overwhelmed by nonradiological phenomena. This is because it takes a physical insult of some kind to breach radiological confinement. Such phenomena as fires, explosions, and building collapse that result in radiological release (among other things) present more significant nonradiological consequences to the involved worker. As a result, each alternative in Chapter 4 of Volume I includes an estimate of the expected

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pages 2-69 to 2-104. Accident impacts are quantified and discussed for the general population and a one paragraph description of consequences for involved workers is included. However, There is no discussion of impacts to noninvolved workers due to accidents. Table 2.4 which is supposed to be a summary of impacts by Alternative and Site only lists the accident Latent Cancer Fatalities for the general public.

The exclusion of involved workers in the accident analysis and the lack of complete results on the effects of accidents on non-involved workers raises serious questions as to DOE's commitments to worker safety and health. It is a reasonable assumption that the effect of an accident on workers would be greater than on the general public. The probability of Cancer Facility is often ten times higher for the non-involved worker compared to the general public. The probability for the involved worker can be expected to be even higher. By only presenting full results for the public the consequences of accidents appear to be lower than what can reasonably be expected. 22

The final environmental impact statement should include a full and complete analysis of worker risks.

Plutonium Polishing

Appendix N of the DEIS describes "a polishing process by which impurities, particularly gallium, could be removed from the plutonium feed for mixed oxide (MOX) fuel fabrication." (p. N-1) It is included as an appendix because DOE considers it a contingency in case the dry processes DOE is developing for gallium removal fail to achieve the necessary purification level for MOX fuel fabrication. The plutonium polishing process would be an aqueous (wet) process. In previous analyses, DOE had rejected an aqueous process because of its higher environmental costs. Aqueous processes generate greater waste volumes and the waste is in a liquid form which is more difficult to handle.

It is difficult to determine, from the information given in the DEIS, exactly what the incremental effects of using plutonium polishing would be in all cases. This is because waste generation figures within each alternative are given for all three facilities. The added waste information presented in Appendix N is very confusing, and makes it very difficult to assess the environmental impact of the addition of plutonium polishing on the PDCF. This comparison would be the most suitable in judging the impacts of plutonium polishing. 7

Appendix N provides the potential impacts of plutonium polishing at the four sites (Tables N-10 to N-13). For the Hanford and SRS sites the DEIS uses alternatives 2 and 3 which would locate all three facilities at the site in question. Plutonium polishing at these sites would approximately 12% more transuranic waste. However, for INEEL and Pantex which would only have two facilities the incremental production of transuranic waste would be approximately 30%. The same holds true generally for low-level waste, mixed low-level waste, hazardous waste, and non-hazardous waste. In fact, for LLW the increases at Hanford and SRS are 27% and 16% respectively, while the increases at INEEL and Pantex are 33% and 64% respectively. This disparity in the cases being

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cases of nonradiological injuries or illnesses and fatalities. These are the dominant risks to involved workers. The reason that risks to the public can be stated in terms of radiological releases is that other facility-related dangers are of only localized concern and do not travel the distance required to represent a public hazard (one notable exception being seismic events, which could cause significant damage to local buildings). With respect to the noninvolved worker, the calculation of population doses, from which cancer statistics can be calculated, is somewhat intractable. The largest individual doses would likely occur immediately outside the facility, particularly for ground-level releases. Doses from stack releases are more stable, but are also highly uncertain at small distances. Therefore, the potentially largest contribution to doses to noninvolved workers are in a regime that is uncertain, for calculations are of questionable value. This problem does not exist for the public, where each member is at a distance where estimates are meaningful. It would be possible, for example, to define the noninvolved worker as a worker beyond some distance like 200 m (656 ft), but the population dose calculated for that population would exclude a potentially large fraction of the total worker dose. Consequently, it was decided to provide the metric of individual dose (and probability of LCF) to the maximally exposed member of the public 1,000 m (3,281 ft) away or at the site boundary if less than 1,000 m (3,281 ft) distant. This was the protocol used in the *Storage and Disposition PEIS*, and it was considered proper for use in this SPD EIS as well; it also provides a valid basis for understanding environmental impacts of and comparing alternatives considered in this EIS.

