4 ORAL COMMENTS AND DOE RESPONSES

4.1 PORTSMOUTH PUBLIC HEARING ORAL COMMENTS AND RESPONSES

Comment 1

David Cosar was quoted as saying uranium hexafluoride is highly corrosive. The affects of those high acids at sites such as Piketon, he says, are regarded as potential general emergency sites by the DOE, meaning if there are gas formations, it could require evacuations of nearby neighbors.

Response 1

If an accidental release were to occur, the uranium hexafluoride would react with water vapor in the air to form hydrogen fluoride (HF) and a uranium compound called uranyl fluoride. The uranium compound is not corrosive, but the HF is highly corrosive. The Portsmouth Site has an Emergency Plan in effect and conducts periodic emergency drills and exercises to prepare for any emergency situation. There are two levels of emergencies at the Site: (1) Alert — An Alert is declared if emergency hazards could affect plant personnel, but not the general public outside the plant boundaries. Local government officials are advised so that their resources and emergency responders are ready to assist on-site if needed. (2) Site Area Emergency — A Site Area Emergency is declared if the hazards could affect the general public within a two-mile radius of the plant boundaries. This is the most serious emergency situation and means that a significant release of hazardous materials may occur. All individuals within this notification area are immediately alerted and instructed on precautions and protection. Local government officials are notified immediately so that their resources may quickly focus on protecting the general public. Experts from the Site, Federal Agencies, and State and Local Officials coordinate emergency actions. Warning sirens are in place to sound for public alert should a Site Area Emergency be declared. There have been no such emergencies requiring warning sirens since the warning system was placed in operation in 1988. Periodically, the sirens are sounded for routine testing or during drills.

Comment 2

I would like to remind you of the 1978 spill here at Piketon plant, when over 28,000 pounds left the site by air, ground, and water and many workers were affected.

Response 2

On March 7, 1978, there was an incident that resulted in a liquid uranium hexafluoride release at the Portsmouth Gaseous Diffusion Plant. At approximately 4:36 p.m., in the X-745B cylinder storage lot, a 14-ton cylinder, 5/16" wall thickness, containing liquid natural uranium hexafluoride, was dropped 8-10 inches and ruptured. The result was the release of 21,125 pounds of feed material in less than five minutes. Emergency notifications and responses were rapid and there were no injuries to personnel and all exposure to radioactive materials were within allowable *limits of the plant. The time of the release, having occurred after shift change, reduced the number of persons on site. Additionally, the wind direction from the northeast to southwest caused the path of the UO_2F_2-HF cloud to be in a direction which affected the least number of facilities with the distance of travel to the site boundary. Precipitation in the form of snow, coupled with cold temperatures, minimized the off-site impact. There was a reported fish kill as a result of runoff from the incident area caused by treating the runoff with lime and causing a pH change in the water. This lime treatment aided in the prevention of off-site uranium contamination. An investigation of the incident determined that failure of the cylinder handling equipment used to transport the cylinder occurred. As a result, modifications were made to improve this equipment as well as eliminating the transport of uranium hexafluoride in the liquid state.*

Comment 3

In September of 1996, another airborne plume went off-site. In between the lithium building, the storage building, and the National Guard building, this plume headed toward Wakefield. I have been told that workers were paid overtime and told to stay inside the buildings. I also called a reporter when this was happening. He called the plant and they lied about the release, and two days later, came out with their own release.

Response 3

On September 19, 1996, during routine movement of empty UF_6 cylinders, the operator of a cylinder handler inadvertently backed into one of the empty UF_6 cylinders that contained approximately 15 pounds of depleted uranium hexafluoride. This action resulted in the rear tire of the cylinder handler striking and severing a pipe nipple in the valve port of the cylinder, which resulted in a release of uranium hexafluoride. Two employees were in the immediate area at the time of the incident and both were evacuated. One employee contacted the Plant Shift Superintendent via hand-held radio and requested emergency assistance. An emergency 911 call was also made. A small, low-lying plume, which is the result of the chemical reaction of UF_6 and air, was evident at the base of the cylinder. This plume dissipated rather rapidly and there was no off-site impact. The area was isolated and the leak was stopped utilizing a standard plug. Health Physics surveys were conducted and the radiological contamination was verified to be contained within a four-foot square area beneath the valve end of the cylinder. An "all clear" for the area outside this boundary was given approximately 1-1/2 hours later. A DOE news release was issued within two hours of the incident to five area newspapers and four local radio stations. Environmental Compliance personnel determined that there was no CERCLA Reportable Quantity exceeded and no Emergency Planning and Community Right to Know Act (EPCRA) reportable quantity exceeded.

Comment 4

I would like someone to tell me why we have alarms and run through drills? When there is actually a potential dangerous release, there is no sounds of alarms to warn the citizens of the surrounding communities. Residents didn't know about the situation, so they weren't even told to stay inside.

Response 4

The Portsmouth Site has an Emergency Plan in effect and conducts periodic emergency drills and exercises to prepare for any emergency situation. There are two levels of emergencies at the Site: (1) Alert — An Alert is declared if emergency hazards could affect plant personnel, but not the general public outside the plant boundaries. Local government officials are advised so that their resources and emergency responders are ready to assist on-site if needed. (2) Site Area Emergency — A Site Area Emergency is declared if the hazards could affect the general public within a two-mile radius of the plant boundaries. This is the most serious emergency situation and means that a significant release of hazardous materials may occur. All individuals within this notification area would be notified immediately by audible voice alert from the plant. Additionally, messages can be directed immediately to local radio and television stations which provide protective actions that are recommended. These recommendations could be to evacuate or to shelter in place. Local government officials are also notified immediately so that their resources, which may include deputies and officers as well as volunteer fire personnel, may quickly focus on protecting the general public. Experts from the Site, Federal Agencies, and State and Local Officials coordinate emergency actions. Warning sirens are in place to sound for public alert should a Site Area Emergency be declared. There have been no such emergencies requiring warning sirens since the warning system was placed in operation in 1988. Periodically, the sirens are sounded for routine testing or during drills.

Comment 5

For the record, I would like to ask Mr. Osborne and Mrs. Osborne if they have ever been told that there was a release here at plant or to evacuate their home? MRS. OSBORNE: No. Were you sent documents, the big blue books for this meeting? MRS. OSBORNE: No. They live at the perimeter of the gates. So I am kind of wondering how many people that actually live right around the facility were actually sent these documents.

Response 5

Mr. and Mrs. Mount Osborne are residents within two miles of the Portsmouth Site. The Osbornes responded accurately that there has not been an occasion for plant officials to request an evacuation of their home due to a release from the plant. The "big blue books" the responder is referring to are the volumes of the "Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride," dated December 1997. The Osbornes did not receive these volumes, however, they did receive the "Notice of Availability" mailed from DOE's Office of Nuclear Energy to all two-mile residents and the individuals on the general community relations mailing list. This notice advised them that the PEIS documents were available in the DOE's Environmental Information Center, which is the public information center located in Waverly, Ohio. These documents are available for public review in the Information Center and are provided free of charge to requestors. A news release and advertisements in the local newspapers were issued regarding the February 26, 1998, meeting date in Piketon, Ohio.

<u>Comment 6</u>

Charles Bradley, you didn't seem to believe me when I told you there was an airborne plume from the site when the valve was broken off. When they were moving the cylinders, something hit a valve and the airborne plume left the site.

<u>Response 6</u>

On September 19, 1997, during a routine movement of empty UF_6 cylinders, the operator of a cylinder handler inadvertently backed into one of the empty UF_6 cylinders that contained approximately 15 pounds of depleted uranium hexafluoride. This action resulted in the rear tire of the cylinder handler striking and severing a pipe nipple in the valve port of the cylinder which resulted in a release of uranium hexafluoride. Two employees were in the immediate area at the time of the incident and both were evacuated. One employee contacted the Plant Shift Superintendent via hand-held radio and requested emergency assistance. An emergency 911 call was also made. At that time, the area was isolated and the leak was stopped utilizing a standard plug. Health Physics surveys were conducted and the radiological contamination was verified to be contained within a four-foot square area beneath the valve end of the cylinder. An "all clear" for the area outside this boundary was given approximately 1-1/2 hours later. A DOE news release was issued within two hours of the incident to five area newspapers and four local radio stations. Environmental Compliance personnel determined that there was no CERCLA Reportable Quantity exceeded and no Emergency Planning and Community Right to Know Act (EPCRA) reportable quantity exceeded.

<u>Comment 7</u>

In the cylinders, you show how it comes out and goes back in. That is not the case in every incident with these cylinders. So I say that you either add other potential releases, how it will happen, or do away with the video to the public.

<u>Response 7</u>

The video referred to was shown at the public hearings. In part it illustrated how, when the workers opened the valve on a depleted UF_6 cylinder, air was drawn into the cylinder rapidly due to the less-than-atmospheric pressure inside the cylinder, making an audible sound. After a short while, a cloud of mist containing HF gas started to come out of the cylinder slowly. However, in the PEIS a wide spectrum of cylinder accidents was analyzed, including small breaches similar to the opening of the valve as illustrated in the video, and large catastrophic breaches. Details of the cylinder accident scenarios are provided in Section D.3 of Appendix D, and the impacts are discussed and summarized in Section 2.4.2 and Table 2.2.

<u>Comment 8</u>

I would like to show another picture of children around cylinders. This should not be allowed with all the information about the hazards of this product and the problem with the site hazards here at Piketon.

<u>*Response 8*</u>

The commentor is referring to a photograph of a tour conducted by Martin Marietta Energy Systems Public Affairs on March 11, 1993 for a group of high school students enrolled in the vocational school's electricity class. The purpose of the tour was to provide information regarding the uranium enrichment process and the ultimate customer of this process, the nuclear industry. The students were pictured at the plant's Product Sampling and Shipping Facility where cylinders of enriched uranium product are readied to ship to customers. Plant tours are conducted to better inform the public and are strictly governed by plant safety procedures regarding access to different areas of the plant. The depleted uranium hexafluoride storage yards are not typically on a tour route unless specifically requested by the tour group.

<u>Comment 9</u>

PRESS (Portsmouth-Piketon Residents for Environmental Safety and Security) considers the view that there is little effect to the public and its workforce to be a serious environmental justice concern. It was not addressed adequately in the Draft PEIS. PRESS, along with the Military Toxic Project, is asking for the comment period to extend to six months to give folks the opportunity to meet with you in a round table meeting, much like the Federal Facility Restoration Dialogue meeting. We need to have the opportunity to discuss the strategies that have been proposed. I am putting on the record the letter from the Military Toxics Project.

<u>*Response 9*</u>

The approach used in the PEIS to assess environmental justice concerns is consistent with guidelines in "Environmental Justice: Guidance Under the National Environmental Policy Act" (Council on Environmental Quality 1997; the full citation is provided in Chapter 8 of the PEIS). The approach taken involved a two-step process to identify impacts associated with environmental justice (see Section 4.3.12 of the PEIS). The first step concerns the presence of disproportionately high percentages of low-income or minority populations in those areas anticipated to experience high and adverse impacts. The second step concerns the presence of high and adverse impacts in general, and thus affecting the total population. Section C.8 of the PEIS provides a detailed discussion of the methods used to identify and assess potential environmental justice impacts.

Because one must know the economic and racial composition of an area potentially affected in order to assess environmental justice impacts, the assessment must be site-specific. In the PEIS, the only alternative components for which locations are known are continued cylinder storage (Appendix D) and cylinder preparation (Appendix E). For these components, environmental justice issues were examined thoroughly (see Sections D.2.11 and E.3.11 which discuss environmental justice impacts). As discussed in these Sections, no high and adverse human health effects or environmental impacts would be expected from continued storage of cylinders or cylinder preparation activities at the Paducah, Portsmouth, and K-25 sites. Because of this general lack of high and adverse impacts, and because minority and low-income populations would not be more prone than the general population to experience impacts from the two site-specific activities, no *environmental justice impacts are anticipated. With regard to the remaining four alternative components (that is, conversion, long-term storage, manufacture and use, and disposal), because their locations currently are unknown no environmental justice evaluation could be conducted in the PEIS. If in its Record of Decision for this PEIS DOE selects an approach to the management of its depleted uranium inventory that involves any of these alternative components, possible sites will be identified and those sites evaluated in subsequent NEPA documents, as described in Section 1.4 of the PEIS. One component of those evaluations would be an assessment of environmental justice impacts.*

DOE announced a 120-day public comment period upon publication of the Draft PEIS in December 1997. This comment period was much longer than the 45 days required by Council on Environmental Quality and DOE regulations implementing the National Environmental Policy Act. As part of the public review process, DOE held public hearings in Oak Ridge, Tennessee; Paducah, Kentucky; Portsmouth, Ohio; and Washington, D.C. DOE believes this comment period was of sufficient duration to allow review of the Draft PEIS and submittal of comments by government agencies, potentially affected communities, and other individuals and organizations.

Comment 10

PRESS, on other views, should see in writing all agreements between the States of all three facilities, Oak Ridge, Paducah, and Piketon, all agreements between Congress, the U.S. DOE, and DOD and others involved.

Response 10

The commentor's preference is noted. Public documents containing information about the three storage sites are available in the DOE reading rooms located near each storage site, specifically, Waverly, Ohio; Kevil, Kentucky; and Oak Ridge, Tennessee. Specific requests for documents related to the Depleted UF_6 Management Program may also be made at these locations.

Comment 11

The EPA was to fine this facility, and I believe over the DU cylinders. We would like to know why and how much and what has happened and the agreement. I would like to remind you that Piketon has never been licensed to store, accept radioactive waste and we have broken many laws by doing so.

Response 11

The Ohio Environmental Protection Agency has issued a Director's Final Findings and Orders (DFF&O) on the management and storage of depleted uranium hexafluoride and lithium hydroxide at the Portsmouth Site, as journalized on February 24, 1998. The DFF&O outlines the management, surveillance and maintenance, inspection requirements, and other requirements for the depleted UF_6 storage yards and cylinders owned by DOE at the Portsmouth Site. The Department of Energy agreed to pay a $193,000 in settlement of a variety of compliance issues *including issues associated with storage of depleted UF_6 and Lithium with the Ohio EPA and the Ohio Attorney General's Office and to implement the management and storage plans addressed under the DFF&O. A Resource Conservation & Recovery Act (RCRA) Part B hazardous waste storage permit was issued in August 1995 to the Portsmouth Gaseous Diffusion Plant by the Ohio Hazardous Waste Facility Board for the storage of mixed (containing both radioactive and hazardous constituents) and hazardous wastes. All wastes are managed in accordance with federal and Ohio hazardous waste management laws.*

Comment 12

You have continuously withheld information from the citizens about the radioactive releases, whether planned, routine, or accidentally: PRESS feels there is a number of cylinders no longer inventoried, and would like to know who is hiding them, were they stolen? Is someone also doing conversion?

Response 12

It is the Site's policy to provide information to the public accurately and on a timely basis. News releases are issued on any significant issues and copies of documents are provided upon request. Emergency procedures are in place to notify the public and the appropriate authorities external to the Site should a release or any off-normal event occur that would result in any off-site impacts. Any questions regarding specific incidents may be directed to the Public Affairs Office at the Portsmouth Site, 740/897-2336.

The DOE inventory of depleted uranium hexafluoride cylinders remains constant. There have been no shipments of DOE depleted uranium to perform conversion to another form, although several companies possess the technology and ability to perform this operation. However, since the completion of the draft, the scope of the PEIS has been expanded to include up to 15,000 cylinders produced by USEC after July 1, 1993 that became or will become the responsibility of the DOE by the signing of two Memoranda of Agreement between DOE and USEC (DOE & USEC 1998a-b; the full citations are provided in Chapter 8 of the PEIS. About 3,000 to 4,000 of all the cylinders that USEC will transfer to DOE are expected to be at Portsmouth.

Comment 13

PRESS is worried that an earthquake could create multiple cylinder failures at all the sites, and are so worried about the possibility of aircraft wreckage. There was a plane wreck here not long ago. One of the jets flew by pretty close to this area and crashed. If one of these planes crashed into this facility, it would be a huge disaster.

Response 13

The seismic risk text in Sections 3.1.4.1, 3.2.4.1, and 3.3.4.1 of the PEIS has been modified to be consistent with material presented in the safety analysis reports (SAR) for the three sites (LMES 1997a-c; the full citations are provided in Appendix C of the PEIS). The SARs do recognize *and discuss the potential for multiple cylinder failures in association with an earthquake. The PEIS considered potential accident scenarios with frequencies as low as 1 in 10 million years, in accordance with NEPA guidance for environmental impact statements (EISs). This frequency range includes small plane crashes, which are analyzed in the PEIS. The flight paths of large planes avoid the site leading to an extremely low accident probability. Large plane crashes occur in the beyond incredible probability range (less than once per 10 million years), which the PEIS does not analyze.*

Comment 14

We feel that until we find a safe way to handle these cylinders, maybe you could come up with a deal on wheels to heat these cylinders in place where stored and put in a new cylinder until new safety technology comes along.

Response 14

As noted in the PEIS, (see discussion of impacts under the no action alternative in Sections 2.4 and 5.1 and Appendix D), the continued storage of depleted UF_6 cylinders at the three current storage sites would be safe. The safety of current cylinder storage is supported by the revised safety analysis reports (LMES 1997f-h; the full citations are provided in Chapter 8 of the PEIS). In support of the PEIS, a number of options for off-site transportation of depleted UF_6 cylinders were reviewed and evaluated. One option for overfilled cylinders was a mobile system which would remove the overfilled portion of an existing depleted UF_6 cylinder while stored. Preliminary analysis of this option and other relevant options resulted in the consideration of the two cylinder preparation options in Appendix E of the PEIS, one of which transfers the contents of a substandard cylinder into a new cylinder, using cold feeding, a process similar to the one suggested by the commentor, except the transfer occurs in an onsite facility instead of in the cylinder yard.

Comment 15

I had a report from Gene Hoffman. He called and wanted to know if I would submit it on the record here. He has already submitted it to Paducah and Oak Ridge. I would like to put in the record a report from Gene Hoffman. Somebody also made copies. Also, a letter sent to "The New York Times" bureau from Leonard Dietz. I would like to submit that.

