APPENDICES

APPENDIX A

RELEVANT FEDERAL REGISTER NOTICES

APPENDIX A: RELEVANT FEDERAL REGISTER NOTICES

64 FR 43358, *Record of Decision for Long-Term Management and Use of Depleted Uranium Hexafluoride,* U.S. Department of Energy, Tuesday, August 10, 1999

69 FR 44649, *Record of Decision for Construction and Operation of Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site*, U.S. Department of Energy, Tuesday, July 27, 2004.

69 FR 44654, *Record of Decision for Construction and Operation of Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site*, U.S. Department of Energy, Tuesday, July 27, 2004.

72 FR 15869, *Notice of Availability of a Draft Supplement Analysis for Disposal of Depleted Uranium Oxide Conversion Product Generated From DOE'S Inventory of Depleted Uranium Hexafluoride,* U.S. Department of Energy, Tuesday, April 3, 2007.

81 FR 58921, *Notice of Intent To Prepare a Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated From DOE's Inventory of Depleted Uranium Hexafluoride*, U.S. Department of Energy, Friday, August 26, 2016, with associated *Correction*, published in 81 FR 61674 on Wednesday, September 7, 2016.

83 FR 67250, *Notice of Availability of Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated From DOE's Inventory of Depleted Uranium Hexafluoride*, U.S. Department of Energy, December 28, 2018.

83 FR 67282, *Environmental Impact Statements; Notice of Availability*, Environmental Protection Agency, December 28, 2018.

84 FR 1716, *Draft Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride, Extension of Public Comment Period*, U.S. Department of Energy, February 5, 2019.

85 FR 3903, *Amended Record of Decision for the Installation and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site*, U.S. Department of Energy/National Nuclear Security Administration, January 23, 2020.

64 FR 43358, *Record of Decision for Long-Term Management and Use of Depleted Uranium Hexafluoride*, U.S. Department of Energy, Tuesday, August 10, 1999.

43358 **Federal Register** / Vol. 64, No. 153 / Tuesday, August 10, 1999 / Notices

DEPARTMENT OF DEFENSE

Office of the Secretary

Defense Intelligence Agency, Science and Technology Advisory Board Closed Panel Meeting

AGENCY: Department of Defense, Defense Intelligence Agency.

ACTION: Notice.

SUMMARY: Pursuant to the provisions of Subsection (d) of Section 10 of Public Law 92–463, as amended by Section 5 of Public Law 94–409, notice is hereby given that a closed meeting of the DIA Science and Technology Advisory board has been scheduled as follows:

DATES: 12 August 1999 (9 am to 4 pm).

ADDRESSES: The Defense Intelligence Agency, Bolling AFB, Washington, DC 20340–5100.

FOR FURTHER INFORMATION CONTACT: Maj. Donald R. Culp, Jr., USAF, Executive Secretary, DIA Science and Technology Advisory Board, Washington, DC 20340–1328 (202) 231–4930.

SUPPLEMENTARY INFORMATION: The entire meeting is devoted to the discussion of classified information as defined in Section 552b(c)(1), Title 5 of the U.S. Code, and therefore will be closed to the public. The Board will receive briefings on and discussion several current critical intelligence issues and advise the Director, DIA, on related scientific and technical matters.

Dated: August 4, 1999.

Patricia L. Toppings,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 99–20480 Filed 8–9–99; 8:45 am]

BILLING CODE 5001–10–M

DEPARTMENT OF DEFENSE

Office of the Secretary

Defense Intelligence Agency, Science and Technology Advisory Board Closed Panel Meeting

AGENCY: Department of Defense, Defense Intelligence Agency.

ACTION: Notice.

SUMMARY: Pursuant to the provisions of Subsection (d) of Section 10 of Public Law 92–463, as amended by Section 5 of Public Law 94–409, notice is hereby given that a closed meeting of the DIA Science and Technology Advisory Board has been scheduled as follows.

DATES: 17 August 1999 (8 am to 4 pm).

ADDRESSES: The Defense Intelligence Agency, 200 MacDill BLVD, Washington, DC, 20340.

FOR FURTHER INFORMATION CONTACT: Maj Donald R. Culp, Jr., USAF, Executive Secretary, DIA Science and Technology Advisory Board, Washington, DC 20340–1328 (202) 231–4930.

SUPPLEMENTARY INFORMATION: The entire meeting is devoted to the discussion of classified information as defined in Section 552b(c)(1), Title 5 of the U.S. Code, and therefore will be closed to the public. The Board will receive briefings on and discuss several current critical intelligence issues and advise the Director, DIA, on related scientific and technical matters.

August 4, 1999.

Patricia L. Toppings,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 99–20481 Filed 8–9–99; 8:45 am]

BILLING CODE 5001–10–M

DEPARTMENT OF DEFENSE

Office of the Secretary of Defense

Department of Defense Wage Committee; Notice of Closed Meetings

Pursuant to the provisions of section 10 of Public Law 92–463, the Federal Advisory Committee Act, notice is hereby given that closed meetings of the Department of Defense Wage Committee will be held on September 7, 1999, September 14, 1999, September 21, 1999, and September 28, 1999, at 10:00 a.m. in Room A105, The Nash Building, 1400 Key Boulevard, Rossyln, Virginia.

Under the provisions of section 10(d) of Public Law 92–463, the Department of Defense has determined that the meetings meet the criteria to close meetings to the public because the matters to be considered are related to internal rules and practices of the Department of Defense and the detailed wage data to be considered were obtained from officials of private establishments with a guarantee that the data will be held in confidence.

However, members of the public who may wish to do so are invited to submit material in writing to the chairman concerning matters believed to be deserving of the Committee's attention.

Additional information concerning the meetings may be obtained by writing to the Chairman, Department of Defense Wage Committee, 4000 Defense Pentagon, Washington, DC 20301–4000.

Dated: August 4, 1999.

Patricia L. Toppings,

Alternate OSD Federal Register Liaison Officer, Department of Defense.

[FR Doc. 99–20483 Filed 8–9–99; 8:45 am]

BILLING CODE 5001–10–M

DEPARTMENT OF ENERGY

Record of Decision for Long-Term Management and Use of Depleted Uranium Hexafluoride

AGENCY: Department of Energy.

ACTION: Record of Decision.

SUMMARY: The Department of Energy ("DOE" or "the Department") issued the Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (Final PEIS) on April 23, 1999. DOE has considered the environmental impacts, benefits, costs, and institutional and programmatic needs associated with the management and use of its approximately 700,000 metric tons of depleted uranium hexafluoride (DUF_6). DOE has decided to promptly convert the depleted UF_6 inventory to depleted uranium oxide, depleted uranium metal, or a combination of both. The depleted uranium oxide will be used as much as possible and the remaining depleted uranium oxide will be stored for potential future uses or disposal, as necessary. At this time, the Department does not believe that long-term storage as depleted uranium metal and disposal as depleted uranium metal are reasonable alternatives; however, the Department remains open to exploring these options further. Pursuant to this Record of Decision (ROD), any proposal to proceed with the siting, construction, and operation of a facility or facilities will involve additional review under the National Environmental Policy Act (NEPA). DOE anticipates that approximately 4,700 cylinders containing depleted UF_6 that are located at the East Tennessee Technology Park (formerly known as the K–25 Site), in Oak Ridge, Tennessee, would be shipped to a conversion facility. Uses for the converted product potentially include Government applications and applications that may be developed by the private sector.

ADDRESSES: The Final PEIS and ROD are available on the Office of Environment, Safety and Health NEPA home page at *http://www.eh.doe.gov/nepa* or on the Office of Nuclear Energy, Science and Technology (NE) home page at *http://www.ne.doe.gov*. You may request copies of the Final PEIS and this ROD by calling the toll-free number 1–800–517–3191, by faxing requests to (301) 903–4905, by making requests via the depleted UF_6 home page at *http://web.ead.anl.gov/uranium/finalpeis.cfm*, via electronic mail to scott.harlow@hq.doe.gov., or by mailing them to: Scott E. Harlow, NE, U.S. Department of Energy, 19901 Germantown Road, Germantown, Maryland 20874.

FOR FURTHER INFORMATION CONTACT: For information on the alternative strategies for the long-term management and use of depleted UF_6, contact Scott Harlow at the address listed above. For general information on the DOE NEPA process, please contact: Carol Borgstrom, Director, Office of NEPA Policy and Assistance (EH–42), U.S. Department of Energy, 1000 Independence Avenue, S.W., Washington, D.C. 20585, (202) 586–4600 or 1–800–472–2756.

SUPPLEMENTARY INFORMATION:

I. Background

Depleted UF_6 results from the process of making uranium suitable for use as fuel for nuclear power plants or for military applications. The use of uranium in these applications requires increasing the proportion of the uranium-235 isotope found in natural uranium through an isotopic separation process called uranium enrichment. Gaseous diffusion is the enrichment process currently used in the United States. The depleted UF_6 that is produced as a result of enrichment typically contains 0.2 percent to 0.4 percent uranium-235 and is stored as a solid in large metal cylinders at the gaseous diffusion facilities.

Large-scale uranium enrichment in the United States began as part of atomic bomb development during World War II. Uranium enrichment activities were subsequently continued under the U.S. Atomic Energy Commission and its successor agencies including DOE. The K–25 Plant (now called the East Tennessee Technology Park) at Oak Ridge, Tennessee, was the first of the three gaseous diffusion plants constructed to produce enriched uranium. The U.S. program to enrich uranium was conducted first to support U.S. national security activities and later (by the late 1960s) to provide enriched uranium-235 for fuel for commercial nuclear power plants in the United States and abroad. The K–25 plant ceased operation in 1985, but uranium enrichment continues at both the Paducah Site in Kentucky and the Portsmouth Site in Ohio. These two plants are now operated by USEC Inc. (formerly known as the United States Enrichment Corporation), created by law in 1993 to privatize the uranium enrichment program. Depleted UF_6 is stored as a solid at all three sites in steel cylinders. Each cylinder holds approximately 9 to 12 metric tons of material. The cylinders usually are stacked two layers high in outdoor areas called "yards."

DOE maintains an active cylinder management program to improve storage conditions in the cylinder yards, to monitor cylinder integrity by conducting routine inspections for breaches (leaks), and to perform cylinder maintenance and repairs as needed. The results of these management activities ensure that cylinders are stored with minimum risks to workers, members of the general public, and the environment at the sites. Because storage began in the early 1950s and the cylinders are stored outdoors, many of the cylinders now show evidence of external corrosion. Eight cylinders out of the 46,422 that were filled by DOE or its predecessor agencies have developed leaks. Because the depleted UF_6 is a solid at outdoor ambient temperatures and pressures, it is not readily released from a cylinder following a breach.

DOE has an integrated program plan that has been in place since December 1994 to ensure the safe management of these cylinders. Under this program plan, if alternative uses for the depleted uranium were not found to be feasible by approximately the year 2010, DOE would take steps to convert the depleted UF_6 to triuranium octaoxide (U_3O_8) beginning in the year 2020. U_3O_8 would be more chemically stable than the depleted UF_6 and would be safely stored pending a determination that all or a portion of the depleted uranium was no longer needed. At that point, the U_3O_8 would be disposed of as low-level waste (LLW). This program plan was based on reserving depleted UF_6 for future defense needs and for other potential productive and economically viable purposes including possible reenrichment in an atomic vapor laser isotope separation plant, conversion to depleted uranium metal for fabricating antitank weapons, and use as fuel in advanced liquid metal nuclear reactors. Since the time when that program plan was put into place, several developments have occurred prompting the need for its revision. These developments include the passage and implementation of the Energy Policy Act of 1992 that assigned responsibility for uranium enrichment to the United States Enrichment Corporation. Also, the demand for antitank weapons has diminished, and the advanced liquid metal nuclear reactor program has been canceled. In addition, stakeholders near the current cylinder storage sites have expressed concern about the environmental, safety, health, and regulatory issues associated with the continued storage of the depleted UF_6 inventory. The selection of a new management strategy constituted a major Federal action and required preparation of a PEIS.

The Final Plan for the Conversion of Depleted Uranium Hexafluoride (herein referred to as the "Plan") submitted to Congress in July 1999 was prepared in accordance with Public Law 105–204, which required the Department to prepare and submit a plan to construct conversion facilities at both the Paducah and Portsmouth gaseous diffusion plants. The Plan was also consistent with the preferred alternative of the Final PEIS, to begin conversion of the depleted UF_6 inventory to depleted uranium oxide, depleted uranium metal, or a combination of both. The Department currently expects that conversion to depleted uranium metal would be performed only if uses become available. At this time, the Department does not believe that long-term storage as depleted uranium metal and disposal as depleted uranium metal are reasonable alternatives; however, the Department remains open to exploring these options further. DOE plans to use the resources and expertise of the private sector to convert the depleted UF_6 inventory. The Department has proceeded to implement its procurement strategy to award one or more contracts for the design, construction, operation, and decontamination and decommissioning of conversion facilities and support functions. The draft request for proposals for this procurement, scheduled to be issued in the summer of 1999, will be based on responses received from the Department's request for expressions of interest issued March 4, 1999, input from Congress and stakeholders, the draft Plan, and the Final PEIS.

Work on the PEIS began in 1994 with a request for recommendations for management strategies for depleted UF_6 published in the **Federal Register** designed to solicit ideas from industry and the general public for the management and use of depleted UF_6. The responses were evaluated and those that appeared reasonable provided the basis for the alternatives that were subsequently assessed in the PEIS. The technologies that were suggested were described in The Technology Assessment Report for the Long-Term Management of Depleted Uranium Hexafluoride (UCRL–AR–120372) and The Engineering Analysis Report for the Long-Term Management of Depleted Uranium Hexafluoride (UCRL–AR–124080). The costs associated with the alternatives analyzed in the PEIS are provided in the Cost Analysis Report for the Long-Term Management of Depleted

Uranium Hexafluoride (UCRL–AR–127650). Public scoping meetings for the PEIS were held in Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee. The Draft PEIS was issued in December 1997. Public hearings on the Draft PEIS were held in Portsmouth, Ohio; Paducah, Kentucky; Oak Ridge, Tennessee; and Washington, D.C. Based on the comments received, a revised version of the document was produced that included a revision of the preferred alternative. The Final PEIS was mailed to interested parties and was made available to the public using the World Wide Web on April 16, 1999.

II. Purpose and Need for the Agency Action

The purpose of the PEIS was to reexamine DOE's long-term management strategy for depleted UF_6 and alternatives to that strategy. DOE needs to take this action to respond to economic, environmental, and legal developments. The PEIS examined the environmental consequences of alternative strategies for long-term storage, use, and disposal of the entire inventory as well as the no-action alternative.

III. Alternatives Analyzed in Detail

DOE evaluated the following alternative strategies for the long-term management and use of depleted UF_6.

No Action. Under this alternative, depleted UF_6 cylinder storage was assumed to continue at the three current storage sites indefinitely. Potential environmental impacts were estimated through the year 2039. The activities assumed to occur at the sites under the no-action alternative include a comprehensive cylinder monitoring and maintenance program with routine cylinder inspections, ultrasonic thickness testing of cylinders, radiological surveys, cylinder painting to prevent corrosion, cylinder yard surveillance and maintenance, construction of four new or improved cylinder yards at Paducah and one at K–25, and relocation of some cylinders at Paducah and K–25 to the new or improved yards. Cylinders were assumed to be painted every ten years, which is consistent with current plans.

Long-Term Storage as Depleted UF_6. This alternative includes long-term storage at a single location and could involve storage of cylinders in newly constructed yards, buildings, or an underground mine. The location of such a long-term storage facility could be at a site other than a current storage site. Continued storage of depleted UF_6 cylinders at the three current storage sites, with existing cylinder management of the entire inventory, would occur through 2008, and the inventory would decrease through 2034 as cylinders are being consolidated at a long-term storage facility. Cylinders would be prepared for shipment at the three current storage sites with transportation of cylinders to a long-term storage facility by truck or rail. The long-term storage facility would include yards, buildings, or an underground mine. Transportation and disposal of any waste created from the activities listed above would occur under this alternative.

Long-Term Storage as Uranium Oxide. Under this alternative, the depleted UF_6 would be converted from depleted UF_6 to depleted uranium oxide prior to placement in long-term storage. Storage in a retrievable form in a facility designed for indefinite, low-maintenance operation would preserve access to the depleted uranium. Storage in the form of an oxide would be advantageous in view of long-term stability and the material preferred for use or disposal at a later date. Conversion of the depleted UF_6 to depleted uranium oxide was assumed to take place in a newly constructed stand-alone plant dedicated to the conversion process. Two forms of uranium oxide, U_3O_8 and uranium dioxide (UO_2), were considered. Both oxide forms have low solubility in water and are relatively stable over a wide range of environmental conditions. Two representative conversion technologies were assessed for conversion to U_3O_8 and three for conversion to UO_2. In addition to producing depleted uranium oxide, conversion would result in the production of considerable quantities of hydrogen fluoride (HF) as a byproduct. HF could be converted to anhydrous hydrogen fluoride (AHF), a commercially valuable chemical. AHF is toxic to humans if exposed at high enough concentrations. HF is typically stored and transported as a liquid, and inventories produced from the conversion process potentially could be sold for use. Alternatively, HF could be neutralized by the addition of lime to form a solid fluoride salt, CaF_2, which is much less toxic than HF. CaF_2 potentially could be sold for commercial use or could be disposed of either in a landfill or LLW disposal facility depending on the uranium concentration and the applicable regulations at the time of disposal. Following conversion, the depleted uranium oxide was assumed to be stored in drums in buildings, below ground vaults, or an underground mine. The storage facilities would be designed to protect the stored material from natural forces/degradation by environmental forces. Once placed in storage, the drums would require only routine monitoring and maintenance activities.

Use as Uranium Oxide. Under this alternative, depleted UF_6 would first be converted to depleted uranium oxide (UO_2 or U_3O_8). For assessment purposes, conversion to depleted UO_2 was assumed. There is a variety of current and potential uses for depleted uranium oxide including use as radiation shielding, use in dense materials applications other than shielding, use in light water reactor fuel cycles, and use in advanced reactor fuel cycles. Radiation shielding was selected as the representative use option for detailed analysis in the PEIS. A conversion facility would be required to convert UF_6 to depleted uranium oxide. The conversion facility would also produce either AHF or CaF_2 as a byproduct. These materials would be used or disposed as discussed above.

Use as Uranium Metal. In this alternative, depleted UF_6 would first be converted to depleted uranium metal. Similar to use as depleted uranium oxide, the depleted uranium metal was assumed to be used as the primary shielding material in casks designed to contain spent nuclear fuel or high-level waste. The depleted uranium metal would be enclosed between the stainless steel shells making up the body of the casks. A conversion facility would be required to convert depleted UF_6 to depleted uranium metal. The conversion facility would also produce either AHF or CaF_2 as a byproduct. These materials would be used or disposed as discussed above. In addition, some metal conversion technologies would also produce large quantities of magnesium fluoride as a byproduct. The magnesium fluoride would be disposed of either in a sanitary landfill or LLW disposal facility depending upon the uranium concentration and applicable disposal regulations at the time. The manufacture of depleted uranium metal casks was assumed to take place at a stand-alone industrial plant dedicated to the cask manufacturing process. The plant would be capable of receiving depleted uranium metal from a conversion facility, manufacturing casks, and storing the casks until shipment by rail to a user such as a nuclear power plant or DOE facility.

Disposal. Under the disposal alternative, depleted UF_6 would be chemically converted to a more stable depleted uranium oxide form and disposed of below ground as LLW.

Compared with long-term storage, disposal is considered to be permanent with no intent to retrieve the material for future use. Prior to disposal, conversion of depleted UF_6 was assumed to take place at a newly constructed stand-alone plant dedicated to the conversion process. This activity would be identical to that described under the long-term storage as oxide alternative. Potential impacts were evaluated for both UO_2 and U_3O_8. The conversion facility would convert depleted UF_6 to depleted uranium oxide and would produce either AHF or CaF_2 as a byproduct. These materials would be used or disposed as discussed above. Several disposal options were considered including disposal in shallow earthen structures, below ground vaults, and an underground mine. In addition, two physical waste forms were considered, ungrouted waste and grouted waste.

Grouted waste refers to the solid material obtained by mixing the depleted uranium oxide with cement and repackaging it in drums. Grouting is intended to increase structural strength and stability of the waste and to reduce the solubility of the waste in water. However, because cement would be added to the depleted uranium oxide, grouting would increase the total volume requiring disposal. Grouting of waste was assumed to occur at the disposal facility.

DOE's Preferred Alternative. DOE's preferred alternative for the long-term management and use of depleted UF_6 is to begin conversion of the depleted UF_6 inventory, as soon as possible, to depleted uranium oxide, depleted uranium metal, or a combination of both. The conversion products, such as fluorine, would be used as much as possible, and the remaining products would be stored for future uses or disposal. The Department currently expects that conversion to depleted uranium metal would be performed only if uses become available. At this time, the Department does not believe that long-term storage as depleted uranium metal and disposal as depleted uranium metal are reasonable alternatives; however, the Department remains open to exploring these options further. DOE's preferred alternative in the Draft PEIS was to begin to convert the depleted UF_6 inventory to uranium oxide or depleted uranium metal only as uses for the material became available. Several reviewers expressed a desire for DOE to start conversion as soon as possible. After consideration of the comments, DOE revised the preferred alternative in the Final PEIS to call for the prompt conversion of the material to depleted uranium oxide, depleted uranium metal, or a combination of both and long-term storage of that portion of the depleted uranium oxide that cannot be put to immediate use. Any proposal to proceed with the location, construction, and operation of a facility or facilities will involve additional review under NEPA and will be subject to availability of funding. DOE expects that in the future, uses would be found for some portion of the converted material. The value of depleted uranium and HF or CaF_2 for use is based on their unique qualities, the size of the inventory, and the history of uses already implemented. DOE plans to continue its support for the development of Government applications for depleted uranium products and to continue the safe management of its depleted uranium inventory as long as such inventory remains in storage prior to total conversion.

IV. Alternatives Dismissed From Detailed Consideration

Storage and Disposal as Depleted Uranium Metal. Conversion of depleted UF_6 to depleted uranium metal for long-term storage and conversion to depleted uranium metal for disposal were not analyzed in depth as reasonable alternatives in the Final PEIS. These alternatives were rejected because of higher conversion cost for some processes used to convert UF_6 to metal, the lower chemical stability of uranium metal as opposed to uranium oxide thus requiring different considerations for handling and storage, and uncertainty over the suitability of depleted uranium metal as a final disposal form. At this time, the Department does not believe that long-term storage as depleted uranium metal and disposal as depleted uranium metal are reasonable alternatives; however, the Department remains open to exploring these options further.

Storage and Disposal as Depleted Uranium Tetrafluoride (UF_4). Long-term storage as depleted UF_4 and disposal as depleted UF_4 were also not analyzed in depth as reasonable alternatives in the Final PEIS. Although more stable than UF_6, UF_4 has no identified direct use, offers no obvious advantage in required storage space, and is less stable than oxide forms. Further, as a disposal form, UF_4 is soluble in water.

V. Summary of Environmental Impacts

The PEIS analyses indicated that the areas of potential adverse environmental impacts include human health and safety impacts, impacts to ground water, air quality, and waste management under certain conditions. In addition, the Final PEIS identified net positive socioeconomic impacts in terms of employment and income for all alternatives. The most important potential impacts in these areas are summarized in the following paragraphs (detailed discussions are provided in the Final PEIS). For all alternatives, potential impacts in other areas, including ecological resources, resource requirements, land use, cultural resources, and environmental justice, it was determined to be low to negligible or entirely dependent on the actual sites where the alternatives would be implemented that are, as yet, unidentified.

Human Health and Safety. Potential impacts to the health and safety of workers and members of the public are possible during construction activities, during normal facility operations, in the long-term if ground water contamination occurs, from facility accidents, and from transportation. During normal facility operations, under all alternatives, impacts to human health and safety would be limited to involved workers (persons directly involved in the handling of radioactive or hazardous materials). Involved workers could be exposed to low-level radiation emitted by depleted uranium during the normal course of their work activities. The overall radiation exposure of workers was estimated to result in one cancer fatality under the no-action alternative, from one to two cancer fatalities under the long-term storage as UF_6 and the two use alternatives, and up to three cancer fatalities under the disposal and preferred alternatives. For all alternatives, except the disposal as oxide alternative, these exposures were estimated to be within applicable public health standards and regulations.

For the disposal as oxide alternative, if the disposal facility were located in a "wet" environment (typical of the Eastern United States), the estimated dose from the use of groundwater at 1,000 years after the assumed failure of the facility would be about 100 mrem/year, which would exceed the regulatory dose limit of 25 mrem/year specified in 10 CFR Part 61 and DOE Order 5820.2A for the disposal of LLW. In a "dry" environment typical of the Western United States, the analysis indicated that disposal would not exceed regulatory limits for over 1,000 years in the future even if the facility leaked.

Under all alternatives, workers (including involved and noninvolved) could be injured or killed from on-the-job accidents unrelated to radiation or chemical exposure. Using statistics from similar activities, under the no-action alternative, it was estimated that zero fatalities and about 180 injuries might occur over the period from 1999 through 2039. Under all other alternatives, it was estimated that from one to five fatalities and from 310 to 4,100 injuries might occur over the same period.

Accidents are possible that could release radiation or chemicals to the environment potentially causing adverse health effects among workers and members of the public under all alternatives. Accidents involving cylinders are possible under all alternatives and could have severe consequences (depending on the amount of DUF_6 released) that would be primarily limited to on-site workers even under the worst conditions. During a severe cylinder accident, it was estimated that up to three fatalities from HF exposure would occur among noninvolved workers, with the additional possibility of fatalities among those directly involved in the accident. However, because the probability of such accidents occurring is low, they would not be expected to occur during the operational periods considered in the Final PEIS.

Low probability accidents involving chemicals at a conversion facility were estimated to have potential consequences that are much greater than accidents involving cylinders. Such accidents would be possible under the long-term storage as oxide, use as oxide, use as metal, disposal, and preferred alternatives because they would require conversion of UF_6 to another chemical form with rupture of tanks containing AHF or ammonia estimated to have the largest potential consequences. Such accidents are expected to occur with a frequency of less than once in one million per year of operation. If such a severe event were to occur, it was estimated that up to 30 fatalities among the public and four fatalities among noninvolved workers would be possible. Although the consequences of cylinder and chemical accidents could be severe, these types of accidents are expected to be extremely rare. The maximum calculated risk for these accidents would be zero fatalities and irreversible adverse health effects expected for noninvolved workers and the public combined and one adverse effect (mild and temporary effects such as temporary decrease in kidney function or respiratory irritation) expected for the general public.

Transportation activities could also potentially result in adverse health and safety impacts. Although specific sites for some of the management activities (conversion, for example) have not been identified, the Final PEIS analyzed the potential impacts associated with shipping UF_6 cylinders to alternative locations using representative shipment lengths and routes. The primary impacts from transportation are related to accidents. The total number of traffic fatalities was estimated on the basis of national traffic statistics for shipments by both truck and rail modes for all alternatives. If shipments were predominantly by truck, it was estimated that zero fatalities would be expected for the no-action alternative, approximately two fatalities for the long-term storage as depleted UF_6 alternative, and up to four fatalities for each of the other alternatives. Shipment by rail would result in similar, but slightly smaller, impacts. Severe transportation accidents could also cause a release of radioactive material or chemicals from a shipment that could have adverse health effects. All alternatives, other than no action and long-term storage as UF_6, could involve the transportation of relatively large quantities of chemicals such as ammonia and AHF because conversion would be required. Severe accidents involving these materials could result in releases that caused fatalities with HF posing the largest potential hazard. For example, if a severe accident involving a railcar containing HF occurred in an urban area under unfavorable weather conditions, it was estimated that up to 30,000 people would experience irreversible adverse effects (such as lung damage) and 300 fatalities could occur. However, because of the low probability of such accidents, the maximum calculated risk for these accidents would be zero fatalities. If HF were to be neutralized to CaF_2 at the conversion facility, the risks associated with its transportation would be eliminated.

Ground Water Quality. For operations under all alternatives, uranium concentrations in ground water at the three current storage sites would remain below guidelines throughout the project duration if cylinder maintenance and painting activities are performed as expected. Ground water impacts are possible under the disposal alternative if the disposal facility were located in a "wet" environment. In a dry environmental setting, ground water impacts for the severe situation would be unlikely for at least 1,000 years.

Air Quality. Under all alternatives, impacts to air quality from construction and facility operations would be within existing regulatory standards and guidelines. Under the no-action alternative, however, if cylinder maintenance and painting do not reduce cylinder corrosion rates, it is possible that cylinder breaches could result in HF air concentrations greater than the regulatory standard level at the K–25 storage site around the year 2020; HF concentrations at the Paducah and Portsmouth Sites were estimated to remain within applicable standards or guidelines.

Waste Management. Under all alternatives requiring conversion, there is the potential that significant amounts of fluorine-containing wastes could be generated. If the HF produced from conversion were not used, CaF_2 generated from the neutralization of HF might have to be disposed of as low-level radioactive waste.

Socioeconomics. Positive socioeconomic impacts would occur under all alternatives. The no-action alternative would create about 140 direct jobs and generate about $6.1 million in direct income per operational year. The storage as UF_6 alternative would create about 610 to 1,200 direct jobs and generate about $35 to $65 million in direct income per year. The other alternatives (long-term storage as oxide, use as oxide, use as metal, disposal, and preferred alternatives) would have more beneficial socioeconomic impacts, creating about 970 to 1,600, 1,250 to 1,600, 1,260 to 1,600, 900 to 2,100, and 1,600 to 1,840 direct jobs per year, respectively, and generating about $55 to $85 million, $79 to $93 million, $79 to $93 million, $55 to $120 million, and $89 to $110 million in direct income per year, respectively. Continued cylinder storage under all alternatives would result in negligible impacts on regional growth and housing.

Cumulative Impacts. The continued cylinder storage and cylinder preparation components of the depleted UF_6 management alternatives would result in environmental impacts that would be expected to be relatively minor. The estimated cumulative doses to members of the general public at all three sites would be below levels expected to result in a single cancer fatality over the life of the project, and the annual dose to the off-site maximally exposed individual would be considerably below the Environmental Protection Agency (EPA) maximum standard of 10 mrem/year from the air pathway. The cumulative collective dose to workers at the three sites would result in one to three additional cancer fatalities over the duration of the program. Cumulative demands for water, wastewater treatment, and power would be well within existing capacities at all three sites. Relatively small amounts of additional land would be needed for depleted UF_6 management at the three current storage sites. The cumulative impacts of conversion, long-term storage, and disposal activities could not be determined because specific sites and technologies have not been designated for these options. Further analyses of cumulative impacts would be performed as required by NEPA regulations for any technology or siting proposals that would involve these facilities.

VI. Environmentally Preferred Alternative

Overall, the potential for adverse environmental impacts tends to be the smallest for the no-action and long-term storage alternatives primarily because they do not require construction and operation of conversion facilities or significant transportation operations. Although the potential impacts tend to be small for all alternatives, differences do exist among the alternatives. The presence of a conversion facility results in the potential for both facility and transportation accidents involving hazardous chemicals that could have severe consequences. However, it must be recognized that the probability of such accidents is low, and accident prevention and mitigative measures are well established for these types of industrial activities. In addition, beneficial socioeconomic impacts tend to be smallest for the no-action and long-term storage as UF_6 alternatives and greatest for those alternatives involving conversion. Finally, the differences in impacts among the alternatives tend to be small when considering the uncertainties related to the actual processes and technologies that will be used and the fact that actual sites have not been identified. In general, because of the relatively small risks that would result under all alternatives and the absence of any clear basis for discerning an environmental preference, DOE concludes that no single alternative analyzed in depth in the Final PEIS is clearly environmentally preferable compared to the other alternatives.

VII. Mitigation

Specific mitigation measures may need to be developed as part of the design of the particular conversion facilities. Such measures would be addressed during the preparation of project-specific NEPA reviews.

VIII. Comments on Final PEIS

The Final PEIS was mailed to stakeholders in mid-April 1999, and the EPA issued a notice of availability in the April 23, 1999, **Federal Register**. In addition, DOE issued a notice of availability in the April 29, 1999, **Federal Register**. The entire document was also made available on the World Wide Web. Comments were received by five reviewers, and at the same time, about two dozen responses to the aforementioned expression of interest were received. The following is a summary of the comments received by reviewers of the Final PEIS:

- *Comments related to the preferred alternative.* One reviewer, BNFL Inc., reiterated their previous comments that DOE should have analyzed in depth, the environmental impacts of conversion of the depleted UF_6 to depleted uranium metal for long-term storage and disposal. DOE addressed these comments in volume 3 of the Final PEIS and earlier in this ROD. At this time, the Department does not believe that long-term storage as depleted uranium metal and disposal as depleted uranium metal are reasonable alternatives; however, the Department remains open to exploring these options further. Should the Department be persuaded that it is reasonable to convert the depleted UF_6 to depleted uranium metal for long-term storage or disposal, these alternatives would be analyzed in detail in future NEPA reviews, as necessary.
- *General comments.* The U.S. Environmental Protection Agency commented that the Department has adequately addressed its concerns on this project and suggested that DOE use a single location for a conversion pilot plant as it conducts its further planning and environmental analysis. The Kentucky Heritage Council recommended that any previously undisturbed areas impacted by the proposed project be surveyed by a professional archaeologist. Should the Department decide to construct a conversion facility in the State of Kentucky, the decision to conduct the requested survey would be addressed at that time. The Kentucky Department for Environmental Conservation, Division of Water, affirmed that the concerns they raised on the Draft PEIS have been addressed in the Final PEIS. The Kentucky Department for Environmental Conservation, Division of Waste Management, reiterated the concerns that were raised in their April 23, 1998, letter regarding the Draft PEIS. These comments were addressed in volume 3 of the Final PEIS. The Kentucky Department for Environmental Conservation, Underground Storage Tank Branch, is currently waiting for closure reports and documentation for several tanks from the Paducah Site. This comment was forwarded to the site for appropriate action. Finally, should the Department decide to construct a conversion facility in the State of Kentucky, the Department would address the issue of using on-site landfills for disposal of waste generated by such a facility at that time.

IX. Other Factors

Public Law 105–204. In accordance with this law, the Secretary of Energy submitted to Congress a plan for the construction of plants at Paducah, Kentucky, and Portsmouth, Ohio, to convert its large inventory of depleted uranium hexafluoride. These proposed activities would be subject to review under NEPA. The preferred alternative is consistent with this legislation.

Cost. As part of the analysis done to develop a long-term management plan, the comparative costs associated with representative technologies for each of the alternatives were calculated. The Cost Analysis Report provided life-cycle cost estimates for each of the alternatives and estimates the primary capital and operating costs for each alternative reflecting all development, construction, operating, and decontamination and decommissioning costs as well as potential offsetting revenues from the sale of recycled materials. The costs are estimated at a preconceptual design level. Depending on the technology and the option selected for disposal, conversion, long-term storage, and cylinder preparation, there was a wide variation in the cost of various alternatives. In general, the no-action alternative was the least costly, while the disposal and use as metal alternatives were the most costly.

Atomic Vapor Laser Isotope Separation (AVLIS). USEC Inc. announced on June 9, 1999, that it would suspend AVLIS technology development activities. The Final PEIS had identified that the AVLIS process could potentially be used to re-enrich depleted UF_6. USEC Inc. has announced that it will move forward with evaluating potentially more economical technology options, such as the Silex laser enrichment process and gas centrifuge technology.

X. Decision

DOE has decided that it will select the preferred alternative from the Final PEIS. This decision includes the following actions:

- DOE will take the necessary steps to promptly convert the depleted UF_6 inventory to depleted uranium oxide, depleted uranium metal, or a combination of both. Conversion to depleted uranium metal would occur

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only when uses for the converted material are identified.

- The depleted uranium oxide will be used as much as possible and the remaining depleted uranium oxide will be stored for potential future uses or disposal, as necessary.
- Any proposal to proceed with the location, construction, and operation of a facility or facilities for conversion of the depleted UF_6 to a form other than depleted UF_6 will involve additional NEPA review (i.e., project-specific EIS).
- The proposed facilities to be constructed to support this conversion decision would be built consistent with the plan submitted as required by Public Law 105–204.
- DOE anticipates that approximately 4,700 cylinders containing depleted UF_6 that are located at the East Tennessee Technology Park at Oak Ridge would be shipped to a conversion facility.
- Depleted UF_6 will be available for use until all of it has been converted to another form.

XI. Conclusion

DOE believes conversion of the depleted UF_6 inventory to depleted uranium oxide as soon as possible is the prudent and proper decision. Several factors, including increased chemical stability, socioeconomic benefits associated with the conversion, and public and congressional desire to move forward with conversion, have contributed to this decision. Conversion to depleted uranium metal would be performed only when uses for the converted material are identified. At this time, the Department does not believe that long-term storage as depleted uranium metal and disposal as depleted uranium metal are reasonable alternatives; however, the Department remains open to exploring these options further. DOE will continue to safely maintain the depleted UF_6 cylinders while moving forward to implement the decisions set forth in this ROD.

Issued in Washington, D.C. this second day of August, 1999.

Bill Richardson,

Secretary of Energy.

[FR Doc. 99–20471 Filed 8–9–99; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Request for Information on Potential Studies in the Russian Federation of Low Dose-Rate Radiation Health Effects

AGENCY: Office of Environment, Safety and Health, DOE.

ACTION: Request for information.

SUMMARY: The U.S. Department of Energy (DOE), announces a request for information (RFI) on potential studies in the Russian Federation of low dose-rate radiation health effects. Specifically, DOE is interested in receiving information on new ideas for epidemiologic, dosimetric/biodosimetric, and/or molecular epidemiologic studies that would: (1) Build upon collaborative research already conducted on workers and populations in the Southern Urals; or (2) utilize information on other similar cohorts in the Russian Federation. Information submitted in response to this RFI will be used to define the scope of a Request for Applications (RFA) that may be issued in late calendar year 1999.

DATES: The deadline for receipt of submissions is October 5, 1999.

ADDRESSES: U.S. Department of Energy, Office of International Health Programs, EH–63/270CC, 19901 Germantown Road, Germantown, Maryland 20874–1290

FOR FURTHER INFORMATION CONTACT: Requests for further information on this announcement may be directed to Elizabeth White, Office of International Health Programs (EH–63), U.S. Department of Energy, telephone: (301) 903–7582; facsimile: (301) 903–1413; electronic mail: elizabeth.white@eh.doe.gov. Responses may be submitted, preferably by electronic mail or facsimile, to Ms. White.

SUPPLEMENTARY INFORMATION:

Table of Contents

I. Purpose

The Office of International Health Programs, Office of Environment, Safety and Health, in partnership with ministries of the Russian Federation, funds epidemiologic studies of cohorts of workers and populations to evaluate the health consequences (cancer and other diseases) of exposure to low dose-rate ionizing radiation. These ongoing studies are coordinated through the Joint Coordinating Committee for Radiation Effects Research (JCCRER). Section II ("Background") provides a description of the JCCRER and Section III ("Description of Ongoing Projects") sets forth a description of the populations currently being studied in the Russian Federation under the auspices of the JCCRER.

The purpose of this Notice is to encourage the submission of information on potential radiation health effects research. The Office of International Health Programs is interested in ideas for new epidemiologic, dosimetric/biodosimetric, and/or molecular epidemiologic studies that would: (1) Build upon low dose-rate radiation health effects research already conducted under the auspices of the JCCRER in the Southern Urals. In particular, DOE is looking for ideas for new projects involving the worker and population cohorts (See Section II) affected by radiation emitted from the Mayak Production Association; or (2) use other similar epidemiologic and dosimetric databases in the Russian Federation to further elucidate the health effects of chronic low dose-rate radiation exposure. In particular, we are interested in learning about other cohorts or potential cohorts of radiation-exposed workers and populations, and the potential scientific studies that could be developed for these cohorts.

DOE, with the help of its standing Scientific Review Group, will review the information submitted in response to this RFI for use in defining the scope of an RFA that may be issued in late calendar year 1999. DOE anticipates that approximately $1,000,000 may be available in fiscal year 2000 to initiate new feasibility projects.

II. Background

The JCCRER is a bilateral Government committee representing agencies from the United States and ministries from the Russian Federation. It was established to implement the Agreement on Cooperation in Research on Radiation Effects for the Purpose of Minimizing the Consequences of Radioactive Contamination on Health and the Environment signed on January 1, 1994, by U.S. Secretary of State Warren Christopher and Russian Foreign Minister Andrey Kozyrev to support and facilitate joint cooperative research.

Radiation research conducted jointly with the Russian Federation provides a unique opportunity to learn more about possible risks to groups of people from lengthy exposure to radiation. This could include people receiving exposure from uranium mining, operations of nuclear facilities, transport and disposal of radioactive materials, the testing and dismantling of nuclear weapons, radiation accidents, and grossly contaminated sites or facilities.

Currently, the JCCRER and DOE are focusing on population and worker studies in the Southern Urals region of

69 FR 44649, *Record of Decision for Construction and Operation of Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site,* U.S. Department of Energy, Tuesday, July 27, 2004.

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halseypj@oro.doe.gov or check the Web site at *www.oakridge.doe.gov/em/ssab.*

SUPPLEMENTARY INFORMATION:

Purpose of the Board: The purpose of the Board is to make recommendations to DOE in the areas of environmental restoration, waste management, and related activities.

Tentative Agenda

8 a.m.—Introductions, overview of meeting agenda and logistics (Dave Mosby)

8:15 a.m.—Past year evaluation—Board and stakeholder survey results, what worked, what can be improved (Facilitator)

9:50 a.m.—Break

10:05 a.m.—Past year evaluation continued

10:45 a.m.—Summaries and Q&A on the most important issues to DOE, TN Department of Environment & Conservation, and EPA (Facilitator)

11:30 a.m.—Lunch

12:30 p.m.—Environmental Management Committee (Luther Gibson)

- Accomplishments and impacts
- Review FY 2004 Work Plan
- Identify issues for FY 2005
- Assignment of new issues/issues managers

1:30 p.m.—Stewardship Committee (Ben Adams)

- Accomplishments and impacts
- Review FY 2004 Work Plan
- Identify issues for FY 2005
- Assignment of new issues/issues managers

2:30 p.m.—Break

2:45 p.m.—Public Outreach Committee (Committee Chair)

- Accomplishments and impacts
- Review FY 2004 Work Plan
- Identify issues for FY 2005

3:15 p.m.—Board Finance Committee (Kerry Trammell)

- Accomplishments and impacts
- Review FY 2004 Work Plan
- Identify issues for FY 2005

3:45 p.m.—Convene Board meeting to elect officers and conduct other business as needed

- Public Comment Period

4:45 p.m.—Set date for next retreat and adjourn

Public Participation: The meeting is open to the public. Written statements may be filed with the Committee either before or after the meeting. Individuals who wish to make oral statements pertaining to agenda items should contact Pat Halsey at the address or telephone number listed above. Requests must be received five days prior to the meeting and reasonable provision will be made to include the presentation in the agenda. The Deputy Designated Federal Officer is empowered to conduct the meeting in a fashion that will facilitate the orderly conduct of business. Each individual wishing to make public comment will be provided a maximum of five minutes to present their comments. This **Federal Register** notice is being published less than 15 days prior to the meeting due to programmatic issues that had to be resolved prior to the meeting date.

Minutes: Minutes of this meeting will be available for public review and copying at the Department of Energy's Information Center at 475 Oak Ridge Turnpike, Oak Ridge, TN between 8 a.m. and 5 p.m. Monday through Friday, or by writing to Pat Halsey, Department of Energy Oak Ridge Operations Office, P.O. Box 2001, EM–90, Oak Ridge, TN 37831, or by calling her at (865) 576–4025.

Issued at Washington, DC, on July 20, 2004.

Rachel M. Samuel,

Deputy Advisory Committee Management Officer.

[FR Doc. 04–17049 Filed 7–26–04; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Record of Decision for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, OH, Site

AGENCY: Department of Energy.

ACTION: Record of decision.

SUMMARY: The Department of Energy (DOE) prepared a *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site* (FEIS) (DOE/EIS–0360). The FEIS Notice of Availability was published by the U.S. Environmental Protection Agency (EPA) in the **Federal Register** (69 FR 34161) on June 18, 2004. In the FEIS, DOE considered the potential environmental impacts from the construction, operation, maintenance, and decontamination and decommissioning (D&D) of the proposed depleted uranium hexafluoride (DUF_6) conversion facility at three alternative locations within the Portsmouth site, including transportation of cylinders (DUF_6, normal and enriched UF_6, and empty) currently stored at the East Tennessee Technology Park (ETTP) near Oak Ridge, Tennessee, to Portsmouth; construction of a new cylinder storage yard at Portsmouth (if required) for the ETTP cylinders; transportation of depleted uranium conversion products and waste materials to a disposal facility; transportation and sale of the aqueous hydrogen fluoride (HF) produced as a conversion co-product; and neutralization of aqueous HF to calcium fluoride (CaF_2) and its sale or disposal in the event that the aqueous HF product is not sold. An option of shipping the ETTP cylinders to the Paducah, Kentucky, site has also been considered, as has an option of expanding operations by increasing throughput (through efficiency improvements or by adding a fourth conversion line) or by extending the period of operation. A similar EIS was issued concurrently for construction and operation of a DUF_6 conversion facility at DOE's Paducah site (DOE/EIS–0359).

DOE has decided to construct and operate the conversion facility in the west-central portion of the Portsmouth site, the preferred alternative identified in the FEIS as Location A. Groundbreaking for construction of the facility will commence on or before July 31, 2004, as anticipated by Public Law (Pub. L.) 107–206. Cylinders currently stored at the ETTP site will be shipped to Portsmouth; a new cylinder yard will be constructed, if necessary, based on the availability of storage yard space when the cylinders are received. The aqueous HF produced during conversion will be sold for use, pending approval of authorized release limits, as appropriate.

ADDRESSES: The FEIS and this Record of Decision (ROD) are available on the DOE National Environmental Policy Act (NEPA) Web site at *http://www.eh.doe.gov/nepa* and on the Depleted UF_6 Management Information Network Web site at *http://web.ead.anl.gov/uranium.* Copies of the FEIS and this ROD may be requested by e-mail at *Ports_DUF6@anl.gov,* by toll-free telephone at 1–866–530–0944, by toll-free fax at 1–866–530–0943, or by contacting Gary S. Hartman, Oak Ridge Operations Office, U.S. Department of Energy, SE–30–1, P.O. Box 2001, Oak Ridge, Tennessee 37831.

FOR FURTHER INFORMATION CONTACT: For information on the conversion facility construction and operation, contact Gary Hartman at the address listed above. For general information on the DOE NEPA process, contact Carol Borgstrom, Director, Office of NEPA Policy and Compliance (EH–42), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, 202–586–4600, or leave a message at 1–800–472–2756.

SUPPLEMENTARY INFORMATION:

I. Background

The United States has produced DUF_6 since the early 1950s as part of the process of enriching natural uranium for both civilian and military applications. Production took place at three gaseous diffusion plants (GDPs), first at the K–25 site (now called ETTP) at Oak Ridge, Tennessee, and subsequently at Paducah, Kentucky, and Portsmouth, Ohio. The K–25 plant ceased enrichment operations in 1985, and the Portsmouth plant ceased enrichment operations in 2001. The Paducah GDP continues to operate.

Approximately 250,000 t (275,000 tons) of DUF_6 is presently stored in about 16,000 cylinders at Portsmouth and about 4,800 cylinders at ETTP. The majority of the cylinders weigh approximately 12 t (14 tons) each, are 48 inches (1.2 m) in diameter, and are stored on outside pads. DOE has been looking at alternatives for managing this inventory. Also in storage are 3,200 cylinders at Portsmouth and 1,100 cylinders at ETTP that contain enriched UF_6 or normal UF_6 (collectively called "non-DUF_6" cylinders) or are empty. [The non-DUF_6 cylinders would not be processed in the conversion facility.] The Portsmouth FEIS considers the shipment of all ETTP cylinders to Portsmouth, as well as the management of both the Portsmouth and ETTP non-DUF_6 cylinders at Portsmouth.

As a first step, DOE evaluated potential broad management options for its DUF_6 inventory in a *Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (DUF_6 PEIS) (DOE/EIS–0269) issued in April 1999. In the PEIS Record of Decision (64 FR 43358, August 10, 1999), DOE decided to promptly convert the DUF_6 inventory to a more stable uranium oxide form and stated that it would use the depleted uranium oxide as much as possible and store the remaining depleted uranium oxide for potential future uses or disposal, as necessary. In addition, DOE would convert DUF_6 to depleted uranium metal, but only if uses for metal were available. DOE did not select specific sites for the conversion facilities but reserved that decision for subsequent NEPA review. Today's Record of Decision announces the outcome of that site-specific NEPA review. DOE is also issuing today a separate but related ROD announcing the siting of a DUF_6 conversion facility at Paducah, Kentucky.

Congress enacted two laws that directly addressed DOE's management of its DUF_6 inventory. The first law, Pub. L. 105–204, signed by the President in July 1998, required the Secretary of Energy to prepare a plan to commence construction of, no later than January 31, 2004, and to operate an on-site facility at each of the GDPs at Paducah, Kentucky, and Portsmouth, Ohio, to treat and recycle DUF_6, consistent with NEPA. The second law, Pub. L. 107–206, signed by the President on August 2, 2002, required that no later than 30 days after enactment, DOE must award a contract for the scope of work described in its Request for Proposals (RFP) issued in October 2000 for the design, construction, and operation of a DUF_6 conversion facility at each of the Department's Paducah, Kentucky, and Portsmouth, Ohio, gaseous diffusion sites. It also stipulated that the contract require groundbreaking for construction to occur no later than July 31, 2004, at both sites.

In response to these laws, DOE issued the *Final Plan for the Conversion of Depleted Uranium Hexafluoride as Required by Public Law 105–204* in July 1999, and awarded a contract to Uranium Disposition Services (UDS) for construction and operation of two conversion facilities on August 29, 2002, consistent with NEPA.

On September 18, 2001, DOE published a Notice of Intent (NOI) in the **Federal Register** (66 FR 48123) announcing its intention to prepare an EIS for the proposed action to construct, operate, maintain, and decontaminate and decommission two DUF_6 conversion facilities: One at Portsmouth and one at Paducah. Following the enactment of Pub. L. 107–206, DOE reevaluated the appropriate scope of its site-specific NEPA review and decided to prepare two separate EISs, one for the plant proposed for the Paducah site and a second for the Portsmouth site. This change in approach was announced in the **Federal Register** on April 28, 2003 (68 FR 22368).

The two draft conversion facility EISs were mailed to stakeholders in late November 2003, and a Notice of Availability was published by the EPA in the **Federal Register** on November 28, 2003 (68 FR 66824). Comments on the draft EISs were accepted during a 67-day review period that ended on February 2, 2004. DOE considered these comments and prepared two FEISs. The Notice of Availability for the two FEISs was published by the EPA in the **Federal Register** (69 FR 34161) on June 18, 2004.

II. Purpose and Need for Agency Action

DOE needs to convert its inventory of DUF_6 to more stable chemical form(s) for use or disposal. This need follows directly from (1) the decision presented in the August 1999 ROD for the PEIS, namely, to begin conversion of the DUF_6 inventory as soon as possible, and (2) Pub. L. 107–206, which directs DOE to award a contract for construction and operation of conversion facilities at both the Paducah site and the Portsmouth site.

III. Alternatives

No Action Alternative. Under the no action alternative, conversion would not occur. Current cylinder management activities (handling, inspection, monitoring, and maintenance) would continue: Thus the status quo would be maintained at Portsmouth and ETTP indefinitely.

Action Alternatives. The proposed action evaluated in the FEIS is to construct and operate a conversion facility at the Portsmouth site for conversion of the Portsmouth and ETTP DUF_6 inventories into depleted uranium oxide (primarily triuranium octaoxide [U_3O_8]) and other conversion products. The FEIS review is based on the conceptual conversion facility design proposed by the selected contractor, UDS. The UDS dry conversion process is a continuous process in which DUF_6 is vaporized and converted to a mixture of uranium oxides (primarily U_3O_8) by reaction with steam and hydrogen in a fluidized-bed conversion unit. The hydrogen is generated from anhydrous ammonia (NH_3). The depleted U_3O_8 powder is collected and packaged for disposition in bulk bags (large-capacity, strong, flexible bags) or the emptied cylinders to the extent practicable. Equipment would also be installed to collect the aqueous HF (also called HF acid) co-product and process it into HF at concentrations suitable for commercial resale. A backup HF acid neutralization system would convert up to 100% of the HF acid to CaF_2 for sale or disposal in the future, if necessary. The conversion products would be transported to a disposal facility or to users by truck or rail. The conversion facility will be designed with three parallel processing lines to convert 13,500 t (15,000 tons) of DUF_6 per year, requiring 18 years to convert the Portsmouth and ETTP inventories.

Three alternative locations within the site were evaluated, Locations A (preferred), B, and C. The proposed action includes the transportation of the cylinders currently stored at the ETTP site to Portsmouth. In addition, an option of transporting the ETTP cylinders to Paducah was considered, as was an option of expanding conversion facility operations.

Alternative Location A (Preferred Alternative). Location A is the preferred location identified in the FEIS for the conversion facility and is located in the west-central portion of the site, encompassing 26 acres (10 ha). This location has three existing structures that were formerly used to store containerized lithium hydroxide monohydrate. The site was rough graded, and storm water ditch systems were installed. This location was identified in the RFP for conversion services as the site for which bidders were to design their proposed facilities.

Alternative Location B. Location B is in the southwestern portion of the site and encompasses approximately 50 acres (20 ha). The site has two existing structures built as part of the gas centrifuge enrichment project that was begun in the early 1980s and was terminated in 1985. USEC is currently in the process of developing and demonstrating an advanced enrichment technology based on gas centrifuges. A license for a lead test facility to be operated at the Portsmouth site was issued by the U.S. Nuclear Regulatory Commission (NRC) in February 2004. The lead facility would be located in the existing gas centrifuge buildings within Location B. In addition, USEC announced in January 2004 that it planned to site its American Centrifuge Facility at Portsmouth, although it did not identify an exact location. Therefore, Location B might not be available for construction of the conversion facility.

Alternative Location C. Location C is in the southeastern portion of the site and has an area of about 78 acres (31 ha). This location consists of a level to very gently rolling grass field. It was graded during the construction of the Portsmouth site and has been maintained as grass fields since then.

Under the action alternatives, DOE evaluated the impacts from packaging, handling, and transporting depleted uranium oxide conversion product (primarily U_3O_8) from the conversion facility to a low-level waste (LLW) disposal facility that would be (1) selected in a manner consistent with DOE policies and orders and (2) authorized to receive the conversion products by DOE (in conformance with DOE orders), or licensed by the NRC (in conformance with NRC regulations), or an NRC Agreement State agency (in conformance with state laws and regulations determined to be equivalent to NRC regulations). Assessment of the impacts and risks from on-site handling and disposal at an LLW disposal facility has been deferred to the disposal site's site-specific NEPA or licensing documents. While the FEIS presents the impacts from transporting the DUF_6 conversion products to both the Envirocare of Utah, Inc., facility and the Nevada Test Site (NTS), DOE plans to decide the specific disposal location(s) for the depleted U_3O_8 conversion product after additional NEPA review, as necessary. Accordingly, DOE will continue to evaluate its disposal options and will consider any further information or comments relevant to that decision. DOE will give a minimum 45-day notice before making its specific disposal decision and will provide any additional NEPA analysis for public review and comment.

The following alternatives were considered but not analyzed in detail in the FEIS: Use of Commercial Conversion Capacity, Sites Other Than Portsmouth, Alternative Conversion Processes, Long-Term Storage and Disposal Alternatives, Transportation Modes Other Than Truck and Rail, and One Conversion Plant Alternative.

IV. Summary of Environmental Impacts

The FEIS evaluated potential impacts from the range of alternatives described above. The impact areas included human health and safety, air quality, noise, water and soil, socioeconomics, ecological resources, waste management, resource requirements, land use, cultural resources, environmental justice, and cumulative impacts. In general, the impacts are low for both the no action and the proposed action alternatives. Among the three alternative locations considered at the Portsmouth site for the conversion facility, there are no major differences in impacts that would make one location clearly environmentally preferable. The discussion below summarizes the results of the FEIS impact analyses, highlighting the differences among the alternatives.

Human Health and Safety—Normal Operations and Transportation. Under all alternatives, it is estimated that potential exposures of workers and members of the general public to radiation and chemicals would be well within applicable public health standards and regulations. UDS would confirm, prior to conversion or at the initiation of the conversion operations, that polychlorinated biphenyl (PCB) releases to the workplace from the paint coating of some cylinders manufactured prior to 1978 would be within applicable Occupational Safety and Health Administration (OSHA) limits.

Transportation by rail would tend to cause fewer impacts than by truck primarily because of exhaust emissions from the trucks and the higher number of shipments for trucks than for rail. The option of converting the aqueous HF to CaF_2 and transporting the CaF_2 to a disposal facility would result in increased shipments. The impacts associated with transportation of uranium oxide product to a disposal facility in the western United States by truck would be about the same if bulk bags are used or two filled cylinders are loaded onto a truck. If only one cylinder is loaded onto a truck, the impacts would be higher because of the increased number of shipments.

Human Health and Safety—Accidents. DOE has extensive experience in safely storing, handling, and transporting cylinders containing UF_6 (depleted, normal, or enriched). In addition, the chemicals used or generated at the conversion facility are commonly used for industrial applications in the United States, and there are well-established accident prevention and mitigative measures for their storage and transportation.

Under all alternatives, it is possible that accidents could release radiation or chemicals to the environment, potentially affecting both the workers and members of the general public. It is also possible that, similar to other industrial facilities, workers could be injured or killed as a result of on-the-job accidents unrelated to radiation or chemical exposure. Similarly, during transportation of materials, both crew members and members of the public may be injured or killed as a result of traffic accidents.

Three kinds of accidents have the largest possible consequences: (1) Those involving the DUF_6 cylinders during storage and handling under all alternatives, (2) those involving chemicals used or generated by the conversion process at the conversion site (in particular NH_3 and aqueous HF) under the action alternatives, and (3) those occurring during transportation of chemicals and cylinders under the action alternatives. The severity of the consequences from such accidents would depend on weather conditions at the time of the accident, and, in the case of the transportation accidents, the location of the accident, and could be significant. However, those accidents would have a low estimated probability of occurring, making the risk low. (Risk is determined by multiplying the consequences by the probability of occurrence).

Under the no action alternative, the risks associated with cylinder storage and handling would continue to exist as long as the cylinders are there. However, under the action alternatives, the risks associated with both the cylinder accidents and the chemical accidents would decline over time and disappear at the completion of the conversion project.

In comparing truck versus rail transportation, even though the consequences of rail accidents are generally higher (because of the larger cargo load per railcar than per truck), the accident probabilities tend to be lower for railcars than for trucks. As a result, the risks of accidents would be about the same under either option.

Air Quality and Noise. Under the action alternatives, the total (modeled plus background value) concentrations due to emissions of most criteria pollutants—such as sulfur dioxide, nitrogen oxides, and carbon monoxide—would be well within applicable air quality standards. For construction, the primary concern would be particulate matter (PM) released from near-ground-level sources. Total concentrations of PM_{10} and $PM_{2.5}$ (PM with an aerodynamic diameter of 10 µm or less and 2.5 µm or less, respectively) at the construction site boundaries would be close to or above the standards because of the high background concentrations. On the basis of maximum background values from 5 years of monitoring at the nearest monitoring station, exceedance of the annual $PM_{2.5}$ standard would be unavoidable because the background concentration already exceeds the standard. Construction activities would be conducted so as to minimize further impacts on ambient air quality.

Water and Soil. During construction of the conversion facility, concentrations of any potential contaminants in soil, surface water, or groundwater would be kept well within applicable standards or guidelines by implementing storm water management, sediment and erosion controls, and good construction practices. During operations, no impacts would be expected because no contaminated liquid effluents are anticipated.

Socioeconomics. Under the action alternatives, construction and operation of the conversion facility would create more jobs and personal income in the vicinity of the Portsmouth site than would be possible under the no action alternative. The number of jobs would be approximately 190 direct and 280 total during construction, and 160 direct and 320 total during operations.

Ecology. For the action alternatives, the total area disturbed during conversion facility construction would be up to 65 acres (26 ha). Although vegetation communities in the disturbed area would be impacted by a loss of habitat, impacts could be minimized (*e.g.*, by appropriate placement of the facility within each location), and negligible long-term impacts to vegetation and wildlife are expected at all locations. Impacts to wetlands could be minimized, depending on where exactly the facility was placed within each location and by maintaining a buffer near adjacent wetlands during construction. During construction, trees with exfoliating bark (such as shagbark hickory or dead trees with loose bark) that can be used by the Indiana bat (federal- and state-listed as endangered) as roosting trees during the summer would be saved if possible.

Waste Management. Under the action alternatives, waste generated during construction and operations would have negligible impacts on the Portsmouth site waste management operations, with the exception of possible impacts from disposal of CaF_2. If the aqueous HF were not sold but instead neutralized to CaF_2, it is currently unknown whether (1) the CaF_2 could be sold, (2) the low uranium content would allow the CaF_2 to be disposed of as nonhazardous solid waste, or (3) disposal as LLW would be required. The low level of uranium contamination expected (*i.e.*, less than 1 ppm) suggests that sale or disposal as nonhazardous solid waste would be most likely. Waste management for disposal as nonhazardous waste could be handled through appropriate planning and design of the facilities. If the CaF_2 had to be disposed of as LLW, it could represent a potentially large impact on waste management operations.

The U_3O_8 produced during conversion would amount to about 5% of Portsmouth's annual projected LLW volume.