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compared is very confusing and underplays the impact of plutonium polishing on waste generation. The incremental impacts on the single facility which would actually house the plutonium polishing module would be even greater.

Furthermore, the DOE has not stated how it would make a decision to use plutonium polishing and what role the potential future use of plutonium polishing will have on its more immediate decisions. If DOE decides to proceed with the hybrid approach and it is discovered in the future that plutonium polishing is necessary, resource commitments already made at that point will likely render it difficult to switch to an immobilization only alternative. 7

Unanswered Questions

While the DEIS does provide a substantial amount of information on both the MOX and immobilization options there are serious gaps.

- What are the DOE's plans to account for the failure of the In-Tank Precipitation (ITP) process at the Savannah River Site? DOE has ruled out the only alternative that it was previously considering, the use of cesium-137 from Hanford. (p. S-15) How will ITP failure affect the immobilization program's technical options and timescale? 23
- What assumptions were made about the number and siting of reactors in assessing the cumulative impacts of the MOX option (Section 2.18.3)? Reference is made in this section to 4.3.5.2 of the *Storage and Disposition PEIS* for a generic analysis of light water reactors using 100% MOX cores. That analysis is for a single reactor at a site and clearly states that for multiple reactors at a site the impacts "would be approximately doubled for two rectors or tripled for three reactors." On p. S-11 of the *Surplus Plutonium Disposition DEIS* it states that irradiation would occur at 3-8 reactors but does not state any assumptions about the number of sites or how many were assumed for the analysis. 24
- Why is the DOE reserving the option to use CANDU reactors and moving forward with testing if throughout the DEIS the assumption is that MOX will be used in US LWRs? If the DOE is still considering CANDU reactors, what effect will Ontario Hydro's recent shutdown of a number of CANDU reactors have on the program? What provisions will be made to ensure that both Canadian and U.S. citizens will have the opportunity for input? 25
- Who is responsible for unirradiated fuel? What will occur if MOX fuel fabrication commences but either the license to use MOX is rejected by the NRC or the reactor operators decide to cancel the project? 26
- How long will unirradiated fuel be stored and at what sites? If storage is at the reactor site, what additional security measures will be undertaken? 27
- What are the implications of siting facilities in the F-Canyon? How will this affect reprocessing policy? How will it affect clean-up of the site? Is there any relation between a decision to use the F-Canyon for the disposition program and the use of the 28

MD237–23 **Immobilization**

DOE's offices are coordinating efforts so that potential impacts of the SRS HLW program's decisions on immobilization are understood. This would allow any necessary changes to the can-in-canister or other immobilization approach to be made in a timely manner. 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.

In addition, results of an in-progress NAS study will help determine to what extent the can-in-canister configuration meeting the Spent Fuel Standard depends on the presence of an intense radiation barrier. 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. Necessary analyses would be conducted at that time should this decision identify the need to reconsider using cesium 137 from the capsules currently stored at Hanford. It should be noted that DOE has not made final decisions on disposition of the Hanford cesium and strontium capsules.

MD237–24 **Cumulative Impacts**

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. The analyses reflect the information provided by the bidders in the MOX procurement process, supplemented by additional information. Section 2.18.3 was revised and Section 4.32.8 was added to include the cumulative impacts of the proposed reactor sites.

MD237–25 **Parallex EA**

In the SPD Draft EIS, DOE retained the option to use some of the surplus plutonium as MOX fuel in CANDU reactors, which would have only been undertaken in the event that a multilateral agreement were negotiated among Russia, Canada, and the United States. Since the SPD Draft EIS was issued, DOE determined that adequate reactor capacity is available in the United States to disposition the portion of the U.S. surplus plutonium that is suitable for MOX fuel and, therefore, while still reserving the CANDU option, DOE is no longer actively pursuing it. However, DOE, in cooperation with Canada and Russia, proposes to participate in a test and demonstration program using U.S. and Russian MOX fuel in a Canadian test reactor. A separate environmental review, the *Environmental Assessment for the Parallex Project Fuel Manufacture and Shipment* (DOE/EA-1216, January 1999), analyzes the fabrication and proposed shipment of MOX fuel rods for research and development activities involving the use of limited amounts of U.S. MOX fuel in a Canadian test reactor. A FONSI was signed on August 13, 1999. Both of these documents can be viewed on the MD Web site at http://www.doe-md.com. If a decision is made to dispose of Russian surplus plutonium in Canadian CANDU reactors in order to augment Russia's disposition capability, shipments of the Russian MOX fuel would take place directly between Russia and Canada.