Response 15

Mr. Hoffman was a speaker at the Oak Ridge, Washington, D.C., and Paducah public hearings. Detailed responses to his comments are provided in Oak Ridge public hearing comments and responses 29-41 and in D.C. public hearing comments and responses 24-48. Mr. Hoffman also submitted written comments that included the report mentioned in this comment. Mr. Hoffman's written comments are in comment letter No. 53 in Chapter 2 and the responses appear in Chapter 3 of this document.

Leonard Dietz's letter was printed as an attachment to comment document No. 80 (see Chapter 2 of this document). The concern raised in the letter focuses on the increased radioactivity *of depleted uranium due to the build up of U-238 decay products. The PEIS analyses considered the impacts associated with the build up of U-238 decay products. In fact, the PEIS analyses assumed that Th-234 and Pa-234, the two short-lived decay products of U-238, were in secular equilibrium with U-238. See Section F.2 of the PEIS.*

<u>Comment 16</u>

It is really a tragedy here that you people keep trying to con this community. Mrs. Osborne here, she is on a respiratory thing. She should have been notified not to have her windows up or shut her windows in September or turn off the air conditioner. There are many people that live on her lane and they live on Big Run Creek there, and many people there are sick. So I think if we are going to be handling this stuff, we need to notify these people when there is an accident.

<u>Response 16</u>

The Portsmouth Site has an Emergency Plan in effect and conducts periodic emergency drills and exercises to prepare for any emergency situation. There are two levels of emergencies at the Site: (1) Alert — An Alert is declared if emergency hazards could affect plant personnel, but not the general public outside the plant boundaries. Local government officials are advised so that their resources and emergency responders are ready to assist on-site if needed. (2) Site Area Emergency — A Site Area Emergency is declared if the hazards could affect the general public within a two-mile radius of the plant boundaries. This is the most serious emergency situation and means that a significant release of hazardous materials may occur. If the conditions existed to set in motion the emergency response for off-site notification, then all residents within a two-mile radius of the plant would have been notified, including Mrs. Osborne. The plant emergency sirens would have been sounded with additional audible voice instructions on recommended actions for the general public. Emergency Notification procedures are in place that require this action. Also, it is also required that the local county officials be notified which would initiate actions from the emergency responders in the county. There has never been an occasion to use this system since it was placed in service in 1988. The system is tested periodically with warning sirens and emergency notifications to ensure its functionality should it ever be needed.

<u>Comment 17</u>

Okay. So there isn't an actual plan, but that is one of the scenarios. I guess a comment on that, I guess, is that treating at the facilities would probably be the safer mechanism than transferring because of the potential loss of jobs for the communities, et cetera, that they are stored out.

<u>Response 17</u>

The transportation analysis in the PEIS, Appendix J, does indicate that the transportation of cylinders and associated materials does pose a potential risk to workers and members of the general public. In addition, depleted uranium management facilities would potentially generate jobs and income in the vicinity of the management sites. However, the selection of locations for future management facilities is beyond the scope of the PEIS which addresses broad program strategies.

Future planning and environmental analysis will address issues related to selection of sites and technologies for depleted UF_6 management strategies.

Comment 18

The other thing is we want to make sure we meet the requirements particularly of the Ohio EPA. We have a variance now to come up with a plan for long-term, and the concern is just planting and staking may or may not meet that. You need to maybe come up with a long-term process. I know that is what this is for. I want to make sure that happens so it meets the expectations of the Ohio EPA because it has other overtones to this facility, and find a way to do that so it is in the best interests of the EPA, as well as the community itself. I think that is all.

Response 18

The commentor's concern is noted. The PEIS assesses the potential environmental impacts of alternative plans for the long-term management of the depleted UF_6. These impacts include ecological, health, safety, and socioeconomic impacts, including employment. Following the PEIS, the selection of a plan will partially satisfy the requirements of the Ohio EPA Director's Final Findings and Orders — that the DOE reconsider its original plan to begin conversion in 2020, and that DOE make a good-faith effort to identify uses for the material. The DOE is also required to provide to the Ohio EPA an annual report documenting the work that has been done on identifying uses for the material.

Comment 19

In the presentation, it wasn't clear to me, is new material coming into these facilities on a daily basis, and will it continue during the processing or during your plan of action to be coming in?

Response 19

The Draft PEIS considered the management of a fixed inventory of 46,422 full cylinders containing depleted UF_6 that were the responsibility of DOE. Since the issuance of the Draft PEIS, the scope of the PEIS has been expanded to include up to 15,000 cylinders produced by USEC after July 1, 1993 that became or will become the responsibility of the DOE by the signing of two Memoranda of Agreement between DOE and USEC after publication of the Draft PEIS (DOE & USEC 1998a-b; the full citations are provided in Chapter 8 of the PEIS). In addition, the management of several hundred heel and small cylinders has been clarified in the Final PEIS.

4.2 PADUCAH PUBLIC HEARING ORAL COMMENTS AND RESPONSES

All public comments with the exception of comments from one individual, Mr. Eugene Hoffman, provided at the Paducah hearing and DOE's responses to these comments are given below. Mr. Hoffman attended and provided comments at the Paducah, Oak Ridge, and Washington, D.C. hearings. The comments he made at the Paducah and Oak Ridge hearings were essentially the same, except he added a few more remarks in Oak Ridge. Therefore, his comments are addressed in whole in Section 4.3 under the Oak Ridge hearing. His comments at the Washington, D.C. hearing were somewhat different from his prior comments. Therefore, they are also included in Section 4.4.

Comment 1

My name is Christie Henson. And I live approximately 50 miles, as the crow flies, from the plant. I oppose proceeding to a decision on this Draft PEIS because it neglects to discuss the actual method of conversion. How can the public or DOE make a decision on how to convert the depleted uranium if there's no information on what kind of conversion facility will do the work?

Response 1

Descriptions of conversion methods and preconceptual conversion facility designs are provided in Appendix F of the PEIS. As described in Appendix F, seven different methods of conversion were considered in the PEIS, including two technologies for conversion to U_3O_8, three for conversion to UO_2, and two for conversion to uranium metal. Additional detailed descriptions of the conversion methods and facility designs used in the PEIS are provided in the engineering analysis report prepared by Lawrence Livermore National Laboratory (LLNL 1997; the full citation is provided in Appendix F of the PEIS), available for review at the DOE public reading rooms near the three current storage sites and in Washington, DC (listed in the Notice of Availability), or by contacting the DOE program manager identified on the cover sheet of the PEIS. Although the PEIS considered seven different conversion technologies, the selection of a specific conversion technology (if required by the management strategy ultimately selected) is beyond the scope of the PEIS which addresses broad program strategies. Future planning and environmental analysis will address issues related to selection of sites and technologies for depleted UF_6 management strategies.

Comment 2

The PEIS also neglects to divulge other important studies done by the National Academy of Science, the Navy and DOE's own assessment team.

Response 2

The report Disposition of the DUF_6 (Chapter 7 of the 1996 National Research Council's "Affordable Cleanup? Opportunities for Cost Reduction in the Decontamination and Decommissioning of the Nation's Uranium Enrichment Facilities") is a valuable background reference on the depleted UF_6 in general and its management options. This report as well as some other general reports on the subject were reviewed and used in preparation of the PEIS and supporting documents, for example, the engineering analysis report . A brief discussion of these general reports has been added to the PEIS (see new Section 1.7) and references to the reports have been provided.

<u>Comment 3</u>

I also want to comment on DOE's lack of responsibility of ignoring this problem for so long. We are faced with a critical health, environmental and economical crisis that could have been avoided. DOE's piling of 28,351 cylinders out in the open on gravel since the 1950's is not much different than dumping out on the back forty. And to make matters worse, DOE is still continuing to make the waste and putting it on the pile. Please do the right thing and make the right decision, to protect our community and the workers who have to deal with this mess.

<u>Response 3</u>

DOE's current cylinder management program provides for safe storage of the depleted UF_6 cylinders. DOE is committed to the safe storage of the cylinders at each site during the decision making period and also through the implementation of the decision made in the Record of Decision. DOE has an active cylinder management program that involves upgrading of cylinder storage yards, constructing new yards, repainting cylinders to arrest corrosion and regular inspection and surveillance of the cylinder and storage yard conditions. The depleted uranium being produced today is by the United States Enrichment Corporation rather than by DOE, and is a product of the enrichment process. Since the gaseous diffusion process began, there have been justifications for keeping the depleted UF_6 in its present form. These justifications may or may not be valid for today's needs, and therefore the need for new decisions regarding the material. This Programmatic Environmental Impact Statement is the first step in that decision-making process. Its purpose is to assess the potential environmental impacts of alternative management strategies. The potential impacts on the community and the workers are considered in this assessment.

<u>Comment 4</u>

I think the draft is insufficient under NEPA. The biggest flaw of the Draft EIS is that it chops off the scope of the analysis at the conversion. And that violates the requirement to do an adequate cumulative effect analysis. And as the NEPA people who are doing this should know, cumulative effects must be analyzed in EIS if there are reasonably foreseeable actions or if there are connected actions. And any way you look at this, the whole process of conversion would have to be looked at as a connected action because you have to empty the cylinders in order to convert the material. When you empty the cylinders, you have to deal with the empty cylinders. And then if you defluorinate, you have to bring in cylinders to put the fluorine in, and those have to be dealt with, and you have the environmental effects of the facilities. All that has to be done in order to convert. It's clearly a connected action. So, therefore, it's arbitrary to just chop off the analysis like this EIS does.

<u>Response 4</u>

The PEIS does not "chop off" the analysis at conversion. Rather, for each of the alternatives, the PEIS considered all of the activities that would be required during implementation, as shown in Figure S.2 and Figure 2.1. It should be noted that conversion itself is not one of the alternatives evaluated in the PEIS, but only one step required by several of the alternatives. The *types of activities considered in the PEIS included continued storage of the cylinders for some period of time (Appendix D); preparation of cylinders for shipment (Appendix E); conversion (including defluorination activities) and treatment of emptied cylinders (Appendix F); long-term storage (Appendix G); manufacture and use (Appendix H); disposal (Appendix I); and transportation (Appendix J). The evaluation of potential environmental impacts for these activities included both the construction and operation of facilities during normal and accident conditions. The evaluation of conversion, presented in Appendix F, considered all the materials required to build and operate a conversion facility, including hydrogen fluoride production and a treatment facility for empty cylinders, and evaluated the potential environmental impacts of operating such a facility. The overall environmental impacts for each PEIS alternative were found by combining the impacts from each of the required activities, as appropriate, as described in Section 2.1. Consequently, the analysis in the PEIS addresses all of the events that would be triggered by the selection of a specific management strategy. The conversion step is not a "connected action" but rather an integral component of several of the alternatives that is addressed accordingly. The cumulative impacts of each alternative are addressed in Section 5.8 for those activities that would occur at the three current storage sites. At this time, the only activities that are reasonably certain to occur at the three current storage sites are continued storage of cylinders (for some period of time) and preparation of cylinders for shipment.*

Comment 5

But that's not the only NEPA problem that DOE has here at Paducah. And it has been my position now for a couple of years that what is needed at this facility is a site-wide environmental impact statement so that we can try to get our hands around the big picture. Under the cumulative effects requirement, under the reasonably foreseeable future actions, the major Supreme Court ruling is a case called Kleppe versus Sierra Club. And that ruling found that if there were proposals that were on the table at the time, in front of the agency, that they have to be looked at in a single EIS, the cumulative effects. That sends — I was involved in a recent court case in Southern Illinois where cumulative effects was defined as all of the proposed actions, the effects of those actions had to be looked at in combination. So, we have here at the facility — not only do we have these cylinders going on, but we have waste management activities. For instance, just as an example, we have 50,000 barrels of legacy waste that there's planning going on — there's a proposal to bring in a radioactive waste incinerator slash vitrification machine to deal with some of that. There's a NEPA going on for that right now. It's an illegal segmentation to segment that analysis from these cylinders. There's also environmental restoration activities — very significant restoration activities at WAG 6, the C-400 Building, which has very massive trichloroethylene and technetium 99 spills, burial grounds, contaminated ditches and creeks, serious groundwater contamination. All of those activities have cumulative effects, not just on — not just direct, but indirect, and not just on the specific location where the direct effects are occurring, but in an area around. And I think the public deserves, I think the regulations require, and I think the statute requires that this be looked at as a major federal action, and that we be given the opportunity to look at the effects of all of these actions together.

<u>*Response 5*</u>

The issue of the need for a site-wide EIS for the Paducah site is beyond the scope of this PEIS. Section 5.8.2.1 of the PEIS explicitly considers cumulative impacts at the Paducah site of existing operations at and near the site (if close enough to affect it), the two activities proposed in the PEIS that would occur at the site, and other reasonably foreseeable future actions at and near the site. Included in the cumulative impact calculations are the impacts of the proposed Vortec Vitrification Process and the impacts of waste management activities at the Paducah site, both mentioned in the comment (see Table 5.12). The topic of environmental restoration activities has been reexamined for all three current depleted UF_6 storage sites, including the Paducah site, and pertinent past and current restoration activities have been added to the cumulative impact calculations (see Table 5.12). As noted in Section 5.8.1, the impacts of future environmental restoration activities were not included in the cumulative impact calculations because of insufficient characterization of the contamination and because proposals for particular actions are not yet final; impacts of environmental restoration activities at these sites would be analyzed and documented as appropriate under the relevant environmental regulations. The geographic breadth of cumulative impacts depends on the nature of each, with some associated with the site itself (e.g., radiological impacts to worker population) and others (most) associated with the area around the site (e.g., off-site radiological and air quality impacts).

<u>Comment 6</u>

Another thing I'm concerned about is, there are statements of little or no impact based on what I would call in-house studies, where the methodology isn't explained, there's no independent verification of where this data came from, just a reference to some of DOE's own studies. I believe that would be — that that's nothing more than a conclusory statement of no impact. Conclusory statements of no impact are insufficient to support an EIS. There's tons of case law on that.

<u>*Response 6*</u>

The assessment methods used in the PEIS are described in Chapter 4 and in Appendix C for each technical discipline. Chapter 4 also provides a detailed table that describes the general criteria used to summarize and describe the magnitude of environmental impacts for each area of impact considered in the PEIS. The main body of the PEIS provides a discussion of the types and magnitude of potential environmental impacts for each alternative, with additional supporting technical information provided in the appendices. Detailed assessment results and further discussion is provided in a series of backup reports that are cited throughout the PEIS. Specifically, supporting information for the various technical disciplines is presented in: Cheng et al. (1997) for the assessment of human health impacts during normal operations; Policastro et al. (1997) for the assessment of accident impacts; Tschanz (1997) for the assessment of air impacts; Tomasko (1997a, 1997b) for the assessment of water impacts; Biwer et al. (1997) for the assessment of transportation impacts; and Allison (1997) for the assessment of socioeconomic impacts. (See PEIS Appendix C for complete citations.) The computer models, and exposure and risk assessment methods used in the PEIS are in wide use in the scientific community and are referenced as appropriate in

Appendix C and the backup reports. The intent of this presentation was to provide sufficient information in the PEIS to establish the applicability of the methods and assumptions, with detailed information provided in the supporting reports. The supporting reports are available to the public through the DOE public reading rooms near the three current storage sites and in Washington, DC (listed in the Notice of Availability), and can also be obtained by contacting the DOE program manager identified on the cover sheet of the PEIS.

Comment 7

Also, I think that while there are equity issues, you know; i.e., we shouldn't be wanting to dump our problems on other communities, the seismic concerns here are really legitimate. I don't think that we should be bringing any cylinders in here. And I sort of reluctantly think that there needs to be strong consideration given to converting the cylinders elsewhere because of the length of time that it's going to take to convert all these cylinders and the seismic risk and the possibility of breaches to the cylinders if there is a seismic event.

Response 7

The commentor's preference for not siting any facilities for long-term storage or conversion of depleted UF_6 at the Paducah site is noted by DOE. With respect to seismic concerns at the Paducah site, the analysis of accident scenarios for continued cylinder storage (Section D.2.2 of the PEIS) was based on the range of potential accident scenarios considered in the safety analysis reports recently prepared for each of the three storage sites (LMES 1997f-h; the full citations are provided in Chapter 8 of the PEIS). The SARs considered a range of potential accident scenarios that could be associated with current storage activities, including natural phenomena events such as earthquakes. The accidents considered in the PEIS for current depleted UF_6 cylinder storage were extracted from those evaluated in the SARs. The accidents selected for the PEIS analysis were those accident scenarios in the SARs that resulted in the greatest potential consequences at each of the three storage sites. These accidents did not include earthquake scenarios, which were found in the SAR analyses to have lesser consequences than the accident scenarios discussed in the PEIS. The text in Section D.2.2 of the PEIS has been modified to clarify this point. If the SARs are revised in the future, DOE will modify its cylinder management program to ensure that the safety of the cylinders is maintained.

Comment 8

Total in long-term storage, 55,000. 21,000, inaccessible end plugs. Oak Ridge is really bad, and the others are not a whole lot better. But these are stacked so tightly together that it's very difficult to do much of an inspection. I'm sure the workers have done the best they can. But the fact that they're stacked so close is a real, real problem.

Response 8

As part of the cylinder program management plan, cylinders with insufficient spacing to allow for complete inspection are scheduled for relocation. The management program calls for *relocating these cylinders to improve stacking and storage conditions, and also includes upgraded inspection procedures and training to improve the capability of the inspectors to make a complete inspection. New stacking requirements which require a four foot aisle between cylinder rows have been implemented through use of by improved procedures and new cylinder stacking equipment. Cylinder relocations have been ongoing in conjunction with the construction and reconstruction of storage yards. In FY 1998 approximately 14,000 cylinders were relocated; 9,900 cylinder relocations are planned for FY 1999, and 8,600 are planned for FY 2000.*

Note: *This commentor was also a speaker at the Oak Ridge, Tennessee and Washington, D.C. public hearings. With the exception of this comment, he made essentially the same comments at both the Pacucah and Oak Ridge hearings. Although there was considerable overlap, his Washington, D.C. public hearing comments were somewhat different from his Paducah and Oak Ridge comments. Therefore, detailed responses to his hearing comments are provided in Oak Ridge public hearing comments and responses 29-41 and in D.C. public hearing comments and responses 24-48.*

Comment 9

My name is Al Puckett. And I live within a mile of the plant. I'm an atomic veteran. I was one of the first people that went into Nagasaki after the bomb was dropped. And the thing that irritates me now is the statement that I hear — they say, well, we dropped the bomb, we killed over 2 million women and children because we wanted to spare the people that would be in an invasion of Japan. Which is totally not true. When the war was over with in Germany, they brought all the B-29 bombers over there and they were bombing Japan. And in one night, they burned 15 square miles of Tokyo. And Japan was trying to surrender before they dropped the atomic bombs. So, they killed mostly 2 million women and children for nothing. And this is what irritates me, when they come out with this party line, oh, we done that to protect the veterans or the servicemen so that they wouldn't be killed. There was no need to invade Japan. There was no need to drop the bomb. Japan was trying to surrender at the time that they were dropping bombs.

