

ATTENDEES LIST

NOVEMBER 13, 2003

MEETING WITH DUKE ENERGY

<u>NAME</u>	<u>ORGANIZATION</u>
Bob Martin	NRC
Undine Shoop	NRC
Anne Cottingham	Winston & Strawn
Mike Schoppman	Framatome ANP
Jeff Tucker	Framatome ANP
George Meyer	Framatome ANP
Steve Nesbit	Duke Energy
Mike Cash	Duke Energy
Skip Copp	Duke Energy
Matt Langsehwaeger	NRC
John A. Nakoski	NRC
Tony Attard	NRC
Katie Kannler	NRC
Frank Akstulewicz	NRC
Brad Grimmel	NRC
David Alberstein	DOE/NNSA
Patrick Rhoads	DOE/NNSA
Samuel Hernandez	NRC
Lambros Lois	NRC
Ralph Landry	NRC
Marcus King	Numark Associates
Andrew Persinko	NRC
Henry Wagage	NRC
Harold Scott	NRC
Ed Hackett	NRC

Meeting Agenda for the November 13 meeting with Duke Energy and Framatome, ANP

8:00 - 8:15	Introductions
8:15-8:45	MOX Fuel Project - Overall Status (Duke)
8:45 - 10:00	Duke LTA submittal (NRC) Status of Program and Schedule Discussion of RAI responses Discussion of additional information needed to support approval of the submittal
10:00 - 10:15	Break
10:15 - 11:00	Continuation of LTA Submittal
11:00- 12:00	LTA confirmatory program (NRC)
12:00- 1:00	Lunch
1:00 - 1:15	CABRI Data Access (NRC)
1:15 - 1:45	Program Element Review Schedule (Duke)
1:45 - 2:15	Summary
2:15 - 2:45	Public Comments
2:45	Adjourn

MOX Fuel Project Status

NRC - Duke Power – Framatome ANP Meeting
NRC Offices - White Flint, MD

Steve Nesbit
Duke Power
November 13, 2003



Russian Plutonium Disposition

- **Late 2002 – U.S.-Russian agreement on basis for Russian plutonium disposition program**
 - Russian MOX Fuel Fabrication Facility (R-MFFF) based on design of United States facility
 - Primary use of MOX fuel in VVER-1000 pressurized water reactors
- **Goal of starting construction on U.S. and Russian fabrication facilities in 2004**
- **Issue of liability for western contractors is still unresolved**



United States MFFF

- **Construction authorization scheduled for end of 2003**
 - Recent change in U.S. MFFF Controlled Area Boundary may impact schedule
- **Atomic Safety and Licensing Board hearings in 2004**
- **Begin construction in summer 2004, contingent on**
 - Regulatory approval
 - Russian progress
- **Produce MOX fuel for McGuire and Catawba ~2009**



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U.S. Reactor Use of MOX Fuel

- **Lead assembly program**
 - Feb 27, 2003 – Duke submitted license amendment request (LAR) for approval to use MOX fuel lead assemblies at McGuire or Catawba
 - September 23, 2003 – Duke amended LAR to apply to Catawba only
 - NRC approval requested by August 2004
 - Load lead assemblies in Catawba Unit 1 spring 2005
- **Batch use of MOX fuel**
 - Submit license amendment request for McGuire and Catawba in 2004
 - Begin batch use of MOX fuel in 2009
 - Dispose of 34,000 kg of surplus plutonium through use as MOX fuel



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Lead Assembly Program – Activities and Schedule

- Spring 2004 – Complete polishing plutonium oxide powder at Los Alamos National Laboratory
- Summer-fall 2004 – Transport plutonium oxide powder to Europe
- Winter 2004-2005 – Fabricate MOX fuel pellets and rods at Cadarache and bundle assemblies at Melox
- Spring 2005 – Transport lead assemblies to Catawba



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MOX Fuel Lead Assembly Irradiation Plan

- Spring 2005 - spring 2008
 - Two eighteen month cycles
 - Irradiate all four MOX fuel assemblies in relatively high power locations
 - Certify MOX fuel for batch use following 2nd cycle, based on poolside post-irradiation examination (PIE) results
- Spring 2008 – fall 2009
 - Irradiate one or more MOX fuel assemblies for a third cycle in relatively low power locations
 - Conduct hot cell (PIE) of MOX fuel rods



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Required Regulatory Approvals

- Duke topical reports (thermal-hydraulic, nuclear analysis)
- Framatome topical reports (fuel performance, fuel assembly design, MOX fuel design)
- Duke license amendment request and exemption requests
- Duke security plan changes and exemption requests
- DOE export license application
- Packaging Technology transportation package certifications (powder and fuel assemblies)



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Lead Assembly License Amendment Request RAIs

