DOE/EIS-0269

FINAL PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT FOR ALTERNATIVE STRATEGIES FOR THE LONG-TERM MANAGEMENT AND USE OF DEPLETED URANIUM HEXAFLUORIDE

Volume 3: Responses to Public Comments

April 1999

U.S. Department of Energy
Office of Nuclear Energy, Science and Technology

COVER SHEET

RESPONSIBLE FEDERAL AGENCY: U.S. Department of Energy (DOE)

TITLE: Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269)

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ABSTRACT: This PEIS assesses the potential impacts of alternative management strategies for depleted uranium hexafluoride (UF_6) currently stored at three DOE sites: Paducah site near Paducah, Kentucky; Portsmouth site near Portsmouth, Ohio; and K-25 site on the Oak Ridge Reservation, Oak Ridge, Tennessee. The alternatives analyzed in the PEIS include no action, long-term storage as UF_6, long-term storage as uranium oxide, use as uranium oxide, use as uranium metal, and disposal. DOE's preferred alternative is to begin conversion of the depleted UF_6 inventory as soon as possible, either to uranium oxide, uranium metal, or a combination of both, while allowing for use of as much of this inventory as possible.

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1 OVERVIEW OF PUBLIC PARTICIPATION AND COMMENT PROCESS

On December 24, 1997, the Department of Energy (DOE) published a Notice of Availability (63 FR 7771) in the *Federal Register* for the *Draft Programmatic Environmental Impact Statement (PEIS) for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride* (DOE/EIS-0269). In accordance with the Council on Environmental Quality (CEQ) and DOE National Environmental Policy Act (NEPA) regulations, the notice invited interested agencies, organizations, and the general public to provide oral and written comments on the Draft PEIS.

This volume of the Final PEIS contains the comments and DOE's responses to comments received during the comment period. Chapter 2 contains photocopies of written submissions received by DOE on the Draft PEIS; DOE's responses to those comments are listed in Chapter 3. Chapter 4 provides the oral comments received at the public hearings and DOE's responses. Chapter 5 provides indices to comments and responses arranged by commentor name and by comment number.

1.1 TECHNOLOGY ASSESSMENT

On November 10, 1994, DOE published a Request for Recommendations (59 FR 56324) and an Advance Notice of Intent (59 FR 56325) in the *Federal Register* to prepare a PEIS for alternative strategies for the long-term management and use of depleted uranium hexafluoride (UF_6). The Request for Recommendations asked interested persons, industry and government agencies to submit suggestions for potential uses for the depleted UF_6 as well as technologies that could facilitate the long-term management of this material.

By publishing the Request for Recommendations, DOE offered a unique opportunity for the public to become involved in the Depleted Uranium Hexafluoride Management Program and provide input early in the decision-making process. In keeping with the DOE's intent to foster candid information exchange and ongoing two-way communication with stakeholders, two sets of information exchange forums/workshops were held at Oak Ridge, Tennessee; Paducah, Kentucky; and Portsmouth, Ohio: one in November/December 1994, after the release of the Request for Recommendations/Advance Notice of Intent, and one in July 1995, at the conclusion of the Technology Assessment phase of the Program. The purpose of these sessions was to explain the Depleted Uranium Hexafluoride Management Program and the Technology Assessment component, provide updates, solicit questions and comments, and foster awareness of the various opportunities for public participation.

A 60-day public comment period was announced; however, all responses, including those submitted after the end of the comment period, were evaluated. In all, 57 responses containing approximately 70 recommendations were received and evaluated, including five options under consideration by DOE. The *Technology Assessment Report for the Long-Term Management of Depleted Uranium Hexafluoride* (UCLR-AR-120372, June 30, 1995) provides a summary of the responses to the Request for Recommendations, the verbatim assessments of the Independent Technical Reviewers, and a summary of the evaluation results. The feasibility analysis in the report was used by DOE in developing alternative strategies for the long-term management of depleted UF_6.

1.2 SCOPING

The DOE published a Notice of Intent (61 FR 2239) to prepare a PEIS in the *Federal Register* on January 25, 1996. The notice invited interested agencies, organizations, and the general public to provide oral and written comments to determine the scope of the PEIS. After publication of the Notice of Intent, stakeholders were sent a letter announcing the schedule for the scoping meetings, a copy of the Notice of Intent, a comment form, and a fact sheet titled "Proposed Scope of Environmental Issues."

Rather than the traditional hearing format, a more interactive workshop format was used for the scoping meetings which were held in February 1996 near the three DOE storage sites in Paducah, Kentucky; Portsmouth, Ohio; and Oak Ridge, Tennessee.

During the 60-day public scoping period, comments were submitted in a variety of ways: through comment forms available at meetings and in mailings, by making an oral comment to a Program representative at a meeting, by mailing or faxing DOE, by calling the toll-free information line, by sending an e-mail or by using the CD ROM program at the meetings. All comments received were entered into a database and were considered in determining the scope of the PEIS.

A summary report, consisting of a compilation of the comments from the scoping period and their disposition/responses, is included in Appendix L to the PEIS. The issues raised during the scoping period were used in developing the details of the draft outline PEIS.

1.3 DRAFT PEIS HEARINGS

During the 120-day public comment period for the Draft PEIS, DOE held four public hearings to discuss issues and to receive oral and written comments. The hearings were held near the three DOE storage sites in Paducah, Kentucky; Portsmouth, Ohio; and Oak Ridge, Tennessee;

as well as in Washington, D.C. The Draft PEIS was made available to the public at the hearings, through mailings, the Depleted UF_6 website, and DOE public reading rooms.

The hearings on the Draft PEIS were an important component of the Program's continuing efforts to provide the public with opportunities to participate in DOE's decision-making process. In keeping with DOE's intent to foster candid information exchange and ongoing two-way communication with the public, an informal, interactive meeting format was chosen. An independent facilitator conducted the hearings that included an information exchange session and a question and answer period. As demonstrated during the scoping phase of the Program, interactive sessions were particularly effective for soliciting comments and gaining participation from the public.

To facilitate public involvement, there were a variety of ways to submit comments on the Draft PEIS. Written comments were accepted by mail, fax, Internet and e-mail. In addition, a toll-free telephone line was available. These methods augmented comments received from the public at the four public hearings. As during the scoping meetings, the public was able to submit both written and oral comments at the Draft PEIS hearings. Court reporters and note takers collected the oral comments offered by the public at each of the hearings. Chapter 4 contains the oral comments from each hearing with DOE's response to those comments.

1.4 COMMENTS ON THE DRAFT PEIS

DOE received approximately 600 comments contained within approximately 90 submissions on the Draft PEIS. The comments addressed a wide range of issues, encompassing technical, environmental, local, economic, and DOE policies. Comments were received from individuals, Federal and State agencies, local governments, foreign entities, and non-government organizations such as businesses, environmental and public interest groups.

Chapter 2 of this document (Volume III) contains photocopies of written submissions received by DOE on the Draft PEIS. Each document was assigned a commentor number. For those documents containing comments, each individual comment was delineated and assigned a unique identification number. This ensured that the comment tracking system tracked each comment, not just the document itself. It also provided DOE with greater detail as to the number of comments submitted in addition to the number of documents received.

After comments were delineated and numbered, each comment was assigned to one of five general categories based on the nature of the comment. In addition, key words were assigned within each category. The use of general categories and keywords facilitated the development of responses to comments and provided DOE with information concerning major issues raised by commentors. DOE's responses to comments are provided in Chapter 3. Where applicable, the responses identify

specific chapters, sections, or appendices in the Final PEIS that address the issue(s) raised in the comments.

1.5 MAJOR ISSUES RAISED BY COMMENTORS

As discussed in the previous section, the use of general categories and keywords identified major issues raised by commentors. These issues are presented below with DOE's general response to these comments. The approximate percentage of commentors that addressed each major issue is provided and indicates the importance of that issue to those stakeholders who submitted comments.

Comment

Approximately 45% of the commentors raised the issue of the suitability of the Paducah site for continued cylinder storage and conversion actions due to its proximity to several fault zones, particularly the New Madrid Fault. The largest recorded earthquake in the region (magnitude of 7.3 on the Richter scale) occurred in 1812 and was centered in the New Madrid fault zone; the epicenter was 60 miles southwest of the Paducah site.

General Response

The PEIS addresses the potential for seismic activity at each of the three storage sites in Sections 3.1.4.1, 3.2.4.1, and 3.3.4.1. Of the three storage sites, an earthquake which could cause more than slight damage is considered credible (though highly unlikely) only for the Paducah site.

The analysis of accident scenarios for continued cylinder storage (Section D.2.2 of the PEIS) was based on the range of potential accident scenarios considered in the safety analysis reports (SARs) for each of the three storage sites (LMES 1997f-h; the full citations are provided in Chapter 8 of the PEIS). The SARs were issued in February 1997 by the DOE's management and operating contractor, and were subsequently reviewed and approved by DOE in March 1997.

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

Comment

Approximately 45% of the commentors expressed doubt about any widespread uses for the depleted UF_6.

General Response

DOE expects that in the future, uses will be available for some portion of the depleted UF_6 inventory. Potential depleted uranium uses include radiation-shielding applications. Uses for the fluorine products exist now in the aluminum, chemical, steel, and glass industries.

The DOE provided its initial plan for the conversion of depleted uranium hexafluoride, as required by Public Law 105-204, to Congress on March 12, 1999. In addition, the Department issued a "Request for Expressions of Interest for a Depleted Uranium Hexafluoride Integrated Solution Conversion Contract and Near-Term Demonstrations" on March 4, 1999. Responses to the request for expressions of interest will provide information to develop the Department's detailed procurement strategy for an integrated approach to the management of its depleted UF_6 inventory. A final plan, incorporating information from the private sector and other stakeholders, is expected to be issued in 1999.

DOE plans to continue its support for the development of government applications for depleted uranium products. The two representative use options described in Section 2.2 and Appendix H of the PEIS, use as uranium oxide and use as uranium metal as radiation shielding, were selected to provide a basis for comparing the potential environmental impacts of broad, programmatic management strategies. The selection of these use options for analysis in the PEIS was not intended to imply that the PEIS will be used to select a specific end-use or preclude other potential uses in the future. If a use strategy is selected in the Record of Decision, specific uses would be considered and evaluated in more detail in future planning and environmental analyses as appropriate.

Comment

Approximately 40% of the commentors favored rapid conversion of the depleted UF_6 materials instead of storage. Of those, approximately 85% favored conversion to U_3O_8 for either storage or ultimate disposition.

General Response

Based on the comments received on the Draft PEIS, DOE has modified its preferred alternative for the final PEIS (see PEIS, Section 2.5). DOE's revised preferred alternative is to begin conversion of the depleted UF_6 inventory as soon as possible, either to uranium oxide, uranium metal, or a combination of both, while allowing for use of as much of this inventory as possible. This would be accomplished through continuing the safe, effective management of the cylinder inventory; beginning prompt conversion of the depleted UF_6 into uranium oxide and HF or CaF_2; interim storage of the uranium oxide pending use; converting depleted UF_6 into depleted

uranium metal and HF or CaF_2 as uses for depleted uranium metal products become available; and/or fabrication of depleted uranium oxide and/or metal products for use.

Comment

Approximately 25% of the commentors requested the PEIS to address site-specific impacts for any proposed facility.

General Response

The PEIS evaluates broad programmatic strategies for the long-term management of the depleted UF_6 cylinder inventory, including strategies of long-term storage, use, and disposal. The evaluation of potential environmental impacts in the PEIS includes all of the activities that would be necessary to implement each of the alternatives (see Sections 2.1 and 2.2 of the PEIS). However, as a programmatic EIS, it does not propose any site-specific projects. Consequently, the impacts of some management activities, such as conversion, long-term storage, manufacture and use, and disposal, were evaluated using representative facility designs and environmental setting information. The characteristics of these representative designs and settings were selected to provide as substantive an assessment as possible and to allow for a comprehensive comparison of the strategy alternatives. The potential impacts from construction and operation of such representative facilities is included in the PEIS. Upon implementation of the strategy to be selected in the Record of Decision for the PEIS, additional NEPA reviews for any site-specific proposals would be prepared identifying the environmental impacts of site-specific projects and a range of alternative actions, including a "no action" alternative.

Comment

Approximately 45% of the commentors raised questions and concerns about the safety and adequacy of current management of the cylinders at the three DOE locations. Many of these concerns stemmed from cylinder inspection data showing that corrosion has occurred on numerous cylinders in the 50 years or so since cylinder storage at the three sites began.

General Response

DOE's current cylinder management program provides for safe storage of the depleted UF_6 cylinders. DOE is committed to the safe storage of the cylinders at each site during the decision making period and also through the implementation of the decision made in the Record of Decision. DOE has an active cylinder management program that involves upgrading of cylinder storage yards, constructing new yards, repainting cylinders to arrest corrosion, and regular inspection and surveillance of the cylinder and storage yard conditions.

Comment

Approximately 15% of the commentors opposed any unrestricted uses of the converted UF_6 products and questioned the process for radioactive release limits of such products as hydrogen fluoride (HF) or calcium flouride (CaF_2).

General Response

As described in Section 2.2 and Appendix H of the PEIS, the two use options evaluated in the PEIS, use as depleted uranium oxide and use as depleted uranium metal as radiation shielding, are representative and were selected to provide a basis for comparing the potential environmental impacts of broad, programmatic management strategies. The selection of these use options for analysis in the PEIS was not intended to imply that the PEIS will be used to select a specific end use or preclude other potential uses in the future. If a use strategy is selected in the Record of Decision, specific uses would be considered and evaluated in more detail in future planning and environmental analyses as appropriate. Careful consideration would be given to whether the benefits of any proposed use outweigh the potential risks. Use of depleted uranium products, HF, and CaF_2 would be subject to DOE and/or NRC review and approval, depending on the specific use.

The ultimate decision concerning HF or CaF_2 production will depend on the conversion process selected, the residual uranium concentrations, market demand, and both public acceptance and regulatory considerations. In response to this uncertainty, the potential environmental impacts of options for both production and sale of HF, and production and sale or disposal of CaF_2 are considered throughout the PEIS.

Comment

Approximately 5% of the commentors favored conversion to uranium metal, followed by long-term storage, use, or disposal.

General Response

The PEIS analyzes two options for radiation shielding applications using depleted uranium. The uranium metal option would result in a spent nuclear fuel disposal package, primarily as part of a Multi-Purpose Unit (MPU).

The reasons that long-term storage and disposal options for uranium metal were considered but not analyzed in detail are provided in Sections 2.3.3 and 2.3.4 of the PEIS. Disadvantages associated with long-term storage or disposal of uranium metal include higher conversion cost, lower chemical stability than uranium oxides, and regulatory restrictions on the disposal of the metal form.

Comment

Approximately 5% of the commentors provided information and raised questions about the health effects of depleted uranium exposures.