Cylinder Preparation at ETTP. The cylinders at ETTP will require preparation for shipment by either truck or rail. Three cylinder preparation options were considered for the shipment of noncompliant cylinders: cylinder overpacks, shipping "as-is" under a U.S. Department of Transportation (DOT) exemption, and use of a cylinder transfer facility (there are no current plans to build such a facility at ETTP). The operational impacts (*e.g.*, storage, handling, and maintenance of cylinders) from any of the options would be small and limited primarily to external radiation exposure of involved workers. If a decision was made to construct and operate a transfer facility at ETTP in the future, additional NEPA review would be conducted.

Conversion Product Sale and Use. The conversion of the DUF_6 inventory produces products having some potential for reuse. These products include aqueous HF and CaF_2, which are commonly used as commercial materials. DOE is currently pursuing the establishment of authorization limits (allowable concentration limits of uranium) in these products to be able to free-release them to commercial users. In addition, there is a small potential for reuse of the depleted uranium oxide product.

D&D Activities. D&D impacts would be primarily from external radiation to involved workers and would be a small fraction of allowable doses. Wastes generated during D&D operations would be disposed of in an appropriate disposal facility and would result in low impacts in comparison with projected site annual generation volumes.

Cumulative Impacts. The FEIS analyses indicated that no significant cumulative impacts at either the Portsmouth or the ETTP site and its vicinity would be anticipated due to the incremental impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions.

Option of Expanding Conversion Facility Operations. The throughput of the Portsmouth facility could be increased either by making process efficiency improvements or by adding an additional (fourth) process line. The addition of a fourth process line at the Portsmouth facility would require the installation of additional plant equipment and would result in a nominal 33% increase in throughput compared with the current base design. This throughput increase would reduce the time necessary to convert the Portsmouth and ETTP DUF_6 inventories by about 5 years. The construction impacts presented in the FEIS would be the same if a fourth line was added, because the analyses in the FEIS used a footprint sized to accommodate four process lines. In general, a 33% increase in throughput would not result in significantly greater environmental impacts during operations than with three parallel lines. Although annual impacts in certain areas might increase up to 33% (proportional to the throughput increase), the estimated annual impacts during operations would remain well within applicable guidelines and regulations, with collective and cumulative impacts being quite low.

The conversion facility operations could be extended to process any additional DUF_6 for which DOE might assume responsibility by operating the facility longer than the currently anticipated 18 years. With routine facility and equipment maintenance and periodic equipment replacements or upgrades, it is believed that the conversion facility could be operated safely beyond this time period. If operations were extended beyond 18 years and if the operational characteristics (*e.g.*, estimated releases of contaminants to air and water) of the facility remained unchanged, it is expected that the annual impacts would be essentially unchanged.

V. Environmentally Preferred Alternative

In general, the FEIS shows greater impacts for the no action alternative than for the proposed action of constructing and operating the conversion facility mainly because of the relatively higher radiation exposures of the workers from the cylinder management operations and cylinder yards and because the cylinders and associated risk would remain if no action occurred. However, considering the uncertainties in the impact estimates and the magnitude of the impacts, the differences are not considered to be significant. The no action alternative has the potential for groundwater contamination with uranium over the long-term; this adverse impact is not anticipated under the proposed action alternatives. Beneficial socioeconomic impacts would be higher for the action alternatives than for the no action alternative.

The impacts associated with transportation of materials among sites would be comparable whether the transportation is by truck or rail.

With all alternatives, there is the potential for some high-consequence accidents to occur. The risks associated with such accidents can only be completely eliminated when the conversion of the DUF_6 inventory has been completed.

Although there are some differences in impacts among the three alternative locations for the conversion facility, these differences are small and well within the uncertainties associated with the methods used to estimate impacts. In general, because of the relatively small risks that would result under all alternatives and the absence of any clear basis for discerning an environmental preference, DOE concludes that no single alternative analyzed in depth in the FEIS is clearly environmentally preferable compared to the other alternatives.

VI. Comments on Final EIS

The Final EIS was mailed to stakeholders in early June 2004, and the EPA issued a Notice of Availability in the **Federal Register** on June 18, 2004. The entire document was also made available on the World Wide Web. Two comment letters were received on the DUF_6 Conversion Facility Final EISs. The State of Nevada indicated that it had no comments on the Final EISs and that the proposal was not in conflict with state plans, goals, or objectives. The U.S. Environmental Protection Agency, Region 5 in Chicago, stated that the Portsmouth Final EIS adequately address its concerns, and that it concurs with the Preferred Alternative and has no further concerns.

Decision

I. Bases for the Decision

DOE considered potential environmental impacts as identified in the FEIS (including the information contained in the classified appendix); cost; applicable regulatory requirements; Congressional direction as included in Pub. L. 105–204 and Pub. L. 107–206; agreements among DOE and the States of Ohio, Tennessee, and Kentucky concerning the management of DUF_6 currently stored at the Portsmouth, ETTP, and Paducah sites, respectively; and public comments in arriving at its decision. In deciding among the three alternative locations at the Portsmouth site for the conversion facility, DOE considered environmental factors, site preparation requirements affecting construction, availability of utilities, proximity to cylinder storage areas, and potential impacts to current or planned site operations. DOE has determined that Location A is the best alternative. DOE believes that the decision identified below best meets its programmatic goals and is consistent with all the regulatory requirements and public laws.

II. Decision

DOE has decided to implement the actions described in the preferred alternative from the FEIS at Location A. This decision includes the following actions:

• DOE will construct and operate the conversion facility at Location A within the Portsmouth site. Construction will commence on or before July 31, 2004, as intended by Congress in Pub. L. 107–206.

• DUF_6 cylinders currently stored at ETTP will be shipped to Portsmouth for conversion; a new cylinder yard will be constructed, if necessary, based on the availability of storage yard space when the cylinders are received.

• All shipments to and from the sites, including the shipment of UF_6 cylinders (DUF_6 and non-DUF_6) currently stored at ETTP to Portsmouth, will be conducted by either truck or rail, as appropriate. Cylinders will be shipped in a manner that is consistent with DOT regulations for the transportation of UF_6 cylinders.

• Although efficiency improvements can be accomplished, which would increase the conversion facility's throughput and decrease the operational period, DOE has decided not to add the fourth processing line to the conversion facility at this time.

• Current cylinder management activities (handling, inspection, monitoring, and maintenance) will continue, consistent with the Depleted Uranium Hexafluoride Management Plan included in the Ohio EPA Director's final findings and orders effective February 1998 and March 2004, which cover actions needed to meet safety and environmental requirements, until conversion could be accomplished.

• The aqueous HF produced during conversion will be sold for use, pending approval of authorized release limits as appropriate. If necessary, CaF_2 will be produced and reused, pending approval of authorized release limits, or disposed of as appropriate.

• The depleted U_3O_8 conversion product will be reused to the extent possible or packaged for disposal in emptied cylinders at an appropriate disposal facility. DOE plans to decide the specific disposal location(s) for the depleted U_3O_8 conversion product after additional appropriate NEPA review. Accordingly, DOE will continue to evaluate its disposal options and will consider any further information or comments relevant to that decision. DOE will give a minimum 45-day notice before making the specific disposal decision and will provide any supplemental NEPA analysis for public review and comment.

III. Mitigation

On the basis of the analyses conducted for the FEIS, the DOE will adopt all practicable measures, which are described below, to avoid or minimize adverse environmental impacts that may result from constructing and operating a conversion facility at Location A. These measures are either explicitly part of the alternative or are already performed as part of routine operations.

• The conversion facility will be designed, constructed, and operated in

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accordance with the comprehensive set of DOE requirements and applicable regulatory requirements that have been established to protect public health and the environment. These requirements encompass a wide variety of areas, including radiation protection, facility design criteria, fire protection, emergency preparedness and response, and operational safety requirements.

- Cylinder management activities will be conducted in accordance with applicable DOE safety and environmental requirements, including the Cylinder Management Plan.
- Temporary impacts on air quality from fugitive dust emissions during reconstruction of cylinder yards or construction of any new facility will be controlled by the best available practices, as necessary, to comply with the established standards for PM_{10} and $PM_{2.5}$.
- During construction, impacts to water quality and soil will be minimized through implementing storm water management, sediment and erosion controls, and good construction practices consistent with the Soil, Erosion, and Sediment Control Plan and Construction Management Plan.
- If live trees with exfoliating bark are encountered on construction areas, they will be saved if possible to avoid destroying potential habitat for the Indiana bat.

Issued in Washington, DC, this 20th day of July, 2004.

Paul M. Golan,
Principal Deputy Assistant Secretary for Environmental Management.

[FR Doc. 04–17048 Filed 7–26–04; 8:45 am]

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DEPARTMENT OF ENERGY

Record of Decision for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, KY, Site

AGENCY: Department of Energy.

ACTION: Record of decision.

SUMMARY: The Department of Energy (DOE) prepared a Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky, Site (FEIS) (DOE/EIS–0359). The FEIS Notice of Availability was published by the U.S. Environmental Protection Agency (EPA) in the **Federal Register** (69 FR 34161) on June 18, 2004. In the FEIS, DOE considered the potential environmental impacts from the construction, operation, maintenance, and decontamination and decommissioning (D&D) of the proposed depleted uranium hexafluoride (DUF_6) conversion facility at three alternative locations within the Paducah site, including transportation of depleted uranium conversion products and waste materials to a disposal facility; transportation and sale of the aqueous hydrogen fluoride (HF) produced as a conversion co-product; and neutralization of aqueous HF to calcium fluoride (CAF_2) and its sale or disposal in the event that the aqueous HF product is not sold. An option of shipping the East Tennessee Technology Park (ETTP) cylinders to the Paducah site has also been considered, as has an option of expanding operations by increasing efficiency or extending the period of operation. A similar EIS was issued concurrently for construction and operation of a DUF_6 conversion facility at DOE's Portsmouth, Ohio, site (DOE/EIS–0360).

DOE has decided to construct and operate the conversion facility in the south-central portion of the Paducah site, the preferred alternative identified in the FEIS as Location A. Groundbreaking for construction of the facility will commence on or before July 31, 2004, as anticipated by Public Law (Pub. L.) 107–206. The aqueous HF produced during conversion will be sold for use, pending approval of authorized release limits, as appropriate.

ADDRESSES: The FEIS and this Record of Decision (ROD) are available on the DOE National Environmental Policy Act (NEPA) Web site at *http://www.eh.doe.gov/nepa* and on the Depleted UF_6 Management Information Network Web site at *http://web.ead.anl.gov/uranium.* Copies of the FEIS and this ROD may be requested by e-mail at *Pad_DUF6@anl.gov*, by toll-free telephone at 1–866–530–0944, by toll-free fax at 1–866–530–0943, or by contacting Gary S. Hartman, Oak Ridge Operations Office, U.S. Department of Energy, SE–30–1, P.O. Box 2001, Oak Ridge, Tennessee 37831.

FOR FURTHER INFORMATION CONTACT: For information on the conversion facility construction and operation, contact Gary Hartman at the address listed above. For general information on the DOE NEPA process, contact Carol Borgstrom, Director, Office of NEPA Policy and Compliance (EH–42), U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, 202–586–4600, or leave a message at 1–800–472–2756.

SUPPLEMENTARY INFORMATION:

I. Background

The United States has produced DUF_6 since the early 1950s as part of the process of enriching natural uranium for both civilian and military applications. Production took place at three gaseous diffusion plants (GDPs), first at the K–25 site (now called ETTP) at Oak Ridge, Tennessee, and subsequently at Paducah, Kentucky, and Portsmouth, Ohio. The K–25 plant ceased enrichment operations in 1985, and the Portsmouth plant ceased enrichment operations in 2001. The Paducah GDP continues to operate.

Approximately 440,000 t (484,000 tons) of DUF_6 is presently stored at Paducah in about 36,200 cylinders. The majority of the cylinders weigh approximately 12 t (14 tons) each, are 48 inches (1.2 m) in diameter, and are stored on outside pads. DOE has been looking at alternatives for managing this inventory. Also in storage at Paducah are approximately 1,940 cylinders of various sizes that contain enriched UF_6 or normal UF_6 (collectively called "non-DUF_6" cylinders) or are empty. [The non-DUF_6 cylinders would not be processed in the conversion facility.]

As a first step, DOE evaluated potential broad management options for its DUF_6 inventory in a Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DUF_6 PEIS) (DOE/EIS–0269) issued in April 1999. In the PEIS Record of Decision (64 FR 43358, August 10, 1999), DOE decided to promptly convert the DUF_6 inventory to a more stable uranium oxide form and stated that it would use the depleted uranium oxide as much as possible and store the remaining depleted uranium oxide for potential future uses or disposal, as necessary. In addition, DOE would convert DUF_6 to depleted uranium metal, but only if uses for metal were available. DOE did not select specific sites for the conversion facilities but reserved that decision for subsequent NEPA review. Today's Record of Decision announces the outcome of that site-specific NEPA review. DOE is also issuing today a separate but related ROD announcing the siting of a DUF_6 conversion facility at Portsmouth, Ohio.

Congress enacted two laws that directly addressed DOE's management of its DUF_6 inventory. The first law, Public Law 105–204, signed by the President in July 1998, required the Secretary of Energy to prepare a plan to commence construction of, no later than January 31, 2004, and to operate an on-site facility at each of the GDPs at

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DOE has decided to construct and operate the conversion facility in the south-central portion of the Paducah site, the preferred alternative identified in the FEIS as Location A. Groundbreaking for construction of the facility will commence on or before July 31, 2004, as anticipated by Public Law (Pub. L.) 107–206. The aqueous HF produced during conversion will be sold for use, pending approval of authorized release limits, as appropriate.

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Congress enacted two laws that directly addressed DOE's management of its DUF_6 inventory. The first law, Public Law 105–204, signed by the President in July 1998, required the Secretary of Energy to prepare a plan to commence construction of, no later than January 31, 2004, and to operate an on-site facility at each of the GDPs at

Paducah, Kentucky, and Portsmouth, Ohio, to treat and recycle DUF_6, consistent with NEPA. The second law, Public Law 107–206, signed by the President on August 2, 2002, required that no later than 30 days after enactment, DOE must award a contract for the scope of work described in its Request for Proposals (RFP) issued in October 2000 for the design, construction, and operation of a DUF_6 conversion facility at each of the Department's Paducah, Kentucky, and Portsmouth, Ohio, gaseous diffusion sites. It also stipulated that the contract require groundbreaking for construction to occur no later than July 31, 2004, at both sites.

In response to these laws, DOE issued the *Final Plan for the Conversion of Depleted Uranium Hexafluoride* as Required by Public Law 105–204 in July 1999, and awarded a contract to Uranium Disposition Services (UDS) for construction and operation of two conversion facilities on August 29, 2002, consistent with NEPA.

On September 18, 2001, DOE published a Notice of Intent (NOI) in the **Federal Register** (66 FR 48123) announcing its intention to prepare an EIS for the proposed action to construct, operate, maintain, and decontaminate and decommission two DUF_6 conversion facilities: One at Portsmouth and one at Paducah. Following the enactment of Public Law 107–206, DOE reevaluated the appropriate scope of its site-specific NEPA review and decided to prepare two separate EISs, one for the plant proposed for the Paducah site and a second for the Portsmouth site. This change in approach was announced in the **Federal Register** on April 28, 2003 (68 FR 22368).

The two draft conversion facility EISs were mailed to stakeholders in late November 2003, and a Notice of Availability was published by the EPA in the **Federal Register** on November 28, 2003 (68 FR 66824). Comments on the draft EISs were accepted during a 67-day review period that ended on February 2, 2004. DOE considered these comments and prepared two FEISs. The Notice of Availability for the two FEISs was published by the EPA in the **Federal Register** (69 FR 34161) on June 18, 2004.

II. Purpose and Need for Agency Action

DOE needs to convert its inventory of DUF_6 to more stable chemical form(s) for use or disposal. This need follows directly from (1) the decision presented in the August 1999 ROD for the PEIS, namely, to begin conversion of the DUF_6 inventory as soon as possible, and (2) Public Law 107–206, which directs DOE to award a contract for construction and operation of conversion facilities at both the Paducah site and the Portsmouth site.

III. Alternatives

No Action Alternative. Under the no action alternative, conversion would not occur. Current cylinder management activities (handling, inspection, monitoring, and maintenance) would continue; thus the status quo would be maintained at Paducah indefinitely.

Action Alternatives. The proposed action evaluated in the FEIS is to construct and operate a conversion facility at the Paducah site for conversion of the Paducah DUF_6 inventory into depleted uranium oxide (primarily triuranium octaoxide [U_3O_8]) and other conversion products. The FEIS review is based on the conceptual conversion facility design proposed by the selected contractor, UDS. The UDS dry conversion process is a continuous process in which DUF_6 is vaporized and converted to a mixture of uranium oxides (primarily U_3O_8) by reaction with steam and hydrogen in a fluidized-bed conversion unit. The hydrogen is generated from anhydrous ammonia (NH_3). The depleted U_3O_8 powder is collected and packaged for disposition in bulk bags (large-capacity, strong, flexible bags) or the emptied cylinders to the extent practicable. Equipment would also be installed to collect the aqueous HF (also called HF acid) co-product and process it into HF at concentrations suitable for commercial resale. A backup HF acid neutralization system would convert up to 100% of the HF acid to CaF_2 for sale or disposal in the future, if necessary. The conversion products would be transported to a disposal facility or to users by truck or rail. The conversion facility will be designed with four parallel processing lines to convert 18,000 t (20,000 tons) of DUF_6 per year, requiring 25 years to convert the Paducah inventory.

Three alternative locations within the site were evaluated, Locations A (preferred), B, and C. In addition, an option of transporting the ETTP cylinders to Paducah rather than to Portsmouth was considered, as was an option of expanding conversion facility operations.

Alternative Location A (Preferred Alternative). Location A is the preferred location for the conversion facility. It is located south of the administration building and its parking lot, immediately west of and next to the primary location of the DOE cylinder yards and east of the main plant access road. This location is an L-shaped tract consisting mostly of grassy field. However, the southeastern section is a wooded area. A drainage ditch crosses the northern part of the site, giving the cylinder yard storm water access to Kentucky Pollution Discharge Elimination System (KPDES) Outfall 017. This location is about 35 acres (14 ha) in size and was identified in the RFP for conversion services as the site for which bidders were to design their proposed facilities.

Alternative Location B. Location B is directly south of the Paducah maintenance building and west of the main plant access road. The northern part of this location is mowed grass and has a slightly rolling topography. The southern part has a dense covering of trees and brush, and some high-voltage power lines cross it, limiting its use. This location has an area of about 59 acres (23 ha).

Alternative Location C. Location C is east of the Paducah pump house and cooling towers. It has an area of about 53 acres (21 ha). Dykes Road runs through the center of this location from north to south. Use of the eastern half of this location could be somewhat limited because several high-voltage power lines run through this area.

Under the action alternatives, DOE evaluated the impacts from packaging, handling, and transporting depleted uranium oxide conversion product (primarily U_3O_8) from the conversion facility to a low-level waste (LLW) disposal facility that would be (1) selected in a manner consistent with DOE policies and orders and (2) authorized to receive the conversion products by DOE (in conformance with DOE orders), or licensed by the U.S. Nuclear Regulatory Commission (NRC) (in conformance with NRC regulations), or an NRC Agreement State agency (in conformance with state laws and regulations determined to be equivalent to NRC regulations). Assessment of the impacts and risks from on-site handling and disposal at an LLW disposal facility has been deferred to the disposal site's site-specific NEPA or licensing documents. While the FEIS presents the impacts from transporting the DUF_6 conversion products to both the Envirocare of Utah, Inc., facility and the Nevada Test Site (NTS), DOE plans to decide the specific disposal location(s) for the depleted U_3O_8 conversion product after additional NEPA review, as necessary. Accordingly, DOE will continue to evaluate its disposal options and will consider any further information or comments relevant to that decision. DOE will give a minimum 45-day notice before making its specific disposal decision and will provide any additional NEPA analysis for public review and comment.

The following alternatives were considered but not analyzed in detail in the FEIS: Use of Commercial Conversion Capacity, Sites Other Than Paducah, Alternative Conversion Processes, Long-Term Storage and Disposal Alternatives, Transportation Modes Other Than Truck and Rail, and One Conversion Plant Alternative.

IV. Summary of Environmental Impacts

The FEIS evaluated potential impacts from the range of alternatives described above. The impact areas included human health and safety, air quality, noise, water and soil, socioeconomics, ecological resources, waste management, resource requirements, land use, cultural resources, environmental justice, and cumulative impacts. In general, the impacts are low for both the no action and the proposed action alternatives. Among the three alternative locations considered at the Paducah site for the conversion facility, there are no major differences in impacts that would make one location clearly environmentally preferable. The discussion below summarizes the results of the FEIS impact analyses, highlighting the differences among the alternatives.

Human Health and Safety—Normal Operations and Transportation. Under all alternatives, it is estimated that potential exposures of workers and members of the general public to radiation and chemicals would be well within applicable public health standards and regulations. UDS would confirm, prior to conversion or at the initiation of the conversion operations, that polychlorinated biphenyl (PCB) releases to the workplace from the paint coating of some cylinders manufactured prior to 1978 would be within applicable Occupational Safety and Health Administration (OSHA) limits. Transportation by rail would tend to cause fewer impacts than by truck primarily because of exhaust emissions from the trucks and the higher number of shipments for trucks than for rail. The option of converting the aqueous HF to CaF_2 and transporting the CaF_2 to a disposal facility would result in increased shipments. The impacts associated with transportation of uranium oxide product to a disposal facility in the western United States by truck would be about the same if bulk bags are used or two filled cylinders are loaded onto a truck. If only one cylinder is loaded onto a truck, the impacts would be higher because of the increased number of shipments.

Human Health and Safety—Accidents. DOE has extensive experience in safely storing, handling, and transporting cylinders containing UF_6 (depleted, normal, or enriched). In addition, the chemicals used or generated at the conversion facility are commonly used for industrial applications in the United States, and there are well-established accident prevention and mitigative measures for their storage and transportation.

Under all alternatives, it is possible that accidents could release radiation or chemicals to the environment, potentially affecting both the workers and members of the general public. It is also possible that, similar to other industrial facilities, workers could be injured or killed as a result of on-the-job accidents unrelated to radiation or chemical exposure. Similarly, during transportation of materials, both crew members and members of the public may be injured or killed as a result of traffic accidents.

Three kinds of accidents have the largest possible consequences: (1) Those involving the DUF_6 cylinders during storage and handling under all alternatives, (2) those involving chemicals used or generated by the conversion process at the conversion site (in particular NH_3 and aqueous HF) under the action alternatives, and (3) those occurring during transportation of chemicals and cylinders under the action alternatives. The severity of the consequences from such accidents would depend on weather conditions at the time of the accident, and, in the case of the transportation accidents, the location of the accident, and could be significant. However, those accidents would have a low estimated probability of occurring, making the risk low. (Risk is determined by multiplying the consequences by the probability of occurrence).

In comparing truck versus rail transportation, even though the consequences of rail accidents are generally higher (because of the larger cargo load per railcar than per truck), the accident probabilities tend to be lower for railcars than for trucks. As a result, the risks of accidents would be about the same under either option.

Under the no action alternative, the risks associated with cylinder storage and handling would continue to exist as long as the cylinders are there. However, under the action alternatives, the risks associated with both the cylinder accidents and the chemical accidents would decline over time and disappear at the completion of the project.

Air Quality and Noise. Under the action alternatives, the total (modeled plus background value) concentrations due to emissions of most criteria pollutants—such as sulfur dioxide, nitrogen oxides, and carbon monoxide—would be well within applicable air quality standards. For construction, the primary concern would be particulate matter (PM) released from near-ground-level sources. Total concentrations of PM_{10} and $PM_{2.5}$ (PM with an aerodynamic diameter of 10 µm or less and 2.5 µm or less, respectively) at the construction site boundaries would be close to or above the standards because of the high background concentrations. Accordingly, construction activities would be conducted so as to minimize further impacts on ambient air quality.

Water and Soil. During construction of the conversion facility, concentrations of any potential contaminants in soil, surface water, or groundwater would be kept well within applicable standards or guidelines by implementing storm water management, sediment and erosion controls, and good construction practices. During operations, no impacts would be expected because no contaminated liquid effluents are anticipated.

Socioeconomics. Under the action alternatives, construction and operation of the conversion facility would create more jobs and personal income in the vicinity of the Paducah site than would be possible under the no action alternative. The number of jobs would be approximately 190 direct and 290 total during construction, and 160 direct and 330 total during operations.

Ecology. For the action alternatives, the total area disturbed during conversion facility construction would be up to 45 acres (18 ha). Although vegetation communities in the disturbed area would be impacted by a loss of habitat, impacts could be minimized (*e.g.*, by appropriate placement of the facility within each location), and negligible long-term impacts to vegetation and wildlife are expected at all locations. Impacts to wetlands could be minimized, depending on where exactly the facility was placed within each location and by maintaining a buffer near adjacent wetlands during construction. Construction of the conversion facility in the eastern portion of Location C could impact potential habitat for cream wild indigo (state-listed as a species of special concern) and compass plant (state-listed as threatened). For construction at all three locations, potential impacts to forested areas could be avoided if temporary construction areas were placed in previously disturbed locations. During construction, trees with exfoliating bark (such as shagbark hickory or dead trees with loose bark) that can be used by the Indiana bat (federal- and state-listed as endangered) as roosting trees during the summer would be saved if possible.

Waste Management. Under the action alternatives, waste generated during construction and operations would have negligible impacts on the Paducah site waste management operations, with the exception of possible impacts from disposal of CaF_2. If the aqueous HF were not sold but instead neutralized to CaF_2, it is currently unknown whether (1) the CaF_2 could be sold, (2) the low uranium content would allow the CaF_2 to be disposed of as nonhazardous solid waste, or (3) disposal as LLW would be required. The low level of uranium contamination expected (*i.e.*, less than 1 ppm) suggests that sale or disposal as nonhazardous solid waste would be most likely. Waste management for disposal as nonhazardous waste could be handled through appropriate planning and design of the facilities. If the CaF_2 had to be disposed of as LLW, it could represent a potentially large impact on waste management operations.

The U_3O_8 produced during conversion would amount to about 80% of Paducah's annual projected LLW volume.

Option of Shipping ETTP Cylinders to Paducah. The cylinders at ETTP would require preparation for shipment by either truck or rail. Three cylinder preparation options were considered for the shipment of noncompliant cylinders: cylinder overpacks, shipping "as-is" under a U.S. Department of Transportation (DOT) exemption, and use of a cylinder transfer facility (there are no current plans to build such a facility at ETTP). The operational impacts (*e.g.*, storage, handling, and maintenance of cylinders) from any of the options would be small and limited primarily to external radiation exposure of involved workers. The annual impacts from conversion operations at Paducah would remain the same, however the conversion period would be approximately 3 years longer. If a decision was made to construct and operate a transfer facility at ETTP in the future, additional NEPA review would be conducted.

Conversion Product Sale and Use. The conversion of the DUF_6 inventory produces products having some potential for reuse. These products include aqueous HF and CaF_2, which are commonly used as commercial materials. DOE is currently pursuing the establishment of authorization limits (allowable concentration limits of uranium) in these products to be able to free-release them to commercial users. In addition, there is a small potential for reuse of the depleted uranium oxide product.

D&D Activities. D&D impacts would be primarily from external radiation to involved workers and would be a small fraction of allowable doses. Wastes generated during D&D operations would be disposed of in an appropriate disposal facility and would result in low impacts in comparison with projected site annual generation volumes.

Cumulative Impacts. The FEIS analyses indicated that no significant cumulative impacts at the Paducah site and its vicinity would be anticipated due to the incremental impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions.

Option of Expanding Conversion Facility Operations. The throughput of the Paducah facility could be increased by making process efficiency improvements. Such an increase would not be expected to significantly change the overall environmental impacts when compared with those of the current plant design.

The conversion facility operations could be extended to process any additional DUF_6 for which DOE might assume responsibility by operating the facility longer than the currently anticipated 25 years. With routine facility and equipment maintenance and periodic equipment replacements or upgrades, it is believed that the conversion facility could be operated safely beyond this time period. If operations were extended beyond 25 years and if the operational characteristics (*e.g.*, estimated releases of contaminants to air and water) of the facility remained unchanged, it is expected that the annual impacts would be essentially unchanged.

V. Environmentally Preferred Alternative

In general, the FEIS shows greater impacts for the no action alternative than for the proposed action of constructing and operating the conversion facility mainly because of the relatively higher radiation exposures of the workers from the cylinder management operations and cylinder yards and because the cylinders and associated risk would remain if no action occurred. However, considering the uncertainties in the impact estimates and the magnitude of the impacts, the differences are not considered to be significant. The no action alternative has the potential for groundwater contamination with uranium over the long-term; this adverse impact is not anticipated under the proposed action alternatives. Beneficial socioeconomic impacts would be higher for the action alternatives than for the no action alternative.

The impacts associated with transportation of materials among sites would be comparable whether the transportation is by truck or rail.

With all alternatives, there is the potential for some high-consequence accidents to occur. The risks associated with such accidents can only be completely eliminated when the conversion of the DUF_6 inventory has been completed.

Although there are some differences in impacts among the three alternative locations for the conversion facility, these differences are small and well within the uncertainties associated with the methods used to estimate impacts. In general, because of the relatively small risks that would result under all alternatives and the absence of any clear basis for discerning an environmental preference, DOE concludes that no single alternative analyzed in depth in the FEIS is clearly environmentally preferable compared to the other alternatives.

VI. Comments on Final EIS

The Final EIS was mailed to stakeholders in early June 2004, and the EPA issued a Notice of Availability in the **Federal Register** on June 18, 2004. The entire document was also made available on the World Wide Web. Two comment letters were received on the DUF_6 Conversion Facility Final EISs. The State of Nevada indicated that it had no comments on the Final EISs and that the proposal was not in conflict with state plans, goals, or objectives. The U.S. Environmental Protection Agency, Region 5 in Chicago, stated that the Portsmouth Final EIS adequately address its concerns, and that it concurs with the Preferred Alternative and has no further concerns.

Decision

I. Bases for the Decision

DOE considered potential environmental impacts as identified in the FEIS (including the information contained in the classified appendix); cost; applicable regulatory requirements; Congressional direction as included in Public Law 105–204 and 107–206; agreements among DOE and the States of Ohio, Tennessee, and Kentucky concerning the management of DUF_6 currently stored at the Portsmouth, ETTP, and Paducah sites, respectively; and public comments in arriving at its decision. In deciding among the three alternative locations at the Paducah site for the conversion facility, DOE considered environmental factors, site preparation requirements affecting construction, availability of utilities, proximity to cylinder storage areas, and potential impacts to current or planned site operations. DOE has determined that Location A is the best alternative. DOE believes that the decision identified below best meets its programmatic goals and is consistent with all the regulatory requirements and public laws.

II. Decision

DOE has decided to implement the actions described in the preferred alternative from the FEIS at Location A. This decision includes the following actions:

- DOE will construct and operate the conversion facility at Location A within the Paducah site. Construction will commence on or before July 31, 2004, as intended by Congress in Public Law 107–206.
- All shipments to and from the conversion site, including any potential shipments of non-DUF_6 cylinders currently stored at ETTP to Paducah, will be conducted by either truck or rail, as appropriate. Cylinders will be shipped in a manner that is consistent with DOT regulations for the transportation of UF_6 cylinders.
- Current cylinder management activities (handling, inspection, monitoring, and maintenance) will continue, consistent with the Cylinder Project Management Plan for Depleted Uranium Hexafluoride, effective October 2003, which cover actions needed to meet safety and environmental requirements, until conversion could be accomplished.
- The aqueous HF produced during conversion will be sold for use, pending approval of authorized release limits as appropriate. If necessary, CaF_2 will be produced and reused, pending approval of authorized release limits, or disposed of as appropriate.
- The depleted U_3O_8 conversion product will be reused to the extent possible or packaged for disposal in emptied cylinders at an appropriate disposal facility. DOE plans to decide the specific disposal location(s) for the depleted U_3O_8 conversion product after additional appropriate NEPA review. Accordingly, DOE will continue to evaluate its disposal options and will consider any further information or comments relevant to that decision. DOE will give a minimum 45-day notice before making the specific disposal decision and will provide any supplemental NEPA analysis for public review and comment.

III. Mitigation

On the basis of the analyses conducted for the FEIS, the DOE will adopt all practicable measures, which are described below, to avoid or minimize adverse environmental impacts that may result from constructing and operating a conversion facility at Location A. These measures are either explicitly part of the alternative or are already performed as part of routine operations.

- The conversion facility will be designed, constructed, and operated in accordance with the comprehensive set of DOE requirements and applicable regulatory requirements that have been established to protect public health and the environment. These requirements encompass a wide variety of areas, including radiation protection, facility design criteria, fire protection, emergency preparedness and response, and operational safety requirements.
- Temporary impacts on air quality from fugitive dust emissions during reconstruction of cylinder yards or construction of any new facility will be controlled by the best available practices, as necessary, to comply with the established standards for PM_{10} and $PM_{2.5}$.
- During construction, impacts to water quality and soil will be minimized through implementing storm water management, sediment and erosion controls, and good construction practices consistent with the Soil, Erosion, and Sediment Control Plan and Construction Management Plan.
- If live trees with exfoliating bark are encountered on construction areas, they will be saved if possible to avoid destroying potential habitat for the Indiana bat.

Issued in Washington, DC this 20th day of July 2004.

Paul M. Golan,

Principal Deputy Assistant Secretary for Environmental Management.

[FR Doc. 04–17050 Filed 7–26–04; 8:45 am]

BILLING CODE 6450–01–U

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. CP04–368–000]

El Paso Natural Gas Company; Notice of Request for Authorization

July 2, 2004.

Take notice that on June 25, 2004, El Paso Natural Gas Company (El Paso), P.O. Box 1087, Colorado Springs, Colorado 80904, filed in Docket No. CP04–368–000, a request pursuant to section 157.216(b) and 157.208(b) of the Commission's Regulations (18 CFR 157.214) to abandon, by removal, its 7.1 mile 10¾ inch diameter Nevada Loop Line (Line No. 2112), and replace two segments of its 16 inch diameter Nevada Loop Line (Line No. 2121), totaling 17.2 miles, located in Mohave County, Arizona, all as more fully set forth in the application on file with the Commission and open for public review.

Any questions regarding this application should be directed to Robert T. Tomlinson, Director, Regulatory Affairs, El Paso Natural Gas Company, P.O. Box 1087, Colorado Springs, Colorado, 80944, at (719) 520–3788.

This filing is available for review at the Commission or may be viewed on the Commission's Web site at *http://www.ferc.gov* using the "eLibrary" link. Enter the docket number excluding the last three digits in the docket number field to access the document. For assistance, please contact FERC Online Support at *FERCOnlineSupport@ferc.gov* or call toll-free at (866) 208–3676, or for TTY, contact (202) 502–8659. Protests, comments and interventions may be filed electronically via the Internet in lieu of paper; see, 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's Web site under the "e-Filing" link. The Commission strongly encourages interveners to file electronically.

Any person or the Commission's staff may, within 45 days after issuance of the instant notice by the Commission, file pursuant to Rule 214 of the Commission's Procedural Rules (18 CFR 385.214) a motion to intervene or notice of intervention and pursuant to section 157.205 of the Regulations under the Natural Gas Act (18 CFR 157.205) a protest to the request. If no protest is filed within the time allowed therefore, the proposed activity shall be deemed to be authorized effective the day after the time allowed for filing a protest. If a protest is filed and not withdrawn within 30 days after the time allowed for filing a protest, the instant request

72 FR 15869, *Notice of Availability of a Draft Supplement Analysis for Disposal of Depleted Uranium Oxide Conversion Product Generated From DOE'S Inventory of Depleted Uranium Hexafluoride*, U.S. Department of Energy, Tuesday, April 3, 2007.

Federal Register/Vol. 72, No. 63/Tuesday, April 3, 2007/Notices 15869

DEPARTMENT OF EDUCATION

The Historically Black Colleges and Universities Capital Financing Advisory Board

AGENCY: The Historically Black Colleges and Universities Capital Financing Board, Department of Education.

ACTION: Notice of an open meeting.

SUMMARY: This notice sets forth the schedule and proposed agenda of an upcoming open meeting of the Historically Black Colleges and Universities Capital Financing Advisory Board. The notice also describes the functions of the Board. Notice of this meeting is required by Section 10(a)(2) of the Federal Advisory Committee Act and is intended to notify the public of their opportunity to attend.

DATES: Friday, April 20, 2007.

Time: 10 a.m.–2 p.m.

ADDRESSES: Xavier University, University Center Building, 1 Drexel Drive, New Orleans, Louisiana 70125.

FOR FURTHER INFORMATION CONTACT: Don E. Watson, Executive Director, Historically Black College and University Capital Financing Program, 1990 K Street, NW., Washington, DC 20006; *telephone:* (202) 219–7037; *fax:* (202) 502–7677; e-mail: *donald.watson@ed.gov.*

Individuals who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FRS) at 1–800–877–8339, Monday through Friday between the hours of 8 a.m. and 8 p.m., Eastern Standard Time.

SUPPLEMENTARY INFORMATION: The Historically Black College and University Capital Financing Advisory Board (Board) is authorized by Title III, Part D, Section 347 of the Higher Education Act of 1965, as amended in 1998 (20 U.S.C. 1066f). The Board is established within the Department of Education to provide advice and counsel to the Secretary and the designated bonding authority as to the most effective and efficient means of implementing construction financing on historically black college and university campuses and to advise Congress regarding the progress made in implementing the program. Specifically, the Board will provide advice as to the capital needs of Historically Black Colleges and Universities, how those needs can be met through the program, and what additional steps might be taken to improve the operation and implementation of the construction financing program.

The purpose of this meeting is to review current program activities, provide guidance for 2007 activities, and to make recommendations to the Secretary on the current capital needs of Historically Black Colleges and Universities.

Individuals who will need accommodations for a disability in order to attend the meeting (e.g., interpreting services, assistance listening devices, or materials in alternative format) should notify Don Watson at 202 219–7037, no later than April 5, 2007. We will attempt to meet requests for accommodations after this date but cannot guarantee their availability. The meeting site is accessible to individuals with disabilities.

An opportunity for public comment is available on Friday, April 20, 2007 between 12:15 p.m.–12:45 p.m. Those members of the public interested in submitting written comments may do so by submitting them to the attention of Don E. Watson, 1990 K Street, NW., Washington, DC, by Friday, April 13, 2007.

Records are kept of all Board proceedings and are available for public inspection at the Office of the Historically Black College and University Capital Financing Advisory Board (Board), 1990 K Street, NW., Washington, DC 20006, from the hours of 9 a.m. to 5 p.m., Eastern Standard Time Monday through Friday (EST).

Electronic Access to This Document: You may view this document, as well as all other documents of this Department published in the **Federal Register**, in text or Adobe Portable Document Format (PDF) on the Internet at the following site: *http://www.ed.gov/news/federegister.*

To use PDF you must have Adobe Acrobat Reader, which is available free at this site. If you have questions about using PDF, call the U.S. Government Printing Office (GPO), toll free at 1–888–293–6498; or in the Washington, DC, area at (202) 512–1530.

Note: The official version of this document is the document published in the **Federal Register**. Free Internet access to the official edition of the **Federal Register** and the Code of Federal Regulations is available on GPO Access at: *http://www.gpoaccess.gov/nara/index.html.*

James F. Manning,

Delegated the Authority of Assistant Secretary for Postsecondary Education.

[FR Doc. E7–6090 Filed 4–2–07; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF ENERGY

Notice of Availability of a Draft Supplement Analysis for Disposal of Depleted Uranium Oxide Conversion Product Generated From Doe's Inventory of Depleted Uranium Hexafluoride

AGENCY: Department of Energy.

ACTION: Notice of availability of a draft supplement analysis.

SUMMARY: DOE has prepared a Draft Supplement Analysis (SA) pursuant to DOE regulations implementing the National Environmental Policy Act (NEPA), 10 CFR 1021.314. The draft SA addresses DOE's proposal to dispose of the depleted uranium oxide conversion product at either the DOE-owned low-level radioactive waste disposal facility at the Nevada Test Site (NTS) or at EnergySolutions LLC, a commercial low-level waste disposal facility in Clive, Utah (EnergySolutions; formerly known as Envirocare of Utah, Inc.).

In April 1999, the U.S. Department of Energy (DOE) published a Programmatic Environmental Impact Statement (PEIS) for management of its Depleted Uranium Hexafluoride (DUF_6) inventory. The PEIS included a generic assessment of the disposal of depleted uranium oxide conversion product (as U_3O_8 or UO_2) and concluded that disposal of either product in shallow earthen structures, vaults, or mines would adequately protect human health and the environment over the time period considered, as long as the disposal facility is located in a dry environment and appropriately engineered (e.g., the cover material is maintained). Subsequently, DOE prepared site-specific final Environmental Impact Statements (EISs) for construction and operation of DUF_6 conversion facilities at the DOE's Paducah, Kentucky, and Portsmouth, Ohio, sites in the Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky Site, DOE/EIS–0359, and the Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site, DOE/EIS–0360. DOE published its Record of Decision for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky Site, and Record of Decision for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site (RODs) on July 27, 2004 (69 FR 44649 and 69 FR 44654).

In each site-specific ROD, DOE announced its decision to implement the actions described as the preferred alternative in the corresponding conversion facility EIS, which included the following actions:

• DOE will construct and operate a conversion facility at Location A within each of the Paducah and Portsmouth sites.

• All shipments to and from the conversion facility sites, including any potential shipments of non-DUF_6 cylinders currently stored at the East Tennessee Technology Park (ETTP), will be conducted by either truck or rail, as appropriate. Cylinders will be shipped in a manner that is consistent with U.S. Department of Transportation (DOT) regulations for the shipment of UF_6 cylinders.

• Current cylinder management activities (handling, inspection, monitoring, and maintenance) will continue, consistent with Cylinder Project Management Plan for Depleted Uranium Hexafluoride, effective October 2003, which covers actions needed to meet safety and environmental requirements, until conversion can be accomplished.

• The aqueous hydrofluoric acid (HF) produced during conversion will be sold for use. If necessary, calcium fluoride (CaF_2) will be produced and reused, or disposed of as appropriate.

• The depleted uranium oxide conversion product will be reused to the extent possible or packaged in emptied cylinders for disposal at an appropriate disposal facility. DOE plans to decide the specific disposal location(s) for the depleted uranium oxide conversion product after additional appropriate NEPA review. Accordingly, DOE will continue to evaluate its disposal options and will consider any further information or comments relevant to that decision. DOE will give a minimum 45-day notice before making the specific disposal decision and will provide any supplemental NEPA analysis for public review and comment.

The conversion facility RODs did not declare a decision regarding the location for disposal of depleted uranium oxide conversion product. The reason DOE did not make its disposal decision at the time it issued the RODs for construction and operation of the two DUF6 conversion facilities is that it discovered that it had, through an oversight, not served copies of the draft and final site-specific EISs (DOE 2004a, b) to the States of Utah, home of EnergySolutions, and Nevada, home of NTS, as required in 40 CFR 1502.19. As a result, each ROD states DOE's intention to decide the specific disposal location(s) for the depleted uranium oxide conversion product after additional appropriate NEPA review.

This draft SA addresses the additional appropriate NEPA review committed to in the earlier RODs. The draft SA identifies no significant new circumstances or information relevant to environmental concerns that bear on DOE's decisions on disposal locations or the impacts of those decisions. Based on the draft SA that is the subject of this Notice, DOE believes that a supplemental EIS is not needed to support amending the conversion facility RODs to decide the disposal location for the depleted uranium oxide conversion product. The depleted uranium oxide conversion product may be disposed either at the EnergySolutions low-level waste disposal facility or at the NTS low-level waste disposal facility. DOE plans to issue amended RODs under the conversion facility EISs no sooner than 45 days from the publication of this Notice.

DATES: DOE will consider all public comments on this matter submitted by May 18, 2007.

ADDRESSES: Comments should be submitted electronically via the Web at *http://web.ead.anl.gov/uranium/* or by regular mail. Written comments can be mailed to: DU Disposal Supplement Analysis Comment, Argonne National Laboratory, Building 900, Mail Stop 3, 9700 S. Cass Avenue, Argonne, IL 60439.

FOR FURTHER INFORMATION CONTACT: Copies of the Supplement Analysis for Disposal of Depleted Uranium Oxide Conversion Product Generated From DOE's Inventory of Depleted Uranium Hexafluoride (DOE/EIS–0359/0360–SA–001) is available on the Depleted UF_6 Management Information Network at: *http://web.ead.anl.gov/uranium/*, and on DOE's NEPA Web site at *http://www.eh.doe.gov/nepa/whatsnew.html.* To request printed copies of this document, please write: DU Disposal Supplement Analysis Comment, Argonne National Laboratory, Building 900, Mail Stop 3, 9700 S. Cass Avenue, Argonne, IL 60439.

For further information on DOE's NEPA process, contact: Ms. Carol Borgstrom, Director, Office of NEPA Policy and Compliance, GC–20, U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585, *Telephone:* 202–586–4600, or leave a message at 1–800–472–2756.

SUPPLEMENTARY INFORMATION: Uranium Disposition Services, LLC (UDS) began construction of the DUF_6 conversion facilities at Paducah, Kentucky and Portsmouth, Ohio in July 2004. The main products from the conversion of DOE's inventory of DUF_6 will be depleted uranium oxide conversion product and aqueous hydrogen fluoride (HF). The quantities of depleted uranium oxide conversion product produced annually will be approximately 10,800 metric tons (t) (11,800 tons) at Portsmouth and 14,300 t (15,800 tons) at Paducah. UDS is planning to sell the HF product to a commercial user.

In addition to depleted uranium oxide conversion product, two other products from the conversion process require disposal: (1) Emptied DUF_6 cylinders and (2) a relatively small quantity of CaF_2 (approximately 18 t [20 tons] at Portsmouth and 24 t [26 tons] at Paducah annually). UDS is planning to use the emptied cylinders as disposal containers for the depleted uranium oxide conversion product. Therefore, the emptied cylinders would become part of the depleted uranium oxide waste stream. Any cylinders not used as disposal containers would be disposed of as low-level waste at an appropriate facility in compliance with applicable regulations. The small quantity of CaF_2 would be disposed with the unused depleted uranium oxide. Therefore, the unused depleted uranium oxide, most of the emptied cylinders, and the small quantity of CaF_2 would be sent to the same disposal facility.

The PEIS considered the environmental impacts of six alternative strategies for long-term management of DOE's DUF_6 inventory. The alternative strategies included: (1) Options for continued storage of DUF_6 in cylinders at the three sites where it was stored (Paducah, KY, Portsmouth, OH, and ETTP in Oak Ridge, TN); (2) long-term storage as DUF_6 at a consolidated site; (3) conversion of the DUF_6 to an oxide followed by long-term storage; (4) conversion to an oxide or depleted uranium metal followed by use; (5) conversion to an oxide followed by disposal; and (6) no action. The analyses of the long-term storage and disposal alternatives included the transportation of the depleted uranium oxide to generic storage or disposal sites located 155 mi (250 km), 620 mi (1,000 km), or 3,100 mi (5,000 km) from the conversion facilities. DOE analyzed the impacts of depleted uranium conversion product disposal using generic assumptions about disposal site characteristics, rather than actual characteristics for any particular disposal site. A technical support document for the PEIS investigated the feasibility of depleted uranium disposal at six low-level waste disposal facilities based on waste acceptance criteria, available capacity, and disposal cost (*Depleted Uranium Storage and Disposal Trade Study:* Summary Report, ORNL/TM–2000/10). This document and subsequent follow-up studies have verified that the only currently operating dry-environment, low-level waste disposal facilities that are feasible for disposal of the depleted uranium oxide conversion product are the NTS and EnergySolutions facilities.

Like the PEIS, site-specific EISs for each conversion facility assumed that depleted uranium oxide would be classified as low-level waste. This assumption is consistent with a recent ruling by the U.S. Nuclear Regulatory Commission (NRC) in the licensing proceeding for a commercial uranium enrichment facility (NRC 2005a,b,c,d and 2006a,b). The site-specific EISs stated that the disposal facility (or facilities) would be (1) selected in a manner consistent with DOE policies and orders, and (2) authorized or licensed to receive the conversion products by DOE (in conformance with DOE orders), the NRC (in conformance with NRC regulations), or an NRC agreement state agency (in conformance with state laws and regulations determined to be equivalent to NRC regulations).

DOE is now proposing to amend the site-specific RODs to decide that the depleted uranium oxide conversion product may be disposed of at either the NTS or the EnergySolutions low-level waste disposal facilities. Accordingly, DOE has prepared the draft SA that is the subject of this Notice. All other aspects of the depleted DUF_6 conversion program remain as previously described in the site-specific EISs and RODs.

The draft SA identifies no significant new circumstances or information relevant to environmental concerns that bear on DOE's decisions on disposal locations or the impacts of those decisions. Since issuance of the two site-specific DUF_6 conversion facility final EISs, the following circumstances have changed. In May 2006, a contract was signed with Solvay Fluorides, a commercial vendor, for purchase of the HF co-product. On June 2, 2006, the NRC issued an order that determined that the Envirocare (now EnergySolutions) site near Clive, Utah, appears to be suitable for near-term disposal of depleted uranium. The transportation campaign has been slightly modified to include more cylinders per railcar with fewer shipments per year. Impacts from the modified campaign for both operations and accident scenarios are projected to be about the same as those presented in the site-specific EISs.

DOE believes, based on the analysis in the draft SA, that disposal at either NTS or EnergySolutions low-level waste disposal facilities are reasonable alternatives. Regarding the alternative of disposal at the EnergySolutions facility, DOE believes that adequate NEPA documentation exists to support disposal of any unused depleted uranium oxide conversion product as well as for emptied DUF_6 cylinders that would be used for disposal containers and the small quantity of CaF_2 that would be generated during the conversion process. With respect to NTS low-level waste facility, the draft SA analyses show that there is adequate NEPA coverage for all actions leading up to delivery at the NTS and that site-specific NEPA coverage at the NTS is adequate for disposal of up to 60,000 m^3 of unused depleted uranium oxide conversion product. Furthermore, upcoming reviews of the NTS site-wide EIS will evaluate disposal of additional uranium oxide conversion product volumes at NTS. Accordingly, DOE believes that a supplemental EIS (or an environmental assessment) is not needed to support amending the site-specific RODs to address disposal of the depleted uranium oxide conversion product.

DOE plans to issue amended RODs under the conversion facility EISs no sooner than 30 days after issuance of the final SA. DOE will consider all public comments on the draft SA submitted by May 18, 2007.

Issued in Washington, DC, March 27, 2007.

Mark W. Frei,

Deputy Assistant Secretary for Program Planning and Budget.

[FR Doc. E7–6039 Filed 4–2–07; 8:45 am]
BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Notice of Extension of Time to Submit Scoping Comments on the Programmatic Environmental Impact Statement for the Global Nuclear Energy Partnership

AGENCY: Office of Nuclear Energy, U.S. Department of Energy.

ACTION: Notice of extension of time to submit scoping comments.

SUMMARY: In response to public requests, the Department of Energy (DOE) announces an extension of time to submit comments on the proposed scope, alternatives, and environmental issues to be analyzed in the Programmatic Environmental Impact Statement for the Global Nuclear Energy Partnership (GNEP PEIS). This date has been extended to June 4, 2007, thereby giving an additional 61 days to provide comments.

ADDRESSES: Please direct comments, suggestions, or relevant information on the GNEP PEIS to: Mr. Timothy A. Frazier, GNEP PEIS Document Manager, Office of Nuclear Energy, U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585–0119; Telephone: 866–645–7803, Fax: 866–645–7807, e-mail to: *GNEP-PEIS@nuclear.energy.gov.* Please mark envelopes, faxes, and e-mails: "GNEP PEIS Comments." Additional information on GNEP may be found at *http://www.gnep.energy.gov.*

FOR FURTHER INFORMATION CONTACT: For general information on DOE's National Environmental Policy Act (NEPA) process, please contact: Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance, GC–20, U.S. Department of Energy, 1000 Independence Avenue, SW., Washington, DC 20585–0103, 202–586–4600, or by leaving a message at 1–800–472–2756. Additional information regarding DOE's NEPA activities is available on the DOE NEPA Web site at *http://www.eh.doe.gov/nepa.* This notice is available at *http://www.eh.doe.gov/nepa* and *http://www.gnep.energy.gov.*

SUPPLEMENTARY INFORMATION: On January 4, 2007, DOE published a Notice of Intent (NOI) (72 FR 331) to prepare the GNEP PEIS pursuant to the National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321 *et seq.*, and the Council on Environmental Quality's (CEQ's) and DOE's regulations implementing NEPA, 40 CFR parts 1500–1508 and 10 CFR part 1021, respectively. With the publication of the NOI, DOE began the PEIS scoping period and invited Federal, state, and local governments, Native American Tribes, industry, other organizations, and the public to provide comments on the proposed scope, alternatives, and environmental issues to be analyzed in the GNEP PEIS. In response to public requests, DOE is now extending the time for submittal of scoping comments an additional 61 days from April 4, 2007, to June 4, 2007. DOE will consider all comments received during the scoping period in preparing the GNEP PEIS. Late comments will be considered to the extent practicable.

81 FR 58921, *Notice of Intent To Prepare a Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated From DOE's Inventory of Depleted Uranium Hexafluoride*, U.S. Department of Energy, Friday, August 26, 2016, with associated *Correction*, published in 81 FR 61674 on Wednesday, September 7, 2016.

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operation of SURTASS LFA sonar and implementation of mitigation and monitoring measures. The Draft SEIS/SOEIS evaluates the environmental impacts associated with two action alternatives and a No-Action Alternative. The primary difference between the action alternatives is that the Navy's preferred alternative reduces the annual permitted allowance of LFA sonar transmissions from 432 hours (Alternative 1) to 255 hours (Alternative 2) per ship. The Draft SEIS/SOEIS and associated analyses will also be used to support consultations associated with required regulatory permits and authorizations effective in 2017.

The Draft SEIS/SOEIS was distributed to appropriate federal, state, and local agencies and organizations, Native Alaskan and Native Tribal governments and organizations, and other interested parties. The Draft SEIS/SOEIS is available for public viewing and downloading at the following project Web site: *http://www.surtass-lfa-eis.com*. Compact disc copies of the Draft SEIS/SOEIS are available upon request from: SURTASS LFA Sonar SEIS/SOEIS Program Manager, 4350 Fairfax Drive, Suite 600, Arlington, VA 22203–1632, Email: *eisteam@surtass-lfa-eis.com*. Compact discs of the Draft SEIS/OEIS are available for public review at the following public libraries:

1. Jacksonville Public Library, 303 N. Laura Street, Jacksonville, FL 32202;
2. Camden County Public Library, 1410 Hwy 40 E, Kingsland, GA 31548;
3. Ben May Main Library, 701 Government Street, Mobile, AL 36602;
4. Meridian-Lauderdale County Public Library, 2517 7th Street, Meridian, MS 39301;
5. New Orleans Public Library, 219 Loyola Avenue, New Orleans, LA 70112;
6. Houston Public Library, 500 McKinney Street, Houston, TX 77002;
7. New Hanover County Public Library, 201 Chestnut Street, Wilmington, NC 28401;
8. Anne Arundel County Public Library, 1410 West Street, Annapolis, MD 21401;
9. Charleston County Public Library, 68 Calhoun Street, Charleston, SC 29401;
10. Mary D. Pretlow Anchor Branch Library, 111 W. Ocean View Avenue, Norfolk, VA 23503;
11. Portland Public Library, 5 Monument Square, Portland, ME 04101;
12. Providence Public Library, 150 Empire Street, Providence, RI 02903;
13. Boston Public Library, 700 Boylston Street, Boston, MA 02116;
14. The Seattle Public Library, 1000 Fourth Avenue, Seattle, WA 98104;
15. Los Angeles Public Library, 630 W. 5th Street, Los Angeles, CA 90071;
16. San Francisco Public Library, 100 Larkin Street, San Francisco, CA 94102;
17. Oregon State University, 250 Winter Street NE., Salem, OR 97301;
18. Alaska Resources Library and Information Services, 3211 Providence Drive, Anchorage, AK 99508;
19. Hawaii State Library, 478 South King Street, Honolulu, HI 96813;
20. Nieves M. Flores Memorial Public Library, 254 Martyr Street, Hagåtña, Guam 96910; and
21. The Feleti Barstow Public Library, Pago Pago, American Samoa, 96799.

Written comments on the Draft SEIS/SOEIS can be submitted by mail: SURTASS LFA Sonar SEIS/SOEIS Program Manager, 4350 Fairfax Drive, Suite 600, Arlington, VA 22203–1632, or by Email: *eisteam@surtass-lfa-eis.com*. All written comments must be postmarked by October 11, 2016 to ensure that they become part of the official record. All timely comments will be addressed in the Final SEIS/SOEIS. No public hearings or meetings will be held.

Dated: August 18, 2016.

C. Pan,

Lieutenant, Judge Advocate General's Corps, U.S. Navy, Alternate Federal Register Liaison Officer.

[FR Doc. 2016–20500 Filed 8–25–16; 8:45 am]

BILLING CODE 3810–FF–P

DEPARTMENT OF ENERGY

Notice of Intent To Prepare a Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated From DOE's Inventory of Depleted Uranium Hexafluoride

AGENCY: U.S. Department of Energy.

ACTION: Notice of intent.

SUMMARY: The U.S. Department of Energy (DOE) announces its intention to prepare a Supplemental Environmental Impact Statement (SEIS) for its proposal to disposition depleted uranium oxide (DUO_X) conversion product from its depleted uranium hexafluoride (DUF_6) conversion facilities at the Paducah, Kentucky, and Portsmouth, Ohio, sites at up to three offsite low-level waste disposal facilities. The *Draft Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride* (DOE/EIS–0359–S1; DOE/EIS–0360–S1) will analyze potential environmental impacts from the proposed action to identify a final disposition location or locations for the DUO_X conversion product from both operating DUF_6 conversion facilities.

The proposed scope of the draft SEIS includes an analysis of potential environmental impacts from activities associated with the transportation to and disposition of depleted uranium oxide at three proposed disposition location alternatives: the DOE-owned low-level radioactive waste disposal facility at the Nevada National Security Site (NNSS) in Nye County, Nevada; the Energy*Solutions*, LLC (formerly known as Envirocare of Utah, Inc.) low-level waste disposal facility in Clive, Utah; and the newly identified location at the Waste Control Specialists, LLC (WCS) low-level waste disposal facility in Andrews, Texas.

ADDRESSES: Questions concerning the project or requests to be placed on the document distribution list can be sent to: Ms. Jaffet Ferrer-Torres, National Environmental Policy Act (NEPA) Document Manager, Office of Environmental Management, U.S. Department of Energy, EM–4.22, 1000 Independence Avenue SW., Washington, DC 20585; or to *DUF6_NEPA@em.doe.gov*. Additional information regarding the SEIS is available at: *http://www.energy.gov/em/disposition-uranium-oxide-conversion-depleted-uranium-hexafluoride*.

FOR FURTHER INFORMATION CONTACT: For further information on DOE's DUF_6 long-term management and disposal program, please contact Ms. Jaffet Ferrer-Torres, U.S. Department of Energy at the above **ADDRESSES**.

For information on DOE's NEPA process, please contact Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Compliance, U.S. Department of Energy, 1000 Independence Avenue SW., Washington, DC 20585–0103; Telephone: (202) 586–4600, or leave a message at (800) 472–2756; or email at *askNEPA@hq.doe.gov*.

SUPPLEMENTARY INFORMATION:

Background

The use of uranium as fuel for nuclear power plants or for military applications requires increasing the proportion of the uranium-235 isotope found in natural uranium. Industrial uranium enrichment in the United States began as part of atomic bomb development during World War II. Uranium enrichment for both civilian and military uses was continued by the U.S. Atomic Energy Commission and its successor agencies, including DOE. Uranium enrichment by gaseous diffusion was carried out at three locations: the Paducah Site in Kentucky, the Portsmouth Site in Ohio, and the East Tennessee Technology Park in Oak Ridge, Tennessee.

DUF_6 results from the uranium enrichment process. The DUF_6 that remains after enrichment typically contains 0.2 percent to 0.4 percent uranium-235 and has been stored as a solid in large metal cylinders at the gaseous diffusion uranium enrichment facilities. The DUF_6 must be converted into a more stable form for disposal. The conversion process results in DUO_X and aqueous hydrogen fluoride [1] (HF). DOE's existing inventory has over 760,000 metric tons (MT) (1 MT = 1,000 kilograms, approximately 2,205 pounds) of DUF_6. Approximately 54,000 MT, or 7% of this total, has already been converted at the end of calendar year 2015. DUF_6 is stored as a solid in steel cylinders that each hold approximately 10 to 14 MT of material. These cylinders are stacked two layers high in outdoor areas known as "yards." The Paducah Site has approximately 44,000 DUF_6 cylinders, and the Portsmouth Site has approximately 19,000 DUF_6 cylinders, for a total of about 63,000 cylinders. All DUF_6 cylinders produced at facilities in Tennessee were previously transported to the Portsmouth Site. Operating at planned capacity, the conversion plants would produce approximately 10,800 MT (11,900 tons) of DUO_X annually at Portsmouth and 14,300 MT (15,800 tons) of DUO_X annually at Paducah. The duration to convert the inventory of DUF_6 to DUO_X is expected to be 18 years for the Portsmouth DUF_6 inventory and 25 years for Paducah's larger DUF_6 inventory.

