

May 4, 2008

MEMORANDUM TO: Vonna L. Ordaz, Assistant for Operations  
Office of the Executive Director  
for Operations

FROM: Michael Weber, Director */RA/*  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: COMMUNICATION PLAN FOR LICENSING OF A MIXED OXIDE FUEL  
FABRICATION FACILITY, REVISION 3

The Office of Nuclear Material Safety and Safeguards is transmitting Revision 3 of its Communication Plan for licensing the proposed mixed oxide (MOX) fuel fabrication facility. This revision addresses staff actions to communicate an update of the licensing activities related to the review of the application to possess and use radioactive material at a MOX fuel fabrication facility. This revised plan replaces the Communication Plan dated March 3, 2006.

Enclosure: Communication Plan

CONTACTS: David Tiktinsky, NMSS/FCSS  
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COMMUNICATION PLAN FOR LICENSING THE MIXED OXIDE FUEL FABRICATION  
FACILITY

## **1.0 GOALS**

The primary goal of this communication plan is to continue to ensure the openness of the NRC process for carrying out its licensing responsibilities for the construction and operation of the MFFF. It should be noted that the scope of this communication plan is limited to weapons-grade plutonium and is unrelated to reprocessing of spent fuel from commercial reactors. The project is not a pilot for wide-scale reprocessing and recycling of reactor-grade plutonium, which is already unsuitable for use in weapons. Also, this communication plan is limited to the construction and operation of the MFFF and does not address the use of the MOX fuel in the commercial nuclear power reactor(s).

## **2.0 BACKGROUND**

The United States (U.S.) and the former Soviet Union (Russian Federation) began dismantling thousands of nuclear weapons, when the Cold War ended in the late 1980s. The dismantlement resulted in large quantities of surplus weapons-grade highly enriched uranium and plutonium. Special safety and management measures are necessary because of the many issues this excess material raises with regard to the environment, public health and safety, and control of fissile material. One of the challenges presented is how to dispose of this surplus material so that both the accessibility and attractiveness for retrieval and future use in weapons are significantly reduced.

Because of concerns over the vast stockpiles of nuclear weapons each country possessed, the U.S. and Russian Federation signed an agreement, in September 2000, committing each country to dispose of 34 metric tons of surplus plutonium. The U.S. Department of Energy (DOE) evaluated different strategies to dispose of this material and ultimately developed a program in the U.S. Under the Surplus Plutonium Disposition Program, DOE plans to convert 34 metric tons of surplus weapons-grade plutonium into mixed oxide (MOX) fuel and irradiate the fuel in commercial nuclear power reactors.

In May 1998, DOE issued a request for proposals to design, construct, and operate a MOX fuel fabrication facility (MFFF), and eventually supply commercial fuel to an affiliated nuclear utility, to be irradiated in its reactor. In March 1999, DOE selected a consortium consisting of Duke, Cogema, and Stone & Webster (DCS) [subsequently renamed to Shaw AREVA MOX Services (MOX Services)]. This partnership is to: (a) design the commercial MOX fuel; (b) design, construct, operate, and deactivate an MFFF; c) design and execute the reactor modifications necessary for use of MOX fuel; and (d) provide the architect/engineering and construction management services associated with these activities. The fuel is then intended to be irradiated in commercial nuclear reactors owned by Duke Energy Corporation.

The MFFF would be U.S. Government-owned and would only be used to dispose of surplus plutonium. Under the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999, the U.S. Nuclear Regulatory Commission (NRC) is granted regulatory and licensing

Enclosure

authority over the MFFF. Licensing the MFFF will occur under existing regulations. Also, NRC developed a facility-specific Standard Review Plan (NUREG-1718), dated August 2000, to help review the license application (LA). It should be noted that NRC is also the regulatory authority for the commercial nuclear power reactor(s) that would irradiate the MOX fuel.

The NRC regulatory review of the MFFF is being performed in two stages. The first stage, which has already been completed, consisted of the review and evaluation of the DCS construction authorization request (CAR). This first step required the applicant to submit a description and safety assessment, detailing the design bases of the principal structures, systems, and components of the plant, including provisions for protection against natural phenomena and the consequences of potential accidents [refer to 10 CFR 70.22(f) and 70.23(b)].

The second stage consists of a review of an LA for authority to possess and use the licensed material at the MFFF.

In February 2001, DCS submitted a CAR to construct an MFFF at DOE's Savannah River Site, near Aiken, South Carolina. NRC conducted environmental and safety reviews of the MFFF CAR and supporting documentation. The results of the staff's environmental review are discussed in NUREG-1767, "Final Environmental Impact Statement on the Construction and Operation of a Proposed Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina," issued in January 2005. In March 2005, NRC issued a construction authorization (CA) to DCS for the MFFF. The NRC staff's technical basis for issuing the CA is set forth in NUREG-1821, "Final Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina," issued in March 2005.