General Response

The analyses of potential health impacts conducted for the PEIS addressed both the chemical and the radioactive toxicity of uranium as several different compounds: UF_6, UO_2F_2, U, U_3O_8, UF_4, and uranium metal. For normal operations, the chemical toxicity was addressed by comparing potential exposure amounts with the U.S. Environmental Protection Agency's reference dose for uranium. For accidents, the chemical toxicity was addressed by comparing potential intakes with: 1) the intake of 30 mg given as the threshold for potential irreversible kidney damage under U.S. Nuclear Regulatory Commission (NRC) guidance for certification of gaseous diffusion plants (NRC 1994a; the full citation is provided in Chapter 8 of the PEIS); and 2) the intake of 10 mg, which NRC publications give as the threshold for potential adverse chemical effects (generally temporary, reversible effects occur in the range from 10 to 30 mg of intake). The methodology for chemical toxicity analyses for uranium exposure is summarized in Sections 4.3.1.2.2 and 4.3.2 of the PEIS and discussed in greater detail in Sections C.5.1.2 and C.5.2.1.1. The methodology for radiological toxicity analyses is summarized in Sections 4.3.1.1.2 and 4.3.2 and discussed in greater detail in Sections C.4.1 and C.4.2. Chemical toxicity was assessed for each alternative, and the results of the accident analyses show that the largest potential impacts from accidental uranium releases would be chemical impacts. Please see text in Section 2.4.2.2 of the PEIS, which states "chemical effects (kidney damage) occur at lower exposure levels than radiological effects," and elaborates on the numbers of workers and members of the general public estimated to experience these adverse chemical effects under the various accident scenarios analyzed.

1.6 CHANGES MADE TO THE DRAFT PEIS

DOE has revised the Draft PEIS in response to the comments received. In general, the responses to comments provided in Chapters 3 and 4 of this volume indicate whether or not a change was made to the text of the PEIS in response to the comment and the nature of the change. The revisions to the PEIS generally consisted of the following types: (1) editorial revisions, consisting mostly of corrections of typographical errors; (2) consistency revisions, in which inconsistencies between sections or tables were corrected; (3) clarifications, in which additional information was provided to clarify or provide further details about information provided; and (4) additions to the PEIS of information in response to changes in the overall scope of the PEIS analysis. The most significant revisions to the PEIS are summarized below.

Revision of the Preferred Alternative. After careful consideration of the comments received, DOE revised the preferred alternative for the PEIS. The revised preferred alternative, as described in detail in Section 2.5 of the PEIS, calls for prompt conversion of the depleted UF_6

inventory to U_3O_8 and long-term storage of that portion of the U_3O_8 that can not be put to immediate use. Under the revised preferred alternative, conversion to depleted uranium metal would take place only if uses for the metal product become available. The impacts of the revised preferred alternative are discussed in Sections 2.5, 5.7 and 6.3.7 of the PEIS.

Discussion of Potential Life-Cycle Impacts. In response to commentors' requests for life-cycle impact analysis, a new section has been added to the PEIS (Section 5.9) that discusses the issues related to potential impacts of the long-term (beyond the year 2039) management of materials containing depleted uranium under all alternatives. However, because of the uncertainties associated with the events that would occur far into the future and with the regulatory atmosphere at that time, the discussion is limited to issues that would need to be considered and the options that would be available for managing the material beyond the year 2039.

Consideration of USEC-Generated Cylinders. In May and June of 1998, management responsibility for approximately 11, 400 depleted UF_6 cylinders (approximately 137,000 metric tons) was transferred from the United States Enrichment Corporation (USEC) to DOE by the signing of two Memoranda of Agreement. The Memorandum of Agreement between DOE and USEC relating to depleted uranium generated prior to the privatization date was signed in May 1998 (DOE and USEC 1998a; the full citation is provided in Chapter 8 of the PEIS). It transferred management responsibility for approximately 9,400 cylinders (about 6,600 cylinders stored at Paducah and about 2,800 stored at Portsmouth) from USEC to DOE. A second Memorandum of Agreement between DOE and USEC relating to depleted uranium, signed in June 1998, transfers a total of about 2,000 depleted UF_6 cylinders from USEC to DOE between 1999 and 2004 (DOE and USEC 1998b). (The locations of these cylinders are not specified in this second agreement.)

To account for uncertainties related to the management of depleted UF_6 generated by USEC in the future, the analysis in the PEIS was expanded to consider management of up to 15,000 USEC-generated cylinders (approximately 180,000 metric tons). For the purposes of analysis, it was assumed that 12,000 of the USEC-generated cylinders would be managed at Paducah and 3,000 would be managed at Portsmouth. Chapter 6 has been added to the PEIS, and Chapter 2 and the Summary have been revised so the PEIS includes the impacts associated with the management of these additional USEC-generated cylinders.

2 COMMENT DOCUMENTS

2.1 INDEX TO PUBLIC COMMENT DOCUMENTS

2.2 COMMENT DOCUMENTS

This section contains photocopies of written submissions received by DOE on the Draft PEIS. For those submissions containing comments, the comments are delineated with unique identification numbers. DOE's responses to those comments are listed in Chapter 3.

COMMENTOR NO. 1: HOLLINGER, WADE
OAK RIDGE, TENNESSEE

Depleted Uranium Hexafluoride Management Program

Comment Form

The Department of Energy is interested in your comments on the *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride.*

There are several ways to provide comments on this document and these include:

- ✓ attending public hearings and giving your comments directly to DOE officials
- ✓ returning this comment form to the registration desk at the hearing
- ✓ returning this comment form or other written comments to the address on the back
- ✓ faxing your comments to 301/428-0145
- ✓ commenting via the Depleted UF_6 World Wide Web site: http://www.ead.anl.gov/uranium.html
- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ccmail.gmt.saic.com

Comments

Make a reasonable risk based, economical decision, hire a team of lawyers and get on with getting rid of the stuff! Just take it for granted someone is going to sue DOE because they want you to make it so that it was never here in the first place (impossible) and put your lawyers to work, by the time it gets out of court you'll have the stuff gone. MAKE THE DECISION AND DO IT! I'm tired of supporting all you do nothing beaurecrats! A NEPA review and going out to the public was not necessary for this. You know what has to be

Thank you for your input. Please use additional sheets if necessary and attach them to this form. Done

Name Wade Hollinger (optional)

Organization _____

Address 117 Westwood Lane (optional)

City Oak Ridge State TN Zip 37840

Phone number _____ (optional)

E-mail address _____ (optional)

☐ Please add my name to the Depleted UF_6 mailing list.

☑ Please take my name off the Depleted UF_6 mailing list.

DO IT!

DEPLETED U_6

Depleted Uranium Hexafluoride Management Program • Charles E. Bradley, Jr.
Department of Energy • Office of Nuclear Energy, Science and Technology • Office of Facilities
19901 Germantown Road • Germantown, MD 20874 • 301/903-4781

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COMMENTOR NO. 2: RAGAN, GUY
LAS VEGAS, NEVADA

Name: Guy Ragan

Date Sent: 1/6/98

Document Ref.: PEIS: S.4 SUMMARY AND COMPARISON OF IMPACTS FOR ALTERNATIVEMANAGEMENT STRATEGIES

----- COMMENT -----

What is the basis for the consequences stated? In other words, if the no-action alternative creates 110 jobs over 40 years, that is as compared to what? Compare it to continuation of the present situation? But continuation of the present situation is not an option. The PEIS states its impacts relative to an inconceivable baseline. According to DOE's "Recommendations for the Preparation of Environmental Assessments and Environmental Impact Statements, "the no-action alternative provides an environmental baseline against which impacts of the proposed action (and alternatives) can be compared." Therefore, the consequences should be stated as deviations from the no action alternative. For example, as compared to the No Action alternative, for operations, Long-Term Storage creates 10 jobs per year over 20 years. Then there are 110 federal jobs from 20 to 40 years. For construction, no jobs are created relative to No Action. Comparisons like this should be made explicit by stating all consequences as deviations from the No Action alternative. This comment applies to all types of enviromental consequences, not just socioeconomic impacts.

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COMMENTOR NO. 3: ELLISON, PHILLIP
IDAHO FALLS, IDAHO

Depleted Uranium Hexafluoride Management Program

Comment Form

The Department of Energy is interested in your comments on the *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride.*

There are several ways to provide comments on this document and these include:

- ✓ attending public hearings and giving your comments directly to DOE officials
- ✓ returning this comment form to the registration desk at the hearing
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- ✓ faxing your comments to 301/428-0145
- ✓ commenting via the Depleted UF_6 World Wide Web site: http://www.ead.anl.gov/uranium.html
- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ccmail.gmt.saic.com

Comments

I briefly Reviewed the UF_6 DRAFT PEIS. It appears to be a well developed and documented effort. ONE area that you may ~~wish~~ wish to improve is the hazards analyses of the HF and NaF tank farms. OTHER events including tornado induced missiles may wish to be addressed. ~~The~~ These events may have been covered but I was unable to locate data on the Results of Analyses

Phil Ellison

Thank you for your input. Please use additional sheets if necessary and attach them to this form.

Name Phillip Ellison (optional)
Organization INEEL
Address PO Box 1625 (optional)
City Idaho Falls State ID Zip 83415
Phone number 208-526-5863 (optional)
E-mail address [redacted] (optional)

☑ Please add my name to the Depleted UF_6 mailing list.
☐ Please take my name off the Depleted UF_6 mailing list.

DEPLETED UF_6

Depleted Uranium Hexafluoride Management Program • Charles E. Bradley, Jr.
Department of Energy • Office of Nuclear Energy, Science and Technology • Office of Facilities
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COMMENTOR NO. 4: DYER, ROBERT
HARRIMAN, TENNESSEE

DYER ENTERPRISES
301 Old Suddath Road * Harriman, TN 37748 * (423) 882-2623
bdyer@hotmail.com
January 12, 1998

Mr. Charles E. Bradley, Jr
Office of Facilities (NE-40)
Office of Nuclear Energy, Science and Technology
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

Dear Friends and Former Associates,

I was happy to see that you are getting better at meeting schedules, only six months late in getting out the two volume Draft PEIS for the alternative strategies for the future of the few cylinders of depleted that are stored around.

I have spent some time reading it and thinking about the way it is presented, both from the my own point of view as one who knows what the stuff is and also from the point of view of one whose only knowledge of depleted UF_6 is from these writings. As you can see by my comments, I think you missed your opportunity to inform the unknowing and get them on your side once you make the long term management strategy.

I am interested in your reaction to my comments, and maybe we can work together to improve the document.

Bob "Captain Fuddy Daddy" Dyer

Robert Dyer

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YER ENTERPRISES
301 OLD SUDDATH ROAD * HARRIMAN, TN 37748 (423) 882-2623

January 12,1999

Comments as a Result of Reviewing the PEIS for
Alternative Strategies for the
Long-Term Management and Use of
Depleted Uranium Hexafluoride

As a result of several days of pouring through the two volumes of the referenced document, I have the following comments and suggestions to make. I believe that I am qualified to review the work because I have had 53 years of experience in the operation and design of the gaseous diffusion process in Oak Ridge while working 35 years for the operating contractor followed by 15 years for DOE . I have seen the depleted cylinders at all three of the plants, I actually filled some of them in Oak Ridge, I know the chemistry and physical properties of UF_6, I was on the committee to investigate the cause and effect of the wall failures of the two Portsmouth cylinders, and I am a voting member of the ANSI N14.1, *Uranium Hexafluoride - Packaging for Transport* standards committee that establishes cylinder design and fabrication criteria. Twice, I have presented my training course "Fundamentals of Gaseous Diffusion Plant Operations" to members of the Argonne National Laboratory staff who have prepared this report.

4-1 (Con't.)

I will start with some general comments and proceed to some specific ones.

UF_6 Storage Cylinder Description

Let me quote some of the words in the box on Page S-1 in Volume 1. *"Sufficient information must be included in the EIS for reviewers to evaluate the relative merits of each alternative."*

It seems to me that you have to describe the problem in order for reviewers to see the merits of any of the possible solutions, including continued long term storage. In this case, the problem is what to do with the large quantity of depleted uranium hexafluoride that has accumulated at the gaseous diffusion plants in Oak Ridge, TN, Paducah KY, and Portsmouth, OH. I think you have to accept the fact that UF_6 is not a commodity that is familiar to the general public, especially those living

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in the vicinity of the plants. Therefore, the description of depleted UF_6 in the storage cylinders on page S-2 is grossly understated *"Depleted UF6 is stored as a solid at all three sites in steel cylinders. Each cylinder holds approximately 10 to 14 tons (9 to 12 metric tons) of material."*

The next mention of stored cylinders of UF_6 that I found was on page B1 in Volume 2. *"Depleted UF_6 has been stored in steel cylinders in outdoor yards at the three DOE storage sites since the 1950s. Most cylinders have either a 10- or 4- tons (9- or 12- metric tons) capacity and a nominal wall thickness of 5/16 in. (0.79 cm or 312.5 mil)."* It is a little more correct, in stating the cylinder capacity as 10 or 14 tons but is still oversimplified:

I, as a reviewer, know the details of the design criteria and methods of fabrication for the storage cylinders, and know that the UF_6 is being safely stored at the plants. I do not think the smidgen of information you have included will sufficiently inform and convince the farmer working the fields next to the plant, or the housewife in Wakefield, Ohio, or the new tenant in one of the K-25 buildings that they have nothing to worry about. These people should not forced to imagine what is in those somewhat rusted cylinders they see stored in the yards. I think you should at least use some of the pictures and descriptions of the cylinders from the ORO 651 series of documents. I can give you copies of ORO 651 Rev 5 and ORO 651 Rev 6, but you will have to buy the successor document USEC 651 Rev 7 from the USEC for which they charge $5.00. Also, and more importantly, you should point out that there is an American National Standard, ANSI N 14.1, *Uranium Hexafluoride - Packaging for Transport* which governs the quality of the material in and fabrication of these cylinders. You should be sure to point out that the cylinder has only one valve for filling and emptying. This valve is located at the 12 o'clock position on one of the ends.

4-2 (Con't.)

Assuming you expand your description of the cylinders, then you need to tell the people what is in them. You need to tell them that the ^{235}U isotope concentration has been reduced from the naturally occuring 0.711% to 0.2 - 0.3 % resulting in a proportional increase the concentration of ^{238}U.

You need to tell them that UF_6 is a chemical compound that has one atom of uranium combined with six atoms of fluorine. It can be either a solid, a liquid or a gas depending on its temperature. In the storage yards it is a solid in the bottom of the cylinders and a gas at subatmospheric pressure in the top. If a cylinder is heated, the solid will melt to a boiling

liquid at 147°F. You need to tell them that it is a greater chemical hazard than a radioactive one.

You need to tell them how UF_6 reacts with the iron on the inner surfaces of the steel cylinder to form a corrosion inhibiting, protective surface layer of iron fluoride. This protective coating insures the UF_6 inside the cylinder will not react with and corrode the cylinder wall, i.e. if you protect the outside of the cylinder, and prevent it from rusting away, the UF_6 can stay in storage in the cylinders forever.