Response 9

The comment is outside the scope of the PEIS.

Comment 10

I was appointed as the chairperson of the first Earthquake Hazards Commission in Kentucky. And Dr. Otto Nuttli was a very dear friend until the day he died. This gentleman has given you a very conservative statement of what you're going to be faced with. And I can tell you this truthfully; the best geologists, the best earthquake specialists in Golden, Colorado, in Western Virginia will never stay overnight in Paducah, because I've invited them to. For the past 20 years, they have declined. One of the prime reasons, of course, is that they fear being below all of the dams on the Tennessee River when the seismic event occurs. With respect to where the epicenter might be, before Dr. Nuttli died, he told me that he believed that the next epicenter for the New Madrid earthquake action will be in the vicinity, maybe a little north, of Evansville. But don't think we will be spared, because the plans are extended out as far as Dallas, Texas, Chicago, Denver, all the way to the East Coast and on. So, this gentleman has given you the gospel. Please accept it.

Response 10

Seismic risks for Paducah are addressed in Section 3.1.4.1 of the PEIS. Additional text has been added (See Comment 27 from the Washington, DC Oral Comments) and the Paducah site safety analysis report has been referenced to provide more information to the reader.

4.3 OAK RIDGE PUBLIC HEARING ORAL COMMENTS AND RESPONSES

Comment 1

And fundamentally what I am trying to get across to them is that if you're going to write a book like this and tell people about how it's going to affect the environment, you got to tell the people what UF_6 is in more detail than Ched just did.

You need to know — talk about the face, characteristics of it, and things of that nature, not the least of which is this stuff is all in the bottom of the cylinder. It's only sixty percent full.

So these guys that go around worrying about earthquakes and claim the cylinders are going to roll end over end, well, that – it won't do it. It's centric loaded. It won't roll. So things like that need to be pointed out. I think it's important.

Another thing that I did not see in the book is to tell people something about the characteristics of the cylinders themselves. Most of them have been made to an ANSI standard; some of them, older ones, were not, but at least we ought to tell people what the cylinder characteristic is

Response 1

More detailed descriptions of the characteristics of both the storage cylinders and depleted UF_6 have been added to Section S.1.1 of the PEIS Summary and Section 1.1 of Chapter 1. Detailed information has been added which addresses the physical characteristics of the cylinders which are used for storage, as well as the physical and chemical characteristics of the depleted UF_6. Photographs have also been included which detail the cylinder and its associated parts which are referenced in the document, such as the cylinder skirt and stiffening rings.

Both the ORO-651 series of documents (DOE's own standard for handling UF_6) and the ANSI N14.1 Standard were reviewed during preparation of the PEIS. The ANSI standard is incorporated under Title 49, Code of Federal Regulations, Section 173.420, the federal regulations *governing transport of depleted UF_6. Reference to the 49CFR173 has been added to Section 1.1 of the PEIS.*

<u>Comment 2</u>

In the book I notice they talk about cylinders with skirts on them. Well, to someone that all they got is a book to read, they don't know what that means. So I have volunteered to give people some of my documents for inclusion. I can't get a rise out of them.

<u>Response 2</u>

A definition of "skirted ends" has been added to Section C.2.1 of the PEIS.

<u>Comment 3</u>

But then in addition to telling people what UF_6 is and what the cylinders are like, you need to tell them how much is in the cylinder. The darn things are only sixty percent full. I think it's important that people know that, and we don't say so in the book.

<u>Response 3</u>

Text has been added to Section 1.1 of the PEIS which indicates that the cylinders are approximately 60% full.

<u>Comment 4</u>

So the plan, the proposed alternative, to convert and use the billion pounds is a proposed decision sort of made by amiable sleepwalking agency which doesn't have its eyes wide open because it's sort of blind to all the data. It's an unrealistic — as I see it, it's an unrealistic decision.

<u>Response 4</u>

In response to comments received on the Draft PEIS, DOE has revised its preferred alternative. The revised preferred alternative consists of the following elements: continuing the safe, effective management of the cylinder inventory; beginning prompt conversion of the depleted UF_6 into uranium oxide and HF or CaF_2; interim storage of the uranium oxide pending use; converting depleted UF_6 into depleted uranium metal and HF or CaF_2 as uses for depleted uranium metal products become available; and/or fabrication of depleted uranium oxide and/or metal products for use (see Section 2.5.1 of the PEIS). The ultimate decision on a management strategy will be announced in a Record of Decision. The Record of Decision will consider the results of the PEIS, along with other information, such as cost and engineering data, to select a management strategy. The Record of Decision will document the strategy selected and describe how it was selected from among the different alternatives.

<u>Comment 5</u>

I believe there's no prospect that uses, which would be desirable if they were invented, can keep up with the increasing amount of UF_6 the country has. It may be in different ownership, the new stuff, but it's still UF_6, in Kentucky and Ohio probably.

<u>Response 5</u>

DOE expects that in the future, uses will be available for some portion of the depleted UF_6 inventory. DOE plans to continue its support for the development of government applications for depleted uranium products and, for as long as necessary, to continue the safe management of its depleted UF_6 cylinder inventory. The scope of the PEIS has been expanded to include up to 15,000 cylinders produced by USEC after July 1, 1993 that became or will become the responsibility of the DOE by the signing of two Memoranda of Agreement between DOE and USEC after publication of the Draft PEIS (DOE & USEC 1998a-b; the full citations are provided in Chapter 8 of the PEIS). The management of any additional depleted UF_6 generated by USEC's privatized successor would be addressed in future agreements as appropriate.

<u>Comment 6</u>

The storage method, while safe in the short run — we haven't hurt many people — is not a good long-term method for dealing with an unstable industrial end product.

<u>Response 6</u>

The commentor's view regarding storage of depleted UF_6 is noted.

<u>Comment 7</u>

If I'm wrong, the demonstration that the uses could be as large as the increasing amount we have, that's more important than other things we're discussing, and that should be given a big — a big, positive push.

<u>Response 7</u>

DOE expects that in the future, uses will be available for some portion of the depleted UF_6 inventory. DOE plans to continue its support for the development of government applications for depleted uranium products.

<u>Comment 8</u>

There are good efforts to try to increase the uses, but I don't believe they keep up with the increase in the amounts we have before us. If I'm right, we need a combined option. One, convert to oxide and use what we can make use of, as suggested by Mr. Bradley; and, second, the other half of the option, is to have a program for converting and disposing of the remainder.

<u>*Response 8*</u>

It is possible that DOE will select as a management strategy a combination of two or more of the six PEIS alternatives, such as converting and using some portion of the inventory and converting and storing of the remainder. The parametric analysis presented in Appendix K of the PEIS was included to allow the environmental impacts of such combinations to be estimated. Several examples of how the impacts for combinations of alternatives can be calculated are provided in Section K.7 of Appendix K. The ultimate decision on a management strategy will be announced in a Record of Decision. The Record of Decision will consider the results of the PEIS, along with other information, such as cost and engineering data, to select a management strategy. The Record of Decision will document the strategy selected and describe how it was selected from among the different alternatives.

<u>Comment 9</u>

Now, what we're going to do. I would think first one would take care of the increase. We shouldn't be — we should have a policy that whoever is making depleted UF_6 now no longer leaves it in storage yards, goes on and puts it in a stable oxide form. And then, of course, suspect cylinders need to be treated first.

<u>*Response 9*</u>

DOE is no longer producing depleted UF_6. However, new material is being produced by the United States Enrichment Corporation (USEC). USEC is responsible for decisions regarding the disposition of the depleted UF_6 that it produces. Two disposition options for USEC-generated depleted UF_6 are to convert the material themselves, or to contract with DOE for the service. Any conversion activities undertaken by USEC would be licensed by NRC. The depleted UF_6 produced by USEC prior to privatization and a limited amount produced by the privatized corporation will be conveyed to DOE. This material has been included in the inventory analyzed in the PEIS. Any additional depleted UF_6 that may be transferred to DOE for management will be addressed in future agreements.

<u>Comment 10</u>

UF_6 has a wide variety of future uses for high technology materials. I'll just throw out a few of them that we've already considered. These won't be the specific compounds, but will give you some idea of some of the uses we envision. New non-ozone depleting halon, or fire extinguishing agent. New high tech polymer in computer processors. Currently this polymer is being made by another method. New medicinal agents, especially in surgery. New fluorination technology. One that's a little bit speculative, new depolymerization or polymer recycle technology, and these are just a few of them. Now, one of — a single one of these, the high tech polymer and computer processors, represents a potential use of eighteen million pounds of UF_6.

Response 10

Comment noted. DOE expects that in the future, uses will be available for some portion of the depleted UF_6 inventory. DOE plans to continue its support for the development of government applications for depleted uranium products.

Comment 11

My concern with the document is primarily the assumptions. The assumptions that were made really make all the options look very much alike.

Response 11

The six management strategies considered in the PEIS were developed to cover the reasonable range of possible alternatives. The alternatives considered and the assessment assumptions, methods and supporting data were carefully selected to provide a meaningful and relevant evaluation and comparison of potential environmental impacts. Similarities exist among the alternatives because they would require very similar activities during implementation. For instance, the long-term storage as oxide, use as oxide, use as metal, and disposal alternatives would all require storage of cylinders for some period of time, conversion of depleted UF_6 to another chemical form, and possibly transportation of cylinders and associated materials (as well as preparation of cylinders for shipment, if required).

Comment 12

And the timeliness is one of my concerns. There's no action before the year 2009 and it goes through 2028. Well, not all of these cylinders are in perfect condition. In fact, the document recognizes this. However, in the appendix D on page D-3, they were assumed that the breaches would cease from corrosion because they were going to paint them. But, indeed, they're not painting enough of them per year to keep that up. Assume the paint — you have to paint them every ten years, but they're not painting enough per year to keep that up.

Response 12

The assumptions used in the PEIS for the No Action Alternative and other alternatives were made based on the current UF_6 cylinder project management plan in effect at that time (LMES 1997i; the full citation is provided in Chapter 8 of the PEIS), and on the cylinder painting program (Pawel 1997 — see references in Appendix D of the PEIS for full citation). The management plan covers a five-year period. The cylinder painting program document states that the estimated life of the paint system would be 12 years, meaning that during this time the painting process arrests corrosion and no further reduction in cylinder wall thickness occurs. Based on this information, the PEIS assumed that each cylinder would be painted once every 10 years in its analyses of impacts from continued cylinder storage (see Appendix D, Section D.2 of the PEIS). In order to address uncertainties in both the effectiveness of the painting in controlling further corrosion and uncertainties in the future painting schedule, a conservative assessment of the impacts was also made assuming that painting would have no effect on corrosion (i.e., historical corrosion rates from *past poor storage conditions were assumed to continue into the future, although many improvements in storage conditions have actually been implemented). The outcome of this supplemental analysis is described in Appendix D, Section D.3 of the PEIS. Project personnel continue to develop more information regarding the physical condition of cylinders, the corrosion rate of the steel, the methods and equipment used for handling cylinders, and storage conditions. Changes to this plan, which include decisions regarding the rate of recoating the cylinders, are made through technical and risk evaluation. Although the rates for construction and recoating may change somewhat, DOE remains committed to the safe management of the inventory. Construction and recoating rate changes or changes in cylinder and storage conditions will be evaluated and accounted for as part of the ongoing cylinder management program.*

Comment 13

Because of the nature of the corrosion and the condition of the cylinders, the oldest ones happen to be here at Oak Ridge. There is no strategy given that says in what order do you process them. And do you do the worst ones first, or do you do the best ones first because they're the easiest and can make — you know. It's not given.

Response 13

The actual schedule or order in which the cylinders would be included in any storage, conversion, or disposal action would be best decided when site- and technology-specific environmental reviews are conducted in follow-on phases of the program. Under all alternatives, DOE is committed to continuing for as long as necessary the safe management of its depleted UF_6 cylinder inventory. The actual decisions of which cylinders are the first to be processed under any of the alternatives would be based on environmental, safety, engineering and economic considerations.

Comment 14

They recognize a potential hazard at Oak Ridge in the future from breaches and excess hydrogen fluoride being released. We do have a very wet environment here and so there's always water vapor around. Hydrogen fluoride is very nasty stuff. The other products are soluble and go into the water, which is not good for the environment.

Response 14

As the commentor states, the PEIS indicates that if cylinder maintenance and painting activities do not reduce cylinder corrosion rates, it is possible that the HF air concentration could be greater than the regulatory standard level at the K-25 storage site around the year 2020, and also that concentrations of uranium in groundwater could exceed the guideline level of 20 µg/L at all three sites at some time after the year 2100. (These analyses are discussed in Section D.3 of Appendix D.) It should also be noted; however, that if continued cylinder maintenance and painting are effective in controlling corrosion, as expected, air concentrations of HF would be kept within *regulatory standards, and groundwater concentrations would be well below the 20 µg/L level (see Sections D.2.3 and D.2.4 of the PEIS for a more detailed discussion of these results).*

Comment 15

Now, we've been fortunate that we haven't had more breaches of the seven that the document speaks of. Four of them, you know, were here at Oak Ridge, and that is primarily because we have the oldest cylinders probably.

Response 15

The oldest cylinders containing depleted uranium hexafluoride are actually located at the Paducah Site, however, they are the thick wall design and no thick wall cylinders have breached. The oldest thin wall cylinder containing depleted UF_6 is at the Portsmouth Site. Mechanical damage to the cylinder wall sustained during handling of cylinders and excessive corrosion due to poor storage conditions are actually the root causes of the cylinders breaching. These root causes have been mitigated by a cylinder restacking program, construction of new cylinder yards, new procedures for handling cylinders and a cylinder recoating project.

Comment 16

Anyway, I'd like to see things go a little faster. I'd like to see options that can move quicker or priorities set for certain conditions. I mean, it recognizes the poor conditions, and it's just not acceptable to wait until 2028 to have all of this taken care of.

Response 16

The commentor's preference for action to begin quickly is noted. DOE is committed to implementing the selected alternative as early as practicable. The preferred alternative in the PEIS has been modified to clarify this point. (See Section 2.5.1 of the PEIS and the response to the following comment)

Comment 17

And I don't mind it being used, if it's really truly feasible, but I'd like to see it converted to U_3O_8, which is the most inactive form, and then you can store it as long as you want and you can wait until these uses get proven. If you're not going to convert it until you can use it and until you can market it, I think we have some big problems because I don't think it will be done by 2028 either. And I'd like to see it move faster.

Response 17

The preferred alternative in the Final PEIS has been modified to clarify that it would be accomplished through continuing the safe, effective management of the cylinder inventor; beginning prompt conversion of the depleted UF_6 into uranium oxide and HF or CaF_2; interim storage of the uranium oxide pending use; converting depleted UF_6 into depleted uranium metal and HF or CaF_2 as uses for depleted uranium metal products become available; and/or fabrication of depleted *uranium oxide and/or metal products for use. DOE expects that in the future, uses will be available for some portion of the depleted UF_6 inventory and plans to continue its support for the development of government applications for depleted uranium products.*

Comment 18

I'd like some real differences in the alternatives. I'd like to see, okay, you know, how many plants do you have to process? You had a thousand mile transportation thing that was — you know, that's kind of a make-believe number. I'd like to see some strategy.

Response 18

The six management strategies considered in the PEIS were selected to cover the reasonable range of alternatives. The six alternatives are fundamentally different from one another, although many of the alternatives share common elements. For instance, the long-term storage as oxide, use as oxide, use as metal, and disposal alternatives would all require storage of cylinders for some period of time, conversion of depleted UF_6 to another chemical form, and possibly transportation of cylinders and associated materials (as well as preparation of cylinders for shipment, if required). Because the PEIS addresses broad program strategies, a number of assumptions were made to allow for a reasonable estimation of potential impacts and a meaningful comparison among the alternatives. For example, because the selection of sites for depleted UF_6 management strategies will be addressed in future planning and environmental analyses, the PEIS evaluated transportation impacts for distances ranging from 155 to 3,100 miles (250 - 5,000 km) (see Appendix J). However, for the purposes of comparing the potential impacts among alternatives, shipment distances of 620 miles (1,000 km) were assumed for all alternatives. The results presented in Appendix J can be used to evaluate how the impacts would differ for either shorter or longer shipment distances. Selection of a different shipment distance would not effect the comparison between the alternatives.

Comment 19

I realize this is a programmatic — PEIS, but you're putting a lot of work into a document that isn't of a great value because there is no strategy in it, and the assumptions are just — some of them, I think, are very poor, others are reasonable. And I'd like to see something done quicker.

Response 19

The purpose of the PEIS is to provide a meaningful evaluation and comparison of broad alternative management strategies. In selecting the broad programmatic alternatives, the DOE considered information obtained from all interested parties through a Request for Recommendations which was issued on November 10, 1994 (59 FR 56324). The alternatives considered were based on input from the Request for Recommendations, as well as a technology assessment report and an engineering analysis report (see Section 1.4 of the PEIS for a more detailed discussion). The assessment assumptions, methods, and supporting data were carefully selected to provide a meaningful and relevant evaluation of potential environmental impacts. The ultimate decision on *a management strategy will be announced in a Record of Decision. The Record of Decision will consider the results of the PEIS, along with other information, such as cost and engineering data, to select a management strategy. The Record of Decision will document the strategy selected and describe how it was selected from among the different alternatives.*

Comment 20

HF is not a good compound to work with, but it certainly isn't the worse. I came into this industry from another industry which most people considered far worse, fuming sulfuric acid, nitric acid, TNT, those kinds of things. This is a technology which has been in existence and use for fifty years and it's had a good record. We understand the chemistry pretty well. We understand the technology. We need to get on with it. The cylinders can't last forever. Eventually they'll have to be faced, and it will be embarrassing if they do start to fail.

Response 20

In the PEIS, the alternatives which involve handling of HF are those which include conversion of the depleted UF_6 to another chemical form for long-term storage, use or disposal. The commentor's preference for timely implementation of one of these alternatives is noted by DOE.

