

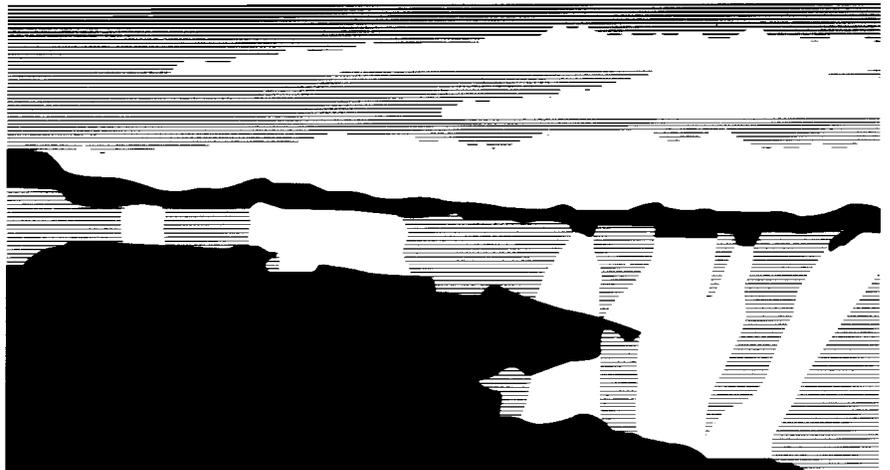
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Title: | **NUCLEAR REGULATORY COMMISSION
CONSIDERATIONS FOR LICENSING A
MIXED OXIDE FUEL FABRICATION FACILITY**

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FOR LICENSING A MIXED OXIDE FUEL FABRICATION FACILITY**

by

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March 1997

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NUCLEAR REGULATORY COMMISSION CONSIDERATIONS FOR LICENSING A MIXED OXIDE FUEL FABRICATION FACILITY

1.0. INTRODUCTION

This paper discusses briefly the regulatory strategy, process, requirements, and issues that are expected to be applied to the mixed oxide (MOX) fuel fabrication facility that the United States (US) Department of Energy (DOE) will employ in the disposition of excess nuclear weapons plutonium.

1.1. Intent

Firms interested in bidding for the design, construction, and operation of the MOX fuel fabrication facility in the US will be required to license and maintain the license for the facility in accordance with US Nuclear Regulatory Commission (NRC) regulations. Although no commercial MOX fuel fabrication facility has been licensed in the US, regulations and regulatory guidance for such a facility exist. However, there are additional parameters that are pertinent to the implementation of this requirement. These are listed below.

The intent of the DOE is that the MOX fuel fabrication facility be

- located on an existing DOE site and
- constructed using DOE provided funds.

The private entity will be required to

- design, construct, and operate this facility;
- obtain and maintain an NRC operating license as governed by 10 CFR 70, Domestic Licensing of Special Nuclear Materials (SNM);
- provide for the possession and use of SNM as covered under the Atomic Energy Act of 1954, as amended;
- establish and maintain a Decontamination and Decommissioning (D&D) fund;
- operate the facility within the confines and requirements of the host DOE site;
- maintain established commercial relationships between the fuel fabrication facility, its utility customers, and other related interests;

- provide MOX fuel to utilities on a continuing basis beginning in or before 2006; and
- operate the facility for the sole purpose of excess weapons plutonium disposition, terminate operation for the production of MOX, and return the facility to DOE after decommissioning when the disposition mission is completed.

The DOE will be responsible for

- placing the facility on the US list of facilities eligible for International Atomic Energy Agency (IAEA) safeguards under the US/IAEA Safeguards Agreement; and
- providing for the transport of the plutonium-bearing materials to and from the MOX fuel fabrication facility in DOE-provided safe, secure transports (SSTs).

The balance of this document describes the strategy and approach that the DOE expects the private entity to employ in obtaining an NRC license for the operation of the MOX facility; explores the potential impacts of the mandated licensing process and regulatory requirements upon the design, construction, and operation of the facility; and identifies regulatory issues that must be resolved during the licensing process.