4-2 (Con't.)

Cylinder Fill Limits

There are long standing specific requirements that have been used to determine the quantity of UF_6 that can be safely stored in an approved design cylinder. The fundamental concepts of the approach to assuring the safety of the many cylinders of depleted UF_6 stored at Paducah, Portsmouth, and Oak Ridge are *certified minimum volume.* and *5% ullage,* In particular, my comment concerns the UF_6 fill-limit and heating temperature limit for 48G cylinders, although the same rationale applies to the other sizes of UF_6 cylinders.

The crucial concept is the *certified minimum volume* of the cylinder. UF_6 cylinders are fabricated in strict accordance with the drawings and criteria in the American National Standards Institute standard ANSI N14.1, *Uranium Hexafluoride - Packaging for Transport*. One of the code requirements is that upon final fabrication, in order to determine its exact internal volume, the cylinder will be completely filled with 60°F water and weighed on a scale accurate to 0.1%. The actual water weight obtained is recorded for the individual cylinder certification data and stamped on the cylinder nameplate to conclusively demonstrate that the requirement has been met. For a cylinder to be acceptable, the quotient of the certified full cylinder water weight divided by 62.37(the weight in pounds of 1 ft^3 of water at 60°F) shall not be less than the published minimum volume. For a 48G cylinder, the minimum volume is 139 ft^3, equivalent to a water weight of 8669 lbs. Using this method of measurement, the actual internal volume of a cylinder can be determined and if it is not greater than the *minimum volume,* the cylinder is destroyed.

4-3

COMMENTOR NO. 4: DYER, ROBERT (CONT'D.)
HARRIMAN, TENNESSEE

The density, or weight of a cubic foot of UF_6 has to be known in order to use the *certified minimum volume* to determine a safe-fill quantity of UF_6 for the cylinder. During the first 20 years of the atomic age, much research work was done to determine the physical properties of UF_6. R. DeWitt of the Goodyear Atomic Corporation made an extensive literature search and compiled the results in a document, GAT 280, *Uranium Hexafluoride: A Survey of the Physico-Chemical Properties January 29,1960.* Data from this source has been used to produce Figures 1 and 2. Solid UF_6 undergoes a significant expansion as it is heated and melts from a solid to a liquid. This is illustrated in Figure 1, Density of Solid UF_6, and Figure 2, Density of Liquid UF_6 235 - 300°F.

Knowing that all cylinders are larger than the *certified minimum volume* allows the establishment of a safe UF_6 fill limit for them. This weight is obtained by using the density of liquid UF_6 at the 250°F design temperature of the cylinder and determining how much of this 250°F liquid UF_6 will fill 95% of the cylinder's *certified minimum volume* . Because all cylinder volumes are certified to be greater than the minimum, this guarantees that there will be at least 5% of the *certified minimum cylinder volume* as ullage(space above the liquid in the cylinder) when the full cylinder is heated to its design temperature of 250°F, and thus there will be no possibility of hydraulic forces developing in the liquid to cause cylinder rupture.

4-3 (Con't.)

From ANSI N14.1, the minimum volume for a 48G cylinder is 139 ft^3 and from Figure 2, the density of liquid UF_6 at 250°F is 203.7 lbs/ft^3. For a 48G cylinder the calculation of the fill limit is:

95%(139 ft^3) (203.3lbs/ft^3 of UF_6) = 26840 lbs of UF_6

COMMENTOR NO. 4: DYER, ROBERT (CONT'D.)
HARRIMAN, TENNESSEE

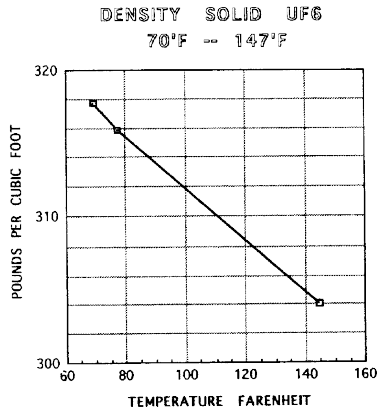

Figure 1

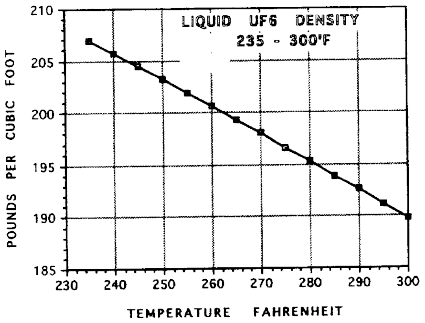

Figure 2

4-3 (Con't.)

COMMENTOR NO. 4: DYER, ROBERT (CONT'D.)
HARRIMAN, TENNESSEE

Keep in mind that because all cylinders are required to prove that they have greater than a minimum volume, there will always be at least, if not more than, a 5% ullage to prevent hydraulic rupture at the design temperature. At lower than design temperatures, because the density of liquid UF_6 expressed in lbs/ft^3 increases as the temperature is lowered to the freeze point of147°F, the percentage of the cylinder volume occupied by gaseous UF_6 will increase and be larger than 5%. For example, prior to going to the storage yards, after all the air was evacuated from inside them, the depleted UF_6 cylinders were filled to the fill limit with liquid UF_6 at a temperature of 160°F with a density of 224 lbs/ft^3. The ullage in this case is at least 14%. There can be no hydraulic rupture as long as gas in the ullage provides a cushion.

This fill-limit calculation assures safety if the cylinder is heated to the design temperature and before any material is removed from it. In diffusion plant practice, the cylinder is never heated above 100°F. As UF_6 gas is withdrawn, there is a smaller mass of liquid UF_6 in the cylinder so the ullage increases. Any volatile impurities that may have been in the cylinder will be expelled when feeding is first started so the pressure of the system will correspond to the vapor pressure of UF_6 for the temperature.

When the cylinder is filled with liquid UF_6 to its proper fill limit, and has cooled to room temperature, based on the data in Figure 1, showing the density at 68°F to be 317.8 lbs/ft^3, the solid UF_6 will occupy 26,840 lbs/317.8 lbs/ft^3 = 84.45 ft^3/139 ft^3 = 61% of the *certified minimum volume*. The remaining 39% of the volume will be filled with UF_6 gas at subatmospheric pressure or vacuum.

4-3 (Con't.)

Minimum Cylinder Wall Thickness

The 0.25" minimum wall thickness specified in ANSI N14.1 and the ORO 651 series for the 48G, 48H, 48 HX, 48 O, and 48 OM cylinders is for a pressure vessel rated at 100 PSIG. However, this pressure is only achieved if the cylinder of solid is heated 147°F to liquefy the UF_6 and the heating of the liquid continued until the temperature of the liquid is increased to 200°F, as is done in gaseous diffusion plant operations requiring rapid emptying of the cylinder's contents. However, if by strict administrative control, the cylinder is only heated to a skin temperature of 133°F, 14°F below the liquefaction temperature, the UF_6 gas pressure in the cylinder will be atmospheric pressure(14.7 psia), and the UF_6 can be changed directly from solid to gas without going through the liquid phase

4-4

in order to remove it from the cylinder at a slow rate. (This is the way the French feed their diffusion plant, and is what you have heard referred to as "cold feeding".

4-4 (Con't.)

Radiation Emanating from a Depleted Cylinder of UF_6

There is another aspect of the filled cylinders that I do not think has been adequately covered. There should be a statement concerning how many, or few, curies or sieverts of radiation emminates from one cylinder. Depleted UF_6 is by definition ^{238}U. The handbooks show ^{238}U to have a half life of 4.47 billion years (about as long as the earth has been around). The thorium and protactinium daughter products have melting points in the range of 1650-1850°F. This means that any daughter products that may be in a cylinder of normal assay UF_6 being fed into the cascade will not be vaporized and expelled from the cylinder with the UF_6 gas at 200°F. In essence, since no uranium daughter products are fed to the cascade, the only ones in depleted UF_6 are the ones that have grown in the past 50 years. With ^{238}U's half life, there can't be more than a handfull!

I know from experience that it is very difficult to measure any gamma radiation when scanning the outer surface of a full cylinder in storage with a radiation meter. However, after a cylinder has been heated, liquefied, emptied, and cooled, the scan will show a small amount of gamma radiation on the bottom of the cylinder. Keep in mind that the purpose for which the diffusion plants were built was to prepare uranium for fission, either in a weapon or a nuclear reactor. The diffusion process removes 70% of the fissionable isotope found in naturally occurring uranium. The stored depleted uranium has never been used as fuel in a nuclear reactor where fission products occur in great abundance. There are very few gamma emitting fission products in the depleted UF_6. The gamma radiation in the depleted uranium is coming from uranium decay daughter products. These non-volatile daughter product form extremely slowly throughout the cake of solid UF_6 as uranium decays. They are homogeneously mixed with the solid UF_6 resulting in their gamma rays being shielded by the uranium atoms. Because the daughters are chemically different than UF_6, they will not vaporize and be removed from the cylinder as a gas. They concentrate in an ever diminishing pool of liquid until they are all that is left on the bottom. In this location, their radiation is directed downward away from people working with the cylinders. If you sit on top of a cylinder, your butt is at least four feet from the emitters.

4-5

COMMENTOR NO. 4: DYER, ROBERT (CONT'D.)
HARRIMAN, TENNESSEE

I make no pretense of being a Health Physicist, so I find it hard to understand how you can estimate the exposures that people will get, if you don't state the intensity of the radiation at the source. Just one of many examples, Table D.1 page D-6 states as an Impact during Storage(1999 - 2039), the *total collective dose to population within 50 miles (3 sites)* will be 0.38 person-rems. How can you be accurate to two decimal points when you don't know how much radiation, if any, is coming from a cylinder of depleted UF_6? Here is an area where you could do a lot of good in taking the hocus pocus out of Health Physics and educating the public about radiation and its effects! Don't let them learn it from the Simpsons on the anti-nuke Fox Network!

4-5 (Con't.)

Specific Comments VOLUME 1

- Table S.3 Page S-46 What are the quantities of uranium compounds and HF considered to be released from a "*Corroded cylinder spill, dry conditions,*" and "*Corroded cylinder spill, wet conditions*"? Without these numbers, it is difficult to understand the postulated consequences. The rest of the table has the same problem of not stating how much UF_6 or HF or UO_2 is released in the accidents

4-6

- .PAGE 1-1 SECTION 1.1 BACKGROUND INFORMATION The statement is made: "*At atmospheric pressure, UF_6 is a solid material below a temperature of 134°F and a gas at temperatures above 134°F (additional information about the characteristics of the chemical UF_6 is provided in Appendix A).*" When I go to the Appendix A, I was amazed at the paucity of information presented not only for UF_6 but also for the other uranium compounds and HF. I thought at least, I would find the phase diagram of UF_6 that clearly shows the inaccuracy of the above statement but, alas, it wasn't there! UF_6 can be a gas below 134°F as well as above 134°F, and a solid all the way up to 147°F.

4-7

- PAGE 3-50 TABLE 3.13 FOOTNOTE [c] The footnote states "*Radiation dose could result from drinking 365 L of K-25 site water(0.3 mrem/yr) and ingesting the maximally contaminated fish (1.6 mrem/yr)* " Do you have to drink all 96.5 gallons(365 L) of water and eat the fish at one sitting? If you do, this is nonsense and serves no purpose. If you don't, what is the time period?

4-8

COMMENTOR NO. 4: DYER, ROBERT (CONT'D.)
HARRIMAN, TENNESSEE

- PAGE 4-14 DEFINITIONS *"Involved Worker - Might be exposed to direct gamma radiation emitted from radioactivematerials such as depleted UF_6 or other uranium compounds"* Here again, the question has to be asked, "How much radiation does depleted UF_6 or other uranium compounds emit/unit quantity of the substance?" Is the UF_6 still in the cylinder? Do you take credit for the shielding of the uranium in the UF_6 in the cylinder? The way this is written does absolutely nothing to allay the fears of the uninformed. — *4-9*
- PAGE 8-18 DEFINITION OF TRANSURANIC WASTE The word "transuranic" means "beyond uranium" i.e. elements that have a greater than the 92 atomic weight of uranium. like plutonium, neptunium, americium, etc. They probably do have half-lives greater than 20 years. Plutonium is deliberately made in nuclear reactors and extracted from spent reactor fuel. In the late '70s, a very small quantity of uranium recovered from spent reactor fuel was refined, converted to UF_6, and fed into the diffusion plant complex. They do not exist in sufficient quantity in depleted UF_6 to be a problem. Here again is a place where you could do good in educating. — *4-10*

Volume 2

- PAGE A-2 TABLE A-1 It seems incredulous that the particle and bulk density of UF_6 are each 4.6 g/cm^3, and neither one of them is the generally accepted 5.1 g/cm^3 at 68°F. — *4-11*
- IBID. A.1.2 I think you should mention that uranyl fluoride picks up water of hydration from humid air and in doing so changes color from brilliant orange to yellow. If a cylinder should break open in the storage yard, this color change would probably be observed. — *4-12*
- PAGE A-4 A.2.1 UF_6 is essentially inert to copper, witness all the copper tubing instrument lines in the plants. Also don't forget Teflon that was developed specially for the Manhattan Project. — *4-13*
- PAGE B-7 4TH FULL PARAGRAPH, LAST SENTENCE *"It was assumed that uranium would be released as solid uranyl fluoride (UO_2F_2),which would be deposited on the ground."* You should do more than say it lays on the ground. Uranyl fluoride (UO_2F_2) has a characteristic of being very soluble in water, so as soon as it rains, its will go into solution which, because of the HF, will be acidic and be neutralized by the cement or limestone construction materials of the storage yard. The resulting calcium salts will — *4-14*

COMMENTOR NO. 4: DYER, ROBERT (CONT'D.)
HARRIMAN, TENNESSEE

probably be insoluble in water and lay where they have been formed.