MD237–26 **DOE Policy**

DOE conducted a procurement process to acquire MOX fuel fabrication and irradiation services. The selected team, DCS, 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. Because the fuel fabricator and reactor licensees work closely as a team, it is unlikely that the fabrication of MOX fuel would outpace its need. Reactor shutdowns or other operational

issues that could affect the need for fuel would be incorporated into the fuel fabrication schedules, and adjustments made as required. In the event that MOX fuel were made and then not be needed due to NRC not issuing a license amendment or other factors, DOE would be responsible for the unirradiated fuel and would reexamine its disposition options.

MD237–27 **MOX RFP**

The MOX facility would have the capability to store the MOX fuel for a minimum of 18 months prior to shipment to the reactor sites for irradiation. The MOX facility would be located at an existing secure DOE site. DOE does not anticipate the need for any additional security measures at reactor sites, other than for the additional security applied for the receipt of fresh fuel. MOX fuel would be delivered to the commercial reactors in SST/SGTs. Commercial reactors currently have armed security forces, primarily to protect against perimeter intrusion. There would be increased security for the receipt and storage of fresh MOX fuel, as compared with that for fresh LEU fuel, for additional vigilance inside the perimeter. However, the increased security surveillance would be a small increment to the plant's existing security plan. 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 geologic repository built in accordance with the NWPA. The duration for storage does not depend on whether the spent fuel originated as MOX or LEU, but rather on when a storage facility is available to receive spent fuel. The storage of MOX spent fuel would not require any additional security due to the radiation barrier and difficulty associated with moving spent fuel.

MD237–28 **DOE Policy**

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). DOE eliminated as unreasonable the eight alternatives in the SPD Draft EIS that used portions of Building 221–F with a new annex at SRS for plutonium conversion and immobilization. It was determined

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F-Canyon to deal with scrubs and alloys from Rocky Flats by reprocessing them at SRS? 28

- What are the implications of re-use of the facilities? The DEIS states:

when the missions of the plutonium disposition facilities are completed, deactivation and stabilization would be performed to reduce the risk of radiological exposure; reduce the need for, and costs associated with, long-term maintenance; and prepare the buildings for potential future use. (Chapter 4 of the SPD EIS provides a discussion on deactivation and stabilization.) At the end of the useful life of the facilities, DOE would evaluate options for D&D or reuse of the facilities. D&D of these facilities would not occur for many years. When DOE is ready to propose D&D of these facilities, an appropriate NEPA review will be conducted. (p. S-5)

Section 4.31 states that "it is *assumed* that the equipment within the building would be deactivated and the facilities stabilized to a condition suitable for reuse." (p. 4-391, emphasis added) Such a process would include removing both nuclear materials and the equipment. However, DOE does not indicate how it would ensure, either through legal or regulatory means, that the facilities would not be reused for MOX fuel production purposes. The ROD for the *Storage and Disposition of Weapons-Usable Fissile Materials Final PEIS* indicates that DOE would try to limit facility licenses in order to prevent use of the MOX FFF for commercial MOX production (as well as limiting reactor licenses). This is not discussed in the *Surplus Plutonium Disposition DEIS*. 29

- What are the effects of an accident involving a cask near water? In chapter L, the DEIS describes various tests done on casks (e.g. drop tests). However, the immersion test is done a separate cask, one which has not gone through the series of physical stress tests. How would the accident analysis change if such a test were performed? Are there plausible scenarios for a cask falling from a height *and* being immersed in water (e.g. accidents on bridges over rivers)? 30

DOE's final environmental impact statement should answer these questions.

