
Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride

AGENCY: Department of Energy

ACTION: Notice of Intent (NOI).

SUMMARY: The Department of Energy (DOE) announces its intent to prepare a programmatic environmental impact statement (PEIS) pursuant to the National Environmental Policy Act (NEPA) of 1969 (42 USC 4321 et seq.). The PEIS will assess the potential environmental impacts of alternative strategies for the long-term management and use of 560,000 metric tons of depleted uranium hexafluoride (UF6) currently stored in cylinders at DOE's three gaseous diffusion plant sites located near Paducah, Kentucky; Portsmouth, Ohio; and Oak Ridge, Tennessee.

This impact statement will support management decisions on depleted UF6 by evaluating the environmental impacts of a range of reasonable alternative strategies as well as providing a means for the public to have a meaningful opportunity to be heard on this matter. This NOI informs the public of the proposal, explains the schedule, announces the dates, times, and places for scoping meetings, and solicits public comment.

DATES: To ensure that the full range of issues and alternatives related to this proposal is addressed, DOE invites comments on the scope of this proposed PEIS. Written comments should be postmarked by March 25, 1996, to ensure consideration. Comments received after this date will be considered to the extent practicable.

Three public scoping meetings will be held to provide information and opportunities for discussion of the subject PEIS and to receive oral and written comments. The meetings will be held near the storage sites located near Paducah, Kentucky; Oak Ridge, Tennessee; and Portsmouth, Ohio. The scoping meetings will be held twice a day, beginning at 3:00 p.m. and 7:00 p.m., at each site to allow for as much interaction with the stakeholders as possible. The meetings will be held according to the following schedule:

Paducah, Kentucky; February 13, 1996 (Information Age Park Resource Center, 2000 McCracken Blvd., Paducah, Kentucky 42001)

Oak Ridge, Tennessee; February 15, 1996 (Pollard Auditorium at Oak Ridge Institute for Science and Education, 210 Badger Avenue, Oak Ridge, Tennessee 37831)

Portsmouth, Ohio; February 20, 1996 (Vern Riffe Pike County Vocational School, State Route 124, Piketon, Ohio 45661)

ADDRESSES: Written comments on the scope of the PEIS and requests for copies of referenced material should be directed to: Mr. Charles E. Bradley, Jr., Office of Facilities, Office of Nuclear

Energy, Science and Technology, U.S. Department of Energy, 19901 Germantown Road, Germantown, Maryland, 20874-1290, (301) 903-4781.

FOR FURTHER INFORMATION CONTACT: For general information on the DOE NEPA process, please contact Ms. Carol M. Borgstrom, Director, Office of NEPA Policy and Assistance, U.S. Department of Energy, 1000 Independence Avenue, S.W., Washington, D.C. 20585, (202) 586-4600 or 1-800-472-2756.

SUPPLEMENTARY INFORMATION: The unique properties and value of depleted UF6, such as its high purity and density, as well as the large volume (560,000 metric tons) in storage, make it appropriate to evaluate, analyze, and decide the fate of this material separately from other DOE materials in storage or awaiting disposition. DOE has determined that such an action is a major Federal action with potentially significant environmental impacts and requires the preparation of an EIS in accordance with NEPA. The purpose of this PEIS will be to assess the potential impacts of a range of reasonable alternative strategies for the long-term management of depleted UF6. A strategy is a set of actions for handling depleted UF6, from its current storage condition at three DOE sites-Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee-to ultimate disposition. These broad strategies focus on material use, storage, and disposal. The programmatic impact statement will address the potential impacts of the actions that would comprise each strategy. DOE will prepare additional tiered, project-specific NEPA documents as appropriate.

The proposed PEIS is the second component of an integrated three-part program to select a long-term management strategy for depleted UF6 at Portsmouth, Paducah, and Oak Ridge. The first component of the program is an engineering analysis of proposed technologies for managing or using the material. This analysis will be based, in part, on responses to a request for recommendations for potential uses, associated conversion technologies, and management technologies for depleted UF6.