- PAGE C-3 C.2.1 CONTINUED CYLINDER STORAGE 1ST PARAGRAPH 3RD SENTENCE *"Because of their age, potential direct contact with the ground, and skirted ends, many of the cylinders show signs of corrosion."* Unless you include the ORO 651 series of documents, how is the reviewer to know what you are talking about when you suddenly introduce "skirted ends"? — *4-15*
- PAGE E-20 FIGURE E.1 The design of the Horizontal "Clamshell" Overcontainer looks interesting, and since you will have to use it at all three plant sites, while you are at it, why don't you design to be a 100 PSIG pressure vessel and use the steam heated autoclaves that you have at the plants to empty the defective cylinders? Otherwise you have to come up with an autoclave designed for hot air heating which will require different than your presently approved safety systems to avoid gross overheating with hot air. — *4-16*
- PAGE E-21 E.2.2 CYLINDER TRANSFER You will have some damaged cylinders at all three sites, and if you can't get a DOT permit to ship them off the plant site, how would one of these expensive cylinder transfer facilities at each site be of value to the enterprise? — *4-17*
- PAGE F-3 SITE LAYOUT FOR A CONVERSION FACILITY Why do you store the full cylinders outside, and build the biggest building on the site for the empties to be under cover? — *4-18*
- PAGE F-11 1ST PARAGRAPH Why wash the empty cylinders with water when a nitric acid solution would do a better cleaning job? The used solution could also be evaporated to dryness for disposal. — *4-19*
- PAGE F-13 F.2.3 CONVERSION TO METAL. 3RD PARAGRAPH, 4TH SENTENCE *"The more dense molten uranium/iron would settle to the bottom of the reactor where it would be continuously withdrawn"* What kind of material are you going to use for the reactor and liquid uranium/iron draw off piping? I have always been told that liquid uranium at 2100°F, and uranium alloys at lower temperatures are the universal solvents. Nothing, even yttrium lined equipment will contain them for very long.
  If you go with the Fe/U alloy just to lower the molten metal temperature, how good a radiation shield will your alloy be as compared to pure uranium? — *4-20*
- PAGE F-14 IMPACTS OF OPTIONS The amount of HF produced from any of the conversion options should be expressed because it is the big safety hazard. The design rate of 2300 48G cylinders of UF_6 a year equates to 6.3*26,840 lbs or169,100 lbs UF_6 a day. Using a molecular — *4-21*

COMMENTOR NO. 4: DYER, ROBERT (CONT'D.)
HARRIMAN, TENNESSEE

weight of 352 for UF_6, these 6.3 cylinders contain 480 lb/mols of UF_6. Each lb/mol of UF_6 that reacts with water will create six lb/mols of HF. Thus 480 lb/mols * 6 = 2880 lb/mols HF/day. Using a molecular weight of 20 for HF, this equates to 57,000 lbs or 6600 gallons of anhydrous HF/day produced. Remembering that HF boils at 60°F, this is a lot of HF to handle day in and day out in plastic pipes and tanks. You are buying a much bigger safety problem than I think you are portraying in these tomes. You should know that a drop of this liquid will burn a hole through your unprotected hand and the fumes can kill as happened at Kerr McGhee in Gore OK! *4-21 (Con't.)*

- PAGE F-23 TABLE F.7 In the Conversion to U_3O_8 section, the last accident is a U_3O_8 drum spilling its contents onto the floor after an accident with a forklift. These drums contain 1600 lbs of U_3O_8 powders, and you are asking the reviewer to believe that the spill quantity will only be 63 milligrams! This tends to lose your creditability for the whole study! Later on in the Table, you show a 2400 lb drum of UO_2 in a similar accident only spilling 25 milligrams, but you have an extremely unlikely 3, UF_6 cylinders bursting from some kind of fire and dumping 24,000 lbs in 30 minutes. I believe you lose integrity when you ignore the historical fact that this cylinder rupture scenario has not occurred, or even come close, in the past 50 years of cylinder storage. On the other hand, you seem to completely accept speculation about future accidents in plants that have not been built. It sure looks like you are trying to make people think this UF_6 stuff is the most hazardous thing there ever was? *4-22*
- PAGE F-29 CYLINDER TREATMENT FACILITY EXTREMELY UNLIKELY ACCIDENTS Why is the amount released in an earthquake where 50% of the stored drums are breached only 1.9 lbs, whereas in a Tornado that pierces only one drum of U_3O_8 the quantity released is 69 lbs? You need to cross check all these tables you publish. I am sure that I have not found all the inconsistencies. *4-23*
- IBID. The 3.4 lbs of HF released when the evaporator tank fails and the pool of HF evaporates into the building is just plain wrong. I can tell that none of you ever worked at Fernald! If the temperature is above 60°F, 3.4 lbs of anhydrous HF will become 61 standard cubic feet of extremely toxic and obnoxious gas.
- PAGE G-16 SECTION G.2.2 I don't find recognition of the cylinder sweating problem in any of the inside storage options. During the winter, the 10 or 14 ton cake of UF_6 in each cylinder cools approaching the temperature of the coldest day. When spring comes and the warm *4-24*

COMMENTOR NO. 4: DYER, ROBERT (CONT'D.)
HARRIMAN, TENNESSEE

humid days return, the outer surface of the cylinders becomes a condenser for the water in the air, not unlike the sweating on your evening rum and coke glass. Unless you air condition the buildings, vaults, and mines, the cylinder wall corrosion will continue especially in the spring. *4-24 (Con't.)*

- PAGE H-16 TABLE H-5 Why is that the drop of a single 2400 lb drum of UO_2 only releases $7.3X10^{-7}$ pounds (3.3 mg) of UO_2 in this accident whereas the same accident in Table G.6 page G-26 releases $1.1X10^{-4}$ lbs (50 mg)of UO_2? Once again, what you got don't make no sense! *4-25*
- PAGE J-28 SECTION J.3.4.3 CYLINDER TREATMENT FACILITY I question the assumption that emptied UF_6 cylinders will retain a 22 lb heel. Why not use dry air to purge the UF_6 gas from the emptied cylinder in the autoclave and let these purge gases go directly to your conversion apparatus. If you do this you should get your heels to be around 10 ppm UF_6. However, even if you do this, you will still have to wash the cylinders to get the daughter products out *4-26*

COMMENTOR NO. 5: DENTON, MARK S., DR.
OAK RIDGE, TENNESSEE

Comment Form

The Department of Energy is interested in your comments on the *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride.*

There are several ways to provide comments on this document and these include:

- ✓ attending public hearings and giving your comments directly to DOE officials
- ✓ returning this comment form to the registration desk at the hearing
- ✓ returning this comment form or other written comments to the address on the back
- ✓ faxing your comments to 301/428-0145
- ✓ commenting via the Depleted UF_6 World Wide Web site: http://www.ead.anl.gov/uranium.html
- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ccmail.gmt.saic.com

Comments

I am currently reviewing the Draft PEIS Summary, Vol I and Vol II. Thank you for the opportunity to provide comment. I have been tracking this problem (which I feel is one of the highest priority ones at the Gaseous Tanks and Melton Valley Storage Tanks at ORNL) since 1992 at Oak Ridge (K-25, PGDP and PORTS).

Please add me to your mailing list as indicated below.

Thank you again.

Paul S. Denton PH.D, CCT CHMM, REP

5-1

Thank you for your input. Please use additional sheets if necessary and attach them to this form.

Name Dr. Mark S. Denton (optional)
☒ Please add my name to the Depleted UF_6 mailing list.
Organization Mountain Technologies Network (MTN) Group
☐ Please take my name off the Depleted UF_6 mailing list.
Address P.O. Box 5901 (optional)
City Oak Ridge State TN Zip 37831
Phone number (423) 599-0979 (optional)
E-mail address FAX (423) 457-8350 (optional)

Depleted Uranium Hexafluoride Management Program

Depleted Uranium Hexafluoride Management Program • Charles E. Bradley, Jr.
Department of Energy • Office of Nuclear Energy, Science and Technology • Office of Facilities
19901 Germantown Road • Germantown, MD 20874 •301/903-4781

COMMENTOR NO. 6: WEIGEL, RUDY
OAK RIDGE, TENNESSEE

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- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ccmail.gmt.saic.com

Comments

NO COMMENT AT THIS TIME. THE PUBLIC MTG SHOULD ELICIT VARIOUS COMMENTS WHICH EITHER WILL ENHANCE OR DISTRACT FROM THE DECISION MAKING PROCESS.

QUESTION – I DIDN'T THINK "ECONOMICS" WAS A CONSIDERATION OF THE NEPA PROCESS. IF IT'S NOT, WHY IS IT PRESENTED IN THE PEIS?? IT'S BEING PRESENTED COULD ADVERSELY INFLUENCE ULTIMATE DECISIONS FOR THE PROJECT – PEOPLE WILL LOOK @ THE $$ INSTEAD OF THE BEST PROJECT OPTION

6-1

Thank you for your input. Please use additional sheets if necessary and attach them to this form.

Name RUDY WEIGEL (optional)
☐ Please add my name to the Depleted UF_6 mailing list.
Organization STAKEHOLDER
☒ Please take my name off the Depleted UF_6 mailing list.
Address 107 TIDEWATER LN (optional)
City OAK RIDGE State TN Zip 37830
Phone number (423) 481-8108 (optional)
E-mail address N/A (optional)

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COMMENTOR NO. 7: PEELLE, BOB
OAK RIDGE, TENNESSEE

Depleted Uranium Hexafluoride Management Program

Comment Form

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- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ccmail.gmt.saic.com

Comments

Re: discussing possible future uses of depleted uranium, you prominently mention radiation shielding. True for x-rays and gamma rays, and sometimes true for electrons. Never true for neutrons! (fast or slow. I once associated with some simple minded experiments 40 yrs ago that made the point dramatically.) The neutrons produce fissions, and the (subcritical) multiplication ruins the shield.

Uranium pellets would ruin concrete blocks, if many neutrons are around. So for any application including around an accelerator, an analysis would have to be made.

So, qualify the statements to apply only to X-ray or X-ray shields. 7-1

Thank you for your input. Please use additional sheets if necessary and attach them to this form.

Name Bob Peelle (optional)
Organization self in this case
Address 130 Oklahoma Ave (optional)
City Oak Ridge State TN Zip 37830
Phone number 423 483 8974 (optional)
E-mail address 76533.226@compuserve.com (optional)

❑ Please add my name to the Depleted UF_6 mailing list.
❑ Please take my name off the Depleted UF_6 mailing list.

DEPLETED UF_6

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COMMENTOR NO. 8: PLANSKY, LEE, DR.
IDAHO FALLS, IDAHO

Name: Dr Lee Plansky

Date Sent: 1/28/98

Document Ref.: PEIS: APPENDIX I: ENVIRONMENTAL IMPACTS OF OPTIONS FOR DISPOSAL OF OXIDE

----- COMMENT -----

A. re: Disposal Options U- minerals are deposited in reducing environments. It would seem that you would chose a *grout* that would tend to be chemically neutral or also reducing, perhaps a glass or synroc. The oxidizing environment implied in the present scenario (cement grouts, implies rapidly rusting metal drum, and oxidation of U to U ++++++ (+6, or +5) and we mobilize what we don't want to. 8-1

B. The PEIS downplays the importance of U-toxicity as a metal. Refer to any simple MDSDS on U METAL and you and the public will all be shocked. 8-2

C. The way I understand it, the new proposed 20 micrograms/liter EPA MCL on U-238 is inviolable. Depleted uranium material would be disposed of as low-level radioactive waste. The disposal options assessed in the PEIS were defined on the basis of the chemical form of the uranium and the type of disposal facility. The following disposal options were considered: Disposal as U3O8. Depleted uranium could be disposed of as U3O8, either ungrouted (bulk) or grouted U3O8, following conversion. The disp al facilities considered included shallow earthen structures, belowground vaults, and an underground mine. Disposal as UO2. Similar to U3O8, depleted uranium could be disposed of as UO2 following conversion, either in ungrouted or grouted form. The disposal facilities considered were the same as those considered U3O8: shallow earthen structures, belowground vaults, and an underground mine. 8-3

COMMENTOR NO. 9: MILITARY TOXICS PROJECT LEWISTON, MAINE

MILITARY TOXICS PROJECT

National Office
471 Main Street, 2nd Floor
Lewiston, ME 04240

phone: (207)783-5091
fax: (207)783-5096
e-mail: mtp@igc.apc.org

February 4, 1998

Charles E. Bradley, Jr.
U.S. Department of Energy
Office of Nuclear Energy, Science and Technology
19901 Germantown Road
Germantown, MD 20874

Dear Mr. Bradley

Secretary Pena recently held a press conference in Washington D.C. to tout his Openess Intiative. We hope that this willingness to be open includes efforts to be more inclusive in DoE's outreach to impacted, or potentially impacted communities.

Specifically of concern to the Military Toxics Project and the Indigenous Environmental Network is the **Draft Programmatic Environmental Impact Statement For Alternative Strategies For The Long-Term Management And Use Of Depleted Uranium Hexafluoride**.

We believe that all of the strategies that proposed have serious environmental justice concerns and potential impacts to communities that you have not adequately reached with the draft PEIS. We also believe that the meetings that the DoE has held in the past, as well as the ones that are beginning on February 19, 1998 in Paducah, are not properly reaching people who are or may be impacted by decisions that your agency will be making regarding the long-term plan for the use of this dangerous material. *9-1*

Keeping with the spirit and intent of **President Clinton's Executive Order on Environmental Justice**, and **Secretary Pena's Openess Intiative**, we feel that it would be reasonable to request that the DoE initiate roundtable meetings, much like the **Federal Facilities Restoration Dialogue** meetings. We beleive that it is necessary and just to bring in grassroots leaders from community, labor and environmental justice groups to further discuss the implications of strategies that have been proposed. *9-2*

We further request that the comment period be extended to six months to give these folks the opportunity to meet with you, in addition to the hearings that are taken place now, as well as the opportunity to obtain expert technical advice regarding the impact of the various different strategies. *9-3*

Please respond to our request in writing. We will be happy to suggest participants for a roundtable discussion.

Sincerely,

Cathy Lemar, Director
Military Toxics Project

Tom Goldtooth, Director
Indigenous Environmental Network

Dan Fahey
Swords To Plowshares

cc: Energy Secretary Federico Pena

COMMENTOR NO. 10:

[Comment letter submitted but since withdrawn.]

COMMENTOR NO. 11: ADKISSON, RON
OKLAHOMA CITY, OKLAHOMA

Depleted Uranium Hexafluoride Management Program

Comment Form

The Department of Energy is interested in your comments on the *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*.

There are several ways to provide comments on this document and these include:

- ✓ attending public hearings and giving your comments directly to DOE officials
- ✓ returning this comment form to the registration desk at the hearing
- ✓ returning this comment form or other written comments to the address on the back
- ✓ faxing your comments to 301/428-0145
- ✓ commenting via the Depleted UF_6 World Wide Web site: http://www.ead.anl.gov/uranium.html
- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ecmail.gmt.saic.com

Comments One long-term alternative which has not been considered to date for long-term storage of the converted uranium (i.e., U02, U308, etc.) is the placement in a uranium mill tailings impoundment for long-term retrievable storage. Mill tailings impoundments are designed for 1,000 year stability and the long-term care and maintenance is legally the responsibility of the Department of Energy. Quivira Mining Company's mill tailings site in New Mexico, for example, is presently licensed to dispose of 5,000,000 tons of byproduct materials even though the structural stability of the site was designed for an additional 43,000,000 tons.

The primary advantages of using a mill tailings site are (1) the inventory would be consolidated and isolated from the environment; (2) placement in a tailings impoundment would be relatively simple and with minimum personnel exposure; (3) it would remain in the custody of the US Government for long-term monitoring and care; and, (4) it could be retrieved at any time in the future should the need arise.

Thank you for your input. Please use additional sheets if necessary and attach them to this form.

Name Ron Adkisson (optional)

Organization Rio Algom Mining Corp. (optional)

Address 6365 Waterford Blvd #325 (optional)

City Oklahoma City State OK Zip 73118

Phone number 405-842-1773 (optional)

E-mail address _____ (optional)

❑ Please add my name to the Depleted UF_6 mailing list.