1.2. Scope

To obtain an NRC operating license for the MOX fuel fabrication facility within the requirements defined above, the private entity will be required to meet the NRC licensing regulations. Effectively, the new MOX fuel fabrication facility will be viewed as a first-of-a-kind facility in the United States; however, there are, within Title 10 of the Code of Federal Regulations (10 CFR), regulations that are applicable to the licensing of this type of facility.

The licensing considerations outlined below address only those topics that are related directly to the granting of an NRC operating licensing for the operation of a MOX fuel fabrication facility under current NRC regulations. Although it is anticipated that the facility will be required to comply with other regulations such as those dealing with the Environmental Protection Agency, host state permitting, and compliance with the Clean Water Act, Clean Air Act, and RCRA provisions for the treatment or disposal of hazardous waste, this document does not address compliance with those regulations.

2.0. LICENSING STRATEGY

The DOE expects that the private entity that will ultimately be responsible for the operation of the MOX facility will apply for the NRC license and employ the same regulatory strategy and approach that a private corporation would utilize in applying for an operating license from the NRC under 10 CFR 70. The private entity should not expect the DOE to attempt to exert any influence on the licensing process or to serve as an advocate for it before the NRC. In particular, the private entity will need to satisfy NRC requirements relating to foreign ownership, control, and influence.

Information relating to the licensing or permitting of European MOX fuel fabrication plants will be of value in this process. However, the private entity should be aware that a significant amount of additional effort will be required to prepare an application meeting NRC requirements because of differences in the regulatory approaches used by the NRC and the European regulators. The NRC currently does not have the expertise or the resources to support a licensing process for this type of facility; therefore, it is quite possible that there will be increased cost and time required to obtain a license.

In addition, the private entity should be aware that there is a potential for intervenors to want to contest the issuance of the NRC license. Currently, there is virtually no experience with the MOX fuel fabrication facility hearing process related to contested applications for licenses to operate such facilities. There is also very little experience with contested licenses for fuel cycle facilities. Therefore, the time and effort required to successfully complete the hearing process is expected to be quite prolonged and extensive.

3.0. SCHEDULE OF THE PLUTONIUM DISPOSITION PROGRAM

The approximate estimated schedule for the construction, start up, and operation for the MOX fabrication facility is as follows:

- Construction Approval/Commencement 2000/yr
- Construction Completion /Initiation of Start up 2005/yr
- Commence Facility Operation 2006/yr

4.0. NRC OPERATING LICENSING PROCESS

The process begins with the submittal of an application under 10 CFR Part 70, and regulatory guidance as identified in the attached Appendix. The application will be prepared in accordance with 10 CFR 70. The license application requesting construction approval for the principal structures, systems, and components of the facility will be processed pursuant to 10 CFR 70.23(b). The approval is based upon an

NRC review of a safety report that is prepared in accordance with Regulatory Guide 3.39 by the applicant and contains a description of the plant site, and a description and safety assessment of the design basis of the principal structures, systems, and components of the plant. This includes provisions for protection against natural phenomena, and a description of the quality assurance program that will be employed. The license application will also include an environmental report that meets the requirements of 10 CFR 51.45 and that will have to be submitted at least 9 months before commencement of construction.

In addition, the NRC can request that the applicant provide additional information at any time after the filing of the application and before the license expires.

4.1. License Application Contents (10 CFR 70.22)

The application includes information such as

- administrative information;
- information about the applicants expertise in the area it proposes to operate;
- a description of the facility, equipment, and methods for protecting health and minimizing danger to life or property;
- an environmental report;
- a description and safety assessment of the design bases of the principal structure, systems, and components of the plant;
- a decommission funding plan or a certification of financial assurance for decommissioning;
- a description of the applicant's program for control and accounting for SNM;
- a safeguards plan for dealing with threats, thefts, and radiological sabotage;
- a physical security plan that meets the requirements of Sec. 73.67(d), (e), (f), and (g);
- an emergency plan for responding to the radiological hazards of an accidental release of SNM and to any associated chemical hazards; and
- a description of the applicant's financial status.

