



Marian Kellett
Document & Data Services
P.O. Box 968, 964T
Richland, WA 99352-0968
Ph. 509-377-8321F. 509-377-2479
mkellett@energy-northwest.com

March 18, 2010

Mr. Tom Clements
1112 Florence Street
Columbia, SC 29201

Reference: Energy Northwest Request for Public Records, Control Number 2010-02 received January 15, 2010

Dear Mr. Clements:

On January 15, 2010, Energy Northwest Document & Data Services received your Request for Public Records, Control Number 2010-02, for documents related to plutonium fuel (mixed oxide fuel, MOX) use in the Columbia Generating Station. Energy Northwest responded on January 20, 2010, and again on February 22, 2010, that the records would be transmitted to you on or before March 18, 2010. A partial response dated March 4, 2010 was emailed to you on March 8, 2010. The following attachments reflect the remaining requested records.

1. Signed and Approved Energy Northwest Request for Public Records Form including delegation letter from JL Lewis to S Gambhir dated March 11, 2010. (2 Pages)
2. Energy Northwest Public Records Act Privilege Log Request Control Number 2010-02 (8 Pages)
3. Hard copies of 31 emails from multiple individuals with a date range of April 9, 2009 through January 29, 2010, including attachments. (86 Pages)
4. Letter subject "Request for Proposal in Support of Paragon Fuels Response to DOE RFP DE-RP02-98CH10888 for Mixed Oxide (MOX) Fuel Fabrication and Reactor Irradiation Services" from JW Baker to Kathleen A. Wehlan dated August 21, 1998, including the attachments. (29 Pages)
5. Document titled "Questions for BPA", no date. (4 Pages)
6. Document titled "The Use of MOX Fuel", no date. (3 Pages)
7. MOX Fuel Overview Presentation, Jerry Lewis, Reactor Fuel Engineering dated January 10, 2008. (7 Slides)
8. Draft Results from August 4, 2009 Senior Staff FY11-20 Strategic Planning Session, no date. (8 Slides)

Mr. Tom Clements
1112 Florence Street
Columbia, SC 29201
Page 2 of 2
March 4, 2010

**Subject: Energy Northwest Request for Public Records, Control Number
2010-02 received January 15, 2010**

Communications responsive to Number 2 of your records request includes emails. By way of clarification, when providing you copies of responsive emails, we did not include duplicate emails or emails which were repeated in their entirety in emails that were already being provided to you. By way of further clarification, the time frame for our email search was through February 2, 2010.

You will notice that some portions of the emails produced in response to your Public Records Request have been redacted. Given that several exemptions applied to the redactions, we have provided you with a privilege log which describes the document redacted by date and author/recipient and which exemptions are being asserted for each email that was redacted. Except as otherwise noted herein (duplicate emails), Energy Northwest withheld no documents in their entirety when responding to this request.

This submission to you completes Energy Northwest's response to your public records request submitted to us on January 11, 2010. Upon your review of Energy Northwest's response to your Public Records Act request, if you believe an error or oversight has been made, please clarify with specificity and we will search again.

As previously stated, you ask that Energy Northwest waive the production fee. Unfortunately, as a public entity we are unable to honor your request without a gifting of public funds concern. However, to minimize your expense, we will transmit the documents via email. Please advise should you also wish Energy Northwest to transmit the document via the U.S. Mail. The cost will be \$.15 cents per page plus postage.

For further information, please contact Elaine Jones, Document & Data Services Public Records Coordinator at 509-377-2387, or by email at eajones@energy-northwest.com.

Respectfully,



Marian Kellett, Manager
Document & Data Services

MK:jgd

cc: M Kellett, MD 964T
Request for Public Records File



Request for Public Records Control No 2010-02

Second Mailing dated March 18, 2010

Attachment 1

Signed and Approved Energy Northwest Request for
Public Records Form including delegation letter
from JL Lewis to S Gambhir
dated March 11, 2010.

(2 Pages)

Date Received: <u>01/15/2010</u>	ENERGY NORTHWEST REQUEST FOR PUBLIC RECORD	Control No.: <u>2010-02</u>
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REQUESTER

Name: Tom Clements	Fax No.:	Telephone No.: 803-834-3084	Date: 01-11-2010
Address: (Street) 1112 Florence Street		Return form to: Energy Northwest Attention: Document & Data Services, MD 964T P.O. Box 968 Richland, WA 99352	
City: Columbia	State: SC	Zip Code: 29201	
Email address: tomclements329@cs.com	Representing: Friends of the Earth		
Nature of Request: <input type="checkbox"/> Inspect Records <input checked="" type="checkbox"/> Obtain a copy - to be provided at cost <input checked="" type="checkbox"/> Email a copy		FAX: (509) 377-2479 Phone: (509) 372-5248	

Records Request (Be as specific as possible):

1. Memorandum of Understanding between Energy Northwest and the Tennessee Valley Authority (TVA) related to plutonium fuel (mixed oxide fuel, MOX) use in the Columbia Generating Station. I am aware this document exists.
2. Any agreement or communication between Energy Northwest and the Pacific Northwest National Laboratory related to MOX use.
3. Any presentations or documents on MOX use prepared by Mr. Ted Coates, S. K. Gambhir, Vice President, Technical Services, or J. V. Parrish, Chief Executive Officer, or other Energy Northwest staff. This request includes internal presentations or documents made for the use of staff, or presentations made to the Energy Northwest executive board or the Operations, Construction & Safety (OPS) Committee.

Given that the documents gathered under this request will be used for non-profit public interest use only and will help the public to understand the workings of Energy Northwest, I request a fee waiver for this request.

NOTE: By my signature I acknowledge that I am responsible for paying copying and other costs directly incident to providing the requested records.

Thomas W. Clements
Requester's Signature: _____

1-11-2010
Date: _____

ENERGY NORTHWEST

Manager, Responding Organization or Designee: <i>M. A. Sullivan</i>	Date: <u>3/16/10</u>	Manager, Responding Organization or N/A:	Date:
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Request Granted: <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Partial	Page Count: <u>155</u>	Copying Fee: <u>N/A</u>	Postage: <u>N/A</u>	Total Cost to Be Paid: <u>N/A Email</u>	Please make checks payable to Energy Northwest
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Request denied for the following reasons: *Redactions: *Please see separate sheets for more details.*

- (1) Security password/codes for conference calls. RCW 42.56.320.
- (2) Personal wireless telephone numbers. RCW 42.56.250.
- (3) Preliminary opinions and recommendations during deliberative process. RCW 42.56.280.
- (4) Financial, commercial + proprietary information. RCW 42.56.270.

Attachments included:
See attached memo - Second mailing

Other Review: <i>Frank DeBate</i>	Date: <u>3/16/2010</u>	Legal Review: <i>Angela Rainey</i>	Date: <u>12 MAR 2010</u>
Request for Public Record Coordinator: <i>Frank DeBate</i>	Date: <u>3/16/2010</u>	Manager, Document & Data Services or Designee:	Date:

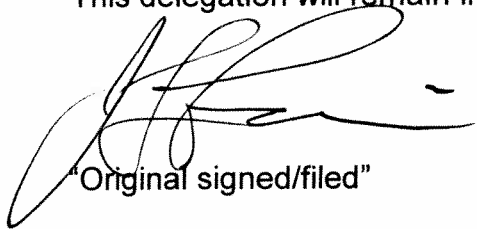


INTEROFFICE MEMORANDUM

DATE: March 11, 2010
TO: Sudesh Gambhir, VP Technical Services, PE04
FROM: Jerry Lewis, Rx/Fuels Engineering Manager, PE26
SUBJECT: DELEGATION OF AUTHORITY

Mr. Jerry L. Lewis, Rx/Fuels Engineering Manager, will be away from Energy Northwest March 12 – March 24, 2010. During his absence Mr. Miguel A. Armenta will act as Rx/Fuels Engineering Manager. Mr. Armenta will have full authority of this position with the exception of salary and personnel actions.

This delegation will remain in effect until my actual return.



"Original signed/filed"

JLL/yy



Request for Public Records Control No 2010-02

Second Mailing dated March 18, 2010

Attachment 2

Energy Northwest Public Records Act Privilege Log
Request Control Number: 2010-02

(8 Pages)

Energy Northwest
 Public Records Act Privilege Log
 Request Control Number: 2010-02
 Prepared by: A.D. Rains, Senior Counsel, Energy Northwest

Date	Type of Record	Author/Recipient	Redactions
03-23-09	Email string	Among Tanya DeMyer, James Buelt, Cheryl Thornhill, William Richmond, Jerry Lewis, Lisa Ferek, Sudesh Gambhir	Personal wireless telephone numbers redacted. RCW 42.56.250.
04-01-09	Email string	Among James Buelt, Sudesh Gambhir, Lisa Ferek, Jerry Lewis	Personal wireless telephone numbers redacted. RCW 42.56.250.
07-02-09	Email string	Among Lisa Ferek, Joseph Parrish, Jerry Lewis, Miguel Armenta, Sudesh Gambhir, Beverly Cadwell, Sarah Leversee, Cheryl Thornhill, Earl Saito, William Richmond, James Buelt	Personal wireless telephone numbers redacted. RCW 42.56.250.
07-02-09	Email string attachment BWR Fuel Qualification for the MFFF	Among Lisa Ferek, Joseph Parrish, Jerry Lewis, Miguel Armenta, Sudesh Gambhir, Beverly Cadwell, Sarah Leversee, Cheryl Thornhill, Earl Saito, William Richmond, James Buelt	The parties are still deliberating on use of MOX fuel and involvement re: same. (1) Financial project estimates have been redacted as pre-decisional opinions and as valuable financial and commercial data disclosure of which would more likely than not produce private gain and public loss. RCW 43.52.270-.280. (2) Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
07-28-09	Email	From Cheryl Thornhill; To Sarah Leversee, Lisa Ferek, Gary Sevigny,	The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions

		Brady Hanson, William Richmond, James Buelt	expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
08-04-09	Email string	Among Lisa Ferek, Joseph Parrish, Sudesh Gambhir, Jerry Lewis, Pamela Bradley, Cheryl Thornhill, Sarah Leversee, Earl Saito, Richard Clark, Dean Tousley, Carol Elliott, Sue King Virginia Kay, Peter Newby	Personal wireless telephone numbers redacted. RCW 42.56.250.
08-04-09	Email string	Among Earl Saito, Cheryl Thornhill, Lisa Ferek, Sarah Leversee, Richard Clark, Dean Tousley, Carol Elliott, Sue King Virginia Kay, Peter Newby	Personal wireless telephone numbers redacted. RCW 42.56.250.
08-13-09	Email string	Among Lisa Ferek, Jerry Lewis, Christopher Laws, Cheryl Thornhill, Sarah Leversee	(1) Telephone security passcodes redacted. RCW 42.56.520. (2) The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
08-17-09 5:46 AM	Email string	Among Cheryl Thornhill, Lisa Ferek, Earl Saito, Sarah Leversee, Jerry Lewis; William Richmond	The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and

08-17-09 6:12 AM	Email string	Among Earl Saito, Cheryl Thornhill, Lisa Ferek, Sarah Leversee, Jerry Lewis, William Richmond	<p>opinions. RCW 43.52.280.</p> <p>The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.</p>
08-24-09	Email string	Among Lisa Ferek, Christopher Laws, Jerry Lewis, Cheryl Thornhill, Sarah Leversee, William Richmond	<p>The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.</p>
09-04-09	Email string	Among William Richmond, Lisa Ferek, Cheryl Thornhill, Sarah Leversee, Earl Saito	<p>(1) The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.</p> <p>(2) Personal wireless telephone numbers redacted. RCW 42.56.250.</p>
09-14-09	Email string	Among Lisa Ferek, Cheryl Thornhill, Sarah Leversee	<p>The parties are still deliberating on use of MOX fuel and involvement re: same. (1) Financial project estimates have been redacted as pre-decisional opinions and as valuable financial and commercial data disclosure of which would more likely than not produce private gain and public loss. RCW</p>

			<p>43.52.270-.280. (2) Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.</p>
10-01-09	<p>Email string</p> <p>Among Cheryl Thornhill, Lisa Ferek, Sarah Leverage, Jerry Lewis, Earl Saito</p>		<p>The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.</p>
10-07-09	<p>Email string</p> <p>Among Lisa Ferek, Sarah Leverage, Cheryl Thornhill</p>		<p>The parties are still deliberating on use of MOX fuel and involvement re: same. (1) Financial project estimates have been redacted as pre-decisional opinions and as valuable financial and commercial data disclosure of which would more likely than not produce private gain and public loss. RCW 43.52.270-.280. (2) Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280. (3) Personal wireless telephone numbers redacted. RCW 42.56.250.</p>
10-22-09	<p>Email string</p> <p>Among Lisa Ferek, Caroline Mathews, Zoe Gastelum</p>		<p>Personal wireless telephone numbers redacted. RCW 42.56.250.</p>
11-18-09	<p>Email string</p> <p>Among Lisa Ferek, Cheryl Thornhill,</p>		<p>The parties are still deliberating on use of MOX fuel</p>

		Sarah Leversee	and involvement re: same. Pre-decisional recommendations expressed as part of the deliberative process have been redacted. Disclosure of recommendations would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
11-24-09	Email string	Among Sarah Leversee, Cheryl Thornhill, Lisa Ferek	The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional recommendations and opinions expressed as part of the deliberative process have been redacted. Disclosure of recommendations and opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
12-14-09 1:34 PM	Email string	Among Lisa Ferek, Cheryl Thornhill, Sarah Leversee, Earl Saito, William Richmond, Joseph Parrish, Gordon Dudder	The parties are still deliberating on use of MOX fuel and involvement re: same. The parties are still deliberating on use of MOX fuel and involvement re: same. (1) Financial project estimates have been redacted as pre-decisional opinions and as valuable financial and commercial data disclosure of which would more likely than not produce private gain and public loss. RCW 43.52.270-.280. (2) Pre-decisional recommendations and opinions expressed as part of the deliberative process have been redacted. Disclosure of recommendations and opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
12-14-09	Email	From Lisa Ferek; To Cheryl Thornhill	The parties are still deliberating on use of MOX fuel

2:16 PM			and involvement re: same. Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
12-14-09 2:16 PM	Email attachment EN MOX scope	From Lisa Ferek; To Cheryl Thornhill	The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions and recommendations expressed as part of the deliberative process have been redacted. Disclosure of opinions and recommendations would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
12-15-09	Email string	Among Lisa Ferek, Earl Saito, Cheryl Thornhill, Sarah Leverage, William Richmond, Gordon Dudder, Russ Fawcett, Douglas Crawford	The parties are still deliberating on use of MOX fuel and involvement re: same. (1) Financial project estimates have been redacted as pre-decisional opinions and as valuable financial and commercial data disclosure of which would more likely than not produce private gain and public loss. RCW 43.52.270-.280. (2) Pre-decisional recommendations and opinions expressed as part of the deliberative process have been redacted. Disclosure of recommendations and opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
12-18-09	Email string	Among Lisa Ferek, Earl Saito, Cheryl Thornhill, William Richmond, Sarah Leverage	(1) Personal wireless telephone numbers redacted. RCW 42.56.250. The parties are still deliberating on use of MOX fuel

			<p>and involvement re: same. (2) Financial project estimates have been redacted as pre-decisional opinions and as valuable financial and commercial data disclosure of which would more likely than not produce private gain and public loss. RCW 43.52.270-.280. (3) Pre-decisional recommendations and opinions expressed as part of the deliberative process have been redacted. Disclosure of recommendations and opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.</p>
01-12-10	Email string	Among Cheryl Thornhill, Lisa Ferek, Sarah Leversee, William Richmond	<p>The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional recommendations and opinions expressed as part of the deliberative process have been redacted. Disclosure of recommendations and opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.</p>
01-14-10	Email	From Cheryl Thornhill; To Lee Farrell, Lisa Ferek, Sarah Leversee, William Richmond, Gordon Dudder	<p>The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional recommendations and opinions expressed as part of the deliberative process have been redacted. Disclosure of recommendations and opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.</p>
01-14-10	Email string with calendar	Among Cheryl Thornhill, Sarah Leversee, Lisa Ferek, Earl Saito, Lee	<p>Telephone security passcodes redacted. RCW 42.56.520.</p>

01-29-10	invite	Farrell, William Richmond Among Cheryl Thornhill, Lisa Ferek, William Richmond, Sarah Leversee	The parties are still deliberating on use of MOX fuel and involvement re: same. Pre-decisional opinions expressed as part of the deliberative process have been redacted. Disclosure of opinions would be injurious to the deliberative and consultative function of the decision-making process and would inhibit the flow of recommendations, observations, and opinions. RCW 43.52.280.
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Request for Public Records Control No 2010-02

Second Mailing dated March 18, 2010

Attachment 3

Hard copies of 31 emails from multiple individuals with a date range of April 9, 2009 through January 29, 2010, including attachments.