❑ Please take my name off the Depleted UF_6 mailing list.

DEPLETED UF_6

Depleted Uranium Hexafluoride Management Program • Charles E. Bradley, Jr.
Department of Energy • Office of Nuclear Energy, Science and Technology • Office of Facilities
19901 Germantown Road • Germantown, MD 20874 • 301/903-4781

11-1

COMMENTOR NO. 12: BALDING, ANDREW
KEVIL, KENTUCKY

Nane: Andrew K. Balding

----- COMMENT -----

Appendix D, pg. 5, 1st Para. - The assumption that any further breaches would be a result of handling damage vs. corrosion is very valid, however the follow on assumption that this breach or damage would go undetected for 4 years is not a valid assumption. The same detailed Inspection of a cylinder is required each and every time it is handled as it is Quadrennially or Annually, the Inspections in fact almost identical, the same procedures and checklists are used regardless of the type of inspection or frequency. Any damage that might occur under the current regimented and proceduralized handling activities whether during painting, cylinder relocation to improved storage, or just normal storage yard operations, would be immediately noted and dealt with at the occurrence. Therefore there would be no release and no "Environmental Impact" whatsoever, furthermore the one handling damage induced breach (the Paducah cracked cylinder) was caused by handling damage in 1987; since that time this Site has handled thousands of cylinders without breaching a cylinder due to handling damage, the current Project alone has handled over 30,000 cylinder relocations since 1992 without causing damage to a cylinder sufficient to cause a breach. The facts do not support the conclusions of the predicted number of cylinder breaches portrayed in the "No Action Alternative": the estimate of 444 at Paducah over the next 40 years with only one under old handling practices (even disregarding that those practices have been improved) is sensationalistic.

12-1

COMMENTOR NO. 13: YGDRASIL INSTITUTE GEORGETOWN, KENTUCKY

Ygdrasil Institute
PO Box 131
Georgetown, KY 40324
502-868-9074

February 21, 1998

Charles E. Bradley, Jr.
US Department of Energy
Office of Nuclear Energy, Science and Technology
19901 Germantown Road
Germantown, MD 20874

Dear Mr. Bradley:

We are writing to you to request that you extend by six months the period for comment on the *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*. The material in the draft is very technical and complex, and many people concerned with the management of the hexafluoride have only recently received copies of it. 13-1

We should also like to recommend that people in the affected communities be invited to roundtable meetings like those for the Federal Facilities Restoration Dialogue. The affected communities should include those likely to be at risk if transportation of uranium hexafluoride on a large scale takes place. 13-2

Sincerely,

Mary B. Davis

Mary B. Davis, PhD
Director

cc: Energy Secretary, Frederico Pena

In Norse mythology, Ygdrasil is the world tree.
Ygdrasil Institute is a project of Earth Island Institute

COMMENTOR NO. 14: WHITEHEAD, CORINNE BENTON, KENTUCKY

Depleted Uranium Hexafluoride Management Program

Comment Form

The Department of Energy is interested in your comments on the *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*.

There are several ways to provide comments on this document and these include:

- ✓ attending public hearings and giving your comments directly to DOE officials
- ✓ returning this comment form to the registration desk at the hearing
- ✓ returning this comment form or other written comments to the address on the back
- ✓ faxing your comments to 301/428-0145
- ✓ commenting via the Depleted UF_6 World Wide Web site: http://www.ead.anl.gov/uranium.html
- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ccmail.gmt.saic.com

Comments

WE URGE DOE TO DETERMINE ALL LEAKING CYLINDERS AT PGDP. TRANSFER THE CONTENTS OF LEAKING CYLINDERS INTO HEAVY GUAGE NEW CONTAINERS. STORE IN A EARTHQUAKE PROOF CONCRETE STRUCTURE OFF THE FLOOR SO THEY CAN BE MONITORED FOR LEAKS. NO MAJOR EFFORTS TO TRANSFER CONTENTS AND WASH OUT CONTAINERS IN A PROCESS TO CHANGE TO URANIUM OXIDE SHOULD BE AT THE PADUCAH FACILITY. DOE HAS KNOWN DETAILS OF SEVERE SEISMIC POTENTIAL SINCE THE LATE 1970'S AND HAS TAKEN LITTLE OR NO ACTION TO PROTECT THE WORKMEN OR THE COMMUNITY. NEGLIGENCE IS NOT AN "ACT OF GOD" IF ACUTE DAMAGE IS DONE TO THE FACILITY OR THE COMMUNITY DURING SEISMIC EVENTS. 14-1

WE URGE A COMPREHENSIVE ENVIRONMENTAL IMPACT STUDY BE MADE WITH FULL REPORT TO THE PUBLIC. WE URGE ATTENTION TO DAMAGE AND HAZARD REDUCTION RE: THE EARTHQUAKE POTENTIAL UTILIZING NATIONAL & INTERNATIONAL EARTHQUAKE ENGINEERING AND SEISMIC SCIENTISTS, WHO ARE RESPECTED IN THAT FIELD. WE DEPLORE THE USE OF DEPLETED URANIUM IN MILITARY EQUIPMENT 14-2

Thank you for your input. Please use additional sheets if necessary and attach them to this form.

Name CORINNE WHITEHEAD (optional)
Organization COALITION FOR HEALTH CONCERN
Address 1091 U S 641 NORTH (optional)
City BENTON State KY Zip 42025
Phone number 502-527-1217 (optional)
E-mail address _____ (optional)

☒ Please add my name to the Depleted UF_6 mailing list.
☐ Please take my name off the Depleted UF_6 mailing list.

DEPLETED UF_6

Depleted Uranium Hexafluoride Management Program • Charles E. Bradley, Jr.
Department of Energy • Office of Nuclear Energy, Science and Technology • Office of Facilities
19901 Germantown Road • Germantown, MD 20874 • 301/903-4781

COMMENTOR NO. 15: JACOBS ENGINEERING GROUP, INC. PADUCAH, KENTUCKY

JACOBS ENGINEERING GROUP INC.
Paducah Site

DOCUMENT REVIEW RECORD

Document Title: *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride.*

Control Number: _____ WBS Code: _____

Reviewers: L. Lee Hamblin

Review for: Editorial ☐ Peer ☐ Regulatory ☒ Technical ☐ QCC

Review Requested by: _____ **Date:** _____

	Concurrence in Comment Incorporation
REVIEWER'S SIGNATURE	REVIEWER'S SIGNATURE
DATE 2/23/98	DATE
☐ Approved (only if no comments) ☒ Not Approved ☐ Not Reviewed (indicate reason(s) for not reviewing below)	☐ Approved

Cmnt No.	Page and Location [Revised Location]	Comments	Comment Disposition
1.	Page S-1; Para. 2; Sent. 4; and Page S-4; Sect. S.1.2; Sent. 2	Text states: "Additional NEPA analyses, as appropriate, will be prepared once a long-term management strategy has been selected..." "This PEIS examines the environmental consequences of alternative strategies of long-term storage, use, and disposal of the depleted UF_6 inventory." This document does not appear to analyze completely the use and disposal of the depleted UF_6 inventory when it defers the analysis of future siting, design, and construction to possible separate NEPA analyses (as appropriate) in the future when, in effect, they appear to be "connected actions" and/or "cumulative actions" and should be evaluated thoroughly in this PEIS.	

15-1

COMMENTOR NO. 15: JACOBS ENGINEERING GROUP, INC. (CONT'D.) PADUCAH, KENTUCKY

JACOBS ENGINEERING GROUP INC.
Paducah Site

DOCUMENT REVIEW RECORD

Document Title: *Proposed Remedial Action Plan for Solid Waste Management Unit 91 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*

Date: February 13, 1998

Cmnt No.	Page and Location [Revised Location]	Comments	Comment Disposition
2.	Page S-42; Sect. S.4.13; Sent. 1	Text states: "All depleted UF_6 management alternatives would result in environmental impacts that, even when combined with other activities that could occur at the three current storage sites, would be expected to be relatively minor." This statement does not adequately address cumulative impacts from all alternatives considered in this draft PEIS. This statement conflicts with the statement on page 4-27 that states: "The cumulative impact analysis was conducted by examining those impacts resulting from depleted UF_6 management activities that would occur at the three current storage sites (Paducah, Portsmouth, and K-25). The impacts from these activities - including continued cylinder storage and cylinder preparation - were then added to the impacts of other past, present, and reasonable foreseeable future actions at these sites to assess potential cumulative UF_6 impacts." What past, present, and reasonable foreseeable future actions at these sites (specifically) were assessed, and where is the methodology discussing such assessment?	
3.	Page 3-12; Sect. 3.3.6.3; Sent. 1	Text states: "No wetlands were identified on the Paducah site by the National Wetlands Inventory (ANL 1991a)." This may be a true statement; however, jurisdictional wetlands were delineated by a wetlands survey performed in 1995 and confirmed by the U.S. Army Corps of Engineers in 1996 in some of the drainage ditches on the Paducah site. So the text stated above may be true, but it is inaccurate as far as the current wetland scenario on the Paducah site. Is it possible old information has been quoted?	

15-2

15-3

COMMENTOR NO. 15: JACOBS ENGINEERING GROUP, INC. (CONT'D.)
PADUCAH, KENTUCKY

JACOBS ENGINEERING GROUP INC.
Paducah Site

DOCUMENT REVIEW RECORD

Document Title: *Proposed Remedial Action Plan for Solid Waste Management Unit 91 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*

Date: February 13, 1998

Cmnt No.	Page and Location [Revised Location]	Comments	Comment Disposition
4.	General	Cumulative impacts are not analyzed thoroughly throughout this document. The storage and management scenarios are well known and scoped; however, the unknowns (siting, design, and construction) are described in enough detail (with enough siting criteria described) to narrow the likely locations at which of these facilities possibly will be sited and constructed to be evaluated for cumulative impacts in this document. These "Phase II actions" appear to be "connected actions" and should be analyzed in this PEIS. Phase II is described as "... implementation of the strategy selected."(page S-5, 1st paragraph, 1st sentence). It would be difficult to implement efficiently a strategy of this magnitude that has "connected actions" that are not fully described, planned, and evaluated in this document.	
5.	Pages 5-2, 5-18, 5-55, 5-66, 5-78, and 5-94	No cumulative impacts discussions were included for each of these alternative discussions even though Figure 4.1 on page 4-7 shows "Areas of Potential Impact Evaluated in the PEIS for Each Alternative." The "Cumulative Impacts " box appears in the center at the bottom of this figure.	
6.	Page 5-104; Sect. 5.8; Sent. 4	Text states: "No non-DOE actions have been identified that would have potential cumulative impacts at the three sites." How was this conclusion reached? What "non-DOE" entities were contacted and what past, present, and reasonably foreseeable actions were analyzed that considered these "non-DOE" entities' actions? Were local governments, municipalities, regional planning agencies, federal agencies, state agencies, local industries, and other non-DOE entities directly communicated with in this PEIS? Are they referenced in this document?	
7.	Appendix E; Page E-72; Sect. E.3.12; Bullet 2	Text states: "The impacts would be negligible." What methodology and analysis deem these impacts to be "negligible?" Where is a cumulative impacts analysis performed to make this decision.?	

15-4

15-5

15-6

15-7

JACOBS ENGINEERING GROUP INC.
Paducah Site

DOCUMENT REVIEW RECORD

Document Title: *Proposed Remedial Action Plan for Solid Waste Management Unit 91 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*

Date: February 13, 1998

Cmnt No.	Page and Location [Revised Location]	Comments	Comment Disposition
8.	Appendix F; Page F-72; Sect. F.3.10; Para. 1; Last sent.	Text states: "These impacts, although considered, were not analyzed in detail for one or more of the following reasons: ..." How can the "The impacts would be negligible" be an accurate statement if the impacts were not analyzed in detail? Were these impacts analyzed for cumulative impacts? If so, where? Also consider the rationale for the 1st and 2nd bullets.	
9.	Appendix G, H, I; Page G-63, H-34, I-72; Sect. G.3.10, H.3.10, I.3.10; Para. 1; Last Sent.	Text states: See number 8 above. Same comment here.	
10.	Appendix J; Page J-39; Sect. J.3.8; Para. 1; Last sent.	Text states: See number 7 above. No cumulative impacts analysis was seen for these determinations. These actions should be analyzed in this document not in "connected actions" via a later NEPA document.	
11.	Appendix J; Page J-39; Sect. J.3.8; Para. 1; Last sent.	Text states: see number 8 above. No cumulative impacts analyses were seen for these determinations. These actions should be analyzed in this document not in a later NEPA document where "connected actions" are proposed for analysis ("as appropriate"). How is the public going to connect effectively these actions back to this PEIS when the identification and technology analyses for siting, design, and construction are going to be performed in distinctly separate NEPA documents that will be generated at some undefined future dates?	
12.	General	How were the magnitude and significance of cumulative effects determined for the proposed action? What methodology was used to make this determination? Will it be included in an appendix for public review and or comments? What other methods were used to analyze cumulative effects?	
13.	General	Do the cumulative effects of any of the alternatives and the proposed plan exceed the carrying capacity of any resources, ecosystems, or human communities?	

15-8

15-7

15-8

15-9

15-10

COMMENTOR NO. 15: JACOBS ENGINEERING GROUP, INC. (CONT'D.)
PADUCAH, KENTUCKY

JACOBS ENGINEERING GROUP INC.
Paducah Site

DOCUMENT REVIEW RECORD

Document Title: *Proposed Remedial Action Plan for Solid Waste Management Unit 91 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*

Date: February 13, 1998

Cmnt No.	Page and Location [Revised Location]	Comments	Comment Disposition
14.	General	Throughout the PEIS, at the Paducah site, Bayou Creek is referenced as "Big Bayou Creek." This is in error, as the 1978 USGS topographic map for Heath, KY, shows the creek as Bayou Creek not Big Bayou Creek.	
15.	General	Is there any correlation between this PEIS and the "Department of the Navy Final Environmental Impact Statement for a Container System for the Management of Naval Spent Nuclear Fuel," DOE/EIS-0251, Nov., 1996, specifically with concern to interim consolidated storage of spent nuclear material at some location such as Yucca Mountain or another site?	
16.	General	The preferred alternative is not one of the alternatives described and compared in the body of this PEIS but is a combination of alternatives 4 and 5. Why wasn't there another alternative (say # 7) that described and compared the use of the entire UF_6 inventory as the preferred alternative? It seems a little difficult to the reader to see that the preferred alternative isn't one of the decribed and compared alternatives in the body of the PEIS. In combining alternatives 4 and 5, were additive, countervailing, and synergistic effects evaluated? If so, where is this covered in the PEIS?	
17.	Pages 5-109, 5-111, 5-113; Tables 5.12, 5.13, and 5.14	Tables are titled: "Maximum Cumulative Impacts of Depleted UF_6 Activities, Existing Operations, and Other Reasonably Foreseeable Future Actions at the ..." The reader does not agree that these tables should be titled "Maximum Cumulative Impacts ..." because cumulative impacts have not been analyzed in detail and appear to be based on a limited cumulative impacts methodology and evaluation. In addition, the "Impact Categories" are incomplete and do not include other potential impact areas.	
18.	General	Has this action been correlated with the Vortec Vitrification proposed action for the Paducah Site?	