Conclusions

The "dual-track" strategy and its emphasis on MOX rests on a number of faulty political and technical assumptions. Two of the most important are, first, the idea that the US must implement a MOX program to ensure Russian participation in a disposition program.. As we have shown above, this is false for a number of reasons. Second, is the idea that the dual-track provides technical backup in the case of problems with one of the options. This idea is faulty because immobilization is necessary to process 17 of the 50 metric tons of surplus plutonium, and so must be made to operate successfully in any case. 31

A MOX disposition program poses a number of long-term proliferation risks not adequately considered by DOE. Most significantly, such a program will finance a MOX fuel fabrication facility in Russia, providing the only missing link in Minatom's plans for 32

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that the amount of space required for the immobilization facility would be significantly larger than originally planned. These new space requirements mean that the annex required to be built alongside Building 221–F would be very close in size and environmental impacts to the new immobilization facility alternatives at SRS. Therefore, this SPD EIS only presents the alternatives involving a completely new immobilization facility at SRS. Building 221–F remains the preferred alternative for processing the RFETS plutonium residues and scrub alloy, as described in the *Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site* (DOE/EIS-0277F, August 1998). The cleanup of site facilities after completion of the surplus plutonium disposition program would be conducted in compliance with applicable environmental and safety regulations.

MD237–29 **DOE Policy**

DOE does not plan to use the proposed surplus plutonium disposition facilities for MOX fuel fabrication after completion of the surplus plutonium disposition program. D&D actions would be commensurate with facility reuse decisions.

MD237–30 **Transportation**

The Type B shipping containers that would be used for the transportation of surplus plutonium in various forms are described in Appendix L.3.1.6. The requirements for certification of a Type B container include maintaining its integrity at a depth of 15 m (50 ft). This would be a greater depth than would be involved in an accident on most bridges. A more rigorous requirement to withstand a depth of 200 m (656 ft) is required for casks that are certified to carry 1 million or more curies. These requirements are applied to an undamaged container because of the very low probability of a container breach by any realistic cause and on the basis of actual transportation experience. As indicated in Section 2.18, no traffic fatalities from nonradiological accidents or LCFs from radiological exposures or vehicle emissions are expected.

MD237–31 **DOE Policy**

The Russian government has plans to use surplus plutonium in commercial reactors. Because the Russians have expressed concern that immobilization would not destroy any plutonium, it is conceivable that the Russians would not eliminate their plutonium stockpile if the United States were to implement an immobilization-only approach. Therefore, the hybrid approach 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 weapons again.

Immobilization is the preferred approach to disposition the 17 t (19 tons) of impure plutonium. All of the surplus plutonium could be made into MOX fuel, however, DOE reviewed the chemical and isotopic composition of the surplus plutonium and determined in the *Storage and Disposition PEIS* ROD that about 8 t (9 tons) of surplus plutonium were not suitable for use in making MOX fuel. Furthermore, DOE has identified an additional 9 t (10 tons) for a total of 17 t (19 tons) that have such a variety of chemical and isotopic compositions that it is more reasonable to immobilize these materials and avert the processing complexity that would be added if these materials were assigned to be made into MOX fuel. The criteria used in this identification included the level of impurities, processing requirements, and the ability to meet the MOX fuel specifications. If at any time it were determined that any of the 33 t (36 tons) currently proposed for MOX fuel fabrication was unsuitable, that portion would be sent to the immobilization facility.

MD237–32 **Nonproliferation**

DOE acknowledges the commentor's concerns regarding the disposition of surplus Russian plutonium as MOX fuel, although programmatic and policy issues such as U.S. policies toward plutonium disposition in Russia are beyond the scope of this SPD EIS. The United States will not support any plans to build a plutonium economy.