In September 2006, DCS submitted an LA and Integrated Safety Analysis (ISA) Summary for an MFFF facility at the Savannah River Site, in South Carolina. In the process of performing the Acceptance/Acknowledgment review of the LA, the staff identified some parts of the submittal that required some modification so as to complete the initial review. During October 2006, DCS requested NRC's consent to change the corporate name for the CA for the MFFF to Shaw AREVA MOX Services (MOX Services). NRC reviewed the request for a name change and issued an amendment to the CA to reflect the new corporate name on November 30, 2006.

The initial review of the LA indicated that much of the information required by 10 CFR Part 70 (in particular 10 CFR 70.22 and 10 CFR Part 70, Subpart H) to be in an operating LA, was contained in the ISA Summary<sup>1</sup>, which is not generally available to the public. The staff also believed that some of the information that was identified to be withheld as proprietary should be publicly available. Consequently a revised LA was submitted to NRC on November 16, 2006. NRC completed its Acceptance/Acknowledgment review and sent a letter to MOX Services on December 20, 2006, indicating that the application was acceptable for docketing. The LA and ISA Summary are currently undergoing a licensing review.

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<sup>1</sup> Contains information on accident sequences that should not be released to the public pursuant to NRC's policy for withholding sensitive unclassified nuclear security information.

### **3.0 AUDIENCE AND KEY MESSAGES**

The following subsections describe the stakeholder groups, their level of involvement in the MFFF licensing process, and the key messages.

#### *Key Messages for External Stakeholders*

- (1) NRC's role is to protect public health and safety, and the environment, by ensuring that the applicant complies with NRC regulations.
- (2) NRC is an independent regulatory agency and, as such, is not a promoter of the proposed facility. The Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 provided NRC with the regulatory and licensing authority over the MFFF at the Savannah River Site. The MFFF would be U.S. Government-owned and would only be used for disposition of the surplus plutonium. DOE signed a contract with MOX Services to design, construct, operate, and deactivate an MFFF.
- (3) The U.S. gained experience in manufacturing and using MOX fuel in reactors in the 1960s and 1970s. The technology has been successfully and safely used in Europe for more than 30 years. NRC has experience regulating plutonium facilities. NRC has been successful regulating fuel fabrication facilities.
- (4) NRC regulatory review of a MFFF is being performed in two stages. The first stage consists of the review, evaluation, and authorization of the construction of the facility. The second stage consists of a review and evaluation of a license application for authority to possess and use the licensed material at the MFFF.
- (5) Stakeholders will continue to be fully informed and encouraged to participate in the regulatory process. Stakeholders will have the opportunity to provide comments during the LA stage, including the opportunity to request a hearing, participate in public meetings, and provide comments on the Safety Evaluation Report (SER) and possible supplemental Final Environmental Impact Analysis (FEIS). Also, stakeholders had formal opportunities to provide comments on NRC's environmental review of the MOX CAR request, and their input was considered and addressed in the FEIS.

#### *Key Messages for Internal Stakeholders*

- (1) It is important that internal stakeholders remain informed about ongoing MOX licensing activities and issues.
- (2) Those assigned to review the MOX license application will maintain a high level of quality and timeliness in their efforts. NRC is relying on the staff's expertise to confirm the safety and security of the applicant's proposed program and to raise safety and safeguards issues that need prompt NRC management attention.

## **A. External Stakeholders**

### *Federal Agencies*

- ▶ U.S. Department of Energy/National Nuclear Security Administration
- ▶ Occupational Safety and Health Administration
- ▶ Defense Nuclear Facilities Safety Board
- ▶ U.S. Department of State

### *State Agencies*

- ▶ South Carolina Department of Health & Environmental Control
- ▶ South Carolina Energy Office
- ▶ Georgia Department of Natural Resources

*State and Local Officials* [Note: Communication with these stakeholders is through Office of Federal and State Materials and Environmental Management (FSME).]

- ▶ State of South Carolina, State Legislature
- ▶ State of South Carolina, Governor
- ▶ State of North Carolina, State Legislature
- ▶ State of North Carolina, Governor
- ▶ State of Georgia, State Legislature
- ▶ State of Georgia, Governor
- ▶ City of Savannah, Georgia
- ▶ City of Aiken, South Carolina
- ▶ City of North Augusta, South Carolina
- ▶ City of Augusta, Georgia

### *U.S. Senate and House of Representatives*

[Note: Communication with these stakeholders is through Office of Congressional Affairs (OCA).]

- ▶ Congressional oversight committees
- ▶ U.S. Senators and Representatives, Georgia
- ▶ U.S. Senators and Representatives, South Carolina

### *Foreign Governments and Organizations*

[Note: Communication with these organizations is through Office of International Programs (OIP).]

- ▶ International Atomic Energy Agency
- ▶ Nuclear Energy Agency/Organization for Economic Co-operation and Development
- ▶ Russian Federation Regulatory Agency, Rostekhnadzor
- ▶ Russian Media

### *Nuclear Industry Companies and Groups*

- ▶ Shaw Areva MOX Services (MOX Services)
- ▶ Nuclear Energy Institute
- ▶ Duke Energy Corporation

### *Media*

[Note: Communications with the media are primarily through Office of Public Affairs (OPA).]