15-11 15-12 15-13 15-14 15-15

COMMENTOR NO. 16: ANONYMOUS
PADUCAH, KENTUCKY

Depleted Uranium Hexafluoride Management Program

Comment Form

The Department of Energy is interested in your comments on the *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*.

There are several ways to provide comments on this document and these include:

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- ✓ returning this comment form to the registration desk at the hearing
- ✓ returning this comment form or other written comments to the address on the back
- ✓ faxing your comments to 301/428-0145
- ✓ commenting via the Depleted UF_6 World Wide Web site: http://www.ead.anl.gov/uranium.html
- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ccmail.gmt.saic.com

Comments

USE CYLINDER DROP TEST RESULTS, CRASH TESTS AND MAKE IT PUBLIC TO REASSURE THE PUBLIC. PUT IT IN THE PEIS. DG PR & CAPITALIZE ON IT. WE'VE DROPPED FULL CYLINDERS AT PADUCAH FROM THE PAH CRANE USE, PUT ON SECOND SKIN FOR BREACHES - SEND TO PADUCAH AND FEED OUT.

DATA TO SHOW NOTHING BAD WILL HAPPEN

16-1

Thank you for your input. Please use additional sheets if necessary and attach them to this form.

Name PADUCAH CYLINDER HANDLER (optional)
Organization _____
Address _____ (optional)
City _____ State ____ Zip ____
Phone number _____ (optional)
E-mail address _____ (optional)

❑ Please add my name to the Depleted UF_6 mailing list.
❑ Please take my name off the Depleted UF_6 mailing list.

DEPLETED UF_6

Depleted Uranium Hexafluoride Management Program • Charles E. Bradley, Jr.
Department of Energy • Office of Nuclear Energy, Science and Technology • Office of Facilities
19901 Germantown Road • Germantown, MD 20874 • 301/903-4781

COMMENTOR NO. 17: ROBISON, WILLIAM A. COOKEVILLE, TENNESSEE

Mail this form

Comment Form

The Department of Energy is interested in your comments on the *Draft Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride*.

There are several ways to provide comments on this document and these include:

- ✓ attending public hearings and giving your comments directly to DOE officials
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- ✓ returning this comment form or other written comments to the address on the back
- ✓ faxing your comments to 301/428-0145
- ✓ commenting via the Depleted UF_6 World Wide Web site: http://www.ead.anl.gov/uranium.html
- ✓ calling toll-free and leaving your comments via voice mail, 1-800-517-3191
- ✓ commenting via electronic mail: depleted_uf6@ccmail.gmt.saic.com

Comments

We have no comments at this time, but will remain involved in the public scoping process

17-1

Thank you for your input. Please use additional sheets if necessary and attach them to this form.

Name William A. Robison (optional)

Organization U.S. Fish & Wildlife Service

Address 446 Neal Street (optional)

City Cookeville State TN Zip 38501

Phone number 931-528-6481 (optional)

E-mail address _____ (optional)

■ Please add my name to the Depleted UF_6 mailing list

❑ Please take my name off the Depleted UF_6 mailing list

Depleted Uranium Hexafluoride Management Program

Depleted Uranium Hexafluoride Management Program • Charles E. Bradley, Jr.
Department of Energy • Office of Nuclear Energy, Science and Technology • Office of Facilities
19901 Germantown Road • Germantown, MD 20874 • 301/903-4781

COMMENTOR NO. 18: JANASKIE, MARK OAK RIDGE, TENNESSEE

Question/Information Request Card

If you have questions that were not addressed or need additional information, please fill out this form and bring it to the registration table. DOE will address your concern to extent possible.

Name: MARK JANASKIE

Address: 151 LAFAYETTE DRIVE, SUITE 210 | OAK RIDGE 37830

Phone: 482-0400 Fax: 482-7690

E-mail: mjanaskie@DPRA.com

Question/Request: Is there any consideration by DOE to measure the corrosion rate, and if it turns out that the corrosion rate is slow or benign, is there a chance that DOE will do no coating and simply wait until the date for beginning conversion (2004+)? If the corrosion rate is slow, could DOE consider the risk to cylinders low, and thus simply wait until conversion begins.

Is this one of DOE's current options?

18-1

COMMENTOR NO. 19: PARROTT, ROBERT C.
OAK RIDGE, TENNESSEE

Question/Information Request Card

If you have questions that were not addressed or need additional information, please fill out this form and bring it to the registration table. DOE will address your concern to extent possible.

Name: Robert C. Parrott
Address: 151 Lafayette Drive, Suite 210
Phone: (423) 482-0400 Fax: (423) 482-7690
E-mail: cparrott@dpra.com

Question/Request: 1) What does DOE plan to do with the cylinders after conversion occurs? Disposal as waste or decon + sale as scrap or reuse? 2) Does DOE have a credible technology to convert the DUF6? Is it realistic that DOE can convert the material by 2028? 3) The current painting program seems inadequate to control corrosion. Does DOE plan to increase the rate of coating? 4) How will DOE decide whether to transport cylinders in overpacks or transfer the contents to new cylinders?

19-1
19-2
19-3
19-4

COMMENTOR NO. 20: RADCLIFFE, DONALD W.
ADDRESS UNKNOWN

TO: depleted UF6 at SAIC_BM2
Subject: Unable to comment on DUF6

When I tried to send a commet through the e-mail link on the website, AOL could not deliver to that address. My comment on the PEIS is:

The cost of enrichment services is much lower and thus the viability of refeeding the DUF6 at higher assays is much improved at some locations outside the U.S. The PEIS should address the issues of overseas shipping and disposal.

20-1

Donald W. Radcliffe
Nuclear Fuel Consultant

COMMENTOR NO. 21: UNITED STATES DEPARTMENT OF THE INTERIOR
WASHINGTON, D.C.

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

In Reply Refer to:
ER 97/732

MAR 5 1998

Mr. Charles E. Bradley, Jr.
Office of Facilities (NE-40)
Office of Nuclear Energy, Science and Technology
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

Dear Mr. Bradley:

The Department of the Interior has reviewed the draft " Programmatic Environmental Impact Statement (PEIS) for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride" and offers the following comments:

The Paducah site's proximity to the Reelfoot Rift and New Madrid fault zones would seem to indicate that an earthquake caused accident could be considerably greater at Paducah than at either the Portsmouth site or the Oak Ridge site. This area has experienced seismic activity within the last two to three months. This should be factored into the analysis. ***21-1***

S.1.3 Under Proposed action-Contaminants leaking into groundwater may not be detected for several hundred years. The rate of movement of contaminants in groundwater is variable. Because of the long period of time during which the radiation would still be potentially harmful, monitoring of ground-water contamination should continue as long as a risk exists and should cover a large enough area to capture the full geographic extent of possible contamination. The McNairy-Nacatoch aquifer is a very important source of drinking and domestic water for a number of towns in Missouri and Arkansas. Monitoring should be extensive enough to capture any incidence of contamination in these important water sources following a contamination event. ***21-2***

S.4.5-It is important to note that the Paducah site should be considered a "wet site." A disposal facility failure in this wet environment would impact the ground-water system with uranium concentrations in groundwater greater than 20 mg/L within 1,000 years after the failure. ***21-3***

The Paducah site is also vulnerable to changes in the biological and chemical composition of surface water caused by ground-water discharges into surface water streams. If contamination from such a discharge were to occur, it could affect the ecological stability of the surface water environment. ***21-4***

COMMENTOR NO. 21: UNITED STATES DEPARTMENT OF THE INTERIOR (CONT'D.)
WASHINGTON, D.C.

There is not sufficient information presented in the PEIS to permit an analysis or assessment of the validity of the models; therefore, we cannot confirm that the worst-case accident or other scenarios are reasonable simulations. ***21-5***

Most of the strategies for disposing of the inventory of uranium would require construction of processing plants to convert UF6 to other chemical forms, however, locations of these plants are not identified. The use of generic data for the proposed plant seems to be a weak link in the analysis because of uncertainty about site location and lack of specific data. Therefore, we cannot confirm the validity of the potential environmental impacts that might be caused by this conversion process. ***21-6***

The units for measuring contaminant concentrations are reported differently in different parts of the document (e.g., mg/g, ug/mg, etc.). The same is true of hydraulic conductivity (cm/s, ft/d). Consistent units of measure should be used throughout the PEIS. ***21-7***

On page 3-28, the assertion that the high thallium concentrations may be caused by a problem in the laboratory analysis should be confirmed or denied, and explained if levels are confirmed to be as high as suggested. ***21-8***

Sincerely,

Willie R. Taylor
Director, Office of Environmental Policy and Compliance

COMMENTOR NO. 22: LAWRENCE LIVERMORE NATIONAL LABORATORY
LIVERMORE, CALIFORNIA

Lawrence Livermore National Laboratory

March 3, 1998

Mr. Charles E. Bradley, Jr.
Office of Facilities (NE-40)
Office of Nuclear Energy, Science and Technology
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

Dear Mr. Bradley,

Lawrence Livermore National Laboratory has no substantive comments to make on the content of the December 1997 Draft Programmatic Environmental Impact Statement (PEIS) for Alternative Strategies for the long-term Management and use of Depleted Uranium Hexafluoride. We wish to receive a copy of the Final PEIS when available. **22-1**

Should you have any questions, please direct them to Ken Zahn (L-627), phone 510-422-2140 or Internet address: zahn1@llnl.gov.

Sincerely,

Kenneth C. Zahn, Group Leader
Environmental Evaluations Group
Environmental Protection Department

cc: EEG file L-627
Zahn., K., L-627
Galles, H., L-626
Jackson, C.S., L-633

Recycle
7600-61230

M98-015.TK:jn

COMMENTOR NO. 23: ECO-PAK SPECIALTY PACKAGING, DIVISION OF CBC
ELIZABETHTON, TENNESSEE

ESF Eco-Pak Specialty Packaging Division of CBC

Intermediate Bulk Containers for Chemicals & Liquids
UF_6 and UO_3 Packaging

125 Jodent Way, Suite A
Elizabethton, TN 37643 USA
Tel: 423-543-4211 • 800-221-2465 • Fax: 423-543-0007
E-mail: info@ecopak.com

February 25, 1998

Mr. Charles E. (Ched) Bradley
Program Manager, Facilities Office, ONEST
19901 Germantown Rd
Germantown, MD 20874

Dear Mr. Bradley:

It was a pleasure to meet you, last night, at the DOE public meeting in Oak Ridge. Heather and I both feel that the preferred program to convert the stockpiled UF6 to uranium oxide and uranium metal for future use is the most worthwhile alternative.

Eco-Pak Specialty Packaging is very interested in assisting in the transport of this material to the future conversion facilities. I am enclosing a brochure on both Eco-Pak Specialty Packaging (ESP) and our parent company, The Columbiana Boiler Company (CBC).

ESP is a division of The Columbiana Boiler Company (CBC) and part of the Columbiana network of companies, which encompasses more than 100 employees and 200,000 square feet of manufacturing area. ESP and CBC offer the knowledge and manufacturing experience of both the UF6 cylinders (30B & 48" series) and the UF6 cylinder overpacks. Additionally, ESP has experience in packaging for the transportation of uranium oxide materials, plutonium products, and waste products. ESP has a comprehensive quality assurance program in place, which is approved by the U.S. Nuclear Regulatory Commission under Quality Assurance Program Approval for Radioactive Material Packages No. 0179, Revision 6. NCI has on staff a core group of project engineers with a wide range of experience, a strong management team, regulation specialists, a certified core of welders, AWS Certified Welding Inspectors also certified in accordance with ASNT-TC-1A for nondestructive inspection, and excellent production personnel. **23-1**

I hope some of this information helps in the decision making for this project. I look forward to working and meeting with you, again.

If you have any questions about our company or need any further information regarding our capabilities, please contact myself or Heather Little at **(800) 221-2465**.

Best regards,

William M. Arnold
President

WMA/hl
Enclosure

COMMENTOR NO. 24: SWORDS TO PLOWSHARES SAN FRANCISCO, CALIFORNIA

Swords To Plowshares
a veterans' rights organization

5 Market Street, 3rd Floor
San Francisco, CA 94103

Telephone: (415) 247-8777
Fax: (415) 227-0848

March 11, 1998

Charles E. Bradley, Jr.
US Department of Energy
Office of Nuclear Energy, Science and Technology
19901 Germantown Road
Germantown, MD 20874

Dear Mr. Bradley:

Enclosed is a copy of the Depleted Uranium Case Narrative about the health and environmental consequences of depleted uranium munitions. I hope that you will carefully review the information presented here as part of your effort to determine the fate of uranium hexaflouride stockpiles.

24-1

Depleted uranium should be stored in safe containers away from humans, water supplies, and the food chain. The use of depleted uranium in ammunition is an unwise use for chemically toxic and radioactive waste.

If I can be of further assistance, please do not hesitate to contact me.

Respectfully,

Dan Fahey

COMMENTOR NO. 24: SWORDS TO PLOWSHARES (CONT'D.) SAN FRANCISCO, CALIFORNIA

Swords To Plowshares
a veterans' rights organization

995 Market Street, 3rd Floor
San Francisco, CA 94103

Telephone: (415) 247-8777
Fax: (415) 227-0848

DEPLETED URANIUM CASE NARRATIVE
QUOTES SHEET

I. Pre-Desert Storm Reports:

1974: "In combat situations involving the widespread use of DU munitions, the potential for inhalation, ingestion, or implantation of DU compounds may be locally significant."
Medical and Environmental Evaluation of Depleted Uranium; Ad Hoc Working Group on Depleted Uranium of the Joint Technical Coordinating Group for Munitions Effectiveness; April, 1974; p. ix.

1974: "The use of DU in certain RDT&E [Research, Development, Training and Evaluation] **and combat activities results in the redistribution of uranium in the environment, thereby providing a potential for adverse effects. Adherence to safety procedures and use of protective clothing minimize the potential for human exposure during RDT&E activities."**
Medical and Environmental Evaluation of Depleted Uranium; April, 1974; p. viii.

July, 1990: "Aerosol DU exposures to soldiers on the battlefield could be significant with potential radiological and toxicological effects."
Kinetic Energy Penetrator Environmental and Health Considerations; Science Applications International Corporation (SAIC); July 1990. Vol. 1, 4-5.

July, 1990: "Under combat conditions, the MEI's [most exposed individuals] **are probably the ground troops that re-enter a battlefield following the exchange of armor-piercing munitions, either on foot or motorized transports."**
Kinetic Energy Penetrator Environmental and Health Considerations; SAIC; July 1990; Vol. 2, 3-4.