(86 Pages)

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Friday, January 29, 2010 11:43 AM
To: Ferek, Lisa L.; Richmond, William G; Leversee, Sarah (GE Infra, Energy)
Subject: RE: Conference call

Unsure if Bill was able to weigh in I know he is on travel. I am on sick leave due to surgery but could call in (already missed today's window though) Vic's idea of a strategy is a good one. Let me weigh in for PNNL. I expect that [REDACTED]

That of course is a business decision ENW and GE can pursue that no longer requires laboratory involvement. However PNNL still believes [REDACTED]

REDACTED

REDACTED

REDACTED

[REDACTED] I was told RG pellets is dead from a political perspective. So we go back to the original PNNL fabricates pellets. MOX can have as much involvement as they would like in that program including specifying the equipment (with concurrence by GE as we need to be able to make a GE specified product. [REDACTED]

[REDACTED] We have lost the 2013 window unless they are willing to ship the labscale equipment we already think they have taken possession of right away, but 2015 is doable from all angles. [REDACTED]

[REDACTED] Lisa, do you have any other utility contacts that you could pulse on interest/disinterest in MOX to put facts on the table that we are representing the industry and TVA is the anomaly, not we are the anomaly and everyone else thinks like TVA?

Hope this helps.

From: Ferek, Lisa L. [llferek@energy-northwest.com]
Sent: Thursday, January 28, 2010 3:50 PM
To: Richmond, William G; Leversee, Sarah (GE Infra, Energy)
Cc: Thornhill, Cheryl K
Subject: Conference call

So, we have received the expected letter from DOE. Vic is already asking for our strategy going forward and meeting with MOX services. Can we set up a conference call to discuss? I am available tomorrow and next week.

One big question is how do we move the pin program forward at this point. It sounds like the use of RG MOX pellets is not an option anymore. Is this really true? What if EN talks directly to AREVA higher-ups? Vic has offered to do this. Can we even ship MOX pellets internationally? If we can't use MELOX pellets, can we make them here using an lab-scale equipment MOX Services may be buying? Other options? What about the "polished Pu" from LANL?

Let me know availability. Thanks, Lisa

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Wednesday, January 20, 2010 2:03 PM
To: 'cheryl.thornhill@pnl.gov'; 'bill.richmond@pnl.gov'
Subject: Fw: Conversation with MOX

Lisa L Ferek
Energy Northwest
509 377 8148

From: Cadwell, Beverly A.
To: McKeever, Janine B.; Ferek, Lisa L.
Cc: Lewis, Jerry L.; Parrish, Joseph V.; Gambhir, Sudesh
Sent: Wed Jan 20 13:57:56 2010
Subject: RE: Conversation with MOX

The first week of March right now looks ok for both Vic and Sudesh.

Thanks, Bev

Bev Cadwell | Executive Assistant, CEO Office
Energy Northwest | ☎ 509.377-8222 | F 509.377.8637 |
 Please consider the environment before printing this email

From: McKeever, Janine B.
Sent: Wednesday, January 20, 2010 1:54 PM
To: Cadwell, Beverly A.
Cc: Ferek, Lisa L.; Parrish, Joseph V.; Gambhir, Sudesh
Subject: RE: Conversation with MOX

Sudesh will be out of the office until February 17th and the boards are in Olympia Feb 17-18, I suggest the following week.

Thank you,

Janine

From: Cadwell, Beverly A. **On Behalf Of** Parrish, Joseph V.
Sent: Wednesday, January 20, 2010 1:47 PM
To: McKeever, Janine B.
Cc: Ferek, Lisa L.
Subject: FW: Conversation with MOX

Janine,

2/11/2010

FYI

Lisa, please copy Janine and I on these emails. It helps to keep us in the loop. Thanks!

...Bev

Bev Cadwell | Executive Assistant, CEO Office
Energy Northwest | ☎ 509.377-8222 | ✉ 509.377.8637 |



Please consider the environment before printing this email

From: Ferek, Lisa L.
Sent: Wednesday, January 20, 2010 12:53 PM
To: Parrish, Joseph V.; Gambhir, Sudesh
Cc: Lewis, Jerry L.
Subject: FW: Conversation with MOX

Vic, Sudesh,

It looks like MOX Services would like to come to Richland to meet with us. I think that it would be beneficial to have one or both of you present at least at the beginning of the meeting to provide our perspective. We are looking to schedule this sometime within the next 2 to 6 weeks. I know that the week of Feb 15th is out since the board meeting will be held in Olympia. Please let me know if you would like to attend and which dates will or will not work. Thanks, Lisa

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Wednesday, January 20, 2010 12:39 PM
To: Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy)
Cc: Richmond, William G
Subject: Conversation with MOX

Bill had lunch with Sue King and they "definitely" want further dialog with us and will come to Richland. It sounds like they are really interested in the analysis piece that we proposed to Dean. Also reactor grade pellets is dead, using reactor grade MOX at this time is not "politically" acceptable so the pins program would have to be with weapons grade material. Bill will send out a more elaborative note later today or tomorrow. That said, please identify the weeks in the next 2 to 6 weeks that would NOT be good for a site visit. Bill will then coordinate with Sue for their schedules. I hope I can be there but if you can get some momentum going sooner than that, please move forward.

Cheryl K Thornhill

Program Manager
National Security Division

Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K9-85
Richland, WA 99352 USA
Tel: 509-375- 2532
Fax: 509-375-2610
Cheryl.Thornhill@pnl.gov
www.pnl.gov

2/11/2010

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Wednesday, January 20, 2010 8:28 AM
To: Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy); Richmond, William G
Subject: Path Forward

At this time there has not yet been a formal letter from DOE. The Email message gave us 2 contacts. Bill will be meeting with Sue King later this week to discuss the guidance that DOE provided us and their support for a GE design and their understanding that AREVA/MOX Services will be taking a more proactive role in establishing customers for MOX. I believe a next step is a sit down meeting with the MOX folks, preferably in Richland where they can be provided facility tours. After today I will be on a medical leave until at least Feb. 18. Selfishly I would prefer that the meeting occur in late February, however if MOX services is willing to move forward with our team quickly, then we need to seize that opportunity and Bill will be acting for me on this initiative. I will try to stay informed by E Mail.

Cheryl K Thornhill

Program Manager
National Security Division
Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K9-85
Richland, WA 99352 USA
Tel: 509-375-2532
Fax: 509-375-2610
Cheryl.Thornhill@pnl.gov
www.pnl.gov

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Thursday, January 14, 2010 4:16 PM
To: Leversee, Sarah (GE Infra, Energy)
Cc: Ferek, Lisa L.
Subject: RE: MOX Program Discussion

Bill can't make the 10/1 timeframe as he is at SRS. Could we do 11/2 or 12/3? I wouldn't ask for the change except Bill may have more news for us based on his visit this week. Just let me know and sorry for the changes.

Cheryl Thornhill

Program Manager
Pacific Northwest National Laboratory

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Thursday, January 14, 2010 2:27 PM
To: Thornhill, Cheryl K
Cc: Ferek, Lisa L.
Subject: RE: MOX Program Discussion

Great, thanks. Talk to you tomorrow 1pm EST/10am Pacific.

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Thursday, January 14, 2010 5:26 PM
To: Leversee, Sarah (GE Infra, Energy)
Cc: Ferek, Lisa L.
Subject: RE: MOX Program Discussion

NO I misread, so 10am/1PM is on.

Cheryl Thornhill

Program Manager
Pacific Northwest National Laboratory

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Thursday, January 14, 2010 2:25 PM
To: Thornhill, Cheryl K
Cc: Ferek, Lisa L.
Subject: RE: MOX Program Discussion

Sorry, I may have mis-read Lisa's email, i thought she was available at 1pm eastern.

Lisa-Can you do 1pm eastern? Earl is unavailable at 1pm Pacific.

Thanks,
Sarah

2/11/2010

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Thursday, January 14, 2010 4:54 PM
To: Leversee, Sarah (GE Infra, Energy); Saito, Earl F. (GE Infra, Energy); Ferek, Lisa L.; Farrell, Lee J; Richmond, William G
Subject: RE: MOX Program Discussion

Sarah,

We made arrangements for a 1pm pacific time call as Lisa is not available until then – can GE support that time? If yes I will send out the call in information

Cheryl Thornhill
Program Manager
Pacific Northwest National Laboratory

-----Original Appointment-----

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Thursday, January 14, 2010 1:00 PM
To: Saito, Earl F. (GE Infra, Energy); Ferek, Lisa L.; Farrell, Lee J; Thornhill, Cheryl K; Richmond, William G
Subject: MOX Program Discussion
When: Friday, January 15, 2010 10:00 AM-10:30 AM (GMT-08:00) Pacific Time (US & Canada).
Where: 1-800-501-0843, passcode: [REDACTED], chairperson code: [REDACTED]

Call is scheduled for 1:00pm Eastern.

Thanks,
Sarah

2/11/2010

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Thursday, January 14, 2010 11:12 AM
To: Farrell, Lee J
Cc: Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy); Richmond, William G; Dudder, Gordon B
Subject: Conference Call

Lee: Please arrange a conference call with Lisa, Sarah and Bill (from SRS), perhaps Friday? To discuss change in direction with BWR Leads program

Dean Tousley informed both Lisa and myself today that the NA26 management has determined that it is not DOE's job to get the customers and fuel designs for the MFFF but it is MOX Services. So they want us to interface directly with AREVA (who has recently made a presentation to DOE on having a more active role marketing MOX) on the pins programs. Dean is to provide a contact and further explanation tomorrow. I think

REDACTED REDACTED REDACTED REDACTED

Cheryl K Thornhill

Program Manager
National Security Division
Pacific Northwest National Laboratory
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P.O. Box 999, MSIN K9-85
Richland, WA 99352 USA
Tel: 509-375- 2532
Fax: 509-375-2610
Cheryl.Thornhill@pnl.gov
www.pnl.gov

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Tuesday, January 12, 2010 12:24 PM
To: Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy); Richmond, William G
Subject: RE: BR MOX

REDACTED

REDACTED

REDACTED

REDACTED

is done would be good.

Probably a call before anything

Cheryl Thornhill

Program Manager
Pacific Northwest National Laboratory

From: Ferek, Lisa L. [mailto:llferek@energy-northwest.com]
Sent: Tuesday, January 12, 2010 12:20 PM
To: Thornhill, Cheryl K; Leversee, Sarah (GE Infra, Energy); Richmond, William G
Subject: RE: BR MOX

Vic Parrish spoke to Dean last week and reiterated Energy Northwest's desire to use MOX fuel even after he (Vic) is gone.

[REDACTED] I'm a little fuzzy on whether or not this will help. It may be good to talk this over as a team? Thoughts?

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Tuesday, January 12, 2010 12:15 PM
To: Leversee, Sarah (GE Infra, Energy); Ferek, Lisa L.; Richmond, William G
Subject: BR MOX

Wes and Dean have a briefing to their management tomorrow which he hopes will result in their ability to make a decision one way or another. Wes himself has urged Dean to make a decision by next week, he understands resources are being lost. No feedback on additional changes to what we have proposed but that might come after tomorrow.

Cheryl K Thornhill

Program Manager
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www.pnl.gov

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Friday, December 18, 2009 11:06 AM
To: Saito, Earl F. (GE Infra, Energy); Thornhill, Cheryl K; Richmond, William G; Leversee, Sarah (GE Infra, Energy)
Subject: RE: VERY Rough Draft

This looks ok to me in concept. I have no comments. I am on vacation until the end of the year. So, if you need to reach me by phone please call my cell [REDACTED]. I will continue to check e-mail. I will try to find out from Vic how his conversation went with Dean. Thanks, Lisa

Lisa L. Ferek
Fuel Management Lead
Energy Northwest
01 509 377 8148

From: Saito, Earl F. (GE Infra, Energy) [mailto:Earl.Saito@gnf.com]
Sent: Thu 12/17/2009 6:38 PM
To: Thornhill, Cheryl K; Richmond, William G; Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy)
Subject: FW: VERY Rough Draft

Cheryl, Good start. I made a few comments to the write up (the biggest being that to fully support items 1 and 2 we would have to do item 5). In addition, I also wrote a much smaller time and material proposal that would allow us to explore the situation and stay under [REDACTED]. This would allow us to move forward while not over committing. -Earl

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Wednesday, December 16, 2009 4:54 PM
To: Richmond, William G; Ferek, Lisa L.; Saito, Earl F. (GE Infra, Energy); Leversee, Sarah (GE Infra, Energy)
Subject: VERY Rough Draft

Attached is the strawman for the proposal to Dean with the various inputs received to date. I need help on item number 3 – both a clear definition and a dollar value. What I think we need to include there is [REDACTED]

REDACTED**REDACTED**

[REDACTED] Any rate this is very rough to put a framework around the various ideas and comments are welcomed.

FYI, I found out today another PNNL program is pursuing acquisition of reactor grade PU oxide and will be pressing “pellets”. So the review of pellet pressing options can include this in house plan. Should know in 2 weeks if that project has been green lighted.