4.2. Application Process for Construction Approval Process

4.2.1. Filing of the Application

The application will be received by the NRC and processed in accordance with 10 CFR 2.101. A notice will then be published in the Federal Register that the application has been received and is available for public inspection.

4.2.2. Safety Report and Technical Review

The NRC staff will review the design and safety basis portion of the license application. Upon completion of staff review, the staff will prepare and issue a safety evaluation report. This NRC report serves as one of the bases for granting a construction approval.

4.2.3. Environmental Review

The NRC will review the applicant's environmental report in the process of preparing its own draft Environmental Impact Statement (EIS). A notice of the availability of the EIS in the Public Document Room will be published in the Federal Register and the EIS will be distributed to the Environmental Protection Agency as well other affected and interested parties. After resolution of received comments on the draft EIS document, the Final Environmental Impact Statement (FEIS) will state the decisions and whether or not the FEIS meets the requirements of sections 101 and 102(1) of the National Environmental Policy Act (NEPA) and any other relevant and applicable environmental laws and policies. There are no specific regulatory requirements for public hearings regarding the draft or final EIS for fuel fabrication facilities, such as the MOX facility. However, considering the nature of this MOX program, it should be assumed that a hearing will be required.

4.2.4. Construction Approval

Receipt of NRC approval for construction of the MOX fuel fabrication facility will be based on the requirements of 10 CFR 70.23(a)(7) and 10 CFR 70.23(b).

4.3. Operating License Issuance

Before completing the construction, the operating license application will be supplemented with updated safety, design and programmatic documentation to support the issuance of an operating license, as per Regulatory Guide 3.39.

To be able to approve the application for the operating license, the NRC will determine the adequacy of the proposed facility and operations as described by the application as per 10 CFR 70.23 (a) and (b). In addition, the safety analysis, quality assurance program, and inspection information will be reviewed to verify that

construction of the principal structures, systems, and components satisfy the commitments made in the license application.

The application for the operating license for the MOX fuel fabrication facility may be referred to a special advisory committee like the Advisory Committee on Reactor Safeguards (ACRS) or a special committee appointed for this project pursuant to 10 CFR 2.102. The ACRS report(s) will be formally considered by the Nuclear Materials Safety and Safeguards (NMSS) Director and NRC Commissioners in determining whether or not to grant an operating license for the MOX fuel fabrication facility.

Before issuing an operating license for the MOX fuel fabrication facility, the NRC will provide notice of the proposed licensing action in the Federal Register pursuant to 10 CFR 2.105, and will afford the applicant or interested members the opportunity to intervene and or to request a public hearing. Once all hearings and interventions are completed and resolved, and the NRC Commission has made the required determinations for approval of the operating license, the NMSS Director will issue the operating license for the MOX fuel fabrication facility to the applicant. Concurrently, the NMSS Director will place a notice in the Federal Register announcing the issuance of the license and will inform State and local officials that the license has been issued. The Federal Register notice will also provide interested parties with the opportunity to contest the issuance of the license.

5.0. MAJOR PROGRAMMATIC CONSIDERATIONS

5.1. Possible Revision of 10 CFR 70

The NRC has drafted a revision to 10 CFR 70. The revision has not been published for comment in the Federal Register, but the NRC has proceeded to draft two NUREGs (1513 and 1520) and a revision to Regulatory Guide 3.52, each of which is designed to address the implementation of the draft revised 10 CFR 70.

5.2. Potential Schedule Impacts

- **Intervention**—Intervention may occur at any stage of the licensing process.
- **Court Cases**—Delays can be expected.
- **Review Process**—The NRC may require more than 9 months to review the Environmental Report and licensing application or may request additional information
- **Shared Site Issues**—See below.

5.3. Price-Anderson Act Amendments

There may be additional legislation required to codify the relationships between the Price-Anderson Act, the DOE, and the license holder for the MOX facility.