Relationship to Existing NEPA Analyses

This SEIS represents the third phase of an environmental review process being used to evaluate and implement the DUF_6 long-term management program. As a first step and pursuant to Council on Environmental Quality (CEQ) and DOE NEPA implementing regulations at 40 CFR parts 1500–1508 and 10 CFR part 1021, respectively, DOE evaluated potential broad management options for its DUF_6 inventory in the *Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DUF_6 PEIS)* (DOE/EIS–0269) issued in April 1999 (64 FR 19999; April 23, 1999). In the DUF_6 PEIS Record of Decision (ROD) (64 FR 43358; August 10, 1999), DOE decided to promptly convert the DUF_6 inventory to a more stable uranium oxide form and stated that it would use the depleted uranium oxide as much as possible and store the remaining depleted uranium oxide for potential future uses or disposal, as necessary. DOE did not select specific sites for the conversion facilities or disposal at that time, but reserved that decision for subsequent NEPA review.

In June 2004, DOE issued two EISs for construction and operation of DUF_6 conversion facilities and other actions at its Paducah, Kentucky and Portsmouth, Ohio sites (69 FR 34161; June 18, 2004). Both the *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Paducah, Kentucky Site* (DOE/EIS–0359) and the *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site* (DOE/EIS–0360) were prepared as a second phase of the environmental review process to evaluate and implement DOE's DUF_6 long-term management program. These EISs evaluated the potential environmental impacts of transportation and disposition of depleted uranium oxide at two potential off-site locations: at the DOE-owned low-level radioactive waste disposal facility at the Nevada Test Site (now known as NNSS), and at Envirocare of Utah, Inc. (now known as Energy*Solutions*, LLC), a commercial low-level waste disposal facility in Clive, Utah. RODs were published for both of these EISs on July 27, 2004 (69 FR 44649, 69 FR 44654). However, DOE deferred a decision on the transportation and disposition of the conversion product and committed to addressing that action at a later date.

In 2007, DOE prepared a draft Supplement Analysis (SA), in accordance with DOE NEPA implementing regulations at 10 CFR 1021.314, in order to determine whether there were substantial changes to the proposal or significant new circumstances or information relevant to environmental concerns that require preparation of a Supplemental EIS to decide disposition locations committed to in the 2004 RODs. DOE made the *Draft Supplement Analysis for Location(s) to Dispose of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride* (DOE/EIS–0359–SA–1 and DOE/EIS–0360–SA–1) publicly available on April 3, 2007 (72 FR 15869). The comments received associated with the scope of the draft SA suggested consideration of WCS's Andrews, Texas, site as a reasonable alternative, which will be considered in this SEIS. DOE determined that more time was needed to allow for resolution of regulatory questions at the disposal sites and did not issue a final SA.

In August 2014, the WCS facility near Andrews, Texas, was granted a license amendment by the Nuclear Regulatory Commission that would allow disposal of bulk uranium. As a result, DOE assumes, for purposes of planning, that WCS may be a new reasonable alternative as a disposal site for depleted uranium oxide conversion product. After due consideration of the existing DOE NEPA analyses summarized above, and any changes in the disposition activities currently being considered, DOE determined in March 2016 that a Supplemental EIS is warranted given that there are substantial changes to the proposal (in this case, a new alternative disposal site is under consideration), or potentially significant new circumstances or information relevant to environmental concerns given the time lapse since the 2004 EISs.

Purpose and Need for Agency Action

The purpose and need for this action is to dispose of DUO_x that results from converting DOE's DUF_6 inventory to a more stable chemical form. This need follows directly from the decisions presented in the 2004 RODs for construction and operation of DUF_6 conversion facilities and other NEPA actions at its Paducah, Kentucky and Portsmouth, Ohio sites, that deferred DOE's decision related to the transportation to and disposal of depleted uranium oxide at potential off-site facilities.

Alternatives Considered

The proposed scope of the draft SEIS includes an analysis of the potential impacts from three action alternatives and the No Action alternative (in accordance with 40 CFR 1502.14). Under the No Action alternative, transportation to and disposal of the conversion product at an offsite low-level waste disposal facility would not occur and refilled cylinders of DUO_x conversion product would remain at the DUF_6 conversion facility sites at DOE's Paducah and Portsmouth sites. The SEIS will also analyze and compare the potential impacts from three action alternatives that include transportation to and disposal of DUO_x at three proposed alternative locations, including government-owned and privately-owned facilities: (1) The DOE-owned Area 5 waste disposal facility at the NNSS; (2) the Energy*Solutions* LLC, low-level waste disposal facility in Clive, Utah; and (3) the newly identified location at the WCS federal low-level

[1] The HF produced during conversion will be recycled into commercial product.

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waste disposal facility in Andrews, Texas.

The SEIS analysis will include a review of available environmental data and information; comparative analyses of potential environmental and human health and safety impacts of DUO_x disposal at the three alternative locations (including updated information for the two offsite disposal locations previously identified and studied in the 2004 EISs); analyses of the potential environmental impacts of transporting DUO_x by rail or truck to each alternative site; and an evaluation of the No Action alternative.

Identification of Environmental Issues

The SEIS will examine potential public health and safety effects and environmental impacts from the proposed action. This notice is intended to inform agencies and the public of DOE's proposal. Although the following is not intended to be all inclusive or to imply any predetermination of impacts, these general categories of impacts will be considered in the SEIS: Land use; geology, soils, and geologic hazards, including seismicity; water resources (surface water and groundwater); biological resources; protected, threatened and endangered species, including species of special concern; human health and safety (both routine operations and potential accidents); air quality; noise; cultural and historic resources; waste management; environmental justice; and socioeconomics.

Public Participation in the SEIS Process

A public scoping process is optional for DOE Supplemental EISs (10 CFR 1021.311(f)), and there will be none for this project. However, DOE will provide opportunities for public review and comment, including public hearings, on the draft SEIS.

SEIS Preparation and Schedule

DOE expects to issue the draft SEIS in 2016.

Issued at Washington, DC, on August 19, 2016.

Frank Marcinowski,

Acting Assistant Secretary for Environmental Management.

[FR Doc. 2016–20501 Filed 8–25–16; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. ER16–2119–000]

Hartree Partners, LP; Supplemental Notice That Initial Market-Based Rate Filing Includes Request for Blanket Section 204 Authorization

This is a supplemental notice in the above-referenced proceeding of Hartree Partners, LP's application for market-based rate authority, with an accompanying rate tariff, noting that such application includes a request for blanket authorization, under 18 CFR part 34, of future issuances of securities and assumptions of liability.

Any person desiring to intervene or to protest should file with the Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426, in accordance with Rules 211 and 214 of the Commission's Rules of Practice and Procedure (18 CFR 385.211 and 385.214). Anyone filing a motion to intervene or protest must serve a copy of that document on the Applicant.

Notice is hereby given that the deadline for filing protests with regard to the applicant's request for blanket authorization, under 18 CFR part 34, of future issuances of securities and assumptions of liability, is September 8, 2016.

The Commission encourages electronic submission of protests and interventions in lieu of paper, using the FERC Online links at *http://www.ferc.gov.* To facilitate electronic service, persons with Internet access who will eFile a document and/or be listed as a contact for an intervenor must create and validate an eRegistration account using the eRegistration link. Select the eFiling link to log on and submit the intervention or protests.

Persons unable to file electronically should submit an original and 5 copies of the intervention or protest to the Federal Energy Regulatory Commission, 888 First Street NE., Washington, DC 20426.

The filings in the above-referenced proceeding are accessible in the Commission's eLibrary system by clicking on the appropriate link in the above list. They are also available for electronic review in the Commission's Public Reference Room in Washington, DC. There is an eSubscription link on the Web site that enables subscribers to receive email notification when a document is added to a subscribed docket(s). For assistance with any FERC Online service, please email *FERCOnlineSupport@ferc.gov* or call (866) 208–3676 (toll free). For TTY, call (202) 502–8659.

Dated: August 19, 2016.

Kimberly D. Bose,

Secretary.

[FR Doc. 2016–20435 Filed 8–25–16; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Combined Notice of Filings #1

Take notice that the Commission received the following electric corporate filings:

Docket Numbers: EC16–117–000.
Applicants: Northern States Power Company, a Wisconsin corporation.
Description: Second Supplement to May 10, 2016 Application of Northern States Power Company, a Wisconsin corporation for Authorization under FPA Section 203 to Acquire Jurisdictional Assets.
Filed Date: 8/16/16.
Accession Number: 20160816–5184.
Comments Due: 5 p.m. ET 9/6/16.

Docket Numbers: EC16–168–000.
Applicants: NRG Renew LLC, Four Brothers Holdings, LLC, Granite Mountain Renewables, LLC, Iron Springs Renewables, LLC.
Description: Joint Application for Approval Under Section 203 of the Federal Power Act and Request for Expedited Action of NRG Renew LLC, et al.
Filed Date: 8/18/16.
Accession Number: 20160818–5339.
Comments Due: 5 p.m. ET 9/8/16.

Take notice that the Commission received the following exempt wholesale generator filings:

Docket Numbers: EG16–136–000.
Applicants: Boulder Solar II, LLC.
Description: Notice of Self-Certification of Exempt Wholesale Generator Status of Boulder Solar II, LLC.
Filed Date: 8/19/16.
Accession Number: 20160819–5125.
Comments Due: 5 p.m. ET 9/9/16.

Take notice that the Commission received the following electric rate filings:

Docket Numbers: ER10–2980–007; ER10–2983–007.
Applicants: Castleton Power, LLC, Castleton Energy Services, LLC.
Description: Notice of Non-Material Change in Status of Castleton Power, LLC, et al.
Filed Date: 8/19/16.

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and Development (OECD) and developed by participating countries with the support of the OECD. U.S. participated in the PIAAC Main Study data collection in 2012, conducted a national supplement in 2014, and in this submission requests to conduct the PIAAC 2017 National Supplement data collection from February to September 2017 with a nationally representative sample of 3,800 adults ages 16–74, in a new sample of 80 primary sampling units (PSUs).

Dated: August 31, 2016.

Kate Mullan,

Acting Director, Information Collection Clearance Division, Office of the Chief Privacy Officer, Office of Management.

[FR Doc. 2016–21378 Filed 9–6–16; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF ENERGY

Notice of Intent To Prepare a Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated From DOE's Inventory of Depleted Uranium Hexafluoride; Correction

AGENCY: U.S. Department of Energy.

ACTION: Notice of intent; correction.

SUMMARY: The Department of the Energy (DOE) published a document in the **Federal Register** (81 FR 58921) on August 26, 2016, announcing a Notice of Intent to Prepare a Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride. The document contained an error regarding the agency that granted the amendment to the Waste Control Specialists facility near Andrews, Texas, to allow disposal of depleted uranium. This document corrects that error.

FOR FURTHER INFORMATION CONTACT: For further information on DOE's DUF_6 long-term management and disposal program, please contact Ms. Jaffet Ferrer-Torres, National Environmental Policy Act (NEPA) Document Manager, Office of Environmental Management, U.S. Department of Energy, EM–4.22, 1000 Independence Avenue SW., Washington, DC 20585.

Correction

In the **Federal Register** (81 FR 58921) of August 26, 2016, FR Doc. 2016–20501, on page 58922, third column, first paragraph, the first sentence is corrected to read: "In August 2014, the WCS facility near Andrews, Texas, was granted a license amendment by the Texas Commission on Environmental Quality that would allow disposal of large quantities of depleted uranium."

Issued in Washington, DC, on August 31, 2016.

Mark Senderling,

Acting Associate Principal Deputy Assistant Secretary for Regulatory and Policy Affairs.

[FR Doc. 2016–21428 Filed 9–6–16; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Project No. 14329–002]

Columbia Basin Hydropower; Notice of Intent To File License Application, Filing of Pre-Application Document, Approving Use of the Traditional Licensing Process

a. *Type of Filing:* Notice of Intent to File License Application and Request to Use the Traditional Licensing Process.

b. *Project No.:* 14329–002.

c. *Date Filed:* June 27, 2016.

d. *Submitted By:* Columbia Basin Hydropower.

e. *Name of Project:* Banks Lake Pumped Storage Project.

f. *Location:* On Banks Lake and Franklin D. Roosevelt Lake, in Grant and Douglas Counties, Washington. The project occupies about 65 acres of United States lands administered by Bureau of Reclamation.

g. *Filed Pursuant to:* 18 CFR 5.3 of the Commission's regulations.

h. Potential *Applicant Contact:* Tim Culbertson, Columbia Basin Hydropower, P.O. Box 219, Ephrata, WA 98823; (509) 754–2227; email: *TCulbertson@cbhydropower.org.*

i. *FERC Contact:* Karen Sughrue at (202) 502–8556; or email at *karen.sughrue@ferc.gov.*

j. Columbia Basin Hydropower filed its request to use the Traditional Licensing Process on June 27, 2016. Columbia Basin Hydropower provided public notice of its request on August 4, 2016. In a letter dated August 31, 2016, the Director of the Division of Hydropower Licensing approved Columbia Basin Hydropower's request to use the Traditional Licensing Process.

k. With this notice, we are initiating informal consultation with the U.S. Fish and Wildlife Service and/or NOAA Fisheries under section 7 of the Endangered Species Act and the joint agency regulations thereunder at 50 CFR, part 402; and NOAA Fisheries under section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations at 50 CFR 600.920. We are also initiating consultation with the Washington State Historic Preservation Officer, as required by section 106, National Historic Preservation Act, and the implementing regulations of the Advisory Council on Historic Preservation at 36 CFR 800.2.

l. With this notice, we are designating Columbia Basin Hydropower as the Commission's non-federal representative for carrying out informal consultation pursuant to section 7 of the Endangered Species Act and section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act; and consultation pursuant to section 106 of the National Historic Preservation Act.

m. Columbia Basin Hydropower filed a Pre-Application Document (PAD; including a proposed process plan and schedule) with the Commission, pursuant to 18 CFR 5.6 of the Commission's regulations.

n. A copy of the PAD is available for review at the Commission in the Public Reference Room or may be viewed on the Commission's Web site (*http://www.ferc.gov*), using the "eLibrary" link. Enter the docket number, excluding the last three digits in the docket number field to access the document. For assistance, contact FERC Online Support at *FERCONlineSupport@ferc.gov*, (866) 208–3676 (toll free), or (202) 502–8659 (TTY). A copy is also available for inspection and reproduction at the address in paragraph h.

o. Register online at *http://www.ferc.gov/docs-filing/esubscription.asp* to be notified via email of new filing and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

Dated: August 31, 2016.

Kimberly D. Bose,

Secretary.

[FR Doc. 2016–21420 Filed 9–6–16; 8:45 am]

BILLING CODE 6717–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

[Docket No. ER16–2509–000]

Rutherford Farm, LLC; Supplemental Notice That Initial Market-Based Rate Filing Includes Request for Blanket Section 204 Authorization

This is a supplemental notice in the above-referenced proceeding Rutherford Farm, LLC's application for market-

83 FR 67250, *Notice of Availability of Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated From DOE's Inventory of Depleted Uranium Hexafluoride*, U.S. Department of Energy, December 28, 2019

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6. *Continuation Awards:* In making a continuation award under 34 CFR 75.253, the Secretary considers, among other things: Whether a grantee has made substantial progress in achieving the goals and objectives of the *project*; whether the grantee has expended funds in a manner that is consistent with its approved application and budget; and, if the Secretary has established performance measurement requirements, the *performance targets* in the grantee's approved application.

In making a continuation award, the Secretary also considers whether the grantee is operating in compliance with the assurances in its approved application, including those applicable to Federal civil rights laws that prohibit discrimination in programs or activities receiving Federal financial assistance from the Department (34 CFR 100.4, 104.5, 106.4, 108.8, and 110.23).

7. *Project Director's Meeting:* Applicants approved for funding under this competition must attend a two-day meeting for project directors at a location to be determined in the continental United States during each year of the *project*. Applicants may include the cost of attending this meeting in their proposed budgets as allowable administrative costs.

VII. Other Information

Accessible Format: Individuals with disabilities can obtain this document and a copy of the application package in an accessible format (*e.g.*, braille, large print, audiotape, or compact disc) on request to the program contact person listed under **FOR FURTHER INFORMATION CONTACT**.

Electronic Access to This Document: The official version of this document is the document published in the **Federal Register**. You may access the official edition of the **Federal Register** and the Code of Federal Regulations at: *www.govinfo.gov*. At this site you can view this document, as well as all other documents of this Department published in the **Federal Register**, in text or Portable Document Format (PDF). To use PDF you must have Adobe Acrobat Reader, which is available free at the site.

You may also access documents of the Department published in the **Federal Register** by using the article search feature at: *www.federalregister.gov*. Specifically, through the advanced search feature at this site, you can limit your search to documents published by the Department.

Dated: December 21, 2018.

James C. Blew,

Acting Assistant Deputy Secretary for Innovation and Improvement.

[FR Doc. 2018–28284 Filed 12–27–18; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF ENERGY

Notice of Availability of Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated From DOE's Inventory of Depleted Uranium Hexafluoride

AGENCY: Office of Environmental Management, U.S. Department of Energy.

ACTION: Notice of availability and public hearings.

SUMMARY: The U.S. Department of Energy (DOE), Office of Environmental Management, announces the availability of the Draft Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride (Draft SEIS) (DOE/EIS–0359–S1; DOE/EIS–0360–S1). DOE also announces three web-based public hearings to receive comments on the Draft SEIS. The Draft SEIS evaluates the potential environmental impacts associated with the transportation to final disposition of depleted uranium (DU) oxide conversion product from its depleted uranium hexafluoride (DUF_6) conversion facilities at the Paducah, Kentucky, and Portsmouth, Ohio, sites at three alternative offsite low-level radioactive waste disposal facilities: The DOE-owned low-level radioactive waste disposal facility at the Nevada National Security Site (NNSS) in Nye County, Nevada; the Energy*Solutions* low-level radioactive waste disposal facility in Clive, Utah; and the Waste Control Specialists LLC (WCS) low-level radioactive waste disposal facility in Andrews, Texas.

DATES: DOE is inviting public comments on the Draft SEIS starting with the date of publication of this Notice and ending on Monday, February 11, 2019. DOE will host three web-based public hearings to receive comments on the Draft SEIS. Comments submitted during this public comment period will be considered in preparation of the Final SEIS. DOE will consider late comments to the extent practicable. DOE will conduct web-based public comment hearings on the dates indicated below:

- Tuesday, January 22, 2019 from 2:00–4:00 p.m., Web-based
- Wednesday, January 23, 2019 from 4:00–6:00 p.m., Web-based
- Thursday, January 24, 2019, from 7:00–9:00 p.m., Web-based

ADDRESSES: Comments on the Draft SEIS maybe be submitted by any of the following methods:

- *Mail:* Ms. Jaffet Ferrer-Torres, Document Manager, Office of Environmental Management, Department of Energy, EM–4.22, 1000 Independence Avenue SW, Washington, DC 20585. Note: Comments submitted by U.S. Postal Service may be delayed by mail screening.
- *Email: DUF6_NEPA@em.doe.gov.*
- WebEx Meeting Room (during scheduled dates see Web-based Public Hearing Information Section):
  - *https://doe.webex.com/join/duf6_nepa* (Copy and Paste into web browser).
- DU Oxide SEIS Website: *http://www.energy.gov/em/disposition-uranium-oxide-conversion-depleted-uranium-hexafluoride.*

This NOA, the Environmental Protection Agency NOA, and the Draft SEIS will be posted on the DOE NEPA website at *http://energy.gov/nepa*. These documents, and additional materials relating to this Draft SEIS, will be also available on the DU Oxide SEIS website at: *http://www.energy.gov/em/disposition-uranium-oxide-conversion-depleted-uranium-hexafluoride.*

FOR FURTHER INFORMATION CONTACT: For further information about this Draft SEIS, please contact Ms. Jaffet Ferrer-Torres, U.S. Department of Energy at the mailing addresses listed in **ADDRESSES**. For information on DOE's NEPA process, please contact Mr. William Ostrum, Acting NEPA Compliance Officer, Office of Regulatory Compliance, U.S. Department of Energy, 1000 Independence Avenue SW, Washington, DC 20585; or email at *askNEPA@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

The Draft SEIS has been prepared in accordance with Council on Environmental Quality (CEQ) and DOE NEPA implementing regulations at 40 CFR parts 1500–1508 and 10 CFR part 1021, respectively. The Draft SEIS evaluates the potential impacts from three Action Alternatives and the No Action alternative (in accordance with 40 CFR 1502.14). Under the No Action alternative, transportation to and disposal of the conversion product at an offsite low-level waste disposal facility would not occur and refilled cylinders of DU oxide conversion product would remain in storage at DOE's Paducah and Portsmouth sites.

Preferred Alternative

DOE does not have a preferred alternative for the disposal of depleted uranium, but does identify factors that DOE plans to consider in developing a preferred alternative or alternatives for inclusion in the Final SEIS. These factors are discussed in the **SUMMARY** and chapter four of the Draft SEIS. The preferred alternative could be a combination of two or more alternatives. DOE invites public comments on these factors and any additional factors that should be considered in the selection of a preferred alternative and why.

Next Steps

Following the end of the public comment period, DOE will consider public comments on the Draft SEIS in preparing the Final SEIS. After issuing the Final SEIS, DOE will consider the environmental impacts presented in the Final SEIS, along with other appropriate information in proposing its decision(s) related to the disposal of depleted uranium for an Amended Record of Decision.

Web-based Public Hearing Information

Registration details are included below and are also available on the DOE EM SEIS project website (See **ADDRESSES** section). If you are joining the web-based public hearing via internet, copy and paste the link below to login to the WebEx Meeting Room, then follow prompts after entering the access code. If you are joining the web-based public hearing via phone, dial the US Toll number below and follow prompts to enter access code. For Global Call in numbers, visit the DU Oxide SEIS website. Documents and the presentation for the public hearing will be made available at *http://www.energy.gov/em/disposition-uranium-oxide-conversion-depleted-uranium-hexafluoride*, as well as shared during live web-based public hearings. Comments will be accepted during the web-based public hearing, by mail, by email, and through submittal of comment forms on the DU Oxide SEIS website. Persons who wish to speak may sign up to speak before each meeting by submitting a request to *DUF6_NEPA@em.doe.gov*.

• Join web-based public hearing via WebEx Meeting Room:
  ○ *https://doe.webex.com/join/duf6_nepa* (Copy and Paste into web browser).

• Join web-based public hearing by phone:
  ○ US Toll: 1–415–527–5035 (For Global Call-In Numbers visit DU Oxide SEIS website).
  ○ Access code: 988 230 782 #.

Public Reading Rooms and Libraries

Copies of the Draft SEIS are available at *http://www.energy.gov/em/disposition-uranium-oxide-conversion-depleted-uranium-hexafluoride*. Copies may also be found for public review at the locations listed below:

District of Columbia

U.S. Department of Energy
Freedom of Information Act Electronic Reading Room:
https://www.energy.gov/management/office-management/operational-management/freedom-information-act/reading-room

Nevada

Nevada Site Office, U.S. Department of Energy
Public Reading Room
755 East Flamingo Road, Room 103
Las Vegas, NV 89119, (702) 794–5106.

Amargosa Valley Library
829 E Farm Road
HCR 69 Box 401–T
Amargosa, NV 89020, (775) 372–5340.

Clark County Library
1401 E Flamingo Road
Las Vegas, NV 89119, (702) 507–3400.

Indian Springs Library
715 Gretta Lane
P.O. Box 629
Indian Springs, NV 89018, (702) 879–3845.

Las Vegas Library
833 N Las Vegas Boulevard
Las Vegas, NV 89101, (702) 507–3500.

Pahrump Community Library,
701 S. East Street
Pahrump, NV 89048, (775) 727–5930.

Tonopah Public Library,
167 S Central Street
Tonopah, NV 89049, (775) 482–3374.

Utah

Tooele City Public Library
128 W Vine Street
Tooele, UT 84074, (435) 882–2182.

Texas

Andrews County Library
109 NW 1st Street
Andrews, TX 79714, (432)-523–9819.

Kentucky

U.S. DOE Environmental Information Center
Emerging Technology Center (Room 221)
5100 Alben Barkley Drive
Paducah, KY 42001, (270) 554–3004.

McCracken County Public Library
555 Washington Street
Paducah, KY 42003, (270) 442–2510.

Ohio

U.S. DOE Environmental Information Center
Ohio State Endeavor Center
1862 Shyville Road (Room 207)
Piketon, OH 45661, (740) 289–8898.

Portsmouth Public Library
1220 Gallia Street
Portsmouth, OH 45662, (740) 354–5688.

Scioto County Law Library
602 Seventh Street (Room 306)
Portsmouth, OH 45662, (740) 355–8259.

Individual commentators' names and addresses (including email addresses) received as part of oral statements at the public hearings or comment documents on this Draft SEIS normally are part of the public record. DOE plans to reproduce comment documents in their entirety in the Final SEIS, as appropriate, and to post all comment documents received in their entirety on the DU oxide SEIS website *at the close of the public comment period.* Any person wishing to have his/her name, address, or other identifying information withheld from the public record of comment documents must state this request prominently at the beginning of any comment document. DOE will honor the request to the extent allowable by law. All submissions from organizations or businesses will be included in the public record and open to public inspection in their entirety.

Issued at Washington, DC on December 20, 2018.

Elizabeth A. Connell,

Acting Associate Principal Deputy Assistant Secretary for Regulatory and Policy Affairs.

[FR Doc. 2018–28249 Filed 12–27–18; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Study on Macroeconomic Outcomes of LNG Exports: Response to Comments Received on Study

AGENCY: Office of Fossil Energy, Department of Energy.

ACTION: Notice of response to comments.

	FE Docket No.
Jordan Cove Energy Project, L.P	12–32–LNG
Gulf LNG Liquefaction Company, LLC	12–101–LNG

83 FR 67282, *Environmental Impact Statements; Notice of Availability*, Enironmental Protection Agency, December 28, 2018

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as applicable; (2) set forth in the heading the name of the applicant and the project number of the application to which the filing responds; (3) furnish the name, address, and telephone number of the person protesting or intervening; and (4) otherwise comply with the requirements of 18 CFR 385.2001 through 385.2005. All comments, motions to intervene, or protests must set forth their evidentiary basis and otherwise comply with the requirements of 18 CFR 4.34(b). All comments, motions to intervene, or protests should relate to the surrender application that is the subject of this notice. Agencies may obtain copies of the application directly from the applicant. A copy of any protest or motion to intervene must be served upon each representative of the applicant specified in the particular application. If an intervener files comments or documents with the Commission relating to the merits of an issue that may affect the responsibilities of a particular resource agency, they must also serve a copy of the document on that resource agency. A copy of all other filings in reference to this application must be accompanied by proof of service on all persons listed in the service list prepared by the Commission in this proceeding, in accordance with 18 CFR 4.34(b) and 385.2010.

Dated: December 20, 2018.

Nathaniel J. Davis, Sr.,

Deputy Secretary.

[FR Doc. 2018–28263 Filed 12–27–18; 8:45 am]

BILLING CODE 6717–01–P

ENVIRONMENTAL PROTECTION AGENCY

[ER–FRL–9043–1]

Environmental Impact Statements; Notice of Availability

Responsible Agency: Office of Federal Activities, General Information 202–564–5632 or *https://www.epa.gov/nepa/*

Weekly receipt of Environmental Impact Statements

Filed 12/17/2018 Through 12/20/2018 Pursuant to 40 CFR 1506.9.

Notice

Section 309(a) of the Clean Air Act requires that EPA make public its comments on EISs issued by other Federal agencies. EPA's comment letters on EISs are available at: *https://cdxnodengn.epa.gov/cdx-enepa-public/action/eis/search*

EIS No. 20180320, Final, BLM, WY, Lost Creek Uranium In-Situ Recover Project Modifications, Review Period Ends: 01/28/2019, Contact: Annette Treat 307–328–4314

EIS No. 20180321, Final, DOE, CA, Remediation of Area IV and the Northern Buffer Zone of the Santa Susana Field Laboratory, Review Period Ends: 01/28/2019, Contact: Stephanie Jennings 805–842–3864

EIS No. 20180322, Draft, APHIS, PRO, Rangeland Grasshopper and Mormon Cricket Suppression Program, Comment Period Ends: 02/11/2019, Contact: Jim Warren 202–316–3216

EIS No. 20180323, Draft Supplement, DOE, KY, Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride, Comment Period Ends: 02/11/2019, Contact: Jaffet Ferrer-Torres 202–586–0730

EIS No. 20180324, Draft, BLM, AK, Coastal Plain Oil and Gas Leasing Program, Comment Period Ends: 02/11/2019, Contact: Nicole Hayes 907–271–4354

Amended Notices

EIS No. 20180272, Draft, USN, NV, Fallon Range Training Complex Modernization, Comment Period Ends: 02/14/2019, Contact: Sara Goodwin 619–532–4463 Revision to FR Notice Published 11/16/2018; Extending the Comment Period from 01/15/2019 to 02/14/2019.

Dated: December 21, 2018.

Robert Tomiak,

Director, Office of Federal Activities.

[FR Doc. 2018–28208 Filed 12–27–18; 8:45 am]

BILLING CODE 6560–50–P

ENVIRONMENTAL PROTECTION AGENCY

[EPA–HQ–OPP–2009–0879; FRL–9987–26]

Environmental Modeling Public Meeting; Notice of Public Meeting

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice.

SUMMARY: An Environmental Modeling Public Meeting (EMPM) will be held on Wednesday, January 30, 2019. This Notice announces the location and time for the meeting and provides tentative agenda topics. The EMPM provides a public forum for EPA and its stakeholders to discuss current issues related to modeling pesticide fate, transport, exposure, and ecotoxicity for pesticide risk assessments in a regulatory context.

DATES: The meeting will be held on January 30, 2019 from 9:00 a.m. to 4:30 p.m.

Requests to participate in the meeting must be received on or before January 7, 2019.

To request accommodation of a disability, please contact the person listed under **FOR FURTHER INFORMATON CONTACT**, preferably at least 10 days prior to the meeting, to give EPA as much time as possible to process your request.

ADDRESSES: The meeting will be held at the Environmental Protection Agency, Office of Pesticide Programs (OPP), One Potomac Yard (South Building), First Floor Conference Center (S–1200), 2777 S. Crystal Drive, Arlington, VA 22202.

FOR FURTHER INFORMATION CONTACT: Rebecca Lazarus or Andrew Shelby, Environmental Fate and Effects Division (7507P), Office of Pesticide Programs, Environmental Protection Agency, 1200 Pennsylvania Ave. NW, Washington, DC 20460–0001; telephone number: (703) 347–0520 and (703) 347–0119; fax number: (703) 305–0204; email address: *lazarus.rebecca@epa.gov* and *shelby.andrew@epa.gov.*

SUPPLEMENTARY INFORMATION:

I. General Information

A. Does this action apply to me?

You may be potentially affected by this action if you are required to conduct testing of chemical substances under the Toxic Substances Control Act (TSCA), the Federal Food, Drug, and Cosmetic Act (FFDCA), or the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). Since other entities may also be interested, the Agency has not attempted to describe all the specific entities that may be affected by this action. The following list of North American Industrial Classification System (NAICS) codes is not intended to be exhaustive, but rather provides a guide to help readers determine whether this document applies to them. Potentially affected entities may include:

- Agriculture, Forestry, Fishing and Hunting NAICS code 11.
- Utilities NAICS code 22.
- Professional, Scientific and Technical NAICS code 54.

B. How can I get copies of this document and other related information?

The docket for this action, identified by docket identification (ID) number EPA–HQ–OPP–2009–0879, is available at *http://www.regulations.gov* or at the Office of Pesticide Programs Regulatory Public Docket (OPP Docket) in the Environmental Protection Agency

84 FR 1716, *Draft Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride, Extension of Public Comment Period*, U.S. Department of Energy, February 5, 2019

1716 **Federal Register** / Vol. 84, No. 24 / Tuesday, February 5, 2019 / Notices

through Innovative Partnerships (EQUIP) project was undertaken in order to advance the Department's understanding of how to best increase access to high quality innovative programs in higher education. An invitation to participate and an explanation of this proposed experimental site would be published separately in the **Federal Register**. This experimental site project is designed to explore ways to increase access for low-income students to high-quality innovate programs in higher education through the engagement of institutions of higher education (IHEs) with non-IHE providers and quality assurance entities that can develop new quality assurance processes for student and taxpayer protection. The data and information collected can provide valuable guidance for the Department in determining future policy in these areas.

Dated: January 30, 2019.

Kate Mullan,

Acting Director, Information Collection Clearance Program, Information Management Branch, Office of the Chief Information Officer.

[FR Doc. 2019–00919 Filed 2–4–19; 8:45 am]

BILLING CODE 4000–01–P

DEPARTMENT OF ENERGY

Extension of Public Comment Period, Draft Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride

AGENCY: Office of Environmental Management, U.S. Department of Energy.

ACTION: Extension of public comment period.

SUMMARY: On December 28, 2018, a **Federal Register** Notice was issued that announced the availability of the U.S. Department of Energy (DOE) Office of Environmental Management's Draft Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride (Draft SEIS) (DOE/EIS–0359–S1; DOE/EIS–0360–S1). The **Federal Register** Notice also announced three web-based public hearings that occurred on January 22 to 24, 2019, to obtain public comments. DOE is extending the public comment period for the Draft SEIS from February 11, 2019, to March 4, 2019.

DATES: DOE extends the public comment period on the notice published at 83 FR 67250 to March 4, 2019. DOE will consider all comments submitted or postmarked by March 4, 2019. Comments submitted to DOE concerning the Draft Supplemental Environmental Impact Statement prior to this announcement do not need to be resubmitted as a result of this extension of the comment period.

ADDRESSES: Written comments on the Draft Supplemental Environmental Impact Statement (SEIS) may be submitted by mail or email and additional information is found on the Depleted Uranium Oxide SEIS website:

- *Mail:* Ms. Jaffet Ferrer-Torres, Document Manager, Office of Environmental Management, Department of Energy, EM–4.22, 1000 Independence Avenue SW, Washington, DC 20585.
- *Email: DUF6_NEPA@em.doe.gov.*
- DU Oxide SEIS website: *http://www.energy.gov/em/disposition-uranium-oxide-conversion-depleted-uranium-hexafluoride.*

FOR FURTHER INFORMATION CONTACT: For further information, please contact Ms. Jaffet Ferrer-Torres, DOE Document Manager at the addresses listed in **ADDRESSES**. For information on DOE's NEPA process, please contact Mr. William Ostrum, Acting NEPA Compliance Officer, Office of Regulatory Compliance, U.S. Department of Energy, 1000 Independence Avenue SW, Washington, DC 20585; or email at *askNEPA@hq.doe.gov.*

SUPPLEMENTARY INFORMATION: The Draft Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride evaluates the potential environmental impacts associated with the transportation to final disposition of depleted uranium oxide conversion product from its depleted uranium hexafluoride conversion facilities at the Paducah, Kentucky, and Portsmouth, Ohio, sites at three alternative offsite low-level radioactive waste disposal facilities: the DOE-owned low-level radioactive waste disposal facility at the Nevada National Security Site in Nye County, Nevada; the Energy*Solutions* low-level radioactive waste disposal facility in Clive, Utah; and the Waste Control Specialists LLC low-level radioactive waste disposal facility in Andrews, Texas. The public comment period has been extended to March 4, 2019, to respond to requests for an extension of the public comment period.

Issued at Washington, DC, on January 30, 2019.

Elizabeth A. Connell,

Acting Associate Principal Deputy Assistant Secretary for Regulatory and Policy Affairs.

[FR Doc. 2019–01063 Filed 2–4–19; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Fusion Energy Sciences Advisory Committee

AGENCY: Office of Science, Department of Energy.

ACTION: Notice of open meeting.

SUMMARY: This notice announces a meeting of the Fusion Energy Sciences Advisory Committee. The Federal Advisory Committee Act requires that public notice of these meetings be announced in the **Federal Register**.

DATES: March 12, 2019; 8:30 a.m. to 5:00 p.m. March 13, 2019; 8:30 a.m. to 12:00 noon.

ADDRESSES: Canopy by Hilton, 940 Rose Avenue, North Bethesda, Maryland 20852.

FOR FURTHER INFORMATION CONTACT: Dr. Samuel J. Barish, Acting Designated Federal Officer, Office of Fusion Energy Sciences (FES); U.S. Department of Energy; Office of Science; 1000 Independence Avenue SW, Washington, DC 20585; Telephone: (301) 903–2917.

SUPPLEMENTARY INFORMATION:

Purpose of the Board: The purpose of the Board is to provide advice on a continuing basis to the Director, Office of Science of the Department of Energy, on the many complex scientific and technical issues that arise in the development and implementation of the fusion energy sciences program.

Tentative Agenda Items

- FES Perspective
- Nuclear Physics Long-Range Planning Activity Perspective
- High Energy Physics Long-Range Planning Activity Perspective
- FES Community: Status of their Long-Range Strategic Planning Activity
- National Academies of Science, Engineering, and Medicine Burning Plasma Report
- Public Comment
- Adjourn

Note: Remote attendance of the FESAC meeting will be possible via Zoom. Instructions will be posted on the FESAC website (*http://science.energy.gov/fes/fesac/meetings/*) prior to the meeting and can also be obtained by contacting Dr. Barish by email *sam.barish@science.doe.gov* or by phone (301) 903–2917.

85 FR 3903, *Amended Record of Decision for the Installation and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site*, U.S. Department of Energy/National Nuclear Security Administration, January 23, 2020

Federal Register / Vol. 85, No. 15 / Thursday, January 23, 2020 / Notices 3903

Number(s) in the title line, or Venture Global Calcasieu Pass Change in Control in the title line to include all applicable dockets in this notice. *Please Note:* If submitting a filing via email, please include all related documents and attachments (*e.g.*, exhibits) in the original email correspondence. Please do not include any active hyperlinks or password protection in any of the documents or attachments related to the filing. All electronic filings submitted to DOE must follow these guidelines to ensure that all documents are filed in a timely manner. Any hardcopy filing submitted greater in length than 50 pages must also include, at the time of the filing, a digital copy on disk of the entire submission.

Calcasieu Pass' Notice and any filed protests, motions to intervene, notices of intervention, and comments are available for inspection and copying in the Office of Regulation, Analysis, and Engagement docket room, Room 3E–042, 1000 Independence Avenue SW, Washington, DC 20585. The docket room is open between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday, except Federal holidays.

The Notice and any filed protests, motions to intervene, notices of intervention, and comments will also be available electronically by going to the following DOE/FE Web address: *http://www.fe.doe.gov/programs/gasregulation/index.html.*

Signed in Washington, DC, on January 16, 2020.

Amy Sweeney,

Director, Office of Regulation, Analysis, and Engagement, Office of Oil and Natural Gas.

[FR Doc. 2020–01069 Filed 1–22–20; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

[OE Docket No. EA–275–C]

Application To Export Electric Energy; NorthPoint Energy Solutions Inc.

AGENCY: Office of Electricity, Department of Energy.

ACTION: Notice of application.

SUMMARY: NorthPoint Energy Solutions Inc. (Applicant or NorthPoint) has applied to renew its authorization to transmit electric energy from the United States to Canada pursuant to the Federal Power Act.

DATES: Comments, protests, or motions to intervene must be submitted on or before February 24, 2020.

ADDRESSES: Comments, protests, motions to intervene, or requests for more information should be addressed to: Office of Electricity, Mail Code: OE–20, U.S. Department of Energy, 1000 Independence Avenue SW, Washington, DC 20585–0350. Because of delays in handling conventional mail, it is recommended that documents be transmitted by overnight mail, by electronic mail to *Electricity.Exports@hq.doe.gov*, or by facsimile to (202) 586–8008.

SUPPLEMENTARY INFORMATION: The Department of Energy (DOE) regulates exports of electricity from the United States to a foreign country, pursuant to sections 301(b) and 402(f) of the Department of Energy Organization Act (42 U.S.C. 7151(b) and 7172(f)). Such exports require authorization under section 202(e) of the Federal Power Act (16 U.S.C. 824a(e)).

On December 21, 2009, DOE issued Order EA–275–B, which authorized NorthPoint to transmit electric energy from the United States to Canada as a power marketer for a ten-year term using existing international transmission facilities appropriate for open access. The authorization expires on April 7, 2020. On December 20, 2019, NorthPoint filed an application (Application or App.) with DOE for renewal of the export authorization contained in Order No. EA–275–B for an additional ten-year term.

NorthPoint states in its Application that it "does not own, operate, or control any electric generation, transmission, or distribution facilities in the United States, nor is it affiliated with any owner of electric generation, transmission, or distribution facilities in the United States." App. at 4. NorthPoint states that it "is a wholly owned subsidiary of SaskPower, a Provincial Crown corporation of the Government of Saskatchewan, Canada" and that "SaskPower is engaged in the generation of power from predominantly thermal sources and the transmission, distribution, and sale of such power to wholesale and retail customers within Saskatchewan." *Id.* At 2. NorthPoint further states that "[a]ny power purchased by NorthPoint for export to Canada will be surplus to the needs of the entities selling power to NorthPoint." *Id.* at 4. The existing international transmission facilities to be utilized by the Applicant have previously been authorized by Presidential permits issued pursuant to Executive Order 10485, as amended, and are appropriate for open access transmission by third parties.

Procedural Matters: Any person desiring to be heard in this proceeding should file a comment or protest to the application at the address provided above. Protests should be filed in accordance with Rule 211 of the Federal Energy Regulatory Commission's (FERC) Rules of Practice and Procedure (18 CFR 385.211). Any person desiring to become a party to this proceeding should file a motion to intervene at the above address in accordance with FERC Rule 214 (18 CFR 385.214). Two (2) copies of such comments, protests, or motions to intervene should be sent to the address provided above on or before the date listed above.

Comments and other filings concerning NorthPoint's application to export electric energy to Canada should be clearly marked with OE Docket No. EA–275–C. Additional copies are to be provided directly to Matthew T. Rick, John & Hengerer LLP, 1629 K Street NW, Suite 402, Washington, DC 20006, and to General Council, SaskPower—Corporate & Regulatory Affairs, 2025 Victoria Avenue, Regina, Saskatchewan, Canada S4P 0S1.

A final decision will be made on this application after the environmental impacts have been evaluated pursuant to DOE's National Environmental Policy Act Implementing Procedures (10 CFR part 1021) and after DOE determines that the proposed action will not have an adverse impact on the sufficiency of supply or reliability of the U.S. electric power supply system.

Copies of this application will be made available, upon request, for public inspection and copying at the address provided above, by accessing the program website at *http://energy.gov/node/11845*, or by emailing Matthew Aronoff at *matthew.aronoff@hq.doe.gov.*

Signed in Washington, DC, on January 15, 2020.

Christopher Lawrence,

Management and Program Analyst, Transmission Permitting and Technical Assistance, Office of Electricity.

[FR Doc. 2020–01076 Filed 1–22–20; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

National Nuclear Security Administration

Amended Record of Decision for the Installation and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio Site

AGENCY: National Nuclear Security Administration, Department of Energy.

ACTION: Amended record of decision.

SUMMARY: The Department of Energy (DOE)/National Nuclear Security

Administration (NNSA) is announcing this amendment to the July 2004 Record of Decision (ROD) for the *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site* (FEIS) (DOE/EIS–0360). In this amended ROD, DOE/NNSA is announcing its decision to implement its preferred alternative for the construction and operation of a depleted uranium hexafluoride (DUF_6) conversion facility at the Portsmouth, Ohio, a DOE Office of Environmental Management (EM) site. This amended ROD addresses DOE/NNSA's intent to construct and operate a fourth process line within the conversion facility, as previously analyzed in the aforementioned FEIS.

FOR FURTHER INFORMATION CONTACT: For further information on the addition of the fourth processing line, please contact Ms. Casey Deering, Director, Office of Secondary Stage Production Modernization, Office of Defense Programs, National Nuclear Security Administration, telephone (202) 586–6075; or by email to *casey.deering@nnsa.doe.gov.*

For information on NNSA's NEPA process, please contact Mr. John Weckerle, NEPA Compliance Officer, National Nuclear Security Administration, Office of General Counsel, Telephone (505) 845–6026; or by email to *john.weckerle@nnsa.doe.gov.* This Amended Record of Decision is available on the internet at *http://energy.gov/nepa.*

SUPPLEMENTARY INFORMATION:

Background

In June 2004, DOE issued the *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site (FEIS) (DOE/EIS–0360).* In the 2004 FEIS, DOE analyzed the potential environmental impacts from the construction, operation, maintenance, and decontamination and decommissioning (D&D) of the proposed depleted uranium hexafluoride (DUF_6) conversion facility at three alternative locations within the Portsmouth site. DOE reviewed transportation of cylinders (DUF_6, normal and enriched UF_6, and empty) stored at the East Tennessee Technology Park (ETTP) near Oak Ridge, Tennessee, to Portsmouth; construction of a new cylinder storage yard at Portsmouth (if required) for the ETTP cylinders; transportation of depleted uranium conversion products and waste materials to a disposal facility; transportation and sale of the aqueous hydrogen fluoride (HF) produced as a conversion co-product; and neutralization of aqueous HF to calcium fluoride (CaF_2) and its sale or disposal in the event that the aqueous HF product is not sold. An option of shipping the ETTP cylinders to the Paducah, Kentucky, site was also considered, as was an option of expanding operations by increasing throughput (through efficiency improvements or by adding a fourth conversion line) or by extending the period of operation. The EIS analyzed the No Action Alternative and three alternative locations within the plant, all of which utilized the same proposed equipment and processes. Location A, the preferred Alternative, was located in the west-central portion of the site; Location B was located in the southwestern portion of the site, and Location C was located in the southeastern portion of the site. A similar EIS was issued concurrently for construction and operation of a DUF_6 conversion facility at DOE EM's Paducah site (DOE/EIS–0359). In the July 27, 2004, ROD (69 FR 44649), DOE chose Alternative Location A and announced its decision to install three of the four processing lines analyzed in the EIS at Portsmouth.

DOE/NNSA now announces its decision to add the fourth processing line analyzed in the 2004 EIS. The process alteration to add the fourth process line is in response to the government's need to meet high purity depleted uranium (HPDU) demand to execute DOE/NNSA mission requirements. Neither commercial nor Y–12 capabilities exist to convert DUF_6 to DUF_4 to support depleted uranium metal production. This line will use utility equipment and materials identical to those currently in operation. The process will be altered slightly to produce DUF_4 that will be provided to a commercial vendor for additional processing.

The United States has produced DUF_6 since the early 1950s as part of the process of enriching natural uranium for both civilian and military applications. The EM sites at Portsmouth and Paducah are currently charged with converting approximately 70,000 DUF_6 cylinders into an impure oxide (UO_x) for disposition as waste or for reuse. The Portsmouth site currently has three process lines in place for this conversion with space designed into the process building to accept a fourth line. This space is the proposed location to accept the additional equipment items and provide the DUF_6 conversion to DUF_4.

The Portsmouth DUF_6 Conversion Facility was commissioned to process the DUF_6 stored in cylinders into a more stable chemical form (UO_x). Current DUF_6 cylinder inventory at Portsmouth is ~19,000 cylinders with ~18 years of processing needed to complete DUF_6 to UO_x conversion. Portsmouth has three operable process lines to accomplish this mission; each line is capable of processing approximately one standard 48″ cylinder per 24-hour workday. The Portsmouth DUF_6 Conversion Facility and its infrastructure were designed and constructed to support four process lines, however only three lines were installed. The physical configuration of the building has already been satisfactorily evaluated in the FEIS to support a fourth process line with respect to seismic design criteria and natural phenomenon hazards. There is adequate space to support an additional process line with respect to the following equipment, utilities and support systems: Electrical power, sanitary water, process water, cooling water, hydrogen, nitrogen, potassium hydroxide, hydrofluoric acid handling, cylinder movement, material handling, instrument air, fire suppression, heating, ventilation, and air conditioning (HVAC), decontamination, emission controls, waste handling, and environmental monitoring. This utility equipment is identical to equipment currently in operation at the facility. The Portsmouth DUF_6 Conversion Facility meets the DOE criteria for a Hazard Category 3 Nuclear Facility.

Currently the facility reacts the DUF_6 with H_2 (hydrogen) and H_2O (steam) to produce the UO_x. This reaction generates hydrogen fluoride (HF) as a production/conversion co-product in molar proportion to the reaction. Potassium Hydroxide (KOH) is used in an off gas scrubber to neutralize the HF vapor which is not collected for resale. As decided in the ROD, the aqueous HF produced during conversion will be sold for use, as appropriate. If necessary, CaF_2 (Calcium Fluoride) will be produced and dispositioned.

Amended Decision

DOE/NNSA is amending DOE's previous decision (69 FR 44649). DOE/NNSA will install the fourth conversion line and will slightly alter the process when reacting the DUF_6. Typically, as stated above, the DUF_6 is reacted with H_2 and H_2O (steam) to produce the UO_x. The altered process will still react DUF_6 with H_2 but will omit the H_2O (steam) from the initial part of the conversion process. The N_2 will still be used as an inert motive force gas and the off gas will still be scrubbed with KOH. At the end of the process, H_2O (steam) will then be used, but only to dilute the generated HF to the desired concentration (molarity). The HF will still be stored in tanks to be sold for use, or converted to CaF_2, as described above. The resulting product, DUF_4, will be provided to a commercial vendor for additional processing. This operation avoids having to provide for subsequent disposition of the UO_x and provides a strategic commodity that can be used in NNSA programs.

Basis for Decision

Implementing this decision supports DOE's continuing need to convert its inventory of DUF_6 to a more stable chemical form for use or disposal, as defined in the *Final Environmental Impact Statement for Construction and Operation of a Depleted Uranium Hexafluoride Conversion Facility at the Portsmouth, Ohio, Site (FEIS) (DOE/EIS–0360).* In this instance, the use will be the production of DUF_4 that can be provided to a commercial vendor for later conversion into metallic depleted uranium for government use. The current proposal does not represent a substantive change to operations, activities, and associated impacts assessed in DOE/EIS–0360. Any applicable updates related to the International Building Code and life safety codes will be incorporated into the NNSA Conversion Project new equipment design. The proposed conversion to DUF_4 would reduce the UO_x quantity that would need to be dispositioned at a commercial facility (sold, re-used, or disposed of as waste), as a quantity of DUF_6 would be converted to DUF_4 and HF instead of oxide. Processes and equipment used for this purpose would be similar or identical to those associated with current conversion activities. The total amount of DU planned for transport would remain unchanged from quantities evaluated in the 2004 EIS; however, the form of a small percentage of the transported material would change. Radiological impacts from handling/transportation between the two material forms are comparable. In the event of a container or equipment breach, a release of DUF_4 would result in reduced hazards in comparison to that of depleted uranium oxide because DUF_4 would be slightly less prone to becoming airborne.

In addition, the planned transportation destinations for oxide involve greater distances than the proposed destination options for DUF_4. Finally, less HF will be generated during the conversion to DUF_4 as compared to the conversion to oxide material.

Signed in Washington, DC, this 23rd day of December 2019, for the United States Department of Energy.

Lisa E. Gordon-Hagerty,

Under Secretary for Nuclear Security, National Nuclear Security Administration.

[FR Doc. 2020–01074 Filed 1–22–20; 8:45 am]

BILLING CODE 6450–01–P

DEPARTMENT OF ENERGY

Federal Energy Regulatory Commission

Combined Notice of Filings #1

Take notice that the Commission received the following electric corporate filings:

Docket Numbers: EC20–32–000.
Applicants: Commonwealth Edison Company.
Description: Application for Authorization Under Section 203 of the Federal Power Act, et al. of Commonwealth Edison Company.
Filed Date: 1/14/20.
Accession Number: 20200114–5227.
Comments Due: 5 p.m. ET 2/4/20.

Take notice that the Commission received the following exempt wholesale generator filings:

Docket Numbers: EG20–65–000.
Applicants: La Chalupa, LLC.
Description: Notice of Self-Certification of Exempt Wholesale Generator Status of La Chalupa, LLC.
Filed Date: 1/16/20.
Accession Number: 20200116–5048.
Comments Due: 5 p.m. ET 2/6/20.

Take notice that the Commission received the following electric rate filings:

Docket Numbers: ER10–1801–004; ER10–1805–005; ER10–2370–003.
Applicants: The Connecticut Light and Power Company, NSTAR Electric Company, Public Service Company of New Hampshire.
Description: Updated Market Power Analysis for Northeast Region of the Eversource Companies.
Filed Date: 12/23/19.
Accession Number: 20191223–5280.
Comments Due: 5 p.m. ET 2/21/20.

Docket Numbers: ER10–2502–007; ER10–2472–006; ER10–2473–006; ER11–2724–007; ER11–4436–005; ER18–2518–002; ER19–645–001.
Applicants: Black Hills Colorado Electric, LLC, Black Hills Colorado IPP, LLC, Black Hills Colorado Wind, LLC, Black Hills Electric Generation, LLC, Black Hills Power, Inc., Black Hills Wyoming, LLC, Cheyenne Light Fuel & Power Company.
Description: Amendment to June 27, 2019 Updated Market Power Analysis of the Black Hills MBR Sellers for the Northwest Region.
Filed Date: 1/14/20.
Accession Number: 20200114–5224.
Comments Due: 5 p.m. ET 2/4/20.

Docket Numbers: ER20–419–002.
Applicants: ITC Midwest LLC.
Description: Tariff Amendment: Amendment to CIAC Agreement Filing to be effective 1/19/2020.
Filed Date: 1/15/20.
Accession Number: 20200115–5117.
Comments Due: 5 p.m. ET 2/5/20.

Docket Numbers: ER20–553–001.
Applicants: Sierra Pacific Power Company.
Description: Tariff Amendment: Service Agreement No. 16–00054; Battle Mountain LGIA Amendment to be effective 12/11/2019.
Filed Date: 1/16/20.
Accession Number: 20200116–5057.
Comments Due: 5 p.m. ET 2/6/20.

Docket Numbers: ER20–806–000.
Applicants: Midcontinent Independent System Operator, Inc., Otter Tail Power Company.
Description: § 205(d) Rate Filing: 2020–01–15_SA 3404 OTP–NSP FSA (J436 J437) Hankinson-Ellendale to be effective 3/16/2020.
Filed Date: 1/15/20.
Accession Number: 20200115–5111.
Comments Due: 5 p.m. ET 2/5/20.

Docket Numbers: ER20–807–000.
Applicants: Ruff Solar LLC.
Description: Baseline eTariff Filing: Ruff Solar, LLC MBR Application to be effective 4/1/2020.
Filed Date: 1/15/20.
Accession Number: 20200115–5122.
Comments Due: 5 p.m. ET 2/5/20.

Docket Numbers: ER20–808–000.
Applicants: PJM Interconnection, L.L.C.
Description: § 205(d) Rate Filing: Original ISA, SA No. 5548; Queue No. AC1–076 AE2–134 to be effective 12/16/2019.
Filed Date: 1/15/20.
Accession Number: 20200115–5124.
Comments Due: 5 p.m. ET 2/5/20.

Docket Numbers: ER20–809–000.
Applicants: Nevada Gold Energy LLC.
Description: § 205(d) Rate Filing: Notice of Succession to be effective 1/1/2020.
Filed Date: 1/16/20.
Accession Number: 20200116–5000.
Comments Due: 5 p.m. ET 2/6/20.

Docket Numbers: ER20–810–000.
Applicants: Southwestern Public Service Company.
Description: Tariff Cancellation: Golden Spread Electric Cooperative,

APPENDIX B

EVALUATION OF THE HUMAN HEALTH EFFECTS OF TRANSPORTATION

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ACRONYMS

ABC	Articulated Bulk Container
ALARA	as low as reasonably achievable
CFR	*Code of Federal Regulations*
DHS	U.S. Department of Homeland Security
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
DU Oxide SEIS	*Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride*
DUF_6	DU hexafluoride
HF	hydrogen fluoride
LCF	latent cancer fatality
LLW	low-level radioactive waste
LSA	low specific activity waste
MEI	maximally exposed individual
MLLW	mixed low-level radioactive waste
Modal Study	*Shipping Container Response to Severe Highway and Railway Accident Conditions*
mrem	millirem
NNSS	Nevada National Security Site
NRC	U.S. Nuclear Regulatory Commission
RADTRAN	Radioactive Material Transportation Risk Assessment
Reexamination Study	*Reexamination of Spent Fuel Shipping Risk Estimates*,
rem	roentgen equivalent man
RISKIND	Risks and Consequences of Radioactive Material Transport
TRAGIS	Transportation Routing Analysis Geographic Information System
WCS	Waste Control Specialists LLC

APPENDIX B: EVALUATION OF THE HUMAN HEALTH EFFECTS OF TRANSPORTATION

B.1 INTRODUCTION

Transportation of any commodity involves a risk to transport crew members and members of the public. This risk results from transportation-related accidents. Transport of certain materials, such as hazardous or radioactive materials or waste, can pose an additional risk due to the unique nature of the material itself. To permit a complete appraisal of the environmental impacts of the alternatives, this appendix to the *Final Supplemental Environmental Impact Statement for Disposition of Depleted Uranium Oxide Conversion Product Generated from DOE's Inventory of Depleted Uranium Hexafluoride* (*DU Oxide SEIS*) assesses the human health risks associated with the transportation of radioactive waste on public railways and highways.

This appendix provides an overview of the approach used to assess the human health risks that could result from transportation. The topics in this appendix include the scope of the assessment, packaging, determination of potential transportation routes, analytical methods used for the risk assessment (for example, computer models), and important assumptions. In addition, to aid in understanding and interpreting the results, specific areas of uncertainty are described with an emphasis on how those uncertainties may affect comparisons of the alternatives.

The risk assessment results are presented in this appendix in terms of "per-shipment" risk factors, as well as the total risks for a given alternative. Per-shipment risk factors provide an estimate of the risk from a single shipment. The total risks for a given alternative are estimated by multiplying the expected number of shipments by the appropriate per-shipment risk factors.

B.2 SCOPE OF ASSESSMENT

The scope of the transportation risk assessment, including transportation activities; potential radiological and nonradiological impacts; transportation modes; and receptors, is described in this section. Additional details of the assessment are provided in the remaining sections of this appendix.

B.2.1 Transportation-Related Activities

The transportation risk assessment estimates the human health risks related to transportation for each alternative. This includes incident-free risks from being in the vicinity of a shipment during transport or at stops, as well as accident risks. It also considers the potential effects of Intentional Destructive Acts, such as acts of sabotage or terrorism.

B.2.2 Radiological Impacts

For each alternative, radiological risks (that is, those risks that result from the radioactive nature of the materials) were assessed for incident-free (normal) transportation conditions and accidents. The radiological risk associated with incident-free transportation conditions would result from the potential exposure of people to external radiation in the vicinity of a shipment. The radiological risk from transportation accidents would come from the potential release and dispersal of radioactive material into the environment during an accident and the subsequent exposure of people, or from an accident where there is no release of radioactive material but there is external radiation exposure, albeit very small, to the unbreached containers.

Radiological impacts are calculated in terms of radiation dose and associated health effects in the exposed populations. The radiation dose calculated is the total effective dose equivalent (see Title 10 of the *Code of Federal Regulations* [10 CFR] Part 20), which is the sum of the effective dose equivalent from external radiation exposure and the 50-year committed effective dose equivalent from internal radiation exposure. Radiation doses are presented in units of roentgen equivalent man (rem) or millirem (mrem) (one-thousandth of a rem) for individuals and person-rem for populations. The impacts are further expressed as health risks in terms of latent cancer fatalities (LCFs) in exposed individuals and populations using dose-to-risk conversion factors recommended by the Interagency Steering Committee on Radiation Standards (DOE 2003). A health risk conversion factor of 0.0006 LCF per rem or person-rem of exposure is used for both the public and workers (DOE 2003).

B.2.3 Nonradiological Impacts

In addition to radiological risks posed by transportation activities, vehicle-related risks are assessed from nonradiological causes (that is, causes related to the transport vehicles, not the radioactive cargo). Nonradiological transportation risks, which would be incurred for shipments of any commodity, are assessed for accidents involving transportation of radioactive waste (DU oxides and other low level wastes [i.e., emptied cylinders]). Nonradiological accident risk refers to the potential occurrence of transportation accidents that result in fatalities unrelated to the characteristics (for example, radioactive nature) of the cargo. For this analysis, state-specific fatality rate data along the routes for truck and train transports were used to determine the nonradiological risks (i.e., traffic fatalities) associated with transportation.

Nonradiological risks during incident-free transportation conditions could also be caused by potential exposure to increased vehicle exhaust emissions. As explained in Section B.6.2 of this appendix, the health effects of these emissions were not explicitly considered, but to add context, Chapter 4, Sections 4.1.2, 4.2.2, 4.3.2, and 4.4.2 of this *DU Oxide SEIS* compare the transportation emissions from the Action Alternatives to total regional transportation emissions.

B.2.4 Transportation Modes

Two options were evaluated for delivery of DU oxide and other radioactive wastes (i.e., ancillary low-level radioactive waste [LLW] and mixed LLW [MLLW] and empty and heel cylinders) to off-site disposal sites: truck and train/truck, as appropriate. The following waste disposal sites were evaluated under the truck and train options:

- Energy*Solutions* near Clive, Utah,
- Nevada National Security Site (NNSS) in Nye County, Nevada, and
- Waste Control Specialists LLC (WCS) near Andrews, Texas.

For train shipment to NNSS, the DU oxide containers would be transferred to trucks from the railcars at an intermodal facility, which was assumed to be located at Barstow, California, and then delivered to NNSS by truck.