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Tuesday, December 15, 2009 1:11 PM
To: 'Saito, Earl F. (GE Infra, Energy)'; Thornhill, Cheryl K; Leversee, Sarah (GE Infra, Energy); Richmond, William G
Subject: RE: Scope for NNSA

Here is EN's paragraph:

Energy Northwest continues to endorse a phased approach to MOX fuel introduction into a US boiling water reactor (BWR) beginning with the irradiation of MOX fuel rods. Energy Northwest will

REDACTED

REDACTED

In addition, Energy Northwest believes that valuable information can be obtained from an effort to identify the optimum fraction of MOX fuel in a representative BWR core. This fraction will be determined in part by limitations inherent in the reactor structures, systems and components, which cannot be modified in a cost effective manner to permit higher core fractions of MOX fuel. In addition to those analyses performed by the fuel vendor and the nuclear steam supply system (NSSS) vendor, Energy Northwest will

Budgetary estimate for EN:

Travel: \$

Analysis: \$

-----Original Message-----

From: Saito, Earl F. (GE Infra, Energy) [mailto:Earl.Saito@gnf.com]

Sent: Tuesday, December 15, 2009 1:04 PM

To: Thornhill, Cheryl K; Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy); Richmond, William G; Dudder, Gordon B

Cc: Fawcett, Russ M. (GNF); Crawford, Douglas C (GNF)

Subject: Scope for NNSA

> In order to have GNF designed bundles available from the MFFF, two
> tasks should be started in 2009. The first is the
> individual rods at E
> The second is the

REDACTED

> The first item would include the following:

> 1)

> 2)

> 3)

REDACTED

REDACTED

REDACTED

REDACTED

> 4) [REDACTED] REDACTED REDACTED [REDACTED]

>
>

> The second item would include:

> 1) [REDACTED] [REDACTED]

> [REDACTED] REDACTED

> 2) [REDACTED] REDACTED

> [REDACTED] REDACTED

> [REDACTED] REDACTED [REDACTED]

> REDACTED

>
>

The total cost will be [REDACTED]

-Earl

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Monday, December 14, 2009 2:16 PM
To: 'Thornhill, Cheryl K'
Subject: MOX write-up
Attachments: EN MOX scope.doc

Hi Cheryl,

Well, take a look at what I have written up. It is pretty vague. I mean, we could certainly spend some \$\$ at Energy Northwest, but I think

[REDACTED] REDACTED REDACTED REDACTED

So, I kept the scope for EN down to just those items that may actually jeopardize EN's desire to use MOX fuel. I may need [REDACTED]. I didn't touch the physical security arena since I don't [REDACTED] REDACTED REDACTED [REDACTED]

Please provide feedback or suggestions. If this looks close to what you had in mind, I will send it out to the other team members. Thanks, Lisa

Energy Northwest continues to endorse a phased approach to MOX fuel introduction into a US boiling water reactor (BWR) beginning with the irradiation of MOX fuel rods. Energy Northwest will

rec
inc

REDACTED

REDACTED

In addition, Energy Northwest believes that valuable information can be obtained from an effort to identify the optimum fraction of MOX fuel in a representative BWR core. This fraction will be determined in part by limitations inherent in the reactor structures, systems and components, which cannot be modified in a cost effective manner to permit higher core fractions of MOX fuel. In addition to those analyses performed by the fuel vendor and the nuclear steam supply system (NSSS) vendor, Energy Northwest will

[REDACTED]

Budgetary estimate for EN:

Travel: \$ [REDACTED]

Analysis: \$ [REDACTED]

Prepared by Lisa Ferek 12/14/09

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Monday, December 14, 2009 1:34 PM
To: 'Thornhill, Cheryl K'
Subject: RE: News from DC

Cheryl,
I assume this info will stay between PNNL and DOE NNSA. Just don't want any unexpected press releases about burning MOX fuel in CGS. Thanks, Lisa

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Friday, December 11, 2009 2:40 PM
To: Ferek, Lisa L.; sarah.leversee@ge.com; earl.saito@ge.com; Richmond, William G
Cc: Parrish, Joseph V.
Subject: RE: News from DC

A conference call is a great idea. I need GE to weigh in on availability as I know Sarah had international travel plans.

From: Ferek, Lisa L. [mailto:llferek@energy-northwest.com]
Sent: Friday, December 11, 2009 2:38 PM
To: Thornhill, Cheryl K; sarah.leversee@ge.com; earl.saito@ge.com; Richmond, William G
Cc: Parrish, Joseph V.
Subject: Re: News from DC

Cheryl,
I will be available next week to work on this. Maybe we can set up a call with the team to discuss on Monday. I also briefed Vic on the status last week and he was going to call Dean as well. Thanks, Lisa
Lisa L Ferek
Energy Northwest
509 377 8148

From: Thornhill, Cheryl K <cheryl.thornhill@pnl.gov>
To: Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy) <sarah.leversee@ge.com>; earl.saito@ge.com <earl.saito@ge.com>; Richmond, William G <Bill.Richmond@pnl.gov>
Cc: Dudder, Gordon B <gordon.dudder@pnl.gov>
Sent: Fri Dec 11 13:27:03 2009
Subject: News from DC

I met with Dean and Wes this week. They would still like to move forward with our modified proposal. However Areva – Paris came back with the feedback that they would not even provide a cost estimate for making the pellets because

[REDACTED]
[REDACTED] I offered Dean 2 scenarios to offer AREVA (making rods in France is DOA from a transportation perspective, would be at least 2015 or later)1

[REDACTED] REDACTED REDACTED [REDACTED]

Meanwhile I asked about us starting work and providing products that DOE could use and would be beneficial planning tools even if they can't get a commitment on the pellets. I suggested some early task orders like

REDACTED REDACTED REDACTED [REDACTED] REDACTED

[REDACTED] AREVA told them it would take 18 months to work out the data transfer issue and I suggested [REDACTED]

[REDACTED] This idea was received with enthusiasm and I was asked to submit a proposal. It would be ideal if I could get a 2 to 3 page proposal to Dean by Thursday of next week. Why? Because of the FINPLAN cycle. If he makes a decision as soon as the Holidays are over he could put money in the February FINPLAN (due usually the 3 to 5th working day of the month prior)and a few weeks later I would have money to award contracts with. If we send the proposal in January then he can't send any money until the March FINPLAN. Please let me know if you can support this effort. Basically I am looking for "task orders" of activities that we would need to do during the first 4 months of this project that result in a paper or plan or some other deliverable that DOE would see as a model for ever doing this type of project but helps us keep to the schedule. I would need a couple sentence description and estimated (ball park)cost [REDACTED]

[REDACTED] that would keep open the option of 2013. The goal is to keep our team together with some funded work while the politics are worked.

Please let me know your thoughts and availability.

2/11/2010

Rains, Angel D.

From: Leversee, Sarah (GE Infra, Energy) [sarah.leversee@ge.com]
Sent: Tuesday, November 24, 2009 2:48 PM
To: Thornhill, Cheryl K; Ferek, Lisa L.
Subject: RE: MOX Data Needs Follow up

The only thing I inferred was that DOE would probably not ship anything more than pellets due to cost and political complexity.

-----Original Message-----

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Tuesday, November 24, 2009 3:16 PM
To: Leversee, Sarah (GE Infra, Energy); Ferek, Lisa L.
Subject: RE: MOX Data Needs Follow up

Did you get any status updates on the proposal from AREVA to make the pellets? Ability to ship to the US? Those were stumbling blocks in a funding decision.

-----Original Message-----

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Tuesday, November 24, 2009 11:15 AM
To: Ferek, Lisa L.
Cc: Thornhill, Cheryl K
Subject: MOX Data Needs Follow up

Hi Lisa,

After meeting with Wes last week, we discussed options of moving forward if we did not receive the requested data from AREVA. I discussed the options with our engineering team.

For Phase 1:

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

There are also other data sources, much generated from international programs.

The conclusion is that there is a path forward if we do not receive the data, especially for Phase 1. However, it would be much easier if we received the data earlier in the program and ultimately will be needed to support the licensing efforts with NRC for Phase 2-LTAs and Phase 3-MOX Reload quantities.

If AREVA is not willing to cooperate then there are other sources for data and other options for pellet fabrication. Although moving forward without them could make things more difficult.

I just saw Dean's question on the use of Japanese BWR MOX data. As I understand it, the Japanese had access to MOX databases to qualify their methods. Some of data is owned by AREVA. I anticipate **REDACTED** I will clarify and send response to all.

Thanks,
Sarah

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Wednesday, November 18, 2009 11:35 AM
To: 'Thornhill, Cheryl K'; Leversee, Sarah (GE Infra, Energy)
Subject: RE: Duke Energy won't do more MOX tests

I am thinking of doing a full briefing with Vic and then recommending that

[REDACTED]
Let me know what you think. L

-----Original Message-----

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Wednesday, November 18, 2009 11:26 AM
To: Leversee, Sarah (GE Infra, Energy); Ferek, Lisa L.
Subject: RE: Duke Energy won't do more MOX tests

I think it definitely increases interest. The two things Dean is working is 1) cost to have Areva make the pellets (which they plan to do in a lab scale system somewhere in France) and availability of shipping containers. The whole rods thing fell apart over having to use SST's, NNSA is not willing to try that again. And I think that is where the TVA reactor grade leads program is stuck also, no shipping containers.

I really pushed for a decision by January but I don't think AREVA is making this a priority.....

-----Original Message-----

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Wednesday, November 18, 2009 11:15 AM
To: Ferek, Lisa L.
Cc: Thornhill, Cheryl K
Subject: Duke Energy won't do more MOX tests

Lisa,

Just wanted to make sure you saw this:

http://chronicle.augusta.com/stories/2009/11/17/met_556022.shtml

Duke Energy has opted not to proceed with a third testing cycle for mixed-oxide nuclear fuels at its Catawba reactor in South Carolina. The utility has performed two tests to measure the suitability of similar fuels to be produced at the Savannah River Site. The company said it did not need a third test because previous cycles have already provided the necessary data that would be used as part of the assessment process for MOX. The Augusta Chronicle (Ga.)
<<http://r.smartbrief.com/resp/sPloselrnBhcrvCicelJCicNpGzV?format=standa>
rd> (11/17)

Hopefully this will increase NNSA's interest in our proposal.

Thanks,
Sarah

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Thursday, October 29, 2009 1:02 PM
To: 'Tousley, Dean'; 'Thornhill, Cheryl K'; 'Leversee, Sarah (GE Infra, Energy)'
Cc: Saito, Earl F. (GE Infra, Energy)
Subject: FW: MOX pin report

FYI

From: Ferek, Lisa L.
Sent: Thursday, October 29, 2009 1:01 PM
To: 'Robert, James T'
Cc: Lewis, Jerry L.
Subject: MOX pin report

Hi Jim,

After discussions with DOE NNSA, we have decided that it is too early in the process to provide any sort of formal write-up of the proposed BWR MOX pin concept at this time. As you are aware, years of planning can go into a program such as this before any firm decision is made on whether or not to proceed. Although we are making progress, we (including DOE) are still working through some basic issues that could cause us to significantly change or cancel the plan. Issuing something now could potentially do more harm than good. I apologize for not being able to support your request for this information.

I have sent you the write-up on the BWR licensing amendments that would be required for introduction of MOX lead use assemblies at Columbia. I still owe you comments on the MOX fuel unloading process used in Europe and how it applies to the US. I will send that along shortly. Thanks, Lisa

Lisa L. Ferek
Fuel Management Lead
Energy Northwest
office: 509 377 8148
fax: 509 377 4786

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Thursday, October 22, 2009 1:56 PM
To: 'Mathews, Caroline E'
Subject: RE: INMM PNW

Hi Carrie,

It was good to see you last week. Yes, I am very interested in becoming involved in this conference and will volunteer to be on the Technical Program Committee. We should discuss what role you see for industry and which sectors should be involved. I have pretty good contacts with the enrichers, fabricators and other utility fuel buyers so I should be able to help out. One topic that I would like to see addressed relates to the security and safeguards regulations for MOX fuel. Energy Northwest is currently in the early early early planning stage for a MOX pin program with PNNL, GE, and DOE NNSA and some of the biggest hurdles are going to be in the security arena. Lisa

From: Mathews, Caroline E [mailto:carrie.mathews@pnl.gov]
Sent: Thursday, October 15, 2009 9:29 AM
To: Ferek, Lisa L.
Subject: INMM PNW

Hi Lisa,

I see the PNW chapter of WIN and NA-YGN are co-sponsoring a concert tonight. I think Jon and I will try to go for a bit, and support local events like this. In case you hadn't heard about it (I just saw it in the paper this morning - our organizations should probably all talk to each other more, between ANS-EWS, INMM-PNW, HPS, WIIS, WIN and NA-YGN we should have a critical mass, right?) I wanted to tell you.

And the main reason I'm writing is to see if you would like to get involved in an upcoming conference in Portland: "PNW International Conference on Global Nuclear Security: The Decade Ahead" 11-16 April 2009. I'm chairing it and would like a strong industry component, particularly on perspectives related to new licensing processes, developing and adhering to new requirements related to new threats, international standards for security, industry self-regulation in security/safety/safeguards, and so on. Would you like to be a member of the Technical Program Committee, and perhaps act as a leader in Industry outreach?

Hope all is well, and I look forward to hearing from you. Isn't it wonderful that the weather today is bucking the forecast? Feels like fall again instead of winter already. :-) Enjoy, -Carrie

Carrie Mathews

Program Manager
 SAFEGUARDS, SECURITY ANALYSIS & OPERATIONS

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 Tel: (509) 375-6783
 Fax: (509) 372-4316

2/11/2010

Cell: [REDACTED]
carrie.mathews@pnl.gov
www.pnl.gov

From: Ferek, Lisa L. [mailto:llferek@energy-northwest.com]
Sent: Monday, February 02, 2009 11:24 AM
To: Mathews, Caroline E
Subject: RE: Introduction

Hi Carrie,

I think you are involved with the INMM in the NW. Do you have any meetings planned? I am listed as being in the SW chapter due to my time spent in New Mexico but am now living in Richland and am interested in getting more involved. Thanks, Lisa

From: Gastelum, Zoe N [mailto:zoe.gastelum@pnl.gov]
Sent: Thursday, December 11, 2008 2:32 PM
To: Ferek, Lisa L.; Mathews, Caroline E
Subject: Introduction

Carrie and Lisa,

Based on recent conversations with Carrie on enrichment plant safeguards and a potential final project for school regarding materials flow through the commercial fuel cycle, I think the two of you would have a lot to talk about. Carrie is in charge of projects relating to International Safeguards at the lab, and Lisa does uranium procurement at ENW and just returned from NM where she worked on designing the safeguards system for the new enrichment plant.

Lisa - I looked through a copy of your slides today - looks like you gave a really interesting briefing. We should get together when you get back into town!

Thanks!

Zoe N. Gastelum

Nonproliferation Policy Analyst
SAFEGUARDS, SECURITY ANALYSIS & OPERATIONS

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Wednesday, October 07, 2009 3:39 PM
To: 'Leversee, Sarah (GE Infra, Energy)'; Thornhill, Cheryl K
Cc: Lewis, Jerry L.
Subject: RE: Updated MOX Cost Estimate-GEH

Cheryl,

I have updated the cost estimate for EN's scope of the MOX pins program. My total estimate is \$ [REDACTED] if I account for GNF costs incurred at the site) or \$ [REDACTED] (not including these costs). This estimate is for 2010-2019.

Here are the GNF items that mv [REDACTED]

REDACTED REDACTED REDACTED

My breakdown for the next 4 fiscal years is:

2010 - \$ [REDACTED]

2011 - \$ [REDACTED]

2012 - \$ [REDACTED]

2013 - \$ [REDACTED]

This assumes very minimal work occurs at EN in 2010 - namely in the areas of contracts, security, and licensing.

Thanks, Lisa

-----Original Message-----

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Wednesday, October 07, 2009 11:17 AM
To: Thornhill, Cheryl K; Ferek, Lisa L.
Subject: Updated MOX Cost Estimate-GEH

Cheryl,

I have updated the cost estimate for GEH/GNF's scope of the MOX pins program. The updated estimate is approximately [REDACTED]

This updated estimate includes:

- * (Pre-manufacturing audit and manufacturing inspection/surveillance at the Melox fabrication facility in France
- * GEH/GNF scope to support Energy Northwest in new fuel introduction activities at the site
- * Uses a discounted Commercial T&M rate, rather than a build up rate)

From the technical side, the pin program will not be significantly affected by the use of WG vs. RG Pu. There are several issues that have been identified, but they can be addressed. One interaction that is different is when the heterogeneities of the MOX are looked at, the WG may be more

problematic due to its high "enrichment" of Pu-239 and the hot spots are hotter than they would be in RG material. The other is the issue of gallium. It is likely that these issues have been addressed by Areva and/or DOE, if so this another example that would be helpful to get access to Euro MOX database.

Please let me know if you would like to discuss.

Thanks,
Sarah

Sarah Leversee
GE Hitachi Nuclear Energy
Fuel Cycle R&D

T 330-650-5272

C [REDACTED]
sarah.leversee@ge.com
www.ge-energy.com/nuclear

92 Emerald Ave
Streetsboro, OH 44241

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Thursday, October 01, 2009 1:25 PM
To: Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy)
Cc: Lewis, Jerry L.; Saito, Earl F. (GE Infra, Energy)
Subject: RE: MOX update

This is all very positive. Wes and I talked for a bit today and I reinforced that we were actively working their request and hope to get back with them next week. I am hosting TVA on Tuesday and Wednesday, so maybe a status call on Thursday?