- ▶ Inside NRC
- ▶ Nuclear News Flashes
- ▶ Nuclear Fuel
- ▶ The Energy Daily
- ▶ Nuclear News
- ▶ Fuel Cycle Week
- ▶ Augusta Chronicle (Augusta, GA)
- ▶ The State (Columbia, SC)
- ▶ Free Times (Columbia, SC)
- ▶ The Charlotte Observer (Charlotte, NC)
- ▶ Exchange/Monitor Publications
- ▶ The Aiken Standard
- ▶ Global Security Newswire

### *Individuals and Public Interest Groups*

- ▶ Blue Ridge Environmental Defense League
- ▶ Nuclear Watch South
- ▶ Greenpeace
- ▶ Individual members of the public or public interest groups may request the MOX Project Managers (PMs) to be added to a mail group to receive information. An e-mail distribution list of these individuals will be maintained. A list of individuals who prefer to receive hard copy mailings of information will also be maintained.

## **B. Internal Stakeholders**

- Office of Nuclear Material Safety and Safeguards (NMSS)/Division of Fuel Cycle Safety and Safeguards (FCSS) staff and management

NMSS/FCSS has the lead for the safety review of the MFFF and has ownership for licensing the MFFF. NMSS/FCSS issued the CA and Final Safety Evaluation Report (FSER) for the construction of a proposed MFFF in March 2005.

- FSME

FSME is responsible for establishing and maintaining effective communications and working relationships between NRC and the States, local government, other Federal agencies, and Native American Tribal Governments. FSME will provide advice and guidance to the Executive Director for Operations, and to NRC staff, on matters relating to interactions with these entities.

- FSME/Division of Waste Management and Environmental Protection (DWMEP)

DWMEP is responsible for the environmental review of the MFFF. DWMEP issued the FEIS for the construction and operation of a proposed MFFF in January 2005.

- Office of Nuclear Security and Incident Response (NSIR)

NSIR staff will perform the physical security review of the application.

- OPA

FCSS and DWMEP will work with OPA to develop press releases and questions and answers for significant regulatory actions on licensing. OPA will also provide [and has provided] support at public meetings by introducing itself as a point of contact for inquiries and comments from the public stakeholders regarding the MOX licensing process. For this reason, it is important that the OPA staff and management be aware of the MOX licensing process, issues, activities, and schedules.

- Office of Nuclear Reactor Regulation (NRR)

NRR reviewed and approved a license amendment application for the irradiation of MOX lead test assemblies from Duke Energy Corporation. The involvement of NRR staff in the licensing process for the MFFF includes activities such as public meetings, to help answer questions about the use, safety, and security of MOX fuel in the reactors. In addition, decisions made in the fabrication component for the fuel cycle have implications for the licensing of reactor operations with MOX fuel. Coordination with NRR is necessary on safety, environmental, transportation, and physical security issues. For this reason, it is important that the NRR staff and management understand MOX licensing issues, activities, and schedules.

- Office of Research (RES)

RES staff will provide review expertise in the areas of human factors engineering.

- Office of the General Counsel (OGC)

OGC will assist FCSS, DWMEP, and NSIR staffs with legal issues, including legal interpretation of regulations, analysis of legal implications of policy issues, review of the staff's FSER and FEIS, and participation in the hearing process.

- OCA

OCA is responsible for ensuring that NRC keeps the appropriate Congressional committees fully and currently informed regarding the MOX licensing action. OCA will provide advice and assistance to the Chairman, Commission, and NRC staff on all relations with the Congress.

- Regional Offices

The Regional staff and management (i.e., Region II) will develop a construction and operation inspection program that confirms the safety and security of licensee operations. The Regional State Liaison Officer (RSLO) is responsible for establishing and maintaining effective communications and working relationships between NRC and States, local government, other Federal agencies, and Native American Tribal Governments within their specific Region.



The RSLO can provide advice and assistance, to NRC staff, regarding effective communications with these entities.

- OIP

The MFFF project is part of a bilateral agreement between the U.S. and the Russian Federation. As part of the agreement, the Russian Federation will construct a similar MFFF to dispose of its surplus weapons-grade material. NMSS and Regional staff and management will participate in meetings and workshops with the Russian Federation regulatory agency, Rostekhnadzor, to share information. OIP participates in the coordination of the activities with the Russian Federation.

- Advisory Committee on Reactor Safety (ACRS)

The ACRS reviews and advises the Commission regarding the licensing and operation of production and utilization facilities and related safety issues, the adequacy of proposed reactor safety standards, technical and policy issues related to the licensing of evolutionary and passive plant designs, and other matters referred to it by the Commission. The Fuel Subcommittee has been tasked with looking at the MFFF. The ACRS is independent of the NRC staff and reports directly to the Commission, which appoints its members.

#### **4.0 COMMUNICATIONS TEAM**

Team Leader – David Tiktinsky, NMSS/FCSS  
Backup Team Leader – Kevin Morrissey, NMSS/FCSS  
Regional Team Member – William Gloersen, Region II

#### **5.0 TOOLS**

The following communication tools are used to inform the identified stakeholders of activities related to the licensing of an MFFF. Appendix A includes a list of the tools to be used to communicate activities about the MFFF project.