- NRC Request for Additional Information (RAI) on Boraflex
 - Issued July 14, 2003
 - Response October 1, 2003
- NRC RAI – Reactor Systems, Radiological, Env.
 - Issued July 25, 2003
 - Partial response October 3, 2003
 - Complete response November 3, 2003
- NRC RAI on quality assurance
 - Issued August 13, 2003
 - Response October 1, 2003



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Summary

- **The United States MOX fuel lead assembly program is a key element of the international initiative to reduce the stockpiles of weapons grade plutonium in the United States and Russia**
- **NRC review and approval schedule is important**
- **Duke and Framatome ANP are committed to working with NRC to facilitate regulatory approvals**



MOX Fuel Qualification
NRC – Duke Power – Framatome ANP Meeting
NRC Offices – White Flint, MD

George Meyer
Framatome ANP
November 13, 2003

MOX Fuel Qualification Plan

- > ***Maximize use of European experience base***
 - ◆ ***Research programs***
 - ◆ ***Established manufacturing process***
 - ◆ ***Reactor irradiation experience***
- > ***Proven fuel assembly design***
- > ***Confirmatory lead assembly program***

MOX Fuel Qualification

> Lead Assembly Program

- ◆ Required to confirm acceptability for batch operation**
- ◆ Plan has evolved since the FQP (April 2001):**
 - Expect to fabricate and irradiate four lead assemblies**
 - Fabrication will be in existing MOX facilities**
 - Pellets and rods fabricated at Cadarache**
 - Assemblies will be fabricated at MELOX**
 - Irradiation at Catawba commencing in Spring, 2005**
 - Two cycles of irradiation, with poolside PIE after each**
 - Certification for batch deployment after 2nd cycle poolside PIE**
 - Hot cell PIE of selected rods after second cycle**
 - Third cycle irradiation of one or two LAs to go beyond 50,000 MWd/t burnup**

Poolside PIE –After Each cycle (Basic PIE)

- > ***Fuel Assembly Visual Examination***
 - ◆ ***Overall appearance - Assess need for additional examinations***
- > ***Fuel Rod Visual Examination***
 - ◆ ***Examine peripheral rods to verify appearance consistent with expectations***
- > ***Fuel Assembly Growth***
 - ◆ ***Confirm growth consistent with prediction***
- > ***Fuel Rod Growth (Shoulder Gap Closure)***
 - ◆ ***Confirm predictions and acceptability for continued operation***
- > ***Fuel Assembly Bow and Distortion***
 - ◆ ***Confirm expected behavior***

Poolside PIE –After Discharge (Extended PIE - preliminary)

- > Extended PIE scope will depend on results of basic PIE and is expected to include examinations such as:***
 - ◆ Grid Width***
 - ◆ Fuel rod oxide thickness***
 - ◆ Fuel assembly RCCA drag***
 - ◆ Rod-to-rod spacing***
 - ◆ Guide thimble profile***

Hot Cell PIE

- > *Hot Cell PIE is expected to include:***
 - ◆ *Fission gas release***
 - ◆ *Clad metallography***
 - ◆ *Clad ductility***
 - ◆ *Fuel pellet ceramography***
 - ◆ *Burnup analysis***
 - ◆ *Burnup distribution***

NRC Regulatory Actions

MOX Fuel Lead Assembly Licensing

Document	Responsible Organization	Date Submitted to NRC	Status/Comments
COPERNIC Fuel Rod Design Computer Code (UO ₂)	Framatome	December 1999	Approved.
COPERNIC Fuel Rod Design Computer Code (MOX)	Framatome	July 2000	Under NRC review.
Nuclear Design Methodology using CASMO-4/ SIMULATE 3 MOX	Duke	August 2001	Under NRC review.
Thermal Hydraulic Statistical Core Design Methodology	Duke	September 2001	Approved.
Advanced Mk-BW Fuel Assembly Mechanical Design	Framatome	April 2002	Under NRC review.
License amendment request to use MOX fuel lead assemblies	Duke	February 2003	Under review. Includes request for exemptions to 10 CFR 50.
Responses to RAIs dated: (a) 07/14/03 - Boraflex (b) 07/25/03 - Rx systems, etc (c) 08/13/03 - QA	Duke	Responses sent: (a) 10/01/03 (b) 10/03/03 & 11/03/03 (c) 10/01/03	Under NRC review.
MOX Fuel Design Report	Framatome	May 2003 (Rev 1)	Under NRC review (Draft RAIs have been issued and discussed)
Security plan	Duke	September 2003	NRC reviewing classification of security plan submittal. Submittal includes request for exemptions to 10 CFR 73.
Export License	DOE	October 2003	License to ship 140 kg of PuO ₂ powder to France for lead assembly fabrication (NRC/OIP review).
Request for certification of FS-47 package (PuO ₂ powder shipment).	Packaging Technology	October 2003	Submitted to DOT August 2003. DOT sent to NRC in October.
Request for certification of FS-65 package (for lead assembly shipment)	Packaging Technology	Early 2004	Pending review and approval by French authority.