We estimated that just over 2kg of Pu would be needed to make 16 rods plus one spare and assuming process losses. 1.6 sounds a little light as we would need to do some confirmatory analyses, could have breakage en route, etc, so we probably need to call this out in the letter. [REDACTED]

The local papers also stated one of the reasons for the AREVA consolidation in Richland was due to the loss of US business. This is so consistent with everything we have heard since we started this journey and hopefully DOE is getting a lesson in the US utility marketplace. Wes said today that this "was so big there is room for both Energy Northwest and TVA". Budget language today, while giving them their 10 monies, was not very flattering and expressed concerns with future cost growth and the department's management of the program.....

From: Ferek, Lisa L. [mailto:lferek@energy-northwest.com]
Sent: Wednesday, September 30, 2009 4:15 PM
To: Leversee, Sarah (GE Infra, Energy); Thornhill, Cheryl K
Cc: Lewis, Jerry L.; Saito, Earl F. (GE Infra, Energy)
Subject: MOX update

I spoke to DOE - Dean Tousley and Wes Taylor - today just to follow-up on my conversation with them from last week.

I told them that we were all still very interested in the irradiated pins program and are currently working on revised cost estimates and schedules assuming that PNNL does not have to make the pellets. I said that the info would probably come to DOE from Cheryl similar to the other letter that we provided to them. I estimated one or two more weeks before the letter was issued.

I told them that GEH was evaluating the use of RG vs WG MOX to ensure that we were still going to get some useful data from the pin program.

Dean told me that "they" (not sure who) calculated that only 1.3 kg Pu would be needed for the total 16 rods. We may want to validate this number. [REDACTED]

Dean told me that AREVA is currently checking into shipping containers for international shipments for the pellets and they are also evaluating when to make the GNF pellets at MELOX.

I re-iterated to Dean the need for EN and GEH to talk with NRC about the licensing for the pins (especially the use of current GNF codes and methods). I told him that being able to use the existing codes for the pin irradiation is a big assumption in the schedule. [REDACTED] NRC does not agree with this, then code licensing definitely becomes critical path. I told him [REDACTED] His big concern is that "anytime you talk to the NRC it becomes public." Right now, we want to manage the political and public relations issues- not have them manage us.

Dean expressed interest in setting up a technical meeting at some point - he suggested coming out here and touring the lab facilities as well as Columbia Generating Station and AREVA's fab plant. Apparently, AREVA just announced they are closing their fabrication plant in Lynchburg and will be consolidating both BWR and PWR manufacturing in Richland. I told him that we can certainly facilitate this and to let me know the timeframe.

Dean also agreed that we should set up regular conference calls between the team and DOE at some frequency just to touch base with developments. Apparently, DOE is already doing this with TVA. I think this is a good idea. Perhaps we can schedule a call after we submit the revised cost and schedule information and then set up recurring calls thereafter.

Lisa

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Monday, September 14, 2009 8:40 PM
To: 'Thornhill, Cheryl K'
Subject: RE: Next steps

Hi Cheryl,

I apologize for not responding sooner. I reviewed the letter to DOE and thought that the numbers looked good. I will be back in the office next week and we can discuss more at that time. My biggest concern is that DOE coughs up the \$\$ for 2013 and then we can't deliver for one reason or another.
L

-----Original Message-----

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Thursday, September 10, 2009 5:14 PM
To: Ferek, Lisa L.
Subject: RE: Next steps

Lisa,

I know you are somewhere in travel but can you provide the numbers for 10, 11, 12 and 13?

-----Original Message-----

From: Ferek, Lisa L. [mailto:llferek@energy-northwest.com]
Sent: Monday, September 07, 2009 10:28 PM
To: Thornhill, Cheryl K; sarah.leversee@ge.com
Subject: RE: Next steps

Cheryl,

EN would need ~\$ [REDACTED] in FY10 for scenarios 1 and 2 and probably only \$ [REDACTED] in FY10 for scenario 3. This assumes no licensing submittal to NRC for EN tech specs, etc. in FY10, no NRC fees. L

Lisa L. Ferek
Fuel Management Lead
Energy Northwest
01 509 377 8148

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Thu 9/3/2009 9:05 AM
To: sarah.leversee@ge.com; Ferek, Lisa L.
Subject: Next steps

I asked my staff to give me 3 scenarios:

1. [REDACTED]

2. [REDACTED]
What is that fiscal year (october thru sept) funding profile for each year?
3. [REDACTED]

We actually need a number of pins for 2015 as 13 is the assumption for cases 1 and 2. More are feasible with a relaxed schedule.

Lisa do you have any utilities other than TVA who have ever spoken about mox? According to sources they are still seeing 60M to get 1 utility.....

Sent from my BlackBerry Wireless Handheld

Rains, Angel D.

From: Richmond, William G [Bill.Richmond@pnl.gov]
Sent: Friday, September 04, 2009 7:44 AM
To: Ferek, Lisa L.
Subject: FW: Information from NNSA Meeting on Thursday

From: Richmond, William G
Sent: Friday, September 04, 2009 7:43 AM
To: Thornhill, Cheryl K; Leversee, Sarah (GE Infra, Energy); Lisa L Ferek (lferek@energy-northwest.com); Earl Saito Ph. D (earl.saito@ge.com)
Subject: Information from NNSA Meeting on Thursday

All –

NNSA met with Shaw-Areva on Thursday morning to start develop the planning assumptions for the new MFFF baseline (reflecting the loss of Duke & the use of BWRs in addition to or instead of PWRs).

I spoke with a couple of the participants of this meetings and as you may have guessed our proposal was discussed. The objections/discussion points as I was told them are –

1. 60 million is a lot of money to pay for a single reactor that will only fill a small amount (3-5% is the number I heard) of the MFFF capacity

I think [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED]
[REDACTED] [REDACTED] [REDACTED] [REDACTED]
[REDACTED] [REDACTED] [REDACTED] [REDACTED]
[REDACTED] [REDACTED] [REDACTED] [REDACTED]
[REDACTED]

2. How good is a letter of intent that was made by a CEO who is now gone?

[REDACTED]

3. There is substantial risk with the 2013 schedule

[REDACTED] [REDACTED] [REDACTED]

REDACTED

[REDACTED]

- 4. Are they expecting to be paid for the initial assemblies is this another leads program?

REDACTED

REDACTED

REDACTED

REDACTED

I would recommend that we get together by phone on Tuesday to discuss this as I think the way to get this in front of NNSA is in our transmittal of our responses to the action items.

I would appreciate it if you would keep this close as it was revealed to me in confidence.

Bill Richmond

Chief Engineer

Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K8-34
Richland, WA 99352 USA
Tel: 509-372-6315
Cell: [REDACTED]

Fax: 509-372-6421
Bill.Richmond@pnl.gov
www.pnl.gov

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Monday, August 24, 2009 5:40 PM
To: Laws, Christopher T.; Lewis, Jerry L.
Subject: FW: Draft presentation for MOX Services

Now Cheryl is saying [REDACTED]
[REDACTED] I'll send out finalized slides when I get them. L

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Mon 8/24/2009 4:43 PM
To: Leversee, Sarah (GE Infra, Energy); Ferek, Lisa L.
Subject: RE: Draft presentation for MOX Services

Sarah,

I will have about 3 vugraphs to insert at the beginning to "set the stage", it is the R2A2 that we discussed last week with a End State vision and Pins program. I am getting with Bill tomorrow afternoon to combine our comments and get one set to you. I think there is a lot there that is really good, may be a little too much, but we will get comments. We did the internal review on Friday and then as you know Gary spoke to some of your staff on Friday and he is having to revise some of his numbers. Main comment I received was to make sure I emphasized the PROCESS and not so much the facility thought it is good to know there are new glove boxes they can have.

[REDACTED] We are developing a position paper to that effect. Thought I would have a presentation to share today but the changes aren't done yet.

-----Original Message-----

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Monday, August 24, 2009 2:47 PM
To: Ferek, Lisa L.; Richmond, William G; Thornhill, Cheryl K
Subject: Draft presentation for MOX Services

Team,

Here are draft slides for presentation to MOX Services.

Lisa-Included 2 slides in the beginning for you, feel free to modify

Cheryl-There is a place holder for you to include the Pins-specific information.

Suggest review this version, add your comments Tuesday and we can talk Wednesday?

Thanks,
Sarah

<<MOX Services 9_2_09 DRAFT 8.24.ppt>>

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Tuesday, August 18, 2009 9:15 AM
To: Lewis, Jerry L.; Gambhir, Sudesh
Subject: FW: question

FYI

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Tuesday, August 18, 2009 3:01 AM
To: Ferek, Lisa L.
Subject: Re: question

Every national lab and operating site like Hanford is a GOCO, government owned contractor operated. Every month the DOE offices (NNSA, NE,EM) submit funding notices for how much funds are being moved from the HQ account for that office to the field and to a particular site or lab. The lab would receive the funds to spend about 30 days later. This is called the financial plan and is the only contract between the lab and that office for a particular work scope. Doesn,t have to be competed or go through a contracts organization,etc. The actual management of PNNL is through the DOE Office of Science (SC). Hanford is managed by EM. But any DOE office can use any DOE lab or site. NN has the mox project and they don't manage any labs but fund all of them.

Sent from my BlackBerry Wireless Handheld

Rains, Angel D.

From: Saito, Earl F. (GE Infra, Energy) [Earl.Saito@gnf.com]
Sent: Monday, August 17, 2009 6:12 AM
To: Thornhill, Cheryl K; Ferek, Lisa L.
Cc: sarah.leversee@ge.com; Lewis, Jerry L.
Subject: RE: Beginnings of an Agenda Outline
Attachments: Draft Agenda for Energy Northwest r1.doc

I have attached a new proposed agenda for comments.

New items:

- Overview of proposal [explain the risk mitigation approach. need to drive action now vs. waiting 3-5 years to start]
 - Full Reloads
 - Lead Fuel Assemblies
 - Pins
- Discussion items
 - Need for iterative process to optimize system [set expectation that even with full reloads there will be an optimization approach]
 - MFFF as sub-contractor (purchase of MOX vs. sale of irradiation services) [if value is so low that MFFF has to pay to take fuel it will be a contract that is difficult]
 - BWR bundle manufacture vs. PWR bundle manufacture [the big issue will be number of zones and number of rods per bundle; this comes back to iterative process to optimize]
 - Contaminants (assume same as those in specification uranium). Discussion on those that may be different
 - License issues for plant and bundles [NRC approvals the biggest risk to the schedule. The sooner we talk to the NRC the better]

Previous:

- Plutonium Oxide and Uranium Oxide Specifications
- MOX Process
- Pellet dimensions
- Rod design –dimensions, material, welding, loading
- Assembly design including number of different MOX loadings and any axial variation in MOX loadings and uranium and burnable absorber design
- Maximum MOX fuel rod and assembly burnup
- Lead assemblies and Fuel Assembly Design
- Batch MOX Fuel—typical number of assemblies and design
- Reload Analyses and responsibilities
- Licensing Approach for lead rods, lead assemblies, and batch MOX fuel

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]

Sent: Sunday, August 16, 2009 3:31 PM
To: llferek@energy-northwest.com; Saito, Earl F. (GE Infra, Energy)
Cc: Leversee, Sarah (GE Infra, Energy); jllewis@energy-northwest.com
Subject: Re: Beginnings of an Agenda Outline

If I ask for a conference call Dean will feel obligated to get all the people we are meeting with on the phone so I don't see that as gaining much. We can set the expectations from our counter proposed agenda and set of questions for them. If they want to know our pellet dimensions don't we first need to know what the press they are specifying can accomodate? Maybe the best description of what we are providing is an implementation plan. We have already had the meeting to describe our good idea. They agreed it was a good idea now we can tell them how we propose to implement that good idea. With a sound plan we will look good and we need to be prepared to answer some questions with we would need to be funded or we would need to have negotiations,etc to answer. I can get on the phone tuesday afternoon or later next week to discuss further.

 Sent from my BlackBerry Wireless Handheld

From: Ferek, Lisa L. <llferek@energy-northwest.com>
To: Thornhill, Cheryl K; Saito, Earl F. (GE Infra, Energy) <Earl.Saito@gnf.com>
Cc: sarah.leversee@ge.com <sarah.leversee@ge.com>; Lewis, Jerry L. <jllewis@energy-northwest.com>
Sent: Fri Aug 14 16:32:07 2009
Subject: RE: Beginnings of an Agenda Outline

Cheryl,

After discussing the upcoming meeting with Earl, I am wondering if it would be possible to set up a conference call with the folks at DOE next week to discuss toning down their proposed agenda to be something less technical and more conceptual? They can vet the concept all they like but we are not ready (nor is it helpful) to talk about pellet sizes, etc. for fabrication at the MFFF. I guess my concern is that we come off looking like we are not answering their questions and thereby leave a bad taste in their mouths. I know that I, for one, am not planning to answer the questions concerning how many fuel bundles we will take for reload quantities or how much we will pay for them in any sort of detail or specificity. EN can't commit to anything with any certainty other than willingness to commit to a phased approach beginning with the irradiation of 10-20 pins. (Obviously, EN wouldn't be doing this if we weren't interested in burning MOX in reload quantities eventually.) Also, although I am meeting with our VP next week to discuss a more formal commitment from EN (such as a letter or intent or MOU), [REDACTED]

I know you are on travel next week. Please let myself and Earl/Sarah know your thoughts. Thanks, Lisa

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Friday, August 14, 2009 3:31 PM
To: Leversee, Sarah (GE Infra, Energy); Ferek, Lisa L.; Richmond, William G
Subject: Beginnings of an Agenda Outline

Outline of Agenda

1. Identification of R2A2, Advantages of pin program and Deployment Overview (PNNL)
2. Technical Approach to Develop a BWR Fuel Design (GE)
 - a. Generic BWR descriptions

- b. Currently available codes and data
- c. Data and code development needs
- d. Licensing strategy
- e. Critical Path Activities
- 3. Technical Approach to Fabricating Pins (PNNL)
 - a. Facility Preparations
 - b. Pu (and U) acquisition and receipt
 - c. Equipment Procurements
 - d. Analytical Assumptions
 - e. Process Development Plans
 - f. Fabrication operations
 - g. GE/ENW Interface
 - h. Critical path activities
- 4. Use of ENW reactor for MOX Program (ENW)
 - a. Phased Licensing strategy
 - b. Modifications
 - c. MOX Fuel Procurement strategy (philosophy?)
 - d. Public Relations (i.e. how to use the Energy Northwest name)
 - e. Critical path activities
- 5. The Japanese Experience (GE)
 - a. Overview
 - b. Proprietary issues and resolution

As always comments are welcomed.