Comment 21

You have a maintenance program, which I understand is quite expensive, and that is an added cost. The uses that are hypothetical I think are pretty far out. It isn't as if we were destroying the material. It will be available for uses in the future. But I think the public is getting tired of the procrastination in these processes, and I would urge DOE to get on with conversion either to the oxide or to the metal, place this in the form it can be stored safely in the truly long term and will not require the maintenance cost forever and ever that the present storage requires.

Response 21

The commentor's preference for conversion to begin promptly is noted. In fact, the preferred alternative in the Final PEIS has been modified to clarify that it would be accomplished through continuing the safe, effective management of the cylinder inventory; beginning prompt conversion of the depleted UF_6 into uranium oxide and HF or CaF_2; interim storage of the uranium oxide pending use; converting depleted UF_6 into depleted uranium metal and HF or CaF_2 as uses for depleted uranium metal products become available; and/or fabrication of depleted uranium oxide and/or metal products for use. DOE expects that in the future, uses will be available for some portion of the depleted UF_6 inventory and plans to continue its support for the development of government applications for depleted uranium products.

Comment 22

There have been a lot of warnings lately about the New Madrid fault and Paducah is very close to that. We're close enough. So if the 1812 earthquake was 8.5 on the Richter scale, it was probably six and a half here so --

<u>*Response 22*</u>

The text in Section 3.3.4.1 of the PEIS has been modified to be consistent with material presented in the Safety Analysis Report for K-25 (LMES 1997a; the full citation is provided in Appendix C of the PEIS). That is, for the K-25 site, an earthquake that has a 1,000 year return period would have a horizontal top-of-soil acceleration of 0.2 times that of gravity. Such an earthquake could occur with equal probability any time within the 1,000 year period. For these conditions, slope stability and soil liquefaction (loss of shear strength) would not be problems, and rocking and rolling-out of cylinders would not occur for single or multiple stacked-cylinders (LMES 1997a).

<u>Comment 23</u>

Time to completion is definitely too long. I can't wait until 2028, and I don't think anybody else can either. I think that we, as Al Brooks has pointed out, that we know this material, we know the process, we know the chemistry, we understand it.

<u>*Response 23*</u>

The commentor's preference for completing the dispositioning of the DOE's depleted UF_6 inventory before 2028 is noted.

<u>Comment 24</u>

The ideas that you mentioned earlier about — from the scoping meeting was safety and handling, employment, resource value of the material. Those are not my concerns. I mean, I was there. I don't remember hearing any of that. They're relevant, but I don't think that they're relevant in this particular situation.

<u>*Response 24*</u>

Under the National Environmental Policy Act, an environmental impact statement (EIS) analyzing the impacts of a proposed action and all reasonable alternatives must be prepared for any major federal action. An EIS generally addresses areas such as health and safety, employment impacts, and resource materials required by the various alternatives, along with other major impact areas (for example, air quality, water and soil, ecology, waste management, land use). These areas are addressed in an EIS because they have been found to be of general concern to the populations which would be affected by the proposed action. The above-listed areas have therefore been included in the depleted UF_6 PEIS.

<u>Comment 25</u>

And how much the material is worth is of some value to me too. How much are the storage casks worth? You could sell those too for scrap.

<u>*Response 25*</u>

In the context of the comment, it was assumed that "storage casks" refers to depleted UF_6 cylinders, as opposed to spent nuclear fuel casks that could potentially use depleted uranium as shielding material. The empty cylinders were addressed in the PEIS in association with the conversion options (Appendix F), and in a support document entitled "Analysis of Options for Disposition of Empty Depleted Uranium Hexafluoride Cylinders" (Nieves et al. 1997). The report by Nieves is available for review at DOE public reading rooms near the three current storage sites and in Washington, DC (listed in the Notice of Availability), or by contacting the DOE program manager identified on the cover sheet of the PEIS. The report analyzed the potential health and cost impacts associated with various options for the cylinders after treatment, including recycle, reuse, burial, and free release.

<u>Comment 26</u>

There is, I think — maybe to point out one thing that I find a little strange in this preliminary report. They have here what I assume means a complete collapse of a cylinder happening once in ten years under dry conditions. On the next page they estimate that it comes once in a hundred thousand years in wet conditions. With the rainfall here in Tennessee — I guess maybe the big document explains all this, but it doesn't seem to match common sense, even a hundred year flood in connection with it. Now, the question of how likely is this sort of thing to happen I really can't say, but you do have these figured correctly, the area of them, and something like a ten PSI differential between the atmosphere and what's inside the things. They are under 250,000 pounds, I think, each cylinder, something of that sort. And they are — I'm reasonably sure that if all of the wall is in good condition all the way through, this is probably nothing to worry about. They will support this very easily probably. Many, many factors of safety. But they are getting old. There are corrosion pits and things like this, and they are sitting some — they are stacked too deep so you have not only the pressure of the atmosphere from the outside, you also have it stacked on top of them, plus the possibility of events like earthquakes and other things of this sort, of maybe dropping when they 're picked up, moved for maintenance, or something like this. So it seems to me like there's a fair possibility of a rather bad accident occurring over this long — rather long period of time we're talking about before we get on with this business. And if you do it under wet conditions, you can get a HF plume, I would imagine, that would give the people that have been bad mouthing TSCA something really to complain about.

<u>*Response 26*</u>

The accident scenarios considered for continued cylinder storage are given in Table D.6 of Appendix D. The cylinder spill accidents discussed in the comment involve corroded cylinders containing solid depleted UF_6 which hypothetically rupture during their handling. The accident frequency (once per 100 years) for the case where the corroded cylinder ruptures during dry conditions (no rain) was estimated taking into account the estimated number of corroded cylinders and the number of cylinder movements per year. In general, cylinder handling does not occur when it is raining. The lower accident frequency for the hypothetical accident where the corroded cylinder *ruptures during heavy rainfall takes into account the low probability that a rainstorm would appear during cylinder handling. The analysis of accident scenarios for continued cylinder storage (Section D.2.2 of the PEIS) was based on the range of potential accident scenarios considered in the safety analysis reports recently prepared for each of the three storage sites (LMES 1997f-h; the full citations are provided in Chapter 8 of the PEIS). The SARs considered a range of potential accident scenarios that could be associated with current storage activities, including natural phenomena events such as earthquakes. The accidents considered in the PEIS for current depleted UF_6 cylinder storage were extracted from those evaluated in the SARs. The accidents selected for the PEIS analysis were those accident scenarios in the SARs that resulted in the greatest potential consequences at each of the three storage sites. These accidents did not include earthquake scenarios, which were found in the SAR analyses to have lesser consequences than the accident scenarios discussed in the PEIS. The text in Section D.2.2 of the PEIS has been modified to clarify this point. If the SARs are revised in the future, DOE will modify its cylinder management program to ensure that the safety of the cylinders is maintained.*

Comment 27

So I think myself we're going to have to do it sooner or later, get on with it. If the — I know that this is easy to say with the budgetary limits and this sort of thing, but at least I think there should be some estimate. I think this is kind of out of the waste management business. It's not considered comparative risk when you're setting priorities between this and, say, digging up Bear Creek Valley and putting it somewhere else. I think it should — DOE should consider considering it in this context. I know there are a lot of things I wouldn't want to interrupt. I wouldn't want to interrupt them from cleaning out the GUNNI tanks. I don't want them to interrupt them cleaning out the mold and salt reactor for something like this. But I think there are probably a lot of things they're talking about doing that could be put off easier than this, and we could get on with maybe doing something about the tanks.

Response 27

The commentor's preference for moving forward on a strategy for managing depleted UF_6 and for appropriate prioritization of that strategy within the context of risk management is noted. DOE will seek appropriate funding to implement the depleted UF_6 management strategy announced in the Record of Decision for the PEIS.

Comment 28

One of the concerns I have about the report is the overall conclusions. I didn't see any discussion in there about how other people that are in the enrichment business are handling this problem. And you know for truth that France has been converting theirs for a number of years. So I was wondering what's different about the situation we have versus what they have? Is it just in the methodology, or is it some real factor that's different between the two?

<u>*Response 28*</u>

The various sections in Appendix F (e.g., Section F.2.1 for conversion to U_3O_8) indicate which processes are commercially available. An example is the conversion of UF_6 to UO_2 which is used by the nuclear fuel fabrication industry. The conversion of UF_6 to U_3O_8 through the introduction of steam is called defluorination and is practiced on a large scale industrial basis by COGEMA in France.Text has been added to Section F.2.1 to clarify that this process is practiced on a large scale industrial basis by COGEMA in France. There are a number of established and innovative technologies for UF_6 conversion. The PEIS is examining the possible benefits of these innovative technologies, in addition to commercially-available technologies, to establish the most appropriate strategy for depleted UF_6 management.

<u>Comment 29</u>

I think the document is a flawed document, and I think some of you may agree with me when I get through. And I am encouraged that Ched has — in conversations we've had he has said that there needs to be some modifications and I couldn't agree more.

<u>*Response 29*</u>

The December 1997 version of the PEIS was a draft. All public comments have been carefully reviewed and responded to. In addition, the PEIS has been revised as appropriate in response to the comments.

<u>Comment 30</u>

So there's three independent documents that were not (cited: the ORNL Report; the DNFSB Report, and NAS Report)-- I think they have very pertinent information because if you don't have a good feel for the condition of the cylinders, this has a lot to do with determining the use and the schedule and the painting and the cleaning and so forth.

<u>*Response 30*</u>

The reports referenced in the comment are valuable background references on the depleted UF_6 in general and its management options. Except for the ORNL report (titled Draft Preliminary Report-DOE Independent UF_6 Cylinder Assessment Team; 25 March 1992), the reports referenced in the comment were reviewed and used in preparation of the PEIS and supporting documents (for example, the engineering analysis report). A brief discussion of these reports has been added to the PEIS (see new Section 1.7) and references to the reports have been provided. The draft preliminary report was never finalized, so it is not cited in the PEIS.

<u>Comment 31</u>

Now, the seismic concerns. Even though Paducah is in much worse shape than this area, as been mentioned already, that doesn't make the problem go away as far as Oak Ridge is concerned. And there were three sentences in the Draft PEIS on this subject, and I'll read them because I know you can't read this in the back. And throughout this I'll just try to point out highlights because I don't want anybody to try to read all this. But here's what was indicated by PEIS. It says: The largest recorded earthquake in the region occurred in 1912 and was centered in New Madrid. The earthquake had a magnitude of 7.3 on the Richter, sixty miles from the plant. The estimated 1,000-year return period peak ground acceleration is 0.45 and so forth. Technically, I'm not a seismologist, and I don't take exception to this sentence. It could be technically correct. But it's extremely misleading. I think the average person that would look at this might think this is a 1,000-year event. His (Dr. Nuttli) studies, based on the stresses in the strata at this time, he said were sufficient to produce a 7.6. But, more importantly, this is a tremor worth fearing and it has the potential to strike this very day. I mean, it could happen tonight, you know. And my comments here are: Severe earthquakes will create multiple cylinder failures at Paducah, Oak Ridge, and Portsmouth storage areas. Yes. What's the definition of severe? But seven or eight certainly could happen in New Madrid.

Response 31

The seismic risk text in Section 3.3.4.1 of the PEIS has been modified to be consistent with material presented in the safety analysis report (SAR) for K-25 (LMES 1997h; the full citation is provided in Chapter 8 of the PEIS). The SAR does recognize and discuss the potential for multiple cylinder failures in association with an earthquake.

Comment 32

These were the numbers that we were given in our investigation in 1992, total 55,649, total thin wall cylinders. This was given to us by Lockheed-Martin and K-25 folks. Another report that we got was there was 54,000. The DNFSB report says 55,649 in '95; again, information supplied by Lockheed-Martin. But the Draft PEIS says 46,000.

Response 32

The PEIS addresses the cylinders which contain depleted uranium, that is, uranium with an assay less than 0.7110% U-235. Additional cylinders present at the sites contain normal UF_6 (assay equal to 0.7110% U-235) or enriched UF_6 (assay greater than 0.7110% U-235). Depleted, normal, and enriched UF_6 are very different materials in their end use. Disposition plans for the normal and enriched UF_6 would be quite different from those proposed for the depleted UF_6 and therefore would not be appropriately addressed under the current scope for this PEIS. If the number of cylinders containing normal and enriched uranium were added to the number containing depleted UF_6, they would total in excess of 55,000 cylinders.

Most of the cylinders at the three storage sites are large diameter cylinders (i.e., 48") that are filled to their capacity with depleted UF_6. Some smaller cylinders also contain depleted UF_6 and are included in the scope of the PEIS. Additionally, approximately 200 cylinders contain a small amount (commonly called a "heel amount" in the UF_6 industry) of depleted UF_6. Text has been added to the PEIS stating that these "heels" cylinders are a part of the inventory included in the scope of the PEIS. (See Sections 1.5.2 and 4.2.1 of the PEIS.)

The scope of the PEIS has been expanded to include up to 15,000 cylinders produced by USEC after July 1, 1993 that became or will become the responsibility of the DOE by the signing of two Memoranda of Agreement between DOE and USEC after publication of the Draft PEIS (DOE & USEC 1998a-b; the full citations are provided in Chapter 8 of the PEIS). In order to accommodate these new cylinders, the PEIS has been revised. Rather than increasing the amount of cylinders assumed to be processed annually, the revised PEIS assumes that the work-off period (the period over which the processes assumed in the PEIS, for example, cylinder preparation, transportation, conversion, manufacturing, would take place) has increased by approximately 6 years (i.e., from 20 to 26 years).

Comment 33

This is a work agreement signed by — or to Link Hall and Parks and so forth. FY '96. And it said: Complete annual inspection of 17,475 cylinders exhibiting accelerated corrosion. Anywhere there's moisture, that rate of corrosion is five to ten times that level, which greatly shortens the lives. And the corrosion is in the forms of pits, which makes it a little more difficult to determine how much wall is left and so forth. But that's just an idea of the numbers we're talking about that are in degraded condition.

Response 33

Prior to the current inspection program and database, it was necessary to estimate the number of cylinders requiring an annual inspection, i.e., those experiencing accelerated corrosion, severe pitting, and those in very poor storage conditions. Since that time, the number of cylinders requiring an annual inspection has decreased significantly from the number quoted in the comment due to the relocation of cylinders from previously poor storage conditions, improved inspection procedures, and the recoating of cylinder bodies.

Comment 34

This is an early report. This was reported by the Defense and the Safety Board in their report of '95, and this is the results that were provided to them by the Lockheed-Martin folks. They were looking at the early analysis of what might be going out in the cylinder yard. And they concluded that there might be twelve additional breaches that hadn't been detected, and the number could be as high as 200. I don't believe it's anything like — as high as that, but I sure wouldn't want to bet there's no leakers out there now. And the process, as maybe described earlier, is so slow that the big leak — the scientists at K-25 did some very, very good work, determined that that cylinder had been leaking for thirteen years, reacting and drooling on the ground and so forth.

Response 34

Since that early analysis, the study has been refined with additional data. Currently, the predicted number of breaches reported in the report entitled, "Prediction of External Corrosion for Steel Cylinders - 1998 Report," ORNL/TM-13568, February 1998, is one in 1998 (ETTP, K-yard) and one in 2000 (ETTP, K-yard). The values in this report were based on the assumption that the *historical trends would continue, and thus represent all baseline projections. Many of the yards are being improved, in which case the corrosion rates will probably be reduced. Additionally, all the cylinders have been inspected, with some cylinders being inspected annually. Prior to 1998, seven cylinders (one at Paducah, two at Portsmouth, and four at K-25) had been identified that had developed breaches, generally around spots previously damaged by handling activities.*

In 1998, one additional breached cylinder was identified at the K-25 site during the course of cylinder maintenance operations (i.e., cylinder painting); previous corrosion modeling had predicted that some additional cylinder breaches would be detected during such activities. The breach was detected during steel grit blasting of the cylinder surface in preparation for painting. An as-fabricated weld defect was opened by the blast process. The cylinder management program includes provisions for patching newly-identified breached cylinders to eliminate releases of material.

Comment 35

That's the biggie. This is the one that was leaking for an estimated thirteen years. The way they detect this, they were looking — checking this valve. And the people who were working on the valve happened to bend over and look down under the cylinder and here was this pile of green stuff. And so they made two attempts to patch it. I think on the third try they succeeded. This is what happens if you get close to — this is the cylinder that was near — I think maybe the leak was over in this area. But this lifting lug used to go out to about here like so. And the HF has completely eaten it up, and that's why the area all around here, the HF fumes are pretty devastating to the steel in the area.

Response 35

The commentor is describing one of two breached cylinders discovered at the Portsmouth site in 1990. The discovery of these breached cylinders lead to inspection of all the cylinders, the identification of 5 more breached cylinders before 1998 , and the development of an extensive cylinder project management plan (described in the Introduction to Appendix D of the PEIS). The conditions which allowed the breached cylinder to go unidentified for such a long period of time have been eliminated. As described in Appendix D, all cylinders are now inspected at least every four years (those with more extensive corrosion or pitting are inspected annually). Runoff from the new and reconstructed storage yards is also monitored, so that the presence of uranium compounds in the runoff would lead to prompt investigation of the source and identification of any breached cylinder. Of the seven breached cylinders discovered before 1998 (2 at Portsmouth, 1 at Paducah, and 4 at K-25) all have either been patched by welding a steel patch to the cylinder body, or have had their contents transferred to new cylinders. The four cylinders discovered at the K-25 Site were originally patched with temporary steel patches that were strapped on with steel and nylon bands. All of these patches have been replaced with welded steel patches, while the remaining breached cylinders have had the contents transferred by refeeding into the cascade at the gaseous diffusion plants. In 1998 one additional breached cylinder was identified at the K-25 site during the course *of cylinder maintenance operations (see response to Oak Ridge Public Hearing Comment 31 for further details). The cylinder management program includes provisions for patching newly-identified breached cylinders.*

<u>Comment 36</u>

So my question is, what is being done to protect these painters who are in blasting off the rust and painting in very close proximity to the cylinders? It may not be a problem. They only cite surface smears in the report on the lessons learned on the painting. It don't mention what kind of gamma protection, but I assume they had some, but it's not obvious in the report.