B.2.5 Receptors

Radiation-related transportation risks were calculated and are presented separately for workers and members of the general public. The workers considered are truck crew members involved in transportation and inspection of the packages. The general public includes all persons who could be exposed to a shipment while it is moving or stopped during transit. For incident-free operation, the affected population includes individuals living within 805 meters (0.5 mile) of each side of the road. Several scenarios were also evaluated for impacts on hypothetical maximally exposed individuals (MEIs). For example, an MEI could be a resident living near the highway who is exposed to all shipments transported on the road. Refer to Section B.6.3 for a description of the MEI scenarios that were analyzed. For accident conditions, the affected population includes individuals residing within 80 kilometers (50 miles) of the accident, and the MEI would be an individual located 330 feet (100 meters) directly downwind from the accident (NRC 1977). The risk to the affected population is a measure of the radiological risk posed to society as a whole by the alternative being considered. As such, the impact on the affected population was used as the primary means of comparing impacts among the alternatives.

B.3 PACKAGING AND TRANSPORTATION REGULATIONS

This section provides a high-level summary of radioactive materials packaging and transportation regulations. Regulations pertaining to the transportation of radioactive materials are published by the U.S. Department of Transportation (DOT) (49 CFR Parts 106, 107, and 171–178) and U.S. Nuclear Regulatory Commission (NRC) (10 CFR Parts 20, 61, and 71). Interested readers are encouraged to visit the cited resources for current specifics or to review DOT's *Radioactive Material Regulations Review* (RAMREG-12-2008) (DOT 2008) for a comprehensive discussion of radioactive material regulations.

B.3.1 Radiological Packaging Regulations

The primary regulatory approach to promote safety from radiological exposure is the specification of standards for the packaging of radioactive materials. Packaging represents the primary barrier between the radioactive material being transported and radiation exposure to the public, workers, and the environment. Transportation packaging for radioactive materials must be designed, constructed, and maintained to contain and shield its contents. The type of packaging used is determined by the total radioactive hazard presented by the material within the packaging. For analyses of radioactive waste transports in this *DU Oxide SEIS*, two basic types of packaging were used: Industrial, and Type A. Specific requirements for these packages are detailed in 49 CFR Part 173, Subpart I. All packages are designed to protect and retain their content under normal conditions.

In this *DU Oxide SEIS*, because of low specific activity of the waste, industrial packaging is used to transport materials that, because of their low concentration of radioactive materials, present a limited hazard to the public and the environment. Industrial packaging is a subset of Type A packaging. Type A packaging is designed to protect and retain its contents under normal transport conditions. Packaging requirements are an important consideration for transportation risk assessment.

Radioactive materials shipped in Type A containers, or packagings, are subject to specific radioactivity limits identified as A1 and A2 values in 49 CFR 173.435. In addition, external radiation limits, as prescribed in 49 CFR 173.441, must be met. If the material qualifies as low specific activity, as defined in 10 CFR Part 71 and 49 CFR Part 173, it may be shipped in a shipping container such as Industrial or Type A Packaging (49 CFR 173.427); see also RAMREG-12-2008 (DOT 2008).

Type A packaging is designed to retain its radioactive contents in normal transport. Under normal conditions, a Type A package must withstand the following:

- Operating temperatures ranging from -40 to 70 degrees Celsius (-40 to 158 degrees Fahrenheit);
- External pressures ranging from 0.25 to 1.4 kilograms per square centimeter (3.5 to 20 pounds per square inch);
- Normal vibration experienced during transportation;
- Simulated rainfall of 5 centimeters (2 inches) per hour (for 1 hour);
- Free fall from 0.3 to 1.2 meters (1 to 4 feet), depending on the package weight;
- Water immersion tests;
- Impact of a 6-kilogram (13-pound) steel cylinder with rounded ends dropped from 1 meter (3.3 feet) onto the most vulnerable surface; and
- A compressive load of five times the mass of the gross weight of the package for 24 hours, or the equivalent of 13 kilopascals (1.9 pounds per square inch), multiplied by the vertically projected area of the package for 24 hours.

B.3.2 Transportation Regulations

The regulatory requirements for packaging and transporting radioactive materials are designed to achieve the following four primary objectives:

- Protect persons and property from radiation emitted from packages during transportation by specific limitations on the allowable radiation levels;
- Contain radioactive material in the package (achieved by packaging design requirements based on performance-oriented packaging integrity tests and environmental criteria);
- Prevent nuclear criticality (an unplanned nuclear chain reaction that could occur as a result of concentrating too much fissile material in one place); and

- Provide physical protection against theft and sabotage during transit.

DOT regulates the transportation of hazardous materials in interstate commerce by land, air, and water. DOT specifically regulates the carriers of radioactive materials and the conditions of transport such as routing, handling and storage, and vehicle and driver requirements. DOT also regulates the labeling, classification, and marking of radioactive material packagings.

NRC regulates the packaging and transportation of radioactive material for its licensees, including commercial shippers of radioactive materials. In addition, under an agreement with DOT, NRC sets the standards for packages containing fissile materials and Type B packagings.

The U.S. Department of Energy (DOE), through its management directives, orders, and contractual agreements, ensures the protection of public health and safety by imposing standards on its transportation activities equivalent to those of DOT and NRC. According to 49 CFR 173.7(d), packagings made by or under the direction of DOE may be used for transporting Class 7 materials (radioactive materials) when the packages are evaluated, approved, and certified by DOE against packaging standards equivalent to those specified in 10 CFR Part 71.

DOT also has additional requirements that help reduce transportation impacts. Some requirements affect drivers, packaging, labeling, marking, and placarding. Others specifying the maximum dose rate from radioactive material shipments help reduce incident-free transportation doses.

B.4 EMERGENCY RESPONSE

The U.S. Department of Homeland Security (DHS) is responsible for establishing policies for, and coordinating civil emergency management, planning, and interaction with, Federal Government agencies that have emergency response functions in the event of a transportation incident. In the event a transportation incident involving a radioactive waste occurs, guidelines for response actions are outlined in the *National Response Framework* (DHS 2016a).

The Federal Emergency Management Agency, an organization within DHS, coordinates Federal and state participation in developing emergency response plans and is responsible for the development and the maintenance of the *Nuclear/Radiological Incident Annex* (DHS 2016b) to the *National Response Framework* (DHS 2016a). The *Nuclear/Radiological Incident Annex* to the *National Response Framework* describes the policies, situations, concepts of operations, and responsibilities of the Federal departments and agencies governing the immediate response and short-term recovery activities for incidents involving release of radioactive materials to address the consequences of the event.

DHS has the authority to activate Nuclear Incident Response Teams, which include DOE Radiological Assistance Program teams that can be dispatched from regional DOE offices in response to a radiological incident. These teams provide first-responder radiological assistance to protect the health and safety of the general public, responders, and the environment and to assist in the detection, identification and analysis, and response to events involving radiological or nuclear material. Deployed teams provide traditional field monitoring and assessment support, as well as a search capability.

DOE uses DOE Order 151.1C, *Comprehensive Emergency Management System* (DOE 2005), as a basis to establish a comprehensive emergency management program that provides detailed, hazard-specific planning and preparedness measures to minimize the health impacts of accidents involving loss of control over radioactive material or toxic chemicals. DOE provides technical assistance to other Federal agencies and to state and local governments. Contractors are responsible for maintaining emergency plans and response procedures for all facilities, operations, and activities under their jurisdiction and for implementing those plans and procedures during emergencies. Contractor and state and local government plans are fully coordinated and integrated. In addition, DOE established the Transportation Emergency Preparedness Program to ensure its operating contractors and state, tribal, and local emergency responders are prepared to respond promptly, efficiently, and effectively to accidents involving DOE shipments of radioactive material. This program is a component of the overall emergency management system established by DOE Order 151.1C.

In the event of a radiological release from a shipment along a route, local emergency response personnel would be the first to arrive at the accident scene. It is expected that response actions would be taken in the context of the *Nuclear/Radiological Incident Annex* (DHS 2008). Based on their initial assessment at the scene, training, and available equipment, first responders would involve state and Federal resources as necessary. First responders and/or state and Federal responders would initiate actions in accordance with the DOT *Emergency Response Guidebook* (DOT 2016a) to isolate the incident and perform actions necessary to protect human health and the environment (such as evacuations or other means to reduce or prevent impacts on the public). Cleanup actions are the responsibility of the carrier. DOE would partner with the carrier, shipper, and applicable state and local jurisdictions to ensure cleanup actions meet regulatory requirements.

To mitigate the possibility of an accident, DOE issued DOE Manual 460.2-1A, *Radioactive Material Transportation Practices Manual for Use with DOE Order 460.2A* (DOE 2008a). As specified in this manual, carriers are expected to exercise due caution and care in dispatching shipments. According to the manual, the carrier determines the acceptability of weather and road conditions, whether a shipment should be held before departure, and when actions should be taken while *en route*. The manual emphasizes that shipments should not be dispatched if severe weather or bad road conditions make travel hazardous. Current weather conditions, the weather forecast, and road conditions at the point of origin and along the entire route would be considered before dispatching a shipment.

B.5 METHODOLOGY

The transportation risk assessment is based on the alternatives described in Chapter 2 of this *DU Oxide SEIS*. **Figure B-1** summarizes the transportation risk assessment methodology. After the *DU Oxide SEIS* alternatives were identified and the requirements of the shipping campaign were understood, data were collected on material characteristics and accident parameters.

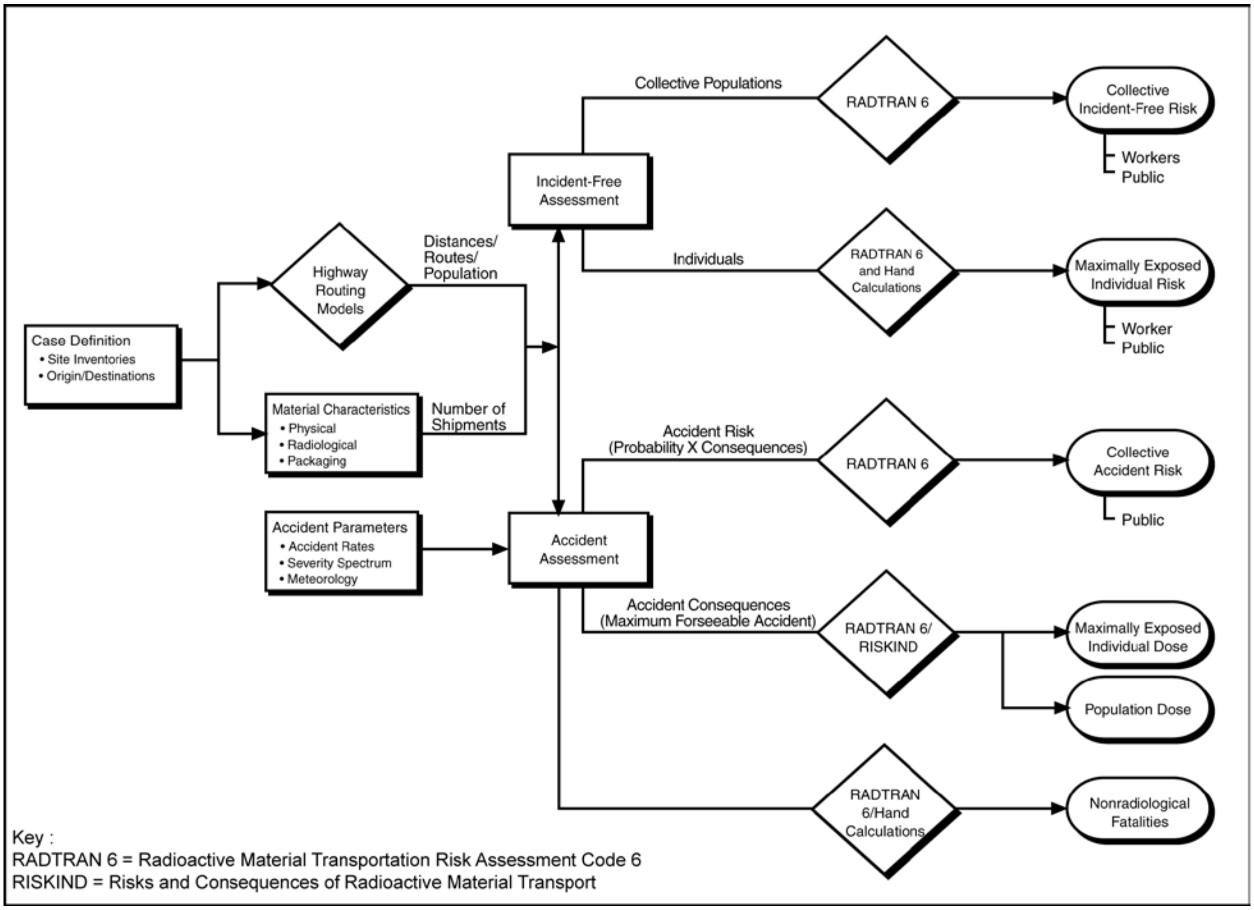

Figure B-1 Transportation Risk Assessment

Potential transportation impacts calculated for this SEIS are presented in two parts: impacts from incident-free or routine transportation and impacts from transportation accidents. Impacts from transportation accidents are further divided into nonradiological and radiological impacts. Nonradiological impacts could result from transportation accidents in terms of traffic fatalities. Radiological impacts of incident-free transportation include impacts on members of the public and crew from radiation emanating from materials in the shipment. Radiological impacts from accident conditions consider all reasonably foreseeable scenarios that could damage transportation packages, leading to releases of radioactive materials to the environment.

Impacts from transportation accidents are expressed in terms of probabilistic risk, which is the probability of an accident multiplied by the consequences of that accident and summed over all reasonably foreseeable accident conditions. This analysis also considers hypothetical maximum reasonably foreseeable transportation accidents with the highest consequences under each alternative. Hypothetical transportation accident conditions ranging from low-speed "fender-bender" collisions to high-speed collisions with or without fires were analyzed. Accident frequencies and consequences were evaluated using a method developed by NRC and described in the *Final Environmental Impact Statement on the Transportation of Radioactive Materials by Air and Other Modes*, NUREG-0170 (*Radioactive Material Transportation Study*) (NRC 1977); *Shipping Container Response to Severe Highway and Railway Accident Conditions*, NUREG/CR-4829 (Modal Study) (NRC 1987); and *Reexamination of Spent Fuel Shipping Risk*

Estimates, NUREG/CR-6672 (Reexamination Study) (NRC 2000). Radiological accident risk is expressed in terms of additional LCFs, and nonradiological accident risk is expressed in terms of additional traffic fatalities. Incident-free risk is also expressed in terms of additional LCFs.

Transportation-related risks were calculated and are presented separately for workers and members of the general public. The workers considered were the truck crew members transporting the radioactive materials and the inspectors. The general public included all persons who could be exposed to a shipment while it is moving or stopped during transit.

The first step in the ground transportation analysis was to determine the distances and populations along the routes. The Transportation Routing Analysis Geographic Information System (TRAGIS) computer program (Johnson and Michelhaugh 2003) was used to identify routes and the associated distances and populations for purposes of analysis. The TRAGIS computer program is a geographic information system-based transportation analysis computer program used to identify the highway, and rail routes for transporting radioactive materials within the United States that were used in the analysis. Both the road and rail network are 1:100,000-scale databases, which were developed from the U.S. Geological Survey digital line graphs and the U.S. Bureau of the Census Topological Integrated Geographic Encoding and Referencing System. The population densities along each route were derived from 2000 U.S. Census Bureau data (Johnson and Michelhaugh 2003). The features in TRAGIS allow users to determine routes for shipment of radioactive materials that conform to DOT regulations, as specified in 49 CFR Part 397. State-level U.S. Census data for 2010 (DOE 2012) were used in relation to the 2000 Census data to project the population densities to 2020 levels.

The information from TRAGIS, along with the properties of the material being shipped and route-specific accident frequencies, was entered into the Radioactive Material Transportation Risk Assessment (RADTRAN) 6.02 computer code (SNL 2013) to calculate incident-free transport and accident risks on a per-shipment basis. The risks under each alternative were determined by summing the products of per-shipment risks for each waste type by the corresponding number of shipments.

The RADTRAN 6.02 computer code (SNL 2013) was used for incident-free and accident risk assessments to estimate the impacts on populations, as well as for incident-free assessments associated with MEIs. RADTRAN 6.02 was developed by Sandia National Laboratories to calculate radiological risks associated with the transportation of radioactive materials by a variety of modes, including truck, train, airplane, ship, and barge.

The RADTRAN 6.02 (SNL 2013) population risk calculations included both the consequences and probabilities of potential exposure events. For incident-free transportation, the probability of exposure is assumed to be 1 and the exposure pathway is direct radiation emanating from the transportation packages. The RADTRAN 6.02 code accident consequence analyses included the following exposure pathways: cloud shine, ground shine, direct radiation (from loss of shielding), inhalation (from dispersed materials), and resuspension (inhalation of resuspended materials) (SNL 2013). The collective population risk is a measure of the total radiological risk posed to society as a whole by the alternative being considered. As such, the collective population risk was used as the primary means of comparing the various alternatives.

The Risks and Consequences of Radioactive Material Transport (RISKIND) computer code (Yuan et al. 1995) was used to estimate the doses to MEIs and populations for the worst-case maximum reasonably foreseeable transportation accident. The RISKIND computer code was developed for DOE's Office of Civilian Radioactive Waste Management to estimate potential radiological consequences and health risks to individuals and the collective population from exposures associated with the transportation of spent nuclear fuel; however, this code is also applicable to transportation of other types of cargo, as the code can model complex atmospheric dispersion and estimate radiation doses to MEIs near the accident. Use of the RISKIND computer code as implemented in this *DU Oxide SEIS* is consistent with direction provided in *A Resource Handbook on DOE Transportation Risk Assessment* (DOE 2002b).

The RISKIND calculations were conducted to supplement the collective risk results calculated using RADTRAN 6.02 (SNL 2013). Whereas the collective risk results provide a measure of the overall risks of each alternative, the RISKIND calculations are meant to address areas of specific concern to individuals and population subgroups if a postulated accident were to take place. Essentially, the RISKIND analyses are meant to address "what if" questions, such as "what if I live next to a site access road?" or "what if an accident happens near my town?"

B.5.1 Transportation Routes

To assess incident-free and transportation accident radiological impacts, route characteristics were determined for the following off-site shipments that would occur as part of routine operations:

- LLW from the Paducah Site, Kentucky to Energy*Solutions* near Clive, Utah; NNSS, Nevada; and WCS, near Andrews, Texas; and
- LLW from the Portsmouth Site, Ohio; to Energy*Solutions* near Clive, Utah; NNSS, Nevada; and WCS, near Andrews, Texas.

Off-Site Route Characteristics

Route characteristics that are important to the radiological risk assessment include the total shipment distance and population distribution along the route. The specific route selected determines both the total potentially exposed population and the expected frequency of transportation-related accidents. Route characteristics for routes analyzed in this *DU Oxide SEIS* are summarized in **Table B-1**. Rural, suburban, and urban areas were characterized according to the following breakdown (Johnson and Michelhaugh 2003):

- Rural population densities range from 0 to 54 persons per square kilometer (0 to 140 persons per square mile);
- Suburban population densities range from 55 to 1,284 persons per square kilometer (140 to 3,326 persons per square mile); and
- Urban population densities include all population densities greater than 1,284 persons per square kilometer (3,326 persons per square mile).

The affected population for route characterization and incident-free dose calculation includes all persons living within 805 meters (0.5 mile) of each side of the transportation route.

Table B-1 Off-Site Transport Truck/Train Route Characteristics

Origin	Destination	Nominal Distance (kilometers)	Distance Traveled in Zones (kilometers)			Population Density in Zone[a] (number per square kilometers)			Number of Affected Persons[b]
			Rural	Suburban	Urban	Rural	Suburban	Urban	
Truck									
Paducah, KY	NNSS, NV	3,208	2,600	549	60	12	341	1882	528,550
	Energy*Solutions*, UT	2,580	2,038	477	65	14	470	1,819	594,191
	WCS, TX	1,695	1,313	353	29	16	398	1,825	343,020
Portsmouth, OH	NNSS, NV	3731	2,970	686	74	13	357	1988	688,430
	Energy*Solutions*, UT	3,080	2,313	715	52	15	329	1,842	584,480
	WCS, TX	2,284	1,495	738	51	21	384	1,857	656,906
Barstow, CA	NNSS, NV[c]	337	3167	21	1.0	4	216	1,900	12,230
Train									
Paducah, KY	Barstow, CA[c]	3,389	2872	467	50	8.0	411	2,531	546,675
	Energy*Solutions*, UT	2,763	2,256	440	67	9	456	2,434	613,427
	WCS, TX	2,007	1,408	550	50	14	444	2,859	648,848
Portsmouth, OH	Barstow, CA[c]	4,029	3,192	707	130	8.9	445	3,141	1,202,036
	Energy*Solutions*, UT	3,243	2,298	772	173	12	455	2,044	1,170,781
	WCS, TX	2,947	1,776	1,034	137	17	482	2,369	1,364,154

Key: CA = California; KY = Kentucky, NNSS = Nevada National Security Site; NV = Nevada; OH = Ohio, TX = Texas, UT = Utah.

[a] Population densities were projected to 2020 using state-level data from the 2010 U.S. Census (DOE 2012) and assuming state population growth rates from 2000 to 2010 continue to 2020.

[b] For off-site shipments, the estimated number of persons residing within 0.5 mile along the transportation route, projected to 2020.

[c] Because NNSS does not have a rail yard, truck transport from a nearby rail yard would be required.

Note: Because all numbers are rounded to nearest digit, total distance may be different from some of individual segments.

The analyzed train and truck routes for off-site shipments of radioactive waste from Paducah and Portsmouth sites to disposal sites are shown in **Figures B-2** and **B-3**.

Figure B-2 Analyzed Train and Truck Routes from Paducah to Potential Disposal Sites

Figure B-3 Analyzed Train and Truck Routes from Portsmouth to Potential Disposal Sites

B.5.2 LLW Waste Shipments

Transportation of all LLW was assumed to occur in certified or certified-equivalent packaging on exclusive-use vehicles. Use of legal-weight, heavy combination trucks was assumed for highway transportation. Type A packages (in this *DU Oxide SEIS*, industrial packages) would be transported on common flatbed or covered trailers.

For transportation by truck, the maximum payload weight was considered to be about 48,000 pounds (21,770 kilograms), based on the Federal gross vehicle weight limit of 80,000 pounds (36,288 kilograms) (23 CFR 658.17). While there are large numbers of multi-trailer combinations (known as longer combination vehicles) with gross weights in excess of the Federal limit in operation on rural roads and turnpikes in some states (DOT 2000), for evaluation purposes, the load limit for the legal truck was based on the Federal gross vehicle weight. The width restriction is about 102 inches (2.59 meters) (23 CFR 658.15). Length restrictions vary by state, but were assumed for purposes of analysis to be no more than 48 feet (14.6 meters).

The LLW that would be transported under the alternatives in this *DU Oxide SEIS* are mainly DU oxide in the repurposed and qualified DU hexafluoride (DUF_6) cylinders (a low specific activity [LSA] waste) or in bulk bags.[64] Other containers such as intermodal or cargo containers could be used for transporting the non-conforming DUF_6 cylinders, if they are volume-reduced. **Table B-2** lists the types of containers assumed for the analysis, along with their volumes and the number of containers in a shipment. A shipment is defined as the amount of LLW transported on a single truck.

In general, the number of shipping containers per truck and per train are based on the current practice and the proposed approach by the Portsmouth/Paducah Project Office (PPPO 2018), limited by the dimensions and weight of the shipping containers, the Transport Index,[65] and the transport vehicle dimensions and weight limits.

It was assumed that the LLW transported to a disposal site (for example, NNSS) would meet the disposal facility's waste acceptance criteria. Under all Action Alternatives, DU oxides and empty and heel cylinders (i.e., cylinders that are considered deficient for transporting radioactive wastes) are transported to a disposal site. It is expected that a total of about 69,000 DU oxides cylinders and about 14,000 empty and heel cylinders would be transported from both Paducah and Portsmouth to a disposal site. On the average, each cylinder would contain 10 metric tons (about 22,000 pounds) of DU oxides. It is assumed that all empty and heel cylinders contain about 23 kilograms (50 pounds) DUF_6 that has been neutralized using potassium hydroxide. In addition, there is a very small amount of LLW and MLLW that is generated annually.

[64] As described in Chapter 2, Section 2.1.2 of this DU Oxide SEIS, small quantities of DU oxide may also be stored in 55-gallon drums. The DU oxide stored in these drums would result in fewer DU oxide cylinders or bulk bags being generated. Therefore, transportion of the drums is not specifically analyzed, but the impacts of transportion of these drums would be encompassed by the transport of DU oxide in cylinders or bulk bags.

[65] The Transport Index is a dimensionless number (rounded up to the next tenth) that is placed on the label of a package to designate the degree of control to be exercised by the carrier. Its value is equivalent to the maximum radiation level in millirem per hour at 1 meter from the package (10 CFR 71.4 and 49 CFR 173.403).

Table B-2 LLW Type and Associated Container Characteristics[a]

Waste Type	Container	Container Volume (cubic feet)[b]	Container Mass (pounds)[c]	Shipment Description
DU Oxide LLW (LSA)	48G	139	30,600	1 per truck; 6 per railcar
DU Oxide LLW (LSA)	48X	108.9	25,530	1 per truck; 6 per railcar
DU Oxide LLW (LSA)	48Y	142.9	32,760	1 per truck; 6 per railcar
Volume-Reduced Empty and Heel Cylinders (LLW/LSA)	intermodal container	690	60,000	1 per truck; 2 per railcar
DU Oxide LLW (LSA)	bulk bag	266	24,000	2 per truck; 8 per railcar
CaF_2 (LSA)	bulk Bag	266	26,500	1 per truck; 4 per railcar
Misc. MLLW or LLW (LSA)	55-gallon drums	7.35	600	80 per truck, 160 per railcar
Intact Empty and Heel Cylinders (LLW/LSA)	see cylinders 48X/Y/G	See cylinders 48X/Y/G	NA[d]	2 per truck; 6 per railcar

Key: LLW = low-level radioactive waste; LSA = low specific activity waste; MLLW = mixed low-level radioactive waste
[a] Containers and transport packages identified in this table were used to determine the transportation impacts for purposes of analysis.
[b] Container interior minimum volume for the 48X/Y/G and exterior volume for the intermodal container.
[c] Filled container maximum mass. Container mass includes the mass of the container shell, its internal packaging, and the materials within.
[d] Generally trucks are weight limited and railcars are space limited, but the weight of the empty and heel cylinders in not the limiting factor for transportation. Therefore, a truck could carry 2 empty or heel cylinders and the weight capacity would not be exceeded.
Source: LLNL1997; MHF 2015

In general, the number of shipping containers per truck and per railcar are based on the current practice and the proposed approach by the Portsmouth/Paducah Project Office (PPPO 2018), limited by the dimensions and weight of the shipping containers, the Transport Index,[66] and the transport vehicle dimensions and weight limits.

It was assumed that the LLW transported to a disposal site (for example, NNSS) would meet the disposal facility's waste acceptance criteria. Under all Action Alternatives, DU oxides and empty and heel cylinders (i.e., cylinders that are considered deficient for transporting radioactive wastes) are transported to a disposal site. It is expected that a total of about 69,000 DU oxides cylinders and about 14,000 empty and heel cylinders would be transported from both Paducah and Portsmouth to a disposal site. On the average, each cylinder would contain 10 metric tons (about 22,000 pounds) of DU oxides. It is assumed that all empty and heel cylinders contain about 23 kilograms (50 pounds) DUF_6 that has been neutralized using potassium hydroxide. In addition, there is a very small amount of LLW and MLLW that is generated annually.

[66] The Transport Index is a dimensionless number (rounded up to the next tenth) that is placed on the label of a package to designate the degree of control to be exercised by the carrier. Its value is equivalent to the maximum radiation level in millirem per hour at 1 meter from the package (10 CFR 71.4 and 49 CFR 173.403).

As indicated in Section B.2.4, two transportation options are considered: train and truck. Under the truck option, one DU oxide cylinder is transported per truck. Under the train option, each train would consist of 10 gondola railcars, each containing six DU oxide cylinders. It is expected that there would be a maximum of 24 train shipments or 1,440 truck shipments per year from each conversion site (i.e., Paducah or Portsmouth) to a disposal site. Two empty or heel cylinders are transported per truck. The LLW and MLLW is transported only by truck using 55-gallon (208-liter) drums because of the small amount of waste generated and the small number of shipments required (one truck shipment per year from each conversion site).

As described in Chapter 2, Section 2.2.2, as another shipping option, DOE could ship 12 DU oxide cylinders per railcar using an Articulated Bulk Container (ABC) railcar. Trains consisting of 10 ABC railcars, carrying 12 cylinders in each railcar, could be used to transport the DU oxide to the disposal site. One hundred twenty cylinders could be shipped in a 10-ABC railcar train versus 60 cylinders in a 10-gondola railcar train. The same number of DU oxide cylinders would be shipped each year in half the number of train shipments. Similarly, half the number of shipments (385 train shipments from Paducah and 191 train shipments from Portsmouth) would be needed to transport the entire inventory of DU oxide cylinders to a disposal site. The differences that would result from using ABC railcars versus gondola railcars are discussed in this appendix.

B.5.3 Radionuclide Inventories

Radionuclide inventories are used to determine accident risks associated with a hypothetical release of a portion of the radioactive cargo. To simplify the analysis and provide conservatism, the compositions of the DU oxide were assumed to be the maximum concentrations of each radionuclide per radioisotope. **Table B-3** shows the radionuclide concentrations in curies per one metric ton of depleted uranium oxide.

Table B-3 Depleted Uranium Oxide Radionuclide Concentrations

Radionuclides	Curies per Metric ton of DU Oxide
Main Nuclides	
Thorium-234	2.84×10^{-1}
Uranium-234	5.27×10^{-2}
Uranium-235	4.58×10^{-3}
Uranium-238	2.84×10^{-1}
Impurities	
Americium-241	3.75×10^{-6}
Technitium-99	2.29×10^{-4}
Neptunium-237	3.13×10^{-6}
Plutonium-238	1.74×10^{-6}
Plutonium-239	2.26×10^{-6}

Source: PPPO 2018; LLNL 1997

B.6 INCIDENT-FREE TRANSPORTATION RISKS

B.6.1 Radiological Risk

During incident-free transportation of radioactive materials, a radiological dose results from exposure to the external radiation field that surrounds the shipping containers. The population dose is a function of the number of people exposed, their proximity to the containers, their length of time of exposure, and the intensity of the radiation field surrounding the containers.

Radiological impacts were determined for crew members and the general population during incident-free transportation. For truck shipments, the crew members were the drivers of the shipment vehicles. The general population analyzed included persons residing within 805 meters (0.5 mile) of the truck route (off-link), persons sharing the road (on-link), and persons at stops. Exposures to workers loading and unloading shipments at Paducah or Portsmouth were not included in this analysis, but were subsumed within occupational exposures for site workers (see Chapter 4, of this *DU Oxide SEIS*). Exposures to inspectors were evaluated and are presented separately, as discussed in Section B.6.3.

Collective doses for the crew and general population were calculated using the RADTRAN 6.02 computer code (SNL 2013). The radioactive material shipments were assigned an external dose rate based on their radiological characteristics. The waste container dose rate at 1 meter (3.3 feet) from its surface, or its Transport Index, depends on the distribution and quantities of the radionuclides, the waste density, the shielding provided by the packaging, and the self-shielding provided by the waste mixture. If a waste container had a high external dose rate that could exceed a Transportation Index of 10, it would be categorized as an exclusive-use shipment and would have further transport and dose rate limitations. All exclusive-use shipments must meet a regulatory limit of 10 millirem per hour at 2 meters (6.6 feet) from the outer lateral surface of the transport vehicle (10 CFR 71.47 and 49 CFR 173.441).

Based on the radionuclide concentrations shown in Table B-3, a dose rate of 1 millirem per hour at 1 meter (3.3 feet) was assigned to packages containing DU oxides. This is a conservative dose rate estimate based on a maximum dose rate of 2-millirem per hour, at a 30-centimeter (1-foot) distance from the surface of the DU oxide cylinder (PPPO 2018). The dose rate is based on information collected at Paducah and Portsmouth during decades of cylinder monitoring. Because of the low radioactive contents in the empty and heel cylinders and in the shipments of LLW and MLLW, a dose rate of 0.01 millirem per hour at 1 meter (3.3 feet) from the transporter was assumed. Correspondingly, for the volume-reduced empty and heel cylinders in an intermodal shipping container, a dose rate of 0.05 millirem per hour at 1 meter (3.3 feet) from the transporter was used.

To calculate the collective dose, a unit risk factor was developed to estimate the impact of transporting a single shipment of radioactive material over a unit distance of travel in a given population density zone. The unit risk factors were combined with routing information, such as shipment distances in various population density zones, to determine the risk for a single shipment (a shipment risk factor) between a given origin and destination. Unit risk factors were developed on the basis of travel on interstate highways and freeways, as required by 49 CFR Parts 171 to 178, for highway-route-controlled quantities of radioactive material within rural, suburban, and urban population zones by using RADTRAN 6.02 (SNL 2013) and its default data. In addition, it was assumed that, for 10 percent of the time, travel through suburban and urban zones would encounter rush-hour conditions, leading to lower average speed and higher traffic density.

The radiological risks from transporting the waste were estimated in terms of the numbers of LCFs among the crew and the exposed population. A health risk conversion factor of 0.0006 LCF per rem or person-rem of exposure was used for both the public and workers (DOE 2003).

B.6.2 Nonradiological Risk

Nonradiological risk (vehicle-related health risk) resulting from incident-free transport of radioactive materials may be associated with the generation of air pollutants by the transport vehicles used during shipment. The vehicle-related health risk under incident-free transport conditions is the excess latent mortality resulting from inhalation of vehicle emissions. The estimation of hypothetical fatalities from exposure to vehicle emissions was deleted from RADTRAN 5 (Neuhauser et al. 2000) and its recent revisions, because of the extreme uncertainties known to be associated with particulate inhalation models. Therefore, no risk factors were assigned to the vehicle emissions analyzed in this *DU Oxide SEIS*. Chapter 4, Sections 4.1.2, 4.2.2, 4.3.2, and 4.4.2 analyze the air quality impacts related to vehicle emissions under each alternative.

B.6.3 Maximally Exposed Individual Exposure Scenarios

Maximum individual doses for routine off-site transportation were estimated for transportation workers, as well as for members of the general population.

For truck shipments, four hypothetical scenarios were evaluated to determine the MEI in the general population. These scenarios are as follows (DOE 2002a):

- A resident living 30 meters (98 feet) from the highway used to transport the shipping containers;
- A person caught in traffic and located 1.2 meters (4 feet) from the surface of the shipping containers for 60 minutes;
- A person at a rest stop or gas station 20 meters (66 feet) from the shipping containers for 60 minutes; and
- A service station worker at a distance of 16 meters (52 feet) from the shipping container for 50 minutes.

Hypothetical MEI doses were accumulated over a single year for all transportation shipments. However, for the scenario involving an individual caught in traffic next to a shipping container, the radiological exposures were calculated on a per event basis. Because a potentially large number of trucks would leave the Paducah or Portsmouth Sites over a year's time, it is possible that an individual could be exposed to multiple shipments. The MEI dose for an individual stuck in traffic next to a shipping container would equal the single event exposure dose (shown in Table B-6 in Section B.8 below) multiplied by the number of exposure events. For example, if an individual were stuck in traffic next to a shipping container for 1 hour 10 times (total exposure duration of 10 hours), the MEI dose would be 24 millirem (2.4 millirem per hour per stop × 10 hours).

The transportation worker would be a truck or train crew member who could be a DOE employee or a driver for a commercial carrier. In addition to complying with DOT requirements, a DOE employee would also need to comply with 10 CFR Part 835, which limits worker radiation doses to 5 rem per year; however, DOE's goal is to maintain radiological exposure as low as reasonably achievable (ALARA). DOE has therefore established an Administrative Control Level of 2 rem per year (DOE 2017). A commercial truck driver who has been trained as a radiation worker is subject to Occupational Safety and Health Administration regulations, which limit the whole body dose to 5 rem per year (29 CFR 1910.1096(b)), and the DOT requirement of 2 millirem per hour in the truck cab (49 CFR 173.411). Commercial truck drivers who have been trained as radiation workers would have the same administrative dose limit as DOE employees; therefore, for purposes of analysis, a maximally exposed driver would not be expected to exceed the DOE Administrative Control Level of 2 rem per year (DOE 2017). For a truck driver who is not trained as a radiation worker, the maximum annual dose is limited to 100 millirem (10 CFR 20.1301).

Other workers would include inspectors who would inspect the truck and its cargo along the route. An inspector was assumed to be at a distance of 1 meter (3.3 feet) from the cargo for a duration of 1 hour per event.

The following two hypothetical scenarios were also evaluated for railcar shipments (DOE 2002a):

- A rail yard worker working at a distance of 10 meters (33 feet) from the shipping container for 2 hours;
- A resident living 200 meters (650 feet) from a rail stop during classification and inspection for 20 hours.

The maximally exposed transportation worker (excluding drivers) for both truck and train shipments would be an individual inspecting the cargo at a distance of 1 meter from the shipping container for 1 hour.

B.7 TRANSPORTATION ACCIDENT RISKS

B.7.1 Methodology

The off-site transportation accident analysis considered the impacts of accidents during the transportation of materials. Under accident conditions, impacts on human health and the environment could result from the release and dispersal of radioactive material. Transportation accident impacts were assessed using an accident analysis methodology developed by NRC. This section provides an overview of the methodology; detailed descriptions of are found in the *Radioactive Material Transportation Study,* NUREG-0170 (NRC 1977); Modal Study, NUREG/CR-4829 (NRC 1987); and Reexamination Study, NUREG/CR-6672 (NRC 2000). Accidents that could potentially breach the shipping container were represented by a spectrum of accident severities and radioactive release conditions. Historically, most transportation accidents involving radioactive materials have resulted in little or no release of radioactive material from the shipping container. Consequently, the analysis of accident risks evaluated accidents ranging from high-probability accidents of low severity to hypothetical high-severity accidents that have a correspondingly low probability of occurrence. The accident analysis calculated the probabilities and consequences from this spectrum of accidents.

To provide a reasonable assessment of radioactive waste transportation accident impacts, two types of analysis were performed. First, an accident risk assessment was performed that takes into account the probabilities and consequences of a spectrum of potential accident severities using methodologies developed by NRC (NRC 1977, 1987, 2000). For the spectrum of accidents considered in the analysis, the RADTRAN 6.02 code (SNL 2013) sums the product of consequences and probability over all accident severity categories to obtain a probability-weighted risk value referred to in this appendix as “dose risk,” to the population within 50 miles, which is expressed in units of person-rem. Second, to represent the maximum reasonably foreseeable impacts on individuals and populations should an accident occur, maximum radiological consequences were calculated in an urban or suburban population zone for an accidental release with a likelihood of occurrence greater than 1 chance in 10 million per year using the RISKIND computer program (Yuan et al. 1995).

For accidents in which a waste container remains undamaged, population and individual radiation exposures from the waste package were evaluated for the time needed to recover the container and resume shipment. The collective dose over all segments of the transportation routes was evaluated for an affected population to a distance of 805 meters (0.5 mile) from the accident location. This approach is consistent with that used in incident-free transport public dose calculations, which considers those individuals within a distance of 805 meters from the route (NRC 1977). When the package remains undamaged, people would receive a dose only from external radiation from the package. In general, the external dose to individuals in this population would be inversely proportional to the square of the distance of the affected individuals from the accident. Any additional dose to those residing beyond 805 meters from the accident would be negligible. The dose to an individual (first responder) was assumed to be equal to that of the inspector dose.

B.7.2 Accident Rates

Whenever material is shipped, the possibility exists that a traffic accident could result in vehicular damage, injury, or a fatality. An accident fatality is the death of a person who is killed instantly or dies within 30 days due to injuries sustained in the accident. Even when drivers are trained in defensive driving and take great care, there is a risk of a traffic accident.

To calculate accident risks, vehicle accident and fatality rates were taken from data provided in *State-Level Accident Rates for Surface Freight Transportation: A Reexamination*, (Saricks and Tompkins 1999) and updated, as discussed below. Accident rates are generically defined as the number of accident involvements (or fatalities) in a given year per unit of travel in that same year. Therefore, the rate is a fractional value, with the accident involvement representing the numerator of the fraction and vehicular activity (total travel distance in truck kilometers) its denominator. Accident rates were generally determined for a multi-year period. For assessment purposes, the total number of expected accidents or fatalities was calculated by multiplying the total shipment distance for a specific case by the appropriate accident or fatality rate.

No reduction in accident or fatality rates was assumed, even though radioactive material carrier drivers are better trained and utilize well-maintained equipment. Saricks and Kvitek (1994) points out that shippers and carriers of radioactive material generally have a higher-than-average awareness of transportation risk and prepare cargoes and drivers for such shipments accordingly. This preparation should have the twofold effect of reducing component and equipment failure and mitigating the contribution of human error to accident causation.

A review of truck accidents and fatalities by the Federal Carrier Safety Administration indicated that state-level accidents and fatalities were underreported (UMTRI 2003). For the years 1994 through 1996, which formed the bases for the analysis in the Saricks and Tompkins report, the review identified that accidents were underreported by about 39 percent and fatalities were underreported by about 36 percent. Therefore, the state-level truck accident and fatality rates in the Saricks and Tompkins report were increased by factors of 1.64 and 1.57, respectively, to account for the underreporting in the analyses for this *DU Oxide SEIS*.

For truck transportation, the calculated accident rates were specifically for heavy combination trucks involved in interstate commerce. Heavy combination trucks typically used for radioactive material shipments are rigs composed of a separable tractor unit containing the engine and one to three freight trailers connected to each other. Truck accident rates were computed for each state based on statistics compiled by the Federal Highway Administration, Office of Motor Carriers, from 1994 to 1996 (Saricks and Tompkins 1999; adjusted for underreporting using UMTRI 2003).

For off-site transport of radioactive waste, a weighted average accident and fatality rate was calculated based on the state-level distances traveled and their associated accident and fatality rates. The accident and fatality values selected were the state-level accident and fatality rates provided in Saricks and Tompkins (1999; adjusted for underreporting using UMTRI 2003). The rates in Saricks and Tompkins (1999) are cited in terms of accident and fatality per car-kilometer and railcar-kilometer traveled. For DU oxide in cylinders and intact empty and heel cylinder transport by train, the accident and fatality rate was based on 10 gondola railcars per train (PPPO 2018), and for the disposal at NNSS an additional 60 truck shipments of DU oxides or 30 truck shipments of empty and heel cylinders from an intermodal facility (considered to be Barstow, California), because there is no direct rail access to NNSS. The selected accident and fatality rates used in this *DU Oxide SEIS* are limited to the rates in those states where truck and train shipments would travel while transporting wastes from Portsmouth or Paducah to the evaluated disposal sites. For trucks, the selected state-level rates are those associated with total accidents and fatalities on interstate highways and primary roads.

B.7.3 Accident Severity Categories and Conditional Probabilities

Accident severity categories for potential radioactive waste transportation accidents are described in the *Radioactive Material Transportation Study* (NUREG-0170) (NRC 1977) for radioactive waste in general. NUREG-0170 was used to estimate conditional probabilities associated with accidents involving transportation of radioactive materials. The NUREG-0170 analysis was primarily performed using best engineering judgments and presumptions concerning cask response.

As discussed earlier, the accident consequence assessment considered the potential impacts of severe transportation accidents. In terms of risk, the severity of an accident must be viewed in terms of potential radiological consequences, which are directly proportional to the fraction of the radioactive material within a cask that is released to the environment during the accident. Although accident severity regions span the entire range of mechanical and thermal accident loads, they are grouped into accident categories that can be characterized by a single set of release fractions and, therefore, can be considered together in the accident consequence assessment. The accident category severity fraction is the sum of all conditional probabilities in that accident category.

In this *DU Oxide SEIS*, consistent with the analysis approach used in the 2004 EISs (DOE 2004a, 2004b), the severity categories and the conditional probabilities are based on NUREG-0170 (NRC 1977). Furthermore, radiological consequences are calculated by assigning package release fractions to each accident severity category. The release fraction is defined as the fraction of the material in a package that could be released from the package as the result of an accident of a given severity. Release fractions take into account all mechanisms necessary to cause release of material from a damaged package to the environment. The release fractions used are those reported in NRC (1977) for both LSA drums and NRC Type A packages. It is assumed that for the higher severity categories all materials within the cylinders involved in an accident would be released and 1 percent of these materials would be aerosolized in all accidents with 5 percent of the aerosolized particles being in the respirable size range (NRC 1977; DOE 1994, DOE 2002b). Assuming the use of finely divided DU oxide powder is very conservative because the DU oxide powder that results from conversion operations at Paducah and Portsmouth is roll-compacted with particle sizes generally much larger.

For the accident risk assessment, the RADTRAN 6.02 computer code (SNL 2013) sums the product of the consequences and probabilities over all accident categories to obtain a probability-weighted risk value referred to in this appendix as "dose risk," which is expressed in units of person-rem.

B.7.4 Atmospheric Conditions

Because it is impossible to predict the specific location of an off-site transportation accident, generic atmospheric conditions were selected for the risk and consequence assessments. On the basis of observations from National Weather Service surface meteorological stations at over 177 locations in the United States, on an annual average, neutral conditions (Pasquill Stability Classes C and D) occur 58.5 percent of the time, and stable (Pasquill Stability Classes E, F, and G) and unstable (Pasquill Stability Classes A and B) conditions occur 33.5 percent and 8 percent of the time, respectively (DOE 2002a). The neutral weather conditions predominate in each season, but most frequently in the winter (nearly 60 percent of the observations).

Neutral weather conditions in Pasquill Stability Class D compose the most frequently occurring atmospheric stability condition in the United States and are thus most likely to be present in the event of an accident involving a radioactive waste shipment. Neutral weather conditions are typified by moderate wind speeds, vertical mixing within the atmosphere, and good dispersion of atmospheric contaminants. Stable weather conditions are typified by low wind speeds, very little vertical mixing within the atmosphere, and poor dispersion of atmospheric contaminants. The atmospheric condition used in RADTRAN 6.02 (SNL 2013) is an average weather condition that corresponds to a combination of Pasquill Stability Classes D and E.

The accident consequences for the maximum reasonably foreseeable accident (an accident with a likelihood of occurrence greater than 1 in 10 million per year) were assessed for both stable (Class F with a wind speed of 1 meter per second, or 2.2 miles per hour) and neutral (Class D with a wind speed of 4 meters per second or about 9 miles per hour) atmospheric conditions. The population dose was evaluated under neutral atmospheric conditions, and the MEI dose under stable atmospheric conditions. The MEI dose would represent an accident under weather conditions that result in a conservative dose (that is, a stable weather condition with minimum diffusion and dilution). The population dose would represent an average weather condition.

B.7.5 Intentional Destructive Acts – Acts of Sabotage or Terrorism

In response to the terrorist attacks of September 11, 2001, DOE continually assesses its measures in place to minimize the risk or potential consequences of radiological sabotage. While it is not possible to determine terrorists' motives and targets with certainty, DOE considers the threat of terrorist attack to be real and makes all efforts to reduce any vulnerability to this threat.

The impacts of intentional destructive acts are presented here to provide perspective on the risks that the transportation of the DU oxide could pose should such an act occur. The consequences of an intentional destructive acts involving radioactive and hazardous material depend on the material's packaging, chemical composition, radioactive and physical properties, accessibility, quantity, and ease of dispersion, as well as on the surrounding environment, including the number of people who are close to the event. An intentional destructive acts could occur during loading of the railcars or trucks and transportation activities under any of the alternatives.

The DU oxide is transported as a low specific activity waste. The low-activity nature of the uranium poses little risk, in general, to human health and the environment, even under accident conditions, as discussed in Tables B-4 through B-6 of this appendix. The impacts of an intentional destructive act could be represented by the impacts of any of the reasonably foreseeable accidents presented in Table B-7 in Section B.8 below. These accidents represent the situations that would result in the highest amount of released materials without considering the accidents' probability. All accident cases (in both urban and suburban areas) indicate a small consequence and risk to the public and individuals—the highest dose from a release of all materials in one railcar without any prevention would be about 47 person-rem to the population in the urban area (with a risk of an LCF of 0.03) and an MEI dose of 6.4 millirem (with an LCF risk of 4×10^{-6}).

B.8 RISK ANALYSIS RESULTS

Per-shipment risk factors have been calculated for the collective populations of exposed persons and for the transport crew for all anticipated routes and shipment configurations. Radiological risks are presented in per-shipment doses for each unique route, material, and container combination. Per-shipment radiological risk factors for incident-free transportation and accident conditions are presented in **Table B-4**, for DU oxide and in **Tables B-4a** for the empty and heel cylinders and LLW and MLLW. These factors have been adjusted to reflect the projected population in 2020. For incident-free transportation, both dose and LCF risk factors are provided for the crew and exposed population. The radiological risks would result from potential exposure of people to external radiation emanating from the packaged waste. The exposed population includes the off-link public (people living along the route), on-link public (pedestrian and car occupants along the route), and public at rest and fuel stops. LCF risk factors were calculated by multiplying the accident dose risks by a health risk conversion factor of 0.0006 cancer fatality per person-rem of exposure (DOE 2003).

For transportation accidents, the risk factors are given for radiological impacts in terms of potential LCFs in the exposed population; for nonradiological impacts, the risk factors are given in terms of number of traffic fatalities. LCFs represent the number of additional latent fatal cancers expected among the exposed population in the event of an accident. Under accident conditions, the population would be exposed to radiation from released radioactivity if the package were breached and would receive an external radiation dose if the package were not breached. For accidents with no release, the analysis conservatively assumed that it would take about 12 hours to remove the package and/or vehicle from the accident area (DOE 2002a). The nonradiological risk factors are non-occupational traffic fatalities resulting from transportation accidents.

As stated in Section B.7.3, the accident dose is called the "dose risk" because the values incorporate the spectrum of accident severity probabilities and associated consequences (for example, dose). The accident dose risks would be very low because the accident severity probabilities (that is, the likelihood of accidents leading to confinement breach of a package or shipping cask and release of its contents) would be small, and the content and form of the wastes (that is, solids) are such that a breach would lead to a semi-dispersible and noncombustible release. Because RADTRAN 6.02 (SNL 2013) assumes a homogeneous population within a 80-kilometer (50-mile) radius along the transportation route, it likely overestimates the actual doses because this assumption theoretically places people directly adjacent to the route, where the highest doses would be present.

As indicated in Table B-4 (and B-4a), all per-shipment risk factors would be less than one. This means that no LCFs or traffic fatalities are expected to occur during each transport. For example, in Table B-4, the risk factors to truck crews and populations from transporting one shipment of DU oxide from Paducah to NNSS in a cylinder by truck are given as 2.3×10^{-6} and 6.2×10^{-6} LCF, respectively. These risk factors can also be interpreted to mean that during a single shipment of DU oxide LLW, there is a chance of about 1 in 435,000 that an additional latent fatal cancer could be experienced among the exposed workers from exposure to radiation, and a chance of about 1 in 161,000 that an additional latent fatal cancer could be experienced among the exposed population residing along the transport route. These chances are essentially equivalent to zero risk. It should be noted that the maximum dose rate allowed by regulation in the truck cab is less than or equal to 2 millirem per hour.

As discussed in Section B.5.2, shipping DU oxide cylinders in ABC railcars instead of gondola railcars would result in twice the number of cylinders in a train shipment. Therefore, the per-shipment radiological risk factors for incident-free transportation and accident conditions would be expected to be approximately twice those listed in Table B-4 for shipment of DU oxide cylinders in gondola railcars.[67]

[67] Although the per-shipment radiological risk factors for incident-free transportation and accident conditions for shipping DU oxide cylinders in ABC railcars would be expected to be approximately twice those for shipping DU oxide cylinders in gondola railcars, because there would be half the number of shipments, the total risk for the two shipping modes would be similar.

Table B-5 shows the risks of transporting DU oxide LLW to each disposal site under each alternative using truck and/or train transport methods. The risks were calculated by multiplying the previously given per-shipment factors by the number of shipments over the duration of the project and, for radiological doses, by the health risk conversion factors. Table B-5 indicates that the disposal at NNSS would have a higher radiological risk to the population during incident-free transport than the other alternatives because this Alternative is farthest from Paducah and Portsmouth, passes near the largest population, and additional truck transports from an intermodal facility to NNSS are required for the train transport option.

Nonradiological accident risks (the potential for fatalities as a direct result of traffic accidents) present the greatest risks, with an estimate of up to 12 fatalities for the duration of the analysis. Considering the transportation activities analyzed in this *DU Oxide SEIS* are assumed to occur over a 34-year period and the average number of traffic fatalities in the United States is about 33,000 per year (DOT 2011) or 1,122,000 fatalities over 34 years, the additional traffic fatality risk under all alternatives would be very small. See Section B.8 for further discussion of accident fatality rates.

As discussed in Section B.5.2, shipping DU oxide cylinders in ABC railcars instead of gondola railcars would result in twice the number of cylinders in a train shipment but half the number of shipments. Because the same number of DU oxide cylinders would be shipped annually an in total, the annual and total impacts of incident-free transportion would be expected to be similar. Because there would be twice the number of cylinders in an ABC railcar shipment versus a gondola railcar shipment, the impacts of a radiological accident while using ABC railcars, could be approximately double those of a gondola railcar shpment. However, because there would be half the number of shipments annually and in total, the annual and total risk of the two shipping modes would be similar. Emissions and traffic accident fatalities for shipping in ABC railcars would be less than for shipping in gondola railcars because there would be fewer train shipments.

Table B-5a shows the risks for transporting empty and heel cylinders to each disposal site under each alternative.

Table B-4 Risk Factors per Shipment of Depleted Uranium Oxide Cylinders[a]

				Incident-Free				Accident	
				Crew		Population			
Origin	**Destination**	**Transportation Method**	**One-way Kilometers Traveled**	**Dose (person-rem)**	**LCF[b]**	**Dose (person-rem)**	**LCF[b]**	**Radiological Risk[b]**	**Nonradiological Risk (traffic fatalities)[b]**
Truck									
Paducah	*EnergySolutions*	Truck	2,578	3.05×10^{-3}	1.83×10^{-6}	8.11×10^{-3}	4.86×10^{-6}	5×10^{-9}	1×10^{-4}
	NNSS	Truck	3,208	3.78×10^{-3}	2.27×10^{-6}	9.92×10^{-3}	5.95×10^{-6}	3×10^{-9}	1×10^{-4}
	WCS	Truck	1,695	2.01×10^{-3}	1.20×10^{-6}	5.25×10^{-3}	3.15×10^{-6}	3×10^{-9}	1×10^{-4}
Portsmouth	*EnergySolutions*	Truck	3,080	3.65×10^{-3}	2.19×10^{-6}	9.43×10^{-3}	5.66×10^{-6}	5×10^{-9}	1×10^{-4}
	NNSS	Truck	3,731	4.41×10^{-3}	2.64×10^{-6}	1.15×10^{-2}	6.93×10^{-6}	4×10^{-9}	2×10^{-4}
	WCS	Truck	2,284	2.73×10^{-3}	1.64×10^{-6}	7.01×10^{-3}	4.20×10^{-6}	6×10^{-9}	2×10^{-4}
Train/Truck									
Paducah	Energy*Solutions*	Train	2,763	7.94×10^{-2}	4.76×10^{-5}	1.07×10^{-1}	6.42×10^{-5}	3×10^{-6}	6×10^{-4}
	WCS	Train	2,007	6.12×10^{-2}	3.67×10^{-5}	9.99×10^{-2}	5.99×10^{-5}	4×10^{-6}	1×10^{-3}
	NNSS[c]	Train	3,389	9.50×10^{-2}	5.70×10^{-5}	1.15×10^{-1}	6.93×10^{-5}	2×10^{-6}	1×10^{-3}
		Truck[c]	337	3.94×10^{-4}	2.36×10^{-7}	1.04×10^{-3}	6.24×10^{-7}	3×10^{-11}	6×10^{-6}
		TOTAL[d]	23,626	1.19×10^{-1}	5.84×10^{-5}	1.78×10^{-1}	1.07×10^{-4}	2×10^{-6}	1×10^{-3}
Portsmouth	Energy*Solutions*	Train	3,243	1.01×10^{-1}	6.07×10^{-5}	1.38×10^{-1}	8.29×10^{-5}	4×10^{-6}	9×10^{-4}
	WCS	Train	2,947	9.61×10^{-2}	5.76×10^{-5}	1.54×10^{-1}	9.23×10^{-5}	5×10^{-6}	1×10^{-3}
	NNSS[c]	Train	4,029	1.18×10^{-1}	7.09×10^{-5}	1.46×10^{-1}	8.77×10^{-5}	4×10^{-6}	1×10^{-3}
		Truck[c]	337	3.94×10^{-4}	2.36×10^{-7}	1.04×10^{-3}	6.24×10^{-7}	3×10^{-11}	6×10^{-6}
		TOTAL[d]	24,266	1.42×10^{-1}	8.51×10^{-5}	2.09×10^{-1}	1.25×10^{-4}	4×10^{-6}	2×10^{-3}

Key: LCF = latent cancer fatality; LSA = low specific activity waste; NNSS = Nevada National Security Site; WCS = Waste Control Specialists.

[a] All shipments would contain LLW (LSA).

[b] Risk is expressed in terms of LCF, except for the nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

[c] Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck.

[d] Each train shipment to NNSS would require the transport of 60 cylinders (or 60 truck shipments) from an intermodal facility in Barstow, California.

Note: To convert kilometers to miles, multiply kilometers by 0.6215.

Table B-4a Risk Factors per Shipment of Empty and Heel Cylinders and LLW and MLLW Drums[a]

				Incident-Free				Accident	
				Crew		Population			
Origin	**Destination**	**Transportation Method**	**One-way Kilometers Traveled**	**Dose (person-rem)**	**LCF[b]**	**Dose (person-rem)**	**LCF[b]**	**Radiological Risk[b]**	**Nonradiological Risk (traffic fatalities)[b]**
Truck- Empty and Heel Cylinders									
Paducah	*EnergySolutions*	Truck	2,578	3.05×10^{-5}	1.83×10^{-8}	8.11×10^{-5}	4.86×10^{-8}	3×10^{-11}	1×10^{-4}
	NNSS	Truck	3,208	3.78×10^{-5}	2.27×10^{-8}	9.92×10^{-5}	5.95×10^{-8}	1×10^{-11}	1×10^{-4}
	WCS	Truck	1,695	2.01×10^{-5}	1.20×10^{-8}	5.25×10^{-5}	3.15×10^{-8}	1×10^{-11}	1×10^{-4}
Portsmouth	*EnergySolutions*	Truck	3,080	3.65×10^{-5}	2.19×10^{-8}	9.43×10^{-5}	5.66×10^{-8}	2×10^{-11}	1×10^{-4}
	NNSS	Truck	3,731	4.41×10^{-5}	2.64×10^{-8}	1.15×10^{-4}	6.93×10^{-8}	2×10^{-11}	2×10^{-4}
	WCS	Truck	2,284	2.73×10^{-5}	1.64×10^{-8}	7.01×10^{-5}	4.20×10^{-8}	3×10^{-11}	2×10^{-4}
Train/Truck- Empty and Heel Cylinders									
Paducah	Energy*Solutions*	Train	2,763	7.94×10^{-4}	4.76×10^{-7}	1.07×10^{-3}	6.42×10^{-7}	5×10^{-9}	6×10^{-4}
	WCS	Train	2,007	6.12×10^{-4}	3.67×10^{-7}	9.99×10^{-4}	5.99×10^{-7}	8×10^{-9}	7×10^{-4}
	NNSS[c]	Train	3,389	9.50×10^{-4}	5.70×10^{-7}	1.15×10^{-3}	6.93×10^{-7}	4×10^{-9}	8×10^{-4}
		Truck[c]	337	3.94×10^{-6}	2.36×10^{-9}	1.04×10^{-5}	6.24×10^{-7}	2×10^{-13}	6×10^{-6}
		TOTAL[d]	13,507	1.07×10^{-3}	6.41×10^{-7}	1.47×10^{-3}	8.80×10^{-7}	4×10^{-9}	9×10^{-4}
Portsmouth	Energy*Solutions*	Train	3,243	1.01×10^{-3}	6.07×10^{-7}	1.38×10^{-3}	8.29×10^{-7}	1×10^{-8}	9×10^{-4}
	WCS	Train	2,947	9.61×10^{-4}	5.76×10^{-7}	1.54×10^{-3}	9.23×10^{-7}	1×10^{-8}	1×10^{-3}
	NNSS[c]	Train	4,029	1.18×10^{-3}	7.09×10^{-7}	1.46×10^{-3}	8.77×10^{-7}	8×10^{-9}	1×10^{-3}
		Truck[c]	337	3.94×10^{-6}	2.36×10^{-9}	1.04×10^{-5}	6.24×10^{-9}	2×10^{-13}	6×10^{-6}
		TOTAL[d]	14,147	1.30×10^{-3}	7.80×10^{-7}	1.77×10^{-3}	1.06×10^{-6}	9×10^{-9}	2×10^{-3}
Truck- LLW and MLLW Drums									
Paducah	*EnergySolutions*	Truck	2,578	3.10×10^{-4}	1.86×10^{-7}	2.26×10^{-4}	1.35×10^{-7}	7×10^{-14}	1×10^{-4}
	NNSS	Truck	3,208	3.85×10^{-4}	2.31×10^{-7}	2.78×10^{-4}	1.67×10^{-7}	4×10^{-14}	1×10^{-4}
	WCS	Truck	1,695	2.04×10^{-4}	1.23×10^{-7}	1.43×10^{-4}	8.60×10^{-8}	4×10^{-14}	1×10^{-4}
Portsmouth	*EnergySolutions*	Truck	3,080	3.72×10^{-4}	2.23×10^{-7}	2.52×10^{-4}	1.51×10^{-7}	6×10^{-14}	1×10^{-4}
	NNSS	Truck	3,731	4.49×10^{-4}	2.69×10^{-7}	3.21×10^{-4}	1.93×10^{-7}	5×10^{-14}	2×10^{-4}
	WCS	Truck	2,284	2.78×10^{-4}	1.67×10^{-7}	1.74×10^{-4}	1.04×10^{-7}	8×10^{-14}	2×10^{-4}

Key: LCF = latent cancer fatality; LSA = low specific activity waste; NNSS = Nevada National Security Site; WCS = Waste Control Specialists.