Cheryl Thornhill

Program Manager
National Security Division

Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K9-85
Richland, WA 99352 USA
Tel: 509-375-2532
Fax: 509-375-2610
Cheryl.Thornhill@pnl.gov
www.pnl.gov

Draft Agenda for Energy Northwest, PNNL, GEH MOX Meeting

- 7:00 Arrive at Badge Office for badging and briefing
- 7:50 Arrive at MOX Services Administration Building
- 8:00 Introductions
- 8:15 MOX Overview—Stinson or King
- 9:15 Break
- 9.30 Technical Approach proposed by ENW/PNNL/GEH
 - Overview of proposal
 - Full Reloads
 - Lead Fuel Assemblies
 - Pins
 - Discussion items
 - Need for iterative process to optimize system
 - MFFF as sub-contractor (purchase of MOX vs. sale of irradiation services)
 - BWR bundle manufacture vs. PWR bundle manufacture
 - Contaminants (assume same as those in specification uranium). Discussion on those that may be different
 - License issues for plant and bundles
- 11:00 Discuss Proprietary Issues
 - GE Proprietary Information
 - AREVA Proprietary Information
- 12:00 Lunch
- 1:00 MFFF Tour
- 1:30 Discuss Contractual Relationships
- 2:00 Uncertainty on MFFF Operation and Fuel Supply Schedule
- 2:30 MOX Fuel Package for BWRs, transportation, security
- 3:00 Break
- 3:15 Expected MOX Batch Fuel Discount
- 3:30 Questions/Answers/Action Items
- 4:00 Leave for Badge Office

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Monday, August 17, 2009 5:46 AM
To: Ferek, Lisa L.; Earl.Saito@gnf.com
Cc: sarah.leversee@ge.com; Lewis, Jerry L.
Subject: Re: Beginnings of an Agenda Outline

Turns out I am with doe this week who will be in our meeting so I am setting expectations

 Sent from my BlackBerry Wireless Handheld

From: Ferek, Lisa L. <liferek@energy-northwest.com>
To: Thornhill, Cheryl K; Saito, Earl F. (GE Infra, Energy) <Earl.Saito@gnf.com>
Cc: sarah.leversee@ge.com <sarah.leversee@ge.com>; Lewis, Jerry L. <jllewis@energy-northwest.com>
Sent: Fri Aug 14 16:32:07 2009
Subject: RE: Beginnings of an Agenda Outline

Cheryl,

After discussing the upcoming meeting with Earl, I am wondering if it would be possible to set up a conference call with the folks at DOE next week to discuss toning down their proposed agenda to be something less technical and more conceptual? They can vet the concept all they like but we are not ready (nor is it helpful) to talk about pellet sizes, etc. for fabrication at the MFFF. I guess my concern is that we come off looking like we are not answering their questions and thereby leave a bad taste in their mouths. I know that I, for one, am not planning to answer the questions concerning how many fuel bundles we will take for reload quantities or how much we will pay for them in any sort of detail or specificity. EN can't commit to anything with any certainty other than willingness to commit to a phased approach beginning with the irradiation of 10-20 pins. (Obviously, EN wouldn't be doing this if we weren't interested in burning MOX in reload quantities eventually.) Also, although I am meeting with our VP next week to discuss a more formal commitment from EN (such as a letter or intent or MOU), [REDACTED]

I know you are on travel next week. Please let myself and Earl/Sarah know your thoughts. Thanks, Lisa

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Friday, August 14, 2009 3:31 PM
To: Leversee, Sarah (GE Infra, Energy); Ferek, Lisa L.; Richmond, William G
Subject: Beginnings of an Agenda Outline

Outline of Agenda

1. Identification of R2A2, Advantages of pin program and Deployment Overview (PNNL)
2. Technical Approach to Develop a BWR Fuel Design (GE)
 - a. Generic BWR descriptions
 - b. Currently available codes and data

- c. Data and code development needs
- d. Licensing strategy
- e. Critical Path Activities
- 3. Technical Approach to Fabricating Pins (PNNL)
 - a. Facility Preparations
 - b. Pu (and U) acquisition and receipt
 - c. Equipment Procurements
 - d. Analytical Assumptions
 - e. Process Development Plans
 - f. Fabrication operations
 - g. GE/ENW Interface
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- 4. Use of ENW reactor for MOX Program (ENW)
 - a. Phased Licensing strategy
 - b. Modifications
 - c. MOX Fuel Procurement strategy (philosophy?)
 - d. Public Relations (i.e. how to use the Energy Northwest name)
 - e. Critical path activities
- 5. The Japanese Experience (GE)
 - a. Overview
 - b. Proprietary issues and resolution

As always comments are welcomed.

Cheryl Thornhill
Program Manager

National Security Division

Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K9-85
Richland, WA 99352 USA
Tel: 509-375-2532
Fax: 509-375-2610
Cheryl.Thornhill@pnl.gov
www.pnl.gov

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Thursday, August 13, 2009 11:37 AM
To: Lewis, Jerry L.; Laws, Christopher T.
Subject: FW: MOX SRS Visit Discussion

FYI on the reason behind the meeting with MOX Services on 9/2. L

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Thursday, August 13, 2009 11:34 AM
To: Leversee, Sarah (GE Infra, Energy)
Cc: Ferek, Lisa L.
Subject: RE: MOX SRS Visit Discussion

You hit the nail on the head: NNSA is looking to MOX Services to "advise" them that we have a technically sound proposal. Thus there will be technical questions which we need to be prepared to answer. I suggest we lead off with presentations on our approaches to design (GE), Fabrication (PNNL) and licensing (ENW). Then be prepared for questions. I think

[REDACTED] That is why I felt so strongly we should get together and dry run our information but perhaps it can be done long distance. The more we are prepared for 9/2 the more likely we are to get a decision and not a schedule for another meeting to answer questions. Ultimately NNSA is the decision maker but there is so much money at stake that they want to know they are doing the right thing.

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Thursday, August 13, 2009 11:19 AM
To: Thornhill, Cheryl K
Subject: RE: MOX SRS Visit Discussion

Great, thanks Cheryl.

We have a university workshop here this week, i've got 50+ nuclear engineers in classes and tours...been a little crazy.

For the call in a few hours I would like to discuss the purpose and the scope of the SRS meeting on Sept 1&2. I know they (MOX Services) wants to hear our technical approach for ultimate bundle fabrication. But who should we be working with to obtain funding for FY 2010? Is DOE NNSA HQ waiting on recommendation from MOX Services that we have a technically sound approach for pins/bundles/methods/fabrication?

Thanks,
Sarah

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Thursday, August 13, 2009 2:15 PM
To: Leversee, Sarah (GE Infra, Energy)
Subject: RE: MOX SRS Visit Discussion

I am available.

-----Original Appointment-----

From: Leverage, Sarah (GE Infra, Energy) [mailto:sarah.leverage@ge.com]

Sent: Thursday, August 13, 2009 11:13 AM

To: Ferek, Lisa L.; Thornhill, Cheryl K

Subject: MOX SRS Visit Discussion

When: Thursday, August 13, 2009 1:00 PM-2:00 PM (GMT-08:00) Pacific Time (US & Canada).

Where: 1-800-501-0843, passcode: [REDACTED]

Ladies,

Sorry for short notice in setting up the call. Are you available at 1pm Pacific today for a tele-conference?

Thanks,

Sarah

Rains, Angel D.

From: Saito, Earl F. (GE Infra, Energy) [Earl.Saito@gnf.com]
Sent: Tuesday, August 04, 2009 6:03 PM
To: Thornhill, Cheryl K; Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy)
Subject: RE: MOX Fuel for Energy Northwest

We need to avoid getting into a technical battle. EN (and other utilities) wants to have selection in design. AREVA is the MOX leader, but a single vendor is not attractive to the US utility model. I suggest the following slides. They have technical concepts but we avoid talking 2 vs 4 ppm at this time. Please add/subtract from this outline.
-Earl

Slide 1: From DC pack pins then bundles then reloads

Slide 2: overview of potential contracting (no MFFF in phase one PNNL to EN for irradiation and GEH for design), EN to GNF sub to MFFF for leads and reloads.

Slide 3: BWR vs PWR in manufacture (end caps different, slight diameter difference, blankets, axial enrichment, bundle patterns, and grids).

Slide 4: Specifications and how to deal with them (identify necessary variance from UO2 fuel) then determine penalty for design modifications

Slide 5: Core design for energy concept (why the number of MOX bundles will vary).

These may take more than 1 slide each but they are the key concepts.

-----Original Message-----

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Tuesday, August 04, 2009 1:02 PM
To: lferek@energy-northwest.com; Leversee, Sarah (GE Infra, Energy)
Cc: Saito, Earl F. (GE Infra, Energy)
Subject: FW: MOX Fuel for Energy Northwest
Importance: High

Team,

Here is our formal invitation. I have a slight preference for the 2, but can make the 1 if that works better for everyone else. Earl, I know Sarah is on vacation but perhaps you can get this information to the team members. I would like to propose on our conference call next Thursday we generate our own list of questions to add to the meeting agenda. THANKS, Cheryl

-----Original Message-----

From: Clark, Richard H. [mailto:RHClark@moxproject.com]
Sent: Tuesday, August 04, 2009 4:14 AM
To: Thornhill, Cheryl K
Cc: Tousley, Dean; Carol.Elliott@nnsa.srs.gov; King, Sue; virginia.kay@nnsa.srs.gov; Newby, Peter G.

Subject: MOX Fuel for Energy Northwest

Dear Cheryl,

As follow-up to our phone call on July 22nd, I would like to offer you, ENW, and GEH personnel the opportunity to visit the MOX Project at Savannah River Site on September 1st with September 2nd as an alternate date. We would like to do this before Labor Day since a key member of our staff is going to France after that. This assumes that all visitors are US citizens, I would need more time to get foreign visitors onto the site.

I have attached a draft agenda for your review and a badge request form which visitors will need to complete the top section and return to me by August 20.

If you have DOE badges they should work at SRS and no visitor form is needed.

Please let me know if this date is acceptable.

Thank you,

Richard H. Clark, P.E.

Shaw AREVA MOX Services, LLC.

Mail: PO Box 7097, Aiken, SC 29804-7097
FedEx: SRS, F-Area, Building 706-1F, Aiken, SC, 29808 Office Location:
BAD-116
Office: 803-819-2687
Cell: [REDACTED]
Fax: 803-819-2483

rhclark@moxproject.com

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Rains, Angel D.

From: Ferek, Lisa L.
Sent: Tuesday, August 04, 2009 12:51 PM
To: Parrish, Joseph V.; Gambhir, Sudesh; Lewis, Jerry L.; Bradley, Pamela R.
Subject: FW: MOX Fuel for Energy Northwest

Importance: High

Attachments: Visitor Badge Request.doc; Draft Agenda for Energy Northwest.doc



Visitor Badge Request.doc (46 ...
Draft Agenda for Energy Northw...

FYI - DOE has requested a follow-up meeting regarding the MOX pin concept which was presented to them on Jul 9th meeting in DC (with Vic, GEH, PNNL and DOE). The meeting will be either Sept 1st or 2nd at the Savannah River site in Aiken, South Carolina.

I will schedule a meeting for next week with the pertinent EN technical folks to discuss those agenda items related to EN. I plan to develop a list of EN personnel to attend the meeting in SC.

Thanks, Lisa

-----Original Message-----

From: Thornhill, Cheryl K [mailto:cheryl.thornhill@pnl.gov]
Sent: Tuesday, August 04, 2009 10:02 AM
To: Ferek, Lisa L.; Leversee, Sarah (GE Infra, Energy)
Cc: Saito, Earl F. (GE Infra, Energy)
Subject: FW: MOX Fuel for Energy Northwest
Importance: High

Team,

Here is our formal invitation. I have a slight preference for the 2, but can make the 1 if that works better for everyone else. Earl, I know Sarah is on vacation but perhaps you can get this information to the team members. I would like to propose on our conference call next Thursday we generate our own list of questions to add to the meeting agenda. THANKS, Cheryl

-----Original Message-----

From: Clark, Richard H. [mailto:RHClark@moxproject.com]
Sent: Tuesday, August 04, 2009 4:14 AM
To: Thornhill, Cheryl K
Cc: Tousley, Dean; Carol.Elliott@nnsa.srs.gov; King, Sue; virginia.kay@nnsa.srs.gov; Newby, Peter G.
Subject: MOX Fuel for Energy Northwest

Dear Cheryl,

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get foreign visitors onto the site.

I have attached a draft agenda for your review and a badge request form which visitors will need to complete the top section and return to me by August 20.

If you have DOE badges they should work at SRS and no visitor form is needed.

Please let me know if this date is acceptable.

Thank you,

Richard H. Clark, P.E.

Shaw AREVA MOX Services, LLC.

Mail: PO Box 7097, Aiken, SC 29804-7097

FedEx: SRS, F-Area, Building 706-1F, Aiken, SC, 29808 Office Location:

BAD-116

Office: 803-819-2687

Cell: [REDACTED]

Fax: 803-819-2483

rhclark@moxproject.com

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Please advise immediately if you or your employer do not consent to Internet email for messages of this kind. Opinions, conclusions, and other information in this message that do not relate to the official business of Shaw Areva MOX Services LLC or its subsidiaries shall be understood as neither given nor endorsed by it.

Visitor Badge Request

Date of Visit:		
Last Name:		
First Name:		
Middle Initial:		
Company (visitor's company):		
Citizenship:		
SSN:		
Site Visiting (include bldg.):		
Purpose of Visit:		
Will Visitor Be Bringing a Laptop (5 days notice & additional paperwork required)		
<input type="checkbox"/> Yes (If Yes, Please provide justification) <input type="checkbox"/> No		
Site Host/Dept./Location/Phone #:		
Host (ACP) Briefing Acknowledgement (sign and date):		
Alternate Site Host/Dept./Location/Phone #:		
Alternate (ACP) Briefing Acknowledgement (sign and date):		
Hazard Level: <input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High		
<u>Low</u> Housekeeping PPE/Body Mechanics Tools and Small Equipment Other	<u>Medium</u> Confined Space Hazardous Material/Environment Fire Protection Excavations Movement of Tall or Narrow Cabinets Other	<u>High</u> Elevated Work Medium and Heavy Equipment Hoisting and Rigging Hazardous Energy Trailers Machete/Chainsaw Use Other
If medium or high hazard, additional forms required, please contact Diane Marozas @ x2877		
Visitor's Email Account:		
Requestor's Name and Phone #:		
Additional Visitor's, Co. Name, Citizenship, SS#'s and e-mail address (if different from above) for this specific visit:		

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Draft Agenda for Energy Northwest, PNNL, GEH MOX Meeting

- 7:00 Arrive at Badge Office for badging and briefing
- 7:50 Arrive at MOX Services Administration Building
- 8:00 Introductions
- 8:15 MOX Overview—Stinson or King
- 9:15 Break
- 9:30 Technical Approach proposed by ENW/PNNL/GEH
 - Plutonium Oxide and Uranium Oxide Specifications
 - MOX Process
 - Pellet dimensions
 - Rod design –dimensions, material, welding, loading
 - Assembly design including number of different MOX loadings and any axial variation in MOX loadings and uranium and burnable absorber design
 - Maximum MOX fuel rod and assembly burnup
 - Lead assemblies and Fuel Assembly Design
 - Batch MOX Fuel—typical number of assemblies and design
 - Reload Analyses and responsibilities
 - Licensing Approach for lead rods, lead assemblies, and batch MOX fuel
- 11:00 Discuss Proprietary Issues
 - GE Proprietary Information
 - AREVA Proprietary Information
- 12:00 Lunch
- 1:00 MFFF Tour
- 1:30 Discuss Contractual Relationships
- 2:00 Uncertainty on MFFF Operation and Fuel Supply Schedule
- 2:30 MOX Fuel Package for BWRs, transportation, security
- 3:00 Break
- 3:15 Expected MOX Batch Fuel Discount
- 3:30 Questions/Answers/Action Items
- 4:00 Leave for Badge Office

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Tuesday, July 28, 2009 11:06 AM
To: Leversee, Sarah (GE Infra, Energy); Ferek, Lisa L.; Sevigny, Gary J; Hanson, Brady D; Richmond, William G; Buelt, James L
Subject: Summary of Meeting

Following is a summary of the meeting I had last week with DOE and MOX services.