In November 1994, DOE published two notices in the Federal Register to initiate the consideration of alternative strategies for the long-term management and use of depleted UF6. The first notice was the ``Management of Depleted Uranium Hexafluoride (UF6): Request for Recommendations'' (59 FR 56324), and the second notice was the ``Advance Notice of Intent to prepare an Environmental Impact Statement: Alternative Strategies for the Long-Term Management of Depleted Uranium Hexafluoride at Several Geographic Locations'' (59 FR 56325). As indicated in the request for recommendations, Lawrence Livermore National Laboratory used technical experts to evaluate the 57 responses to the request for recommendations. The results of these evaluations are presented in ``The Technology Assessment Report for the Long-Term Management of Depleted Uranium Hexafluoride'' (UCRL-AR-120372), dated June 30, 1995. Copies of this report are available from the National Technical Information Service, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161, phone (703) 487-4650, or from Mr. Bradley at the address above. Copies are also in the DOE reading rooms at the following locations:

DOE Headquarters, 1000 Independence Avenue, SW, Room 1E-190, Washington, D.C. 20585, phone (202) 586-3142;

Oak Ridge Operations Office, Public Reading Room, 55 Jefferson Circle, Room 112, Oak Ridge, Tennessee 37831, phone (615) 241-4780;

Paducah/DOE, Environmental Information Center, 175 Freedom Blvd., Kevil, Kentucky 42053, phone (502) 462-2550;

Portsmouth/DOE, Environmental Information Center, 505 West Emmitt Avenue, Suite 3, Waverly, Ohio 45690, phone (614) 947-5093.

As a result of the process implemented to date, DOE has considered a wide range of potential alternatives. While many of the options offered in response to DOE's request for recommendations were already known,

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others contained information on unique technologies and potential uses that had not been evaluated previously. DOE officials have considered the opinions of the independent technical reviewers on each of the recommended options. After the consideration of public comments on the scope of the PEIS, DOE will determine which options will be evaluated in detail in the impact statement. Based on its initial review, DOE has grouped the recommendations into four categories of options: (1) Conversion, (2) use, (3) storage, and (4) disposal. DOE intends to consider representative options in each category in evaluating the environmental impacts

of the alternatives.

The third component of DOE's program is a parallel study of the life-cycle costs of each of the management strategy alternatives to be evaluated in the EIS. The results of this study, in conjunction with those of the impact assessment, will form the basis for making a strategy selection from among the alternatives. This decision will be documented in the Record of Decision for this PEIS.

Background

Uranium is a naturally occurring radioactive element containing different isotopes, notably Uranium-238 (U-238) and Uranium-235 (U-235). In its natural state, uranium occurs as an oxide ore (U3O8). This oxide ore is concentrated and then fluorinated to yield UF6.

The ability to use uranium for controlled fission in nuclear chain reactions in most nuclear reactors depends on increasing the proportion of the U-235 isotope in the material (0.7 percent in natural uranium) relative to the proportion of the U-238 isotope through an isotopic separation process called enrichment. In this process, a stream of UF6 containing both U-235 and U-238 is divided into separate streams-one is increased, or enriched, in its percentage of U-235 (typically 3.5 percent), and the other reduced, or depleted, in its percentage of U-235 (typically 0.25 percent). The enriched UF6 is used for making reactor fuel and historically for making weapons-grade uranium. The large-scale enrichment process developed by the United States in the 1940's is called ``gaseous diffusion.'' After World War II

1940's is called ``gaseous diffusion.'' After World War II, the process continued at the Portsmouth, Paducah, and Oak Ridge facilities under the auspices of the Atomic Energy Commission and its successor agencies, including DOE. On July 1, 1993, responsibility for uranium enrichment operations at the Portsmouth and Paducah facilities was transferred from DOE to the United States Enrichment Corporation. Diffusion plant operations at the Oak Ridge facility ceased in 1985. The facility used for diffusion operations at Oak Ridge is no longer needed, and DOE plans to decontaminate and decommission the buildings and equipment used in the diffusion process.