5.4. Jurisdiction

- **DOE-NRC**—The basis of this document is that the private firm will design, construct, and operate the facility under an NRC license on a DOE site. As such, the DOE will be in the position of being a landlord (at least for the land), and may potentially require access to the facility to address concerns that normally fall within the landlord's or host site's responsibilities. These relationships and responsibilities must be carefully defined so that DOE representatives are aware of their duties, and the limitation upon them.

Before submittal of its application, the applicant will need to know whether compliance with the DOE regulations will be required and or what the order of precedence will be.

- **Intra- and Inter-Agency Relationships and Authorities**—These relationships will have to be clarified as they relate to the plutonium disposition program via the reactor alternative.

5.5. Shared Site Issues

The presence of the MOX facility on a DOE site will create a number of potential licensing issues. These include the following.

- **MOX Facility Security Forces**—Because the facility will be located on a host DOE site, it will rely, at least in part, upon the DOE for security force response. It will also be subject to the DOE site access controls. The MOX facility's reliance upon DOE for security forces will mean that those forces need to meet the NRC safeguards requirements in 10 CFR 73 and the 10 CFR 95 security requirements
- **Inspections**—There are issues of whether DOE or NRC will inspect the performance and training of the security forces and whether the MOX facility licensee can be held accountable (e.g., fined) for DOE security force deficiencies resulting in noncompliance.
- **Facility Access**—MOX facility employees will require DOE clearances for access if the MOX fuel fabrication facility is located within a DOE limited area. These clearance requirements may be in addition to any NRC security clearance requirements under 10 CFR 25 or special nuclear

- material access authorizations that will be required under 10 CFR 11. This may also place limitations on the abilities of individuals, including perhaps NRC inspectors, to visit the MOX facility.
- **Host Site Emergency Preparedness**—The MOX fuel fabrication facility will rely, at least in part, upon the DOE site emergency preparedness program. This will require coordination with the DOE site to ensure that the requirements of 10 CFR 70.22(i) are met. There are issues regarding whether DOE or NRC will inspect the emergency preparedness program and whether the MOX facility licensee can be held accountable (i.e., fined) for DOE emergency preparedness deficiencies leading to noncompliance.
 - **Site Boundary**—The location of the “site boundary” for accident analysis dose calculation purposes and whether DOE employees are considered members of the public for these purposes needs to be defined. Although 10 CFR 70 does not specifically require a licensee to establish an exclusion area of the type mandated by 10 CFR 100.11, the NRC NMSS staff has expected applicants for recent enrichment facility license and gaseous diffusion plant certification to establish the equivalent of an exclusion area. Therefore, it is likely that some type of "exclusion area" will need to be defined. If DOE employees are considered to be members of the public, the establishment of such an exclusion area may require changes to the manner in which the DOE site operates.
 - **Safety Analysis**—The safety analysis for the MOX facility will need to address the hazards associated with possible postulated accidents at nearby DOE facilities. Once the safety analyses have been completed, it will be necessary to establish controls for coordination of modifications to the existing nearby DOE facilities or the construction of new DOE facilities to ensure that such modification or construction does not create new hazards to the MOX facility or new hazards that are more severe than those analyzed in the MOX facility safety analyses.
 - **Site Utilities**—The availability (sharing) of site utilities, fire protection, and medical services will have to be addressed.
 - **Collateral Site Effects**—With the MOX facility and DOE facilities in close proximity, it may be difficult to determine which facility is responsible for radioactive or other regulated airborne or water borne effluents. Therefore, it may be difficult for the MOX facility to demonstrate compliance with 10 CFR 20.1301 and 20.1302 if it is not possible to distinguish the MOX facility emissions from those of nearby DOE facilities. This may also complicate environmental permitting [e.g., National Emissions Standards for Hazardous Air Pollutants [(NESHAP s) and National Pollution Discharge Elimination System (NPDES)]. It will also be

necessary to determine whether the MOX facility is required to comply with 40 CFR 61 Subpart H (for DOE sites) or 40 CFR 61 Subpart I (for NRC licensees). Although the requirements of these regulations are similar, they are not identical.