Organizationally NNSA sends money to the Savannah River Site Office. The SRS site holds the contract with Shaw AREVA MOX Services. MOX Services is an LLC formed by Shaw Engineering and AREVA. Duke Engineering was one of the original partners but Duke sold off Duke Engineering. The reactors were always a sub vendor to the main partners. Shaw has to be the majority partner as the majority position could not be held by a foreign owned company. Last week I met with Dean Tousley, who is NNSA – HQ. He had invited Marcy Fowler who is an intern in the office and Wes Taylor who had transferred to DP but is transferring back to NA-26. Wes used to work for TVA in the fuels group so he is generally listened to by the 26 crowd. He is a long time (15 year) friend of mine. On the phone was Carol Elliot who is the NNSA-SRS contracting officer for MOX Services and her assistant David (Whose last name I didn't catch). Also on the phone was Sue King who is the Vice President for MOX Services and 2 of her staff – Richard Clark and Peter (last name not provided). In the vision of the future NNSA will fund NNSA-SRS who contracts with MOX Services. MOX Services is then to contract with utilities to burn MOX. At one time DOE thought they would hold all the contracts but they now realize that just isn't a model utilities are buying in to. So the negotiations on the price to be paid for the fuel will be with MOX Services who I expect

As we have previously discussed they want us to come to SRS – in early September – for a tour of the MOX facility and more detailed technical discussions. I have asked Dean for an agenda or a list of questions. Bill knows Sue King quite well and is going to ask her this week for a list of questions as well. Then we can plot the strategy. I think it is safe to say they are very interested in our idea. They are EXTREMELY interested in having Energy Northwest become an interested utility. At this point in time they are trying to find out if there are any “fatal flaws” in what we are proposing. I think

We will need a list of advantages of having options for the utility to consider.

I also think the MOX Services folks are having a little bit of trouble with the vision – i.e., MFFF as a contract fabricator who has multiple designs to offer utilities, not all of them AREVA designs. So when we meet with them we will have to clarify:

1. This is a GE design and these are the steps GE will take to provide that design, xxxxxx. While we will attempt to use the currently specified equipment there might have to be differences – not known until we know more about the process equipment and we have had time to work on the design. Issues they mentioned off the bat include details of the assembly design, pellet enrichment differences (we

believe they want to minimize those), limits on burnup, is 3 2 year cycles really do-able from a fission gas release perspective. They are concerned with the proprietary information issue and we will have to speak to that. GE will need an "approach to BWR fuel design and licensing" presentation.

2. Benefits of a pins program – Richard thought you needed a full assembly to qualify MOX. The pins program gets MOX fuel performance EARLY, absence the assembly performance so there is confidence in deploying full assemblies. In my opinion:

REDACTED

REDACTED

I will work on a "Benefits of Pins Program" presentation that I would like all to contribute to. Generally I think this would be a good topic for EN to lead.

3. Ability of PNNL to really build fuel.

REDACTED

REDACTED

PNNL will have to have a sound technical approach to alleviate this aspect. We are going to do an in house review of the technical approach and the costs in the next couple of weeks to determine if there are any weak areas we need to bolster and to validate the preliminary cost estimate. I expect we will once again be asked for numbers in September unless they have convinced themselves this concept has a fatal flaw.

I think this covers everything we talked about on the phone. I regret that there is this month long lag before we get to meet with them but summer is usually hard to schedule large group meetings.

Cheryl Thornhill

Program Manager
National Security Division

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Richland, WA 99352 USA
Tel: 509-375-2532
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Cheryl.Thornhill@pnl.gov
www.pnl.gov

Rains, Angel D.

From: Ferek, Lisa L.
Sent: Thursday, July 02, 2009 9:57 AM
To: Parrish, Joseph V.
Cc: Lewis, Jerry L.; Armenta, Miguel A.; Gambhir, Sudesh; Cadwell, Beverly A.
Subject: FW: MOX Slides for NNSA 7/2

Attachments: BWR Fuel Qualification for the MFFF 7-2 Notes for Vic.pdf



BWR Fuel
Qualification for the...Vic,

Here is a draft set of the slides to be used in the meeting with DOE. PNNL still needs to finish up slide 9 and I imagine other tweaks will be made but this is basically what will be presented to DOE. I wanted to give you a chance to see these before the pre-meeting Thursday morning in case you want to make changes.

I have provided notes on each slide for you to indicate who is going to be speaking and provide any background info as needed. You will be taking the lead on the presentation with transition to the other groups (GEH and PNNL) at slide 6.

Please contact me with any questions comments x8148. My cell is [REDACTED] I am in the office M-W of next week (7/6-7/8). Thanks, Lisa

-----Original Message-----

From: Leversee, Sarah (GE Infra, Energy) [mailto:sarah.leversee@ge.com]
Sent: Thursday, July 02, 2009 7:41 AM
To: Thornhill, Cheryl K; Ferek, Lisa L.; Saito, Earl F. (GE Infra, Energy); Richmond, William G; Buelt, James L
Subject: MOX Slides for NNSA 7/2

Team,

Attached are updated slides...Thanks for good discussion to ensure we have a clear message. Please let me know if I have missed anything.

<<BWR Fuel Qualification for the MFFF 7-2.ppt>> Have a fun and safe weekend!

Thanks,
Sarah

Sarah Leversee
GE Hitachi Nuclear Energy
Advanced Fuel Cycle Initiative

T 330-650-5272

C [REDACTED]
sarah.leversee@ge.com
www.ge-energy.com/nuclear

92 Emerald Ave
Streetsboro, OH 44241

BWR Fuel Qualification for the MFFF



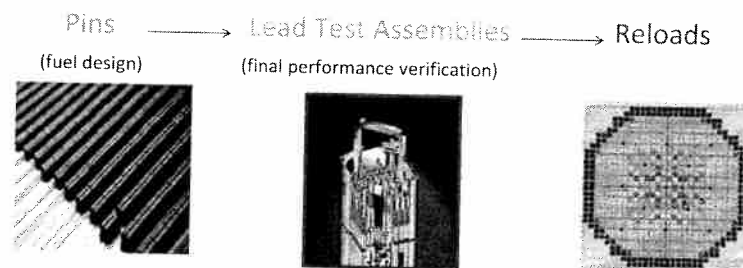
Vic will start out leading the presentation.



HITACHI

- Energy Northwest (EN), Pacific Northwest National Laboratory (PNNL) and General Electric (GE) propose to build, irradiate and inspect 10-20 BWR MOX fuel pins.

– Lays foundation for phased deployment of MOX fuel in US BWRs using commercial fuel procurement process

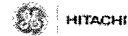
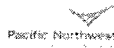
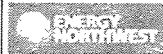


Vic will speak to this slide.

This slide basically introduces the pin concept (which is what we want funding for) and shows how it supports the overall objective of MOX use in reload quantities.

Energy Northwest (EN) Perspective

- EN is interested in qualifying and irradiating MOX in the Columbia Generating Station (CGS)
 - *Under the following conditions:*
 - **Must have good in-reactor performance**
 - MINIMIZE RISK TO REACTOR OPERATION
 - 3 cycles of irradiation (6 years)
 - Wet and dry storage of spent MOX
 - **Must be economical (benefit to ratepayers)**
 - Cost effective compared to low enriched uranium (LEU) fuel
 - Multiple fuel vendors, multiple fuel assembly designs
 - Normal fuel procurement process



Vic will speak to this slide.

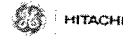
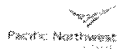
This will provide DOE direct input regarding the utility perspective and how the use of MOX in general fits into the overall operation of the nuclear plant.

We must be able to operate the reactor with MOX without any impacts on operation, it must operate for 3 cycles minimum, and we must be able to store it in the pool and in casks. More on this in slide 4.

Regarding the economics, not only must it be cost effective, we need the same flexibility that we have now regarding the ability to choose our fuel vendor and fuel design. More on this in slide 5.

Managing Risks to Plant Operation

- **Types of Risk:**
 - Fuel Failures
 - Lost Generation
 - Slower power ramp rates
 - More restrictive thermal limits
 - Limited control rod maneuvering
 - Higher Dose Rates
 - **Strategy to minimize risk:**
 - Implement in a phased approach
 - Pins → Lead assemblies → Reload quantities
 - Gather and analyze data throughout
 - In-reactor core monitoring
 - Post irradiation examinations
 - Check and adjust based on results
- EN is comfortable to **commit today** to a *phased approach*



Vic will speak to this slide.

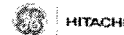
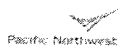
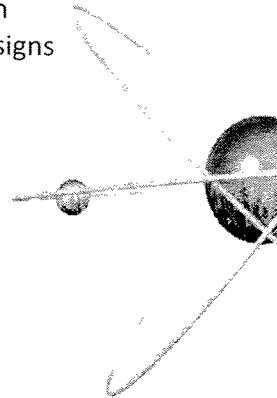
The basic message is that we manage risk by implementing a phased approach, which lets us check and adjust based on results of the data. Data gathering will occur both during and following irradiation.

FYI – the risk of higher dose rates is due primarily to higher dose rates during handling the fresh MOX.

The bottom bullet is meant to emphasize that EN is not ready to sign up for full MOX reloads today. Rather, we are ready to sign up to a phased approach (pins then leads then reloads if all goes well.)

How Utilities Buy Fuel

- Utility chooses the fuel vendor *AND* fuel design
 - Multiple fuel vendors with multiple fuel designs
- GNF is current uranium fuel vendor for EN
- Must have confidence that
 - Fuel will be delivered on schedule
 - Fuel will perform well
 - Fuel will not adversely impact operation
 - Fuel is economic



Vic will speak to this slide.

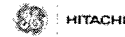
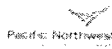
The way that MOX Services has currently structured the MOX Fuel Fabrication Facility (MFFF) is that it will build the AREVA Mark-BW/MOX1 (PWR) fuel bundle. This implies that if a utility wishes to use MOX fuel from the MFFF, they must use AREVA as their fuel vendor, they must be a PWR, and they must use the Mark-BW fuel design.

However, in the US, it is the utility who chooses the fuel vendor and the fuel design. So, unless a utility really wants AREVA as their fuel vendor, they probably will not be willing to sign up to the MFFF – unless the fuel is heavily discounted.

Thus, the long term goal/benefit of our proposal is that the MFFF will function more as a contract fabrication shop – and be able to produce pellets and load rods of fuel from multiple vendors. This is much more attractive to the utility – knowing that it won't be locked into a particular fuel vendor and a particular fuel design. This will help NNSA attract more utilities to the MFFF. More on this in slide 10.

Team Qualifications

- Energy Northwest
 - Successful participant in the 2005 Uranium Tails Pilot Project with DOE
 - Good operational performance of CGS
 - *“Columbia Generating Station operated in a manner that preserved public safety and fully met all cornerstone objectives.” NRC Annual Assessment Letter dated 3/4/09*
- GEH
 - Designer of 35 BWR plants in US
 - Current fuel vendor for 22 units
 - GNF-J Designs and licenses MOX for Japanese utilities
 - GE had provided MOX for Quad Cities-1 in the 1970s
- PNNL
 - Has designed and fabricated a safety related basic component for irradiation in a commercial reactor (tritium-producing burnable absorber rod)
 - Approved supplier for design/fabrication services to fuel vendor (Westinghouse) and utility (TVA)
 - Has capacity and new capabilities which can be utilized



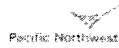
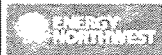
Vic will speak to the Energy Northwest piece, Earl will speak for GEH, and Cheryl will speak for PNNL.

The point for Vic is that EN worked cooperatively with DOE on the tails program (i.e., we received discounted fuel, DOE received \$40 million, we were not continuously “coming back to the well” asking DOE for more and more and more.)

The other point for Vic is that CGS is in good-standing with the NRC and is not considered a troubled plant. We are currently proceeding with license renewal to extend the operating license to 2043.

PNNL Experience

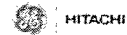
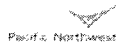
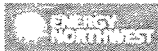
- This team has a strong commitment to the use of MOX fuel in Light Water Reactors:
 - EN was teamed with Battelle and Siemens on original MFFF Request For Proposal
 - PNNL also developed a proposal to fabricate the MOX LTA for Framatome
 - Hanford was included in Programmatic EIS
- PNNL supplied nuclear core components to NRC-licensed facilities
- NNSA is co-funding 20-year life extension for PNNL's Category 2 nuclear facility
 - New glove boxes and hot cells available for use in FY10



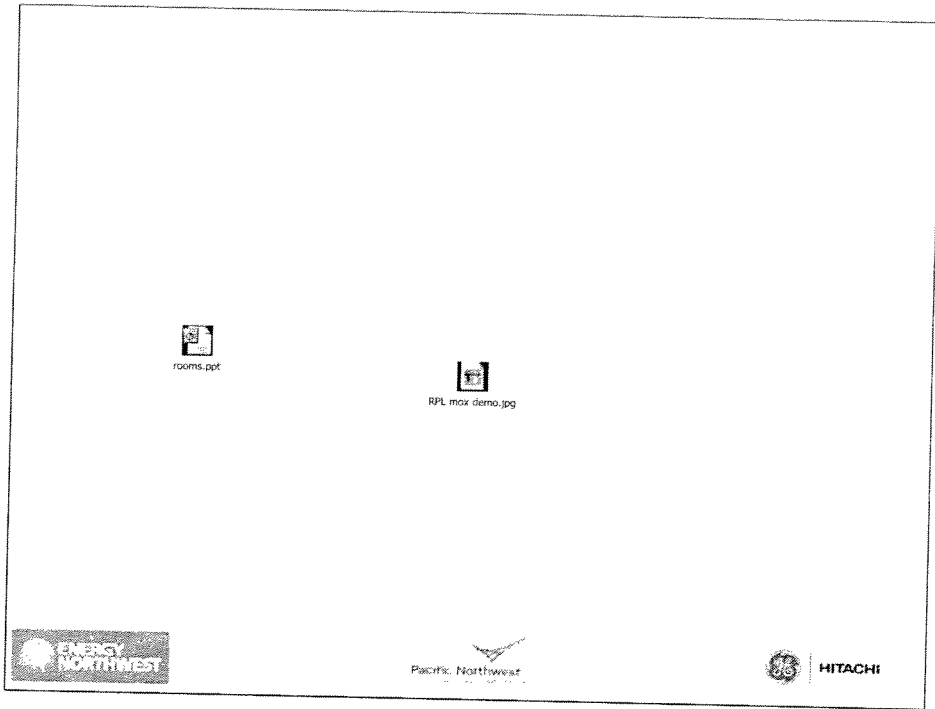
Cheryl will speak to this slide.

Fuel Qualification Concept

- PNNL to fabricate 10-20 pins, based on GNF MOX fuel design
- Individual MOX pins installed in bundles at EN
- Target installation date 2013
- Operates for three, possibly 4, 2-year cycles, with intermittent & final PIE
- Followed by LTAs as early as 2019
 - GNF design fabricated at MFFF
- Transition to full reloads as soon as practical



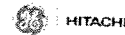
Cheryl will speak to this slide with support from Earl and Vic as needed.



This slide is not yet finalized. Cheryl will speak to this slide to describe the facilities at PNNL that will be used to manufacture the MOX rods.

Benefits

- Provides early qualification of BWR fuel design, compatible with 35 reactors
- Establishes technical basis for 3+ cycle (6+year) MOX irradiation
- Establishes an MFFF operating model based on Japanese experience: multiple designers, single fabrication facility
- Provides a fuel qualification option using WG Pu well before the start up of the MFFF
- Location: EN & PNNL are adjacent on Hanford Reservation
- Reduces risk to NNSA by providing expanded fuel market, accelerates customers for MFFF



Cheryl will probably speak to this slide. The points here are:

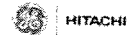
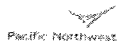
- BWR fuel design (vs. MFFF PWR design)
- 3 cycle product is much more attractive to utilities than the current 2 cycle MOX fuel design
- Shifts the operating model of the MFFF to be a "contract fab shop" where it can support multiple vendors and multiple fuel designs
- Accelerates the qualification of MOX without waiting on the MFFF to open (however, MFFF will be needed for the fabrication of the lead test assemblies)
- Proximity of EN and PNNL reduces complexity of MOX transportation
- Finally, we hope that by shifting the operating model of the MFFF to resemble something similar to the existing process, the NNSA will not have to 'put all their eggs in one basket' of an individual utility – like Duke, who pulled out and left NNSA with no customer.