A major consequence of the gaseous diffusion process is the accumulation of a significant amount of depleted UF6. This material is so named because it is depleted in the percentage of the U-235 isotope as compared to the original feed material. Most of this material, accumulated since the 1940s, is stored at the Paducah and Portsmouth Gaseous Diffusion Plant sites and at the Oak Ridge Reservation. The total amount of depleted UF6, created prior to July 1, 1993, and still the responsibility of DOE, is approximately 560,000 metric tons. Depleted UF6 is stored as a solid in a partial vacuum in large steel cylinders each containing approximately 12 metric tons. These are stacked two layers high at the sites in large storage areas referred to as ``yards.'' The specifications for these cylinders are typically: a capacity of 12 metric tons, a diameter of 48 inches, a length of 12 feet, and wall thicknesses of 5/16 of an inch. There are approximately 46,500 such cylinders in storage at the three sites. About 28,400 cylinders are stored at Paducah, 13,400 at Portsmouth, and 4,700 at Oak Ridge.

Purpose of the PEIS

The purpose of the PEIS is to evaluate the impacts of reasonable alternative strategies for depleted UF6 long-term management and use, and to support the selection of a strategy for implementation. The alternatives will be analyzed for their potential impacts on the human environment, including risks to worker and public health and safety.

The need to re-examine the current strategy for long-term management of depleted UF6 arises from several factors including DOE's current missions and functions; increasing budget pressures; the continuing need for good stewardship of resources including materials in inventory; and continuing Departmental attention to considerations of environment, safety, and health. The increased pressure on the Federal budget particularly requires that DOE take a closer look at materials management in order to ensure maximum cost effectiveness. This includes an examination of feasible uses of this material consistent with DOE's mission as well as an examination of management methods that are consistent with environmental requirements and budgetary constraints.

Description of Preliminary Alternatives

Reasonable alternatives (i.e., those that are practical or feasible both technically and economically) to be considered in detail in the PEIS will represent a range of alternatives for meeting DOE's purpose and need. Each alternative is in the form of a strategy. A strategy is a set of actions and schedules

form of a strategy. A strategy is a set of actions and schedules for depleted UF6, including storage, use and/or disposal. Such actions also may include conversion and transportation activities. All alternatives begin with the material in storage. Strategies involve the configuration of the proposed facilities associated with these actions, including various centralization or decentralization options. The time period for the analysis would cover approximately 40 years from the Record of Decision.

The following is a preliminary list of six alternatives and the actions within each that will be analyzed. The proposed alternatives include continuation of the current management plan (the no action alternative), two storage alternatives, two use alternatives, and a disposal alternative. The conversion processes and other options that will be analyzed will be representative of those recommended in response to the published request for recommendations. This list of alternatives is subject to modifications (additions or deletions) as suggested by the public.

Continue Current Management Plan (No Action)

Under the ``no action'' alternative, cylinder management activities (handling, inspection, monitoring, and maintenance) would continue, consistent with the current management plan. These management activities include actions needed to meet safety and environmental requirements.

Storage

Two storage alternatives are proposed for consideration in

the impact statement. These are continued storage beyond 2020 as UF6 and as an oxide. Storage for up to 40 years will be analyzed.

Storage as UF6

This alternative considers storing depleted UF6 in one of three types of storage facilities. The steps in the alternative include repackaging as necessary to meet the requirements of the storage facility designs and transport to the storage facility(s). The storage

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alternatives include (1) storage in yards, (2) storage in enclosed buildings, and (3) deep underground retrievable storage (such as a mine). In cases where the storage facility is located off site, the impact statement will examine the transportation impacts associated with moving the material from its current location.

Storage as an Oxide

The steps in this storage alternative include: transport of the depleted UF6 to a conversion facility, conversion to an oxide form (either U308 or UO2), and transport of the oxide to a storage facility. The potential storage facilities are: (1) Buildings, (2) below-ground cement vaults, and (3) deep underground retrievable storage (such as a mine). In addition

underground retrievable storage (such as a mine). In addition to the oxide, the conversion technology could produce an additional product(s) (such as hydrogen fluoride). The alternative analysis will include an assessment of the impacts associated with the transport of that product to either a disposal site or to a user.