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a plutonium economy. It also poses severe safety and environmental dangers, particularly in its reliance on again Russian reactors. | 32

Furthermore, immobilization provides a number of other advantages over MOX. Reactor control issues would not be present under an immobilization program. The number of facilities and operations would be reduced and the overall cost of the program would be lower. | 33

The DEIS is insufficient as an environmental analysis document. The DOE has failed to include the communities living near the reactors their opportunity to participate in the process. It is insufficient to assume the NRC re-licensing process will accommodate their concerns. Furthermore, many reactor-related issues have been left out of this document. | 16

Similarly, the DOE has failed to demonstrate that the sites chosen for conversion of uranium hexafluoride to uranium dioxide are representative of the actual sites which may be used. DOE has also failed to involve the affected citizens near these sites in the NEPA process. | 17

The DEIS also has a number of deficiencies which need to be addressed. The DOE has failed to analyze a reasonable alternative which would involve a single facility undertaking the pit disassembly and conversion, as well as the immobilization process. | 21
The facility accident analysis does not adequately address the issue of worker risk and the effects of accidents on involved workers. The results for non-involved workers are not fully presented. There are numerous other deficiencies and unanswered questions which need to be resolved. | 22

Unless DOE studies the proper options and provides complete analysis the final environmental impact statement will be fundamentally flawed and incomplete.

Recommendations

The Institute for Energy and Environmental Research strongly urges the Department of Energy to:

1. Select immobilization of all 50 metric tons of plutonium. Immobilization is the best alternative for meeting the non-proliferation and disarmament goals of the program while minimizing the impacts. The MOX option should be rejected for both technical and policy reasons, because it could create many safety and proliferation problems, even while addressing the security of surplus weapons plutonium. Certainly, it is in the interest of the US to encourage plutonium disposition in Russia, and to support such a program financially. However, DOE has not adequately explored other options for reconciling Russian policy on plutonium as an economic asset with the need to put surplus plutonium in non-weapons-usable form. | 34
2. The DOE should analyze the option of conversion and immobilization of all 50 tons of surplus plutonium utilizing a single facility | 21
3. The DOE should revise its accident analysis to include involved workers. | 22

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Close cooperation between the two countries is required to ensure that nuclear arms reductions cannot be easily reversed. Understanding the economic dilemma in Russia, the U.S. Congress has appropriated funding for a series of small-scale tests and demonstrations of plutonium disposition technologies jointly conducted by the United States and Russia. In fiscal year 1999 (starting October 1998), Congress further appropriated funding to assist Russia in design and construction of a plutonium conversion facility and a MOX fuel fabrication facility. This funding would not be expended until the presidents of both countries signed a new agreement. Although the amount appropriated by Congress is not sufficient to fund the entire Russian surplus plutonium disposition program, the United States is working with Russia and other nations to resolve this issue.

U.S. nonproliferation policy is addressed in response MD237–4.

MD237–33 **Alternatives**

It is correct that there would be no reactor issues involved if surplus plutonium disposition occurred through the immobilization-only approach, and the overall costs would probably be less because only two proposed surplus plutonium disposition facilities would be needed. However, 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.

MD237–34 **Alternatives**

Russia's plans for MOX fuel are addressed in response MD237–1.

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4. The DOE should provide integrated impacts for each alternative analyzed. A clear and concise summary of those impacts should be provided and comparisons made between the two major classes of alternatives: Hybrid and Immobilization. | 35

5. The DOE should develop technical back-up options by developing alternate immobilization technologies, perhaps through pilot scale work to handle Rocky Flats materials. | 36

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MD237–35 **General SPD EIS and NEPA Process**

A comparison of the impacts of the hybrid and the all immobilization alternatives is addressed in response MD237–18.

MD237–36 **DOE Policy**

Several immobilization technologies for surplus plutonium disposition were analyzed in the *Storage and Disposition PEIS*. They include vitrification (glass), ceramic immobilization, and electrometallurgical treatment. Vitrification and electrometallurgical treatment are existing technologies. This SPD EIS analyzes the can-in-canister approach for both glass and ceramic immobilization. This technology is currently under testing for ceramic immobilization. Regarding the RFETS plutonium materials, existing technologies are being used to stabilize these materials so that they can be immobilized with the technology chosen in the SPD EIS ROD.