Next Steps

Need to get started now...to meet 2013 irradiation goal

Request funding to:

- Complete detailed cost and schedule
- Update and validate codes & methods
- Develop NRC document modifications
- Procure equipment
- Prepare facility for Pu receipt and pin fabrication



Cheryl will probably speak to this slide.

The point here is we need funding starting in DOE's FY10 to meet our goal of irradiation in 2013.

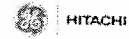
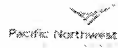
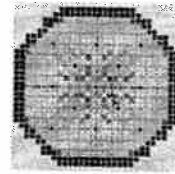
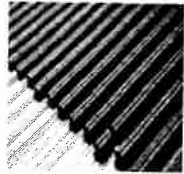
All three team members (EN, PNNL, GEH) have tasks that need to begin immediately.

We intentionally did not include a schedule or cost estimate. We will talk to these items. PNNL has the overall cost estimate. The EN costs are estimated to be \$ [REDACTED] over 10 years.

Questions?

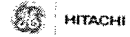
A phased approach to minimize risk and increase utility confidence

Pins → Lead Test Assemblies → Reloads
(fuel design) (final performance verification)



Last slide in the formal presentation to DOE.

Backup



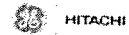
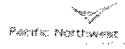
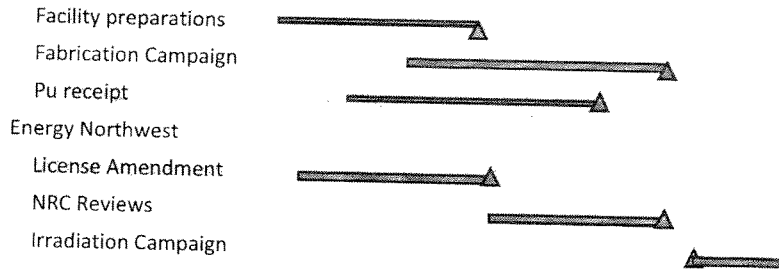
Schedule

	2010	2011	2012	2013
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GE



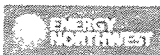
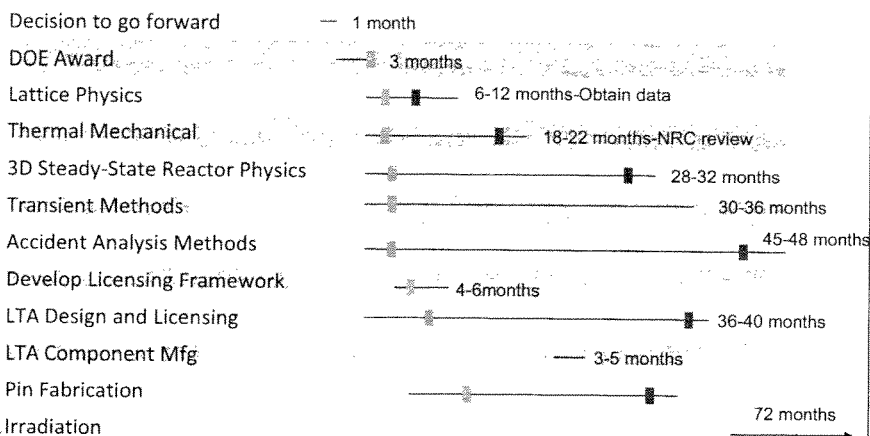
PNNL



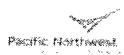
GEH/GNF Technical Schedule

	2010	2011	2012	2013
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GEH/GNF

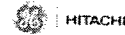
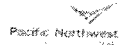


Late
 Start



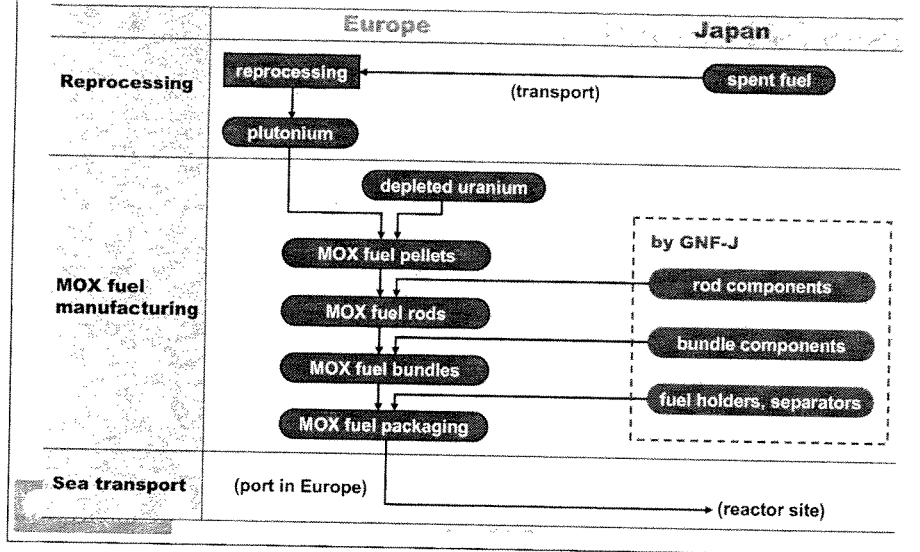
Roles

Energy Northwest	PNNL	GEH/GNF
<ul style="list-style-type: none"> • License amendment request › Tech Specs › Physical Security Plan › Plant and accident analysis • Pin receipt & placement in new bundles • Irradiation • Poolside exams 	<ul style="list-style-type: none"> • Pu transport • Pu purification • Pellet fabrication • Fuel rod welding • Pin storage and shipment • Post irradiation exams 	<ul style="list-style-type: none"> • Licensing Technical Reports › Codes & methods › Fuel design • Plant and accident analysis to support CGS amendment • Supply fuel rod components • GNF-J MOX experience • BWR expertise • BWR customer relationship



Material Flow in MOX fuel Manufacturing

Modeled after Japanese MOX program:



Rains, Angel D.

From: Ferek, Lisa L.
Sent: Tuesday, May 12, 2009 10:50 AM
To: Thornhill, Cheryl K; sarah.leversee@ge.com
Cc: Lewis, Jerry L.
Subject: Why EN did not respond to the EOI
Attachments: DCS-VENDOR-005873.pdf; No response to EOI.doc

We talked at the meeting in Wilmington about being ready to answer the question of why we did not respond to the expression of interest from MOX Services. I have reviewed the EOI again and compiled a list of reasons - see attached. Note: Jerry and I made the decision, senior management was not really involved. I will need to run this by Vic so make sure he is on board. Comments are welcome. Thanks, Lisa



14 OCT 08

To All Nuclear Utilities in the USA

DCS-VENDOR-005873
Response Required: YES
Response Due: TBD

**SUBJECT: EXPRESSION OF INTEREST FOR NUCLEAR REACTORS TO IRRADIATE MOX
 FUEL**

Dear Interested Parties:

Shaw AREVA MOX Services, LLC (MOX Services), operating under a Department of Energy (DOE) Contract, is the prime contractor for the Mixed Oxide Fuel (MOX) Plutonium Disposition Program. Shaw AREVA MOX Services is a partnership between AREVA NC and Shaw Environmental & Infrastructure. The purpose of the DOE project is to dispose of at least 34 metric tons of weapons grade plutonium that the United States has declared surplus. Other teaming members include AREVA NP, Nuclear Fuel Services, and Duke Energy. MOX Services holds the prime contract with DOE and all companies operate as subcontractors to MOX Services. A Mixed Oxide Fuel Fabrication Facility (MFFF) is currently under construction at the Savannah River Site outside of Aiken, South Carolina, and is expected to be completed in April 2014.

MOX Services is seeking an expression of interest from US utilities to identify additional domestic commercial reactors to team with to irradiate the MOX fuel produced by the MFFF from US surplus weapons grade plutonium. The MFFF construction commenced on August 1, 2007 and the MFFF is expected to produce a limited quantity of MOX fuel by October 2018, with increasing amounts thereafter. See Table 1 for the projected MFFF production assuming all 34 MT of weapons grade plutonium is converted into 17x17 Advanced MKBW/MOX1 PWR fuel assemblies at 4.37 weight per cent plutonium concentration. The MFFF is licensed to fabricate fuel with up to 6% plutonium concentrations. For initial calculation purposes one should assume the plutonium will contain 94% Pu-239, 4.5% Pu-240, and 0.5% Pu-241 and the uranium is at 0.25% U-235. DOE is considering fabrication of additional amounts of surplus weapons-usable plutonium (beyond 34 MT) into MOX fuel.

Currently, Duke Energy is under contract to irradiate MOX fuel in its four McGuire and Catawba reactors. More fuel can be produced annually than can be used at the four Duke Energy reactors. Table 2 shows the projected difference in production between what Duke Energy can use and what the MFFF can produce, again assuming the same type of fuel assembly is produced. MOX Services is seeking expressions of interest in irradiation of MOX fuel in quantities ranging from those presented in Table 2 up to the entire MFFF output, as presented in Table 1.

Figure 1 shows the key features of the Advanced MKBW/MOX 1 fuel assembly design. Four lead test assemblies were fabricated from weapons grade plutonium in 2004 and 2005 and began irradiation in Catawba Unit 1 in June 2005. The assemblies completed their second cycle of irradiation in May 2008 and were removed from the core. Selected fuel rods have been removed from one of the MOX lead assemblies and will be transported to Oak Ridge National Laboratory for examination in its hot cell. Data from these examinations and from similar work in Europe with reactor grade MOX fuel will be used in licensing MOX fuel for reactors in the United States.

Due to the extensive work done to date with the AREVA Advanced MKBW/MOX1 fuel assembly design and MOX Services teaming partner arrangement with AREVA NP, there is a preference to seek utilities that can use this fuel design in their reactors. Also, there is a high probability that changes to this assembly design will occur between now and production to further improve the performance of this design and keep it current with uranium fuel offerings.

However, other domestic commercial reactors, including BWRs, that can use any AREVA fuel design should review this EOI and respond if they have any interest in using MOX fuel in their reactors.

Depending on the MOX fuel loading strategy that is proposed, utility companies that participate in the MOX Program may need to modify their reactors to receive and irradiate MOX fuel, and have their operating licenses amended to permit the use of MOX Fuel. The licensing activities and the design and installation of any physical modifications to the reactors would be done under a cost plus fixed fee contract with MOX Services. Later in the irradiation phase of the contract, the utility would purchase fuel from MOX Services and a more typical fuel fabrication or supply agreement would be executed.

Any utility that is interested in possibly participating in the MOX Project should provide the following information by December 18, 2008:

- Reactor(s) type and number of unit(s) it proposes to use and the fuel design required;
- A fuel management plan showing the number of MOX fuel assemblies (and type) by year, typical core loading pattern, maximum burnup of the MOX fuel rods (current design is expected to be limited to slightly greater than 50,000 MWD/MTU);
- An estimate of the cost to license its reactors to use MOX fuel (separately list expected NRC costs);
- An estimate of the cost to design any reactor modifications;
- An estimate of the cost to implement those modifications;
- A proposed price that the utility would be willing to pay for the MOX fuel, tied to the then current uranium fuel price going into the same reload cycle;
- DOE/NNSA is considering establishment of an inventory of LEU that could be available for sale at fair market value to utilities participating in the MOX program, subject to applicable law, to mitigate the risk to fuel supply that could result from delays in deliveries of MOX fuel. Indicate the extent to which the availability of such an LEU inventory would affect the utility's interest in irradiation of MOX fuel,

including, as appropriate, any increase in price the utility would be willing to pay for the MOX fuel if backed up by an LEU inventory;

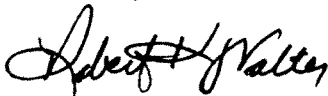
- An explanation of what work the utility would perform versus what work is to be performed by AREVA NP, and if services of any other companies are required;
- The projected necessity of irradiating lead test assemblies prior to expanded MOX fuel loading.

MOX Services is unable at this time to determine how many additional reactors will be needed as this is a function of the reactors' ability to use the MOX fuel and also likely a function of what modifications a utility is willing to make. For instance a large number of reactors might be able to use 12-16 MOX fuel assemblies per cycle with few or no modifications, or a smaller number of reactors might use up to a 40% core fraction, but might require substantially more reactor modifications.

A MOX Services information suite is planned for October 21, 2008 at the Westin Tabor Center, Denver, CO. Representative from MOX Services and DOE will be available to answer questions. An information sharing session including a tour of the MFFF construction site is planned for November 19, 2008 in Aiken, SC. Interested utilities should plan to participate in this meeting and attendance by both representatives knowledgeable in fuel procurement and reload core design should attend. Please contact Mr. Robert Walter by November 12, 2008 if you plan to attend the Aiken information session.

Response to the EOI is requested by December 18, 2008. Please respond to Mr. Robert K. Walter, Senior Contract Administrator, at rkwalter@moxproject.com or phone 803-819-2568 for details.

Sincerely,



Robert K. Walter
Sr. Contract Administrator

Attachments:

1. Table 1: Projected MFFF Production
2. Table 2: Expected MOX Fuel Assembly Surplus above Duke Energy Usage
3. Figure 3: Advanced MKBW/MOX1 Features

cc: R. Clark
S. King
C. Kenney
G. W. Painter
EDMS: documentum\Docbases\dcsmox\Correspondence\Outgoing\Vendors\2008
Vendors

ATTACHMENT 1

Table 1

Projected MFFF Production

Year	<i>Total MFFF FA Production (estimated)</i>
2018	8
2019	20
2020	75
2021	100
2022	100
2023	151
2024	151
2025	151
2026	151
2027	151
2028	151
2029	151
2030	151
2031	151
2032	38
2033	0
Total	1,700

ATTACHMENT 2

Table 2

Expected MOX Fuel Assembly Surplus above Duke Energy Usage

Year	<i>Total MFFF FA Production (estimated)</i>	<i>Duke FAs (estimated)</i>	<i>Surplus Fuel Assemblies</i>
2018	8	8	0
2019	20	20	0
2020	75	36	39
2021	100	80	20
2022	100	68	32
2023	151	104	47
2024	151	116	35
2025	151	76	75
2026	151	112	39
2027	151	116	35
2028	151	76	75
2029	151	112	39
2030	151	26	125
2031	151	0	151
2032	38	0	38
2033	0	0	0
Total	1,700	950	750

ATTACHMENT 3

Figure 3
Advanced MKBW/MOX1 Features



Mark-BW / MOX1 Fuel Assembly

Our goal is to implement MOX in the USA in a proven Low Enriched Uranium (LEU) fuel design.

Proven Performance:


- > Fuel assembly structure is identical to the Advanced Mark-BW, a Framatome ANP LEU fuel design
- > Advanced Alloy M5® fuel rods with MOX fuel pellets, are proven in European reactors

Features:

- > Upper end fitting with quick-disconnect
- > M5® cladding, guide tubes and grids reduce corrosion, hydrogen pickup and growth
- > Effective combination of grids:
 - Alloy 718 upper and lower grids for mechanical robustness
 - M5® mixing grids for excellent thermal performance
 - M5® mid-span mixing grids for additional thermal performance
- > Lower end fitting with proven debris protection

The fuel design is provided by Framatome ANP, an AREVA and Siemens company.

FUEL



Reasons Energy Northwest did NOT respond to the Expression of Interest (EOI) from MOX Services

The model for fuel procurement presented in the EOI is not typical of a US utility's fuel procurement strategy. Usually the utility will procure the nuclear material and provide that material to the fabricator. The utility has a wide variety of choices for supply of the nuclear material and, to a lesser extent, fabrication services (3 different vendors supply BWR fuel). Utilities have frequently exercised the option of switching between fuel vendors in order to reduce fuel costs and improve operating flexibility. The US utility is not, generally, comfortable with being locked into a single fuel supplier. The fuel supply model presented in the EOI is more typical of that in France. It should be noted that no other utilities, with the possible exception of TVA, have responded to this EOI.