Use of Depleted Uranium

Strategies that focus on the use of depleted uranium normally include conversion of the UF6 to another chemical form, usually oxide or metal. The basic steps in a use alternative are: (1) Transport of the depleted UF6 from storage to a conversion facility, (2) conversion of the depleted UF6 to another chemical form, (3) transport of this new material to a fabrication plant, (4) fabrication of the end product, and (5) transport of this product to the user. Conversion processes leading to uranium oxide and depleted uranium metal generate additional products including calcium fluoride and hydrogen fluoride, which may either be sold or disposed of as waste. The impacts associated with transporting these additional products will be included in the assessment of the use alternatives.

In the use alternatives, the conversion products (oxides, metals, etc.) would be manufactured into other forms. Of the uses proposed in response to the request for recommendations, the production of radiation shielding, from either oxide or metal, will be analyzed as a representative dense-material use alternative. Other dense-material applications include using depleted uranium metal in industrial counterweights, energy

storage flywheels, or as munitions. Impacts associated with other dense-material would be generally bounded by the consideration of the more general radiation shielding application. Should the dense-material use alternative be selected in DOE's Record of Decision, DOE will prepare additional tiered NEPA analysis as appropriate concerning this alternative and specific dense-material uses.

Although suggested as a use alternative, enriching and converting this material into fuel feed for existing commercial reactors or advanced reactors (including breeder reactors) is not a reasonable alternative and will not be analyzed in detail in the PEIS. While technologically feasible, enrichment would be a lengthy and expensive process which would continue to generate additional depleted UF6. This alternative is unreasonable for a number of reasons including: Duration, cost-effectiveness, current and anticipated commercial market prices, current and anticipated market demand, the lack of current and anticipated demand by DOE's Experimental Breeder Reactor-II, and the generation of additional depleted UF6 for further disposition. However, the PEIS will analyze long-term storage, and the impacts from the use of stored material as a fuel source, if subsequently proposed, would be analyzed in subsequent NEPA documentation.

Radiation Shielding from Metal

Once converted, the metal would be packaged and transported to a fabrication plant where uranium metal shielding components could be manufactured. The impacts associated with off-site transport of the metal and the manufacturing process will be

part of the assessment. The impacts of the uses of the final products will be assessed in a general way consistent with public access to the manufactured product.

Radiation Shielding from Oxide

The steps in this alternative are identical to those described previously except that the conversion technology produces oxide rather than metal. The oxide (in the form of depleted UO2) would be transported to a fabrication plant where a concrete material containing uranium could be manufactured. The transport of the oxide material off site and the manufacture of the concrete and the container will be included in the impact assessment. The impact of the use of the concrete material for shielding will be included in the assessment.

Disposal of Depleted UF6

This alternative analyzes the impact of the disposal of depleted UF6 in the oxide form in three different disposal facility configurations. Because it is chemically stable and insoluble, the oxide form would likely be the most appropriate form for permanent disposal. In this scenario, the material would be disposed of as a low-level radioactive waste.

The steps in the disposal alternative are: (1) Transport of the depleted UF6 from storage to a conversion facility, (2) conversion to oxide, (3) transport of the oxide to a disposal facility, and (4) disposal. The conversion of the depleted UF6

to an oxide form (either U3O8 or UO2) would be accomplished using the technology assessed as part of alternatives described previously. After conversion, the material would be appropriately packaged and transported to a disposal facility. The facility designs analyzed in the alternative include drums placed in: (1) Engineered trenches, (2) below-ground concrete vaults, and (3) mines. Both bulk disposal of the depleted UF6 and grouted disposal forms will be considered. Bulk disposal consists of placing the oxide directly in the drums. Grouted disposal requires fixing the oxide in a cement-type medium. General facility configurations will be assessed for both humid and arid hypothetical locations to provide the full range of potential impacts. Transportation impacts associated with moving the low-level waste material will be assessed for locations in both the Eastern and Western United States.