##### **A. For External Stakeholders**

- *MOX Web Site*

The MOX web page on the NRC external web site can be found at:

<http://www.nrc.gov/materials/fuel-cycle-fac/mox/licensing.html>

The MOX web site includes significant safety and environmental review, and adjudicatory process information related to the proposed MFFF, including, but not limited to, the following:

- ▶ Meeting announcements and summaries
- ▶ CAR information
- ▶ LA information
- ▶ Status of the licensing process

- ▶ Frequently asked questions
- ▶ MOX News
- ▶ Fact Sheets
- ▶ Contact information

- *E-mail lists*

An external e-mail distribution list will be maintained and amended as individuals provide their e-mail address through public meetings, letters, e-mails directed to the NRC staff, and telephone requests. NMSS/FCSS staff established an e-mail account, the MOXFEEDBACK e-mail account, that will be used to distribute information about significant licensing activities, milestones, or significant changes to the schedule. Also, stakeholders may send requests to the following e-mail address: [moxfeedback@nrc.gov](mailto:moxfeedback@nrc.gov), or via the 'Contact us' web link included in the MOX web site.

*Note:* To protect the privacy of individuals, all e-mail addresses will be listed in the blind carbon copy field, when sending e-mail messages to the distribution list. This practice ensures that the identity of individuals is protected from general disclosure.

- *Service List*

All individuals or groups that have been admitted as parties to a hearing will be placed on the service list to receive copies of all outgoing correspondence related to MOX licensing activities.

- *Agency-wide Documents Access and Management System (ADAMS)*

ADAMS is another resource for stakeholders to gain access to information about MOX activities. ADAMS can be accessed via the NRC external web site. A brief explanation of its purpose and how to access documents will be provided at public meetings and on the NRC external web site.

- *Press Releases and Newspaper Advertisement*

NMSS staff will coordinate with OPA to issue press releases pertaining to major actions during the MFFF licensing process. NMSS and OPA staff will develop newspaper advertisements to announce significant licensing actions and public meetings.

- *Public Meetings*

Public meetings will be held in the area of the proposed facility, to solicit comments from members of the public, public interest groups, and local officials. In addition, meetings with the applicant at the NRC Headquarters will be made open to the public, to the extent possible, considering proprietary and sensitive issues. The public meetings will be announced on the NRC external web site, by e-mail distribution, or by OPA press releases.

The NRC Public Feedback Forms (Form 659) will be available at all public meetings and collected by the NRC staff responsible for conducting the meeting. The NRC staff will analyze the feedback forms periodically to assess the efficacy of this plan.

For public meetings sponsored by other organizations, the NRC staff will participate as needed to make presentations and respond to questions.

- *Fact Sheets and Frequently Asked Questions (FAQs)*

NMSS staff has developed fact sheets providing general information about MOX fuel (i.e., “Backgrounder on Mixed Oxide Fuel”) and plutonium (i.e., “Fact Sheet on Plutonium”). The staff also developed FAQs about MOX fuel. The fact sheets and FAQs can be accessed via the MOX web site. The FAQs are included in Appendix B.

- *Briefings for Elected Officials*

Briefings to Congressional staff will be coordinated through OCA and briefings for State and local officials will be coordinated through FSME. Briefings will be held at their request.

- *International Meetings*

The NRC staff may meet with members of Rostekhnadzor in Moscow, Russia, and at the NRC offices, to exchange technical and regulatory information, and discuss the status of the MOX licensing process.

Note: Per OGC guidance, NRC staff will not contact parties to a hearing, other than the applicant, during any formal hearing process.

## **B. For Internal Stakeholders**

- *E-mail*

NMSS/FCSS maintains an internal e-mail distribution list, used to distribute relevant information about the MOX licensing activities. The MOX PM will periodically inform the identified internal stakeholders about any important activities, actions, significant changes to the schedule, or anticipated challenges.

- *Weekly Highlights and Items of Interest*

NMSS staff will provide weekly updates on MOX licensing issues, via e-mail to the MOX PM, to be included in the Weekly Highlights and Items of Interest. Inputs to the Weekly Highlights and Items of Interest will include important actions or milestones.

- *MOX Review Team Meetings*

The MOX PM maintains a list of the MOX Application Reviewers and will hold meetings with this group to discuss issues that arise during the application review and licensing process, and to provide information about the status of the licensing process. Any application reviewer may discuss any technical or licensing issues during these meetings. It is recommended that the reviewers inform the MOX PM about the issues they want to discuss before the meeting convenes.

- *Briefings to Management*

NMSS management (i.e., Division or Office Level) will be briefed periodically, regarding the review status, significant changes to the schedule or licensing activities, or anticipated challenges.

- *Monthly Status Report*

The MOX PM issues a monthly report on the status of NRC's review, including a list of open and closed technical issues to the applicant. This report is also distributed internally to all staff involved in the review.