<u>Response 36</u>

Workers involved in cylinder maintenance are protected through a combination of planning, training, monitoring, environmental controls, and the use of personal protective equipment, as appropriate. For the specific recoating of cylinders, radiological control personnel at the sites perform pre- and post-work contamination surveys for detecting possible contamination and directing decontamination if necessary. In addition, workers are provided with radiation dosimeters to monitor external doses. All workers in radiological areas receive training (Radiological Worker II) prior to performing work on-site to ensure that they understand and are aware of the hazards associated with radiation and proper procedures to ensure safety. Workers must review and understand the applicable area-specific requirements prior to entry into specific radiological controlled areas. Cylinder refurbishing activities will be performed inside a containment building that is operated under negative pressure. Ventilation is used to control the dust concentration within the containment building. Air exhausted from the containment building will be filtered to prevent excessive dust emissions and control potential contaminants. Potentially contaminated dust will be controlled to the degree feasible. The selection of personal protective equipment for the painting is based on the physical, chemical, and radiological hazards and is determined by the Health & Safety Officer for the project. All personnel will utilize "as low as reasonably achievable" methods to reduce exposure and hazardous situations and all activities will be performed in accordance with the radiological requirements found in 10 CFR 835.

<u>Comment 37</u>

So they (the French) — since 1977 they have been converting their UF_6 to U_3O_8. And they have — and not only that, the containers, the three cubic meter metal containers, the powder is pressed to condensify it, and then these containers are stored in a metal frame seismically resistant modular shed. And they can accommodate — I think it's 288,000 metric tons in this facility.

<u>Response 37</u>

The PEIS considers in Appendix F an option similar to that suggested in the comment, which incorporates the conversion of UF_6 to U_3O_8 practiced on a large scale industrial basis by COGEMA in France. In the PEIS, the U_3O_8 product from the conversion step is then compacted and *stored in readily-available 55-gallon drums in a seismically-qualified building, prior to being transported for storage or disposal.*

<u>Comment 38</u>

Okay. Again, these are the — this is as reported in the PEIS, and these are some of my comments, quite obvious. Transportation of degraded cylinders is a problem on-site and a much more challenging, expensive off-site transportation problem. Conversion of the Paducah cylinders on-site would eliminate a very large part of the transportation problems as they've got the bulk of the cylinders. And my thought is that the Oak Ridge and Portsmouth cylinders — the conversion to start at a second facility if you expedite more timely conversion and to provide a technical and cost competitive situation which would benefit the taxpayer.

<u>Response 38</u>

The commentor's preference for conversion to occur at the Paducah site (and possibly also at the Portsmouth and K-25 sites) in order to reduce transportation risks, is noted by DOE. It should also be noted; however, that the PEIS did look at two cylinder preparation options which would allow transportation of substandard cylinders if necessary under the management alternative chosen. The two substandard cylinder preparation options looked at were the use of overcontainers for substandard cylinders, and the construction and operation of a cylinder transfer facility to transfer substandard cylinder contents to new cylinders prior to transportation (see Appendix E of the PEIS for details). Differences in cost of the various options was beyond the scope of the PEIS, but cost estimates have been provided in the cost analysis report (LLNL 1997b; the full citation is provided in Chapter 8 of the PEIS). To provide a conservative estimate of potential impacts, it was assumed for the PEIS that a conversion facility would be located at a separate site, requiring transportation of cylinders from the current storage sites. The potential impacts of transportation of cylinders are discussed in detail in Appendix J of the PEIS. Site-specific issues will be addressed in future planning and analysis documents when the site selection occurs.

<u>Comment 39</u>

This is one I had a little problem with. There's a statement in the EIS that in nearly forty years of handling, no accidents involving releases from cylinders containing uranium hexafluoride have occurred that has caused diagnosed irreversible adverse effect. The translation of that is death, plus serious injury. And this is what is in the NUREG report on the accident that happened at Gore, Oklahoma, at Sequoyah Fuels. On January 4th at 11:30 a.m. a Model 48 cylinder with uranium ruptured while it was being heated in a steam chest. The incident resulted in the death of one plant worker and injuries to several others.

<u>Response 39</u>

The PEIS text referred to is in Sections S.4.2.2 and 2.4.2.2, Facility Accidents Involving Releases of Radiation or Chemicals, as follows: "In nearly 40 years of cylinder handling activities, no accidents involving releases from cylinders containing solid uranium hexafluoride have occurred *that have caused diagnosed irreversible adverse effects among workers." The word solid is significant, because all the depleted UF_6 cylinders addressed in the PEIS contain solid UF_6 that is in storage at ambient temperatures. If a breach occurred during handling of a cylinder containing solid UF_6, the rate of UF_6 release would be significantly less than that which occurred in the Gore, Oklahoma accident. However, cylinders containing liquid UF_6 (which may be present if conversion is required under the management strategy selected), or cylinders engulfed in flame for a sufficient amount of time to cause hydraulic cylinder rupture will release their contents to the atmosphere quickly in the form of HF gas and particulate uranyl fluoride. Accidents of this nature have been assessed for all alternatives in the PEIS. The greatest initial hazard after such a release would be the HF, which can cause death if inhaled concentrations are high enough. The acute danger from exposure to HF gas is stated in Sections 4.3.1.2.1 and in Appendix C, Section C.5.2.1. The text in Sections S.4.2.2 and 2.4.2.2 was not intended to minimize the danger of exposure to HF gas; text has been added to the referenced paragraph to clarify that such exposure is life-threatening.*

<u>Comment 40</u>

This isn't an Oak Ridge problem, but one of the problems that we had in our investigation.--I think Bob would agree with this, is these three plants were operating like independent entities. The problems were the same, but everybody had a different method. Oak Ridge has asphalt yards, gravel yards. Portsmouth had concrete, which was the best. Paducah insisted that gravel was the best. And they finally — they've come around. They're putting concrete there.

<u>Response 40</u>

On May 5, 1995, the Defense Nuclear Facilities Safety Board (DNFSB) issued to the Department of Energy (DOE) a recommendation regarding the storage of depleted UF_6 in cylinders. In their response and acceptance of this recommendation, the Department committed to managing the UF_6 cylinder project using a systems engineering approach. This approach has been implemented through a 3-Site Management Project with project control to be accomplished through the institutionalization and maintenance of systems engineering for the project. As a part of this approach, a 3-Site Technical Manager has been appointed to provide recommendations and guidance to the project to ensure that technical consistency is achieved. Additionally, all procedures have been converted to three-site procedures and guidelines as necessary to ensure work is performed safely and consistently. Prior to this approach and implementation of systems engineering, each storage location was under the technical and programmatic direction of the managing site which did result in inconsistencies.

<u>Comment 41</u>

AVLIS. If AVLIS isn't dead, it's sure not too healthy. And many people feel that even if we have AVLIS, uranium is cheap, natural uranium with 0.7235, so why would you mess around with these cylinders and the problem handling it when you can get that 0.2 to 0.4235. Economically, it would seem to me that they prefer to use the natural uranium. And then blending down from the enriched material we're getting from the Russians and so forth and for weapons, said, would have little effect on the conversion to U_3O_8.

<u>*Response 41*</u>

The possible use of atomic vapor laser isotope separation (AVLIS) to re-enrich uranium is mentioned in Section S.1.1 and Section 1.1 of the PEIS as one of several reasons explaining why depleted UF_6 was stored at the current storage sites. Re-enrichment of depleted uranium using AVLIS technology is not considered in detail as a future use in the PEIS. However, as discussed in Section 2.3.2, if a more efficient enrichment technology, such as AVLIS, becomes commercially available in the future, using depleted UF_6 to make reactor fuel might become more advantageous than using natural uranium. The advantages and disadvantages of using depleted UF_6 for re-enrichment are discussed in the reports by White ("Environmental and Energy Analysis of the Refeed Option of Depleted Uranium Hexafluoride") and Gillette ("Cost Analysis for Refeed Option, Depleted Uranium Management Program") referenced in the PEIS and available for review at DOE public reading rooms near the three current storage sites and in Washington, DC (listed in the Notice of Availability). These reports can also be obtained by contacting the DOE program manager identified on the cover sheet of the PEIS.

4.4 WASHINGTON, D.C., PUBLIC HEARING ORAL COMMENTS AND RESPONSES

<u>Comment 1</u>

Thank you very much and good afternoon. There's no secrecy. I'm Andrew Lorimer from British Nuclear Fuels, BNFL. We share the problem with the United States in that we have tails material of our own in Europe. Our quantities are 30,000 metric tons rather than the 500,000 metric tons that you've got, but the problem remains the same. In the UK we currently have the same policy which we welcome in this report. We look at this material as a strategic material. We should be continuing to store the material and looking at ways in which it can be done safely whilst we find uses for that material. Again from the UK's point of view, we have the luxury, if not the handicap, of not having anywhere to put this material if we did want to decide to put it away now. We have a pecking order for disposal. Our repository is probably slightly more remote than your Yucca Mountain, but at the best will of the world, because of other materials, this material would not be available for disposal, ultimate disposal, until 2050 which, if you think about the economics of processing it now, discounting makes the cost of conversion into alternative forms relatively significant compared to the ultimate disposal process.

<u>*Response 1*</u>

Comment noted.

<u>Comment 2</u>

In terms of finding uses for this material, it's important that we recognize that the material does not disappear. You can convert it hopefully into forms for which there is a use. This is both an economic and an environmental advantage. But at the end of the day, some of this material is going to exist and certainly in terms of material which has nuclear connotations, i.e., the uranium, it remains significant and, therefore, if we convert it into an alternative form for use or for storage, we have ultimately to take account of the environmental and economic effects of disposition including the end disposal.

<u>Response 2</u>

The DOE recognizes the long half-life of uranium and the associated concerns. However, the PEIS did not address in detail the ultimate disposition of uranium after use because actions to be taken beyond the 40 year period considered in the PEIS (with the exception of long-term disposal impacts) are considered highly uncertain and speculative at this time. For instance, products containing depleted uranium potentially could be stored, recycled for other uses, or treated and disposed of as low-level waste. In addition, future regulatory requirements concerning disposal may differ significantly from current requirements. To address such issues, a discussion related to potential life-cycle impacts and the final disposition of products containing depleted uranium has been added to the PEIS in Section 5.9.

<u>Comment 3</u>

On that basis, we see that there is an omission in the current PEIS which is the use of metal or the implications for metal of disposal. Metal is identified in the report for its potential uses. We see that on the argument that even if you use it, you've got to dispose of it at the end of the day, but also in its own right, metal has potentially certain advantages for long-term storage and ultimate disposal and we would invite the DOE to add that long-term storage and the disposal issues associated with metal along with those of oxide and other forms.

<u>Response 3</u>

The reasons why elemental uranium metal was considered but not analyzed in detail for long-term storage and disposal are provided in Sections 2.3.3 (Long-Term Storage) and 2.3.4 (Disposal) of the PEIS. Disadvantages associated with long-term storage of uranium metal include higher conversion cost, lower chemical stability than uranium oxides, and uncertainty about the suitability of the metal form for eventual disposal in large quantities. The reasons for considering but not analyzing in detail the options for long-term storage and disposal of depleted uranium metal are also explained in Sections 4.4 and 4.5 of the engineering analysis report (LLNL 1997a; the full citation is provided in Chapter 8 of the PEIS). Sections 2.3.3 and 2.3.4 of the PEIS have been expanded to add more detail from the engineering analysis report.

The engineering analysis report is available for review at DOE public reading rooms near the three current storage sites and in Washington, DC (listed in the Notice of Availability), and can also be obtained by contacting the DOE program manager identified on the cover sheet of the PEIS.

Comment 4

Transport has been mentioned. Again, we concur with the general conclusions of the transport. We've looked at the transportation of the tails from a European perspective, both from BNFL and also from Urenco, as an enricher. And the integrity of the container is an important thing, that there is no problem, there is a lot of experience, a lot of very good safety record of moving sound containers containing UF_6. So if the containers are sound, the transportation is not a difficulty.

Response 4

The comment is noted. Prior to transportation, the cylinders would have to meet DOT transportation requirements for UF_6 (as given in 49 CFR 173). Any cylinders not meeting these standards would either have the contents transferred to new cylinders, or be placed in overpacks which would also meet DOT transportation requirements. Details on the overcontainer and cylinder transfer facility options are given in the Appendix E, Section E.2 of the PEIS, and in the engineering analysis report (LLNL 1997a; the full citation is provided in Chapter 8 of the PEIS). All other materials requiring shipment under the management strategy selected would also be transported in certified containers conforming to all applicable shipping regulations.

Comment 5

The problem occurs when the containers are of dubious quality. And we would caution against assumptions that these can be moved simply in an overpack. The overpack itself has to act as the containment of the material in the event of a rupture of the original container and our practice would be to gas off the cylinders and put them in sound cylinders before they're moved, so that has cost implications to the program.

Response 5

Many of the depleted UF_6 cylinders in storage would not meet DOT transportation requirements because they are either overpressured, overfilled, or of substandard quality. In the PEIS, the options assessed for transporting these "problem" cylinders were to transport them in overcontainers, or to transfer the cylinder contents to new cylinders. Any overcontainer selected for use would have to meet requirements such that, when loaded with a damaged, deteriorated, or breached UF_6 cylinder, it could safely be subjected to the same handling, storage, transportation, pressure, temperature, and operational requirements as new Model 48G cylinders (see the engineering analysis report, Chapter 6 for more details). The human health and environmental impacts of using overcontainers to prepare problem cylinders were found to be lower than those of transferring the contents of problem cylinders to new cylinders. However, the impacts of the two options were not significantly different from one another.

Comment 6

In terms of the risk analysis of transportation, we found from a risk analysis basis the dangers of actually moving heavy material from A to B — and Ched mentioned the question of people being run over or so forth — these greatly exceed any chemical or radiological hazard resulting from an accident. So it's actual physical transportation of the quantities that are important. I think that's all I need to say.

Response 6

Comment noted. As summarized in Section J.1 of Appendix J, the transportation analysis for the PEIS shows that the vehicle-related risks exceed the chemical and radiological risks for transportation of the depleted uranium and related materials.

Comment 7

In its report, the DOE examined six alternatives but its analysis is incomplete and deficient. The DOE's effort to address the long-term management of the country's depleted uranium hexafluoride, specifically the realization of the importance to convert this material into a stable form, is long overdue. The Draft PEIS is seriously deficient because it doesn't address the most environmentally appropriate option. Specifically, the DOE did not include the alternative of disposing of depleted uranium according to the rules of 40 CFR 191 which governs the disposal of transuranic waste. IEER (Institute for Energy & Environmental Research) in its comment on DOE's notice of intent has already noted that their proposed list of alternatives was incomplete since it did not include the option of disposal under 40 CFR 191.

And I will summarize with IEER's recommendation which are depleted uranium should be classified as a waste equivalent of transuranic waste for management purposes. UF_6 should be converted to an oxide form and declared a waste to be handled on a par with repository designated TRU waste with the possible exception of a relatively small quantity to be used for the blending down of highly enriched uranium. This should be the preferred option in the Final PEIS.

Response 7

The commentors preference for depleted uranium to be considered as transuranic waste that would be disposed of in accordance with 40 CFR 191 is noted. Depleted UF_6 is a source material. For purposes of evaluating disposal options in the PEIS, it has been assumed that depleted UF_6 would be converted into an oxide. This oxide form would be considered to be a LLW. Only waste containing more than 100 nanocuries of alpha-emitting transuranic isotopes per gram of waste, with half-lives greater than 20 years, is classified as TRU waste. Waste containing depleted uranium with no or little TRU radionuclides does not fall within this definition. Therefore, disposal of depleted uranium oxides resulting from the conversion of DOE's depleted UF_6 inventory would not be subject to the regulations specified in 40 CFR 191. The material would be classified as LLW and the disposal alternative evaluated in the PEIS considered it to be LLW.

<u>Comment 8</u>

The DOE has rejected our comments without providing any technical or environmental explanation. Our comments are attached. If you're interested, I can give you these comments. DOE should include this option in the Final PEIS.

<u>Response 8</u>

All comments received during the scoping process were considered in defining the scope of the PEIS. Appendix L of the PEIS contains a summary of the responses to comments received during the scoping process.

<u>Comment 9</u>

IEER agrees with DOE that no action alternative is inappropriate and should be rejected because of the dangers of UF_6 storage. For the same reason, long-term UF_6 storage in new containers should also be rejected. Overall conversion to oxide would reduce risks. While conversion poses risk to workers and the outside population, continued storage also poses serious risks. However, the various alternatives that DOE has considered have not been properly assessed in this PEIS

<u>Response 9</u>

The purpose of the PEIS is to present and compare the potential environmental impacts from alternative strategies for the long-term management of depleted UF_6, including evaluation of the no action alternative. The alternatives considered and the assessment assumptions, methods, and supporting data were carefully selected to provide a meaningful and relevant evaluation of potential environmental impacts. Although some differences exist, the results of the PEIS indicate that the potential impacts to human health and the environment are generally similar among the alternatives considered. The ultimate decision on a management strategy will be announced in a Record of Decision. The Record of Decision will consider the results of the PEIS, along with other information, such as cost and engineering data, to select a management strategy. The Record of Decision will document the strategy selected and describe how it was selected from among the different alternatives.

<u>Comment 10</u>

Now I will address the conversion of uranium hexafluoride. Most of the alternatives considered involve the conversion of uranium hexafluoride, but DOE's analysis is incomplete or deficient in regard to several points. The first one is the fate of the empty cylinders. In its PEIS the DOE doesn't say what will happen to the empty cylinders and that means that the ultimate disposition of the empty cylinders was not analyzed in detail as part of the alternative management strategy, and we don't think this is acceptable.