As with the other alternatives that include a conversion step, byproducts are produced. The transport of these additional materials will be included in the assessment.

Identification of Environmental Issues

This EIS is the first level of a tiered environmental assessment process. Tiering refers to the process of first addressing general (programmatic) matters in a broad PEIS followed by more narrowly focused (project level) environmental documentation that incorporates by reference the more general discussions. At this first level, the PEIS addresses the potential impacts of broad strategy alternatives, including analyses of the general impacts of (1) the current management program for depleted UF6 at DOE's storage sites,

(2) technologies for converting the depleted UF6 to other chemical forms, (3) storage for subsequent use or disposal, (4) transportation of materials, and (5) disposal. The environmental impacts of the transport of materials along specific routes, impacts from the siting of any specific facilities, or the use of specific technologies will be assessed in future NEPA documents, as appropriate. These subsequent documents are the ``project

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level'' documents and are the second level of the tier.

The second level document(s) would address specific siting issues, construction and operation decisions, and the impacts of transport between identified origins and destinations. As this PEIS supports the selection of a general strategy, the range of impact areas to be considered will focus on those appropriate to this level of decision. The impact analysis will consider, for each alternative, the physical, chemical, and radiological health and safety risks to workers and to the public of material storage, conversion, transportation, use, and disposal. Potential impacts to air quality and noise levels, water quality, waste disposal capacity, biotic resources, and socioeconomic factors associated with these activities will be assessed. Environmental justice issues will be considered as appropriate for this level of decision. Cumulative impacts of strategy-related actions and other actions at the three DOE sites will be assessed.

Related and Other DOE NEPA Documentation

Consistent with tiering, should the depleted UF6 strategy selection result in site-specific actions, additional NEPA documents would be prepared to consider the specific impacts on the site and vicinity from any proposed action. Such analyses would address additional site-specific issues such as historic resources, threatened and endangered species, critical environmental resources, floodplain, and land use. The results of specific analyses conducted as part of other Departmental EISs will be incorporated as appropriate.

Invitation to Comment

DOE will conduct a full and open process to define the scope of the PEIS. DOE will hold public scoping meetings at the sites that may be affected by the proposed action in order to discuss issues and to receive oral and written comments on the scope of the impact statement. These meetings will provide the public with an opportunity to present comments, ask questions, and discuss concerns with DOE officials. The public will be encouraged to comment on the content of the proposed action, the proposed alternatives, and the range of impacts to be considered including cumulative effects. Oral and written comments will be considered equally in the preparation of the document.

The scoping meetings will allow opportunity for the public to provide comments on the alternative strategies being considered by DOE. These scoping meetings build upon six public information forums held during the request for recommendations comment period

and the completion of the technology assessment phase. At those forums, the public provided recommendations for technologies to be considered and comments on the factors used to evaluate the recommendations.

The scoping meetings will consist of an explanation of the depleted UF6 management program, as well as interactive workshops to examine the alternatives being considered for evaluation in the EIS. Background information and fact sheets will be made available to the public prior to the scoping meetings, upon request. (Requests should be sent to Mr. Charles E. Bradley, Jr., Office of Facilities, Office of Nuclear Energy, Science and Technology, U.S. Department of Energy, 19901 Germantown Road, Germantown, MD 20874-1290; (301) 903-4781.) These materials, along with posters, demonstrations, and technical experts, will be present at each of the scoping meetings to provide as much information as possible to the participants.

Information on the meeting dates and locations, as well as related materials, can be obtained through the address above. Information is also available through the information and resource centers located near the sites. Contact Mr. Charles E. Bradley at the address above for more information.

Issued in Washington, DC, this 22nd day of January 1996.

Peter N. Brush,
Principal Deputy Assistant Secretary, Environment, Safety and Health.

[FR Doc. 96-1196 Filed 1-24-96; 8:45 am]

BILLING CODE 6450-01-P

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