5.6. Safeguards Requirements

DOE and NRC have differing nuclear material safeguards requirements. The MOX facility must comply with the applicable NRC safeguards requirements in 10 CFR 73 and 10 CFR 74 to obtain an NRC license.

6.0. MEMORANDA OF UNDERSTANDING

Many of the issues described in section 5.0 may be resolved through negotiation with the NRC, DOE and its host site, and local interested parties. The results of these negotiations may be stated in a Memoranda of Understanding (MOU). In this instance, the reference to an MOU is intended as a "place holder" that represents a written form of binding agreement between the parties. The representation of the solution to these issues could be formalized in any manner that the parties deem appropriate.

The issues discussed in section 5.0 are significant, and each party may be legally bound to assert a degree of control over the MOX fuel fabrication facility. Even if the parties are not legally bound to regulate, they may hesitate to relinquish authority. In some instances, such as in the area of emergency preparedness, the MOU may serve to identify the protocol to be used when the NRC is inspecting the DOE site contractor's emergency preparedness program.

Issues that are not appropriately resolved through the use of the MOU include the determination of the site boundary for accident analysis and the calculation of dose to the public. The NRC is required to assure that adequate safety is afforded to members of the public. If the NRC determines that workers near the facility on the DOE site should be considered members of the public for purposes of the MOX facility, the MOX facility will have to provide adequate assurance that the dose to those "members of the public" is below the limits found in 10 CFR 20.1301 and 1302. Even if the NRC finds that the workers near the facility on the DOE site are not members of the public, the EPA may be forced to treat those same workers as members of the public for purposes of 40 CFR 190. These and other issues may require reference to the Office of General Council to determine the appropriate resolution of licensing issues, e.g., whether the facility will be required to comply with 40 CFR 61, subpart I or H."

APPENDIX

Selected Regulations, Regulatory Guides and NUREGs

The following Federal Regulations, Regulatory Guides, and NUREGs may apply to the licensing of a MOX fuel fabrication facility. Other Federal Regulations are applicable to the facility, if not in the area of nuclear safety. Additional Regulatory Guides and NUREGs exist and may also apply to the licensing of the facility. In addition to the cited guidance, the design and operation should consider relevant DOE directives, local standards, and industry standards

10 CFR 11:	Criteria and Procedures for Determining Eligibility for Access to or Control Over Special Nuclear Material
10 CFR 19:	Notices, Instructions and Reports to Workers: Inspections and Investigations
10 CFR 20:	Standards for Protection Against Radiation
10 CFR 21:	Reporting of Defects and Noncompliance
10 CFR 25:	Access Authorization for Licensee Personnel
10 CFR 30:	Rules of General Applicability to Domestic Licensing of Byproduct Material
10 CFR 33:	Specific Domestic Licenses of Broad Scope for Byproduct Material
10 CFR 40:	Domestic Licensing of Source Material
10 CFR 50:	Domestic Licensing of Production and Utilization Facilities
10 CFR 51:	Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions
10 CFR 70:	Domestic Licensing of Special Nuclear Material
10 CFR 71:	Packaging and Transportation of Radioactive Material
10 CFR 72:	Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-Level Radioactive Waste
10 CFR 73:	Physical Protection of Plants and Materials
10 CFR 74:	Material Control and Accounting of Special Nuclear Materials
10 CFR 75:	Safeguards on Nuclear Material - Implementation of US/IAEA Agreement
10 CFR 95:	Security Facility Approval and Safeguarding of National Security Information and Restricted Data
29 CFR 1910.119	Process Safety Management (OSHA)
40 CFR 61	Radioactive Nuclide Emissions
40 CFR 190	Environmental Radiation Standards

Following is a list of regulatory guides for the licensing of the Plutonium Processing and Fuel Fabrication Facilities.