<u>*Response 10*</u>

The management of empty cylinders was addressed in the PEIS in association with the conversion options (Appendix F), as well as in a support document entitled "Analysis of Options for Disposition of Empty Depleted Uranium Hexafluoride Cylinders" (Nieves et al. 1997). In the PEIS, for each alternative requiring conversion, the impacts of constructing and operating a cylinder treatment facility were included in the impact analysis. This analysis assumed an initial storage period of 3 months after UF_6 removal from the cylinders to allow the level of radioactivity associated with the decay products of uranium to decrease to acceptable levels. The cylinders would then be washed with water to remove the heels; finally the cylinders would become part of the DOE scrap metal inventory. As a part of the waste management analyses in the PEIS, the impact of disposal (i.e., burial) of the empty cylinders as low-level waste was also examined (Section F.3.7.4). It was found that the empty cylinders would represent only approximately 3% of the projected DOE complex-wide volume of LLW expected to be generated during the time period examined (i.e., through about 2030). The above-cited report by Nieves et al. analyzed the potential health and cost impacts associated with various options for the empty cylinders after treatment, including recycle, reuse, disposal (i.e., burial), and free release. Health endpoints assessed included chemical risks, radiation risks, and trauma risks. Total inventory health risks over 20 years of processing ranged from 0.1 to 0.8 total fatalities for the various options. The potential health impacts were similar for each of the options; however, the disposal option would have the greatest adverse environmental impacts due to land-allocations required and removal of the metal mass from any further usefulness. Text has been added to Sections 2.3.6 and F.2 of Appendix F of the PEIS to summarize the results of the Nieves et al. analyses. The Nieves et al. report and other PEIS supporting documents are available to the public through the DOE public reading rooms near the three current storage sites and in Washington, DC (listed in the Notice of Availability), and can also be obtained by contacting the DOE program manager identified on the cover sheet of the PEIS.

<u>Comment 11</u>

The second point is the commercial use of contaminated hydrogen fluoride which is produced during conversion. The DOE has not properly assessed the management of both hydrofluoric acid which is a byproduct of the conversion process and calcium fluoride, a product of the neutralization of hydrogen hydrofluoric acid. The DOE in its Draft PEIS assumed that these products could be commercially sold for unrestricted use which is quite a problem and it admits that public acceptance will be rather difficult.

<u>*Response 11*</u>

The PEIS evaluates several options for the fluorine-containing products of conversion, as follows: (1) that hydrogen fluoride (HF) produced during conversion could potentially be sold for use; (2) that the HF could be neutralized by the addition of lime to form calcium fluoride, which could also be sold for use; or (3) that the HF could be neutralized to form calcium fluoride, which would be disposed of either as nonhazardous solid waste in a commercial landfill or as low-level waste (LLW), depending on the uranium concentration and applicable disposal regulations at the *time of disposal. These various use and disposal options for HF and calcium fluoride are described in Sections 2.2.3, 2.2.4, 2.2.5, 2.2.6, and Section F.2 of Appendix F; the potential waste management impacts of the various options are described in Sections 2.4.8, 5.3.7, 5.4.7, 5.5.7, 5.7.8, and Section F.3.7 of Appendix F. Additionally, the risks from storage and transportation of HF if HF production were part of a conversion option chosen for implementation are presented in Sections 2.4.2.2 and 2.4.3. The ultimate decision concerning HF or calcium fluoride production will depend on the conversion process selected, the residual uranium concentrations, market demand, and both public acceptance and regulatory considerations. In response to this uncertainty, the potential environmental impacts of options for both production and sale of HF, and production and sale or disposal of calcium fluoride, are considered throughout the PEIS.*

Comment 12

Also, the DOE has not addressed the fact that part of the UF_6 inventory is recycled UF_6 which is contaminated by radionuclides although the uranium-238 such as technicum-99 and uranium-236 which both have a long half life and, as far as I know, there are three sides of this problem of technicum-99 at least.

Response 12

Between 1953 and 1975, some recycled uranium was fed to the Paducah gaseous diffusion plant and to the gaseous diffusion plant at Oak Ridge. The recycled uranium does contain the isotopes mentioned in the comment. However, these isotopes are lighter than U-238, and consequently tend to preferentially end up in the enriched product when they leave the enrichment cascades. The amount of Tc-99 and U-236 in the depleted UF_6 inventory is too small to make a significant difference in the health and safety analyses results presented in the PEIS.

Comment 13

The third point is the radiological effects on workers during the conversion process. In their calculation of radioactivity dose assessment, DOE doesn't take into account internal radiation doses that would be received by involved workers during the conversion process and that certainly needs to be addressed.

Response 13

Radiological impacts were evaluated in the PEIS for both involved workers (those involved in hands-on activities) and non-involved workers (workers at the site not directly involved in hands-on activities) during conversion operations. The assessment of the radiation dose to non-involved workers considered internal radiation from the inhalation of radioactive material released through exhaust stacks. The evaluation of the dose to involved workers was limited to external radiation exposure. Internal radiation doses would be expected to be much smaller than external doses because (1) processes would be enclosed, (2) ventilation controls would be in place to inhibit airborne emissions within facilities, (3) indoor air would be monitored to ensure concentrations were below applicable standards, and (4) workers would be provided with *appropriate personal protective equipment (e.g., respirators) if internal exposures were possible. In addition, dose monitoring is required for all radiation workers. Radiation workers are routinely monitored for external exposure and, in cases where workers are likely to be exposed to free contamination, for internal exposures by use of bioassay or whole-body counting. The worker doses are kept below approved administrative and regulatory limits. They are also kept as low as reasonably achievable (ALARA). Furthermore, the conceptual nature of the conversion, storage, manufacturing, and disposal facility designs does not allow for an accurate estimate of potential indoor air concentrations at this time.*

Comment 14

Now I will address the uses of depleted uranium. In its PEIS, DOE's preferred alternative is to use the entire inventory of depleted uranium after its conversion to metal or oxide form for radiation shielding in storage casks for spent fuel. However, since these casks would have to be licensed by the NRC, this choice is premature. Even if the license is approved, cast fabrication creates more problems than solutions. It is not a final solution since the cask conversions do not meet the criteria for deep repository disposal, and DOE doesn't say what will happen to the depleted uranium in these casks.

Response 14

As described in Section 2.2 of the PEIS and Appendix H, the two use options evaluated in the PEIS, use as uranium oxide and use as uranium metal as radiation shielding, are representative and were selected to provide a basis for comparing the potential environmental impacts of broad, programmatic management strategies. The selection of these use options for analysis in the PEIS was not intended to imply that the PEIS will be used to select a specific end-use or preclude other potential uses in the future. The PEIS does not state a preference for the end-use products. Consequently, discussion of issues related to specific uses, such as NRC licensing of spent fuel casks, is considered beyond the scope of the PEIS. Such issues would be considered and evaluated in more detail in future planning and environmental analyses. A discussion of issues related to the final disposition of products containing depleted uranium has been added to the PEIS in Section 5.9. This section acknowledges the uncertainties associated with the ultimate disposition of the material and notes that at the end of their useful lives products containing depleted uranium potentially could be stored, recycled for other uses, or treated and disposed of as low-level radioactive waste.

Comment 15

Then DOE addresses some other uses, not in depth, but which could have very serious consequences if they are being implemented. With the long-term storage options, DOE preserves the possibility to pursue the use of depleted uranium in light water reactor fuel cycle, advanced reactor fuel cycles and advanced material applications. The light water reactor option has two sub-options, the re-enrichment of depleted uranium and the use of depleted UF_6. Among these options, the fact that the use of depleted uranium in advanced reactors, which is another name for breeder reactors, is at all considered is particularly disturbing. Depleted uranium being the raw material for plutonium production when converting it into material not only much more radioactive but also weapons usable would not only defeat the purpose of the PEIS which is, in quotes, "Achieve the safe and effective long-term management of depleted UF_6" and it would also have serious proliferation consequences.

<u>*Response 15*</u>

As described in Section 2.2 and Appendix H, the two use options evaluated in the PEIS, use as uranium oxide and use as uranium metal as radiation shielding, are representative and were selected to provide a basis for comparing the potential environmental impacts of broad, programmatic management strategies. The selection of these use options for analysis in the PEIS was not intended to imply that the PEIS will be used to select a specific end-use or preclude other potential uses in the future. If a use strategy is selected in the Record of Decision, specific uses would be considered and evaluated in more detail in future planning and environmental analyses as appropriate. Careful consideration would be given to whether the benefits of any proposed use outweigh the potential risks. Regarding the use of depleted uranium in advanced reactors, the United States has no active breeder reactor program at this time. Implementation of an advanced reactor fuel cycle would require a change in national policy.

<u>Comment 16</u>

We think that the PEIS has some uses which are not analyzed and specifically the feasibility of using depleted uranium hexafluoride for the blending down of surplus highly enriched uranium was not considered in this PEIS. Although it would utilize only a small portion of the stock, this use would have several advantages, among them the contribution to nonproliferation, a minimum of handling, and incorporation of depleted uranium into spent fuel. This use option could be made part of any of the alternatives except UF_6 storage.

<u>*Response 16*</u>

The two use alternatives evaluated in detail in the PEIS, use as uranium oxide and uranium metal as radiation shielding, were selected as representative options for the purposes of comparing the potential environmental impacts of broad alternative management strategies. These options were intended to be representative only, and were not intended to preclude other potential uses in the future. Specific uses, such as use for blending down highly enriched uranium, would be considered and evaluated in the implementation phase (Phase II) of the program as appropriate. Several alternatives for managing highly enriched uranium were evaluated in the Disposition of Surplus Highly Enriched Uranium Final Environmental Impact Statement, issued in June 1996, as summarized in Section 1.6 of the PEIS. It is expected that such uses would require only a small fraction of the depleted UF_6 inventory currently in storage and would not affect the selection of a long-term management strategy. A reference to the potential use of depleted uranium for blending has been added to Section 2.3.2 of the PEIS.

Comment 17

But nevertheless, to recycle this material the first gentleman pointed out the one unequivocal thing one must recognize is that it's still radioactive at the end of its functional life. No matter what that is, its half life being over five billion years, is going to outlast most of us and, as a consequence, any recycled, reused storage or whatever needs to contemplate the long-term outcome.

Response 17

The DOE recognizes the long half-life of uranium and the associated concerns. However, the PEIS did not address in detail the ultimate disposition of uranium after use because actions to be taken beyond the 40 year period considered in the PEIS (with the exception of long-term disposal impacts) are considered highly uncertain and speculative at this time. For instance, products containing depleted uranium potentially could be stored, recycled for other uses, or treated and disposed of as low-level waste. In addition, future regulatory requirements concerning disposal may differ significantly from current requirements. To address such issues, a discussion related to potential life-cycle impacts and the final disposition of products containing depleted uranium has been added to the PEIS in Section 5.9.

Comment 18

And the long-term outcome, as I see it, should be chosen on the basis of the minimum cost path to an acceptable long-term or essentially geologically equivalent management strategy. There's a lot of simple and very expensive ways we can get to a safe long-term outcome. There are much fewer economic ways.

Response 18

The ultimate decision on a management strategy, which will be announced in a Record of Decision, will consider cost information along with the results of the PEIS, engineering data, and other pertinent information. The Record of Decision will document the strategy selected and describe how it was selected from among the different alternatives.

Comment 19

When we talk of depleted uranium as a resource, we have to talk out of two sides of our brain. On one hand, the fluorine material, if properly extracted and mined, can in fact have an economic resource recovery value. The depleted uranium, until there's a lot more people in line wanting to use it, does not have an economic recovery value, and I think the strategy that needs to be chosen is one that will minimize the cost on getting to the geological repository disposal and, more importantly, minimizing it in a context of all of the other nuclear waste management issues under the responsibility of the Department of Energy.

Response 19

The commentor's preference is noted.

Comment 20

To wit, I would like to mention spent fuel, one that most of you are relatively familiar with. The spent fuel storage issue, be it geologic or the interim storage facility, there is no solution today and I offer DUCRETE which, for those of you not familiar with it, is simply to take the depleted uranium hexafluoride, extract the fluorine value from it as best as you can and as economically as you can. You now will have converted it into an oxide, just as the last couple of speakers mentioned. In an oxide form you have a chemically stable, inherently relatively benign material. If you keep it out of your lungs, it ain't going to hurt you. That's health physics for depleted uranium. And then the next step after that that I advocate is the conversion to a ceramic aggregate which the work we did at INEL has formed an extremely stable ceramic aggregate that's comparable in leach resistance to some of the high level waste glasses that have been developed. That ceramic aggregate can now be mixed with traditional concrete materials and made into concrete. With a density of about 400 pounds a cubic foot, you have a uniquely different shielding material than ever before contemplated by mankind because in a technical context you have both the high density associated with uranium which other materials have high density, but you also have hydrogen embedded in the matrix for the attenuation of neutrons. So you have a uniquely capable material to use for high level waste and spent fuel storage applications. In the means of processing this thing, you have now incorporated the uranium into an extremely stable geologically safe repository waste form that at the end of the useful life of the containers can then be disposed of either with the containers in a repository — and for some of you, you've seen I have many papers on how I would redesign the repository which I won't get into today. But there are many safe and very practical things that, if the Department takes the context of uranium management in the system context of its other management issues, you will come up with a different solution than by separating these things into what has become popular the last two years called the stovepipes where you separate the solutions and ignore the fact that there's the functional equivalent of 11,000 containers of depleted uranium concrete casks could be made and supplied and use up this entire inventory including the generous contributions yet to come from the U.S. Enrichment Corporation.

There's an interesting system match between the amount of material that we've mined, converted into fissile material, used in reactors and the tails left over such that in the studies I've done under the INEL work in the past years and most of which are public documents, you'll find that there's enough inventory now for about 8,700 casks and with the USEC generating about 300 cask equivalents per year, we won't run out of DU before we encapsulate all of the spent fuel in a DUCRETE system which leaves the entire management in an environmentally responsible final physical form that is stable for very, very long periods of time.

Response 20

The commentor's preference for use of depleted uranium in DUCRETE is noted. The PEIS considers the potential use of DUCRETE in depleted uranium shielding. As noted in Appendix H of the PEIS, the PEIS evaluates two options for the manufacture and use of depleted uranium shielding, one of which is the uranium oxide option, which is based on the use of dense uranium oxide (UO_2).

This option uses dense uranium oxide in the manufacture of depleted uranium concrete for shielding in spent nuclear fuel storage casks, to produce an uranium concrete material known as DUCRETE.

Comment 21

So with that, I think I will mention one other important thing is that all of that which looks good on paper doesn't mean a damn thing unless we get on with it today. This has been talked about futilely myself for over four years in my efforts at INEL and since I've left INEL a year and a half ago with the company I'm now employed by. The spent fuel storage system is evolving. It is being designed. It can't be retrofitted easily with DUCRETE without causing large financial perturbations on those companies that are active in it. If this option is to be available to the Department, it must be implemented on a timely basis and from the system consideration I'm talking about so that all the departments who have some role in these various disposal issues will focus on it as a combined problem and develop the synergy that can be brought to it. So the action is required now, not 10 years from now when the commitments and fuel storage, fuel transportation for Yucca Mountain are all well established and you can't walk backwards without incurring billion dollar type of cost liabilities.

Response 21

The commentor's preference for prompt implementation of the uranium oxide concrete (DUCRETE) spent fuel storage cask option is noted.

Comment 22

Related to what I said at the outcome and the British gentleman said, this stuff is a low level waste under any stretch of the imagination and there needs to be a final disposition planned in advance. It's not called a resource when somebody has to take the liability potentially — Barnwell, for example-- of $300 a cubic foot and then some and God only knows what it might be 20 or 50 years hence.

Response 22

An evaluation of impacts of any specific plan for disposal would be included in a project-specific NEPA document following strategy selection. The analysis in the PEIS is at a more general level appropriate for the selection of a strategy. Once the strategy is selected, and should that strategy involve disposal, the project-specific disposal plan analysis would be done. However, for purposes of evaluating strategies involving disposal, it was assumed that depleted UF_6 would be converted into an oxide form and thereafter disposed of as a low level radioactive waste. The PEIS evaluates the impacts of such disposal on human health and the environment (section 5.6 of the PEIS). The potential disposal impacts are evaluated for two different uranium oxides — U_3O_8 and UO_2. For each disposal form, several disposal options were considered, including disposal in engineered shallow earthen structures, below-ground vaults, and a deep mine.

<u>Comment 23</u>

I think to support and encourage the deployment of resource applications of the uranium material, be it an oxide or in any other form that makes economic sense, that there needs to be a policy issue addressed and probably Congress has to get in the act that at the end of the day when the sun sets that there will be a facility owned and operated by the DOE to ultimately receive the material. Without that, no commercial company is going to take on the liability of owning an inventory of material even if the regulators would allow it — and in most states that wouldn't happen — and taking on this liability that's going to essentially put their stockholders in bankruptcy. So recycle is a wonderful word but only if all the parts fit together. It's got to be the economics. It's got to be the final disposition and the action has to be taken now or those few, very, very few applications will disappear as the evolution of spent fuel storage issues move forward in the country. Thank you.

<u>Response 23</u>

Use of products made from either depleted uranium oxide or metal is possible today in non-commercial environments such as DOE or the Department of Defense, consistent with government policy, procedures, and regulations. To be used outside of those environments, the planned uses would have to be consistent with policies and regulations of the Nuclear Regulatory Commission. DOE believes that the private sector, rather than the Government, may be better able to provide solutions for the management of the depleted UF_6 inventory. On March 4, 1999, DOE issued a Request for Expressions of Interest for a Depleted Uranium Hexafluoride Integrated Solution Conversion Contract and Near-Term Demonstrations. (This is referred to on page 13 of the March 8 issue of the Commerce Business Daily *published by the U.S. Department of Commerce.) Responses to this request will provide DOE with information to develop a detailed procurement strategy for an integrated approach to the management of DOE's depleted UF_6 inventory.*

<u>Comment 24</u>

As I said down here, unfortunately, this report six years is still considered draft, preliminary draft. It's never been issued for public dissemination which was contrary to every investigating team that I worked on while I was at the Department of Energy. Needless to say, this report, even though not formally issued, has received wide dissemination by me.

<u>Response 24</u>

The comment regarding the "Draft Preliminary Report — DOE Independent UF_6 Cylinder Assessment Team" is noted.

<u>Comment 25</u>

More disturbing are the next two. As a result of my concerns and others' concerns, DNFSB–everybody, I think, knows that hieroglyphic–but the Defense Nuclear Facility Safety Board, looked at the cylinders of K-25 and they decided investigation would be appropriate and they spent about six or seven months with a high quality team of former nuclear Navy types under Doctor

Woody Cunningham and they issued a report on May 5, 1995. Here's the number. DNFSB TECH-4. Not only was the preliminary draft report not cited in the EIS which is not maybe too surprising, but this report is not cited either.

Response 25

The preliminary draft report referred to in the comment is the March 25, 1992, Draft Preliminary Report by the DOE Independent UF_6 Cylinder Assessment Team. Because this report was never finalized it is not cited in the PEIS. The referenced DNFSB Tech-4 report was followed by DNFSB Recommendation 95-1, which made specific recommendations to DOE to address the problems identified in Tech-4. DNFSB Recommendation 95-1 has been addressed by DOE and was used in the preparation of the PEIS to the extent practicable. DNFSB Recommendation 95-1 was listed in the reference section of the Draft PEIS, but on review of the text it was decided that further details on the recommendation and its relationship to this PEIS would be informative. A summary of the DNFSB report and DOE's actions in response to the DNFSB recommendations has been added to the PEIS (see new Section 1.7).