July, 1990: "We are simply highlighting the potential for levels of [DU] exposure to military personnel during combat that would be unacceptable during peacetime operations."
Kinetic Energy Penetrator Environmental and Health Considerations; SAIC; July 1990; Vol. 1, 4-5.

July, 1990: "Following combat, however, the condition of the battlefield, and the long-term health risks to natives and combat veterans may become issues in the acceptability of the continued use of DU kinetic energy penetrators for military applications."
Kinetic Energy Penetrator Environmental and Health Considerations; SAIC; July 1990; Vol. 2, 3-4.

July, 1990: "Depleted uranium: low level alpha radiation emitter which is linked to cancer when exposures are internal, [and] chemical toxicity causing kidney damage."
Kinetic Energy Penetrator Environmental and Health Considerations; SAIC; July 1990; Vol. 1, 2-2.

July, 1990: "Assuming US regulatory standards and health physics practices are followed, it is likely that some form of remedial action will be required in a DU post-combat environment."
Kinetic Energy Penetrator Environmental and Health Considerations; SAIC; July 1990; Vol. 1, 4-6.

October, 1990: "Bioassay procedures will be performed when radioactive materials are used in such a manner that they could be inhaled, ingested, or absorbed into the body."
Preventative Medicine; US Army Regulation 40-5; October 15, 1990; Chapter 9, 9-6 a(2).

September, 1990: "If ingestion or inhalation of radioactive materials is suspected, bioassays should be performed."
Guidelines for Safe Response to Handling, Storage, and Transportation Accidents Involving Army Tank Munitions and Armor Which Contain Depleted Uranium; TB 9-1300-278; Headquarters, Department of the Army; September, 1990; p. 7-3.

II. Post-Desert Storm Reports:

March, 1991: "There has been and continues to be a concern regarding the impact of dU on the environment. Therefore, if no one makes a case for the effectiveness of dU on the battlefield, dU rounds may become politically unacceptable and thus, be deleted from the arsenal . . . I believe we should keep this sensitive issue at mind when after action reports are written."
"The Effectiveness of Depleted Uranium Penetrators;" Los Alamos National Laboratory memorandum; Lt. Col. M.V. Ziehmn; March 1, 1991.

March, 1991: "As Explosive Ordnance Disposal (EOD), ground combat units, and the civil populations of Saudi Arabia, Kuwait, and Iraq come increasingly into contact with DU ordnance, we must prepare to deal with the potential problems. Toxic war souvenirs, political furor, and post conflict clean-up (host nation agreement) are only some of the issues that must be addressed."
"Depleted Uranium (DU) Ammunition;" Lt. Col. Gregory Lyle; Defense Nuclear Agency; March, 1991.

1995: "When DU is indicted as a causative agent for Desert Storm illness, the Army must have sufficient data to separate fiction from reality. Without forethought and data, the financial implications of long-term disability payments and health-care costs would be excessive."
Health and Environmental Consequences of Depleted Uranium Use in the US Army: Technical Report; US Army Environmental Policy Institute (AEPI); June, 1995; p. 4.

1996: "US service personnel also could have been exposed to DU if they inhaled or ingested DU dust particles during incidental contact with vehicles destroyed by DU munitions, or if they lived or worked in areas contaminated with DU dust from accidental munitions fires. Thus, unnecessary exposure of many individuals could have occurred."
Presidential Advisory Committee on Gulf War Veterans' Illnesses Final Report; December, 1996; p. 99.

1993: "Army officials believe that DU protective methods can be ignored during battle and other life-threatening situations because DU-related health risks are greatly outweighed by the risks of combat."
Operation Desert Storm: Army Not Adequately Prepared to Deal With Depleted Uranium Contamination; US General Accounting Office; GAO/NSIAD-93-90; January, 1993; p. 4.

1995: "Combat in Desert Storm has shown us that all soldiers anytime during battle may come across depleted uranium and depleted uranium contamination."
Development of Depleted Uranium Support Packages: Tier I - General Audience; US Army Chemical School; October, 1995; p. 25.

1995: "The person most likely to be contaminated is breathing without protection when DU munitions hit and penetrate his AHA [DU armored] M1 tank and the DU aerosolizes into the tank turret. He will inhale large amounts of DU dust. Next is the person in an AHA M1 tank hit and penetrated by non-DU munitions. The DU in the armor would aerosolize into the turret. Other persons include crew members in Bradleys struck by DU ammunition. Last are individuals moving

COMMENTOR NO. 24: SWORDS TO PLOWSHARES (CONT'D.)
SAN FRANCISCO, CALIFORNIA

Statement of Jerry Wheat
Gulf War Veteran
4/7 Cav, 3rd Armored Division
March 2, 1998

My name is Jerry Wheat, and I served in the Army from 1987 until 1991 as a cavalry scout. During the Gulf War, I was assigned to the 3rd Armored Division in Germany and was sent to the Gulf on December 24, 1990. We were deployed near the Iraqi border, where we practiced manuvers before the invasion in February 1991. I left the Gulf in March 1991.

Our unit was engaged in heavy fighting on February 26, 1991. I was injured in a friendly fire incident involing depleted uranium ammunition. Our Bradley Fighting Vehicle was struck twice by DU rounds fired by US tanks, and I was awarded a Purple Heart for my shrapnel wounds.

In October 1991, I became ill. I began having abdominal pains that would drop me to the floor, and I could barely eat. This went on for several weeks even though I was seeing a doctor at an Air Force hospital in Albuquerque, NM. I left the military shortly after falling ill, and I could no longer seek medical care from the military. I contemplated suicide because there were no answers and there was no treatment. At that time, I was not informed nor was I aware of the fact I could go to the Department of Veterans Affairs for medical care. The pain is still with me today.

Later on, I visited the VA in Albuquerque, and I was told that the illnesses are not real, but that it is psychological -- that it is in my head. After seven years, the VA won't say if my physical ailments are related to DU exposure.

In March 1992, my father, an industrial hygenist technician at Los Alamos Laboratory, called me and informed me that the shrapnel taken from my gear and skin were radioactive. This was a tremendous surprise to me, since the Army never bothered to tell me I was hit with radioactive and toxic ammunition.

I am now part of a VA medical review following the health of veterans exposed to DU. This program only follows a handful of those with known heavy doses of DU exposure. By 1993, I had lost 60 pounds, and the VA has yet to explain this to me.

I am speaking out today because so many people are affected by Gulf War illnesses. Our government should stop using depleted uranium. If it won't do that, then the least it can do is provide training and health care for those exposed to the toxic waste.

Remember, this sad legacy of government mistakes is not new. About 50 years ago, veterans were used as human test subjects for atomic bomb blasts. Then the government tested LSD drugs on others. Then there was the use of Agent Orange more than 30 years ago.

The government should conduct more research into the health effects of DU. The government should admit that many, many more were exposed to DU dust and begin to provide health care as soon as possible -- before it is too late. Thank you.

COMMENTOR NO. 24: SWORDS TO PLOWSHARES (CONT'D.)
SAN FRANCISCO, CALIFORNIA

Swords to Plowshares, Inc.
National Gulf War Resource Center, Inc.
Military Toxics Project, Inc.

Case Narrative

Depleted Uranium (DU) Exposures

Case Narratives are reports of what we know today about specific events that took place during the Persian Gulf War. This particular case narrative focuses on exposures to depleted uranium (DU). This is an interim report, not a final report. We hope that you will read this and contact us with any new information that would help us better understand the events reported here. With your help, we will be able to report more accurately on depleted uranium exposures during the Persian Gulf War. Please contact our offices to report any new information by calling:

(202) 628-2700, ext. 162
National Gulf War Resource Center, Inc.

(207) 783-5091
Military Toxics Project

(415) 247-8777
Swords to Plowshares

Last Update:
March 2, 1998

Author:
Dan Fahey

COMMENTOR NO. 25: QUAPP, WILLIAM J., P.E.
IDAHO FALLS, IDAHO

Comments on the
DOE NE PEIS on the Management of
Depleted Uranium Hexafluoride

Prepared by: William J. Quapp, PE
Starmet Corporation,
2300 No. Yellowstone Hwy
Idaho Falls, ID 83401

Phone: 208-535-9001
Fax: 208-535-9070
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March 10, 1998

1. INTRODUCTION AND BACKGROUND

Good afternoon, my name is William Quapp, from Starmet Corporation. I have been actively involved in evaluating the management issues associated with depleted uranium hexafluoride since May 1993. At that time and until June 1996, I was employed at the Idaho National Engineering Laboratory. My investigations were performed for DOE Environmental Management Program (EM50). Over these three years, we identified various management options and costs of their deployment. One of the major things we learned is that the management of the depleted uranium inventory must be considered as a system in context with other DOE materials and waste management responsibilities. While the depleted uranium hexafluoride can be processed and useful fluorine byproducts extracted for the recycle value, the residual uranium material – oxide or metal – must be managed as a radioactive material. The fluorine product value will not pay for the total conversion and byproduct management costs. Consequently, DOE must either plan on disposal of the residual uranium materials or identify products that can consume the material and be manufactured at reasonable costs. Additionally, there must be customers for those products. The alternative to products and customers is to manage the depleted uranium as waste.

25-1

The INEL program developed and patented one technology – *DUCRETE Shielding: A Depleted Uranium Concrete* -- which has been considered in the DOE PEIS as a potential use for depleted uranium. However, as will be pointed out later, because of the radioactive nature of depleted uranium, certain policies with respect to eventual disposal must be put in place to remove obstacles and encourage the use of depleted uranium in products.

25-2

As has been shown in studies supported by DOE EM, the current quantity of depleted uranium reasonably matches the required quantity if some of the storage applications were to be implemented. No other economic use has been identified that uses large quantities of material.

COMMENTOR NO. 25: QUAPP, WILLIAM J., P.E. (CONT'D.)
IDAHO FALLS, IDAHO

My remarks today will provide a summary of the INEL findings and provide my recommendations for DOE policies and actions needed to support the depleted uranium recycle applications envisioned in the PEIS for the preferred alternative.

2. DISPOSAL AS WASTE

The INEL studies addressed this issue in a parametric sense using published costs of conversion of UF_6 to oxide and the then current cost of disposal at the Nevada Test Site and Hanford. The studies showed that the potential cost range was somewhere between $3 to $11 billion assuming that either the Nevada Test Site or Hanford could accept the material and dispose of it in shallow land burial. Parameters considered included 1.) disposal as a compacted oxide and as stabilized oxide, 2.) disposal site locations and costs, and 3.) disposal as LLW versus Mixed LLW (RCRA controlled material).

25-3

3. RECYCLE USES

We evaluated recycle uses with the recognition that the depleted uranium is a radioactive material and must be controlled, used, and ultimately disposed of in appropriate nuclear waste repositories. We did not consider uses that would allow unrestricted use and disposal.

25-4

After evaluating numerous concepts (nuclear shielding, flywheels, drill rods, blast shielding, etc.), we concluded nuclear shielding was the only viable use for depleted uranium since it was a controlled nuclear material and will be slightly radioactive forever. Additionally, because of the lower cost of competitive materials, depleted uranium was not an economic alternative for most other applications. Depleted uranium metal makes economic sense when the benefit of its very high density enables a solution that is otherwise not possible with traditional materials (steel, lead, concrete, etc.).

Depleted uranium has been used as metallic shielding in the past for various shipping casks and as shielding for radiation sources. In these applications, depleted uranium was selected because of its higher efficiency for gamma attenuation would allow cask weight limitations and/or size constraints to be met.

We found that one of the biggest impediments to the use of depleted uranium as metal in storage cask shielding applications is the high cost of converting from UF_6 to uranium metal. In a survey performed for DOE by Technics Corporation, the cost was identified to be about $11.70 per kg-U ($5.30 per lb-U) for conversion of UF_6 to metal and casting into a shape. Any forming or machining was additional and was priced at $4.40 to $22 per kg-U. Some cost reductions could be forecast through larger conversion facilities but these would not be expected to be sufficient to dramatically reduce the costs below those cited. Consequently, since casks could be made with conventional materials at lower total cost, we believed that there was no economic application for depleted uranium metal in storage casks.

25-5

This economic reality spawned the invention of DUCRETE Concrete as a potentially economic alternative for using depleted uranium and avoiding the near term investment in disposal. This concept, while not directly cost competitive with conventional concrete, is much cheaper than

COMMENTOR NO. 25: QUAPP, WILLIAM J., P.E. (CONT'D.)
IDAHO FALLS, IDAHO

using depleted uranium metal and has some performance values that can make it economically competitive to traditional materials on a life cycle cost basis. And, by recycling the material, DOE can avoid declaring the material waste.

4. DUCRETE SPENT FUEL AND HIGH-LEVEL WASTE STORAGE CASKS

1.) DUCRETE Concrete is a technically viable material for spent fuel and high-level waste dry storage casks. Smaller, lighter weight, and more versatile casks can be designed and fabricated. DUCRETE casks can be factory fabricated and shipped to the user facility and re-shipped to the interim storage site or the geologic repository as required.
2.) DUCRETE Storage casks can be developed and deployed at DOE sites, commercial utility sites, the DOE Interim Spent Fuel Storage Site, and for shielding in Yucca Mountain. However, there is no industry incentive to independently finance DUCRETE cask demonstrations. Consequently, DOE must support such demonstration.
3.) DUCRETE Casks are competitive with traditional concrete **IF** DOE pays for conversion of the UF_6 into the depleted uranium aggregate (UF_6 to UO, to aggregate). DUCRETE concrete is not a competitive cask material if the cost for conversion from UF_6 to aggregate must be born by the cask fabricator.
4.) DUCRETE Casks will be acceptable to utilities and other users **IF** DOE agrees to accept them at end of life in a DOE disposal facility such as the NTS or the Spent Fuel Geologic Repository. Without a predefined disposal option, no commercial utility will accept ownership.
5.) DUCRETE concrete is a stable chemical form of material that meets the disposal criteria of the Nevada Test Site as-is. No further processing would be required for disposal.
6.) When used as shielding in casks or other radioactive material containers, DUCRETE concrete is managed by organizations already licensed to hold nuclear materials. Thus, the institutional control required for handling of depleted uranium is in place.

25-5 (Con't.)

4. TIMELY ACTIONS REQUIRED

Driven by the need for spent fuel storage in the country, many fuel storage actions are underway by both DOE OCRWM and utility organizations. Since a cask demonstration and licensing program could take up to 4 years, if DOE NE is to be successful in its goal to recycle the depleted uranium into nuclear storage products, prompt funding of demonstration cask projects need to be undertaken. If prompt initiation of such programs is not undertaken, the window of opportunity for the deployment of depleted uranium in spent fuel storage casks will have passed. To take advantages of the unique characteristics of DUCRETE cask systems, the cask design must be compatible with other transportation systems being developed. This necessitates early integration of cask design with other parts of the transportation systems.