[a] All empty and heel cylinder shipments would be LLW (LSA).

[b] Risk is expressed in terms of LCF, except for the nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

[c] Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck.

[d] Each train shipment to NNSS would require the transport of 60 cylinders (or 30 truck shipments) from an intermodal facility in Barstow, California.

Note: To convert kilometers to miles, multiply kilometers by 0.6215.

Table B-5 Total Risks to Crew Members and Populations from Transporting Depleted Uranium Oxide Cylinders under Each Disposal Alternative

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free: Crew Dose (person-rem)	Incident-Free: Crew LCF[b]	Incident-Free: Population Dose (person-rem)	Incident-Free: Population LCF[b]	Accident: Radiological Risk[b]	Accident: Nonradiological Risk[b]
Energy*Solutions* Disposal Alternative								
Truck								
Paducah	46,200	119,000,000	141	0.08	374	0.2	3×10^{-4}	6
Portsmouth	22,900	70,400,000	83	0.05	215	0.1	1×10^{-4}	3
Train								
Paducah	770	2,100,000	61	0.04	82	0.05	2×10^{-3}	0.5
Portsmouth	380	1,200,000	38	0.02	52	0.03	2×10^{-3}	0.3
NNSS Disposal Alternative								
Truck								
Paducah	46,200	148,100,000	175	0.1	458	0.3	1×10^{-4}	6
Portsmouth	22,900	85,300,000	101	0.06	264	0.2	9×10^{-5}	4
Train/Truck[a]								
Paducah	46,970	18,200,000	91	0.05	137	0.08	1×10^{-3}	1
Portsmouth	23,280	9,200,000	54	0.03	79	0.05	1×10^{-3}	0.7
WCS Disposal Alternative								
Truck								
Paducah	46,200	78,200,000	93	0.06	242	0.1	1×10^{-4}	6
Portsmouth	22,900	52,200,000	62	0.04	160	0.1	1×10^{-4}	4
Train								
Paducah	770	1,500,000	47	0.03	77	0.05	2×10^{-3}	0.7
Portsmouth	380	1,100,000	37	0.02	58	0.04	2×10^{-3}	0.5

Key: LCF = latent cancer fatality; NNSS = Nevada National Security Site; WCS = Waste Control Specialists.

[a] The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000. Under the Truck Option, the number of shipments would be those sent directly to the disposal facilities. Under the Train Option, the same number of train shipments would leave either Paducah or Portsmouth under all disposal site alternatives, but because NNSS does not have a rail connection, train shipments would be shipped to an intermodal facility (which was assumed for analysis to be at Barstow, California) and then the cargo would be transported by truck to NNSS. Impacts from these additional shipments were included in the tabulated results for the NNSS under "Train/Truck" in this table.

[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

Note: To convert kilometers to miles, multiply kilometers by 0.6215.

Table B-5a Total Risks to Crew Members and Populations from Transporting Empty and Heel Cylinders under Each Disposal Alternative

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonradiological Risk[b]
Energy*Solutions* Disposal Alternative								
Truck								
Paducah	4,242	10,900,000	0.1	8×10^{-5}	0.3	2×10^{-4}	1×10^{-7}	0.6
Portsmouth	2,759	8,500,000	0.1	6×10^{-5}	0.3	2×10^{-4}	6×10^{-8}	0.4
Train								
Paducah	140	390,000	0.1	7×10^{-5}	0.1	9×10^{-5}	7×10^{-7}	0.09
Portsmouth	90	290,000	0.09	5×10^{-5}	0.1	7×10^{-5}	9×10^{-7}	0.08
NNSS Disposal Alternative								
Truck								
Paducah	4,242	13,600,000	0.2	1×10^{-4}	0.4	3×10^{-4}	6×10^{-8}	0.6
Portsmouth	2,759	10,300,000	0.1	7×10^{-5}	0.3	2×10^{-4}	5×10^{-8}	0.5
Train/Truck [a]								
Paducah	4,380	1,900,000	0.1	9×10^{-5}	0.2	1×10^{-4}	6×10^{-7}	0.1
Portsmouth	2,850	1,290,000	0.1	7×10^{-5}	0.2	1×10^{-4}	8×10^{-7}	0.1
WCS Disposal Alternative								
Truck								
Paducah	4,242	7,200,000	0.09	5×10^{-5}	0.2	1×10^{-4}	6×10^{-8}	0.5
Portsmouth	2,759	6,300,000	0.08	5×10^{-5}	0.2	1×10^{-4}	8×10^{-8}	0.4
Train								
Paducah	140	280,000	0.09	5×10^{-5}	0.1	8×10^{-5}	1×10^{-6}	0.1
Portsmouth	90	270,000	0.09	5×10^{-5}	0.1	8×10^{-5}	1×10^{-6}	0.1

Key: LCF = latent cancer fatality; NNSS = Nevada National Security Site; WCS = Waste Control Specialists.

[a] The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000. Under the Truck Option, the number of shipments would be those sent directly to the disposal facilities. Under the Train Option, the same number of train shipments would leave either Paducah or Portsmouth under all disposal site alternatives, but because NNSS does not have a rail connection, train shipments would be shipped to an intermodal facility (which was assumed for analysis to be at Barstow, California) and then the cargo will be transported by truck to NNSS. Impacts from these additional shipments were included in the tabulated results for NNSS under "Train/Truck" in this table.

[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

Note: To convert kilometers to miles, multiply kilometers by 0.6215.

DOE is also considering the option of transport of DU oxide to the disposal facility using bulk bags consistent with the analysis presented in the 2004 EISs (DOE 2004a, 2004b). It is estimated that there would be 20,510 and 9,070 truck shipments and 510 and 230 train shipments from Paducah and Portsmouth, respectively, using consistent assumptions as those used in the 2004 EISs and this *DU Oxide SEIS*. Because the amount of DU oxide evaluated in this SEIS is larger than that evaluated in the 2004 EISs, the bulk bag shipment numbers presented in this *DU Oxide SEIS* are proportionally larger than those cited in the 2004 EISs.

In order to estimate the risks from transport of the DU oxide in bulk bags to the Energy*Solutions*, NNSS, and WCS disposal facilities, the per-shipment transportation risks to Energy*Solutions* and NNSS[68] were first calculated from the information in the 2004 EISs (DOE 2004a, 2004b). The per-shipment calculations for the incident-free and accident risks for transporting the DU oxide in cylinders and bulk bags to Energy*Solutions* and NNSS were compared to determine the increase or decrease in radiological risks when bulk bags are used. The most important factors in the dose to the transportation crew (e.g., truck/train crew) are the characteristics of the cargo (the width and height), its distance to the crew, and the total exposure time. The dose to the public is primarily a function of the characteristics of the cargo, speed of the transporter, and population density within each transportation zone (rural, suburban, and urban). The dose from the accident is a function of the material at risk (the quantity of DU oxide in the container), severity of accident (release fraction), environmental (atmospheric) conditions, and the exposed population. Because similar transport parameters were used for cylinders and bulk bags, the difference in the calculated dose/risk between these two containers is attributed to their characteristics and associated capacities.

Based on the above methodology, proportionality constants (ratios of the dose resulting from shipment of DU oxide in bulk bags to that resulting from shipment of DU oxide in cylinders) were developed. The calculated proportionality constants that were used to estimate the risks from transporting DU oxide in bulk bags by truck and train include the overall per-shipment ratios of crew dose, population dose, and radiological accident dose of 1.1, 1.4, and 2.2 for trucks, and 1.3, 1.2, and 1.8 for trains, respectively.[69] Because new analyses for the transport of DU oxide in cylinders to Energy*Solutions*, NNSS, and WCS had been performed for this *DU Oxide SEIS*, the proportionality constants could be used to estimate the impacts of transporting DU oxide in bulk bags to the three disposal locations.

Consistent with the Council on Environmental Quality's instruction to discuss potential impacts "in proportion to their significance" (40 CFR 1502.2(b)), DOE determines the appropriate level of detail of impact analysis on a case-by-case basis. DOE determined that more detailed, bulk bag-specific transportation modeling is not necessary based on these calculated risks and the findings of the 2004 EISs, which showed that bulk bag transportation would result in similarly small impacts to workers and the public. The risk calculations for the other packagings, (e.g., DU oxide in cylinders, empty cylinders, volume-reduced empty cylinders in intermodal containers,

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[68] Transportation of wastes to WCS was not analyzed in the 2004 EISs (DOE 2004a, 2004b).
[69] These ratios from the 2004 EISs (DOE 2004a, 2004b) were very similar for Energy*Solutions* and NNSS. Therefore, one number was used to summarize each ratio. Because these ratios were very similar for Energy*Solutions* and NNSS, DOE expects that similar ratios would apply to WCS. Therefore, these ratios can be used to estimate impacts for shipment of DU oxide in bulk bags to Energy*Solutions*, NNSS, and WCS.

LLW/MLLW in drums), and nonradiological (traffic) accidents are new calculations and are not based on the analyses from the 2004 EISs.

If the bulk bags are used, then, the empty and heel cylinders also need to be transported to the disposal sites. It is assumed that the cylinders would be volume-reduced and packaged 10 in a 20-ft intermodal container and transported one container per truck and two containers per railcar with 10 railcars per train. The 2004 EISs also considered that about 10 percent of the cylinders could not be accepted at the Energy*Solution*, therefore, these cylinders would be transported intact to NNSS. The risks of transporting the volume-reduced cylinders and the intact cylinders are calculated using the same assumptions used in Table B-5a in this *DU Oxide SEIS*.

In addition, if DOE is unable to sell the hydrogen fluoride (HF), the HF could be converted to CaF_2 for disposal as LLW. Approximately 25,262 bulk bags of CaF_2 at Paducah and 13,559 bulk bags at Portsmouth were analyzed in the 2004 EISs (DOE 2004a, 2004b), while 32,417 bulk bags of CaF_2 at Paducah and 13,554 bulk bags of CaF_2 at Portsmouth would be expected under the quantities analyzed in this *DU Oxide SEIS*.

Table B-5b shows the risks of transporting DU oxide in bulk bags to Energy*Solutions*, NNSS, and WCS under each alternative using truck and/or train transport methods. **Table B-5c** shows the risks for transporting empty and heel cylinders to Energy*Solutions*, NNSS, and WCS under each alternative. Table B-5b indicates that disposal at NNSS would have a higher radiological risk to the population during incident-free transportation than the other alternatives because this location results in the farthest transportation distances, passes near the largest population, and additional truck transports from an intermodal facility to NNSS are required for the train transport option.

Nonradiological accident risks (the potential for fatalities as a direct result of traffic accidents) present the greatest risks, with an estimate of up to 4 fatalities for the duration of the analysis. Considering the transportation activities analyzed in this *DU Oxide SEIS* are assumed to occur over a 32-year period and the average number of traffic fatalities in the United States is about 33,000 per year (DOT 2011), the additional traffic fatality risk under all alternatives would be very small.

The risks to various exposed individuals under incident-free transportation conditions were estimated for the hypothetical exposure scenarios identified in Section B.6.3. The maximum estimated doses to workers and the public MEIs are presented in **Table B-6**, considering all shipment types. Doses are presented on a per-event basis (rem per event, per exposure, or per shipment), because it is generally unlikely that the same person would be exposed to all shipments. For those individuals that could have multiple exposures, the cumulative dose was calculated.

Table B-5b Total Risks to Crew Members and Populations from Transporting Depleted Uranium Oxide in Bulk Bags under Each Disposal Alternative

			Incident-Free				Accident	
			Crew		Population			
Origin	Number of Shipments[a]	One-way Kilometers Traveled	Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonradiological Risk[b]
Energy*Solutions* Disposal Alternative								
Truck								
Paducah	20,510	52,900,000	69	0.04	233	0.14	2×10^{-4}	3
Portsmouth	9,070	27,900,000	36	0.02	120	0.07	9×10^{-5}	1
Train								
Paducah	510	1,400,000	53	0.03	64	0.04	2×10^{-3}	0.3
Portsmouth	230	700,000	30	0.02	37	0.02	2×10^{-3}	0.2
NNSS Disposal Alternative								
Truck								
Paducah	20,510	65,800,000	85	0.05	285	0.17	1×10^{-4}	3
Portsmouth	9,070	33,800,000	44	0.03	147	0.09	8×10^{-5}	2
Train/Truck[c]								
Paducah	21,020	8,600,000	72	0.04	99	0.06	2×10^{-3}	0.7
Portsmouth	9,300	4,000,000	39	0.02	53	0.03	2×10^{-3}	0.4
WCS Disposal Alternative								
Truck								
Paducah	20,510	34,800,000	45	0.03	151	0.09	1×10^{-4}	3
Portsmouth	9,070	20,700,000	27	0.02	89	0.05	1×10^{-4}	1
Train								
Paducah	510	1,000,000	41	0.02	60	0.04	3×10^{-3}	0.5
Portsmouth	230	700,000	29	0.02	42	0.03	3×10^{-3}	0.3

Key: LCF = latent cancer fatality; NNSS = Nevada National Security Site; WCS = Waste Control Specialists.

[a] The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000.

[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

[c] Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck. There would be 20,510 truck shipments for the Paducah wastes and 9,070 truck shipments for the Portsmouth wastes, in addition to the regular train shipments of 510 and 230 for Paducah and Portsmouth, respectively..

Note: To convert kilometers to miles, multiply the kilometer numbers by 0.6215.

Table B-5c Total Risks to Crew Members and Populations from Transporting Empty and Heel Cylinders under Each Disposal Alternative

			Incident-Free				Accident	
			Crew		Population			
Origin	Number of Shipments[a]	One-way Kilometers Traveled	Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonradiological Risk[b]
Energy*Solutions* Disposal Alternative								
Truck (volume-reduced)								
4,970	12,700,000	9	0.006	3	0.002	6×10^{-7}	0.7	4,970
2,550	7,900,000	6	0.003	2	0.001	3×10^{-7}	0.4	2,550
Train (volume-reduced)								
Paducah	250	690,000	0.9	0.0005	1	0.0007	3×10^{-7}	0.2
Portsmouth	130	420,000	0.6	0.0003	0.8	0.0005	5×10^{-7}	0.1
NNSS Disposal Alternative								
Truck (volume-reduced)								
Paducah	4,970	15,800,000	10	0.007	4	0.003	3×10^{-7}	0.7
Portsmouth	2,550	9,500,000	7	0.004	2	0.001	2×10^{-7}	0.4
Train/Truck (volume-reduced)[c]								
Paducah	5,170	2,510,000	20	0.001	2	0.001	2×10^{-7}	0.2
Portsmouth	2,680	1,380,000	1	0.0008	1	0.0007	3×10^{-7}	0.2
10 Percent Disposal at NNSS								
Truck (intact cylinders)								
Paducah	2,730	8,758,800	0.1	0.00006	0.3	0.0002	4×10^{-8}	0.4
Portsmouth	1,420	5,298,000	0.06	0.00004	0.2	0.0001	3×10^{-8}	0.2
Train/Truck (intact cylinders)[d]								
Paducah	2,820	1,223,000	0.1	0.00006	0.1	0.00008	4×10^{-7}	0.08
Portsmouth	1,470	679,000	0.1	0.0008	0.1	0.0007	8×10^{-7}	0.1

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonradiological Risk[b]
WCS Disposal Alternative								
Truck (volume-reduced)								
Paducah	4,920	8,300,000	6	0.004	2	0.001	4×10^{-7}	0.6
Portsmouth	2,550	5,800,000	4	0.003	2	0.001	4×10^{-7}	0.4
Rail (volume-reduced)								
Paducah	250	500,000	0.7	0.0004	1	0.0007	6×10^{-7}	0.2
Portsmouth	130	380,000	0.5	0.0003	0.9	0.0005	7×10^{-7}	0.2

Key: LCF = latent cancer fatality; NNSS = Nevada National Security Site; WCS= Waste Control Specialists.

[a] The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000.

[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

[c] Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck. There would be 4,920 truck shipments for the Paducah wastes and 2,550 truck shipments for the Portsmouth wastes, in addition to the regular train shipments of 250 and 130 from Paducah and Portsmouth, respectively.

[d] The intact cylinders represent transport of 10 percent of the total empty and heel cylinders, which are 83,000 (69,000 plus 14,000). The calculated doses and risks are based on the information provided in Table 5A of this *DU Oxide SEIS*, assuming that the intact cylinders are transported two per truck and 60 per train. These cylinders are transported to NNSS, when the disposal facility is other than NNSS. The train shipments to NNSS include 2,730 truck shipments for Paducah and 1,420 truck shipments for Portsmouth in addition to 90 and 50 train shipments from Paducah and Portsmouth, respectively.

Note: To convert kilometers to miles, multiply the kilometer numbers by 0.6215.

Table B-6 Estimated Dose to Maximally Exposed Individuals under Incident-Free Transportation Conditions

Receptor	Dose to Maximally Exposed Individual
Workers	
Crew member (truck/train driver)	2 rem per year[a]
Inspector	2.9×10^{-3} rem per event per hour of inspection
Rail yard worker	1.1×10^{-3} rem per event
Public	
Resident (along the truck route)	3.1×10^{-8} rem per event
Resident (along the rail route)	1.1×10^{-7} rem per event
Person in traffic congestion	2.4×10^{-3} rem per event per one hour stop
Resident near rail yard during classification	1.5×10^{-5} rem per event
Person at a rest stop/gas station	2.0×10^{-5} rem per event per hour of stop
Gas station attendant	2.6×10^{-5} rem per event

Key: rem = roentgen equivalent man.

[a] In addition to complying with DOT requirements, a DOE employee would also need to comply with 10 CFR Part 835, which limits worker radiation doses to 5 rem per year; however, DOE's goal is to maintain radiological exposure to achieve ALARA goals. DOE has therefore established the Administrative Control Level of 2 rem per year (DOE 2017). Based on the number of shipments, the total crew dose per shipment to two drivers in Table B-4, and the number of commercial trucks per day (about 6),[70] a commercial driver dose would not exceed this administrative control limit. Therefore, the administrative control limit is reflected in this table (Table B-6) for the maximally exposed truck crew member.

The maximum dose to a crew member, as shown in Table B-6, was based on the assumption that the same individual would be responsible for driving multiple shipments until the administrative limit is reached. Note that the potential exists for larger individual exposures under one-time events of a longer duration. For example, the maximum dose to a person stuck in traffic next to a shipment of DU oxide LLW for 1 hour was calculated to be 2.4×10^{-3} rem (2.4 millirem). This was generally considered a one-time event for that individual, although this individual may encounter another exposure of a similar or longer duration in his or her lifetime. An inspector inspecting the conveyance and its cargo would be exposed to a maximum dose rate of 2.9×10^{-3} rem (or 2.9 millirem) per hour if the inspector stood within 1 meter of the cargo for the duration of the inspection.

A member of the public residing along the route would likely receive multiple exposures from passing shipments. The total dose to this resident was calculated by assuming all shipments pass his or her home. The total dose also was calculated assuming that the resident was present for every shipment and was unshielded at a distance of about 30 meters (98 feet) from the route. Therefore, the total dose depends on the number of shipments passing a particular point and is independent of the actual route being considered. Assuming the maximum resident dose provided in Table B-6 for all radioactive shipments, the maximum dose to this resident on a truck route, if all the materials were shipped via this route, would be, about 1.4×10^{-3} rem (1.4 millirem) for the estimated 46,150 truck transports from Paducah over 34 years, and about 7.1×10^{-4} rem (0.71 millirem) for the estimated 22,850 truck transports from Portsmouth over 22 years. A resident living along a rail route, if exposed to all train shipments, would receive a dose of about 8.6×10^{-5} rem (0.086 millirem) for the estimated 770 train shipments from Paducah, and 4.2×10^{-5} for the estimated 380 train shipments from Portsmouth. The doses from transporting the empty and heel cylinders and ancillary LLW and MLLW would be a factor of 100 less, and therefore an

[70] The maximum number of truck shipments originates from Paducah with an average number of shipments per year of 1,440, which leads to an average of about six truck shipments per day.

insignificant contribution when compared to the doses from DU oxide shipments. CaF_2 would contain little or no radionuclide contamination and therefore transportation of CaF_2 would result in little or no dose.

As discussed in Section B.5.2, shipping DU oxide cylinders in ABC railcars instead of gondola railcars would result in twice the number of cylinders in a train shipment but half the number of shipments. Because the same number of cylinders would be shipped annually and in total, the annual and total radiological impacts of incident-free transportion would be expected to be similar. Emissions impacts would be smaller due to the reduced number of shipments.

The accident risk assessment and the impacts shown in Table B-5 take into account the entire spectrum of potential accidents, from minor accidents (i.e., fender-benders) to extremely severe accidents (i.e., high-speed collisions). To provide additional insight into the severity of accidents in terms of the potential dose to an MEI and the public, an accident consequence assessment was performed for a maximum reasonably foreseeable hypothetical transportation accident with a likelihood of occurrence greater than 1 chance in 10 million per year.

The following assumptions were used to estimate the consequences of maximum reasonably foreseeable off-site transportation accidents:

- The accident is the most severe with the highest release fraction (high-impact and high-temperature fire accident [highest severity category]).
- The individual is 100 meters (330 feet) downwind from a ground release accident.
- The individual is exposed to airborne contamination for 2 hours and ground contamination for 24 hours, with no interdiction or cleanup. A stable weather condition (Pasquill Stability Class F) with a wind speed of 1 meter per second (2.2 miles per hour) was assumed.
- The population was assumed to have a uniform density to a radius of 80 kilometers (50 miles) and be exposed to the entire plume passage and 7 days of ground exposure, without interdiction and cleanup. A neutral weather condition (Pasquill Stability Class D) with a wind speed of 4 meters per second (8.8 miles per hour) also was assumed. Because the consequence would be proportional to the population density, the accident was assumed to occur in an urban[71] area with the highest density (see Table B-1).

Table B-7 provides the estimated dose and risk to an individual and population from maximum reasonably foreseeable truck and train transportation accidents with the highest consequences under each alternative. Only those accidents with a probability greater than 1×10^{-7} (1 chance in 10 million) per year were analyzed. The accident was assumed to be a severe impact in conjunction with a long fire. The highest consequences for the maximum reasonably foreseeable accident, based on population dose, would be from accidents occurring in an urban area via all rail routes, as part of the transport to the Energy*Solutions* site, and via truck routes as part of the transport to NNSS.

[71] If the likelihood of an accident in an urban area is less than 1 chance in 10 million per year, then the accident was evaluated for a suburban area.

Table B-7 Estimated Dose to the Population and to Maximally Exposed Individuals under the Maximum Reasonably Foreseeable Accident

Transport Mode	Material or Waste in the Accident With the Highest Consequences	Applicable Alternatives	Maximum Likelihood of the Accident (per year)	Population Zone	Population[a]		MEI[b]	
					Dose (person-rem)	LCF	Dose (rem)	Increased Probability of a Fatal Cancer
Truck transport to disposal site[c]	LLW(DU Oxide)	All	5.3×10^{-7}	Urban	7.7	5×10^{-3}	6.4×10^{3}	4×10^{-6}
Train transport to disposal site[d]	LLW(DU Oxide)	All	1.5×10^{-7}	Urban	47.3	3×10^{-2}	3.9×10^{2}	2×10^{-5}
Truck transport to disposal site[d]	LLW(DU Oxide)	All	3.8×10^{-5}	Suburban	2	1×10^{-3}	6.4×10^{3}	4×10^{-6}
Train transport to disposal site[e]	LLW(DU Oxide)	All	4.1×10^{-6}	Suburban	11	7×10^{-3}	3.9×10^{2}	2×10^{-5}

Key: DU = depleted uranium; LCF = latent cancer fatality; LLW = low-level radioactive waste; MEI = maximally exposed individual.

[a] The population extends at a uniform density to a radius of 50 miles. The weather condition was assumed to be Pasquill Stability Class D, with a wind speed of 8.8 miles per hour.

[b] The MEI was assumed to be at a distance downwind from the accident that would maximize exposure and to be exposed to the entire plume of the radioactive release. The weather condition was assumed to be Pasquill Stability Class F, with a wind speed of 2.2 miles per hour.

[c] The maximum dose and frequency would occur for transports to NNSS.

[d] The maximum dose and frequency would occur for transports to Energy*Solutions*.

[e] The maximum dose and frequency would occur for transports to WCS.

As discussed in Section B.5.2, shipping DU oxide cylinders in ABC railcars instead of gondola railcars would result in twice the number of cylinders in a train shipment but half the number of shipments. Because there would be twice the number of cylinders in an ABC railcar shipment versus a gondola railcar shipment, the impacts of a radiological accident while using ABC railcars, could be approximately double that of a gondola railcar shipment. However, because there would be half the number of train shipments annually and in total, the annual and total risk of the two shipping modes would be similar.

B.9 LONG-TERM IMPACTS OF RADIOACTIVE MATERIAL TRANSPORTATION

The *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (DOE 2015a) analyzed the cumulative impacts of the transportation of radioactive material, consisting of impacts of historical shipments of radioactive waste and used nuclear fuel, reasonably foreseeable actions that include transportation of radioactive material, and general radioactive material transportation that was not related to a particular action. The collective dose to the general population and workers was the measure used to quantify cumulative transportation impacts. This measure of impact was chosen because it may be directly related to the LCFs using a cancer risk coefficient. **Table B-8** provides an updated summary of the total worker and general population collective doses from various transportation activities involving the shipment of radioactive materials. The table shows that the potential impacts of transportation related to this *DU Oxide SEIS* would be small compared with the overall transportation impacts.

Table B-8 Cumulative Transportation-Related Radiological Collective Doses and Latent Cancer Fatalities (1943 to 2073)

Category	Collective Worker Dose (person-rem)	Collective General Population Dose (person-rem)
Transportation Impacts in this *DU Oxide SEIS*[a]	83–276[b] 71–145[c]	244–723[b] 104–217[c]
Transportation Impacts from Appendix C of this *DU Oxide SEIS*, Impacts of the Management of Commercially Generated DUF_6	18–55[b] 18–30[c]	55–144[b] 23–43[c]
Subtotal	101–331[b] 89–175[c]	299–867[b] 127–260[c]
Other Nuclear Material Shipments[e]		
Past, Present, and Reasonably Foreseeable DOE Actions	31,400	36,900
Past, Present, and Reasonably Foreseeable non-DOE Actions	5,380	61,300
General Radioactive Material Transport (1943 to 2073)	384,000	338,000
Total Collective Dose (up to 2073)[f]	**423,000**	**437,000**
Total Latent Cancer Fatalities[g]	**253**	**262**

Key: DOE = Department of Energy; SEIS = supplemental environmental impact statement.

a Range of values from Table B-5, reflecting the sum impact values from Paducah and Portsmouth to each disposal site.

b Transport by truck.

c Transport by truck/train.

d This is the maximum among the three disposal alternatives

e From the *Final Surplus Plutonium Disposition Supplemental Environmental Impact Statement* (DOE 2015a); this reference provides the details of all contributing actions.

f Total includes the maximum values from the *DU Oxide SEIS* alternatives. Total may not equal the sum of the contributions due to rounding. Rounded to nearest 1,000.

g Total LCFs were calculated assuming 0.0006 LCF per rem of exposure (DOE 2003).

The total collective worker dose from all types of shipments that are not associated with this *DU Oxide SEIS* (historical, reasonably foreseeable actions; and general transportation) was estimated to be about 423,000 person-rem (potentially resulting in 253 LCFs) for the period from 1943 through 2073 (131 years) (DOE 2015a). Note the potential doses from transport of radioactive materials associated with the alternatives evaluated in this *DU Oxide SEIS* would be very small and would be insignificant compared to the dose from other nuclear material shipments. The total general population collective dose was estimated to be about 437,000 person-rem (potentially resulting in 262 LCFs). The majority of the collective dose for workers and the general population would be due to the general transportation of radioactive material (see Table B-8). Examples of these activities are shipments of radiopharmaceuticals to nuclear medicine laboratories and shipments of LLW to commercial disposal facilities.

The total number of potential LCFs (among the workers and the general population) estimated to result from radioactive material transportation over the period between 1943 and 2073 would be about 515 (253 from workers and 262 from the general population) (DOE 2015a). These potential LCFs averaged over 131 years would lead to about 4 LCFs per year. Over this same period (131 years), about 75 million people would die from cancer, based on the average annual number of cancer deaths in the United States of about 573,000, with no more than a 3 percent fluctuation in the number of cancer fatalities in any given year (CDC 2009 through CDC 2016). The transportation-related LCFs would be 0.0003 percent of the total number of cancer deaths;

therefore, this number is indistinguishable from the natural fluctuation in the total annual death rate from cancer.

B.10 CONCLUSIONS

Based on the results presented in the previous sections, the following conclusions have been reached (see Tables B-4 to B-7):

- For all alternatives, it is unlikely that transportation of radioactive waste would cause an additional fatality as a result of radiation exposure, either from incident-free transport or postulated transportation accidents.

- The highest risk to the public due to incident-free transportation would occur for DU oxide transport in cylinders by truck under the NNSS Disposal Alternative (722 person-rem, 0.4 LCF) because it is the farthest site among the disposal sites and passes through the largest population (see Table B-5).

- The highest risk to the crew due to incident-free transportation would occur for DU oxide transport in bulk bags by train under the NNSS Disposal Alternative (276 person-rem, 0.2 LCF) because it is the farthest site among the disposal sites (see Table B-5).

- The nonradiological accident risks (the potential for fatalities as a direct result of traffic accidents) present greater risks (up to 12 potential fatalities) than the radiological accident risks. For comparison, in the United States in 2012, there were over 4,100 fatalities due to crashes involving large trucks (DOT 2014) and over 32,000 traffic fatalities due to all vehicular crashes (DOT 2012). The incremental increase in risk to the general population from shipments from both Paducah and Portsmouth would therefore be very small and would not substantially contribute to cumulative impacts.

B.11 UNCERTAINTY AND CONSERVATISM IN ESTIMATED IMPACTS

The sequence of analyses performed to generate the estimates of radiological risk for transportation includes: (1) determination of the inventory and characteristics, (2) estimation of shipment requirements, (3) determination of route characteristics, (4) calculation of radiation doses to exposed individuals (including estimating environmental transport and uptake of radionuclides), and (5) estimation of health effects. Uncertainties are associated with each of these steps. Uncertainties exist in the way that the physical systems being analyzed are represented by the computational models; in the data required to exercise the models (due to measurement errors, sampling errors, natural variability, or unknowns caused simply by the future nature of the actions being analyzed); and in the calculations themselves (for example, approximate algorithms used within the computer codes).

In principle, one can estimate the uncertainty associated with each input or computational source and predict the resultant uncertainty in each set of calculations. Thus, one can propagate the uncertainties from one set of calculations to the next and estimate the uncertainty in the final, or absolute, result; however, conducting such a full-scale quantitative uncertainty analysis is often impractical and sometimes impossible, especially for actions to be initiated at an unspecified time in the future. Instead, the risk analysis is designed to ensure, through uniform and judicious selection of scenarios, models, and input parameters, that relative comparisons of risk among the various alternatives are meaningful. In the transportation risk assessment, this design is accomplished by uniformly applying common input parameters and assumptions to each alternative. Therefore, although considerable uncertainty is inherent in the absolute magnitude of the transportation risk for each alternative, much less uncertainty is associated with the relative differences among the alternatives in a given measure of risk.

In the following sections, areas of uncertainty are discussed for the assessment steps enumerated above. Special emphasis is placed on identifying whether the uncertainties affect relative or absolute measures of risk. The reality and conservatism of the assumptions are addressed. Where practical, the parameters that most significantly affect the risk assessment results are identified.

B.11.1 Uncertainties in Material Inventory and Characterization

The inventories and the physical and radiological characteristics are important input parameters to the transportation risk assessment. The potential numbers of shipments under all alternatives were primarily based on the projected dimensions of package contents, the strength of the radiation field, and assumptions concerning shipment capacities. The physical and radiological characteristics are important in determining the material released during accidents and the subsequent doses to exposed individuals through multiple environmental exposure pathways.

Uncertainties in the inventory and characterization are reflected in the transportation risk results. If the inventory is overestimated (or underestimated), the resulting transportation risk estimates also will be overestimated (or underestimated) by roughly the same factor. However, the same inventory estimates were used to analyze the transportation impacts of each of the alternatives. Therefore, for comparative purposes, the observed differences in transportation risks among the alternatives, as given in Table B-5, are believed to represent unbiased, reasonably accurate estimates from current information in terms of relative risk comparisons.

B.11.2 Uncertainties in Containers, Shipment Capacities, and Number of Shipments

The transportation requirement for each alternative was based in part on assumptions concerning the packaging characteristics and shipment capacities for commercial trucks. Representative shipment capacities were defined for assessment purposes based on probable future shipment capacities. In reality, the actual shipment capacities may differ from the predicted capacities, such that the projected number of shipments and, consequently, the total transportation risk, would change. However, although the predicted transportation risks may increase or decrease accordingly, the relative differences in risks among alternatives would remain about the same.

B.11.3 Uncertainties in Route Determination

Analyzed routes were determined between Paducah and Portsmouth, and the disposal sites evaluated in this *DU Oxide SEIS*. The routes were determined to be consistent with current guidelines, regulations, and practices, but may not be the actual routes that would be used in the future. In reality, the actual routes could differ from the ones that are analyzed with regard to distances and total populations along the routes. Moreover, because materials could be transported over an extended time starting in the future, the highway infrastructure and the demographics along the routes could change. These effects were not accounted for in the transportation assessment; however, such changes are not expected to significantly affect the relative comparisons of risk among the alternatives considered in this *DU Oxide SEIS*.

B.11.4 Uncertainties in the Calculation of Radiation Doses

The models used to calculate radiation doses from transportation activities introduce a further uncertainty. Estimating the accuracy or absolute uncertainty of the risk assessment results is generally difficult. The accuracy of the calculated results is closely related to the limitations of the computational models and to the uncertainties in each of the input parameters that the model requires. The single greatest limitation facing users of RADTRAN 6.02 (SNL 2013), or any computer code of this type, is the availability of data for certain input parameters. Populations (off-link and on-link) along the transportation routes, shipment surface dose rates, and the locations of individuals residing near the routes are among the most uncertain data in dose calculations. In preparing these data, one makes assumptions that the off-link population is uniformly distributed; the on-link population is proportional to the traffic density, with an assumed occupancy of two persons per car; the shipment surface dose rate is the maximum allowed dose rate; and a potential exists for an individual to be residing at the edge of the highway. Clearly, not all assumptions are accurate. For example, the off-link population is mostly heterogeneous, and the on-link traffic density varies widely within a geographic zone (urban, suburban, or rural). Finally, added to this complexity are the assumptions regarding the expected distance between the public and the shipment at a traffic stop, rest stop, or traffic jam, and the afforded shielding.

Uncertainties associated with the computational models were reduced by using state-of-the-art computer codes that have undergone extensive review. Because many uncertainties are recognized, but difficult to quantify, assumptions were made at each step of the risk assessment process that were intended to produce conservative results (that is, to overestimate the calculated dose and radiological risk). Because parameters and assumptions were applied consistently to all alternatives, this model bias is not expected to affect the meaningfulness of relative comparisons of risk; however, the results may not represent risks in an absolute sense.

B.11.5 Uncertainties in Traffic Fatality Rates

Vehicle accident and fatality rates were taken from Saricks and Tompkins 1999, as updated using UMTRI (2003). Truck and train accident rates were computed for each state based on statistics compiled by the Federal Highway Administration, Office of Motor Carriers, and the Federal Railroad Administration from 1994 to 1996. The statistics are provided in terms of unit car-kilometers for each state, as well as national average and mean values. In this analysis, route-specific (origin-destination) rates were used.

Finally, it should be emphasized that the analysis was based on accident data for the years 1994 through 1996. While these data are considered to be the best available data, future accident and fatality rates may change due to vehicle and highway improvements. More-recent DOT national accident and fatality statistics for large trucks and buses indicate lower accident and fatality rates for recent years (DOT 2009) compared to those of 1994 through 1996 and earlier statistical data.

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APPENDIX C

IMPACTS OF THE MANAGEMENT OF COMMERCIALLY GENERATED DEPLETED URANIUM HEXAFLUORIDE

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ACRONYMS

ABC	Articulated Bulk Container
AQCR	Air Quality Control Region
AQI	Air Quality Index
CaF_2	calcium fluoride
CO_2e	carbon dioxide equivalent
DD&D	decontamination, decommissioning, and demolition
DU	depleted uranium
DUF_6	depleted uranium hexafluoride
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planing Guideline
FR	*Federal Register*
GHG	greenhouse gas
HF	hydrogen fluoride
HI	hazard index
LCF	latent cancer fatality
LLW	low-level radioactive waste
mg	milligram
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NH_3	anhydrous ammonia
NNSS	Nevada National Security Site
NRC	U.S. Nuclear Regulatory Commission
$PM_{2.5}$	particulate matter with a diameter of less than or equal to 2.5 microns
ppm	parts per million
ROI	region of influence
SAAQS	State Ambient Air Quality Standards
U.S.C.	*United States Code*
WCS	Waste Control Specialists

APPENDIX C: IMPACTS OF THE MANAGEMENT OF COMMERCIALLY GENERATED DEPLETED URANIUM HEXAFLUORIDE

C.1 INTRODUCTION

Commercial uranium enrichment facilities may request that DOE dispose of their depleted uranium hexafluoride (DUF_6). Section 3113(a) of the United States Enrichment Corporation Privatization Act (Title 42 of the *United States Code* Section [U.S.C. §] 7h-11[a]) and Section 66 of the Atomic Energy Act of 1954 (as amended) (42 U.S.C. § 2011 et seq.), requires the U.S. Department of Energy (DOE) to accept low-level radioactive waste (LLW), including commercial DUF_6 determined to be LLW, for disposal upon request and reimbursement of the cost by any generator licensed by the U.S. Nuclear Regulatory Commission (NRC) to operate a uranium enrichment facility. Therefore, this appendix analyzes the environmental impacts of the reasonably foreseeable receipt, conversion, storage, handling, and disposal of commercial DUF_6 from uranium enrichment facility licensees. This analysis was used to determine the potential contribution of these activities to cumulative impacts, as described in Chapter 4, Section 4.5, of this *DU Oxide SEIS*.

At the current time, DOE has not received a formal request to accept additional commercial DUF_6 for processing. In the future, if DOE receives a formal request to process additional commercial DUF_6, DOE would determine the need for additional NEPA documentation to evaluate the environmental impacts of this activity.

C.2 BACKGROUND AND ASSUMPTIONS

As described in Chapter 1, Section 1.1, of this *DU Oxide SEIS*, at its peak, Paducah stored approximately 560,000 metric tons of DOE DUF_6 (46,000 DUF_6 cylinders), and Portsmouth stored approximately 250,000 metric tons of DOE DUF_6 (21,000 DUF_6 cylinders). This appendix analyzes the management of an additional 150,000 metric tons (approximately 12,500 cylinders[72]) of commercial DUF_6. For purposes of analysis in this *DU Oxide SEIS* and as a conservative measure of impacts, DOE has assumed that the entire mass of commercial DUF_6 (150,000 metric tons) could be managed at Paducah or Portsmouth.

DOE expects that commercial DUF_6 would be similar to the DUF_6 already in inventory because the materials would be generated using similar processes.

Consistent with the decision to convert DOE DUF_6 to DU oxide (69 FR 44654; 69 FR 44649, July 27, 2004), DOE is assuming the commercial material would be converted to DU oxide at Paducah or Portsmouth. Based on the conversion rates of DUF_6 to DU oxide of 18,000 metric tons per year at Paducah, and 13,500 metric tons per year at Portsmouth (PPPO 2018), the conversion of 150,000 metric tons of commercial material could add 8 years to the conversion operations at Paducah, or 11 years to the conversion operations at Portsmouth.

[72] Assuming 12-metric ton cylinders are used.

As described in Chapter 2 of this *DU Oxide SEIS*, DOE has evaluated a No Action Alternative and three Action Alternatives for management of DOE DU oxide. As described in Chapter 2, Section 2.2.1, under the No Action Alternative, the DOE DU oxide containers would remain in storage at the Paducah and Portsmouth Sites (Paducah and Portsmouth) indefinitely.[73] As described in Chapter 2, Section 2.2.2, under the Action Alternatives, the DOE DU oxide containers would be shipped to one or more of three disposal facilities and therefore would not remain in storage indefinitely. In order to be consistent with the alternatives for storage and disposal of the DOE DU oxide, this appendix analyzes two scenarios for the commercial DUF_6: (1) Conversion and Storage and (2) Conversion and Disposal. Under the Conversion and Storage Scenario, the commercial DUF_6 would be converted to DU oxide and stored for 100 years. Under the Conversion and Disposal Scenario, the commercial DUF_6 would be converted to DU oxide and shipped off site for disposal.

DOE expects that the impacts of conversion of a given amount of commercial DUF_6 would be the same as the impacts of conversion of the same amount of DOE DUF_6. Therefore, the annual impacts for DUF_6 to DU oxide conversion that are presented in the 2004 EISs, would be expected to be the same for commercial material.

The estimated cylinder breach rates shown in Table 2-2 were used to calculate the number of cylinders that could be breached under the various corrosion scenarios and storage periods. For "uncontrolled corrosion," DOE has assumed that historic cylinder breach rates described in Chapter 2, Section 2.2.1, would apply to the approximately 12,500 cylinders that could come from managing the commercial DUF_6. The results of these estimates are presented in **Table C-1** and are used in the impact analyses presented in this appendix. Because storage conditions have improved dramatically as a result of cylinder yard upgrades and restacking activities, it is expected that these breach estimates based on historical corrosion rates provide a worst case for estimating the potential impacts from cylinder storage. "Controlled corrosion" assumes that the planned cylinder maintenance program and improved storage conditions would maintain the cylinders in a protected condition.

As described in Chapter 2, Section 2.2.2 of this *DU Oxide SEIS*, under the Action Alternatives, a total of 1,440 DU oxide cylinders could be transported by train annually, 6 to a gondola railcar, with 10 railcars in a train. This would require 24 train shipments annually from each site to the disposal facilities. At this rate, it would take approximately 9 years to transport all the commercial DU oxide cylinders by rail from Paducah or Portsmouth.

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[73] For analysis purposes in this DU Oxide SEIS, the potential impacts of storage are evaluated for 100 years beginning with storage of the first DOE DU oxide cylinders in 2011 and ending in 2110. Based on the rate of conversion of DUF_6 to DU oxide, DOE estimates that conversion activities will be completed and the last DOE DU oxide cylinders produced between 2044 and 2054 at Paducah, and between 2032 and 2042 at Portsmouth. Storage under the No Action Alternative could extend beyond the 100 years analyzed in this DU Oxide SEIS. Storage for longer than 100 years would not change the maximum annual impacts of operations but would extend the impacts described in this SEIS further out in time. The contributions attributable to those facilities to total life-cycle impacts, such as those for total worker and population dose and latent cancer fatalities (LCFs), and total waste generation, would increase in proportion to the extended period. These impacts can be estimated from the analyses provided in this DU Oxide SEIS under the No Action Alternative by multiplying the additional years of operation by the annual impacts.

As described in Section 2.2.2, as an option to shipping 6 cylinders in each gondola railcar, 12 cylinders could be shipped in Articulated Bulk Container (ABC) railcars. Therefore, 120 cylinders could be shipped in a 10-ABC railcar train, versus 60 cylinders in a 10-gondola railcar train. Therefore, the same number of cylinders could be shipped each year in half the number of train shipments.

Because truck shipments would be made by legal-weight semitrailer trucks, it is expected that only one cylinder of DU oxide would be loaded on each truck. Assuming 1,440 truck shipments were made each year from each site, it would take approximately 9 years to transport all the DU oxide cylinders from Paducah or Portsmouth to the disposal facilities.

Table C-1 Estimate of Potential Cylinder Breaches During Storage of Commercial DUF_6/DU Oxide

Site	Number of Cylinders	Scenario	Storage Period (years)[a]	Number of Breaches[b]	
				Controlled Corrosion	Uncontrolled Corrosion
Paducah	12,500	Conversion and Storage	100	31[b]	383 [b]
		Conversion and Disposal	84	26	322
Portsmouth	12,500	Conversion and Storage	100	31[b]	144[b]
		Conversion and Disposal	58	18	83

[a] Conservatively assumes that all 12,500 cylinders are stored for the entire analysis period. In order to produce a conservative estimate of the number of cylinder breaches, the maximum storage period was analyzed for the Conversion and Disposal scenario (i.e., 84 years at Paducah and 58 years at Portsmouth). The maximum storage period for Paducah includes the storage of DU oxide containers for the 44 years of conversion facility operation, plus 32 years to ship all the DOE DU oxide containers to the disposal facility, plus 8 years to ship all the commercial DU oxide containers to the disposal facility. The maximum storage period for Portsmouth includes the storage of DU oxide containers for the 32 years of conversion facility operation, plus 15 years to ship all the DOE DU oxide containers to the disposal facility, plus 11 years to ship all the commercial DU oxide containers to the disposal facility.

[b] Annual rates can be estimated by dividing the total number of cylinder breaches by the duration of the storage period in years.

Note: This table is based on information from Chapter 2, Tables 2-1 and 2-2, of this *DU Oxide SEIS*.

Assuming 5 percent of the commercial DUF_6 cylinders were not able to be reused (PPPO 2018), another 11 train shipments or 313 truck shipments would be needed from Paducah or Portsmouth to transport the 625 unusable empty and heel cylinders to the disposal site. This assumes 6 unusable empty and heel cylinders would be transported per gondola railcar with 10 railcars per train, or 2 cylinders per truck. Unusable empty and heel cylinders are assumed to be shipped during the 8 year duration of conversion operations at Paducah, or 11 years of conversion operations at Portsmouth.

As an option, this *DU Oxide SEIS* also evaluates the transport and disposal of DU oxide in bulk bags versus cylinders. It is estimated that approximately 10,986 bulk bags of DU oxide would be needed at Paducah or Portsmouth to dispose of the commercial DU oxide. It is assumed that 8 bulk bags would be shipped per railcar with 10 railcars per train or 2 bulk bags per truck. This results in 137 train and 5,493 truck shipments. In addition, under this option, 12,500 empty and heel cylinders would need to be loaded on to trains or trucks for shipment to the disposal facilities. It is assumed that 6 intact cylinders would be transported per gondola railcar with 10 railcars per train, or 2 cylinders per truck. This results in 208 train or 6,250 truck shipments. If empty and heel cylinders are volume-reduced, it is assumed that 10 cylinders would be transported in an intermodal shipping container, 2 containers per railcar with 10 railcars per train, or 1 container per truck. This results in 63 train or 1,250 truck shipments. Bulk bags and empty and heel cylinders are assumed to be shipped during the 8 year duration of conversion operations at Paducah, or 11 years of conversion operations at Portsmouth.

Likewise, approximately 8,084 bulk bags of CaF_2 at Paducah or Portsmouth would be expected, for the quantities of commercial DUF_6 analyzed in this *DU Oxide SEIS*, if the hydrogen fluoride (HF) could not be sold and needed to be converted and disposed of as CaF_2. It is assumed that 4 bulk bag would be shipped per railcar with 10 railcars per train, or 1 shipped per truck. This results in 202 train and 8,084 truck shipments. CaF_2 in bulk bags is assumed to be shipped during the 8 year duration of conversion operations at Paducah, or 11 years of conversion operations at Portsmouth.

This appendix considers the impact of management of the commercial DUF_6 and DU oxide for all the resource areas evaluated in Chapter 4 of this *DU Oxide SEIS*. Conversion of the DUF_6 to DU oxide in the existing facilities at Paducah or Portsmouth would not be expected to disturb any land areas. In addition, the commercial DUF_6 and DU oxide could be stored in a number of locations at Paducah or Portsmouth. DOE expects that existing storage pads in the industrialized portions of the sites would be used (PPPO 2018). Therefore, it is unlikely that there would be impacts on Geology and Soil, Land Use and Aesthetics, and Cultural Resources and these resource areas are not analyzed further.

The impacts of the receipt, conversion, storage, handling and disposal of 150,000 metric tons of commercial DUF_6 are evaluated below for Site Infrastructure; Air Quality, Climate, and Noise; Water Resources; Biotic Resources; Public and Occupational Safety and Health; Socioeconomics; Waste Management; Environmental Justice; and Resource Use. Impacts are evaluated for the Conversion and Storage and Conversion and Disposal Scenarios. The contributions to cumulative impacts of the management of commercial DUF_6 are considered in Chapter 4, Section 4.5.

As described above and in Chapter 2, Section 2.2.2, as another shipping option, DOE could also ship 12 cylinders per railcar using an Articulated Bulk Container (ABC) railcar. This would result in half the number of annual train shipments while transporting the same number of DU oxide cylinders. The same number of cylinders and same quantity of DU oxide would be handled each year and in total. Therefore, for impacts related to the annual or total number of shipments and impacts related to the number of cylinders handled, shipping in gondola railcars would be similar to or bound the impacts of shipping in ABC railcars, and this topic is not discussed further. This topic is only discussed in more detail in relation to transportation impacts. For nonradiological transportation impacts (e.g., air emissions from the train engine, traffic fatalities), transporting DU oxide cylinders in ABC railcars would have approximately half the impacts of shipping in gondola railcars. For radiological transportation impacts, annual and total impacts would remain similar, but per shipment impacts could increase due to the higher quantity of DU oxide per shipment..

The impacts of transportation of the DUF_6 cylinders from the commercial uranium enrichment facility to Paducah or Portsmouth is the responsibility of the commercial facility licensee and would be included in licensing documents and NEPA documents prepared by the licensee and the NRC. Therefore, these impacts are not included in this appendix but are considered in Chapter 4, Section 4.5.5.1 (Cumulative Impacts), of this *DU Oxide SEIS*.

C.3 SITE INFRASTRUCTURE

Impacts on site infrastructure could occur from DUF_6 cylinder storage, conversion of DUF_6 to DU oxide, DU oxide container storage, and loading DU oxide containers and other wastes for off-site disposal.

The management of the additional commercial DU would be conducted using the existing systems currently being used to store DUF_6 cylinders, convert DUF_6 to DU oxide, and store the DU oxide containers. The storage of the 12,500 cylinders associated with the commercial DUF_6 would likely be conducted alongside of existing cylinder storage at either Paducah or Portsmouth. There could be adequate storage capacity at both Paducah and Portsmouth to accommodate these additional cylinders pending shipment of DOE DU oxide off site (for beneficial reuse or disposal). Otherwise, additional cylinder yard storage space could be required to accommodate the additional commercial cylinders. If additional storage space is needed, DOE would determine the need for additional NEPA documentation.

To the extent that the addition of these cylinders requires a long-term commitment of these storage areas, the inclusion of these cylinders in the site storage inventory could limit the availability of this space for other future uses. During the conversion process, this space commitment would be for a term of approximately 8 years at Paducah and 11 years at Portsmouth. During long-term storage, the storage space associated with these additional cylinders would not be available for other uses.

DOE expects that the impacts of conversion and management of a given amount of commercial DUF_6 would be the same as the impacts of conversion and management of the same amount of existing DOE DUF_6. Therefore, the primary impacts would be the extension of utility use for approximately 8 years at Paducah or 11 years at Portsmouth during operation of the conversion facility, and utility use during long-term storage of the DU oxide containers.

Table C-2 compares the estimated utility use for operation of the conversion facility with utility infrastructure capacity and current use at Paducah and Portsmouth. Both of the 2004 EISs concluded that no strategic or critical resources would be consumed and that the expected utility requirements would be well within the supply capacities at the sites (DOE 2004a, 2004b). Substantial infrastructure changes have occurred at both sites since the completion of the 2004 EISs, including the commissioning of five new natural gas-fueled boilers at Paducah in 2015 (DOE 2017b), and a similar natural gas-fueled steam plant commissioned at Portsmouth in 2012 (DOE 2017c). Although the electric and natural gas consumption patterns have changed at both sites since the 2004 EISs were completed, current consumption is still well within capacity.

Impacts on infrastructure at Paducah or Portsmouth could occur from long-term storage of the DU oxide containers. As shown in **Table C-3**, infrastructure needs for long-term storage would be small when compared to current use and site capacity. Therefore, impacts on infrastructure at Paducah or Portsmouth would be minor. In addition, the potential impacts of storage of DU oxide containers was considered in the 2004 EISs which found that no strategic or critical resources would be consumed and that the expected requirements would be within the supply capacities at the Sites (DOE 2004a, 2004b).

Table C-2 Comparison of Utility Use for Conversion of Commercial DUF_6 with Site Utility Capacity and Current Use

Utility	Conversion (DOE 2004a, 2004b) Average Use[a]	Conversion (DOE 2004a, 2004b) Peak Demand[b]	Utility System Capacity	Utility System Current Use[c]
Paducah				
Electricity[d]	4.3 MWh[e]	7.1 MWh	3,040 MW	12 MWh[f]
Natural Gas[d]	44,000 mcf/yr[g]	190 scfm[h]	876,000 mcf/yr[i]	154,000 mcf
Process water	1.0×10^5 gal/day[j]	215 gal/min	2.8×10^7 gal/day[k]	3.4×10^6 gal/day[l]
Potable water	8.2×10^3 gal/day[m]	350 gal/min	8.6×10^6 gal/day	6×10^5 gal/day[l]
Steam	NR	NR	135,000 pounds/hour	100,000 lbs/hr[n]
Portsmouth				
Electricity[o]	3.6 MWh[p]	6.2 MWh	2,260 MW	20 to 40 MWh[q]
Natural Gas[o]	40,000 mcf/yr	180 scfm	NR[r]	366,000 mcf/yr
Process water	8.2×10^4 gal/day[s]	215 gal/min	1.3×10^7 gal/day[t]	1.9×10^6 gal/day[u]
Potable water	8.2×10^3 gal/day[v]	350 gal/min	1.8×10^6 gal/day[w]	NR[x]
Steam	NR	NR	84,000 pounds/hour	26,800 pounds/hour[x]

Key: gal = gallon; lbs = pounds; mcf = 1,000 cubic feet; mgd = million gallons per day; min = minute; MW = megawatt; MWH = megawatts per hour; NR = not reported; psia = standard atmospheric pressure; SCF = standard cubic feet measured at 14.7 psia and 60°F (17°C); scfm = standard cubic feet per minute; yr = year.

[a] Average use is a projected value based on design and planned operations (DOE 2004a, 2004b)
[b] Peak demand identified as maximum rate expected in any hour.
[c] 2017 average values are based on consumption measurements (DOE 2017a; PPPO 2018).
[d] The Paducah 2004 EIS notes that the operations at that time relied on electric heating, with a conversion to natural gas being planned (DOE 2004a). That conversion was completed in 2015 with the commissioning of five new natural gas boilers, resulting in a substantial reduction in site electric demand and consumption and a corresponding increase in natural gas demand in consumption (DOE 2017b).
[e] Paducah historic electric use calculated based on the reported 37,269 MWh/yr (DOE 2004a) assuming 8,760 hours per year.
[f] Estimated average electrical power demand for 2017 (PPPO 2018)
[g] Paducah natural gas annual average calculated based on reported annual average of 4.4×10^7 SCF (DOE 2004a), which is represented as 44,000 mcf.
[h] DOE 2004a, Table 5.2-19.
[I] Paducah natural gas capacity identified as 100 mcf per hour (PPPO 2018). At 8,760 hours per year, total annual capacity identified as 876,000 mcf.
[j] Paducah projected daily process water demand calculated based on estimated 37×10^6 gal/yr reported in the 2004 EIS (2004a).
[k] Paducah water withdrawal capacity is limited by a KDOW permit to 30 mgd (DOE 2017b).
[l] Paducah water consumption is estimated based on reported total withdrawal of up to 4 mgd, with 15% diversion for potable water use (PPPO 2018).
[m] Paducah projected daily potable water demand calculated based on estimated 3×10^6 gal/yr reported in the 2004 EIS (DOE 2004a).
[n] Paducah current use of steam is an estimate of demand (PPPO 2018).
[o] The 2004 Portsmouth EIS notes that the operations at that time relied on electric heating, with a conversion to natural gas being planned (DOE 2004b). That conversion occurred in 2012 with the commissioning of the new steam plant resulting in a substantial reduction in site electric use and a corresponding increase in natural gas consumption (DOE 2017c).
[p] Portsmouth electrical use calculated based on reported 31,840 MWh/yr (DOE 2004b) assuming 8,760 hours per year.
[q] Portsmouth electrical usage based on reported range of 20 to 40 megawatts per hour (DOE 2017a).
[r] Portsmouth natural gas capacity provided as a factor of pipe size (6 inch diameter) and pressure (350 to 400 pounds/square inch). Current capacity not disclosed.
[s] Portsmouth projected daily process water demand calculated based on estimated 30×10^6 gal/yr reported in the 2004 EIS (DOE 2004b).
[t] Portsmouth 2017 maximum water capacity is reported as 13×10^6 mgd (DOE 2017a).
[u] Portsmouth 2017 use estimated based upon reported approximate 707 million gallons of annual usage, or 1.94 million gallons per day (DOE 2017a).
[v] Portsmouth projected daily potable water demand calculated based on estimated 3×10^6 gal/yr reported in the 2004 EIS (DOE 2004b).
[w] Portsmouth recently upgraded its potable water system, providing a treatment capacity of approximately 1.8 mgd; current usage not reported.
[x] Portsmouth steam use estimate based on extrapolation of hourly use based on reported annual use of 235 million pounds per year and 8,760 hours per year.

Sources: DOE 2004a, 2004b, 2017b, 2017c; PPPO 2018

Table C-3 Comparison of Utility Use for Long-Term Storage of Commercial DUF6 with Site Utility Capacity and Current Use

Resource	Paducah[a]			Portsmouth[b]		
	Long-Term Storage[c]	Utility System		Long-Term Storage[c]	Utility System	
		Capacity	Current Use		Capacity	Current Use
Electricity	0.167 MWh	3,040 MW	12 MW	0.167 MWh	2,260 MW	20 to 40 MWh
Water (mgd)	0.23	28	3.4	0.073	13	1.9
Natural gas (mcf/year)	Minimal	876,000	154,000	Minimal	NR	366,000
Steam (lbs/hr)	Minimal	135,000	100,000	Minimal	84,000	26,800

Key: gal = gallons; hr = hour; lbs = pounds; M = million; mcf = million cubic feet; mgd = million gallons per day; MW = megawatt; MWh = Megawatt hours; NR = not reported.
[a] Paducah capacity and current use from Chapter 3, Section 3.1.1, unless otherwise noted.
[b] Portsmouth capacity and current use from Chapter 3, Section 3.2.1, unless otherwise noted.
[c] Usage estimates from Chapter 4, Table 4-1 of this *DU Oxide SEIS.*
Note: To convert gallons to liters multiply by 3.785.

The impacts on the utility infrastructure of loading wastes for off-site shipment would be similar to those described under the *DU Oxide SEIS* No Action Alternative (Chapter 4, Section 4.1.1.1). Truck and railcar loading activities would consume minimal amounts of water and electricity. Cylinder handling using Straddle Buggies and NCH-35 cylinder handlers is expected to use 15,600 gallons per year (59,050 liters per year) of diesel fuel at Paducah or Portsmouth (PPPO 2018). Support vehicles (i.e., cars and light trucks) are expected to use 2,080 gallons per year (7,870 liters per year) of gasoline at each site (PPPO 2018). Fuel consumed by container loading equipment and support vehicles would be supplied by off-site sources and would not adversely affect the infrastructure at Paducah or Portsmouth. The primary impacts would be the extension of these activities for approximately 9 years at Paducah or Portsmouth during shipping of the DU oxide to off-site disposal sites. Therefore, the potential impacts on the utility infrastructure at Paducah or Portsmouth are expected to be minor.

The impacts on the transportation infrastructure of loading the DU oxide containers and other wastes for off-site shipment would be similar to those described under the *DU Oxide SEIS* No Action Alternative (Chapter 4, Section 4.1.1.1). The loading of the DU oxide containers, empty and heel cylinders, and CaF_2 in bulk bags and off-site shipment using either truck or train would not require new significant construction or changes in infrastructure at either Paducah or Portsmouth. Therefore, the potential impacts on the transportation infrastructure at Paducah or Portsmouth would be minor.

Therefore, impacts on the utility and transportation infrastructure associated with the potential management of commercial DUF6 at either Paducah or Portsmouth under the Conversion and Storage scenario would be expected to be minor and well within the available capacities.

Secondary impacts might arise associated with the requirement that site operations associated with storage, conversion and management would need to be extended for the noted time periods. To the extent that the time periods associated with the introduction of the commercial DUF_6 requires a commitment of key equipment (e.g., boilers) or facilities beyond the planned design life, there may be an increase in repair, maintenance and replacement costs for such key equipment and facilities so as to extend their operational life. Such key equipment and facilities would need to be serviced and operational for an additional 8 years at Paducah or 11 years at Portsmouth to support the conversion process.

Conversion and Disposal Scenario: The impacts on site infrastructure from DUF_6 cylinder handling, conversion of DUF_6 to DU oxide, and storage of DU oxide containers, under the Conversion and Disposal scenario, would be similar to that described above for the Conversion and Storage Scenario. The impacts of storage would be less for the Conversion and Disposal scenario because the DU oxide containers would be shipped to a disposal facility or facilities and not be stored indefinitely.