- *Regional Communication via E-mail, Telephone, and Meetings*

The MOX PM or other assigned staff will maintain e-mail and telephone communication and hold meetings with the Regional staff and management to ensure they are fully informed of ongoing licensing activities and issues.

- *Interoffice Meetings*

The MOX PM will conduct interoffice meetings with all involved Offices, quarterly.

**APPENDIX A  
LICENSING ACTIVITY INFORMATION**

*Table 1. Schedule of General Licensing Activities for the MFFF<sup>1</sup>*

<b>Action</b>	<b>Stakeholders Involved</b>	<b>Date</b>
Communication Plan Development	NMSS (FCSS)	Ongoing
NRC developed a facility-specific Standard Review Plan (NUREG-1718).	NRC, DCS (now MOX Services), Duke Energy Corp.	8/2000
DCS submitted a CAR to construct a MOX fuel fabrication facility.	DCS (now MOX Services)	2/2001
Public meeting in North Augusta, SC to provide information on the Draft Safety Evaluation Report	ALL	8/27/2002
Public meetings informing the public of changes in the revised Environmental Report received from DCS, and the DOE surplus disposition program related to the development of an NRC Draft Environmental Impact Statement (DEIS) for the proposed MOX facility	ALL	9/17-19/2002
Public meeting regarding NRC (DEIS) for the construction and operation of the MFFF	ALL	3/25-27/2003
Meeting with Duke Cogema Stone & Webster to Discuss the revised CAR for the MFFF	ALL	7/14/2004
NRC issued construction and operation FEIS (NUREG- 1787).	ALL	1/2005
NRC issued construction stage FSER and Construction Authorization (NUREG-1821).	ALL	3/10/2005
NNSA groundbreaking ceremony for the MOX facility	ALL	10/2005
NRC establishes Resident Inspector Office.	ALL	7/2006

MOX Services starts nuclear safety-related site preparations.	ALL	9/2006
NRC receives License Application to possess and use special nuclear material	NRC, DCS (now MOX Services)	9/27/2006
NRC issues an amendment for new corporate name	NRC, DCS (now MOX Services)	11/30/2006
Acceptance/Acknowledgment Review completed	NRC	12/20/2006
NRC publishes Notice of Opportunity for Hearing	OPA, NMSS, OGC	3/15/2007
Closing Date to Request an Opportunity for Hearing	OPA, NMSS, OGC	5/14/2007
ASLB decision regarding petitioner standing and contentions	OGC, NMSS, Petitioner	2008
NRC issues FSER for the License Application stage	NRC, MOX Services	12/21/2010

Table 2. NRC Communication Tools for Licensing Activities for an MFFF

Action	External Communication			Internal Communication	
	E-mail, Mailing	Press Release	NMSS Newsletter	E-mail	Highlights/ Items of Interest
NRC establishes Resident Inspector Office.	x	x	x	x	x
NRC receives License Application.	x	x	x	x	x
NRC issues revised licensing schedule.	x			x	
NRC completes acceptance review of License Application.	x			x	x
NRC publishes Notice of Opportunity for Hearing.	x	x		x	x
Supplemental FEIS	x	x	x	x	x
Public Meeting on License Application submittal.	x	x		x	x
NRC issues FSER and holds potential Public Meeting.	x	x	x	x	x
NRC issues Operating License.	x	x	x	x	x

Note: All these actions will also be noticed in the MOX Web Site.

## APPENDIX B FREQUENTLY ASKED QUESTIONS

**Q 1. What is mixed oxide fuel?**

**Answer: Mixed oxide fuel (MOX) is a blend of plutonium dioxide and depleted uranium dioxide that will be used as fuel in commercial nuclear power plants.**

- The purpose of manufacturing MOX fuel is to meet the goals of the U.S. Department of Energy's (DOE's) Surplus Plutonium Disposition Program. Under this program, DOE will reduce the inventory of fissile material from nuclear weapons by converting approximately 34 metric tons of surplus weapons-grade plutonium into MOX fuel, for use in commercial nuclear power plants. The process of converting the fissile material into MOX fuel renders the plutonium less attractive for use in nuclear weapons.

**Q 2. Where does the depleted uranium and plutonium come from?**

**Answer: Depleted uranium is a byproduct of the uranium enrichment process. Plutonium would be obtained from surplus nuclear weapons.**

- Depleted uranium: The uranium nuclear fuel cycle consists of several processes involving uranium in different chemical and physical forms. Natural uranium contains 0.7 percent of the uranium-235 (U-235) isotope. Uranium enrichment facilities produce uranium that is enriched to a higher concentration of U-235. The enrichment process also produces uranium depleted in U-235. Depleted uranium has about 0.3 percent U-235.
- The plutonium would be obtained from DOE's weapons-grade plutonium inventories, which are declared surplus to national security needs. DOE will construct a pit disassembly and conversion facility (PDCF), which would be used to disassemble nuclear weapon components and convert them to an unclassified plutonium dioxide form. The PDCF would not be under the Nuclear Regulatory Commission's (NRC's) jurisdiction.
- The MOX fuel fabrication facility (MFFF) supply of plutonium does not include spent nuclear fuel, it only consists of weapons-grade plutonium.
- The depleted uranium dioxide, combined with the plutonium dioxide from retired U.S. nuclear devices and other surplus plutonium, forms MOX fuel.