25-6

5. POLICIES THAT DOE SHOULD ESTABLISH TO ENCOURAGE DEPLETED URANIUM RECYCLING

1. Any product manufactured from depleted uranium after the PEIS ROD should be accepted at the NTS or other DOE site for disposal, provided that,

25-7

COMMENTOR NO. 25: QUAPP, WILLIAM J., P.E. (CONT'D.)
IDAHO FALLS, IDAHO

a) All depleted uranium products submitted to DOE for future disposal be in a chemical and physical which form meets the current Waste Acceptance Criteria at that DOE disposal site, or,

b) DOE shall retain title to the depleted uranium material and, at end of product life, DOE will accept the product for disposal at the NTS provided that the depleted uranium product meets the NTS Waste Acceptance Criteria.

25-7 (Con't.)

1. The Nuclear Waste Policy Act should be modified to allow disposal of depleted uranium casks or other depleted uranium materials in empty drift space between or other locations within the geologic repository. Presently, the Act restricts disposal of all materials other than spent fuel or high level waste.

25-8

2. Empty depleted uranium storage casks in sound physical condition should be accepted at the NTS for re-use and at no cost to the owner. DUCRETE spent fuel or high-level waste casks would be very suitable as high integrity containers for the subsequent disposal of various Greater-than-Class C wastes from reactor decommissioning. DOE has responsibility for receiving such future wastes.

25-9

6. OTHER DOE ACTIONS THAT WILL FACILITATE THE RECYCLE OF DEPLETED URANIUM

1. DOE should stimulate the demonstration of low cost UF_6 conversion technologies to lower the cost of management. Low cost processes to convert the UF_6 to metal or to an oxide are needed to reduce the management cost to DOE and to support any recycle objective.

25-10

2. DOE should support the development and licensing of DUCRETE storage casks and mandate their use on DOE storage projects where the total system life cycle cost can be shown to be advantageous to DOE.

25-11

3. DOE can consider the provision of DUCRETE storage casks to utilities for interim storage of spent fuel as partial compensation for being unable to receive spent fuel as required by law.

25-12

4. DOE should objectively evaluate the use of DUCRETE shielded storage casks for shielding the spent fuel and high level waste packages in the geologic repository as an alternative to operating the repository as a remote handled facility for the 125 year period during emplacement and post-closure monitoring.

25-13

7. CONCLUSIONS

Fifty years of nuclear activities in the US have left a large inventory of material with both unique and undesirable characteristics. To minimize the future cost of management in an environmentally and economically responsible manner, a system solution is needed to assure that the beneficial attributes of depleted uranium are recognized and used while the negative impacts of being a nuclear material are minimized.

25-14

During the studies I managed for the DOE, we defined such a system solution where DUCRETE casks were used for spent fuel storage at reactor sites, at the interim storage facility, and for disposal containers in the geologic repository. That concept still appears to me to be the most environmentally responsible solution achievable at the least cost to the US taxpayers.

COMMENTOR NO. 26: DIETZ, LEONARD A.
NISKAYUNA, NEW YORK

Leonard A. Dietz
1124 Mohegan Road
Niskayuna, NY 12309-1315

March 12, 1998

Mr. Charles E. Bradley, Jr.
Office of Facilities (NE-40)
Office of Nuclear Energy, Science and Technology
U.S. Department of Energy
19901 Germantown Road
Germantown, MD 20874-1290

Subject: Comments requested on "Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride"

Dear Mr. Bradley:

Remediation of the depleted uranium (DU) storage problem is an important and urgent task of Herculean proportions. My choice of the six options presented is No. 2: **Long-Term Storage as UF_6**—storage of UF_6 cylinders in yards, buildings, or a mine at a consolidated site. This choice has the least potential to pollute the environment with more DU. I suggest that each cylinder of DU hexafluoride should be placed in a permanent overcontainer filled with one atmosphere pressure of an inert gas such as argon to retard corrosion by preventing water vapor and oxygen from entering the containers. The overcontainers should be sealed hermetically and designed to last for 100 years or more.

26-1

I believe that at this time we as a nation do not possess sufficient wisdom or foresight needed to decide on the final disposition of this enormous stockpile of waste uranium. It would be prudent to wait a few decades more before deciding on a final course of action.

Under no circumstance should DU be allowed in commercially-manufactured consumer goods or be made available to the general public as has been hinted at in a New York Times article by Mathew Wald.[1] He mentions industrial use of DU flywheels to store energy and use as a substitute for lead weights. Elsewhere it has been suggested that DU should be used as ballast in the keels of sailboats. Imagine a long-forgotten sailboat sunk in a storm and unretrievable, its hulk polluting a deep freshwater lake with uranium that slowly becomes soluble and pollutes the water. I became even more convinced that DU should be banned from commercial use when I saw an advertisement for a new driver golf club that contains a sphere of DU metal in its head so that a golf ball can be driven farther. These suggested commercial uses of DU are irresponsible and reckless, and will be dangerous to public health if they are implemented. The average person knows nothing about the technical aspects of uranium or radioactivity and is totally unprepared to deal with this radioactive and pyrophoric material that is highly toxic both chemically and radiologically.[2] Uranium in any chemical form presents significant dangers to health and safety, if it is not handled with scrupulous care.

26-2

Beginning on the next page, detailed reasons are given why I chose the second alternative.

I would appreciate it very much if you would please add my name to the Depleted UF_6 mailing list. Thank you.

Sincerely,

Leonard A. Dietz

[1] M. L. Wald, "Danger From Uranium Waste Grows as Government Considers Its Fate," NY Times, March 25, 1997.

[2] *Handbook of Chemistry and Physics*, The Chemical Rubber Co., 75th ed., 1994-95, Boca Raton, FL 33431, p. 4-32.

COMMENTOR NO. 26: DIETZ, LEONARD A. (CONT'D.) NISKAYUNA, NEW YORK

Detailed Reasons for Choosing the Second Alternative

Design of the DU Processing Plant and its Containment Efficiency

The processing of DU hexafluoride into uranium oxide or uranium metal requires extensive chemical processing, melting and casting operations. The pyrophoric nature of uranium makes it inevitable that significant quantities of uranium oxide aerosol particles will be formed. There does not have to be an accident at a DU processing plant for the public to be exposed to dangerous concentrations of aerosol micrometer particles of uranium oxide. Exposure can occur from DU aerosol particles released into the atmosphere during normal operations. To illustrate this, we assume that a well-designed and super-efficient processing plant can be built that would contain 99.99999% of all the uranium it processes. In such a plant only 1-gram in 10-million grams of DU would escape into the environment. We examine how this relates to the large amount of DU proposed to be processed from the years 2009 through 2028 and then compare it with an actual experience in New York State.

Using the data given on page S-2, Vol. I, The depleted UF_6 cylinders currently managed by DOE plus the cylinders produced by the United States Enrichment Corporation total approximately 54,422. They contain about 600,000 metric tons of DU hexafluoride. Continued operation of the Portsmouth and Paducah diffusion plants could double this amount by the year 2028. Therefore, the DU hexafluoride that must be processed each year for 20 years beginning in 2009 is approximately 60,000 metric tons, of which two thirds is the element uranium. Thus, it appears that up to 40,000 metric tons of DU will be processed per year.

Containment of DU within the processing facility or facilities will be a major problem, even with the very best technology available. For example, if as postulated, 99.99999% of the DU can be contained successfully, then in 40,000 metric tons of DU processed each year, 4,000-grams will escape at an average rate of 333-grams per month.

26-3

The New York State Experience with a DU Processing Plant

The estimated rate of 333-grams of DU escaping into the atmosphere per month must be compared with the New York State experience with National Lead Industries, a former DU processing plant near Albany, NY. At NL Industries DU was processed into DU metal penetrators for 30-mm cannon rounds and into airplane counterweights made of DU. In February 1980, a court order by NY State citing public health reasons shut down NL Industries for exceeding a NY State Department of Environmental Conservation monthly radioactivity limit of 150 microcuries (387-grams of DU) for airborne emissions. Recently the highly contaminated plant was razed and a large quantity of radioactively contaminated structural material and soil has been prepared for shipment to a disposal site.

The NL Industries plant caused massive contamination to the residential area and commercial properties outside the perimeter of the plant. In 1984, 1985 and 1988 a total of 950 cubic meters of radioactively contaminated soil were removed by DOE from 53 of 56 vicinity properties.[3] My hypothetical super-efficient plant would release 333-grams (129 microcuries) of DU airborne particles per month into the environment. This amount of DU is not significantly different from the 150 microcuries per month limit set by New York State. It is highly unlikely that a release rate of 150 microcuries of DU per month into the atmosphere will ever again be allowed by a local government or by citizens affected by the fallout. The containment efficiency of a DU processing plant would have to

[3]DOE Report No. DOE/OR/21950-888, "Engineering Evaluation/Cost Analysis (EE/CA) for the Colonie Interim Storage Site (CISS) Buildings," June 1993, p. ES-1.

COMMENTOR NO. 26: DIETZ, LEONARD A. (CONT'D.) NISKAYUNA, NEW YORK

be at least 10 times better than I have assumed, allowing less than 1-gram of DU in 100-million grams (100 metric tons) of DU to escape into the environment. This extremely high requirement may be impossible to meet. The control and containment of DU emissions inside the plant would have to be even more stringent. When processing such huge quantities of DU it will be extremely difficult if not impossible to keep workers inside the plant from becoming contaminated with it.

26-3 (Con't.)

Transport of DU Particles in the Atmosphere

Another serious issue is what happens to the uranium particles that escape into the atmosphere and become dispersed far and wide by wind action. In the fall of 1979 I worked at the Knolls Atomic Power Laboratory in Schenectady, NY. The laboratory was operated by the General Electric Company for the Department of Energy. While troubleshooting a problem for the radiological group, my colleagues and I accidentally discovered DU aerosols collected in environmental air filters exposed at the Knolls site. The source of the uranium contamination was the NL Industries plant in Colonie, 10 miles east of the Knolls site, outside Albany, NY. We also discovered DU in air filters exposed at the Kesselring site in West Milton, NY, where crews for the nuclear Navy are trained, 26 miles NW of the NL plant. This is by no means the maximum fallout distance for uranium aerosols. A radius of 26 miles encompassed an area of more than 2,000 square miles around Albany where this fallout occurred. In January, 1980 I wrote and issued an internal technical report that documents our mass spectrometer measurements.[4] Airborne uranium aerosol particles act like dust and can go everywhere that dust goes. The scientific explanation of how micrometer-size uranium particles can easily travel such large distances when airborne is given in a survey paper that is available on the Internet.[5]

26-4

Use of DU Metal in Large Commercial and Military Airplanes

The use of DU metal counterweights in commercial and military airplanes should be banned. Until about 1980 each Boeing 747 passenger jet contained 1,500 kilograms of DU metal counterweights used for dynamic flight control.[6] In a crash and ensuing intense fire DU metal will begin to oxidize rapidly and sustain slow combustion when it is heated in air at a temperature of 500° C.[6] This can cause DU oxide particles to be formed that can become airborne and poison large numbers of people and their surroundings.[7] This scenario has already happened. In 1977 two Boeing 747s crashed into each other and burned on a runway at Tenerife, Canary Is. In 1988 a Boeing 747, Pan Am Flight 103, crashed and burned at Lockerbie, Scotland. And in 1992 an El Al Isralei Boeing 747 crashed into an apartment building and burned in Amsterdam, Holland.

26-5

Fire and safety personnel exposed to the combustion products of DU are at risk. How many fire and safety emergency crews at airports or in cities have been trained and provided with equipment that will protect them from uranium particles that have been generated in intense fires?

[4]L. A. Dietz, CHEM-434-LAD, "Investigation of Excess Alpha Activity Observed in Recent Air Filter Collections and Other Environmental Samples," Jan. 24, 1980, unclassified technical report, Knolls Atomic Power Laboratory, Schenectady, NY 12301; obtained under the Freedom of Information Act. Copies available from L. A. Dietz. If desired, a certified copy should be available from Schenectady Naval Reactors.

[5]L. A. Dietz, "How Gulf War Veterans and Others became Contaminated by Depleted Uranium," available on the world-wide web at the WISE Uranium Project home page: <http://www.nl/~wise/uranium/>.

[6]Lowenstein, P., "Industrial Uses of Depleted Uranium," photocopy in *Uranium Battlefields Home & Abroad: Depleted Uranium Use by the U.S. Department of Defense*, Bukowski, G. and Lopez, D. A., March, 1993, p. 136.

[7]Parker, R. L., "Fear of flying," *Nature*, Vol. 336 22/29 Dec. 1988, p. 719.

COMMENTOR NO. 27: DUPONT NAFION® PRODUCTS FAYETTEVILLE, NORTH CAROLINA

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DuPont Nafion® Products

March 17, 1998

Mr. Charles E. Bradley, Jr., Program Manager
Depleted Uranium Hexafluoride Management Program Office of Facilities
Office of Nuclear Energy, Science and Technology
Department of Energy
Germantown, MD 20874-1290

Dear Mr. Bradley,

We are interested in the Depleted Uranium Hexafluoride Management Program and the safe disposal of this material. Our major interest is in the utilization of the fluorine contained in the depleted uranium hexafluoride.

A number of proposals for the chemical conversion of the UF_6 have been made. At present, the conversion of UF_6 into elemental fluorine and uranium metal proposed by BNFL Inc. appears to be the most promising scheme. The preparation of high value fluorine (F_2) makes the most economic sense. We have had and continue to have discussions with BNFL Inc. about this process and our uses for the fluorine product. Although we do not anticipate any interest in the uranium coproduct this may also be its most desirable form for ultimate use or disposal by others.

27-1

We will continue our discussions and contacts with BNFL Inc. and the Department of Energy. Please do not hesitate to contact us if we be ot any help to you in your work on the Depleted Uranium Hexafluoride Management Program.

Sincerely yours,

Paul R. Resnick

Paul R. Resnick
DuPont Fellow
(910) 678-1607 (910) 678-1496 FAX

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COMMENTOR NO. 28: STATE OF TENNESSEE, DEPARTMENT OF ENVIRONMENT AND CONSERVATION OAK RIDGE, TENNESSEE

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DOE OVERSIGHT DIVISION
761 EMORY VALLEY ROAD
OAK RIDGE, TENNESSEE 37830-7072

March 18, 1998

Charles E. Bradley, Jr.
Office of Facilities (NE-40)
US Department of Energy
19901 Germantown Road
Germantown MD 20874

Dear Mr. Bradley

Programmatic Environmental Impact Statement For Alternative Strategies For The Long-Term Management And Use Of Depleted Uranium Hexafluoride

The Tennessee Department of Environment and Conservation, DOE Oversight Division (TDEC/DOE-O) would like to request an extension on the comment period for the "Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride." This is an important issue for the State of Tennessee, and we would like additional time to complete a thorough review of this document. An extension of the comment period to May 7, 1998, will be sufficient. Please let us know if this is acceptable.

28-1

If you have any questions, please contact Rebeeca Charles at (423) 481-3032 or me at (423) 481-0995.

Sincerely

John Owsley

John Owsley
Assistant Director

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