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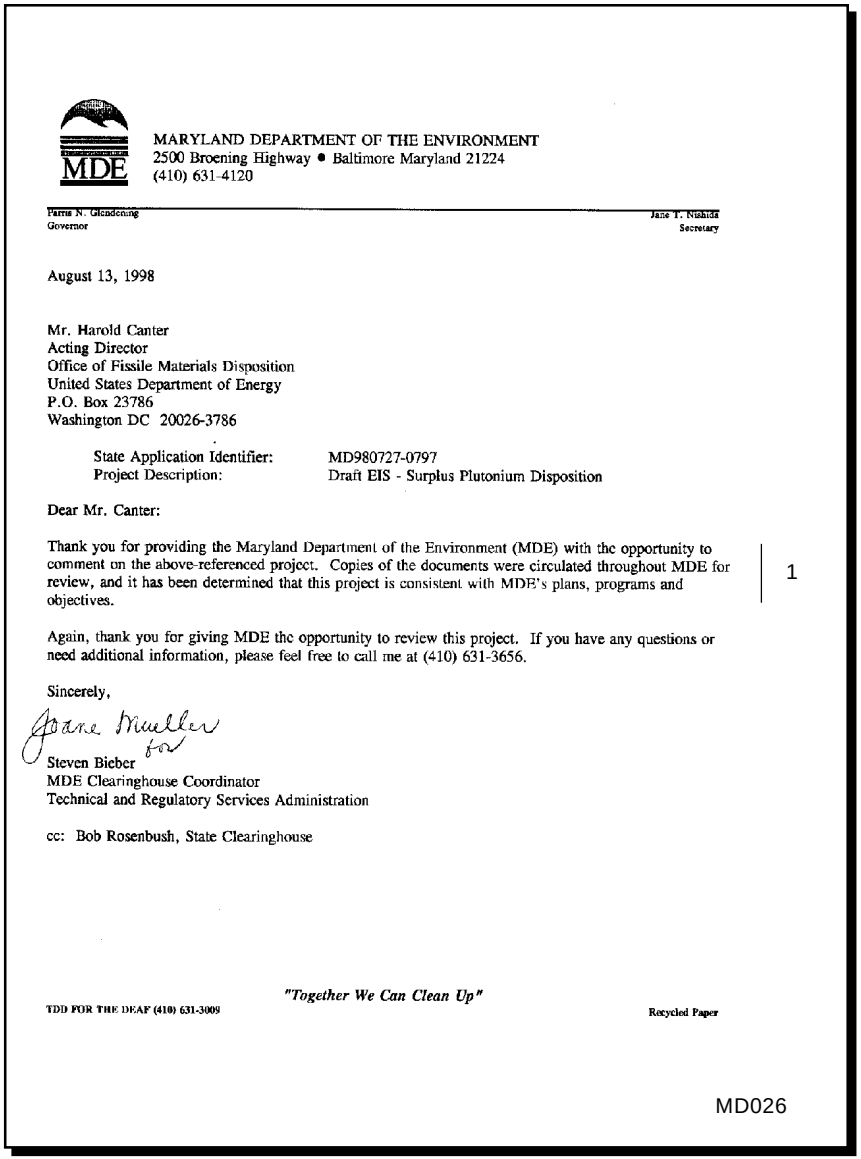

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August 13, 1998

Mr. Harold Canter
Acting Director
Office of Fissile Materials Disposition
United States Department of Energy
P.O. Box 23786
Washington DC 20026-3786

State Application Identifier: MD980727-0797
Project Description: Draft EIS - Surplus Plutonium Disposition

Dear Mr. Canter:

Thank you for providing the Maryland Department of the Environment (MDE) with the opportunity to comment on the above-referenced project. Copies of the documents were circulated throughout MDE for review, and it has been determined that this project is consistent with MDE's plans, programs and objectives. 1

Again, thank you for giving MDE the opportunity to review this project. If you have any questions or need additional information, please feel free to call me at (410) 631-3656.

Sincerely,

Joane Mueller for

Steven Bieber
MDE Clearinghouse Coordinator
Technical and Regulatory Services Administration

cc: Bob Rosenbush, State Clearinghouse

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MD026

MD026–1 **Other**

DOE acknowledges the commentor's input.