Comment 26

And third, even more disturbing is the fact that an investigation or examination by the National Academy of Sciences and National Research Council did a very extensive study. This is the preliminary ORO report. This is the DNFSB report and this tome is the National Research Council report. "The Opportunities for Cost Reduction in the Decontamination and Decommissioning of the Nation's Uranium Enrichment Facilities" and there's one or two chapters in here that are devoted specifically to the subject of this meeting and that's the depleted UF_6. That again is not cited in the environmental impact statement. And I'm glad to hear there's an emphasis on this. A draft is a draft and it's going to be revised and I talked with Ched a little bit and he told me that he thought it would be appropriate to maybe mention these reports which are specific to this problem. The National Research Council team, and they spent about 18 months, I believe, investigating this. This laundry list of names here are outstanding engineers and scientists in this nation that did this study and there were several of these. Doctor May and Doctor Schneider, Georgia Tech and University of Illinois, that headed a sub-task that looked at depleted uranium. And when I talked to Doctor Zuccheeto, who is the study director, recently he was quite surprised, disappointed, shocked, however you want to characterize it, that none of the information that they generated was used in the PEIS.

Response 26

Much of the information provided in the report Disposition of the DUF_6 (Chapter 7 of the 1996 National Research Council's "Affordable Cleanup? Opportunities for Cost Reduction in the Decontamination and Decommissioning of the Nation's Uranium Enrichment Facilities" consists of preliminary estimates of costs associated with various options for disposition of the depleted UF_6 inventory. Cost analyses are not within the scope of the PEIS. However, the report is a valuable background reference on the depleted UF_6 in general and its management options. This report as *well as some other general reports on the subject were reviewed and used in preparation of the PEIS and supporting documents, for example, the engineering analysis report. A brief discussion of these general reports has been added to the PEIS (see new Section 1.7) and references to the reports have been provided.*

Comment 27

I'll switch gears now to my seismic concerns. I'd be waiting to see a copy of this for nine months. It was originally planned to be issued in March of last year and then June and September and then finally Christmas Eve I got a package. I told my wife that was the nicest Christmas present I could get. She always thought I was a little weird but that confirmed it. I told my wife the first thing I'm going to do is a sanity check. I'll read you what's said in the EIS. "The largest recorded earthquake in the region occurred in 1812 and was centered in New Madrid Fault Zone. This earthquake had a magnitude of 7.3 on the Richter scale and the epicenter was 60 miles southwest of the site. Paducah, of course. The estimated 1,000 year return period peak ground acceleration was 0.45 of the acceleration to gravity." I'm no seismologist, but I think that the general public, with their lack of detailed knowledge of seismology, might interpret this as 1,000 year return period or reoccurrence frequency. And, as I've said before, my 95 year old mother and my 12 year old grandson know more about the New Madrid earthquake than was displayed in this document. This is one of many, many references to that subject and I have a file about two or three inches thick in New Madrid in my home in western Kentucky. But in The Coming Quake by Heppenheimer 1988, references the New Madrid earthquake. Without reading all the details, there were four major earthquakes. The smallest was 8.3 and the largest was 8.8 over a three month period. Greater than any earthquakes ever hit the United States. Three or four times higher than anything California has ever seen and some people think maybe it was the largest earthquake in the history of the earth. Doctor Otto Nuttli, who is the guru of this subject and several other people have confirmed to me that he is quite a knowledgeable expert, in a paper issued in the Journal of Seismology in 1973 said there was enough stress built up in the faults in New Madrid to generate a 7.6 earthquake. Remember the EIS said 7.3. And this is a tremor worth fearing. It has the potential to strike tomorrow, not 1,000 years from now or not 500 years from now. That doesn't mean it's going to happen, but the potential is there. This shows kind of the bull's eye. The selectors of the Paducah site must have used this map to pick the site. Paducah is right about here and this is the New Madrid quake and this is Doctor Nuttli's prediction based on a 7.6 Richter and, as you can see, Knoxville and Oak Ridge is a little bit out of the range there but the characteristic of New Madrid is quite — for those of you, I don't want to talk down to anyone on this subject — but the earthquakes in the New Madrid area were a hell of a lot more severe than anything in California. I mean they extend for hundreds and hundreds and hundreds of miles without much dissipation of force, quite in contrast to the California quakes. I'm sure you've all heard about that 1812 ringing the church bells in Boston which it did.

Response 27

The PEIS addresses the potential for seismic activity at each of the three storage sites in Sections 3.1.4.1, 3.2.4.1, and 3.3.4.1. Of the three storage sites, an earthquake which could cause more than slight damage is considered credible (though highly unlikely) only for the Paducah site. The text of Section 3.1.4.1 of the PEIS has been revised to be consistent with information presented in the safety analysis report for the Paducah Gaseous Diffusion Plant.

The analysis of accident scenarios for continued cylinder storage (Section D.2.2 of the PEIS) was based on the range of potential accident scenarios considered in the safety analysis reports recently prepared for each of the three storage sites (LMES 1997f-h; the full citations are provided in Chapter 8 of the PEIS). The SARs considered a range of potential accident scenarios that could be associated with current storage activities, including natural phenomena events such as earthquakes. The accidents considered in the PEIS for current depleted UF_6 cylinder storage were extracted from those evaluated in the SARs. The accidents selected for the PEIS analysis were those accident scenarios in the SARs that resulted in the greatest potential consequences at each of the three storage sites. These accidents did not include earthquake scenarios, which were found in the SAR analyses to have lesser consequences than the accident scenarios discussed in the PEIS. The text in Section D.2.2 of the PEIS has been modified to clarify this point. If the safety analysis reports are revised in the future, DOE will modify its cylinder management program to ensure that the safety of the cylinders is maintained.

Comment 28

There's a little concern about — or at least I have a little concern about how many cylinders we're talking about. Again, without going into all the details, in our investigating team we were told there were 55,649 thin wall cylinders of various models. The DNFSB team was told in '95 55,000 and the direct EIS is 46,400. Now there may be a very good explanation for this, but I'm not sure what it is but, as Ched pointed out, the number is going to go up about 10,000 if the privatization occurs so it's such a big number I guess it doesn't matter whether it's off five or ten thousand.

Response 28

The PEIS addresses the cylinders which contain depleted uranium, that is, uranium with an assay less than 0.7110% U-235. Additional cylinders present at the sites contain normal UF_6 (assay equal to 0.7110% U-235) or enriched UF_6 (assay greater than 0.7110% U-235). Depleted, normal, and enriched UF_6 are very different materials in their end use. Disposition plans for the normal and enriched UF_6 would be quite different from those proposed for the depleted UF_6 and therefore would not be appropriately addressed under the current scope for this PEIS. If the number of cylinders containing normal and enriched uranium were added to the number containing depleted UF_6, they would total in excess of 55,000 cylinders.

Most of the cylinders at the three storage sites are large diameter cylinders (i.e., 48") that are filled to their capacity with depleted UF_6. Some smaller cylinders also contain depleted UF_6 and are included in the scope of the PEIS. Additionally, approximately 200 cylinders contain a small *amount (commonly called a "heel amount" in the UF_6 industry) of depleted UF_6. Text has been added to the PEIS stating that these "heels" cylinders are a part of the inventory included in the scope of the PEIS. (See Sections 1.5.2 and 4.2.1 of the PEIS.)*

The scope of the PEIS has been expanded to include up to 15,000 cylinders produced by USEC after July 1, 1993 that became or will become the responsibility of the DOE by the signing of two Memoranda of Agreement between DOE and USEC after publication of the Draft PEIS (DOE & USEC 1998a-b; the full citations are provided in Chapter 8 of the PEIS). In order to accommodate these new cylinders, the PEIS has been revised. Rather than increasing the amount of cylinders assumed to be processed annually, the revised PEIS assumes that the work-off period (the period over which the processes assumed in the PEIS, for example, cylinder preparation, transportation, conversion, manufacturing, would take place) has increased by approximately 6 years (i.e., from 20 to 26 years).

Comment 29

This is what I call a swamp picture. This is Oak Ridge. The cylinder is too high. You can barely see the ties here that they're resting on and they were on a very soft storage yard and they sunk into the earth and this is weeds and so forth and the importance of this is that the moisture accelerates the local corrosion by a factor of five to 10, so a lot of times you might see that the corrosion rate is like 1/10th of a mil per year or a fraction of a mil per year and that may be true on the upper portions of the cylinders where it's fairly dry, but the lower part is complicated by a lot of factors. If it's close to the ground, it's a moist area, if it's got rust on it, moisture collects in the rust, the water runs around the cylinders and the cylinders cool off at night and in the day time they pick up moisture. Moisture condenses. So you've got a prime condition for getting the moisture in contact with the steel which accelerates the corrosion.

Response 29

Because substandard conditions such as ground contact and poor drainage in cylinder storage yards have been identified as the cause of external cylinder corrosion, the UF_6 cylinder project management plan (LMES 1997i; the full citation is provided in Chapter 8 of the PEIS) was developed to eliminate these substandard conditions. (The plan is discussed and referenced in the Introduction to Appendix D of the PEIS.) Under this management plan, all cylinders must be stored out of ground-contact with enough space to allow for periodic complete inspections. These requirements have necessitated some yard reconstruction and cylinder relocations; most of this work has already been completed at the three sites or is planned for completion by the year 2002. The DOE is confident that the activities required under the cylinder project management plan will maintain adequate safety of the depleted UF_6 cylinder inventory.

Comment 30

This was the biggie. There's a reinforcing ring right here. The scientists at Oak Ridge did a wonderful job of analyzing these leaks and the scenario of how the corrosion started, when the leaks initially occurred and the material doesn't drool out on the ground by any stretch of the imagination. They estimated that this leak from their studies was 13 years old. When you get all the crud off, there was a hole 4" wide and about 18" long and the only reason this was discovered was there'd been a lot of trouble with the valves on these cylinders in the past and when the workers were looking at the valve, somebody happened to glance around the corner and saw this pile of reaction debris laying underneath the cylinder. I may mention it later but these reaction products are soluble in water so if you have a small leak and a lot of rain and you start checking for uranium, you're not going to find much.

<u>Response 30</u>

The commentor is describing one of two breached cylinders discovered at the Portsmouth site in 1990. The discovery of these breached cylinders lead to inspection of all the cylinders, the identification of five more breached cylinders before 1998 , and the development of an extensive cylinder project management plan (described in the Introduction to Appendix D of the PEIS). The conditions which allowed the breached cylinder to go unidentified for such a long period of time have been eliminated. All cylinders are now inspected at least every four years (those with more extensive corrosion or pitting are inspected annually). This inspection schedule has been designed to detect breaches in the early stages so that the environmental impact can be greatly minimized. During early stages of hole growth, the exposed area of UF_6 is separated and protected from the environment by a relatively insoluble UF_4 layer. It is estimated that it takes 4-5 years for a 2-inch hole to develop. Visual inspections geared to detection of holes within this period (1 to 4 years) are designed to limit the potential uranium loss. The size of the hole in the cylinder the commentor is referencing indicates that the reaction had been occurring for an estimated 13 years. The comment is correct in stating that uranyl fluoride would react further upon contact with water. The second paragraph of section C.2.1 in Appendix C of the PEIS indicates that the estimation of potential impacts to water resources from cylinder breaches assumed reaction of the uranyl fluoride laying on the ground with water to form hydrogen fluoride and various uranium compounds which could dissolve and infiltrate surface and shallow groundwater resources.

In 1998 one additional breached cylinder was identified at the K-25 site; see response to Oak Ridge Public Hearing Oral Comment 31 for further details on this breached cylinder.

<u>Comment 31</u>

This is what I call a 6:00 leak. Initially when it was in another storage yard before it was transported and restacked, this was in the ground or close to the ground and the corrosion on the bottom of the cylinder excessive and generated this leak. I'm not going to say much about mechanical damage, but that is another real problem and, even though Portsmouth cylinders are probably in better shape than anywhere else, they have a lot of cylinders that have dents in them and where the lugs, depending on how accurately they stack them, if they aren't very careful, these lugs can hit the adjacent cylinder and these cylinders are 0.312, 5/16th of an inch thick and I have more to say about that later on.

Response 31

Cylinder stacking anomalies such as contact of lifting lugs with neighboring cylinder bodies are noted and recorded in the periodic cylinder inspections so that cylinder management personnel can be made aware of incorrect stacking conditions. Under the current cylinder project management plan (LMES 1997i; the full citation is provided in Chapter 8 of the PEIS) discussed in the introduction to Appendix D of the PEIS, restacking of many cylinders and construction of new storage yards has been accomplished to correct stacking anomalies and to remove cylinders from ground contact. Annual cylinder inspections are required for cylinders previously stored in ground contact or cylinder damaged due to incorrect stacking. Improved procedures now used during stacking activities have greatly decreased the number of cylinders damaged during restacking.

Comment 32

Ched showed a picture of this earlier. Unfortunately, it's glorified with a nice border and so forth and detracted a little bit, I think, from the detail. I think in this shot there's something like 33,000, but you can see a few rusters here, rust, all these are rusted, all these, these, these, these. They're pretty heavily rusted. No semblance of paint remaining on these cylinders.

Response 32

The commentor is referring to an aerial view of the Paducah Cylinder Storage Yards. The remarks are noted.

Comment 33

When we were doing our investigation, this is the numbers that were given to us by Martin-Marietta, the contractor operating the K-25. I won't go through all this but number in long-time storage, 55,000. Number in near ground contact, 37,000. Inaccessible end plugs. Anybody that happens to be in Oak Ridge and is interested in this subject should take a mechanized tour around the fence to look at these cylinders as far as being inaccessible. Some of them you couldn't put a piece of paper between the ends of them. Twenty one thousand of those. Shell to lug contact, 44,000. Poor drainage yard, 12,253. Paducah and Oak Ridge are the worst offenders in this regard. Portsmouth did a much, much better job with their concrete yards. This is out of a work agreement to Linc Hall, Lockheed Martin from Joe Parks of DOE Operations Office, October '95 and it says, this particular line, "Complete annual inspection of 17,475 cylinders exhibiting accelerated corrosion and other problems." So we're talking about a lot of cylinders that are in varying degrees of degradation.

Response 33

Subsequent to the identification of 7 breached cylinders in 1990 through 1992, the cylinder project management plan was initiated to remediate the inadequate storage conditions listed above by the commentor. Under this management plan, all cylinders are now inspected at least every four years (those with more extensive corrosion or pitting are inspected annually). All cylinders must be stored out of ground-contact with enough space to allow for the periodic complete inspections.

These requirements have necessitated some yard reconstruction and cylinder relocations; most of this work has already been completed at the three sites. The DOE is confident that the activities required under the cylinder project management plan will maintain adequate safety of the depleted UF_6 cylinder inventory.

Comment 34

This is a K-25 report in '92 which again corroded cylinders, visible pitting and so forth, 15,000. Full limit consideration fill limit and I'm not going to get into that too much but that's a real problem if you have a cylinder that has more in it than you thought it might have and when it's melted, it can cause rupture. So there are some cylinders that may be okay, but there's a question mark involved in some of them. Inaccessible cylinders, 22,000.

Response 34

In regard to the overfilled cylinders, this issue is discussed in the Introduction to Appendix E of the PEIS, and in the engineering analysis report, Section 6.1.4.2. Both the overcontainer and the cylinder transfer options considered under Cylinder Preparation would address the problem of overfilled cylinders and allow for safe transportation and handling of these cylinders. Additionally, the amount of material in each cylinder is a known quantity and can be evaluated when the cylinder is handled, whether for transportation or for transfer of material. The problem of inaccessible cylinders is being addressed under the cylinder project management plan through restacking in configurations that allow for complete cylinder inspection. Corroded cylinders with visible pitting are required to be inspected annually so that if a breach were to develop, it would be identified and patched before significant quantities of UF_6 were released. (During the early stages when a cylinder is breached, the exposed area of UF_6 is separated and protected from the environment by a relatively insoluble UF_4 layer.)

Comment 35

And a few words about conversion. To me, the most important one is what have the French been doing for the last 22 years? They chose in 1977 to convert all their UF_6 to U_3O_8 and they packed the U_3O_8. They compressed it to get it as dense as they can in steel three cubic meter containers and they store those containers in metal reinforced seismic resistant buildings. And I think they have something like 280,000 metric tons stored and additional capacity. But the reason they did that was because they felt there was a problem of storing UF_6 for a long period of time.

Response 35

Comment noted. Conversion to U_3O_8 followed by placement into long-term storage is one of the alternatives analyzed in the PEIS.

Comment 36

Some of the safety thoughts. There's a statement made in the PEIS that says, "In nearly 40 years of cylinder handling activities, no accidents involving releases from cylinders containing uranium hexafluoride have occurred that have caused diagnosed irreversible, adverse effects among workers." I think it's an interesting term that must be used quite a bit, this irreversible adverse effects, but I think it includes death and serious accidents. This is a report in an NRC NUREG report June of 1986 and many of you who are in this business know of this accident. This happened at Gore, Oklahoma in the Sequoyah Fuels Corporation where a cylinder ruptured when they were making the transfer. It was liquid form. Thirteen tons. Lots of HF. One worker was killed and several others were injured and an HF cloud rolled across I-40 and the Oklahoma state police had to close the interstate for a number of hours. One lady who lived nearby in a home ran vigorously and escaped, thank goodness.