The impacts on the utility infrastructure of loading the DU oxide containers and other wastes for off-site shipment would be similar to those described under the *DU Oxide SEIS* disposal alternatives (Chapter 4, Section 4.2.1.1). Truck and railcar loading activities would consume minimal amounts of water and electricity. Cylinder handling using Straddle Buggies and NCH-35 cylinder handlers is expected to use 15,600 gallons per year (59,050 liters per year) of diesel fuel at Paducah or Portsmouth (PPPO 2018). Support vehicles (i.e., cars and light trucks) are expected to use 2,080 gallons per year (7,870 liters per year) of gasoline at each site (PPPO 2018). Fuel consumed by container loading equipment and support vehicles would be supplied by off-site sources and would not adversely affect the infrastructure at Paducah or Portsmouth. The primary impacts would be the extension of these activities for approximately 9 years at Paducah or Portsmouth during shipping of the DU oxide to off-site disposal sites. Therefore, the potential impacts on the utility infrastructure at Paducah or Portsmouth are expected to be minor.

The impacts on the transportation infrastructure of loading the DU oxide containers and other wastes for off-site shipment would be similar to those described under the *DU Oxide SEIS* disposal alternatives (Chapter 4, Section 4.2.1.1). The loading of the DU oxide containers, unusable cylinders, and CaF_2 in bulk bags and off-site shipment using either truck or train would not require new significant construction or changes in infrastructure at either Paducah or Portsmouth. Therefore, the potential impacts on the transportation infrastructure at Paducah or Portsmouth would be minor.

C.4 AIR QUALITY, CLIMATE, AND NOISE

Impacts on air quality, climate, and noise could occur from DUF_6 cylinder storage, DUF_6 conversion to DU oxide, DU oxide container storage, and routine maintenance activities.

Conversion and Storage Scenario: Because there would be no expansion of the facilities or substantial changes in activities, the impacts associated with conversion of DUF_6 to DU oxide on an annual basis would be essentially the same as analyzed in the 2004 EISs (DOE 2004a, 2004b). As discussed in the 2004 EISs, annual air emissions from conversion operations at both Paducah and Portsmouth would not exceed the respective National Ambient Air Quality Standards (NAAQS) or State Ambient Air Quality Standards (SAAQS) for all criteria pollutants (DOE 2004a, 2004b)

Operations at Paducah would emit low concentrations of criteria pollutants. Criteria pollutant emissions would all be lower than 0.3 percent of NAAQS or SAAQS. If required during long-term storage, painting of cylinders could generate hydrocarbon emissions. Although no explicit air quality standard has been set for hydrocarbon emissions, these emissions are associated with ozone formation. Standards have been set for ozone. For the Paducah site, hydrocarbon emissions from any painting that would be performed were estimated to be less than 1.2 percent of the hydrocarbon emissions from the entire surrounding county. Because ozone formation is a regional issue affected by emissions for an entire area, this small additional contribution to the county total would be unlikely to substantially alter the ozone levels of the county. In addition, the actual frequency of cylinder painting is expected to be greatly reduced from the level assumed (DOE 2004a, 2004b).

At the Portsmouth site, except for annual average particulate matter with a diameter of less than or equal to 2.5 microns ($PM_{2.5}$), total concentrations of criteria pollutants would be well below their respective standards. Total maximum estimated concentrations of criteria pollutants, except $PM_{2.5}$, would be less than 64 percent of NAAQS and SAAQS. Predicted total concentrations of 24-hour and annual average $PM_{2.5}$ would be near or above their respective standards, respectively; however, their concentration increments associated with site operations would account for only about 2.8 percent of the standards (DOE 2004a, 2004b). While the 2004 EIS predicted that the annual average $PM_{2.5}$ concentration at most statewide monitoring stations could either approach or exceed the standard, ambient air concentrations have not exceeded the NAAQS in the 13 years since publication of that document (EPA 2018). Further, the nearest $PM_{2.5}$ ambient concentration monitoring sites (located in Adams, Lawrence, and Franklin Counties) all report an Air Quality Index (AQI) in the "Good" range (Ohio EPA 2018). AQI is measured on a scale from 0 to 500. The higher the AQI value, the greater the level of air pollution and potential health concern. For example, an AQI value of 50 represents good air quality with little potential to affect public health, while an AQI value over 300 represents hazardous air quality (AirNow 2016).

Conversion of commercial DUF_6 under either of the scenarios would be essentially the same as discussed in the 2004 EISs. Although the 2004 EISs did not analyze greenhouse gas (GHG) emissions, the conversion process itself does not produce GHGs in meaningful concentrations. No active emission points at the Paducah Site require nonradiological air monitoring. The aging steam plant boilers that required emission monitoring no longer are used as of May 2015, and have been replaced with new efficient natural gas fired package boilers. The new boilers do not require emission monitoring, and GHG emissions were not reported (DOE 2017a). However, the primary sources of operational GHG emissions are the boilers, the conversion building stack, and a backup generator. Because the boilers use relatively clean-burning natural gas, the backup generator is infrequently used, and the primary chemical emissions of concern from the HF stack are fluorides, GHG emissions from conversion operations at Paducah would be low, especially in comparison to national emissions levels. In 2015, Portsmouth reported emissions of 13,703 metric tons of carbon dioxide, 0.26 metric ton of methane, and 0.026 metric ton of nitrous oxide for a grand total of 13,716 metric tons (15,120 tons) carbon dioxide equivalents (CO_2e). These emissions primarily result from combustion of natural gas used at the X-690 Boilers (DOE 2017a). GHG emissions from DUF_6 conversion operations at Paducah or Portsmouth would be minimal in the region and national context and not likely to substantially contribute to climate change.

The impacts of storage and maintenance of commercial DU oxide containers at Paducah or Portsmouth until shipped off site for disposal would be similar to those described for long-term storage under the No Action Alternative (Chapter 4, Section 4.1.1.2) of this *DU Oxide SEIS*. Impacts on air quality and climate change could occur from the combustion of fossil fuels associated with DU oxide storage and maintenance activities. These activities would not involve any construction or other industrial processes requiring fossil fuel combustion or other emissions of criteria air pollutants or GHGs above those from normal daily operations. The only potential increase would be if the option to ship CaF_2 off-site for disposal is exercised. However, that increase in emissions would be minimal in perspective of national annual emissions from either truck or train transport. Therefore, potential impacts on air quality and climate change due to emissions from Paducah or Portsmouth would be minor.

Conversion and storage operations are ongoing activities at Paducah and Portsmouth and therefore, the continuation of these activities for management of commercial DUF_6 is unlikely to change current noise levels. The 2004 EISs estimated noise impacts from cylinder handling and conversion facility operation. The 2004 EISs estimated that somewhat increased noise levels at the site could result from industrial activities such as cooling towers, heavy equipment use, and traffic. However, it is expected that the noise levels at off-site residences near Paducah would not increase noticeably. At Portsmouth, the noise levels at the nearest residence would be somewhat higher than the ambient background level, but would be barely distinguishable from the background level, depending on the time of the day. In conclusion, noise levels generated by cylinder handling and conversion plant operations would have minor impacts on the residence located nearest to the proposed facility and would be well below the EPA guideline limits for residential areas (DOE 2004a, 2004b). Also, as described in Chapter 4, Section 4.1.1.2, of this *DU Oxide SEIS*, DU oxide container storage and maintenance activities would occur within the industrialized areas of Paducah or Portsmouth, and there would be no significant construction, painting, or other increase in activities above normal daily operations that would contribute to the noise environment. Off-site shipments via train would increase by a few shipments per week per site and truck shipments would increase by less than 3 per day. This increase in activity is unlikely to contribute to changes in the noise environment that would be perceptible along public roadways and existing railways in comparison to the shipments already occurring.

Conversion and Disposal Scenario: The impacts on air quality, climate and noise from DUF_6 cylinder handling, conversion of DUF_6 to DU oxide, and storage of DU oxide containers, under the Conversion and Disposal scenario, would be similar to that described above for the Conversion and Storage Scenario.

The quantity of DU oxide in each truck or train shipment would vary depending on whether cylinders or bulk bags are used. If bulk bags were to be used, the total number of truck shipments of DU oxide would decrease, but the number of empty and heel cylinders to be shipped for disposal would increase. The total number of train shipments under the bulk bag shipment scenario would be more than the number of shipments utilizing DU oxide in cylinders if the empty and heel cylinders are shipped intact. The analysis below represents the most conservative scenario (i.e., the largest quantity of emissions), and all other potential shipping scenarios would generate lower levels of emissions of both criteria pollutants and GHGs.

Transfer of DU oxide containers from the storage locations to a loading area for transportation to the disposal sites would involve the use of Straddle Buggies and NCH-35 cylinder handlers. These types of equipment are currently in use as part of the conversion facility operations. **Table C-4** presents the operational emissions at the Paducah Site and compares the emissions to those for McCracken County, Kentucky. **Table C-5** presents the operational emissions at the Portsmouth

Site and compares the emissions to those for Pike County, Ohio. Emissions from diesel fuel combustion during container movement and loading activities would therefore be minimal, and would not contribute to any exceedances of SAAQS or NAAQS. Likewise, GHG emissions (measured as CO_2e) would be minimal in the context of the over 1.3 million metric tons CO_2e emitted annually from fossil fuel combustion in the industrial sector and would not be expected to contribute substantially to climate change (EPA 2018).

In addition to the emissions discussed above, the Conversion and Disposal scenario would include air emissions associated with transportation of the DU oxide containers to a commercial disposal site. Air emissions from shipping of commercial DU oxide by truck or train to one or more of the disposal sites would be similar to those discussed in Chapter 4, Sections 4.2.2, 4.3.2, and 4.4.2 of this *DU Oxide SEIS*.

Table C-4 Criteria Pollutant Emissions from Cylinder-Loading Activities at the Paducah Site

	Criteria Pollutant Emissions (tons per year)						
	CO	**NO_2**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**VOC**	**CO_2e**
Straddle Buggies and NCH-35	0.93	1.9508	0.0796	0.0796	0.0024	0.2464	239.08
McCracken County	13,217	15,200	2,464	826.2854015	30,162	6,378	497,850
Percentage of County Emissions	0.01%	0.01%	0.00%	0.01%	0.00%	0.00%	0.05%

Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalents; NO_2 =nitrogen dioxide; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.
Sources: EPA 2016a, 2018

Table C-5 Criteria Pollutant Emissions from Cylinder-Loading Activities at the Portsmouth Site

	Criteria Pollutant Emissions (tons per year)						
	CO	**NO_2**	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**VOC**	**CO_2e**
Straddle Buggies and NCH-35	0.93	1.9508	0.0796	0.0796	0.0024	0.2464	239.08
Pike County	8,297	1,371	2,729	755.3689	35	7,214	268,870
Percentage of County Emissions	0.01%	0.14%	0.00%	0.01%	0.01%	0.00%	0.09%

Key: CO = carbon monoxide; CO_2e = carbon dioxide equivalents; NO_2 = nitrogen dioxide; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.
Sources: EPA 2016b, 2018

Emissions were calculated to provide an estimate of the annual criteria pollutant emissions associated with truck shipments from Paducah or Portsmouth to NNSS containing ancillary LLW and MLLW, intact empty and heel cylinders, and CaF_2. Although shipments may go to various facilities, in order to bound the impacts, calculations are based on the longest potential shipping distance which would be to NNSS. Annual emissions of all criteria pollutants would be less than 28 tons (25 metric tons) for all shipments from Paducah or Portsmouth. These emissions would be spread across a large area, so it is not useful to compare to NEI baseline emissions for any particular Air Quality Control Region (AQCR). Although the EPA does separately track commercial versus other mobile sources of criteria pollutants, the national on-road emissions associated with heavy-duty diesel vehicles and heavy-duty gasoline vehicles from the 2014 NEI (EPA 2019) are provided for comparison in **Table C-6**.

Table C-6 National Annual On-Road Heavy-Duty Vehicle Emissions

Emissions (tons/yr)					
CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	VOC
1,435,373	2,196,533	130,823	93,585	3,969	198,397

Key: CO = carbon monoxide; NOx = nitrogen oxides; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.
Source: EPA 2019

Because the criteria pollutant emissions from transportation of wastes to the disposal facilities are so small in comparison to U.S. heavy-duty vehicle emissions, the emissions are not likely to contribute to any significant impact on air quality.

Table C-7 presents estimated annual GHG emissions from transportation of ancillary LLW and MLLW, intact empty heel cylinders, and CaF_2 to NNSS. As presented in Table C-7, maximum GHG emissions from truck transport would not be likely to exceed approximately 3,806 tons (3,453 metric tons) annually. Again, this quantity would be miniscule in comparison to the national GHG emissions from truck transportation, which total 467.4 million tons (424.0 million metric tons) annually (EPA 2018).

Table C-7 Annual GHG Emissions from Transportation of Ancillary LLW and MLLW, Intact Empty and Heel Cylinders, and Calcium Fluoride to the Nevada National Security Site

Site	GHG Emissions (tons per year CO_2e)			
	Train/Truck Option			Truck Option
	Train	Truck	Total	
Paducah[a]	233	862	1,095	3,806
Portsmouth[a]	199	746	945	3,143
National Train Emissions[b]	45, 300,000			NA
National Truck Emissions[c]	467,400,000			467,400,000
Total National Train/Truck Emissions	512,700,000			NA

Key: CO_2e = carbon dioxide equivalents.
[a] Source: PPPO 2018
[b] Source CNR 2016
[c] Source ATA 2018

In addition to the low noise levels discussed under the Conversion and Storage scenario, truck and railcar loading activities would occur within the industrialized areas of Paducah or Portsmouth, and there would be little or no increase above current normal daily operations that would contribute to adverse noise impacts at or beyond the site boundary. Therefore, potential impacts on noise levels near Paducah or Portsmouth from truck and railcar loading activities are expected to be minor. Off-site shipments via train would increase by approximately 1 to 2 shipments per week per site and truck shipments would increase by 9 to 10 per day. This increase in activity is unlikely to contribute to changes in the noise environment that would be perceptible along public roadways and existing railways in comparison to the shipments already occurring.

C.4.1 Transportation to EnergySolutions

Train Option

Emissions associated with train transportation of DU oxide and other wastes from either site to Energy*Solution*s was estimated based on the number of rail miles traveled and the emission factors for train locomotives. It was estimated that locomotives would travel approximately 1,600 miles (2,600 kilometers) per train shipment from Paducah to Energy*Solutions* or approximately 1,900 miles (3,100 kilometers) from Portsmouth to Energy*Solutions*. Emissions were calculated using emission factors for tier 2 line haul locomotives derived from the EPA's *Emission Factors for Locomotives* (EPA 2009).

Emissions of all criteria pollutants would be less than 19 tons (17 metric tons) annually for all waste shipments from Paducah or Portsmouth (see **Table C-8**). Emissions would be spread across a large area, so it is not useful to compare to National Emissions Inventory (NEI) baseline emissions for any particular AQCR. However, because the emissions are so small in comparison to overall locomotive and vehicle transportation emissions, the emissions are not likely to contribute to any significant impact on air quality.

Table C-8 Criteria Pollutant Emissions from Transportation of Wastes via Train to Energy*Solutions*

Material	Site	Criteria Pollutant Emissions (tons/year)					
		CO	NO_x	PM_{10}	$PM_{2.5}$	SO_x	VOC
Ancillary LLW and MLLW	Paducah	0.09	0.34	0.01	0.01	0.01	0.02
	Portsmouth	0.11	0.41	0.01	0.01	0.01	0.02
DU oxide in cylinders	Paducah	1.69	6.54	0.24	0.23	0.12	0.36
	Portsmouth	2.01	7.76	0.28	0.27	0.14	0.43
Unusable empty and heel cylinders	Paducah	0.28	1.09	0.04	0.04	0.02	0.06
	Portsmouth	0.33	1.29	0.05	0.05	0.02	0.07
DU oxide in bulk bags	Paducah	1.06	4.09	0.15	0.14	0.07	0.23
	Portsmouth	0.84	3.23	0.12	0.11	0.06	0.18
12,500 empty and heel cylinders	Paducah	1.62	6.26	0.23	0.22	0.11	0.35
	Portsmouth	1.42	5.50	0.20	0.19	0.10	0.30
CaF_2	Paducah	1.69	6.54	0.24	0.23	0.12	0.36
	Portsmouth	1.25	4.85	0.18	0.17	0.09	0.27
Maximum Total (DU Oxide in Cylinders)		**4.14**	**4.14**	**16**	**0.58**	**0.56**	**0.29**
Maximum Total (DU Oxide in Bulk Bags)		**4.81**	**4.81**	**18.59**	**0.68**	**0.65**	**0.33**

Key: CaF2 = calcium fluoride; CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.

Truck Option

Emissions associated with truck transportation of DU oxide and other wastes from either site to Energy*Solution*s was estimated (see **Table C-9**). The analysis is based on approximately 1,600 miles (2,600 kilometers) per truck shipment from Paducah to Energy*Solutions* or approximately 1,900 miles (3,100 kilometers) per shipment from Portsmouth to Energy*Solutions* via truck. Emissions were derived using the emission factors for heavy-duty diesel vehicles in the EPA's MOVES2014a. MOVES is the EPA Motor Vehicle Emission Simulator. It is used to create emission factors or emission inventories for both on road motor vehicles and nonroad equipment (EPA 2015).

Emissions of all criteria pollutants would be less than 32 tons (29 metric tons) annually for all waste shipments from Paducah or Portsmouth. These emissions would be spread across a large area, so it is not useful to compare to NEI baseline emissions for any particular AQCR. Although the EPA does separately track commercial versus other mobile sources of criteria pollutants, the national on-road emissions associated with heavy-duty diesel vehicles and heavy-duty gasoline vehicles from the 2014 NEI (EPA 2019) are provided for comparison in Table C-6. Because the criteria pollutant emissions from transportation of wastes to Energy*Solutions* are so small in comparison to overall U.S. heavy-duty vehicle emissions, the emissions are not likely to contribute to any significant impact on air quality.

Table C-9 Criteria Pollutant Emissions from DU Oxide Transportation via Truck to Energy*Solutions*

		Criteria Pollutant Emissions (tons/year)					
Material	**Site**	**CO**	**NO_x**	**PM_{10}**	**$PM_{2.5}$**	**SO_x**	**VOC**
Ancillary LLW and MLLW	Paducah	0.17	0.48	0.02	0.02	0.00	0.05
	Portsmouth	0.14	0.41	0.01	0.01	0.00	0.04
DU oxide (cylinders)	Paducah	5.49	15.67	0.57	0.53	0.04	1.63
	Portsmouth	6.52	18.61	0.68	0.62	0.04	1.94
Unusable empty and heel cylinders	Paducah	0.48	1.36	0.05	0.05	0.00	0.14
	Portsmouth	0.57	1.62	0.06	0.05	0.00	0.17
DU oxide in bulk bags	Paducah	2.30	6.56	0.24	0.22	0.01	0.68
	Portsmouth	1.87	5.32	0.19	0.18	0.01	0.55
12,500 empty and heel cylinders	Paducah	2.59	7.39	0.27	0.25	0.02	0.77
	Portsmouth	2.35	6.71	0.24	0.23	0.02	0.70
CaF_2	Paducah	3.64	10.37	0.38	0.35	0.02	1.08
	Portsmouth	2.79	7.96	0.29	0.27	0.02	0.83
Maximum Total (DU Oxide in Cylinders)		**10.9**	**10.9**	**31.08**	**1.14**	**1.04**	**0.06**
Maximum Total (DU Oxide in Bulk Bags)		**9.27**	**9.27**	**26.42**	**0.97**	**0.89**	**0.05**

Key: CaF2 = calcium fluoride; CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.

Greenhouse Gases

Annual GHG emissions from train shipments of DU oxide and other wastes would be 186 tons (169 metric tons) or 157 tons (142 metric tons) from Paducah and Portsmouth, respectively, and would be minimal in terms of the national GHG emissions from railway transportation, which total 45.3 million tons (41.1 million metric tons) annually (EPA 2018). Total annual GHG emissions from truck shipments would be 6,894 tons (6,254 metric tons) or 7,082 tons (6,425 metric tons) from Paducah and Portsmouth, respectively, and would be minimal in terms of the national GHG emissions from truck transportation, which total 467.4 million tons (424.0 million metric tons) annually (EPA 2018).

C.4.2 Transportation to the Nevada National Security Site

Train/Truck Option

Because there is no direct rail access to NNSS, shipment via train would travel to Barstow, California, where it would be transported by truck approximately 200 miles (330 kilometers) from Barstow to the NNSS facility. Emissions associated with train transportation of DU oxide and other wastes from either site to Barstow, California, was estimated based on the number of rail miles traveled and the emission factors for train locomotives. It was estimated that locomotives would travel approximately 2,000 miles (3,300 kilometers) per train shipment from Paducah to Barstow, California, or approximately 2,400 miles (3,800 kilometers) from Portsmouth to Barstow, California. Emissions were calculated using emission factors for tier 2 line haul locomotives derived from the EPA's *Emission Factors for Locomotives* (EPA 2009). **Table C-10** presents annual emissions associated with truck shipments from Barstow to the NNSS facility.

Table C-10 Criteria Pollutant Emissions from Transportation of Wastes via Train to Barstow, California, and Truck to NNSS

Material	Mode of Transport	Site	Criteria Pollutant Emissions (tons/year)					
			CO	NO_x	PM_{10}	$PM_{2.5}$	SO_x	VOC
Ancillary LLW and MLLW	Truck	Paducah	0.02	0.05	0.00	0.00	0.00	0.00
		Portsmouth	0.01	0.03	0.00	0.00	0.00	0.00
	Train	Paducah	0.09	0.34	0.01	0.01	0.01	0.02
		Portsmouth	0.11	0.41	0.01	0.01	0.01	0.02
DU oxide in cylinders	Truck	Paducah	0.69	1.96	0.07	0.07	0.00	0.20
		Portsmouth	0.69	1.96	0.07	0.07	0.00	0.20
	Train	Paducah	2.11	8.17	0.30	0.29	0.15	0.45
		Portsmouth	2.54	9.81	0.36	0.35	0.18	0.54
Unusable empty and heel cylinders	Truck	Paducah	0.06	0.17	0.01	0.01	0.00	0.02
		Portsmouth	0.06	0.17	0.01	0.01	0.00	0.02
	Train	Paducah	0.35	1.36	0.05	0.05	0.02	0.08
		Portsmouth	0.42	1.63	0.06	0.06	0.03	0.09
DU oxide in bulk bags	Truck	Paducah	0.29	0.82	0.03	0.03	0.00	0.09
		Portsmouth	0.20	0.56	0.02	0.02	0.00	0.06
	Train	Paducah	1.32	5.11	0.19	0.18	0.09	0.28
		Portsmouth	1.06	4.09	0.15	0.14	0.07	0.23
12,500 empty and heel cylinders	Truck	Paducah	0.32	0.92	0.03	0.03	0.00	0.10
		Portsmouth	0.25	0.71	0.03	0.02	0.00	0.07
	Train	Paducah	2.02	7.83	0.28	0.28	0.14	0.43
		Portsmouth	1.80	6.95	0.25	0.24	0.13	0.38
CaF_2	Truck	Paducah	0.45	1.30	0.05	0.04	0.00	0.14
		Portsmouth	0.29	0.84	0.03	0.03	0.00	0.09
	Train	Paducah	2.11	8.17	0.30	0.29	0.15	0.45
		Portsmouth	1.58	6.13	0.22	0.22	0.11	0.34
Maximum Total (DU Oxide in Cylinders)			**6.39**	**23.48**	**6.39**	**23.48**	**0.86**	**0.83**
Maximum Total (DU Oxide in Bulk Bags)			**7.11**	**26.39**	**7.11**	**26.39**	**0.96**	**0.93**

Key: CaF2 = calcium fluoride; CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.

Emissions of all criteria pollutants would be less than 27 tons (24 metric tons) annually for all shipments from Paducah or Portsmouth. Emissions would be spread across a large area, so it is not useful to compare to NEI baseline emissions for any particular AQCR. However, because the emissions are so small in comparison to overall locomotive and vehicle transportation emissions, the emissions are not likely to contribute to any significant impact on air quality.

Truck Option

Emissions associated with truck transportation of DU oxide and other wastes from either site to NNSS was estimated (**Table C-11)**. The analysis is based on approximately 2,000 miles (3,300 kilometers) per truck shipment from Paducah NNSS or approximately 2,400 miles (3,800 kilometers) per shipment from Portsmouth to NNSS via truck.

Under the truck option, emissions of all criteria pollutants would be less than 41 tons (37 metric tons) annually for all shipments from Paducah or Portsmouth. These emissions would be spread across a large area, so it is not useful to compare to NEI baseline emissions for any particular AQCR. Although the EPA does separately track commercial versus other mobile sources of criteria pollutants, the national on-road emissions associated with heavy-duty diesel vehicles and heavy-duty gasoline vehicles from the 2014 NEI (EPA 2019) are provided for comparison in Table C-6.

Table C-11 Criteria Pollutant Emissions Transportation via Truck to NNSS

Material	Site	Criteria Pollutant Emissions (tons/year)					
		CO	NOx	PM_{10}	$PM_{2.5}$	SOx	VOC
Ancillary LLW and MLLW	Paducah	0.17	0.48	0.02	0.02	0.00	0.05
	Portsmouth	0.14	0.41	0.01	0.01	0.00	0.04
DU oxide (cylinders)	Paducah	6.88	19.61	0.72	0.66	0.04	2.04
	Portsmouth	8.72	24.86	0.91	0.83	0.06	2.59
Unusable empty and heel cylinders	Paducah	0.60	1.70	0.06	0.06	0.00	0.18
	Portsmouth	0.72	2.04	0.07	0.07	0.00	0.21
DU oxide (bulk bags)	Paducah	2.88	8.20	0.30	0.28	0.02	0.85
	Portsmouth	2.36	6.72	0.25	0.23	0.02	0.70
12,500 empty and heel cylinders	Paducah	3.24	9.23	0.34	0.31	0.02	0.96
	Portsmouth	2.97	8.47	0.31	0.28	0.02	0.88
CaF_2	Paducah	4.54	12.96	0.47	0.43	0.03	1.35
	Portsmouth	3.52	10.05	0.37	0.34	0.02	1.05
Maximum Total (DU Oxide in Cylinders)		**14.15**	**40.34**	**1.47**	**1.35**	**0.09**	**4.2**
Maximum Total (DU Oxide in Bulk Bags)		**11.55**	**32.91**	**1.2**	**1.11**	**0.07**	**3.42**

Key: CaF2 = calcium fluoride; CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.

Because the criteria pollutant emissions from transportation of wastes to NNSS are so small in comparison to overall U.S. heavy-duty vehicle emissions, the emissions are not likely to contribute to any significant impact on air quality.

Greenhouse Gases

Total annual GHG emissions for shipments of DU oxide, LLW, MLLW, and unusable cylinders, and CaF_2 via train to Barstow, California, and truck from Barstow to NNSS, would be 2,039 tons per year (1,850 metric tons per year). This amount would be minimal in terms of the national annual GHG emissions from combined truck and train transportation, which total 512.7 million tons (465.1 million metric tons) annually (EPA 2018). Total annual GHG emissions for shipments of DU oxide, ancillary LLW and MLLW, unusable cylinders, and CaF_2 via truck to NNSS (17,564 tons [15,934 metric tons]) would be minimal in terms of the national GHG emissions from truck transportation, which are 467.4 million tons (424.0 million metric tons) annually (EPA 2018).

C.4.3 Transportation to Waste Control Specialists

Train Option

Emissions associated with train transportation of DU oxide and other wastes from either site to WCS was estimated based on the number of rail miles traveled and the emission factors for train locomotives. It was estimated that locomotives would travel approximately 1,000 miles (1,700 kilometers) per train shipment from Paducah to WCS or approximately 1,400 miles (2,300 kilometers) from Portsmouth to WCS. Emissions were calculated using emission factors for tier 2 line haul locomotives derived from the EPA's *Emission Factors for Locomotives* (EPA 2009).

Emissions of all criteria pollutants would be less than 13 tons (12 metric tons) annually for all wastes shipments from Paducah or Portsmouth (**Table C-12**). Emissions would be spread across a large area, so it is not useful to compare to NEI baseline emissions for any particular AQCR.

Table C-12 Criteria Pollutant Emissions from Transportation of Wastes via Train to Waste Control Specialists

Material	Site	Criteria Pollutant Emissions (tons/year)					
		CO	NO_x	PM_{10}	$PM_{2.5}$	SO_x	VOC
Ancillary LLW and MLLW	Paducah	0.34	0.01	0.01	0.01	0.02	0.34
	Portsmouth	0.41	0.01	0.01	0.01	0.02	0.41
DU oxide in cylinders	Paducah	4.09	0.15	0.14	0.07	0.23	4.09
	Portsmouth	5.72	0.21	0.20	0.10	0.32	5.72
Unusable empty and heel cylinders	Paducah	0.68	0.02	0.02	0.01	0.04	0.68
	Portsmouth	0.95	0.03	0.03	0.02	0.05	0.95
DU oxide in bulk bags	Paducah	2.55	0.09	0.09	0.05	0.14	2.55
	Portsmouth	2.38	0.09	0.08	0.04	0.13	2.38
12,500 empty and heel cylinders	Paducah	3.92	0.14	0.14	0.07	0.22	3.92
	Portsmouth	4.05	0.15	0.14	0.07	0.22	4.05
CaF_2	Paducah	4.09	0.15	0.14	0.07	0.23	4.09
	Portsmouth	3.58	0.13	0.13	0.07	0.20	3.58
Maximum Total (DU Oxide in Cylinders)		**11.17**	**11.17**	**0.4**	**0.38**	**0.2**	**0.62**
Maximum Total (DU Oxide in Bulk Bags)		**12.05**	**12.05**	**0.43**	**0.41**	**0.22**	**0.66**

Key: CaF2 = calcium fluoride; CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.

Both McCracken and Pike Counties are currently classified as being in attainment for all criteria pollutants, so the General Conformity rule is not applicable. However, it is worth noting that none of the criteria pollutant emissions would exceed the *de minimis* thresholds set by the rule. Because the emissions are so small in comparison to overall vehicle emissions on both urban and rural highways and roads, the emissions are not likely to contribute to any significant impact on air quality.

Truck Option

Emissions associated with truck transportation of DU oxide and other wastes from either site to WCS was estimated (**Table C-13**). The analysis is based on approximately 1,000 miles (1,700 kilometers) per truck shipment from Paducah to WCS or approximately 1,400 miles (2,300 kilometers) per truck shipment from Portsmouth to WCS.

Table C-13 Criteria Pollutant Emissions from Transportation via Truck to Waste Control Specialists

Material	Site	Criteria Pollutant Emissions (tons/year)					
		CO	NO_x	PM_{10}	$PM_{2.5}$	SO_x	VOC
Ancillary LLW and MLLW	Paducah	0.08	0.24	0.01	0.01	0.00	0.02
	Portsmouth	0.08	0.24	0.01	0.01	0.00	0.02
DU oxide (cylinders)	Paducah	3.43	9.79	0.36	0.33	0.02	1.02
	Portsmouth	4.81	13.71	0.50	0.46	0.03	1.43
Unusable empty and heel cylinders	Paducah	0.30	0.85	0.03	0.03	0.00	0.09
	Portsmouth	0.42	1.19	0.04	0.04	0.00	0.12
DU oxide (bulk bags)	Paducah	1.44	4.10	0.15	0.14	0.01	0.43
	Portsmouth	1.38	3.92	0.14	0.13	0.01	0.41
12,500 empty and heel cylinders	Paducah	1.62	4.62	0.17	0.15	0.01	0.48
	Portsmouth	1.73	4.94	0.18	0.17	0.01	0.51
CaF_2	Paducah	2.27	6.48	0.24	0.22	0.01	0.68
	Portsmouth	2.06	5.86	0.21	0.20	0.01	0.61
Maximum Total (DU Oxide in Cylinders)		**7.58**	**7.58**	**21.62**	**0.79**	**0.73**	**0.04**
Maximum Total (DU Oxide in Bulk Bags)		**5.94**	**5.94**	**16.95**	**0.62**	**0.58**	**0.03**

Key: CaF2 = calcium fluoride; CO = carbon monoxide; NO_2 = nitrogen dioxide; PM_{10} and $PM_{2.5}$ = particulate matter with a diameter of less than or equal to 10 microns and 2.5 microns, respectively; SO_2 = sulfur dioxide; VOC = volatile organic compounds.

Emissions of all criteria pollutants would be less than 22 tons (20 metric tons) annually for all shipments from Paducah or Portsmouth. These emissions would be spread across a large area, so it is not useful to compare to NEI baseline emissions for any particular AQCR. Although the EPA does separately track commercial versus other mobile sources of criteria pollutants, the national on-road emissions associated with heavy-duty diesel vehicles and heavy-duty gasoline vehicles from the 2014 NEI (EPA 2019) are provided for comparison in Table C-6. Because the criteria pollutant emissions from transportation of wastes to WCS are so small in comparison to overall U.S. heavy-duty vehicle emissions, the emissions are not likely to contribute to any significant impact on air quality.

Greenhouse Gases

Total annual GHG emissions from train shipments for disposal of DU oxide, ancillary LLW and MLLW, unusable cylinders, and CaF_2 (232 tons [211 metric tons]) would be minimal in terms of the national GHG emissions from railway transportation, which total 45.3 million tons (41.1 million metric tons) annually (EPA 2018). Total annual GHG emissions from truck shipments for disposal of DU oxide, ancillary LLW and MLLW, unusable cylinders, and CaF_2 (9,528 tons [8,643 metric tons]) would be minimal in terms of the national GHG emissions from truck transportation, which total 467.4 million tons (424.0 million metric tons) annually (EPA 2018).

C.5 WATER RESOURCES

Impacts on water resources could occur from changes in water use, surface water discharge, groundwater recharge, or impacts on surface water or groundwater quality as a result of contamination by radioactive or hazardous materials associated with storage of DUF_6 containers, conversion of DUF_6 to DU oxide, storage of DU oxide containers, and potential container breach.

Conversion and Storage: Under the Conversion and Storage scenario, storage of DUF_6 containers, conversion of DUF_6 to DU oxide, and storage of DU oxide containers would occur within the industrialized areas of either Paducah or Portsmouth in areas outside the 100-year floodplain. There would be no significant construction, no change to groundwater recharge, and no routine releases of DU or hazardous materials. The impacts of conversion of DUF_6 to DU oxide were evaluated in the 2004 EISs (DOE 2004a, 2004b). The relevant information for water resources impacts from the 2004 EISs is summarized in Section C.3, Site Infrastructure; Section C.9, Waste Management; and this section.

As described in Section C.3, Tables C-2 and C-3, water usage for the Conversion and Storage scenario would be a very small percentage of the existing daily water use at Paducah or Portsmouth. All of the water needed at Paducah would be withdrawn from the Ohio River. The water needed would be a very small percentage of the average flow in the Ohio River. Impacts of this withdrawal would be negligible. Because all water used at Paducah would be obtained from the Ohio River there would be no impacts on groundwater levels and flow (DOE 2004a).

All of the water needed at Portsmouth would be withdrawn from groundwater resources. As shown in Section C.3, Tables C-2 and C-3, groundwater use would represent a very small percent of current water use. Impacts from this rate of groundwater use would be very small (DOE 2004b). Because all of the water used at Portsmouth would be obtained from groundwater wells, there would be no impacts on surface water levels and flow (DOE 2004b).

As described in Section C.9, Table C-29, wastewater generation for the Conversion and Storage scenario would be small percentages of the existing daily wastewater generation at Paducah or Portsmouth. This water would not contain any radionuclides and would be treated and released in accordance with National Pollutant Discharge Elimination System (NPDES) or state equivalent permits. At Paducah, the small quantities of wastewater released to the receiving water (Bayou Creek) after treatment would not have a measurable impact (DOE 2004a). At Portsmouth, the small quantities of wastewater released after treatment would produce negligible impacts on Little

Beaver Creek, Big River Creek, and the Scioto River (DOE 2004b). Because there would be no direct discharges to groundwater, there would be no impacts on groundwater quality (DOE 2004a).

Potential impacts on surface and groundwater quality as a result of a release associated with a potential container breach was evaluated in the 2004 EISs. For both sites, the impacts on surface water and groundwater quality from hypothetical releases of uranium would result in uranium concentrations below radiological benchmark levels (i.e., Safe Drinking Water Act maximum contaminant levels) (DOE 2004a, 2004b).

Conversion and Disposal: The impacts of storage of DUF_6 containers, conversion of DUF_6 to DU oxide, and storage of DU oxide containers at Paducah or Portsmouth until shipped to a disposal site would be similar to those described under the Conversion and Storage scenario. The impacts of storage would be less for the Conversion and Disposal scenario because the DU oxide containers would be shipped to a disposal facility or facilities and not be stored indefinitely.

Under the Conversion and Disposal scenario, truck and railcar loading activities would occur within the industrialized areas of Paducah or Portsmouth, would not occur in the 100-year floodplain, and there would be no routine releases of DU or hazardous materials. Therefore, any impacts on water resources are expected to be minor.

C.6 BIOTIC RESOURCES

Impacts on biotic resources could occur from removal or degradation of vegetation, wildlife habitats, wetlands, and federally and state-listed species; facility operations; or contamination by radioactive or hazardous materials via air or water borne pathways.

Conversion and Storage: A portion of the emissions released from the process stack of the conversion facility could become deposited on the surrounding soils. Uptake of uranium-containing compounds can cause adverse effects to vegetation. Deposition of uranium compounds on soils, resulting from atmospheric emissions, would result in soil uranium concentrations considerably below the lowest concentration known to produce toxic effects in plants. Because there would not be a release of process effluent from the facility to surface waters, impacts on vegetation along nearby streams would not occur. Therefore, DOE concluded that the toxic effects on vegetation from uranium uptake from conversion of the quantities of DUF_6 addressed in the 2004 EISs would be expected to be negligible (DOE 2004a, 2004b). This appendix addresses the conversion and disposition of an additional amount of commercial DUF_6 that would be added to the DOE inventory of DUF_6. The additional inventory's cumulative toxic effects on vegetation from uranium uptake would be expected to be below concentrations known to produce toxic effects.

During operations, ecological resources in the vicinity of the conversion facility would be exposed to atmospheric emissions from the boiler stack, cooling towers, and process stack; however, emission levels are expected to be extremely low. The highest average air concentration of uranium compounds would result in a radiation exposure to the general public (nearly 100 percent due to inhalation) of 3.9×10^{-5} mrem/yr at Paducah and 2.07×10^{-5} mrem/yr at Portsmouth. Noninvolved worker doses at both sites are similar to the doses to the general public. The noninvolved worker MEI dose from conversion operations was less than 1×10^{-5} millirem per year at Paducah (DOE 2004a) and less than 5.5×10^{-5} millirem per year at Portsmouth (DOE 2004b). DOE guidelines limit an absorbed dose to terrestrial plants and aquatic animals to less than 1 rad/d, and to terrestrial animals to less than 0.1 rad/d (DOE 2002). Therefore, impacts on vegetation and wildlife from radiation are expected to be negligible. Toxic effect levels of chronic inhalation of uranium are many orders of magnitude greater than expected emissions from the conversion facility. Therefore, toxic effects on wildlife as a result of inhalation of uranium compounds are also expected to be negligible. The maximum annual average air concentration of HF due to operation of a conversion facility would be 0.01 $\mu g/m^3$ at Paducah and 0.0028 $\mu g/m^3$ at Portsmouth. Toxic effect levels of chronic inhalation of HF are many orders of magnitude greater than expected concentrations. Therefore, toxic effects to wildlife from HF emissions would be expected to be negligible (DOE 2004a, 2004b).

Noise generated by the operation of a conversion facility and disturbance from human presence would likely result in a minor disturbance to wildlife in the vicinity (DOE 2004a, 2004b). Movement of trains along the new rail line southwest of the conversion facility at the Paducah facility might potentially cause the adjacent mature deciduous forest habitat to be unsuitable for some species (DOE 2004a).

Liquid process effluents would not be discharged to surface waters during the operation of the conversion facility. In addition, surface water level changes would be negligible. Therefore, except for potential local indirect impacts near the facility, impacts on wetlands due to changes in groundwater or surface water levels or flow patterns would be expected to be negligible. As a result, adverse effects on wetlands or aquatic communities from effluent discharges or water use are not expected (DOE 2004a, 2004b).

Storm water runoff from conversion facility parking areas and other paved surfaces might carry contaminants commonly found on these surfaces to local streams. Biota in receiving streams might be affected by these contaminants, resulting in reduced species diversity or changes in community composition. Storm water discharges from the conversion facility are regulated under the existing NPDES or state permits for industrial facility storm water discharge. The streams near the conversion facility and cylinder storage yards currently receive runoff and associated contaminants from various roadways and storage yards, and their biotic communities are likely indicative of developed areas (DOE 2004a, 2004b).

Direct impacts on federally or state-listed species during operation of a conversion facility are not expected. The wooded areas near the industrialized areas of Paducah and Portsmouth have not been identified as summer roosting habitat for the Indiana bat (federally and state-listed as endangered). Disturbances from increased noise, lighting, and human presence due to facility operation, and the movement of trucks and trains might decrease the quality of the adjacent forest habitat for use by Indiana bats. However, Indiana bats that might currently be using habitat near Paducah and Portsmouth would already be exposed to noise and other effects of human disturbance due to operation of the site, including vehicle traffic. Consequently, disturbance effects related to conversion facility operation would be expected to be minor (DOE 2004a, 2004b).

In addition, noise from train movement along the rail lines entering and exiting Paducah or Portsmouth may result in a disturbance to Indiana bats that may use this habitat. Indiana bats have been observed to tolerate increased noise levels. Consequently, disturbances from rail traffic are not expected to result in loss of suitability of these habitat areas (DOE 2004a).

Under the Conversion and Storage scenario, container storage and maintenance activities would occur within the industrialized areas of Paducah or Portsmouth, would not disturb wetlands, sensitive habitat, or threatened, endangered, or sensitive species, and there would be no significant construction and no routine releases of DU or other hazardous materials. Therefore, potential impacts on biotic resources are expected to be minor.

Potential impacts on biotic resources as a result of an accidental release associated with a potential container breach were evaluated in the 2004 EISs. For either site, groundwater uranium concentrations could exceed the ecological screening value for surface water. However, contaminants in groundwater discharging to a surface water body, such as a local stream, would be quickly diluted to negligible concentrations (DOE 2004a, 2004b).

Conversion and Disposal: The impacts of storage of DUF_6 containers, conversion of DUF_6 to DU oxide, and storage of DU oxide containers at Paducah or Portsmouth until shipped to a disposal site would be similar to those described under the Conversion and Storage scenario. The impacts of storage would be less for the Conversion and Disposal scenario because the DU oxide containers would be shipped to a disposal facility or facilities and not be stored indefinitely.

Under the Conversion and Disposal scenario, truck and railcar loading activities would occur within the industrialized areas of Paducah or Portsmouth and there would be no routine releases of DU or hazardous materials. Truck- and railcar-loading activities would not disturb wetlands, sensitive habitat, or threatened, endangered, or sensitive species, and there would be no significant construction and no routine releases of DU or other hazardous materials. Therefore, any impacts on biotic resources are expected to be minor.

C.7 PUBLIC AND OCCUPATIONAL SAFETY AND HEALTH

This section presents radiological impacts on workers and the public from normal operations and postulated accidents at Paducah or Portsmouth, as well as impacts from potential chemical exposures and accidents and intentional destructive acts. Chapter 4, Section 4.1.1.6, of this *DU Oxide SEIS*, provides additional background information on the definition of terms, safety requirements, and analysis of health risks from chemical and radiological exposure.

C.7.1 Normal Operations

This section provides public and occupational health and safety impacts for the commercial DUF_6 Conversion and Storage Scenario and Conversion and Disposal Scenario. The activities addressed for both scenarios are the conversion process, cylinder yard operations associated with the conversion process, and long term storage of DU oxide cylinders. Radiological and chemical impacts are assessed for normal operations.

C.7.1.1 Conversion and Storage Scenario

Impacts on public and worker health at Paducah or Portsmouth under the Conversion and Storage Scenario considered impacts from conversion facility operation as well as cylinder yard activities during conversion (cylinder movements between the conversion facility and the cylinder storage yard) and during cylinder storage. Conversion of the commercial DUF_6 would require 8 years of conversion operations at Paducah or 11 years at Portsmouth. Under the Conversion and Storage Scenario cylinders of DU oxide are assumed to be stored for 100 years at either Paducah or Portsmouth.[74]

Public Safety and Health

The 2004 EISs (DOE 2004a, 2004b) estimated the public health impacts from the conversion of DUF_6 to DU oxide and from the storage of DUF_6 at Paducah and Portsmouth. After conversion, any exposure to stored uranium would be from DU oxide. The chemical form of the released uranium does not appreciably impact the radiological characteristics of the material. Therefore, the dose estimates from the 2004 EISs for DUF_6 were used in this *DU Oxide SEIS* to estimate the effects of exposure to DU oxide. In addition, information from both sites' annual site environmental reports (DOE 2017b, 2017c) were used to augment the analysis of public health and safety.

Conversion of Commercial DUF_6

The 2004 EISs (DOE 2004a, 2004b) estimated the public health impacts from the conversion of DUF_6 to DU oxide at Paducah and Portsmouth. Potential impacts were assessed for both conversion operations and the cylinder yard operations associated with conversion (e.g., cylinder movement). However, only the conversion operations had the potential for impacts on the public. Annual impacts were provided for an off-site maximally exposed individual (MEI) and for the total population. Both of these EISs used census data from the 2000 U.S. Census. Populations have not changed significantly in the areas around the two sites; the population around Paducah has increased by about 14,000 persons or 3 percent (from 520,000 to 534,000 in 2016 [DOE 2017b]) and that around Portsmouth has increased by about 7,000 persons or 1 percent (from 670,000 to 677,000 in 2015 [DOE 2017c]). These small population changes would have an insignificant impact on the results of the analysis and are not considered further in this analysis.

The 2004 Paducah EIS calculated an MEI dose of less than 3.9×10^{-5} millirem per year and a population dose of 4.7×10^{-5} person-rem per year of conversion operations (DOE 2004a). That analysis used the same throughput (20,000 tons [18,000 metric tons]) that is being assumed for the conversion of the commercial DUF_6. For the eight-year conversion period for the commercial DUF_6, the total dose for the MEI (assuming the same person is the MEI for each year of operations) would be less than 3.1×10^{-4} millirem and the total population dose would be 3.8×10^{-4} person-rem. The MEI cancer risk would be essentially zero (2×10^{-10}) and no additional latent cancer fatalities[75] (LCFs) would be expected within the general population (2×10^{-7}).

The 2004 Portsmouth EIS calculated an MEI dose of less than 2.1×10^{-5} millirem per year and a population dose of 6.2×10^{-5} person-rem per year of conversion operations (DOE 2004b). That analysis used the same throughput (15,000 tons [13,500 metric tons]) that is being assumed for the

[74] The impacts presented for Paducah assume that all 150,000 tons of commercial DUF_6 are converted and stored at Paducah. The impacts presented for Portsmouth make a similar assumption.
[75] This DU Oxide SEIS uses a risk factor of 0.0006 LCF per person-rem, consistent with current DOE guidance (DOE 2003a).

conversion of the commercial DUF_6 (PPPO 2018). For the 11-year conversion period for the commercial DUF_6, the total dose for the MEI (assuming the same person is the MEI for each year of operations) would be less than 2.3×10^{-4} millirem and the total population dose would be 6.8×10^{-4} person-rem. The MEI cancer risk would be essentially zero (1×10^{-10}) and no additional LCFs would be expected within the general population (4×10^{-7}).

Conversion to DU oxide would result in very low levels of exposure to hazardous chemicals. No adverse health effects to the general public are expected during normal operations. Human health impacts resulting from exposure to hazardous chemicals during normal operations of the conversion facilities are estimated as a hazard index of 1.4×10^{-4} and 4.1×10^{-5} for the general public MEIs at Paducah or Portsmouth, respectively (DOE 2004a, 2004b). These hazard indices for the conversion process are significantly lower than the hazard index of 1, which is the level at which adverse health effects might be expected to occur in some exposed individuals.

Storage of Cylinders Containing Commercial Depleted Uranium

The 2004 EISs (DOE 2004a, 2004b) estimated the public health impacts from the storage of DUF_6 at Paducah and Portsmouth. After conversion, any exposure to stored uranium would be from DU oxide. The chemical form of the uranium does not appreciably impact the radiological characteristics of the material. Therefore, the dose estimates from the 2004 EISs for DUF_6 were used in this *DU Oxide SEIS* to estimate the effects of exposure to DU oxide.

The 2004 Paducah EIS (DOE 2004a) estimated that if all DU assumed to be released in cylinder breaches each year were released to the atmosphere (a very conservative assumption), the dose to the general public would be 0.008 person-rem per year. This dose is based on the storage of 36,191 cylinders and a breach rate associated with the uncontrolled corrosion breach rate.[76] The number of expected breaches for the 12,500 cylinders containing commercial DU would be 35 percent of the number used in the 2004 Paducah EIS for the storage of 36,191 cylinders. Scaling from the 2004 Paducah EIS results in an estimated dose of 0.003 person-rem per year.

For the 100 years of DU storage assumed for the Conversion and Storage Scenario, this population dose rate would correspond to a total population dose of 0.28 person-rem. This population dose would result in an estimated 0 (2×10^{-4}) LCF, indicating that there is a very small likelihood, about 1 in 6,000, of any additional cancer fatalities in the general population associated with DU oxide storage at Paducah. For comparison, the average natural background radiation level in the United States is 310 millirem per year; this means that during the 100 years of DU oxide storage, the population within 50 miles of Paducah would receive a background dose of 16 million person-rem based on a population of 534,000 (DOE 2017b). The population dose associated with natural background radiation could result in an estimated 9,600 LCFs.

The 2004 Portsmouth EIS (DOE 2004b) estimated that if all the DU assumed to be released in cylinder breaches each year were released to the atmosphere (a very conservative assumption), the dose to the general public would be 0.002 person-rem per year. This dose is based on the storage of 16,109 cylinders and the uncontrolled corrosion breach rate. The number of expected breaches for the 12,500 cylinders containing commercial DU would be 77 percent of the number used in

[76] The uncontrolled corrosion breach rate was used to maintain consistency between the 2004 EISs and the alternatives analysis in this DU Oxide SEIS.

the 2004 Portsmouth EIS for the storage of 16,109 cylinders. Scaling from the 2004 Portsmouth EIS results in an estimated dose of 0.002 person-rem per year. For the 100 years of DU oxide storage assumed for the Conversion and Storage Scenario, this population dose rate would correspond to a total population dose of 0.16 person-rem. This population dose would result in an estimated zero (9×10^{-5}) LCF, indicating that there is a very small likelihood, about 1 in 10,000 of any additional cancer fatalities in the general population associated with DU oxide storage at Portsmouth. For comparison, over the same period, the 677,000 people (DOE 2017c) living within 50 miles of Portsmouth would receive a background dose of 21 million person-rem. The population dose associated with natural background radiation could result in an estimated 12,600 LCFs.

The 2004 EISs calculated impacts on an MEI in the general population. At Paducah this MEI dose is approximately 0.1 millirem per year from airborne releases of uranium and less than 0.5 millirem per year from the ingestion of contaminated water (DOE 2004a); at Portsmouth it is less than 0.1 millirem per year from airborne releases of uranium and less than 0.4 millirem per year from the ingestion of contaminated water (DOE 2004b). In addition, the Annual Site Environmental Reports for both sites identify an MEI dose that results from direct radiation exposure to an individual that passes the site in close proximity to the cylinder storage yards. Since the commercial cylinders are to be stored within or directly adjacent to the existing cylinder storage yards, the addition of these cylinders should not significantly impact this direct radiation dose at either site. Therefore, the only incremental impact of storage of the commercial cylinders would be from the anticipated cylinder breaches. Scaling the MEI dose resulting from potential cylinder breaches to reflect the incremental number of cylinders from commercial DUF_6 at each site results in MEI doses of less than 0.2 millirem per year at Paducah (scaling factor of 0.35) and less than 0.4 millirem per year at Portsmouth (scaling factor of 0.77).

At Paducah, this dose to the MEI results in an incremental increase in the risk of a fatal cancer for this individual of 1×10^{-7}, less than a 1 in 8 million chance. Although it is extremely unlikely that the same individual would be the MEI every year over the 100 years of DU oxide storage, the likelihood of the individual receiving this MEI dose during that period and contracting a fatal cancer is less than 1 in 80,000.

At Portsmouth, this dose to the MEI results in an incremental increase in the risk of a fatal cancer for this individual of 2×10^{-7}, less than a 1 in 4 million chance. Although it is unlikely that the same individual would be the MEI every year over the 100 years of DU oxide storage, the likelihood of the individual receiving this MEI dose during that period and contracting a fatal cancer is approximately 1 in 40,000.

The 2004 EISs (DOE 2004a, 2004b) also provide an estimate of the nonradiological impacts of uranium releases on the public. Both of the 2004 EISs estimated that the hazard index (HI) associated with airborne releases of uranium would be less than 0.1 and that for releases into the waters around the sites the hazard index would be less than 0.05. Therefore, no adverse impacts are expected from chemical exposure.

Summary

Table C-14 provides a summary of the combined public radiological health impacts for the Conversion and Storage Scenario. Both MEI and total population impacts are dominated by cylinder storage impacts. All individual doses are well below regulatory limits for radiation exposure to a member of the public established by both the EPA and DOE. The EPA has set a radiation dose limit to a member of the general public of 10 millirem per year from airborne sources (40 CFR Part 61). DOE has established a limit on the dose to a member of the public of 100 millirem per year from all sources combined (DOE Order 458.1). Impacts from all operations are not expected to result in any health effects (i.e., LCFs), and the risks to individuals and the population are both less than 1 in 500,000 for each year of operation.

Table C-14 Conversion and Storage Scenario - Public Health Radiological Impacts

Site	Scenario	MEI			
		Annual		Duration of Activity	
		Dose (millirem/yr)	Health Risk (LCF)	Dose (rem)	Health Risk (LCF)
Paducah	Conversion	3.9×10^{-5}	(a)	3.1×10^{-7}	2×10^{-10}
	Cylinder storage	0.2	1×10^{-7}	0.02	1×10^{-5}
	Total	**0.2**	$\mathbf{1\times10^{-7}}$	**0.02**	$\mathbf{1\times10^{-5}}$
Portsmouth	Conversion	2.1×10^{-5}	(a)	2.3×10^{-7}	1×10^{-10}
	Cylinder storage	0.4	2×10^{-7}	0.04	2×10^{-5}
	Total	**0.4**	$\mathbf{2\times10^{-7}}$	**0.04**	$\mathbf{2\times10^{-5}}$
Site	**Scenario**	**Population**			
		Annual		**Duration of Activity**	
		Dose (person-rem/yr)	**Health Risk (LCF)**	**Dose (Person-rem)**	**Health Risk (LCF)**
Paducah	Conversion	4.7×10^{-5}	3×10^{-8}	3.8×10^{-4}	2×10^{-7}
	Cylinder storage	3×10^{-3}	2×10^{-6}	0.28	2×10^{-4}
	Total	$\mathbf{3\times10^{-3}}$	$\mathbf{2\times10^{-6}}$	**0.28**	$\mathbf{2\times10^{-4}}$
Portsmouth	Conversion	6.2×10^{-5}	4×10^{-8}	6.8×10^{-4}	4×10^{-7}
	Cylinder storage	2×10^{-3}	9×10^{-7}	0.16	9×10^{-5}
	Total	$\mathbf{2\times10^{-3}}$	$\mathbf{9\times10^{-7}}$	**0.16**	$\mathbf{9\times10^{-5}}$

Key: LCF = latent cancer fatality; yr = year.
[a] Health risks are effectively zero.

Occupational Safety and Health

During normal operation of the conversion facility, conversion workers (involved workers) would be exposed to external radiation from the handling of DU. Impacts on the remainder of the site workers (noninvolved workers) would result from trace amounts of uranium compounds released to the environment. Cylinder storage yard workers would be exposed to low levels of gamma and neutron radiation while working in the yards performing activities that include routine inspections, ultrasonic inspections, radiological monitoring and valve maintenance, and container repair and relocations. The numbers of noninvolved workers assumed in this analysis is the same as the numbers used in the analyses presented in Chapter 4, Sections 4.2.1.6 and 4.2.2.6, of this *DU Oxide SEIS*. However the number of involved workers for cylinder storage has been scaled by the number of cylinders in this analysis compared to that in the Chapter 4 analyses. At Paducah the analysis in Chapter 4 used 16 cylinder yard workers for the 46,150 cylinders being stored for those alternatives; for Portsmouth 12 cylinder yard workers for 22,850 cylinders was used (PPPO 2018).

The storage of commercial cylinders involves 12,500 cylinders. By scaling the workforce, the equivalent of 4 cylinder yard workers would be required to manage the commercial cylinders at Paducah or 6 cylinder yard workers at Portsmouth.

Conversion of Commercial DUF_6

The 2004 EISs (DOE 2004a, 2004b) estimated the worker health impacts for both involved and noninvolved workers, from the conversion of DUF_6 to DU oxide at Paducah and Portsmouth. Potential impacts were assessed for both conversion operations and the cylinder yard operations associated with conversion (e.g., cylinder movement). Annual impacts were provided for an average worker, the total worker population, a maximally exposed noninvolved worker, and for the total noninvolved worker population. This analysis for the conversion of commercial DUF_6 assumes the same annual throughput (20,000 tons [18,000 metric tons] at Paducah and 15,000 tons [13,500 metric tons at Portsmouth) and the same number of involved workers (142 at Paducah and 135 at Portsmouth) as the analyses in the 2004 EISs (DOE 2004a, 2004b). However the noninvolved worker numbers have changed at both sites; Paducah now has 1,200 workers (down from 1,900) and Portsmouth has 2,612 workers (up from 1,800) (DOE 2004a, 2004b; PPPO 2018).

The 2004 Paducah EIS calculated a conversion worker average dose of 75 millirem per year and a conversion worker population dose of 10.7 person-rem per year of conversion operations. (DOE 2004a). For the eight-year conversion period for the commercial DUF_6, the total dose for the average conversion worker would be 0.60 rem and the total worker population dose would be 86 person-rem. The average conversion worker cancer risk would 4×10^{-4} and no additional LCFs (0.05) would be expected within the conversion worker population. Annual doses for workers involved in cylinder yard operations were 690 millirem per year to the average cylinder yard worker and 5.5 person-rem to the total cylinder yard workforce. For the eight-year conversion period for the commercial DUF_6, the total dose for the average cylinder yard worker would be 5.5 rem and the total worker population dose would be 44 person-rem. The average cylinder yard worker cancer risk would be 3×10^{-3} and no additional LCFs (0.03) would be expected within the conversion worker population. Combined, the total workforce cumulative dose would be 130 person-rem resulting in no additional LCFs (0.08).

The 2004 Paducah EIS (2004a) also calculated the dose to the noninvolved workforce. The noninvolved worker MEI dose from conversion operations (there was no contribution from cylinder yard operations) was less than 1×10^{-5} millirem per year. With the smaller workforce at Paducah now, compared to the workforce used in the 2004 EIS, the noninvolved worker population dose (1.9×10^{-5} per the 2004 EIS) would be 1.2×10^{-5} person-rem per year. These two dose estimates result in essentially zero health risk to the noninvolved MEI worker and zero LCFs among the noninvolved worker population.

The 2004 Portsmouth EIS calculated a conversion worker average dose of 75 millirem per year and a conversion worker population dose of 10.1 person-rem per year of conversion operations (DOE 2004b). For the 11-year conversion period for the commercial DUF_6, the total dose for the average conversion worker would be 0.83 rem and the total worker population dose would be 110 person-rem. The average conversion worker cancer risk would 5×10^{-4} and no additional LCFs (0.07) would be expected within the conversion worker population. Annual doses for workers involved in cylinder yard operations were 600 millirem per year to the average cylinder yard worker and 3.0 person-rem per year to the total cylinder yard workforce. For the 11-year conversion period for the commercial DUF_6, the total dose for the average cylinder yard worker would be 6.6 rem and the total worker population dose would be 33 person-rem. The average cylinder yard worker cancer risk would 4×10^{-3} and no additional LCFs (0.02) would be expected within the conversion worker population. Combined the total workforce cumulative dose would be 130 person-rem resulting in no additional LCFs (0.09).

The 2004 Portsmouth EIS (2004b) also calculated the dose to the noninvolved workforce. The noninvolved worker MEI dose from conversion operations (there was no contribution from cylinder yard operations) was less than 5.5×10^{-5} millirem per year. With the larger workforce at Portsmouth now, compared to the workforce used in the 2004 EIS, the noninvolved worker population dose (< 9.9×10^{-6} person-rem per year per the 2004 EIS) would be <1.4×10^{-5} person-rem per year. These two dose estimates result in essentially zero health risk to the noninvolved MEI worker and zero LCFs among the noninvolved worker population.

Conversion to DU oxide would result in very low levels of exposure to hazardous chemicals. Impacts on involved workers from exposure to chemicals during normal operations are not expected. The workplace would be monitored to ensure that airborne chemical concentrations were within applicable health standards that are protective of human health and safety. If planned work activities were likely to expose involved workers to chemicals, workers would be provided with appropriate protective equipment, as necessary. (DOE 2004a, 2004b)

No adverse health effects to noninvolved workers are expected during normal operations. Human health impacts resulting from exposure to hazardous chemicals during normal operations of the conversion facilities are estimated as a hazard index of 1.3×10^{-6} and 3.8×10^{-7} for the noninvolved worker at Paducah or Portsmouth, respectively (DOE 2004a, 2004b). The hazard indices for the conversion process would be significantly lower than the hazard index of 1, which is the level at which adverse health effects might be expected to occur in some exposed individuals.