**Q 3. How are mixed oxide fuel assemblies fabricated?**

**Answer: The applicant, MOX Services, will design, construct, and operate a facility to produce MOX fuel assemblies for commercial nuclear power plants. These fuel assemblies consist of fuel rods, which contain fuel pellets consisting of a blend of plutonium dioxide and depleted uranium dioxide.**



- The plutonium dioxide powder is blended with the depleted uranium dioxide powder to make MOX fuel. The MOX powder is pressed into pellets and sintered in a furnace. The pellets are then loaded into corrosion-resistant thin metal tubes called fuel rods. The rods are bundled into fuel assemblies that are shipped to commercial nuclear power plants licensed to use MOX fuel. MOX fuel assemblies will be shipped to the reactors in transportation containers that have undergone a thorough safety evaluation and are approved by NRC for this purpose.

**Q 4. Why was Savannah River Site chosen as the location for the mixed oxide fuel fabrication facility?**

**Answer: DOE selected the Savannah River Site. As part of the selection process, DOE prepared an Environmental Impact Statement (EIS) and solicited public input through meetings and comments on the EIS.**

**Q 5. Is mixed oxide fuel currently produced in the U.S. or elsewhere?**

**Answer: MOX fuel is not currently produced in the U.S. However, several European countries have been producing MOX fuel for more than 20 years. European countries currently producing MOX fuel obtain their supply of plutonium from spent nuclear fuel rather than nuclear weapons. Also, in the U.S., MOX fuel was fabricated and used in several commercial reactors, in the 1970s as part of a development program.**

- The MFFF supply of plutonium does not include spent nuclear fuel; it only consists of weapons-grade plutonium.
- The MFFF will not reprocess spent nuclear fuel.

**Q 6. What is the difference between weapons-grade plutonium and reactor-grade plutonium?**

**Answer: The main difference between weapons-grade plutonium and reactor-grade plutonium is the amount of the different isotopes of plutonium. Weapons-grade plutonium contains more of the isotope plutonium-239 than reactor-grade, while reactor-grade plutonium has more plutonium-240 than weapons-grade.**

- Weapons-grade plutonium is more fissionable; reactor-grade is more radioactive. However, both require safe handling and that will be the focus of NRC's review.
- Refer to Plutonium Fact Sheet for additional information on plutonium.

**Q 7. Where will mixed oxide fuel be used?**

**Answer: MOX fuel will be used in U.S. commercial nuclear power reactors. Presently, four power reactors have been designated to receive MOX fuel. These power reactors are McGuire and Catawba.**

- **McGuire** is located about 17 miles northwest of Charlotte, North Carolina, on Lake Norman. There are two McGuire units, operated by Duke Power Corporation. Each reactor is capable of producing 1100 net MWe.
- **Catawba** is located in North-Central South Carolina, about 6 miles north of Rock Hill and 19 miles southwest of Charlotte. There are two Catawba units, operated by Duke Energy Nuclear LLC. Each reactor is capable of producing 1129 net MWe.

**Q 8. Would mixed oxide fuel be used in reactors in the same way that uranium fuel is now used?**

**Answer: MOX fuel will be irradiated in commercial nuclear reactors just like uranium fuel. However, because of the differing fuel composition, slight reactor adjustments may need to be made.**

- Although the reactors were not specifically designed to use weapons-grade plutonium, they were designed to use the reactor-grade plutonium that is generated in the uranium fuel during normal operation. There is substantial worldwide experience with the use and behavior of reactor-grade plutonium, because all operating reactors contain plutonium created during the fission process.
- Duke Energy Corporation submitted a request for changes to the Catawba Nuclear Station Technical Specifications. The requested changes would revise the Technical Specifications: Spent Fuel Assembly Storage; Reactor Core; Fuel Storage; and Core Operating Limits Report, to allow the use of four MOX fuel lead test assemblies (LTAs) in one of the two Catawba units.

**Q 9. What is the status of the mixed oxide fuel lead test assemblies' license amendment?**

**Answer: NRC approved the license amendment, from Duke Energy Corporation, to test four MOX fuel LTAs in the reactor for at least two operating cycles. The MOX LTAs were loaded into the Catawba nuclear power plant in Spring 2005. The MOX fuel tests to verify the ability of the models to predict fuel performance are currently in progress.**

- Also, MOX fuel is tested in a nuclear power reactor to verify the applicability of the European database to the U.S. MOX fuel.
- After NRC's final approval, the reactor licensee would insert a maximum of 40 percent of the reactor core with MOX fuel.