<u>Response 36</u>

The referenced text from the PEIS is from Sections S.4.2.2 and 2.4.2.2, Facility Accidents Involving Releases of Radiation or Chemicals. However, the text is slightly but significantly misquoted; the word "solid" was omitted in the comment. The actual text of the PEIS reads as follows: "In nearly 40 years of cylinder handling activities, no accidents involving releases from cylinders containing solid uranium hexafluoride have occurred that have caused diagnosed irreversible adverse effects among workers." The omission of the word solid is significant, because all the depleted UF_6 cylinders addressed in the PEIS contain solid UF_6 that has been in storage at ambient temperatures. If a breach occurred during handling of a cylinder containing solid UF_6, the rate of UF_6 release would be significantly less than that which occurred in the Gore, Oklahoma accident. However, cylinders containing liquid UF_6 (which may be present if conversion is required under the management strategy selected), or cylinders engulfed in flame for a sufficient amount of time to cause hydraulic cylinder rupture will release their contents to the atmosphere quickly in the form of HF gas and particulate uranyl fluoride. The potential for adverse effects and irreversible adverse effects, including death, from accidents of this nature have been assessed for all alternatives in the PEIS. The definition of these terms is found in Section 4.3.2.1 of the PEIS. As the commentor stated, the greatest hazard initially is the HF, which can cause death if inhaled concentrations are high enough. The acute danger from exposure to HF gas is stated in Sections 4.3.1.2.1 and in Appendix C, Section C.5.2.1. The referenced text in Sections S.4.2.2 and 2.4.2.2 was not intended to minimize the danger of exposure to HF gas; text has been added to the referenced paragraph to clarify that such exposure is life-threatening. The intent of the text was to clarify that the PEIS likely overestimates the health impacts which would be associated with exposure to uranium compounds if an exposed individual did not succumb to HF toxicity. For example, even in the Gore, Oklahoma accident, the 31 other exposed workers whose health status was investigated after the accident showed no signs of kidney toxicity from the uranium exposure; the intakes of these workers were estimated to range from 0.6 to 24 mg of uranium. Some workers did have short-term respiratory problems associated with the HF exposure; however, no evidence of long-term lung damage was observed based on comparison of pre- and post-accident pulmonary function tests.

Additionally, estimated intakes for 2 adult male workers exposed in a 1944 accidental release of UF_6 were 80-100 mg uranium (as summarized in McGuire 1991 and Fisher et al. 1990;

see references to Appendix C for full citations). These workers had some evidence of short-term kidney function impairment which was repaired by about 3 weeks post-exposure. In contrast to these findings, the PEIS conservatively assumed in the accident analyses that anyone with an intake of 10 mg or more of uranium could experience adverse effects (generally temporary in nature), and that anyone with an intake 30 mg or more could experience irreversible adverse health effects.

Comment 37

The fill limit problem. I'm not going to talk about that but it is a serious consideration. The 62 percent solid fill that was mentioned earlier by Ched is an extremely important consideration when you start melting these cylinders. You've got to be sure that you have room to expand. Incompressible liquids fracture things.

Response 37

The reference "Uranium Hexafluoride: A Manual of Good Handling Practices," ORO-651, provides information of UF_6 cylinder fill limits. UF_6 exhibits a significant expansion when undergoing the phase change from solid to liquid, with a 53% increase in volume from a solid at 70 °F to a liquid at 235 °F. As an example, a 140 cubic foot cylinder, with a shipping fill limit of 27,030 lb, could accept up to 31,340 lb UF_6 at 160 °F. When heated above 160 °F, the liquid UF_6 would completely fill the cylinder and would hydraulically deform and rupture the cylinder. To assure the safe transfer of the contents of the depleted UF_6 cylinders, the PEIS considers transferring by sublimination using air heating, instead of the current practice of transferring by liquefaction using steam heating. Further details of the method of cylinder transfer considered in the PEIS is provided in Appendix E of the PEIS.

Comment 38

This is an interesting memo I came across when we were doing our investigation. This is from Portsmouth and it's a 14 ton cylinder problem. It says, "It was reported that another cylinder was stepped on by a supervisor and he felt the wall give." I mean that may give you some indication of what this 0.312 and that's probably not due to corrosion. It's just the fact that just the weight of a foot on the top of these cylinders caused it to flex and it wasn't the first time. And I've got undocumented statements from other people that talk about the truck drivers when they tighten the tie-downs down have noticed the cylinder walls flexing a little bit but that's just to give you some idea of how rugged these cylinders are.

Response 38

The 0.312 the commentor is referring to is the wall thickness in inches. Most of the thin-wall cylinders are over 0.300 inches in wall thickness. Some of the older cylinders have wall thicknesses at some points below the 0.250 inches that the Department of Transportation requires for safe shipment and that the American National Standard Institute (ANSI) requires for safe transport. The cylinder project personnel have evaluated the structural integrity of these cylinders in the configuration that they are presently stored and in many handling configurations. It has been *determined that the cylinders may be safely stacked in two-tier rows without compromising the structural integrity. This allows one 14-ton cylinder to be stacked on top of two 14-ton cylinders with no deflection in the steel.*

Comment 39

One thing I didn't mention is why are they 5/16th" thick? Somebody, probably a genius here at headquarters, back in the period of probably 30 years ago, 25 or 30 years ago, decided that they over-designed these cylinders and they could cut the thickness from 5/8", 0.625, down to 5/16. And in our investigation, we talked to the metallurgists at Portsmouth and Paducah in particular and they said they fought it but they were overruled on cost basis. So penny wise, pound foolish.

Response 39

The initial UF_6 processing utilized 30" cylinders and smaller cylinders for in plant processing and transportation. In the early 1950's 48" cylinders were designed for UF_6 use for a more efficient operation. These cylinders were designed very conservatively since the industry was young and operating conditions were being identified. The thicknesses of these initial cylinders were designed to be 5/8" which corresponded to 200 psig design pressure which turned out to be over-designed for the feed and withdrawal services actually experienced for normal operation. In the mid to late 1950's a 5/16" thick cylinder was designed corresponding to a 100 psig design pressure which was in line with actual process feed and withdrawal pressures. At this time these thinner cylinders were not used for any transportation. As the plants gained more experience with the thinner cylinders they were found to be acceptable for transport. Tests to demonstrate compliance to DOT requirements were initiated in the 1960's to be able to ship normal and depleted UF_6 in thin wall cylinders. The testing showed that the thin walled cylinders were better able to withstand the drop tests than the heavy wall cylinders. In the late 1980's ANSI N14.1 included the thin walled cylinders into the standard for shipment of normal and depleted UF_6. In the early 1990's IAEA accepted the thin wall design. When the thin walled cylinders were developed in the 1950's the design was accepted by all the sites. There were no technical objections to the design. The only significant advantage of the heavy wall cylinder over the thin is the additional thickness that is available for corrosion during storage.

Comment 40

The other thing I might mention in that regard is why the cylinders stack two high. Apparently about in the same time period appeals were made from the three plants to get more money for storage yards and somebody decided they didn't need the additional storage yard. They'd just stack them two high. And that was the second big mistake.

Response 40

The current practice for outside storage of depleted UF_6 cylinders is for the cylinders to be stacked two high. This stacking configuration has been evaluated by structural engineers and has been approved as sound. The bottom tier of cylinders is supported on saddles to distribute the *load and prevent contact with the storage surface. Depleted UF_6 cylinders have been safely stacked two high in outdoor yards since the 1950's without any significant radiological releases or other consequences to the general public.*

Comment 41

These are taken from a DNFSB report. I'm not going to bother reading all this but they had safety concerns and one of them was — and this is something that was suggested by Martin-Marietta people many, many years ago — that there had never been a safety test run in which — let me back up. If you drill a hole in the bottom of the cylinder and you put it in a pond, no problem. It'll react slowly and so forth. Up in this vapor region you have fluff. This stuff decomposes, it condenses and so forth and it's a tremendous amount of surface area. The reaction of moisture with the UF_6 is exothermic and so the accident scenario that's been proposed is a small crack in the top of the cylinder like truck wrecks in a creek, whatever, and some limited amount of water gets into that upper area. You've got a tremendous surface area, exothermic reaction and limited amount of water for cooling and the scenario is that there will probably be a steam explosion of some type. It might just blow material back out. It might rupture the cylinder. I don't think we really have an answer to that.

Response 41

The accident scenario described in the comment is similar to the vehicle-induced fire accident considered in Appendix D of the PEIS, in that excessive heat (in the form of an exothermic reaction in the comment, and in the form of a fire in the PEIS accident) is postulated to result in hydraulic rupture of an affected cylinder, with resulting release of the cylinder contents. The PEIS considered the vehicle-induced fire accident scenario, because the PEIS accident was postulated to affect three cylinders (unlike a single cylinder in the comment) and thus would bound the consequences of the accident proposed in the comment.

Comment 42

This is one that came as kind of a shock to me. I was supplied with a memo of a 1964--this is to K-25 manager, John Murray from A.J. Mallett and it had been proposed that the quote "empty cylinders" which have about 50 pounds of heels — they don't get all the material out when they make a transfer — and this contains mostly daughter products of uranium and actually there's more radiation from an empty cylinder than a full one because of this material that's on the bottom and you don't have the shielding effect of the uranium when it's filled. But this is approval to clean 74 cylinders containing 33,000 grams of uranium, 435 U-235, various enrichment levels and so forth and what the safety person said is that the proposed cleaning in this pond appears safe. And so my question is how will cylinders be cleaned in the future and my other concern, and I've got it in my short list of major concerns is I don't think cleaning cylinders in this manner and then admitting the contaminated pond effluent to the Clinch River is going to be acceptable in the future.

<u>*Response 42*</u>

The commentor is correct that radiation exposure from empty cylinders is of special concern because the shielding effect of the depleted uranium hexafluoride is no longer present. In the PEIS and the engineering analysis report, the method proposed for protecting workers and the general public from exposure to the short-lived daughter products is to store the cylinders for three months after emptying to allow the daughter products to decay enough so that handling the cylinders is safe. Details on the design and operation of a cylinder treatment facility are provided in the engineering analysis report. The cylinders would be washed with an aqueous solution to remove the heels. The UF_6 from the heel would be converted to U_3O_8 which would be sent for either disposal or storage. Wastewater generation from a cylinder treatment facility is discussed in Section F.3.4.1 of the PEIS. Wastewater would be treated to meet the requirements of a National Pollutant Discharge Elimination System (NPDES) permit and discharged to nearby surface waters, or to an appropriate wastewater sewer, depending on the location of the treatment facility. DOE has no plans for cleaning the cylinders in any pond at any site.

<u>Comment 43</u>

This is the last safety-related. Things keep happening on this activity that seem very timely. Here's the Paducah plant and the storage yards about 40 - 50 acres. The Barcley Regional Airport is about a mile and a half to two miles from the storage yard. The day before we had our meeting in Paducah — I'm sure all of you read about this — a B-1 bomber supersonic 200,000 pounds crew bailed out. Plane crashed into a farm. Dug a trench 4' deep and 40' long. It was 35 to 40 miles from this plant and I would say if somebody looked at what's the probability of a plane like that crashing on that farm, they'd say incredible, never happen, and so forth. But that's a consideration that we had back in our study and that the DNFSB had also. Can you imagine a plane like that hitting in the center of the cylinder yard? I mean you would be bound to rupture--I don't know--six dozen, I don't know how many cylinders. If it happened to be raining, you would have so much HF formed that you couldn't even get near it and the HF would start chewing up the cylinders around it. So you might call it a maximum credible accident, but I think it's not a ridiculous thing to be considered.

<u>*Response 43*</u>

Plane crashes were considered but only for small planes. Large planes have flight patterns that do not pass close to any of the three sites and as a result, impacts would be considered in the beyond incredible probability range ($<1 \times 10^{-7}$) for those large planes.

<u>Comment 44</u>

Uses. Most important. There's a lot been said about this already and here's just a couple of excerpts. This is from the PEIS and it talks about conversion half to UO_2 or metal but the thing that got me was safe management of the cylinder inventory would continue until 100 percent of the inventory had been converted for use. Now, the general reaction I've had from people that read that is that means, the translation is never because there's not going to be 100 percent use made of this material, as people have already said. And again, back to my earlier statement that if some reasonable assessment could be made of an optimistic use scenario, start taking care of those cylinders and get serious about the conversion to U_3O_8.

<u>*Response 44*</u>

DOE expects that in the future, uses will be available for some portion of the depleted UF_6 inventory. DOE plans to continue its support for the development of government applications for depleted uranium products. The two representative use options described in Section 2.2 and Appendix H of the PEIS, use as uranium oxide and use as uranium metal as radiation shielding, were selected to provide a basis for comparing the potential environmental impacts of broad, programmatic management strategies. The selection of these use options for analysis in the PEIS was not intended to imply that the PEIS will be used to select a specific end use or preclude other potential uses in the future. If a use strategy is selected in the Record of Decision, specific uses would be considered and evaluated in more detail in future planning and environmental analyses as appropriate. DOE's preferred alternative is to begin conversion of the depleted UF_6 inventory as soon as possible, either to uranium oxide, uranium metal, or a combination of both, while allowing for use of as much of this inventory as possible. This would be accomplished through continuing the safe, effective management of the cylinder inventory; beginning prompt conversion of the depleted UF_6 into uranium oxide and HF or CaF_2; interim storage of the uranium oxide pending use; converting depleted UF_6 into depleted uranium metal and HF or CaF_2 as uses for depleted uranium metal products become available; and/or fabrication of depleted uranium oxide and/or metal products for use. Prior to use or other disposition, DOE will continue the safe, responsible management of the cylinder inventory. Current cylinder management practices include visual inspections, ultrasonic testing of cylinder wall thickness, radiological surveys, cylinder coating maintenance, and cylinder yard maintenance. These practices will be modified and supplemented as necessary to meet any new or revised requirements or to incorporate new technologies as they become available for protecting workers, the public, and the environment. The commentor's preference for converting depleted UF_6 to U_3O_8 is noted.

<u>Comment 45</u>

And last, you'll be glad to hear. Again, I'm not going to go through this but in the National Research Council report they have a section on potential uses and not to take exception to the gentleman's experience with INEL and the DUCRETE studies, they had concerns about the use in DUCRETE. I'm not smart enough to know. It sounds to me like a good use for some of the material, but they also made a point that UO_2 is not totally stable. U_3O_8 is the form found in nature, extremely stable, doesn't react, so forth. And they sort of made a pitch like if you're going to use it in DUCRETE, you ought to use U_3O_8 and I know it's slightly less dense so that's a consideration.

<u>*Response 45*</u>

UO_2 is slightly less stable than U_3O_8, but is less susceptible to fracturing and to the formation of respirable fine particulates. U_3O_8 is less dense than UO_2 (density of 3 g/cm^3 versus between 6 to 9 g/cm^3 for UO_2), and is friable and not readily formed into hard microspheres that resist

fracture. Effective shielding of gamma radiation from spent nuclear fuel requires a relatively high density material, such as DUCRETE produced using dense UO_2 material. In addition, the friability of U_3O_8 may present operational problems during the high-shear mixing of uranium oxide and cement to produce DUCRETE.

Comment 46

And they talked about it as a fluorinating agent and their concern there is there's probably going to be some residual radioactivity in this fluorine and using, even at very low levels of radiation contamination, it's probably going to take NRC license and everything and a lot of commercial users are going to be a little hesitant to use fluorine in their products. There's people here that know more about that subject than I do. But these are three more uses, re-enrichment and dilution and so forth, and they sort of mostly discounted them as being a significant user of the inventory.

Response 46

DOE expects that in the future, uses will be available for some portion of the depleted UF_6 inventory. DOE plans to continue its support for the development of government applications for depleted uranium products and, for as long as necessary, to continue the safe management of its depleted UF_6 cylinder inventory. The use of depleted UF_6 as a fluorinating agent will depend on the conversion process selected, the residual uranium concentrations in the hydrogen fluoride produced, market demand, and both public acceptance and regulatory considerations.

Comment 47

In the PEIS DOE evaluated six alternative management strategies. However, an option to continue storage of a reasonable fraction of the DUF_6, only the best cylinders under shelter, for future use and begin conversion of the most degraded cylinders to a safe stable form of U_3O_8 was not considered in the PEIS and my question is why?

Response 47

The strategy the commentor describes would fall into the category of a "combination of alternatives," specifically, a combination of continued cylinder storage (a.k.a. No Action Alternative) and long-term storage as oxide. As discussed in Section 2.3.7 of the PEIS, the alternatives assessed in the PEIS were based on the assumption that all facilities would be designed to process 100% of the inventory; this approach was intended to provide a conservative estimate of the impacts that could result from each of the alternatives considered. However, DOE did recognize that it would be possible to select a management strategy that is a combination of the alternatives (e.g., 50% continued cylinder storage and 50% long-term storage as oxide). Therefore, the PEIS includes an analysis of potential environmental impacts for a range of facility sizes to allow for an evaluation of combinations of alternatives. Appendix K presents the potential environmental impacts for facilities designed to process between 25 and 100% of the depleted UF_6 inventory. Section K.7.1 presents an example of how to estimate the impacts for any combination of alternatives. The actual schedule or order in which the cylinders would be converted (if conversion is identified in the

Record of Decision) is beyond the scope of the PEIS. However, such considerations would be the subject of follow-on studies and reviews.

Comment 48

I mentioned before this work agreement by said there are--this is in the '92 statement by the DOE Oak Ridge. The current DOE schedule for cleaning, inspecting and repainting of the cylinders will require at least 30 years, especially when the fact is considered that many of the cylinders will have to be recleaned and repainted at least three times during that period. Now, the people that did the painting, Hartman Walsh of St. Louis, that painted 2,168 of these cylinders in the 1996-1997 period, the lessons report on that subject said that in their examination of the cylinders they didn't find much paint left on any cylinders that had been painted before 1990. Next. DNFSB, the accident concerns that they raised were not cited or addressed in the PEIS. Last of the last. And again, I don't have to repeat this I don't think too much because I just said it and this is the accident scenario involving a plane crash into the cylinder yards and what would happen in the event of that.

Response 48

The current UF_6 cylinder project management plan, dated March 1997, implements the analytical and risk studies conducted to determine the most effective means of recoating cylinder bodies. The worst case cylinders, that is, those that are determined to have exterior corrosion effects such that the wall thickness has been reduced below the 0.250" required for off-site transport, will be painted first. The rate of painting cylinders is determined by these studies as well as other factors. The assumptions for the No Action Alternative used in the PEIS were made to closely approximate the current management project, however, it is impossible to maintain those exact rates in a real-time situation. With respect to accident concerns raised by the DNFSB, their Recommendation 95-1 requested that the safety analysis reports for the three sites be updated. These reports (LMES 1997f-h; the full citations are provided in Chapter 8 of the PEIS) were updated and the results (including results for plane crash scenarios) were incorporated into the accident analyses conducted for the PEIS. See Appendix D, Section D.2.2, for a discussion of accident impacts under current storage conditions. If the SARs are revised in the future, DOE will modify its cylinder management program to ensure that the safety of the cylinders is maintained.