Regulatory Guide 3.4:	“Nuclear Criticality Safety in Operations with Fissionable Materials at Fuels and Materials Facilities”
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Rev. 3 -- 5/2/97

Regulatory Guide 3.12:	“General Guide for Ventilation Systems of Plutonium Processing and Fuel Fabrication Plants”
Regulatory Guide 3.21:	Quality Assurance Requirements for Fuel Reprocessing Plants and for Plutonium Processing and Fuel Fabrication Plants
Regulatory Guide 3.39:	Standard Format and Content for the Health and Safety Sections of License Applications for Fuel Cycle
Regulatory Guide 3.43:	“Nuclear Criticality Safety in the Storage of Fissile materials”
Regulatory Guide 3.45:	“Nuclear Criticality Safety for Steel-Pipe Intersections Containing Aqueous Solutions of Fissile Materials”
Regulatory Guide 3.52, Rev. 1:	Standard Format and Content for the Health and Safety Sections of License Renewal Applications for Uranium Processing and Fuel Fabrication
Regulatory Guide 3.57:	“Administrative Practices for Nuclear Criticality Safety at Fuels and Materials Facilities,” and “Nuclear Criticality Training”
Regulatory Guide 3.58:	“Criticality Safety for Handling, Storing, and Transporting LWR Fuel at Fuels and Materials Facilities”
Regulatory Guide 3.65:	“Standard Format and Content of Decommissioning Plans for Licensees under 10 CFR Parts 30, 40, and 70,” August 1989
Regulatory Guide 3.66:	“Standard Format and Content of Financial Mechanisms Required for Decommissioning under 10 CFR Parts 30, 40, 70, and 72,” June 1990
Regulatory Guide 3.67:	“Standard Format and Contents for Emergency Plans for Fuel Cycle and Materials Facilities”
Regulatory Guide 3.68:	“Nuclear Criticality Safety Training”
Regulatory Guide 8.1:	Radiation Symbol
Regulatory Guide 8.2:	Guide for the Administrative Practice in Radiation Monitoring
Regulatory Guide 8.10, Rev. 1-R:	Operating Philosophy for Maintaining Occupational Radiation Exposures As Low as Is Reasonably Achievable
Regulatory Guide 8.13, Rev. 2:	Instructions Concerning Risks from Occupational Radiation Exposure
Regulatory Guide 8.15:	“Acceptable Programs for Respiratory Protection”
Regulatory Guide 8.24, Rev. 1:	Health Physics Surveys During Enriched Uranium-235 Processing and Fuel Fabrication
Regulatory Guide 8.25, Rev. 1:	Air Sampling in the Workplace
Regulatory Guide 8.29:	Instructions Concerning Risks from Occupational Radiation Exposure

The following NUREG reports describe NRC issues and positions:

- NUREG-0772: The Effect of Natural Phenomena on the Exxon Nuclear Company Mixed Oxide Fabrication Plant at Richland, Washington
- NUREG-1200: Rev. 3, "Standard Review Plan for the Review of License Application for a Low - Level Waste Disposal Facility," Section 9.1, Quality Assurance during Design, Construction, and Operation, April 1991
- NUREG-1320: Nuclear Fuel Cycle Facility Accident Analysis Handbook
- NUREG --1324: Proposed Method for Regulating Major Materials Licensees, Section 3.7, "Maintenance Programs," (1992)
- NUREG-1400: Air Sampling in the Workplace
- NUREG-1460: Rev. 1, Guide to NRC Reporting and Record keeping Requirements, July 1994
- NUREG-1520: Standard Review Plan for Review of a License Application for a Fuel Cycle Facility (DRAFT)
- NUREG-0762: Standard Format and Content for Emergency Plans for Fuel Cycle and Material Facilities
- NUREG-0810: Standard Review Plan for Review of Radiological Contingency Plans for Fuel Cycle and Material Facilities
- NUREG/CR-5849: Draft Report, : "Manual for Conducting Radiological Surveys in Support Of License Termination,"x June 1992