Storage of Cylinders Containing Commercial Depleted Uranium

At Paducah the equivalent of 4 workers would be involved in cylinder storage yard activities associated with storage of 12,500 cylinders containing commercial DUF_6 for the remainder of the duration of storage after the 8 years of conversion operation (an additional 92 years of cylinder storage at Paducah). At Portsmouth, the equivalent of 6 workers would be required for the 89 year duration (the 100-year duration of the project minus the 11 years of conversion operation) of DU oxide storage (PPPO 2018).

The average annual doses to Paducah and Portsmouth cylinder yard workers are provided in the DOE's 2014 and 2016 Occupational Radiation Exposure Reports (DOE 2015, 2017d). In 2014 the average dose was 74 millirem at Paducah and in 2016 the average dose was 63 millirem at Portsmouth. These reported exposures are well below the worker exposure limit of 5,000 millirem per year as required by 10 CFR 835, "*Occupational Radiation Protection*." These workers performed duties similar to what would be expected of the workers during the implementation of this scenario. Therefore, it is estimated that, at Paducah, the total worker dose for the 4 cylinder yard workers would be approximately 0.30 person-rem per year, and would total 27 person-rem for the 92 years of DU oxide storage after conversion assumed for the Conversion and Storage

Scenario. No LCFs (0.02) are expected from this exposure. Similarly, it is estimated that the total worker dose for the 6 Portsmouth cylinder yard workers would be approximately 0.38 person-rem per year and 34 person-rem for the 89 years of DU oxide storage after conversion associated with the Conversion and Storage Scenario. No LCFs (0.02) are expected to result from this exposure.

The 2004 EISs (DOE 2004a, 2004b) calculated a maximum noninvolved worker dose of 0.15 millirem per year from storage of DUF_6. The noninvolved worker dose was calculated at 100 meters (328 feet) from the storage yards for airborne releases. The dose was estimated based on the uranium in the cylinders in the conversion facility and cylinder storage yards and those moved to and from the conversion facility. Since the amount of uranium that will be stored as an oxide would be similar to that previously being stored as DUF_6, the dose to the noninvolved worker would be similar for the storage and handling of DU oxide.

The 2004 EISs (DOE 2004a, 2004b) also calculated a total worker dose for noninvolved workers. The total noninvolved worker dose at the facilities were estimated to be 0.003 person-rem per year at Paducah and 0.001 person-rem per year at Portsmouth for workforces that vary from those predicted for each site during the storage of DU oxide. However the differences in the number of workers do not significantly affect the workforce doses for the total noninvolved worker dose. No LCFs (less than 0.0002 at Paducah and 0.00006 at Portsmouth) would be expected at either site for the 100 years of DU oxide storage assumed for the Conversion and Storage Scenario.

For worker protection from the toxic effects of uranium, DOE uses the OSHA permissible exposure levels for workplace exposure to uranium of 0.25 milligram per cubic meter for insoluble and 0.05 milligram per cubic meter for soluble uranium (29 CFR 1910.1000, Table Z-1). Under the requirements of DOE's worker protection program, site worker exposures to airborne uranium are maintained below these levels. Adherence to these limits would result in no adverse health effects to workers at either site from the toxic effects of uranium exposure.

Industrial accidents also pose a risk to site workers. All on-site work would be performed in accordance with good management practices and in accordance with applicable OSHA requirements and DOE Orders and regulations. In particular, worker safety practices would be governed by worker safety requirements in 10 CFR 851, *Worker Safety and Health Program*. DOE Order 450.2 *Integrated Safety Management* integrates safety into management and work practices at all levels ensuring protection of workers, the public, and the environment.

The estimated number of accidental worker injuries and fatalities were based on the number of workers in the cylinder storage yard (4 at Paducah or 6 at Portsmouth) and national worker injury and fatality rates. During the 100 years of the Conversion and Storage Scenario there would be no anticipated fatalities at either site based on an average worker fatality rate of 3.4 fatalities per 100,000 worker years (BLS 2014). Accidents resulting in lost worker days occur at a rate of 3.0 per 100 worker years (the national average across all industries in 2016 (BLS 2016). This rate results in an estimated 0.12 cylinder yard worker injury per year during conversion and 0.12 cylinder yard worker injury per year once conversion operations cease at Paducah and 0.18 cylinder yard worker injury per year at Portsmouth. During the 100 years of the Conversion and Storage Scenario, this could result in 12 worker injuries at Paducah and 18 worker injuries at Portsmouth.

Summary

Table C-15 provides a summary of the combined worker radiological health impacts for the Conversion and Storage Scenario. Due to the 100-year length of the cylinder storage activity, no single worker would receive the average dose for the full duration of cylinder storage. However, a cumulative average worker dose has been calculated assuming the same worker received the average dose from working in the cylinder yard for 50 years.

Table C-15 Conversion and Storage Scenario - Worker Health Radiological Impacts

Site	Involved Worker					
	Average Worker			Worker Population		
	Annual	Duration of Activity[a]		Annual	Duration of Activity	
	Dose (mrem/yr)	Dose (rem)	Health Risk (LCF)	Dose (person-rem/yr)	Dose (person-rem)	Health Risk (LCF)
Paducah						
Conversion	75	0.60	4×10^{-4}	10.7	86	0.05
Cylinder operations	690	5.5	3×10^{-3}	5.5	44	0.03
Cylinder storage	74	3.7	2×10^{-3}	0.89	27	0.02
Total[b]	**690**	**5.5**	**3×10^{-3}**	**17**	**160**	**0.10**
Portsmouth						
Conversion	75	0.83	5×10^{-4}	10.1	110	0.07
Cylinder operations	600	6.6	4×10^{-3}	3.0	33	0.02
Cylinder storage	63	3.2	2×10^{-3}	0.38	34	0.02
Total[b]	**600**	**6.6**	**4×10^{-3}**	**13**	**180**	**0.11**
Site	**Noninvolved Worker**					
	MEI Worker			**Worker Population**		
	Annual	**Duration of Activity**		**Annual**	**Duration of Activity**	
	Dose (mrem/yr)	**Dose (rem)**	**Health Risk (LCF)**	**Dose (person-rem/yr)**	**Dose (person-rem)**	**Health Risk (LCF)**
Paducah						
Conversion	1.0×10^{-5}	1×10^{-7}	(c)	1.2×10^{-5}	9.6×10^{-5}	(c)
Cylinder storage	0.15	8×10^{-3}	5×10^{-6}	3×10^{-3}	0.3	2×10^{-4}
Total[b]	**0.15**	**8×10^{-3}**	**5×10^{-6}**	**3×10^{-3}**	**0.3**	**2×10^{-4}**
Portsmouth						
Conversion	5.5×10^{-5}	6×10^{-7}	(c)	1.4×10^{-5}	1.5×10^{-4}	(c)
Cylinder storage	0.15	8×10^{-3}	5×10^{-6}	1×10^{-3}	0.1	6×10^{-5}
Total[b]	**0.15**	**8×10^{-3}**	**5×10^{-6}**	**1×10^{-3}**	**0.1**	**6×10^{-5}**

Key: LCF = latent cancer fatality; MEI = maximally exposed individual; mrem = millirem; yr = year.

[a] For the average worker, the exposure time is assumed to be 50 years for cylinder storage, not the full duration of cylinder storage.

[b] Numbers may not sum due to rounding.

[c] Health risks are effectively zero.

Involved worker impacts result primarily from the conversion operations, despite the longer period of time associated with cylinder storage. Cylinder operations (cylinder movement) associated with conversion operations result in annual MEI doses nearly an order of magnitude higher than those associated with conversion or cylinder storage. In all cases, the average worker doses are well below the worker exposure limit of 5,000 millirem per year as required by 10 CFR Part 835, "Occupational Radiation Protection." No LCFs would be expected within the worker populations from any of the activities.

Noninvolved worker annual and total impacts, both to the MEI and total worker population, are orders of magnitude lower than the impacts on the involved workers. No health effects (LCFs) are expected within the noninvolved worker population.

C.7.1.2 Conversion and Disposal Scenario

Impacts on public and worker health at Paducah or Portsmouth under all three Conversion and Disposal Scenarios would be similar to the impacts described in Section C.7.1 for the Conversion and Storage Scenario. The major difference would be that under the Conversion and Disposal Scenario, cylinders would be stored at Paducah for up to 62 years (53 years of storage and 9 years to ship to a disposal facility) and at Portsmouth for up to 52 years (43 years of storage and 9 years to ship to a disposal facility) rather than the 100 years under the Conversion and Storage Scenario.

Public Safety and Health

The 2004 EISs (DOE 2004a, 2004b) estimated the public health impacts from the conversion of DUF_6 to DU oxide and from the storage of DUF_6 at Paducah and Portsmouth. After conversion, any exposure to stored uranium would be from DU oxide. The chemical form of the released uranium does not appreciably impact the radiological characteristics of the material. Therefore, the dose estimates from the 2004 EISs for DUF_6 were used in this *DU Oxide SEIS* to estimate the effects of exposure to DU oxide. In addition, information from both sites' annual site environmental reports (DOE 2017b, 2017c) were used to augment the analysis of public health and safety.

Conversion of Commercial DUF_6

Impacts from the conversion of the commercial DUF_6 would be the same under any of the Conversion and Disposal Scenarios as they would be under the Conversion and Storage Scenario.

Storage of Cylinders Containing Commercial Depleted Uranium

The 2004 Paducah EIS (DOE 2004a) estimated that if all DU assumed to be released in cylinder breaches each year were released to the atmosphere (a very conservative assumption), the dose to the general public would be 0.008 person-rem per year. These impacts were scaled using the same ratios as used for the Conversion and Storage Scenario. This results in an estimated dose of 0.003 person-rem per year at Paducah. For the 62 years of DU storage and shipment assumed for the Conversion and Disposal Scenario, this population dose rate would correspond to a total population dose of 0.18 person-rem. This population dose would result in an estimated zero (1×10^{-4}) LCF, indicating a very small likelihood, about 1 in 9,000, of additional cancer fatalities in the general population associated with commercial DU oxide storage at Paducah. For comparison, the average natural background radiation level in the United States is 310 millirem per year; this means that during the 62 years of commercial DU oxide storage, the population within 50 miles of Paducah would receive a background dose of 10 million person-rem based on a population of 534,000 (DOE 2017b). The population dose associated with natural background radiation could result in an estimated 6,100 LCFs.

The 2004 Portsmouth EIS (DOE 2004b) estimated that if all DU assumed to be released in cylinder breaches each year were released to the atmosphere (a very conservative assumption), the dose to the general public would be 0.002 person-rem per year. These impacts were scaled using the same ratios as used for the Conversion and Storage Scenario. This results in an estimated dose of less than 0.002 person-rem per year at Portsmouth. For the 52 years of commercial DU oxide storage and shipment assumed for the Conversion and Disposal Scenario, this population dose rate would correspond to a total population dose of 0.081 person-rem. This population dose would result in an estimated zero (5×10^{-5}) LCF, indicating a very small likelihood, about 1 in 25,000, of any additional cancer fatalities in the general population associated with commercial DU oxide storage at Portsmouth. For comparison, over the same period, the 677,000 people (DOE 2017c) living within 50 miles of Portsmouth would receive a background dose of 11.0 million person-rem. The population dose associated with natural background radiation could result in an estimated 6,500 LCFs.

The 2004 EISs calculated impacts on an MEI in the general population. At Paducah this MEI dose is approximately 0.1 millirem per year from airborne releases of uranium and less than 0.5 millirem per year from the ingestion of contaminated water (DOE 2004a); at Portsmouth it is less than 0.1 millirem per year from airborne releases of uranium and less than 0.4 millirem per year from the ingestion of contaminated water (DOE 2004b). In addition, the Annual Site Environmental Reports for both sites identify an MEI dose that results from direct radiation exposure to an individual that passes the site in close proximity to the cylinder storage yards. Since the commercial cylinders are to be stored within the existing cylinder yards and other appropriate available areas, and the dose drops off very quickly with distance from the cylinders, the addition of these cylinders should not significantly impact this direct radiation dose at either site. Therefore, the only incremental impact of storage of the commercial cylinders would be from the anticipated cylinder breaches. Scaling the MEI dose to reflect the reduced number of cylinders at each site results in MEI doses of less than 0.2 millirem per year at Paducah (scaling factor of 0.35) and less than 0.4 millirem per year at Portsmouth (scaling factor of 0.77).

At Paducah, this dose to the MEI results in an incremental increase in the risk of a fatal cancer for this individual of 1×10^{-7}, less than a 1 in 8 million chance. Although it is unlikely that the same individual would be the MEI every year over the 62 years of DU oxide storage and shipment, the likelihood of the individual receiving this MEI dose during that period and contracting a fatal cancer is less than 1 in 140,000.

At Portsmouth, this dose to the MEI results in an incremental increase in the risk of a fatal cancer for this individual of 2×10^{-7}, less than a 1 in 4 million chance. Although it is unlikely that the same individual would be the MEI every year over the 52 years of DU oxide storage and shipment, the likelihood of the individual receiving this MEI dose during that period and contracting a fatal cancer is approximately 1 in 80,000.

The 2004 EISs (DOE 2004a, 2004b) also provide an estimate of the nonradiological impacts of uranium releases on the public. Both of the 2004 EISs estimated that the HI associated with airborne releases of uranium would be less than 0.1 and that for releases into the waters around the sites the hazard index would be less than 0.05. Therefore, no adverse impacts are expected from chemical exposure.

Summary

Table C-16 provides a summary of the combined public health radiological impacts for the Conversion and Disposal Scenario. Both MEI and total population impacts are dominated by cylinder storage impacts. All individual doses are well below regulatory limits for radiation exposure to a member of the public established by both the EPA and DOE. The EPA has set a radiation dose limit to a member of the general public of 10 millirem per year from airborne sources (40 CFR Part 61). DOE has established a limit on the dose to a member of the public of 100 millirem per year from all sources combined (DOE Order 458.1). Impacts from all operations are not expected to result in any health effects (LCFs), and the risks to individuals and the population are both less than 1 in 1,000,000 for each year of operation.

Table C-16 Conversion and Disposal Scenario - Public Health Radiological Impacts

		MEI			
		Annual		Duration of Activity	
Site	Scenario	Dose (millirem/yr)	Health Risk (LCF)	Dose (rem)	Health Risk (LCF)
Paducah	Conversion	3.9×10^{-5}	(a)	3.1×10^{-7}	2×10^{-10}
	Cylinder storage	0.2	1×10^{-7}	0.012	7×10^{-6}
	Total	**0.2**	$\mathbf{1\times10^{-7}}$	**0.012**	$\mathbf{7\times10^{-6}}$
Portsmouth	Conversion	2.1×10^{-5}	(a)	2.3×10^{-7}	1×10^{-10}
	Cylinder storage	0.4	2×10^{-7}	0.02	1×10^{-5}
	Total	**0.4**	$\mathbf{2\times10^{-7}}$	**0.02**	$\mathbf{1\times10^{-5}}$
		Population			
		Annual		**Duration of Activity**	
Site	**Scenario**	**Dose (person-rem/yr)**	**Health Risk (LCF)**	**Dose (Person-rem)**	**Health Risk (LCF)**
Paducah	Conversion	4.7×10^{-5}	3×10^{-8}	3.8×10^{-4}	2×10^{-7}
	Cylinder storage	3×10^{-3}	2×10^{-6}	0.18	1×10^{-4}
	Total	$\mathbf{3\times10^{-3}}$	$\mathbf{2\times10^{-6}}$	**0.18**	$\mathbf{1\times10^{-4}}$
Portsmouth	Conversion	6.2×10^{-5}	4×10^{-8}	6.8×10^{-4}	4×10^{-7}
	Cylinder storage	2×10^{-3}	9×10^{-7}	0.081	5×10^{-5}
	Total	$\mathbf{2\times10^{-3}}$	$\mathbf{9\times10^{-7}}$	**0.081**	$\mathbf{5\times10^{-5}}$

Key: LCF = latent cancer fatality; yr = year.
[a] Health risks are essentially zero.

Occupational Safety and Health

During normal operation of the conversion facility, conversion workers (involved workers) would be exposed to external radiation from the handling of DU materials. Impacts on the remainder of the site workers (noninvolved workers) would result from trace amounts of uranium compounds released to the environment. Cylinder storage yard workers would be exposed to low levels of gamma and neutron radiation while working in the yards performing activities that include routine inspections, ultrasonic inspections, radiological monitoring and valve maintenance, and container repair and relocations. The numbers of workers (involved and noninvolved) assumed in this analysis are the same as the numbers used in the 2004 EISs and in the analyses presented in Chapter 4, Sections 4.2.1.6 and 4.2.2.6, of this *DU Oxide SEIS*.

Conversion of Commercial DUF_6

Impacts from the conversion of the commercial DUF_6 would be the same under any of the Conversion and Disposal Scenarios as they would under the Conversion and Storage Scenario.

Storage of Cylinders Containing Commercial Depleted Uranium

At Paducah the equivalent of 4 workers would be involved in these activities. At Portsmouth, the equivalent of 6 workers would be required. The average annual dose to Paducah and Portsmouth cylinder yard workers, are provided in the DOE's 2014 and 2016 Occupational Radiation Exposure Reports (DOE 2017d). In 2016 the average dose was 74 millirem at Paducah and in 2014 the average dose was 63 millirem at Portsmouth. These reported exposures are well below the worker exposure limit of 5,000 millirem per year as required by 10 CFR 835, *Occupational Radiation Protection*. These workers performed duties similar to what would be expected of the cylinder yard workers during the implementation of this scenario. Therefore, it is estimated that at Paducah the total worker dose for the 4 cylinder yard workers would be approximately 0.30 person-rem per year and 16 person-rem for the 53 years (61 years minus the 8 years of conversion operations) of DU oxide storage associated with the Conversion and Disposal Scenario. No LCFs (0.009) would be expected to result from this exposure. Similarly, it is estimated that the total worker dose for the 6 Portsmouth cylinder yard workers would be approximately 0.38 person-rem per year and 15 person-rem for the 41 years (52 years minus the 11 years of conversion operations) of DU oxide storage associated with the Conversion and Disposal Scenario. No LCFs (0.009) are expected to result from this exposure.

Worker exposure would also result from the handling of the DU oxide cylinders and unusable cylinders during loading operations at the site in preparation for shipment to the waste disposal site. For the DU oxide cylinders, it is assumed that the cylinders could be shipped either by train (six cylinders per railcar) or by truck (one cylinder per truck). It would take four workers and a supervisor about four hours to load six cylinders onto a railcar (PPPO 2018). The same crew would take about a half-hour to load a single cylinder onto a truck. As noted in the transportation analysis the dose at 30 cm from the cylinder surface is about 2 millirem/hour which equates to less than 1 millirem/hour at 1 meter from the cylinder surface. Although it takes four hours to load six cylinders onto a railcar, the time spent in close proximity to the cylinder is limited. It is estimated that the worker dose associated with loading these six cylinders would be 2 millirem per person, for a total of 0.01 person-rem for the 5 workers. This would result in a worker dose of 21 person-rem for the 12,500 DU oxide cylinders generated from commercial DUF_6. Over the 9 years of shipping operations, the average total annual worker dose would be 2.3 person-rem per year, 0.46 person-rem to the average worker. Given the shorter time to load a single cylinder onto a truck, compared to loading a single cylinder onto a railcar, the impacts of loading railcars should bound the impacts of loading trucks.

The 2004 EISs (DOE 2004a, 2004b) calculated a maximum noninvolved worker dose of 0.15 millirem per year from storage of DUF_6. The dose was estimated based on the uranium in the cylinders in the conversion facility and cylinder storage yards and those moved to and from the conversion facility. Since the amount of uranium that will be stored as an oxide would be similar to that previously being stored as DUF_6, the dose to the noninvolved worker would be similar for the storage and handling of DU oxide.

The 2004 EISs (DOE 2004a, 2004b) also calculated a total worker dose for noninvolved workers. The total noninvolved worker doses at the facilities were estimated to be 0.003 person-rem per year at Paducah and 0.001 person-rem per year at Portsmouth for workforces that vary from those predicted for each site during the storage of DU oxide. The difference in work force populations does not significantly impact the estimated noninvolved worker population dose. No LCFs (less than 0.00009 at Paducah and 0.00003 at Portsmouth) would be expected at either site for DU oxide storage and handling before shipment to a disposal site.

For worker protection from the toxic effects of uranium, DOE uses the OSHA permissible exposure levels for workplace exposure to uranium of 0.25 milligram per cubic meter for insoluble and 0.05 milligram per cubic meter for soluble uranium (29 CFR 1910.1000, Table Z-1). Under the requirements of DOE's worker protection program, site worker exposures to airborne uranium are maintained below these levels. Adherence to these limits would result in no adverse health effects to workers at either site from the toxic effects of uranium exposure.

Industrial accidents also pose a risk to site workers. All on-site work would be performed in accordance with good management practices, and in accordance with applicable OSHA requirements and DOE Orders and regulations. In particular, worker safety practices would be governed by worker safety requirements in 10 CFR 851, *Worker Safety and Health Program*. DOE Order 450.2 *Integrated Safety Management* integrates safety into management and work practices at all levels ensuring protection of workers, the public, and the environment.

The estimated number of accidental worker injuries and fatalities were determined on the basis of the number of workers in the cylinder yard (four at Paducah and six at Portsmouth) and national worker injury and fatality rates. Under the Conversion and Disposal Scenario there would be no anticipated fatalities at either site based on an average worker fatality rate of 3.4 fatalities per 100,000 worker years (BLS 2014). Accidents resulting in lost worker days occur at a rate of 3.0 per 100 worker years (the national average across all industries in 2016) (BLS 2016b). This rate results in an estimated 0.12 cylinder yard worker injury per year at Paducah and 0.18 cylinder yard worker injury per year at Portsmouth. Under the Conversion and Disposal Scenario this could result in seven worker injuries at Paducah and nine worker injuries at Portsmouth.

Summary

Table C-17 provides a summary of the combined worker radiological health impacts for the Conversion and Disposal Scenario. Due to the length of the cylinder storage activity, 52 or 43 years at Paducah or Portsmouth, respectively, it is unlikely that any one worker would be subject to the average dose for the entire duration of cylinder storage. However, the average worker dose for the duration of cylinder storage has been calculated.

Involved worker impacts result primarily from the conversion operations, despite the longer period of time associated with cylinder storage. Cylinder operations (cylinder movement) associated with conversion operations result in annual MEI doses nearly an order of magnitude higher than those associated with conversion or cylinder storage. In all cases, the average worker doses are well below the worker exposure limit of 5,000 millirem per year as required by 10 CFR Part 835, "Occupational Radiation Protection." No LCFs would be expected within the worker populations from any of the activities.

Noninvolved worker annual and total impacts, both to the MEI and total worker population, are orders of magnitude lower than the impacts on the involved workers. No health effects (LCFs) are expected within the noninvolved worker population.

Table C-17 Conversion and Disposal Scenario—Worker Health Radiological Impacts

	Involved Worker					
	Average Worker			Worker Population		
	Annual	Duration of Activity		Annual	Duration of Activity	
Site	Dose (mrem/yr)	Dose (rem)	Health Risk (LCF)	Dose (person-rem/yr)	Dose (person-rem)	Health Risk (LCF)
Paducah						
Conversion	75	0.6	4×10^{-4}	10.7	86	0.05
Cylinder Operations	690	5.5	3×10^{-3}	5.5	44	0.03
Cylinder Storage	74	3.9	2×10^{-3}	0.30	16	0.009
Cylinder Shipment	460	4.2	3×10^{-3}	2.3	21	0.01
Total[a]	**690**	**5.5**	**3×10^{-3}**	**16 [c]**	**170**	**0.1**
Portsmouth						
Conversion	75	0.83	5×10^{-4}	10.1	110	0.07
Cylinder Operations	600	6.6	4×10^{-3}	3.0	33	0.02
Cylinder Storage	63	2.6	2×10^{-3}	0.38	15	0.009
Cylinder Shipment	460	4.2	3×10^{-3}	2.3	21	0.01
Total[a]	**600**	**6.6**	**4×10^{-3}**	**13[c]**	**180**	**0.1**
	Noninvolved Worker					
	MEI Worker			**Worker Population**		
	Annual	**Duration of Activity**		**Annual**	**Duration of Activity**	
Site	**Dose (mrem/yr)**	**Dose (rem)**	**Health Risk (LCF)**	**Dose (person-rem/yr)**	**Dose (person-rem)**	**Health Risk (LCF)**
Paducah						
Conversion	1.0×10^{-5}	1×10^{-7}	(b)	1.2×10^{-5}	9.6×10^{-5}	(b)
Cylinder Storage and Shipment	0.15	8×10^{-3}	5×10^{-6}	3×10^{-3}	0.2	1×10^{-4}
Total[a]	**0.15**	**8×10^{-3}**	**5×10^{-6}**	**3×10^{-3}**	**0.2**	**1×10^{-4}**
Portsmouth						
Conversion	5.5×10^{-5}	6×10^{-7}	(b)	1.4×10^{-5}	1.5×10^{-4}	(b)
Cylinder Storage and Shipment	0.15	6×10^{-3}	4×10^{-6}	1×10^{-3}	0.04	2×10^{-5}
Total[a]	**0.15**	**6×10^{-3}**	**4×10^{-6}**	**1×10^{-3}**	**0.04**	**2×10^{-5}**

Key: LCF = latent cancer fatality; yr = year.

a Numbers may not sum due to rounding. Conversion and cylinder operations do not occur concurrently with cylinder storage and shipment

b Health risks are effectively zero.

C.7.1.3 Conversion and Disposal Bulk Bag Scenario

An option is being considered under the Conversion and Disposal scenario, where the DU oxide produced from commercial DUF_6 would be placed directly in bulk bags. These bulk bags would then be loaded onto trucks or railcars and shipped to a waste disposal facility and would not be placed in the cylinder yards for storage. Based on the amount of DU oxide that would be produced and the assumed capacity of the bulk bags; approximately 10,990 bulk bags would be filled and shipped at Paducah or Portsmouth. In this option, the 12,500 empty and heel cylinders would be volume-reduced and shipped off site as waste.

Public Health and Safety for the Bulk Bag Option

Conversion operations would result in the same population and individual doses as identified for conversion operations in the previous section (see Table C-16).

Under this option there would be no long-term storage of DU oxide and therefore no individual or population dose from the long-term storage of DU oxide. Comparatively, there would be less DU oxide on site at any one time since the bags are filled, loaded, and shipped as the DU oxide is generated. This means there would be less material available as a source of direct radiation for any member of the public near the site boundary. (The dose at 1 meter from the surface of the bulk bag is expected to be similar to that for a cylinder, less than 1 millirem/hour) (PPPO 2018). The annual individual and population dose associated with the truck or railcar loading of DU oxide bulk bags and empty and heel cylinders would be similar to that described in Chapter 4, Section 4.2.1.6, under the option for DU oxide disposal in bulk bags.

The primary source of the normal operations population dose from cylinder storage is the release of material during cylinder breaches. Because the bulk bags are on-site for a short period there would little to no likelihood of a breach of a bulk bag that would be considered a normal operational event. Any rupture of the bulk bags would be the result of an accident and not from normal wear or corrosion.

Occupational Safety and Health for the Bulk Bag Option

As with the public health and safety, there would be no worker exposure due to the storage of bulk bags.

Worker doses from the conversion process would be the same as identified in the previous section (see Table C-17). Additionally, worker exposure would result from the handling of the DU oxide in bulk bags and empty and heel cylinders during loading operations at the site in preparation for shipment to the waste disposal site.

For the DU oxide bulk bags, it is assumed that the bulk bags could be shipped either by train (eight bulk bags per railcar; 10 railcars per train) or by truck (two bulk bags per truck). It is assumed that the information on the loading of cylinders is a reasonable approximation for the loading of bulk bags. It would take four workers and a supervisor about four hours to load six bulk bags onto a railcar (PPPO 2018). The same crew would take about a half-hour to load a single bulk bag onto a truck. The dose at 1 meter from the bulk bag is less than 1 millirem/hour (PPPO 2018), similar to the dose associated with a full cylinder. Although it takes four hours to load six bulk bags onto a railcar, the time spent in close proximity to the bulk bag is limited. It is estimated that the worker dose associated with loading these six bulk bags would be 2 millirem per person, for a total of 0.01 person-rem for the 5 workers. Given the shorter time to load a single bulk bag onto a truck, compared to a single bulk bag onto a railcar, the impacts of loading railcars should bound the impacts of loading trucks.

The 10,990 DU oxide bulk bags are to be shipped to a waste disposal facility. Given the dose rate per railcar provided above, this results in a total worker dose of 18 person-rem. No LCFs (calculated value of 0.01) would be expected from this exposure. Over the 8 years of shipment operations at Paducah and the 11 years at Portsmouth, the average individual worker dose would be 2.3 person-rem per year which corresponds to an annual risk of about 0.001 LCF at Paducah or 1.6 person-rem per year which corresponds to an annual risk of about 0.001 LCF at Portsmouth.

The use of bulk bags would result in the generation of 12,500 empty and heel cylinders at either site that would need to be disposed. These cylinders would be compacted and cut in half to reduce their length in a cylinder disposition facility. The reduced size cylinder would then be loaded by overhead crane into a shipping container. Secondary containment would be provided for the intermodal container loadout. None of these activities requires a worker to be in close proximity to the cylinders. Therefore, worker doses from this activity are not expected to significantly alter the worker doses estimated for the conversion process.

C.7.2 Accidents

Accident risks to the public and worker health at Paducah or Portsmouth under the Conversion and Storage Scenario considered impacts from conversion facility operation as well as cylinder storage yard activities during conversion (cylinder movements between the conversion facility and the cylinder storage yard) and during cylinder storage. Conversion of the commercial DUF_6 would require 8 years of conversion operations at Paducah and 11 years at Portsmouth. Under the Conversion and Storage Scenario, cylinders of DU oxide would be stored for up to 100 years at either Paducah or Portsmouth. Under the Conversion and Disposal Scenario DU oxide containers would be stored for up to 53 years at Paducah and 43 years at Portsmouth rather than the 100 years under the Conversion and Storage Scenario.

The potential impacts of accidents associated with the management of the commercial DUF_6 and DU oxide have been extensively examined in NEPA and safety analyses for Paducah and Portsmouth, including the 2004 EISs (DOE 2004a, 2004b), the DUF_6 PEIS (DOE 1999), and the 2016 documented safety analyses for the cylinder storage yards for each site (BWXT 2006a, 2006b). The characteristics and processes for the conversion, management and storage of the commercial DUF_6 and DU oxide are similar to those for DOE DUF_6 and DU oxide evaluated in the site NEPA and safety documents, so the accident scenarios and consequences are expected to be similar. The additional materials processed, stored, and shipped would increase the amounts of material stored, extend the operational periods for the facilities and extend the timeframe during which the accident hazards exist.

Both the 2004 EISs and 2016 safety analyses identified similar accidents and impacts from conversion of DUF_6 and from cylinder storage yard and DU oxide management and storage activities. The accident analyses in these documents indicate that the physical hazards associated with handling large, heavy cylinders were such that workers could be injured or killed as a result of on-the-job accidents unrelated to radiation or chemical exposure. The potential for accidental injuries and deaths are similar to other industries that use heavy equipment or manipulate heavy objects.

Under both the Conversion and Storage and the Conversion and Disposal scenarios, containers of commercial DUF_6 and DU oxide would be stored and handled for many years. The accident analyses indicated that it is possible that accidents could release radiation or chemicals to the environment, potentially affecting both the workers and members of the general public. In both the NEPA and safety documents, a range of operational and natural-phenomena initiated accidents were considered, including cylinder handling equipment fires, fires involving cylinder(s) in a pool of fuel or oil, small vehicle or transport truck fires, tornado and high wind, seismic events, train accident with derailment and subsequent fires, and small and large aircraft impacts followed by fires. The NEPA and safety documents considered accidents ranging from those that would be reasonably likely to occur (expected one or more times in 100 years on average) to those that would be extremely rare (estimated to occur less than once in 1 million years on average).

These analyses indicate that of all the operational accidents considered, those involving DUF_6 cylinders would have the largest potential effects. Among extremely unlikely natural phenomena accidents, a severe seismic event that causes widespread failure of the DU oxide storage containers resulted in the highest radiological impacts. A seismic-initiated earthquake was evaluated in the 2004 EISs in which a DU oxide storage building was damaged and 10 percent of the contents of the stored containers were breached, resulting in a spill of 61 kilograms (135 pounds) (DOE 2004a, 2004b). Because the DU oxide will not be stored in a building, there would be no risk of damage to the cylinders from falling debris; thus, this storage building accident is not applicable. Severe, natural phenomena events, including earthquakes, do not have the potential to substantially damage stored DU oxide containers, and releases larger than the 6 kilograms (13 pounds) of DU oxide evaluated above would not be expected.

Under both the Conversion and Storage and the Conversion and Disposal scenarios, the probability is low that accidents involving DUF_6 cylinders would occur while in storage. If an accident occurred, DUF_6 could be released to the environment. The DUF_6 would combine with moisture in the air, forming gaseous HF and uranyl fluoride, a soluble solid in the form of small particles. The uranyl fluoride and HF could be dispersed downwind, potentially exposing workers and members of the general public to radiation and chemical effects. The amount released would depend on the severity of the accident and the number of cylinders involved. The probability of cylinder accidents would decrease as the DUF_6 is converted and the number of DUF_6 cylinders in storage decreases.

For releases involving DUF_6 and other uranium compounds, both chemical and radiological effects could occur if the material was ingested or inhaled. The chemical effect of most concern associated with internal uranium exposure is kidney damage, and the radiological effect of concern is an increase in the probability of developing cancer. With regard to uranium, chemical effects occur at lower exposure levels than do radiological effects. Exposure to HF from accidental releases could result in a range of health effects, from eye and respiratory irritation to death, depending on the exposure level. Large anhydrous ammonia (NH_3) releases could also cause severe respiratory irritation and death (NH_3 is used to generate hydrogen, which is required for the conversion process).

Chemical and radiological exposures to involved workers under accident conditions would depend on how rapidly the accident developed, the exact location and response of the workers, the direction and amount of the release, the physical forces causing or caused by the accident, meteorological conditions, and the characteristics of the room or building if the accident occurred indoors. Impacts on involved workers under accident conditions would likely be dominated by physical forces from the accident itself. For these reasons, the impacts on involved workers during accidents are not quantified in this *DU Oxide SEIS*. However, it is recognized that injuries and fatalities among involved workers would be possible if an accident did occur.

The impacts from accidental chemical releases for this *DU Oxide SEIS* were estimated by determining the numbers of people downwind who might experience *adverse* effects and *irreversible adverse* effects. These terms have very specific health meaning and are defined as:

Adverse Effects: Any adverse health effects from exposure to a chemical release, ranging from mild and transient effects, such as respiratory irritation or skin rash (associated with lower chemical concentrations), to irreversible (permanent) effects, including death or impaired organ function (associated with higher chemical concentrations).

Irreversible Adverse Effects: A subset of adverse effects, irreversible adverse effects are those that generally occur at higher concentrations and are permanent in nature. Irreversible effects may include death, impaired organ function (such as central nervous system or lung damage), and other effects that may impair everyday functions.

The accident analyses reported in the 2004 EISs (DOE 2004a, 2004b) concluded that for accidents involving cylinders that might happen at least once in 100 years (i.e., likely accidents), off-site concentrations of HF and uranium would be considerably below levels that would cause *adverse* chemical effects among members of the general public from exposure to these chemicals. If this type of accident occurred, up to 10 noninvolved workers at Paducah or 70 noninvolved workers at Portsmouth might experience potential adverse effects from exposure to HF and uranium (mild and temporary effects, such as respiratory irritation or temporary decrease in kidney function). It is estimated that up to 3 noninvolved workers at Paducah or Portsmouth would experience potential irreversible adverse effects that are permanent in nature (such as lung damage or kidney damage); no fatalities are expected. Radiation exposures would be unlikely to result in additional LCFs among noninvolved workers or members of the general public for these types of accidents (DOE 2004a, 2004b).

Cylinder accidents that are less likely to occur could be more severe, having greater consequences that could potentially affect off-site members of the general public. These types of accidents are considered extremely unlikely, expected to occur with a frequency of between once in 10,000 years and once in 1 million years of operations. **Table C-18** summarizes the estimated consequences of chemical exposures from extremely unlikely cylinder accidents at Paducah or Portsmouth. Among all the cylinder accidents analyzed, the postulated accident that would result in the largest number of people with *adverse* effects (including mild and temporary as well as permanent effects) would be an accident that involves rupture of DUF_6 cylinder(s) in a fire. If this type of accident occurred, it is estimated that up to 2,000 members of the general public at Paducah (or 680 at Portsmouth) and up to 910 noninvolved workers at Paducah (or 1,000 at Portsmouth) might experience a*dverse* chemical effects from HF and uranium exposure (mild and temporary effects, such as respiratory irritation or temporary decrease in kidney function) (DOE 2004b). At Paducah, it is estimated that more adverse effects would occur among the general public than among noninvolved workers because of the buoyancy effects from the fire on contaminant plume spread to nearby off-site populations (i.e., the concentrations that would occur would be higher at points farther from the release than at closer locations) (DOE 2004a). For the similar accident at Portsmouth, there are more adverse effects off-site due to the differences in population distributions between Paducah and Portsmouth.

Table C-18 Estimated Consequences of Extremely Unlikely Chemical Exposures for DUF_6 Cylinder Accidents at the Paducah and Portsmouth Sites

Accident Scenario[a]	Potential Effect[b]	Consequence[c] (number of persons effected)	
		Paducah	Portsmouth
Impact to the General Public			
Rupture of cylinders – fire	Adverse effects	3–2,000	4–680
Corroded cylinder spill, wet conditions – water pool	Irreversible adverse effects	0–1	0–1
Corroded cylinder spill, wet conditions – water pool	Potential fatalities	0	0
Impacts on Noninvolved Workers[d]			
Rupture of cylinders – fire	Adverse effects	4–910	160–1,100
Corroded cylinder spill, wet conditions – water pool	Irreversible adverse effects	1–300	0–110
Corroded cylinder spill, wet conditions – water pool	Potential fatalities	0–3	0–1

Key: m/s = meters per second; mph = miles per hour.

[a] The accidents listed are those estimated to result in the greatest impacts among all the accidents considered (except for certain accidents with security concerns). The site-specific impacts for a range of accidents at Paducah and Portsmouth are given in the 2004 EISs (DOE 2004 a, 2004b) and the supporting analyses by Hartmann (1999a, 1999b)

[b] Potential adverse effects include exposures that could result in mild and transient injury, such as respiratory irritation. Potential irreversible adverse effects include exposures that could result in permanent injury (e.g., impaired organ function) or death. The majority of the adverse effects would be mild and temporary in nature. It is estimated that less than 1 percent of the predicted potential irreversible adverse effects would result in fatalities (see text).

[c] The consequence is expressed as the number of individuals with a predicted exposure level sufficient to cause the corresponding health endpoint as reported in the 2004 EISs. Changes in the general population distributions since the analyses were performed for the 2004 EISs are not expected to result in meaningful changes to the potential impacts identified. The range of estimated consequences reflects different atmospheric conditions at the time of an accident assumed to occur at the cylinder yard closest to the site boundary. In general, maximum risks would occur under the atmospheric conditions of F stability with a 1-m/s (2-mph) wind speed; minimum risks would occur under D stability with a 4-m/s (9-mph) wind speed. For both conditions, it was assumed that the wind would be blowing in the direction of the highest density of worker or public populations.

[d] Noninvolved workers are persons who work at the site but who are not involved in handling materials. Depending on the circumstances of the accident, injuries and fatalities among involved workers are possible for all accidents.

Sources: DOE 2004a, 2004b, Tables 5.1-2

The postulated cylinder accident that would result in the largest number of persons with *irreversible adverse* health effects is a corroded DUF_6 cylinder spill under wet conditions, with the DUF_6 being released into a pool of standing water. This accident is considered extremely unlikely, with an estimated frequency of between once in 10,000 years and once in 1 million years of operations. If this accident occurred, it is estimated that 1 member of the general public at Paducah or Portsmouth, and up to 300 noninvolved workers at Paducah or 110 noninvolved workers at Portsmouth, might experience *irreversible adverse* effects (such as lung damage or kidney damage). No fatalities are expected among members of the general public; there would be a potential for 3 fatalities at Paducah or 1 at Portsmouth among noninvolved workers from chemical effects. Radiation exposures would be unlikely to result in additional LCFs among noninvolved workers (1 chance in 170 at Paducah' 1 chance in 100 at Portsmouth) or the general public (1 chance in 70 at Paducah; 1 chance in 30 at Portsmouth) (DOE 2004a, 2004b).

The number of persons actually experiencing *adverse* or *irreversible adverse* effects from DUF_6 cylinder accidents would likely be considerably fewer than those estimated for this analysis and would depend on the actual circumstances of the accident and the individual chemical sensitivities of the affected persons. For example, although exposures to releases from cylinder accidents could be life-threatening (especially with respect to immediate effects from inhalation of HF at high concentrations), the guideline exposure level of 20 parts per million (ppm) of HF used to estimate the potential for *irreversible adverse* effects from HF exposure is likely to result in overestimates. This exposure level is equivalent to the Emergency Response Planning Guideline (ERPG)-2 value for HF (DOE 1999). ERPG-2 levels are defined as "the maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action". This is because no animal or human deaths have been known to occur as a result of acute exposures (i.e., 1 hour or less) at concentrations of less than 50 ppm; generally, if death does not occur quickly after HF exposure, recovery is complete (DOE 2004a, 2004b).

Similarly, the guideline intake level of 30 milligrams (mg) used to estimate the potential for irreversible adverse effects from the intake of uranium in this *DU Oxide SEIS* is the level suggested in NRC guidance. This level is somewhat conservative; that is, it is intended to overestimate rather than underestimate the potential number of irreversible adverse effects in the exposed population following uranium exposure. In more than 40 years of cylinder handling activities, no accidents involving releases from cylinders containing solid DUF_6 have occurred that have caused diagnosable irreversible adverse effects among workers (DOE 2004a, 2004b). In previous accidental exposure incidents involving liquid DUF_6 in gaseous diffusion plants, some worker fatalities occurred immediately after the accident as a result of inhalation of HF generated from the DUF_6. However, no fatalities occurred as a result of the toxicity of the uranium exposure. A few workers were exposed to amounts of uranium estimated to be about three times the guideline level (30 mg) used for assessing irreversible adverse effects; none of these workers, however, actually experienced such effects (DOE 2004a, 2004b).

Under both the Conversion and Storage and the Conversion and Disposal scenarios, low-probability accidents involving chemicals at the conversion facility could have large potential consequences for noninvolved workers and members of the general public. These accidents were evaluated in detail in the 2004 EISs (DOE 2004a, 2004b). At either conversion site, accidents involving chemical releases, such as NH_3 and HF, could occur. NH_3 is used to generate hydrogen for conversion, and HF is produced as a co-product of converting DUF_6.

The largest impacts identified in the 2004 EISs for the conversion operations would be caused by an HF storage tank rupture; a corroded DUF_6 cylinder spill under wet conditions (i.e., rain and formation of a water pool); an NH_3 tank rupture; and the rupture of several DUF_6 cylinders in a fire. Accidents involving stack emissions would have smaller impacts compared with accidents involving releases at ground level because of the relatively larger dilution and smaller release rates (due to filtration) involved with the stack emissions. The conversion accident estimated to have the largest potential consequences is an accident involving the rupture of tanks containing either 70 percent HF or NH_3. Such an accident could be caused by a large earthquake and would be expected to occur with a frequency of less than once in 1 million years of operations.

The Summary and Section 5.2 results in the 2004 EISs (DOE 2004a, 2004b) indicate that if an aqueous HF or NH_3 tank ruptured at the conversion facility, a maximum of up to about 6,700 members of the general public near Paducah (DOE 2004a, page S-35) or 2,300 members of the general public near Portsmouth (DOE 2004b, page S-37) might experience adverse effects (mild and temporary effects, such as respiratory irritation or temporary decrease in kidney function) as a result of chemical exposure. A maximum of about 370 people near Paducah or 210 people near Portsmouth might experience irreversible adverse effects (such as lung damage or kidney damage), with the potential for about 7 fatalities at Paducah or 4 fatalities at Portsmouth. With regard to noninvolved workers, up to about 1,600 at Paducah or 1,400 at Portsmouth might experience adverse effects (mild and temporary) as a result of chemical exposures. A maximum of about 1,600 noninvolved workers at Paducah or 1,400 noninvolved workers at Portsmouth might experience irreversible adverse effects, with the potential for about 30 fatalities at either location (DOE 2004a, 2004b).

Although such high-consequence accidents at the conversion facility are possible, they are expected to be extremely rare. The risk over the life of these facilities (defined as consequence×probability) for these accidents would be less than 1 fatality and less than 1 irreversible adverse health effect for noninvolved workers and members of the public combined. NH_3 and HF are commonly used for industrial applications in the United States, and there are well-established accident prevention and mitigation measures for HF and NH_3 storage tanks (DOE 2004a, 2004b). These include storage tank siting principles, design recommendations, spill detection measures, and containment measures that were implemented during construction of the conversion facilities.

In the 2004 EISs, the highest consequence radiological accident at the conversion facility is estimated to be a design-basis earthquake damaging the DU oxide storage building and breaching 10 percent of the stored containers (DOE 2004a, 2004b). Because there are no plans to store the commercial DU oxide in a building, there would be no risk of damage to the cylinders from falling debris; thus, this storage building accident is not applicable for the Conversion and Storage and the Conversion and Disposal scenarios.

In the 2004 EISs, the accident scenario at the conversion facility with the second-highest radiological impacts was the extremely unlikely scenario caused by a tornado strike (DOE 2004a, 2004b). This accident would be possible but extremely unlikely under both the Conversion and Storage and the Conversion and Disposal scenarios. In this accident, it is assumed that a windblown missile from a tornado would pierce a single DU oxide container in storage. In this hypothetical accident, if bulk bags were used to transport and dispose of the DU oxide, approximately 1,200 pounds (550 kilograms) of DU oxide could be released at ground level. Under conservative meteorological conditions, it is estimated that the dose to the MEI and noninvolved worker would be 7.5 rem at either Paducah or Portsmouth. The collective doses would be up to 230 person-rem at Paducah or 130 person-rem at Portsmouth to the worker population and up to 35 person rem at Paducah or 17 person-rem at Portsmouth to the general population. If cylinders are being used as DU oxide containers, rather than bulk bags, the doses would be approximately half of the above results.

Accident analyses in the 2004 EISs (DOE 2004a, 2004b) concluded that no cancer fatalities are predicted for any of the accidents. The maximum radiological dose to the noninvolved worker and general public MEIs (assuming that an accident occurred) would be about 40 rem for Paducah or 30 rem for Portsmouth. This dose would thus be greater than the 25-rem total effective dose equivalent established by DOE as a guideline for assessing the adequacy of protection of public health and safety from potential accidents (DOE 2000c). Occurrence by the annual probability of occurrence by the number of years of operations) would be less than 1.

Summary

Accident risks to the public and worker at Paducah or Portsmouth under the Conversion and Disposal Scenario would be similar to those under the Conversion and Storage Scenario. The major difference would be that under the Conversion and Disposal Scenario cylinders would be stored for up to 53 years at Paducah and 43 years at Portsmouth rather than the 100 years under the Conversion and Storage Scenario. Other than the differences in storage time for the DU oxide cylinders, the accident scenarios, potential releases, and impacts on the public associated with DUF_6 cylinder handling, conversion to oxide, and DU oxide container storage would be very similar. For purposes of this *DU Oxide SEIS*, any differences in accident risks and impacts between the scenarios at Paducah and Portsmouth would be small.

Because of the low hazard posed by DU oxide, the material would not be an attractive target for a terrorist attack or other intentional destructive acts. The 2004 EISs (DOE 2004a, 2004b) demonstrated that other hazardous chemicals and cylinders of other forms of uranium (including DUF_6) present a higher potential impacts to workers and the public than DU oxide when released. The releases caused by intentional destructive acts during the management of DU oxide were not expressly calculated in the 2004 EISs (DOE 2004a, 2004b) and this *DU Oxide SEIS*. In both the NEPA and safety documents, a range of operational, external events, and natural-phenomena-initiated accidents were considered, including cylinder handling equipment fires, fires involving cylinder(s) in a pool of fuel or oil, small vehicle or transport truck fires, tornadoes and high winds, seismic events, and small and large aircraft impacts followed by fires. As discussed in the 2004 EISs and this *DU Oxide SEIS*, releases for and the consequences from severe accidents involving the DU oxide were derived using highly conservative assumptions. Therefore any releases caused by and the consequences from any potential intentional events would either be bounded by or be comparable to the releases and consequences presented in the 2004 EISs (including operational accidents, tornados, seismic events, and aircraft crashes) and in this *DU Oxide SEIS* for severe operational, external, and natural phenomena-initiated accidents. Substantial security measures would be in place to reduce the likelihood of a successful intentional destructive act.

C.7.3 Transportation of Commercial DU Oxide and Other Wastes

As described in Section C.2 of this appendix, an additional 150,000 metric tons (approximately 12,500 cylinders[77]) of commercial DUF_6 could undergo conversion at Paducah or Portsmouth and require storage or disposal. For purposes of analysis in this *DU Oxide SEIS*, and as a conservative measure of impacts, DOE has assumed that the entire mass of commercial DUF_6 would be managed at each facility. Therefore, this section provides the potential impacts associated with the shipment of DU oxide and other wastes from Paducah in Kentucky or Portsmouth in Ohio, to Energy*Solutions* in Utah, the Nevada National Security Site (NNSS) in Nevada, or Waste Control Specialists LLC (WCS) in Texas. Details of the transportation analysis methodology and related waste characteristics assumptions are presented in Appendix B of this *DU Oxide SEIS*, and are not repeated here.

Consistent with the analysis presented in Appendix B, two transport options: train and truck are analyzed. Section C.2 provides assumptions for the numbers of shipments of ancillary LLW and MLLW, DU oxide in cylinders (and the option of DU oxide in bulk bags and empty and heel cylinders) unusable empty and heel cylinders, and CaF_2. Each empty cylinder is expected to contain between 10 to 23 kilograms (22 to 50 pounds) of residual DU.

C.7.3.1 Transportation of DU Oxide and Other Wastes to Energy*Solutions*

This section summarizes the potential impacts associated with the shipment of DU oxide and other wastes between Paducah or Portsmouth, to Energy*Solutions* under incident-free and accident conditions. **Table C-19** summarizes the potential transportation impacts for disposal of DU oxide at Energy*Solutions*. As indicated in this table, all risk values are less than one, except for nonradiological accident risk associated with truck shipments. This means that no LCFs are expected to occur during transport by truck or train, but a small number of traffic fatalities could result from nonradiological accidents. This is the result of the large number of transports over 9 years.

As discussed in Section C.2, shipping DU oxide cylinders in ABC railcars instead of gondola railcars would result in twice the number of cylinders in a train shipment but half the number of shipments. Because the same number of cylinders would be shipped annually and in total, the annual and total impacts of incident-free transportion would be expected to be similar. Because there would be twice the number of cylinders in an ABC railcar shipment versus a gondola railcar shipment, the impacts of a train accident could be approximately double, but because there would be half the number of shipments, the total risk of the two shipping modes would be similar. Emissions and traffic fatalities for shipping in ABC railcars would be less than for shipping in gondola railcars because there would be half the number of train shipments.

[77] Assuming 12 metric ton cylinders are used.

Table C-19 Total Risks to Crew Members and the Public from Transporting Depleted Uranium Oxide in Cylinders to Energy*Solutions*

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonrad Risk[b]
Truck								
Paducah	12,500	32,200,000	38	0.02	101	0.06	7×10^{-5}	2
Portsmouth	12,500	38,500,000	46	0.03	118	0.07	6×10^{-5}	2
Train								
Paducah	208	600,000	17	0.01	22	0.01	5×10^{-4}	0.1
Portsmouth	208	700,000	21	0.01	29	0.02	9×10^{-4}	0.2

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
[a] The number of shipments were rounded to the nearest 10 when greater than 1,000.
[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
Note: To convert kilometers to miles multiply by 0.62137.

Tables C-20 and C-21 summarize the potential transportation impacts for shipment of unusable cylinders and other LLW and MLLW to Energy*Solutions*. Table C-20 shows the transportation impacts assuming the unusable empty and heel cylinders are transported intact. The risk associated with cylinder size reductions are estimated based on the analysis in the 2004 EISs.

As indicated in these tables, all risk values are less than one. This means that no LCFs are expected to occur during transport by truck or train. Transport of LLW and MLLW to Energy*Solutions* would be about 1 truck shipment annually. The impacts of this transport would be similar to those provided in Table B-4a in Appendix B of this *DU Oxide SEIS*.

Table C-20 Total Risks to Crew Members and the Public from Transporting Unusable Empty and Heel Cylinders to Energy*Solutions*

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonrad Risk[b]
Truck								
Paducah	313	800,000	0.01	6×10^{-6}	0.03	2×10^{-5}	8×10^{-9}	0.04
Portsmouth	313	1,000,000	0.01	1×10^{-6}	0.03	2×10^{-5}	7×10^{-9}	0.04
Train								
Paducah	11	30,000	0.009	5×10^{-6}	0.01	7×10^{-6}	6×10^{-8}	0.007
Portsmouth	11	36,000	0.01	7×10^{-6}	0.02	9×10^{-6}	1×10^{-7}	0.01

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
[a] The number of shipments were rounded to the nearest 10 when greater than 1,000.
[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
Note: To convert kilometers to miles multiply by 0.62137.

Table C-21 Annual Risks to Crew Members and Public from Transporting Ancillary Low-Level Radioactive Waste and Mixed Level Radioactive Waste to Energy*Solutions*

Origin	Number of Shipments	One-way Kilometers Traveled	Incident-Free[a]				Accident[a]	
			Crew		Population			
			Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonrad Risk[b]
Truck[c]								
Paducah	1	2,600	3×10^{-4}	2×10^{-7}	2×10^{-4}	1×10^{-7}	7×10^{-14}	1×10^{-4}
Portsmouth	1	3,100	4×10^{-4}	2×10^{-7}	3×10^{-4}	2×10^{-7}	6×10^{-14}	1×10^{-4}

Key: LCF = latent cancer fatality; Nonrad = nonradiological.

[a] Total risks can be estimated by multiplying by the maximum duration of the storage period for this alternative (52 years [44 + 8] for Paducah and 43 years [32 +11] for Portsmouth).

[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

[c] Because of the small amount of waste requiring shipment to the waste management facility, train transport would be inefficient and was not considered.

DOE is also considering the option of transport of DU oxide using bulk bags consistent with the analysis presented in the 2004 EISs (DOE 2004a, 2004b). If this option is considered, it was estimated that there would be 5,490 truck shipments or 140 train shipments of bulk bags from Paducah, or Portsmouth site, using consistent assumptions as those used in the 2004 EISs. If the bulk bags are used, then, the empty and heel cylinders also need to be transported to the disposal sites. It is assumed that the cylinders would be volume-reduced and packaged 10 in 20-ft intermodal containers and transported one per truck and two per railcar with 10 railcars per train. The 2004 EISs also considered that about 10 percent of the cylinders could not be accepted at the Energy*Solutions*, therefore, these cylinders would be transported intact to NNSS. The risks of transporting the volume-reduced cylinders and those for the intact cylinders are calculated using the same assumptions used in Table C-20.

Tables C-19a and C-20a summarize the potential transportation impacts for shipping DU oxides in bulk bags and the empty and heel cylinders to the Energy*Solutions* site. As indicated in these tables, all risk values are less than one. This means that no LCFs are expected to occur during transport by truck or train.

Table C-19a Total Risks to Crew Members and the Public from Transporting Depleted Uranium Oxide in Bulk Bags to Energy*Solutions*

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free: Crew Dose (person-rem)	Incident-Free: Crew LCF[b]	Incident-Free: Population Dose (person-rem)	Incident-Free: Population LCF[b]	Accident: Radiological Risk[b]	Accident: Nonrad Risk[b]
Truck								
Paducah	5,490	14,160,000	18	0.01	62	0.04	7×10^{-5}	0.8
Portsmouth	5,490	16,888,000	22	0.01	72	0.04	6×10^{-5}	0.8
Train								
Paducah	140	384,000	14	0.009	18	0.01	6×10^{-4}	0.09
Portsmouth	140	426,000	18	0.01	23	0.01	1×10^{-3}	0.1

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
a The number of shipments were rounded to the nearest 10 when greater than 1,000 and to the nearest five when less than 1,000.
b Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
Note: To convert kilometers to miles multiply by 0.62137.

Table C-20a Total Risks to Crew Members and the Public from Transporting Empty and Heel Cylinders to Energy*Solutions*

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free: Crew Dose (person-rem)	Incident-Free: Crew LCF[b]	Incident-Free: Population Dose (person-rem)	Incident-Free: Population LCF[b]	Accident: Radiological Risk[b]	Accident: Nonrad Risk[b]
Truck (volume-reduced)								
Paducah[c]	1,125	2,904,000	2	0.001	0.7	0.0004	1×10^{-7}	0.2
Portsmouth[d]	1,125	3,485,000	3	0.002	0.9	0.0005	1×10^{-7}	0.2
Truck (intact)[e]								
Paducah[c,e]	625	2,005,000	0.02	1×10^{-5}	0.06	4×10^{-5}	8×10^{-9}	0.09
Portsmouth[d,e]	625	2,332,000	0.03	2×10^{-5}	0.07	4×10^{-5}	1×10^{-8}	0.1
Train (volume-reduced)								
Paducah[c]	56	155,000	0.2	0.0001	0.3	0.0002	7×10^{-8}	0.03
Portsmouth[d]	56	181,000	0.2	0.0001	0.4	0.0002	2×10^{-7}	0.05
Train (intact)[e]								
Paducah[c,e]	650	281,000	0.02	1×10^{-5}	0.03	2×10^{-5}	8×10^{-8}	0.02
Portsmouth[d,e]	650	295,000	0.03	2×10^{-5}	0.04	2×10^{-5}	2×10^{-7}	0.03

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
a The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000.
b Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
c The intact cylinders represent transport of 10 percent of the total empty and heel cylinders, which is 12,500. The calculated doses and risks are based on the assumtion that the intact cylinders are transported 2 per truck and 60 per train shipment. These cylinders are transported to NNSS, when the disposal facility is other than NNSS.
d Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck. There would be 625 truck shipments for the Paducah or Portsmouth wastes, in addition to the 21 train shipments from Paducah or Portsmouth.
Note: To convert kilometers to miles multiply by 0.62137.

Furthermore, the impacts from the transport of CaF_2 from neutralization of hydrogen fluoride, as a nonradioactive, nonhazardous waste, to a disposal facility is also estimated. It is estimated that there would be about 8,080 truck shipments or 202 train shipments from Paducah or Portsmouth to Energy*Solutions*. The estimated traffic fatalities from these shipments are summarized in **Table C-21a**.

Table C-21a Collective Population Transportation Risks for Shipment of Calcium Fluoride to Energy*Solutions* for the Hydrogen Fluoride Neutralization Option

Origin	Paducah		Portsmouth	
Mode of Transport	**Truck**	**Train**	**Truck**	**Train**
Number of shipments	8,080	202	8,080	202
Total Distance (one-way [km])	20,843,000	5,581,000	24,887,000	6,551,000
Traffic fatalities (round trip)	1.1	0.12	1.2	0.31

Key: km = kilometer.

Impacts from Incident-Free Transportation of Radioactive Waste

The potential radiological impacts for transport crews and populations along the routes are shown in Tables C-19, C-20, and C-21. These tables include the results of shipping all DU oxide and other radioactive wastes to Energy*Solutions*. As shown in these tables, transportation of the DU oxide dominates the risks. Therefore, the impacts of shipping unusable cylinders and other LLW and MLLW to Energy*Solutions* are not discussed further.

Under the Energy*Solutions* disposal option, transport of DU oxide would not result in any LCFs to crew members. For truck transport, the maximum calculated LCF risk over the duration of the project (assuming all DU oxide waste was disposed of at Energy*Solutions*) would be 0.03, or 1 chance in 33 of developing a single LCF among the transportation crews. For train transport, the maximum calculated LCF risk over the duration of the project would be 0.02, or 1 chance in 50 of a single LCF among the transportation crews. Transportation of DU oxide in cylinders results in the maximum impact on the transportation crew versus transportation of DU oxide in bulk bags because there are more shipment with cylinders.

Under this option, the dose to the general population likely would not result in an LCF. For truck transport of DU oxide, the maximum calculated LCF risk over the duration of the project would be 0.07, or 1 chance in 15 of a single LCF in the exposed population. For train transport, the maximum calculated LCF risk over the duration of the project would be 0.02, or 1 chance in 50 of a single LCF in the exposed population. Transportation of DU oxide in cylinders results in the maximum impact on the general population versus transportation of DU oxide in bulk bags.

The total radioactive dose received by an MEI (a resident along the route near Energy*Solutions*), hypothetically assumed to be exposed to every DU oxide truck shipment over the duration of the project, would be about 0.39 millirem, resulting in an increased risk of developing a fatal cancer of 2.3×10^{-4}, or 1 chance in 4,300,000. Assuming that shipments would occur over 9 years, the average annual dose to this individual would be 0.04 millirem, which is 0.04 percent of DOE's limit in DOE Order 458.1 of 100 millirem a year, for exposure to a member of the public.

Impacts of Transportation Accidents Involving Radioactive Waste

Two sets of analyses were performed to evaluate potential radiological transportation accident impacts: (1) all reasonably foreseeable accidents (total transportation accidents), and (2) maximum reasonably foreseeable accidents (accidents with radioactive release probabilities greater than 1×10^{-7} [1 chance in 10 million] per year). As indicated in Table C-19, considering all reasonably foreseeable accidents, transport of radioactive waste would likely not result in any LCFs, but there could be nonradiological fatalities due to traffic accidents under the truck transportation option.