**Q 10. How will the waste products from the mixed oxide fuel fabrication facility be handled?**

**Answer: DOE has the responsibility for handling the waste produced at the MFFF.**

**Q11. How will the spent mixed oxide fuel be stored?**

**Answer: The spent MOX fuel would first be held in interim storage at the reactor site. Ultimately, the spent MOX fuel would be moved to a Federal high-level waste-facility.**

- Interim Storage NRC expects no significant difference in the way spent MOX fuel and spent uranium fuel are stored because their composition is similar. After fuel has been in a reactor for two operating cycles, the fuel is stored in fuel pools or storage casks located at each reactor site. In the U.S., spent fuel will remain in interim storage until a high-level waste (HLW) storage facility is available.
- HLW Disposal If a Federal HLW storage facility is licensed, spent fuel assemblies, including MOX fuel assemblies, would be packaged directly into special containers designed for the HLW storage facility. The containers would be shipped to the HLW storage facility, using NRC-approved shipping packages.

**Q 12. Would mixed oxide fuel be reprocessed?**

**Answer: The U.S. does not currently reprocess nuclear fuel.**

- However, a small quantity of spent fuel was reprocessed at the West Valley site in the 1960s. Reprocessing of spent fuel involves the chemical treatment of the fuel to separate unused uranium and plutonium from radioactive fission products. Theoretically, uranium could be recycled through an enrichment facility and some recovered plutonium could be used in new fuel assemblies.

**Q 13. The U.S. Nuclear Regulatory Commission is only responsible for the commercial use of nuclear material. At what point in the process does the weapons-grade plutonium become commercial?**

**Answer: DOE will construct a PDCF, which would be used to disassemble nuclear weapon components and convert them to an unclassified plutonium dioxide form. The PDCF would not be under NRC's jurisdiction. This plutonium dioxide would then be transferred to the MFFF, which is designed to fabricate the MOX fuel for the commercial nuclear power plants.**

- DOE would retain jurisdiction over the plutonium during the PDCF, where the weapons-grade plutonium would be converted into plutonium oxide powder. When the plutonium dioxide powder is transferred to the proposed MFFF, MOX Services would take possession, subject to NRC regulations, but DOE would still own the material. The reactor licensee assumes ownership of the material when the MOX fuel assemblies are placed in the reactor(s).

**Q 14. What is the U.S. Nuclear Regulatory Commission's role in the construction and operation of a mixed oxide fuel fabrication facility?**

**Answer: Congress provided NRC with the regulatory authority over the MFFF. Regulatory activities include licensing, inspections, and environmental**

**reviews to ensure adequate protection of the public health, safety, and the environment.**

- Four NRC Offices have regulatory responsibility for MOX. The Office of Nuclear Material Safety and Safeguards is responsible for licensing the proposed MFFF, which is intended to make fuel assemblies for commercial nuclear power plants. NRC's Office of Nuclear Reactor Regulation is responsible for licensing the use of the MOX fuel in commercial nuclear power plants. The NRC Office of Nuclear Security and Incident Response is responsible for the physical security review of the MOX license application. The Region II Office is responsible for implementing the inspection, enforcement, investigation, and emergency response activities for the MFFF.

**Q 15. What are the roles of the U.S. Nuclear Regulatory Commission, U.S. Department of Energy, and MOX Services regarding the mixed oxide fuel fabrication facility?**

**Answer: NRC has responsibility for the regulatory civilian use of nuclear material. Congress provided NRC with regulatory authority over the activities at the proposed MFFF. DOE would own the MFFF. MOX Services would design, construct, and operate the facility for DOE. MOX Services would be subject to NRC regulatory authority. Safe and secure handling of licensed material would be the MOX Services' responsibility.**

- NRC is also responsible for licensing the use of the MOX fuel in commercial nuclear power plants.
- In March 1999, DOE signed a contract with a consortium, MOX Services, to; (a) design commercial MOX fuel; (b) design, construct, operate, and deactivate an MFFF; c) design and execute the reactor modifications necessary for use of MOX fuel; and (d) provide the architect/engineering and construction management services associated with these activities.

**Q 16. Who has the ultimate authority over the proposed mixed oxide fuel fabrication facility?**

**Answer: The responsibility for ensuring that the facility is designed, constructed, and operated safely resides with the facility operator: MOX Services.**

- NRC's role is to provide sufficient oversight and regulation to ensure that public health and safety, common defense and security, and the environment remain protected.

**Q 17. How will the Nuclear Regulatory Commission license the proposed mixed oxide fuel fabrication facility?**

**Answer: Licensing MFFF will occur under existing regulations, including the revised 10 CFR Part 70. Also, NRC developed a facility-specific Standard Review Plan (NUREG-1718), dated August 2000, to help NRC staff with the review**

**of the license application. It should be noted that NRC is also the regulatory authority for the commercial nuclear power reactor(s) that would irradiate the MOX fuel.**

- NRC regulatory program for an MFFF is being performed in two stages. The first stage consisted of the review and evaluation of the construction authorization request submitted by the applicant, MOX Services. This first step required the applicant to submit a description and safety assessment detailing the design bases of the principal structures, systems, and components of the plant, including provisions for protection against natural phenomena, and the consequences of potential accidents [refer to 10 CFR 70.22(f) and 70.23(b)]. The second stage will consist of a review for a license application for authority to possess and use the licensed material at the MFFF.
- Licensing of such a facility is required under NRC regulations in Part 70, and 10 CFR Parts 20, and 51.