For maximum reasonably foreseeable accidents, transportation accident probabilities were calculated for all route segments (that is, rural, suburban, and urban), and maximum consequences were determined for those shipment routes with a likelihood-of-release frequency exceeding 1 chance in 10 million per year. For DU oxides shipped under this scenario, the maximum reasonably foreseeable transportation accident with the highest consequence/risk would involve train transport with the assumption of the breach of all six cylinders in a railcar in an urban area (see Appendix B, Table B-7). The maximum reasonably foreseeable probability of a train accident involving transport of DU oxide to Energy*Solutions* would be up to 1.5×10^{-7} per year in an urban area, or approximately 1 chance in 7 million each year. The consequences of the train transport accident, if it occurred, in terms of population and MEI dose would be about 47.3 person-rem and 0.039 rem, respectively. These doses would likely result in 0 (0.028) additional LCF among the exposed population and a 2×10^{-5} risk that the MEI would develop an LCF. When the annual frequency of the accident occurring is taken into account, the increased risk of a single LCF in the exposed population would be negligible (4.5×10^{-9}).

C.7.3.2 Transportation of Depleted Uranium Oxide and other Wastes to the Nevada National Security Site

This section summarizes the potential impacts associated with the shipment of DU oxide and other wastes from Paducah or Portsmouth to NNSS under incident-free and accident conditions. Because NNSS lacks a direct rail connection for waste delivery, truck transports were evaluated for shipments from an intermodal facility to NNSS. For purposes of analysis and consistent with the *Final Environmental Impact Statement for Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada* (DOE 2013), the intermodal facility was assumed to be the rail yard at Barstow, California.

Table C-22 summarizes the potential transportation impacts for disposal of DU oxide at NNSS. As indicated in this table, all risk values are less than one, except for nonradiological accident risk associated with truck shipments. This means that no LCFs are expected to occur during transport by truck or train, but a small number of traffic fatalities could result from nonradiological accidents. This is the result of the large number of transports over 9 years.

As discussed in Section C.7.3.1, DU oxide cylinders could be shipped in ABC railcars instead of gondola railcars. The annual and total impacts of shipping in ABC railcars would be similar to shipping in gondola railcars, except for emissions and traffic accident impacts, which would be smaller due to the reduced number of shipments.

Table C-22 Risks to Crew Members and the Public from Transporting Depleted Uranium Oxide in Cylinders to the Nevada National Security Site

			Incident-Free				Accident	
			Crew		Population			
Origin	Number of Shipments[a]	One-way Kilometers Traveled	Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonrad Risk[b]
Truck								
Paducah	12,500	40,100,000	47	0.03	124	0.07	4×10^{-5}	2
Portsmouth	12,500	46,600,000	55	0.03	144	0.09	5×10^{-5}	2
Train/Truck[c]								
Paducah, Train	208	700,000	20	0.01	24	0.01	4×10^{-4}	0.2
Truck	12,500	4,200,000	5	0.003	13	0.008	4×10^{-7}	0.07
Total	**12,710**	**4,900,000**	**25**	**0.01**	**37**	**0.02**	$\mathbf{4\times10^{-4}}$	**0.3**
Portsmouth, Train	208	800,000	25	0.02	30	0.02	7×10^{-4}	0.3
Truck	12,500	4,200,000	5	0.003	13	0.008	4×10^{-7}	0.07
Total	**12,710**	**5,000,000**	**29**	**0.02**	**43**	**0.03**	$\mathbf{7\times10^{-4}}$	**0.4**

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
[a] The number of shipments were rounded to the nearest 10 when greater than 1,000.
[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
[c] Under the Train Option, the same number of train shipments would leave either Paducah or Portsmouth, but because NNSS does not have a rail connection, train shipments would be shipped to an intermodal facility (which was assumed for analysis to be at Barstow, California) and then the cargo will be transported by truck to NNSS. Impacts from these additional shipments were included in the tabulated results for the NSSS under "Train/Truck" in this table. For transport from Paducah or Portsmouth, 12,500 truck transports would be required.
Note: To convert kilometers to miles multiply by 0.62137.

Tables C-23 and C-24 summarize the potential transportation impacts for shipment of unusable cylinders and other LLW and MLLW to NNSS. Table C-23 shows the transportation impacts assuming the unusable cylinders are transported intact. The risk associated with cylinder size reductions are estimated based on the analysis in the 2004 EISs.

As indicated in these tables, all risk values are less than one. This means that no LCFs are expected to occur during transport by truck or train. Transport of other LLW and MLLW to NNSS would be about 1 truck shipment annually.

DOE is also considering the option of transport of DU oxide using bulk bags consistent with the analysis presented in the 2004 EISs (DOE 2004a, 2004b). If this option is considered, it was estimated that there would be 5,490 truck shipments or 137 train shipments of bulk bags from Paducah, or Portsmouth, using consistent assumptions as those used in the 2004 EISs. If bulk bags are used, then the empty and heel cylinders also need to be transported to the NNSS for disposal. It is assumed that the cylinders would be volume-reduced and packaged 10 in 20-ft intermodal containers and transported one per truck and two per railcar with 10 railcars per train. The 2004 EISs also considered that about 10 percent of the cylinders could would be transported intact to NNSS. The risks of transporting the volume-reduced cylinders and those for the intact cylinders are calculated using the same assumptions used in Table C-20.

Table C-23 Risks to Crew Members and the Public from Transporting Unusable Empty and Heel Cylinders to the Nevada National Security Site

Origin	Number of Shipments	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[a]	Dose (person-rem)	LCF[a]	Radiological Risk[a]	Nonrad Risk[a]
Truck								
Paducah	313	1,000,000	0.01	7×10^{-6}	0.03	2×10^{-5}	4×10^{-9}	0.04
Portsmouth	313	1,200,000	0.01	8×10^{-6}	0.04	2×10^{-5}	6×10^{-9}	0.05
Train/Truck[b]								
Paducah, Train	11	37,000	0.01	6×10^{-6}	0.01	8×10^{-6}	4×10^{-8}	0.008
Truck	313	110,000	0.001	7×10^{-7}	0.003	2×10^{-6}	5×10^{-1}	0.002
Total	**323**	**147,000**	**0.01**	$\mathbf{7\times10^{-6}}$	**0.02**	$\mathbf{1\times10^{-5}}$	$\mathbf{4\times10^{-8}}$	**0.01**
Portsmouth, Train	11	44,000	0.01	8×10^{-6}	0.02	1×10^{-5}	9×10^{-8}	0.02
Truck	313	110,000	0.001	7×10^{-7}	0.003	2×10^{-6}	5×10^{-11}	0.002
Total	**323**	**154,000**	**0.01**	$\mathbf{9\times10^{-6}}$	**0.02**	$\mathbf{1\times10^{-5}}$	$\mathbf{9\times10^{-8}}$	**0.02**

Key: LCF = latent cancer fatality; Nonrad = nonradiological.

[a] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

[b] Under the Train Option, the same number of train shipments would leave either Paducah or Portsmouth, but because NNSS does not have a rail connection, train shipments would be shipped to an intermodal facility (which was assumed for analysis to be at Barstow, California) and then the cargo will be transported by truck to NNSS. Impacts from these additional shipments were included in the tabulated results for the NSSS under "Train/Truck" in this table. For transport from Paducah or Portsmouth, 313 truck transports would be required.

Note: To convert kilometers to miles multiply by 0.62137.

Table C-24 Annual Risks to Crew Members and Public from Transporting Ancillary LLW and MLLW to the Nevada National Security Site

Origin	Number of Shipments	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[a]	Dose (person-rem)	LCF[a]	Radiological Risk[a]	Nonrad Risk[a]
Truck								
Paducah	1	3,200	4×10^{-4}	2×10^{-7}	3×10^{-4}	2×10^{-7}	4×10^{-14}	1×10^{-4}
Portsmouth	1	3,700	4×10^{-4}	3×10^{-7}	3×10^{-4}	2×10^{-7}	5×10^{-14}	2×10^{-4}

Key: LCF = latent cancer fatality; Nonrad = nonradiological.

[a] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

Tables C-22a and **C-23a** summarize the potential transportation impacts for shipment DU-oxides in bulk bags, and the empty and heel cylinders to NNSS. As indicated in these tables, all risk values are less than one. This means that no LCFs are expected to occur during transport by truck or train.

Table C-22a Risks to Crew Members and the Public from Transporting Depleted Uranium Oxide in Bulk Bags to the Nevada National Security Site

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonrad Risk[b]
Truck								
Paducah	5,490	17,613,000	23	0.01	76	0.05	3×10^{-5}	0.8
Portsmouth	5,490	20,459,000	27	0.02	89	0.05	5×10^{-5}	0.9
Train/Truck[c]								
Paducah	5,630	2,314,000	20	0.01	27	0.02	4×10^{-4}	0.2
Portsmouth	5,630	2,424,000	24	0.01	32	0.02	1×10^{-3}	0.2

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
a The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000.
b Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
c Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck. There are 5,490 truck shipments for the Paducah or Portsmouth wastes, in addition to the 140 train shipments from Paducah or Portsmouth.
Note: To convert kilometers to miles multiply by 0.62137.

Furthermore, the impacts from the transport of calcium fluoride (CaF2) from neutralization of hydrogen fluoride, as a nonradioactive, nonhazardous waste, to a disposal facility is also estimated. It is estimated that there would be about 8,080 truck shipments or 202 train shipments from Paducah or Portsmouth to NNSS. The estimated traffic fatalities from these shipments are summarized in **Table C-24a**.

Table C-23a Risks to Crew Members and the Public from Transporting Empty and Heel Cylinders to the Nevada National Security Site

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonrad Risk[b]
Truck (volume-reduced)								
Paducah	1,125	3,613,000	3	0.002	0.9	0.0005	8×10^{-8}	0.2
Portsmouth	1,125	4,191,000	3	0.002	1.0	0.0006	1×10^{-7}	0.2
Truck (intact)[e]								
Paducah	625	2,005,000	0.02	1×10^{-5}	0.06	4×10^{-5}	8×10^{-9}	0.09
Portsmouth	625	2,332,000	0.03	2×10^{-5}	0.07	4×10^{-5}	1×10^{-8}	0.1
Train (volume-reduced)[d]								
Paducah	1,190	570,000	0.5	0.0003	0.4	0.0002	5×10^{-8}	0.05
Portsmouth	1,190	603,000	0.6	0.0003	0.5	0.0003	1×10^{-7}	0.08
Train (intact)[c,e]								
Paducah	650	281,000	0.02	1×10^{-5}	0.03	2×10^{-5}	8×10^{-8}	0.02
Portsmouth	650	295,000	0.03	2×10^{-5}	0.04	2×10^{-5}	2×10^{-7}	0.03

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
a The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000.
b Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident

dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

[c] The intact cylinders represent transport of 10 percent of the total empty and heel cylinders, which is 12,500. The calculated doses and risks are based on the assumption that the intact cylinders are transported 2 per truck and 60 per train.

[d] Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck. There would be 1,125 truck shipments for the Paducah or Portsmouth wastes, in addition to the 56 train shipments from Paducah or Portsmouth.

[e] Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck. There would be 625 truck shipments for the Paducah or Portsmouth wastes, in addition to the 21 train shipments from Paducah or Portsmouth, respectively.

Note: To convert kilometers to miles multiply by 0.62137.

Table C-24a Collective Population Transportation Risks for Shipment of Calcium Fluoride to the Nevada National Security Site for the Hydrogen Fluoride Neutralization Option

Origin	Paducah		Portsmouth	
Mode of Transport	**Truck**	**Train**	**Truck**	**Train**
Number of shipments	8,080	202	8,080	202
Total Distance (one-way [km])[a]	25,923,000	9,571,000	30,146,000	10,863000
Traffic fatalities (round trip)	1.19	0.49	1.34	0.33

Key: km = kilometer.

[a] Because NNSS does not have a direct rail line connection, every train transport requires four shipments of truck transport from an intermodal facility to NNSS. The cited distances are the sum of truck and train transport distances.

Impacts from Incident-Free Transportation of Radioactive Waste

The potential radiological impacts for transport crews and populations along the routes are shown in Tables C-22, C-23, and C-24. These tables include the results of shipping all DU oxide and other wastes to NNSS. As shown in these tables, transportation of the DU oxide dominates the risks. Therefore, the impacts of shipping unusable cylinders and ancillary LLW and MLLW to NNSS are not discussed further.

Under this option, transport of DU oxide would not result in any LCFs to crew members. For truck transport, the maximum calculated LCF risk over the duration of the project (assuming all DU oxide waste was disposed of at NNSS) would be 0.03, or about 1 chance in 33 of developing a single LCF among the transportation crews. For train transport, the maximum calculated LCF risk over the duration of the project would be 0.02, or about 1 chance in 50 of a single LCF among the transportation crews. Transportation of DU oxide in cylinders results in the maximum impact on the transportation crew versus transportation of DU oxide in bulk bags, because there are more shipments with cylinders.

Under this option, the dose to the general population likely would not result in an LCF. For truck transport of DU oxide, the maximum calculated LCF risk over the duration of the project would be 0.09, or about 1 chance in 11 of a single LCF in the exposed population. For train transport, the maximum calculated LCF risk over the duration of the project would be 0.03, or about 1 chance in 33 of a single LCF in the exposed population. Transportation of DU oxide in cylinders results in the maximum impact on the general population.

The total radioactive dose received by an MEI (a resident along the route near NNSS), hypothetically assumed to be exposed to every DU oxide truck shipment over the duration of the project, would be about 0.39 millirem, resulting in an increased risk of developing a fatal cancer of 2.3×10^{-4}, or 1 chance in 4,300,000. Assuming that shipments would occur over 9 years, the average annual dose to this individual would be 0.04 millirem, which is 0.04 percent of DOE's limit in DOE Order 458.1 of 100 millirem a year, for exposure to a member of the public.

Impacts of Transportation Accidents Involving Radioactive Waste

Two sets of analyses were performed to evaluate potential radiological transportation accident impacts: (1) all reasonably foreseeable accidents (total transportation accidents), and (2) maximum reasonably foreseeable accidents (accidents with radioactive release probabilities greater than 1×10^{-7} [about 1 chance in 10 million] per year). As indicated in Table C-22, considering all reasonably foreseeable accidents, transport of radioactive waste would likely not result in any LCFs, but there could be nonradiological fatalities due to traffic accidents under the truck transportation option.

For maximum reasonably foreseeable accidents, transportation accident probabilities were calculated for all route segments (that is, rural, suburban, and urban), and maximum consequences were determined for those shipment routes with a likelihood-of-release frequency exceeding 1 chance in 10 million per year. For DU oxides shipped under this option, the maximum reasonably foreseeable transportation accident with the highest consequence/risk would involve truck transport in an urban area (see Appendix B, Table B-7). The maximum reasonably foreseeable probability of a truck accident involving transport of DU oxide to NNSS would be up to 5.3×10^{-7} per year in an urban area, or approximately 1 chance in 1.9 million each year. The consequences of the truck transport accident, if it occurred, in terms of population and MEI dose would be about 7.7 person-rem and 0.0064 rem, respectively. These doses would likely result in no (0.005) additional LCFs among the exposed population and a 4×10^{-6} risk that the MEI would develop an LCF. When the annual frequency of the accident occurring is taken into account, the increased risk of a single LCF in the exposed population would be negligible (3×10^{-9}).

C.7.3.3 Transportation of DU Oxide and Other Wastes to Waste Control Specialists

This section summarizes the potential impacts associated with the shipment of DU oxide and other wastes between Paducah or Portsmouth to WCS under incident-free and accident conditions. **Table C-25** summarizes the potential transportation impacts for disposal of DU oxide at WCS. As indicated in this table, all risk values are less than one, except for nonradiological accident risk associated with truck shipments. This means that no LCFs are expected to occur during transport by truck or train, but a small number of traffic fatalities could result from nonradiological accidents. This is the result of the large number of transports over 9 years.

As discussed in Section C.7.3.1, DU oxide cylinders could be shipped in ABC railcars instead of gondola railcars. The annual and total impacts of shipping in ABC railcars would be similar to shipping in gondola railcars, except for emissions and traffic accidents, which would be smaller due to the reduced number of shipments.

Table C-25 Risks to Crew Members and the Public from Transporting Depleted Uranium Oxide in Cylinders to Waste Control Specialists

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[b]	Dose (person-rem)	LCF[b]	Radiological Risk[b]	Nonrad Risk[b]
Truck								
Paducah	12,500	21,200,000	25	0.02	66	0.04	4×10^{-5}	2
Portsmouth	12,500	28,600,000	34	0.02	88	0.05	7×10^{-5}	2
Train								
Paducah	208	400,000	13	0.008	21	0.01	7×10^{-4}	0.2
Portsmouth	208	600,000	20	0.01	32	0.02	1×10^{-3}	0.3

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
[a] The number of shipments were rounded to the nearest 10 when greater than 1,000.
[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
Note: To convert kilometers to miles multiply by 0.62137.

Tables C-26 and C-27 summarize the potential transportation impacts for shipment of unusable cylinders and other LLW and MLLW to WCS. As indicated in these tables, all risk values are less than one. This means that no LCFs are expected to occur during transport by truck or train. Transport of LLW and MLLW to WCS would be about 1 truck shipment annually.

Table C-26 Risks to Crew Members and the Public from Transporting Unusable Empty and Heel Cylinders to Waste Control Specialists

Origin	Number of Shipments	One-way Kilometers Traveled	Incident-Free				Accident	
			Crew		Population			
			Dose (person-rem)	LCF[a]	Dose (person-rem)	LCF[a]	Radiological Risk[a]	Nonrad Risk[a]
Truck								
Paducah	313	500,000	0.006	4×10^{-6}	0.02	1×10^{-5}	5×10^{-9}	0.04
Portsmouth	313	700,000	0.009	5×10^{-6}	0.02	1×10^{-5}	9×10^{-9}	0.05
Train								
Paducah	11	22,000	0.007	4×10^{-6}	0.01	7×10^{-6}	8×10^{-8}	0.008
Portsmouth	11	32,000	0.01	6×10^{-6}	0.02	1×10^{-5}	1×10^{-7}	0.01

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
[a] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
Note: To convert kilometers to miles multiply by 0.62137.

Table C-27 Annual Risks to Crew Members and Public from Transporting Ancillary LLW and MLLW to Waste Control Specialists

Origin	Number of Shipments	One-way Kilometers Traveled	Incident-Free: Crew Dose (person-rem)	Incident-Free: Crew LCF[a]	Incident-Free: Population Dose (person-rem)	Incident-Free: Population LCF[a]	Accident: Radiological Risk[a]	Accident: Nonrad Risk[a]
Truck								
Paducah	1	1,700	2×10^{-4}	1×10^{-7}	1×10^{-4}	9×10^{-8}	4×10^{-14}	1×10^{-4}
Portsmouth	1	2,300	3×10^{-4}	2×10^{-7}	2×10^{-4}	1×10^{-7}	8×10^{-14}	2×10^{-4}

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
[a] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

DOE is also considering the option of transporting DU oxide using bulk bags, consistent with the analysis presented in the 2004 EISs (DOE 2004a, 2004b). If this option is considered, it was estimated that there would be 5,490 truck shipments and 1,370 train shipments of bulk bags from Paducah or Portsmouth, using consistent assumptions as those used in the 2004 EISs. If bulk bags are used, then the empty and heel cylinders also need to be transported to the disposal sites. It is assumed that the cylinders would be volume-reduced and packaged 10 in a 20-foot (6-foot) intermodal container and transported one per truck and two per railcar with 10 railcars per train. The 2004 EISs also considered that about 10 percent of the cylinders would be transported intact to NNSS. The risks of transporting the volume-reduced cylinders and those for the intact cylinders are calculated using the same assumptions used in Table C-26.

Tables C-25a and **C-26a** summarize the potential transportation impacts for shipment of DU oxide in bulk bags and the empty and heel cylinders to WCS, respectively. As indicated in these tables, all risk values are less than one. This means that no LCFs are expected to occur during transport by truck or train.

Table C-25a Risks to Crew Members and the Public from Transporting Depleted Uranium Oxide in Bulk Bags to Waste Control Specialists

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free: Crew Dose (person-rem)	Incident-Free: Crew LCF[b]	Incident-Free: Population Dose (person-rem)	Incident-Free: Population LCF[b]	Accident: Radiological Risk[b]	Accident: Nonrad Risk[b]
Truck								
Paducah	5,490	9,315,000	12	0.01	40	0.02	4×10^{-5}	0.7
Portsmouth	5,490	12,530,000	17	0.01	54	0.03	7×10^{-5}	0.9
Train								
Paducah	140	275,000	11	7×10^{-3}	17	0.01	8×10^{-4}	0.1
Portsmouth	140	426,000	17	0.01	25	0.02	2×10^{-3}	0.2

Key: LCF = latent cancer fatality; Nonrad = nonradiological.
[a] The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000.
[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.
Note: To convert kilometers to miles multiply by 0.62137.

Table C-26a Risks to Crew Members and the Public from Transporting Empty and Heel Cylinders to Waste Control Specialists

Origin	Number of Shipments[a]	One-way Kilometers Traveled	Incident-Free Crew Dose (person-rem)	Incident-Free Crew LCF[b]	Incident-Free Population Dose (person-rem)	Incident-Free Population LCF[b]	Accident Radiological Risk[b]	Accident Nonrad Risk[b]
Truck (volume-reduced)								
Paducah	1,125	1,898,000	1	0.0008	0.5	0.0003	8×10^{-8}	0.1
Portsmouth	1,125	2,559,000	2	0.001	0.7	0.0004	2×10^{-7}	0.2
Truck (intact)[c]								
Paducah,	625	2,005,000	0.02	0.00001	0.06	0.00004	8×10^{-9}	0.09
Portsmouth	625	2,332,000	0.03	0.00002	0.07	0.00004	1×10^{-8}	0.1
Train (volume-reduced)								
Paducah	56	112,000	0.2	0.0001	0.3	0.0002	1×10^{-7}	0.04
Portsmouth	56	164,000	0.2	0.0001	0.4	0.0002	3×10^{-7}	0.07
Train/Truck (intact)[c,d]								
Paducah	650	281,000	0.02	0.00001	0.03	0.00002	8×10^{-8}	0.02
Portsmouth	650	295,000	0.03	0.00002	0.04	0.00002	2×10^{-7}	0.03

Key: LCF = latent cancer fatality; Nonrad = nonradiological.

[a] The number of shipments was rounded to the nearest 10 when greater than 1,000 and to the nearest 5 when less than 1,000.

[b] Risk is expressed in terms of LCF, except for nonradiological risk, where it refers to the number of traffic accident fatalities. Radiological risk is calculated for one-way travel, while nonradiological risk is calculated for two-way travel. Accident dose-risk can be calculated by dividing the risk values by 0.0006 (DOE 2003). The values were rounded to one non-zero digit.

[c] The intact cylinders represent transport of 10 percent of the total empty and heel cylinders, which are 12,500. The calculated doses and risks are based on the assumption that the intact cylinders are transported two per truck and 60 per train. These cylinders are transported to NNSS, when the disposal facility is other than NNSS.

[d] Because NNSS does not have a rail yard, the waste would be transported from a nearby rail yard (Barstow, California) to NNSS via truck. There are 625 truck shipments for the Paducah or Portsmouth wastes, in addition to the 21 train shipments from Paducah or Portsmouth, respectively

Note: To convert kilometers to miles multiply by 0.62137.

Furthermore, the impacts from the transport of calcium fluoride (CaF_2) from neutralization of hydrogen fluoride, to a LLW disposal facility is also estimated. It is estimated that there would be about 8,090 truck shipments or 202 train shipments from Paducah or Portsmouth to NNSS. The estimated traffic fatalities from these shipments are summarized in **Table C-27a**.

Table C-27a Collective Population Transportation Risks for Shipment of Calcium Fluoride to the Waste Control Specialists Site for the Hydrogen Fluoride Neutralization Option

Origin	Paducah		Portsmouth	
Mode of Transport	**Truck**	**Train**	**Truck**	**Train**
Number of shipments	8,080	202	8,080	202
Total Distance (one-way [km])[a]	12,454,000	4,055,000	18,455,000	5,953,000
Traffic fatalities (round trip)	0.91	0.19	1.29	0.27

Impacts from Incident-Free Transportation of Radioactive Waste

As shown in Tables C-25, C-26, and C-27, transportation of the DU oxide dominates the risks. Therefore, the impacts of shipping unusable cylinders and other LLW and MLLW to the WCS facility are not discussed further.

Under this option, transport of DU oxide would not result in any LCFs to crew members. For truck transport, the maximum calculated LCF risk over the duration of the project (assuming all DU oxide waste was disposed of at WCS) would be 0.02, or 1 chance in 50 of a single LCF among the transportation crews. For train transport, the maximum calculated LCF risk over the duration of the project would be 0.01, or 1 chance in 100 of a single LCF among the transportation crews. Transportation of DU oxide in cylinders results in the maximum impact on the transportation crew versus transportation of DU oxide in bulk bags, because there are more transports with cylinders.

Under this option, the dose to the general population likely would not result in an LCF. For truck transport of DU oxide, the maximum calculated LCF risk over the duration of the project would be 0.05, or 1 chance in 20 of a single LCF in the exposed population. For train transport, the maximum calculated LCF risk over the duration of the project would be 0.02, or 1 chance in 50 of a single LCF in the exposed population. Transportation of DU oxide in cylinders results in the maximum impact on the general population.

The total radioactive dose received by an MEI (a resident along the route near WCS), hypothetically assumed to be exposed to every DU oxide truck shipment over the duration of the project, would be about 0.39 millirem, resulting in an increased risk of developing a fatal cancer of 2.3×10^{-4}, or 1 chance in 4,300,000. Assuming that shipments would occur over 9 years, the average annual dose to this individual would be 0.04 millirem, which is 0.04 percent of DOE's limit in DOE Order 458.1 of 100 millirem a year, for exposure to a member of the public.

Impacts of Transportation Accidents Involving Radioactive Waste

Two sets of analyses were performed to evaluate potential radiological transportation accident impacts: (1) all reasonably foreseeable accidents (total transportation accidents), and (2) maximum reasonably foreseeable accidents (accidents with radioactive release probabilities greater than 1×10^{-7} [1 chance in 10 million] per year). As indicated in Table C-25, considering all reasonably foreseeable accidents, transport of radioactive waste would likely not result in any LCFs, but there could be nonradiological fatalities due to traffic accidents under the truck transportation option.

For maximum reasonably foreseeable accidents, transportation accident probabilities were calculated for all route segments (that is, rural, suburban, and urban), and maximum consequences were determined for those shipment routes with a likelihood-of-release frequency exceeding 1 chance in 10 million per year. For DU oxides shipped under this option, the maximum reasonably foreseeable transportation accident with the highest consequence/risk would involve train transport with the assumption of the breach of all six cylinders in a railcar in an urban area (see Appendix B, Table B-7). The maximum reasonably foreseeable probability of a train accident involving transport of DU oxide to WCS would be up to 4.1×10^{-6} per year in an urban area, or approximately 1 chance in 244,000 each year. The consequences of the train transport accident, if it occurred, in terms of population and MEI dose would be about 11 person-rem and 0.039 rem, respectively. These doses would likely result in 0 (0.007) additional LCFs among the exposed population and 2×10^{-5} risk that the MEI would develop an LCF. When the annual frequency of the accident occurring is taken into account, the increased risk of a single LCF in the exposed population would be negligible (3×10^{-8}).

C.8 SOCIOECONOMICS

The socioeconomic analysis covers the effects on population, employment, income, regional growth, housing, and community resources in the region of influence (ROI) of Paducah and Portsmouth.

C.8.1 Conversion and Storage

The socioeconomic impacts from operating the conversion facilities were evaluated in the 2004 EISs (DOE 2004a, DOE 2004b). As stated in Section C.2 of this *DU Oxide SEIS*, annual impacts for DUF_6 to DU oxide conversion that are presented in the 2004 EISs, would be expected to be the same for commercial material. During operation of the conversion facility at Paducah, 160 direct jobs and 170 indirect jobs were expected to be created. At the beginning of operations, an estimated 220 new residents were estimated to migrate into the area and require 80 housing units. In addition, 2 new public service employees (one general and one teacher in McCracken County) were estimated to be required to support the incoming population. During conversion operations, an estimated $13 million in personal income was estimated to be generated annually in the ROI (DOE 2004a). Any socioeconomic impacts associated with the operational impacts evaluated in the 2004 EIS (DOE 2004a) would have occurred and would be expected to continue at that level. Thus, there would be no new direct or indirect jobs or incoming population or new public service positions during conversion of 150,000 MT of commercial DUF_6. Existing employment, annual personal income generated, and annual public finances generated during conversion operations would extend for the additional 8 years it would take to convert the commercial DUF_6 to DU oxide at Paducah.

Similar to the socioeconomic impacts of conversion operations at Paducah, operation of the conversion facility at Portsmouth, was estimated to require 160 direct jobs and 160 indirect jobs. At the beginning of operations, an estimated 220 new residents were estimated to migrate into the area and require 80 housing units. In addition, 4 new public service employees were estimated to be required to support the incoming population. During conversion operations, an estimated $13 million in personal income was estimated to be generated annually in the ROI (DOE 2004a). Any socioeconomic impacts associated with the operational impacts evaluated in the 2004 EIS (DOE 2004b) would have occurred and would be expected to continue at that level. Thus, there would be no new direct or indirect jobs or incoming population or new public service positions during conversion of 150,000 MT of commercial DUF_6. Existing employment, annual personal income generated, and annual public finances generated during conversion operations would extend for the additional 11 years it would take to convert the commercial DUF_6 to DU oxide at Portsmouth.

DU oxide container storage and maintenance activities, and loading of wastes for off-site shipment at Paducah, while 12 workers would be required at Portsmouth (PPPO 2018). This employment represents approximately 1 percent in the 2018 total employment of 1,200 at Paducah or 0.5 percent of the 2018 total employment of 2,612 at Portsmouth (PPPO 2018). Additional management of large quantities of CaF_2 would only be required if DOE was unable to sell HF; in which case, staff assigned to manage HF could manage CaF_2. Therefore, because of the small number of employees involved, no in-migration or out-migration is expected that would impact population, employment, income, regional growth, housing, or community services in the Paducah or Portsmouth ROIs as a result of management of the commercial DU oxide material.

Post conversion employment at both sites would be expected to decline to 6 employees. Assuming that there would be no job replacements within the ROI, a total loss of 10 employees at Paducah and 6 employees at Portsmouth could result in an out-migration of people. Based on the U.S. Census information in Sections 3.1.7 and 3.2.7, an out-migration would represent a 0.01 percent decline in the total ROI population at Paducah and 0.003 percent decline at Portsmouth. Employment in both areas would decline by 0.01 percent. In addition, the number of houses available for sale or rent would increase slightly while demand for public services would decline. The socioeconomic impacts of the out-migration of 10 employees within the Paducah ROI and 6 employees within the Portsmouth ROI would be relatively small.

Potential socioeconomic impacts associated with conversion and storage under the Conversion and Disposal scenario would be similar to those impacts under the Conversion and Storage scenario.

C.8.2 Conversion and Disposal

Under the Conversion and Disposal scenario, DU oxide storage containers and other wastes would need to be moved and loaded onto trucks or railcars for shipment to the disposal site. Similar to the Conversion and Storage scenario, employment for DU oxide container monitoring and maintenance, and loading of wastes for off-site shipment, is estimated at 16 full-time employees for Paducah and 12 full-time employees for Portsmouth. Loading of DU oxide in bulk bags for off-site shipment to disposal would likely be similar to loading of DU oxide in cylinders since bulk bags would require fewer bags than DU oxide in cylinders (less labor) but would generate a greater number of empty and heel cylinders (more labor). Therefore, because of the small number of employees involved, no in-migration or out-migration is expected under this scenario and no impact on population and regional growth, housing, or community services in the Paducah or Portsmouth ROIs during loading of wastes for off-site shipment to disposal.

C.9 WASTE MANAGEMENT

Impacts on the waste management infrastructure could occur at Paducah or Portsmouth from DUF_6 cylinder storage, conversion of DUF_6 to DU oxide, DU oxide container storage, and loading DU oxide containers for off-site disposal. Impact on the capacity of one or more off-site disposal facilities could occur from disposal of DU oxide and other wastes.

C.9.1 Paducah or Portsmouth

DUF_6 conversion operations at Paducah or Portsmouth would annually generate DU oxide that would be contained within cylinders that had been emptied of $DUF_{6,}$ or alternatively, disposed of in bulk bags). The DU oxide cylinders would be stored indefinitely (assumed to be 100 years for purposes of analysis) at the sites under the Conversion and Storage Scenario but disposed of off site as LLW under the Conversion and Disposal Scenario. Bulk bags would not be used under the Conversion and Storage scenario, because they are not intended for long-term storage of DU oxide. In any event, DU oxide is not discussed further in this section because it is not consider to be waste until shipped off site for disposal.

In addition to DU oxide, under both scenarios the same types of waste would be generated at either of the two facilities. **Table C-28** summarizes the annual and total radioactive waste volumes projected at Paducah or Portsmouth for conversion operations and for storage and maintenance of oxide cylinders, as well as the percentages that the annual waste quantities would represent compared to current waste generation rates.

Table C-28 Annual and Total Radioactive Waste Generation at Paducah or Portsmouth

Waste	Activity	Paducah		Portsmouth		Total Waste Volume (cubic yards)	
		Annual Waste Volume (cubic yards)	Percent of Current Waste Generation[a]	Annual Waste Volume (cubic yards)	Percent of Current Waste Generation[a]	Paducah	Portsmouth
Conversion and Storage Scenario							
Unusable cylinders[b]	DUF_6 Conversion	420	NWS	310	NWS	3,500	3,500
LLW		58	27	43	27	480	480
CaF_2		4,910	NWS	3,660	NWS	40,600	40,600
LLW[c]	DU oxide storage and maintenance	2.1	1.0	1.6	1.0	210	160
MLLW		0.014	1.0	0.010	1.0	1.4	1.0
Conversion and Disposal Scenario							
Unusable cylinders[b]	DUF_6 Conversion	420	NWS	310	NWS	3,500	3,500
LLW		58	27	43	27	480	480
CaF_2		4,700	NWS	3,660	NWS	46,600	46,600
LLW[c]	DU oxide storage and maintenance	2.1	1.0	1.6	1.0	180	91
MLLW		0.014	1.0	0.010	1.0	1.1	0.59

Key: DU = depleted uranium; DUF_6 = depleted uranium hexafluoride; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NA = not applicable; NWS = new waste stream.

[a] Waste from current activities at Paducah is described in Chapter 3, Section 3.1.8, of this *DU Oxide SEIS*, while waste from current activities at Portsmouth is described in Section 3.2.8.

[b] The listed volume of the unusable cylinders is the envelope volume of the cylinders. Waste volumes may be significantly reduced if the cylinders were volume-reduced (e.g., compacted or shredded) at the disposal facilities or a separate waste treatment facility.

[d] The comparison is against current LLW generation rates other than DU oxide and unusable cylinders which are addressed separately in this table.

Note: To convert cubic yards to cubic meters, multiply by 0.76456.

It is assumed that some of the cylinders that had been emptied of DUF_6 would be determined to be unusable as containers for DU oxide. It is assumed that the DU oxide and unusable cylinders would be managed as LLW. As with Chapter 4, Section 4.1.1.8, of this *DU Oxide SEIS*, it was conservatively assumed that 5 percent of the DUF_6 cylinders received from commercial sources would be unusable as DU oxide containers and would be disposed of as LLW. Under this assumption, unusable cylinders would be generated at a rate of 75 cylinders per year at Paducah or about 56 cylinders per year at Portsmouth. The same envelope volume is assumed for the unusable cylinders as for the DU oxide cylinders.

The LLW volumes include CaF_2, which, for this appendix, is conservatively assumed to be managed as radioactive waste. Total volumes were estimated based on the total periods of conversion operations, assumed to be approximately 8 years at Paducah or 11 years at Portsmouth (see Section C.1).

Finally, storage and maintenance of DU oxide cylinders at Paducah or Portsmouth would annually generate solid LLW, including LLW containing constituents such as polychlorinated biphenyls, which are regulated under the Toxic Substances Control Act and MLLW. Annual volumes are assumed to be the same as those for storage of DU oxide cylinders generated from conversion of DOE DUF_6 (see Chapter 4, Section 4.1.1.8, of this *DU Oxide SEIS*). Total volumes are estimated for the Conversion and Storage and Conversion and Disposal Scenarios based on the assumed DU oxide storage years, which are listed in Table C-1.

As indicated, the bulk of the radioactive waste would be generated as part of the conversion process with only minor quantities generated from storage and maintenance of DU oxide cylinders. For analysis, it is assumed that the oxide generation rate would be in accordance with the nominal conversion rates for Paducah and Portsmouth (current conversion rates are smaller). Assuming these nominal conversion rates and the above conservative assumptions about the annual volume of unusable cylinders to be generated, the annual volume of unusable cylinders produced would be much larger than current actual LLW generation rates. LLW volumes from DUF_6 conversion would be a fraction of current generation rates for either site as a whole, while LLW and MLLW volumes from storage and maintenance of DU oxide cylinders would represent a negligible percentage of current waste generation rates for either site as a whole.

Although the unusable cylinders and CaF_2 would be very large percentages of current LLW generation, the site waste management infrastructure was modified to handle these volumes of wastes. Therefore, managing these waste would not adversely affect the waste management infrastructure. DOE does not expect operational difficulties at Paducah or Portsmouth in managing the projected radioactive waste quantities. Although the projected volume of unusable cylinders is much larger than the current rate at either Paducah or Portsmouth, assuming the maximum generation rate of unusable cylinders (75 per year at Paducah), this rate would represent only 6 to 7 unusable cylinders being generated each month. Assuming truck delivery of the unusable cylinders to off-site facilities and two cylinders per truck load, only 3 to 4 off-site shipments would be required per month. Shipment of the CaF_2 to off-site disposal facilities, would require 3 to 4 truck shipments or approximately 2 train shipments per month. These off-site shipment rates would not represent a management problem at Paducah or Portsmouth. Therefore, generation of waste during DUF_6 conversion and storage of DU oxide cylinders would not impact radioactive waste management capabilities at either Paducah or Portsmouth.

All oxide and other radioactive waste would be sent to off-site radioactive waste disposal facilities. Management of this waste at these facilities is addressed below in the "Radioactive Waste Disposition" subsection.

Conversion of DUF_6 would also generate hazardous waste, nonhazardous waste, and liquid sanitary waste as summarized in **Table C-29.** The indicated waste quantities would be the same for both the Conversion and Storage and Conversion and Disposal Scenarios. For hazardous waste and nonhazardous waste, a comparison of annual rates is made against current generation rates. For liquid sanitary waste, a comparison of annual rates is made against the treatment capacities of the on-site wastewater treatment systems. Much smaller quantities of nonhazardous waste and liquid sanitary waste would also be generated as part of DU oxide container storage and maintenance operations.

Table C-29 Nonradioactive Waste Generation from Commercial Depleted Uranium Hexafluoride Conversion at Paducah or Portsmouth

Waste	Paducah		Portsmouth		Total Waste Volume (cubic yards)[c]	
	Annual Waste Volume (cubic yards)[a]	Percent of Current Annual Waste Generation[b]	Annual Waste Volume (cubic yards)[a]	Percent of Current Annual Waste Generation[b]	Paducah	Portsmouth
Hazardous waste	7.2	97	5.4	97	60	60
Nonhazardous waste	240	300	190	320	2,000	2,100
Liquid sanitary waste (liters)	5.50×10^{6}	0.23	5.50×10^{6}	0.075	4.6×10^{7}	6.1×10^{7}

[a] Annual waste volumes for liquid sanitary waste are in units of liters.
[b] Waste from current activities at Paducah is described in Chapter 3, Section 3.1.8, of this *DU Oxide SEIS*, while waste from current activities at Portsmouth is described in Section 3.2.8.
[c] Total waste volumes assuming 8 and 11 years of conversion facility operation for Paducah and Portsmouth, respectively.
Note: To convert cubic yards to cubic meters, multiply by 0.76456; liters to gallons, multiply by 0.26418.

At either Portsmouth or Paducah, nonhazardous waste would be disposed of on site or sent to off-site permitted recycle or disposal facilities; hazardous waste would be sent to off-site treatment and disposal facilities, and sanitary wastewater would be treated in on-site facilities (see Sections 3.1.8 and 3.2.8). The projected waste quantities would not represent a management problem at Paducah or Portsmouth. Because hazardous waste generation rates would be comparable to existing rates, no concerns are expected in on-site management or in off-site waste management capacities. Multiple off-site hazardous waste facilities exist within Kentucky and Ohio and neighboring states.[78] Nonhazardous waste generation rates would be larger than current rates but again, no management concerns are expected. In addition to an on-site disposal capacity that may be used at Portsmouth, there are multiple nonhazardous waste recycle and disposal facilities within Kentucky and Ohio;[79] thus, no concerns are expected with respect to off-site disposal capacities.

C.9.2 Radioactive Waste Disposition

This section describes the potential impacts on the disposal capacities and operations at Energy*Solutions*, NNSS, and WCS. Other potential environmental impacts of disposal at each site are not analyzed in this *DU Oxide SEIS*. Consistent with common practice, as long as the waste to be disposed of is within the authorized capacity and waste acceptance criteria of the disposal facility, the impacts of disposal have already been considered and found to be acceptable. It is expected that disposal of the oxide and other radioactive wastes identified in this appendix would be licensed or authorized[80] in accordance with a regulatory determination of safety by means of analyses and long-term performance assessments. Chapter 5, Section 5.4.3, of this *DU Oxide SEIS*, describes the licenses and permits held by the Energy*Solutions* site. Energy*Solutions*'

[78] For example, 22 commercial facilities in Ohio provide hazardous waste services, including one hazardous waste landfill (Ohio EPA 2008); 12 commercial facilities provide hazardous waste services in Kentucky, although none operates a hazardous waste landfill (Fisher 2018).
[79] For example, there are 43 permitted municipal solid waste facilities in Ohio (Ohio EPA 2018), and 31 in Kentucky (KEEC 2018)
[80] Or permitted in the case of constituents within the waste regulated under other statutes than the Atomic Energy Act of 1954, as amended.

operating licenses and permits are available for review at the following website: https://customerportal.energysolutions.com/.

Section 5.4.2 of this *DU Oxide SEIS* describes applicable laws and regulations for disposal of waste at NNSS. Additional information on applicable laws and regulations, and the impacts of disposal of LLW at NNSS, is presented in the *Final Site-Wide Environmental Impact Statement for the Continued Operation of the Department of Energy/National Nuclear Security Administration Nevada National Security Site and Off-Site Locations in the State of Nevada* (DOE 2013). Section 5.4.3 of this *DU Oxide SEIS* describes the licenses and permits held by WCS. WCS operating licenses and permits are available for review at the following website: http://www.wcstexas.com/facilities/licenses-and-permits/.

Table C-30 presents the total volumes of LLW and MLLW (including oxide and unusable cylinders) that are projected from conversion of 150,000 metric tons of commercial DUF_6. In

Table C-30 Percentages of Disposal Capacities at Energy*Solutions*, Nevada National Security Site, and Waste Control Specialists

Waste	Volume (cubic yards)	Percent of Disposal Capacity		
		Energy*Solutions*[a]	Nevada National Security Site[b]	Waste Control Specialists[c]
Conversion and Storage Scenario				
DU oxide	NA	NA	NA	NA
Unusable cylinders[d]	3,500	0.084	0.20	0.37
LLW[e,f]	680	0.016	0.039	0.072
MLLW	1.4	3.8×10^{-4}	9.1×10^{-4}	1.4×10^{-4}
CaF_2	40,600	1.0	2.3	4.3
Conversion and Disposal Scenario				
DU oxide	69,900	100	3.9	7.3
Unusable cylinders[d]	3,500	0.084	0.20	0.37
LLW[e,f]	650	0.016	0.037	0.068
MLLW	0.70	2.0×10^{-4}	4.8×10^{-4}	7.4×10^{-5}
CaF_2	40,600	1.0	2.3	4.3

Key: DU = depleted uranium; FWF = Federal Waste Facility; LLW = low-level radioactive waste; MLLW = mixed low-level radioactive waste; NA = not applicable; WCS = Waste Control Specialists.

[a] The disposal capacity for LLW and MLLW other than DU oxide is assumed, respectively, to be the remaining capacity in the Class A West Embankment (4.17 million cubic yards [3.25 million cubic meters]) and the Mixed Waste disposal cell (358,000 cubic yards [274,000 cubic meters]) as of August 2016 (see Chapter 3, Table 3-27). DU oxide would be disposed of in a separate dedicated disposal unit sized to receive all DU oxide.

[b] The disposal capacity for LLW and MLLW at the Area 5 Radioactive Waste Management Complex is assumed to be 1,78 million cubic yards (1.36 million cubic meters) and 148,000 cubic yards (113,000 cubic meters) (Table 3-28). It is assumed that DU oxide would be disposed of in the Area 5 LLW disposal units.

[c] It is assumed that LLW, MLLW, and DU oxide would be disposed of in the FWF at WCS with a total capacity of about 963,000 cubic yards (736,000 cubic meters), of which about 8,000 cubic yards (6,116 cubic meters) had been used as of August 2016 (see Chapter 3, Table 3-29).

[d] The listed volume of the unusable cylinders is the envelope volume of the cylinders. Waste volumes may be significantly reduced if the cylinders were volume-reduced (e.g., compacted or shredded) at the disposal facility or a separate waste treatment facility.

[e] Includes all LLW projected from DUF_6 conversion and storage and maintenance of DU oxide cylinders except for DU oxide, CaF_2, and unusable cylinders. Both these waste streams are considered separately.

[f] Total LLW volumes from storage and maintenance of DU oxide cylinders are slightly different for these activities at Paducah compared to comparable activities at Portsmouth. The larger LLW volumes from either Paducah or Portsmouth are shown in this table.

addition, the table estimates the percentages of the disposal capacities represented by these volumes for the three LLW and MLLW disposal facilities addressed in this *DU Oxide SEIS*: Energy*Solutions*, NNSS, and WCS. The percentages of disposal capacities are determined assuming that all LLW and MLLW from the conversion process would be disposed of at each of the three facilities. The percentages for any individual facility would be reduced by sending the waste to more than one facility.

The disposal of DU oxide, unusable cylinders, ancillary LLW and MLLW, and CaF_2 would not exceed the disposal capacities at any of the evaluated facilities, even if each facility received all waste from Paducah or Portsmouth. DU oxide would not be disposed of under the Conversion and Storage Scenario. Under the Conversion and Oxide Disposal Scenario, disposal of DU oxide at Energy*Solutions* would not exceed the disposal capacity. This is because the disposal unit that would receive the DU oxide is a dedicated disposal unit that would be designed and sized to receive all DU oxide that may be sent from Paducah and Portsmouth. Disposal of DU oxide under this scenario at NNSS or WCS would represent less than 10 percent of the disposal capacities at either facility. Disposal of unusable cylinders and other LLW would represent less than 1 percent of the capacity at any evaluated facility, while disposal of MLLW would represent only tiny fractions of the disposal capacities at any evaluated facility.

As noted above, the listed volume of the unusable cylinders is the envelope volume of the cylinders. Cylinder waste volumes would be significantly reduced if the cylinders were volume-reduced (e.g., compacted or shredded) at the disposal facility or a separate waste treatment facility. In addition, disposal operations at any of the evaluated facilities would need to address the void spaces within the cylinders, which could include measures such as volume reduction, filling the void volume within the cylinders with a material such as grout or sand, or by stabilizing the cylinders in place with grout or similar media.

DOE would coordinate the proposed shipment scheduling with any facility receiving the waste to ensure that appropriate personnel and equipment are available to safely manage waste receipts. Energy*Solutions* and WCS routinely receive waste by both truck and train. Assuming either Energy*Solutions* or WCS received DU oxide cylinders from Paducah or Portsmouth, either disposal facility could conservatively receive up to 2,880 cylinders in a year. Assuming the cylinders are all shipped by truck and that there are 250 working days per year at Paducah or Portsmouth and the disposal sites, Energy*Solutions* or WCS would receive an average of about 12 truckloads of DU oxide cylinders per day. Otherwise, assuming the same number of cylinders was shipped by train from Paducah or Portsmouth, trains with DU oxide cylinders would arrive about 4 times per month. Assuming 6 cylinders per gondola railcar and 10 railcars per train, each train shipment would contain 60 cylinders to be offloaded and transferred to the designated disposal unit.

DOE expects that neither Energy*Solutions* nor WCS would have difficulty in accommodating either delivery mode. DOE expects that an average of 12 trucks per day or 4 trains per month would be within the range of truck and train shipments that routinely arrive at Energy*Solutions* or

WCS, and the uniform nature of the DU oxide shipments in terms of container type and size, and waste content, enhances the efficiency of disposal operations.[81]

Projected volumes of other radioactive wastes are much smaller and could be easily managed at Energy*Solutions* or WCS. Unusable cylinders would represent the largest volumes, but could be readily managed at either disposal facility. Unusable cylinders would annually average approximately 38 truck deliveries from Paducah or about 28 truck deliveries from Portsmouth (assuming two cylinders per truck). Assuming 250 working days per year at the disposal facilities, there would be an average of one truck delivery of unusable cylinders every seven working days from Paducah or one truck delivery every nine working days from Portsmouth. The largest annual quantity of LLW (not including DU oxide and unusable cylinders) considering either scenario (about 77 cubic yards) would be generated at Paducah. This annual volume of waste could be hypothetically disposed of in approximately 290, 55-gallon drums. Assuming that delivery to either disposal facility would be by truck and each truck could carry 60 drums, there would be approximately 5 truck shipments per year. The projected annual volume of MLLW from either Paducah or Portsmouth could be hypothetically delivered in a single 55-gallon drum, so receipt of MLLW would not represent a management concern at either facility.

Alternatively, shipments of unusable cylinders and other wastes could be made by train delivery to Energy*Solutions* or WCS. Delivery of these cylinders and wastes would require only a few train shipments per year, which would not be expected to represent any management concerns at either facility.

NNSS is capable of receiving waste only by truck shipment. Assuming NNSS received DU oxide from Paducah or Portsmouth at a rate of 12 trucks per day, this frequency of delivery could be addressed at NNSS under the current operational capability (equipment and personnel). Assuming the cylinders were delivered by train to an intermodal location to be transferred to trucks for delivery to NNSS, it could require multiple days for all cylinders from each train shipment to be transported from the intermodal location to NNSS. As discussed above, one of the features of the DU oxide shipments that would lead to efficient and timely disposal operations is their expected uniformity in terms of container shape, size, and waste content. Truck and train shipments would be scheduled to ensure the proper mix of personnel and equipment.

Similar to the discussion for Energy*Solutions* and WCS, the projected volumes of unusable cylinders or other wastes are smaller than the oxide volumes and could be managed at NNSS given its existing personnel and equipment configuration. As discussed above, delivery of unusable cylinders would annually average 1 truck delivery every 7 working days from Paducah or 1 truck

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[81] Shipments to LLW and MLLW disposal facilities are inspected upon arrival for compliance with acceptance criteria such as direct radiation levels, the presence of detectable removable contamination, waste content, and manifesting. Departing vehicles are also inspected to ensure compliance with transportation requirements including the presence of detectable removable contamination. A uniform waste stream such as DU oxide would require less time to perform these inspections than another waste stream containing, for example, a more variable range of isotopes. It also requires less time to inspect a rail shipment than it would if the same quantity of waste in the rail shipment was instead shipped in multiple truck loads. The uniform size and configuration of the great majority of the DU oxide containers (i.e., cylinders) also promotes a more efficient and timely waste emplacement process compared to that required for shipments containing the same quantity of waste but in containers of a variety of sizes and configurations (e.g., drums, boxes, lift liners).

delivery every 9 working days from Portsmouth. As discussed above, annual deliveries of other LLW and MLLW would not represent a management concern at NNSS.

C.10 ENVIRONMENTAL JUSTICE

A determination of impacts that could disproportionately affect minority and low-income populations is based upon the impacts on the resource areas considered in this appendix.

C.10.1 Conversion and Storage

As shown in Chapter 3, Sections 3.1.11 and 3.2.11, of this *DU Oxide SEIS*, there are a number of census tracts with a higher proportion of minority and low-income populations within 50 miles (80 kilometers) of both Paducah and Portsmouth. However, as described in this appendix, under normal conditions there would be no high and adverse impacts anticipated on other resource areas that would disproportionately impact minority and low-income populations under the Conversion and Storage scenario.

Potential adverse human health impacts associated with an accident could impact the health and safety of the general population surrounding the site. For all youth and elderly populations, disproportionate impact is inherent. The extent to which youth and the elderly will be impacted is disproportionate due to their inherent vulnerabilities. Thus, potential accidental releases of hazardous materials have the potential to disproportionately impact children (under 18 years) and the elderly (65 and older). Operational and natural phenomena initiated events identified in the hazard evaluation tables in the documented safety analyses that involved DU oxide were found to have “negligible” radiological and chemical consequences to the public. In addition, as described in Section C.7.3, truck or train transportation of DU oxide, unusable cylinders, CaF_2, and ancillary LLW and MLLW to off-site disposal facilities is not expected to result in any LCFs although a number of nonradiological fatalities due to traffic accidents could occur. The location of potential transportation accidents and the types of persons affected cannot be projected and reliably predicted and thus, there would be no reason to expect that minority and low-income populations would be affected disproportionately by high and adverse impacts. Therefore, disproportionate high and adverse impacts on minority or low-income populations are not expected under this scenario.

C.10.2 Conversion and Disposal

The impacts of storage of DUF_6 containers, conversion of DUF_6 to DU Oxide, storage of DU oxide containers, and loading of wastes for off-site disposal at Paducah or Portsmouth would be similar to those described for the Conversion and Storage scenario and there would be no high and adverse impacts anticipated to other resource areas that would disproportionately impact minority and low-income populations.

During disposal of the DU Oxide under this scenario, truck and railcar loading activities would occur within the industrialized areas of Paducah or Portsmouth. For all youth and elderly populations, disproportionate impact is inherent. The extent to which youth and the elderly will be impacted is disproportionate due to their inherent vulnerabilities. However, the potential impacts associated with the shipment of DU oxide and other wastes from Paducah or Portsmouth to the disposal sites (see Section C.7.3) is not expected to result in any LCFs although a number of nonradiological fatalities due to traffic accidents could occur. In addition, the locations of potential transportation accidents and the types of persons affected cannot be projected and reliably predicted and thus, there would be no reason to expect that minority and low-income populations would be affected disproportionately by high and adverse impacts. Therefore, disproportionate high and adverse impacts on minority or low-income populations are not expected during transportation of wastes to disposal sites under this scenario.

C.11 RESOURCE USE

Resources would be used during commercial DUF_6 cylinder storage, conversion of DUF_6 to DU oxide, DU oxide container storage, loading DU oxide containers for off-site disposal, and disposal of DU oxide and other wastes. The major commitments of natural and man-made resources related to the scenarios for management of commercial DUF_6 are discussed below. Three major resource categories would be committed: land, labor and materials, and energy.

C.11.1 Land

When no longer needed, DOE could decontaminate the conversion facilities and the storage yards. After decontamination, the conversion facilities and the storage yards could be reused for another productive use. If a productive use for the facilities is not found, they could be demolished and removed. Appropriate CERCLA and/or NEPA reviews would be conducted before initiation of decontamination, decommissioning, and demolition (DD&D) and removal actions. Examples of future use of these tracts of land, although beyond the scope of this *DU Oxide SEIS*, could include other industrial uses, and restoring them for unrestricted use. Therefore, the commitment of this land resource would not necessarily be irreversible. However, the land used to dispose of DU oxide and other wastes is likely to be irretrievable because wastes in belowground disposal areas are not anticipated to be removed, the land could not be restored, and the site could not be used for other purposes.

C.11.2 Labor and Materials

Human resources (labor) would be expended during commercial DU management activities. The commitment of labor and material resources for management of commercial DUF_6 would include labor and materials consumed or reduced to unrecoverable forms of waste. **Table C-31** shows the estimated consumption of labor and materials under the commercial DUF_6 management scenarios evaluated in this *DU Oxide SEIS*. Consumption of the labor and materials would not constitute a major drain on local resources. Substantial steel would be used in the form of unusable cylinders and DU oxide disposal containers. Substantial quantities of other materials would be used during the conversion of DUF_6 to DU oxide. Consumption of steel and other materials, although irreversible and irretrievable, would not involve a resource in short supply in the United States.

Table C-31 Resource Use for Management of Commercial DUF_6

Resource	Paducah		Portsmouth	
	Conversion and Storage Scenario	Conversion and Disposal Scenario	Conversion and Storage Scenario	Conversion and Disposal Scenario
Labor				
Full-time equivalent (person-years)	1,710	1,540	2,480	2,130
Material				
Steel (in disposal containers and unusable cylinders) (tons)	814	17,100	814	17,100
Lime (tons)	152	152	154	154
Ammonia (tons)	5,360	5,360	5,610	5,610
Potassium hydroxide (tons)	64	64	66	66
Nitrogen (tons)	80,000	80,000	85,800	85,800
Energy				
Electricity (megawatt-hours)	298,000	298,000	342,000	342,000
Gasoline (gallons)	55,700	34,000	125,000	64,900
Diesel fuel (gallons)[a]				
Max for train transportation	185,000	3,540,000	271,000	4,380,000
Max for truck transportation		9,190,000		10,900,000
Natural gas (scf)	1.85×10^{14}	1.85×10^{14}	2.31×10^{14}	2.31×10^{14}

Key: Max = maximum; scf = standard cubic feet.
[a] Includes diesel fuel for conversion, cylinder handling and loading equipment, and for truck or train transportation vehicles for transportation to a disposal site. Disposal at the Nevada National Security Site (NNSS) resulted in the maximum fuel use and therefore the values for NNSS were used in this table.

C.11.3 Energy

The commitment of energy resources during commercial DUF_6 management would include the consumption of electricity and fossil fuels (i.e., diesel fuel, gasoline) used for equipment operation and transportation vehicles (see Table C-31). Consumption of energy would not constitute a permanent drain on local resources or involve any energy source in critically short supply in the United States.

C.12 FACILITY LIFE EXTENSION

As described in Section C.2, the conversion of 150,000 metric tons of commercial DUF_6 could add 8 years to conversion facility operations at Paducah or 11 years to the conversion facility operations at Portsmouth. In addition, it would take approximately 9 years to transport all the DU oxide cylinders from Paducah or Portsmouth to the disposal facilities. Therefore, operations at Paducah could be extended by up to approximately 17 years, or operations at Portsmouth by 20 years.

The 2004 EISs (DOE 2004a, 2004b) discussed extention of conversion facility operations beyond the original years assumed (25 for Paducah, 18 for Portsmouth) in that analysis. These documents indicated that the facilities could safely operate for extended times "with routine facility and equipment maintenance and periodic equipment replacements or upgrades." As shown in Chapter 2, Table 2-3, this *DU Oxide SEIS* assumed the Paducah and Portsmouth conversion facilities would operate for up to 44 and 32 years, respectively. An additional 8- to 11-year extension of conversion facility operation should be possible with equipment replacements/

upgrades and continued maintenance and repair. Replacement of the buildings or supporting infrastructure is not likely to be needed.

An additional 17- to 20-year extension of cylinder storage yard operations should be possible with equipment replacements/upgrades and continued maintenance and repair. Replacement of the cylinder storage pads or supporting infrastructure is not likely to be needed.

When no longer needed, DOE could DD&D the conversion facilities and cylinder storage yards. If a decision is made to entirely remove the conversion facilities and cylinder storage yards, the areas could be restored to long-term productivity as functioning habitat for plants and animals. If the facilities and storage yards are not entirely removed, the areas could be put to a productive industrial use. Such a decision would be coordinated with the decision regarding end use of Paducah and Portsmouth.

Therefore, the extended operation of the facilities would only delay the DD&D operations, but would not expand the scope of DD&D activities nor would it affect the possible end use of the site. Both uses as a functioning habitat for plants and animals and as a productive industrial site would still be possible.

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APPENDIX D

CONTRACTOR DISCLOSURE STATEMENTS

APPENDIX D: CONTRACTOR DISCLOSURE STATEMENTS

NEPA DISCLOSURE STATEMENT FOR PREPARATION OF A SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR DEPLETED URANIUM OXIDE DISPOSAL

CEQ regulations at 40 CFR Part 1506.5(c), which have been adopted by DOE (10 CFR Part 1021), require contractors who will prepare an EIS to execute a disclosure specifying that they have no financial or other interest in the outcome of the project. The term "financial interest or other interest in the outcome of the project," for the purposes of this disclosure, is defined in the March 23, 1981 guidance "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," 46 FR 18026-18038 at Question 17a and b.

"Financial or other interest in the outcome of the project 'includes' any financial benefit such as a promise of future construction or design work in the project, as well as indirect benefits the contractor is aware of (e.g., if the project would aid proposals sponsored by the firms other clients)," 46 FR 18026-18038 at 18031.

In accordance with these requirements, the offeror and any proposed subcontractors hereby certify as follows: (check either (a) or (b) to assure consideration of your proposal)

(a) [X] Offeror and any proposed subcontractor have no financial interest in the outcome of the project.

(b) [ ] Offeror and any proposed subcontractor have the following financial or other interest in the outcome of the project and hereby agree to divest themselves of such interest prior to award of this contract.

Financial or Other Interests:
1.
2.
3.

Certified by:

Erlinda Silva
Signature

Erlinda Silva
Name

Contract Manager
Title

July 27, 2018
Date

STC Environmental, LLC