**Q 18. What is the mixed oxide Construction Authorization Request?**

**Answer: The CAR is an application submitted by MOX Services to support construction of the proposed MFFF to be located at the Savannah River Site in South Carolina.**

**Q 19. What are the principal hazards at a mixed oxide fuel fabrication facility?**

**Answer: NRC performed a safety and environmental review of the CAR for the proposed MFFF. The staff's safety review of the potential hazards is set forth in NUREG-1821. The process hazards evaluated included: (1) loss of confinement of licensed nuclear material; (2) fire; (3) chemical; (4) load-handling events; (5) explosions; (6) nuclear criticality; and (7) natural phenomena and external manmade events. The safety review determined that the design bases of the principal systems, structures, and components will provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents.**

**The environmental review is documented in NUREG-1767, which concluded that the applicable environmental requirements and proposed mitigation measures discussed in this document would eliminate or substantially lessen any potential adverse environmental impacts associated with the proposed action. On March 30, 2005, NRC issued the Construction Authorization for the proposed MFFF to the applicant.**

- NUREG-1821, "Final Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina."

- NUREG-1767, "Environmental Impact Statement on the Construction and Operation of a Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina - Final Report."

**Q 20. Why does the U.S. Nuclear Regulatory Commission prepare a Safety Evaluation Report?**

**Answer: NRC prepares a Safety Evaluation Report (SER) to document its technical safety review. The SER establishes the baseline for the approval of a facility based on the application. It also serves as a baseline for all future changes to the facility.**

- The SER covers: (a) radiation protection; (b) chemical safety; (c) financial qualifications; (d) the accident analyses performed in an Integrated Safety Analysis; (e) fire protection; (f) nuclear criticality safety; (g) emergency response; (h) environmental protection; (i) decommissioning; (j) applicant management and organization; and (k) management measures to ensure quality.

**Q 21. Why does the U.S. Nuclear Regulatory Commission prepare an Environmental Impact Statement?**

**Answer: The issuance of a license for the construction and operation of an MFFF is considered a major Federal action that has the potential to significantly affect the quality of the human environment. The National Environmental Policy Act of 1969 (NEPA) requires the preparation of an EIS.**

- An EIS documents the environmental impacts from the proposed action and allows NRC to consider such impacts when making its decision on possible licensing of a facility. NEPA is a Federal law that requires Federal agencies to consider the environmental impacts of actions under their jurisdiction. To do so, NEPA requires that a detailed statement of the environmental impacts of the proposed action (i.e., an EIS) and reasonable alternatives to the proposed action be prepared for major Federal actions that have the potential to significantly affect the quality of the human environment.

**Q 22. Will the applicants' financial condition be taken into consideration in reviewing the license applications?**

**Answer: Yes, the applicant's financial condition is considered in the licensing process.**

- NRC's regulations in Part 70 require all applicants to be financially qualified to safely construct, operate, and decommission the proposed facilities.

**Q 23. Will the Price-Anderson Act apply to the mixed oxide facility? Who will be liable if an accident occurs and who will be liable for future clean-up costs?**

**Answer The Price-Anderson Act will apply to the MFFF.**

- Pursuant to provisions of the Price-Anderson Act, NRC staff understands that DOE intends to indemnify MOX Services for any damages caused by accidents, clean-up costs, or other similar expenses that involve the risk of public liability connected with the MOX project at the Savannah River Site. Using MOX fuel in a reactor would not violate the Price-Anderson Act.

**Q24. I heard there were multiple differing professional opinions (DPOs) raised by an NRC employee related to the MFFF. How have they been addressed? Why did the staff issue a Construction Authorization for the MFFF when there may be open DPOs?**

**Answer The DPOs have been dispositioned through NRC's review process**

The NRC maintains an open, collaborative working environment that encourages all employees to raise differing views to improve our regulatory decision-making and provides multiple methods to pursue concerns, including the DPO Program described in NRC Management Directive 10.159, "The NRC Differing Professional Opinions Program."

An NRC employee raised six issues involving chemical safety and waste management during the MOX Construction Authorization.

Of the six issues:

- one was returned because it was outside the NRC's regulatory jurisdiction,
- five have been reviewed to completion under the DPO process (including a review by an independent panel of NRC employees, a decision issued by the NMSS Office Director, and an appeal decision issued by the Executive Director for Operations (EDO)), and

Summaries of DPO decisions and DPO appeal decisions are posted on the NRC's public web site in the Commission's Weekly Information Report.

The NRC strives to ensure that all issues are raised and sufficiently evaluated in the decision-making process. However, the DPO process does not preclude the NRC from making regulatory decisions. The issues raised by the employee were openly vetted and reviewed by NRC management and the Advisory Committee on Reactor Safeguards (ACRS) in sufficient detail to support a staff decision to issue a construction authorization and a conclusion by the ACRS that the FSER should be issued.