Reaction to specific items in the EOI:

1. It is stated, "Due to the extensive work done to date with AREVA Advanced MKBW/MOX1 fuel assembly design and MOX Services teaming partner arrangement with AREVA NP, there is a preference to seek utilities that can use this fuel design in their reactors."
 - This design is PWR-specific. The EOI is focused primarily on PWRs as evidenced by their bundle projections in Tables 1 and 2.
2. It is stated, "However, other domestic commercial reactors, including BWRs that can use any AREVA fuel design, should review this EOI and respond ..."
 - Our current fuel vendor is GNF. We transitioned to GNF in 2009 (Cycle 20) due, in part, to the superiority of their fuel design and advances in their analytical methods. Neither the AREVA fuel design (ATRIUM-10) nor their methods have changed substantially since 2001. The next-generation AREVA fuel design is just beginning to be loaded as leads in the US. Thus, we are hesitant to commit to an "AREVA fuel design." This would commit us to loading AREVA non-MOX fuel as well, since it is not typical (nor economical) to have prolonged use of two different vendors' fuel designs.
3. It is stated, "The current design is expected to be limited to slightly greater than 50,000 MWD/MTU."
 - The operating experience from Duke is that the AREVA MOX fuel design is a 2-cycle product. The burnup limit is low and requires careful placement of the MOX fuel assemblies in the core to ensure the burnup limit is not exceeded. Although some LEU fuel is discharged after two cycles, it is not known if the MOX fuel could be placed in similar high-power (limiting) core locations – probably not, at least initially.
4. The EOI is written from the position that the utility will sign up for multiple deliveries of batch-size quantities of MOX bundles.
 - Given the nature of this new fuel material and design, it is not feasible, from a utility perspective, to sign up for anything other than leads. This EOI does not seem to recognize or make any allowance for the risk the utility is taking by loading and irradiating MOX fuel.

5. It is stated, "The licensing activities and the design and installation of any physical modifications to the reactors would be done under a cost plus fixed fee contract with MOX Services."
 - Would we pay for this? Although this may not be the intent, it sure sounds like it. Are we obligated to use MOX Services?
6. It is stated, "Later in the irradiation phase of the contract, the utility would purchase fuel from MOX Services and a more typical fuel fabrication or supply agreement would be executed." Also, the EOI asks for "a proposed price the utility would be willing to pay for the MOX fuel tied to the then current uranium fuel price going into the same reload cycle."
 - It is not clear how the price for the nuclear material and fabrication services would be determined. Obviously, this would need to be subsidized to be in the same ballpark as LEU fuel. The fuel price would need to be discounted relative to LEU fuel to account for the additional ongoing costs (e.g., security) during implementation, the additional risk associated with burning MOX fuel, and to provide some incentive for the utility.
7. At the time of issuance of the EOI, Duke was still participating in the program. It was likely that the only MOX supply available would be that left over after the Duke requirements were met.
 - Although it is stated that a contingency supply of LEU could be made available in the event of delays in the MOX fabrication schedule, there would still be significant utility effort involved in redesigning the core if this were to occur.
8. MOX Services asks that the utility supply significant amounts of information as part of the EOI including estimates of the number of MOX assemblies to be loaded each cycle, the typical core loading pattern, estimates of the cost to license its reactors to use MOX fuel including NRC fees, estimates of the costs to design and implement any reactor modifications, etc.
 - This information is not readily available and a good deal of resources would be required to provide it.

Rains, Angel D.

From: Thornhill, Cheryl K [cheryl.thornhill@pnl.gov]
Sent: Tuesday, April 21, 2009 1:11 PM
To: Ferek, Lisa L.; sarah.leversee@ge.com; Richmond, William G; Buelt, James L; Hanson, Brady D; Wootan, David W
Cc: Reid, Bruce D; Omberg, Ronald P
Subject: Comments from First Meeting

Summary of the discussion points from our first meeting and a subsequent meeting with Bill Richmond:

1. Pin Design – GE has the lead on Pin Design. PNNL needs enough flow sheet detail to put together a process flow and equipment list to build a schedule and ROM. Hopefully this can be done prior to NDA negotiations.
2. Materials – NNSA will provide the Pu. Need to let that be their decision as to whether to get it from LANL, SRS or Livermore. We need to tell them how much Pu we need by when and to what specification when we do our meeting. GE will provide the cladding. GE has action to see if they can provide the Uranium.
3. Fabrication – PNNL will have the lead and will be on the QSL for Energy Northwest
4. Reactor Mods – Lisa will verify that none are required but security, receipt and handling of pins will require license amendment for the security plan at least and will require a one year lead time. Lisa will interface with staff at Energy Northwest on this issue
5. Irradiation Cycles – the planning cycle will be 2013 with an optimistic option for 2011. Each team will develop their timelines to that schedule need utility to dictate when all pins must be delivered.
6. Post Irradiation Examinations – GE should identify data they need from a pin irradiation for fuel qualification. PNNL can then address what analyzes they can currently do, what they could do with a modest upgrade and what would require samples to be shipped elsewhere, if applicable. For this program to have the best chance of capturing NNSA attention it needs to be a somewhat “cost effective” approach, not the investment in science that has been done at ORNL. We should also identify what data, if any, that is coming from the PWR program would be beneficial to the BWR program.
7. Licensing Strategy – Energy Northwest Lead – thought process is the pin irradiation puts us on the path to a “full up” LTA with no(?) requirements for additional PIE unless there are any anomalies and then move forward with quantity increases. However the LTA would be geared to count as actual disposition. Need to outline other utilities that would benefit from the pin irradiation and could potentially sign up for a leads.
8. Risks/Uncertainties
 - a. GE has the lead to determine NDA strategies and how we propose to use their design in this

existing facility being operated by a consortium which includes AREVA. Richmond's thought is GE is "purchasing" fabrication services for their utility customers.

- b. Need to define the economic model, availability and advantages of the BWR market (Thornhill/Richmond have previous proposal which outlines the advantages of BWRs)
- c. Need to outline the purpose of the test – burning MOX versus demonstration of fabrication and irradiation of prototypic pin.
- d. Funding Flow – PNNL can receive funds directly from DOE and do the contracting. Will need a contracting strategy.
- e. Need to get an early read of issues for NNSA with this new approach (Thornhill/Richmond)

All: Add any actions or points which I have not captured. THANKS,

Cheryl Thornhill

Program Manager
National Security Division

Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K9-85
Richland, WA 99352 USA
Tel: 509-375-2532
Fax: 509-375-2610
Cheryl.Thornhill@pnl.gov
www.pnl.gov

Rains, Angel D.

From: Buelt, James L [james.buelt@pnl.gov]
Sent: Wednesday, April 01, 2009 7:10 AM
To: Gambhir, Sudesh
Cc: Ferek, Lisa L.; Lewis, Jerry L.
Subject: RE: Tour

Don't we all.

Lisa, I'll contact you today with the information we need for your clearance.

James L Buelt
Nuclear Energy Sector Manager
Energy and Environment Directorate

Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K2-01
Richland, WA 99352 USA
Tel: 509-375-2624
Cell: [REDACTED]
Fax: 509-375-5946
james.buelt@pnl.gov
www.pnl.gov

-----Original Message-----

From: Gambhir, Sudesh [mailto:sgambhir@energy-northwest.com]
Sent: Tuesday, March 31, 2009 6:49 PM
To: Buelt, James L
Cc: Ferek, Lisa L.; Lewis, Jerry L.
Subject: Tour

Jim,
Thanks for the invitation but I will not be able to participate.
Again, thanks for the leadership that you have shown and your vision is inspiring.
I am hoping that your vision will translate to reality one day!

Thanks and have a nice day,
Sudesh Gambhir.
[REDACTED] (Cell)
Sent by Good Messaging (www.good.com)

-----Original Message-----

From: Buelt, James L [mailto:james.buelt@pnl.gov]
Sent: Wednesday, March 18, 2009 12:06 PM Pacific Standard Time
To: Gambhir, Sudesh
Cc: Thornhill, Cheryl K; Richmond, William G

Subject: MOX qualification concept for BWRs

Sudesh: As we discussed on the phone, we have been kicking a concept around here at the Laboratory on how to qualify MOX fuels for NNSA's Materials Disposition program for BWRs. You may or may not be aware that we have been involved with the Materials Disposition program since the mid-90's, including our work on the design of the Pit Disassembly and Conversion Facility. As such, we are aware of many of the issues facing the Materials Disposition program. We believe there may be mutual benefit worth exploring to NNSA, Energy Northwest, GE, and PNNL in fabricating, irradiating, and examining MOX fuel pins in support of a qualification process for BWRs. We believe there is a mechanism for doing this locally that would avoid overseas shipment of material. We would like the opportunity to discuss these concepts with you and your staff at your convenience.

James L Buelt
Nuclear Energy Sector Manager
Energy and Environment Directorate

Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K2-01
Richland, WA 99352 USA
Tel: 509-375-2624
Cell: [REDACTED]
Fax: 509-375-5946
james.buelt@pnl.gov
www.pnl.gov <file://www.pnl.gov>

Rains, Angel D.

From: Demyer, Tanya M.
Sent: Monday, March 23, 2009 7:57 AM
To: 'Buelt, James L'
Cc: Thornhill, Cheryl K; Richmond, William G; Lewis, Jerry L.; Ferek, Lisa L.; Gambhir, Sudesh
Subject: RE: MOX qualification concept for BWRs

Mtg is scheduled for 3/30 at 8am - I just sent you an Outlook calendar invite.

Tanya DeMyer | Executive Assistant to VP Technical Services
Energy Northwest | ☎ 509.377.2133 | F 509.377.2354 |
PO Box 968, MD PE04, Richland WA 99352-0968



Please consider the environment before printing this email

From: Buelt, James L [mailto:james.buelt@pnl.gov]
Sent: Thursday, March 19, 2009 3:44 PM
To: Demyer, Tanya M.
Cc: Thornhill, Cheryl K; Richmond, William G; Lewis, Jerry L.; Ferek, Lisa L.; Gambhir, Sudesh
Subject: RE: MOX qualification concept for BWRs

Can we try for before 10:00 am on March 30. That would be best for us. Thanks.

James L Buelt

Nuclear Energy Sector Manager
Energy and Environment Directorate

Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K2-01
Richland, WA 99352 USA
Tel: 509-375-2624
Cell: [REDACTED]
Fax: 509-375-5946
james.buelt@pnl.gov
www.pnl.gov

From: Demyer, Tanya M. [mailto:TMDEMYER@energy-northwest.com]
Sent: Thursday, March 19, 2009 9:03 AM
To: Buelt, James L

Cc: Thornhill, Cheryl K; Richmond, William G; Lewis, Jerry L.; Ferek, Lisa L.; Gambhir, Sudesh

Subject: RE: MOX qualification concept for BWRs

Tomorrow is a day off for us, so it appears the week of 3/30 would be the next opportunity. Let me know if either of these work for your team.

3/30 anytime before 10:00 a.m.

4/2 anytime before 11:00 a.m.

Tanya DeMyer | Executive Assistant to VP Technical Services
Energy Northwest | ☎ 509.377.2133 | ✉ 509.377.2354 |
PO Box 968, MD PE04, Richland WA 99352-0968



Please consider the environment before printing this email

From: Buelt, James L [mailto:james.buelt@pnl.gov]

Sent: Thursday, March 19, 2009 8:42 AM

To: Gambhir, Sudesh

Cc: Thornhill, Cheryl K; Richmond, William G; Demyer, Tanya M.; Lewis, Jerry L.; Ferek, Lisa L.; Demyer, Tanya M.

Subject: RE: MOX qualification concept for BWRs

My apologies, next week will be difficult. Most of our key players are out of the office next week. The remainder of this week, except Friday morning, still works out fine. Thanks and sorry for the inflexibility.

James L Buelt

Nuclear Energy Sector Manager
Energy and Environment Directorate

Pacific Northwest National Laboratory

902 Battelle Boulevard

P.O. Box 999, MSIN K2-01

Richland, WA 99352 USA

Tel: 509-375-2624

Cell: [REDACTED]

Fax: 509-375-5946

james.buelt@pnl.gov

www.pnl.gov

From: Buelt, James L

Sent: Thursday, March 19, 2009 8:25 AM

To: Gambhir, Sudesh

Cc: Thornhill, Cheryl K; Richmond, William G; Demyer, Tanya M.; Lewis, Jerry L.; Ferek, Lisa L.; Demyer, Tanya M.

3/2/2010

Subject: RE: MOX qualification concept for BWRs

Would appreciate avoiding the Friday morning timeslot if at all possible. Later this afternoon, Friday afternoon, or even Monday should work out fine.

James L Buel

Nuclear Energy Sector Manager
Energy and Environment Directorate

Pacific Northwest National Laboratory
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P.O. Box 999, MSIN K2-01
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Tel: 509-375-2624
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Fax: 509-375-5946
james.buel@pnl.gov
www.pnl.gov

From: Gambhir, Sudesh [mailto:sgambhir@energy-northwest.com]

Sent: Wednesday, March 18, 2009 4:32 PM

To: Buel, James L

Cc: Thornhill, Cheryl K; Richmond, William G; Demyer, Tanya M.; Lewis, Jerry L.; Ferek, Lisa L.; Demyer, Tanya M.

Subject: RE: MOX qualification concept for BWRs

Jim,

Thanks for the information and I will be asking Tanya Demyer to set up this meeting for us. Jerry Lewis and Lisa Ferek are both involved with this issue and will be participating in this discussion.

Thanks,
Sudesh

Sudesh Gambhir P.E.,PMP
Vice President-Technical Services
Energy Northwest
Columbia Generating Station

☎ 509.377.8313 | Fax 509.377.2354 | Cell [REDACTED]

From: Buel, James L [mailto:james.buel@pnl.gov]

Sent: Wednesday, March 18, 2009 12:06 PM

To: Gambhir, Sudesh

Cc: Thornhill, Cheryl K; Richmond, William G

Subject: MOX qualification concept for BWRs

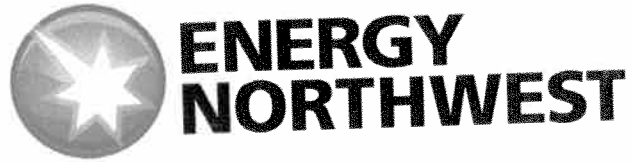
3/2/2010

Sudesh: As we discussed on the phone, we have been kicking a concept around here at the Laboratory on how to qualify MOX fuels for NNSA's Materials Disposition program for BWRs. You may or may not be aware that we have been involved with the Materials Disposition program since the mid-90's, including our work on the design of the Pit Disassembly and Conversion Facility. As such, we are aware of many of the issues facing the Materials Disposition program. We believe there may be mutual benefit worth exploring to NNSA, Energy Northwest, GE, and PNNL in fabricating, irradiating, and examining MOX fuel pins in support of a qualification process for BWRs. We believe there is a mechanism for doing this locally that would avoid overseas shipment of material. We would like the opportunity to discuss these concepts with you and your staff at your convenience.

James L Buelt

Nuclear Energy Sector Manager
Energy and Environment Directorate

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Request for Public Records Control No 2010-02

Second Mailing dated March 18, 2010

Attachment 4

Letter Subject

Request for Proposal in Support of Paragon Fuels

Response to DOE RFP DE-RP02-98CH10888

for Mixed Oxide (MOX) Fuel Fabrication

and Reactor Irradiation Services”

from JW Baker to Kathleen A. Wehlan

dated August 21, 1998,

including the attachments.

(29 Pages)

August 21, 1998

Kathleen A. Whelan
MS K-9-84
Battelle, Pacific Northwest Division
P.O. Box 999
3200 Q Avenue
Richland, WA 99352

Subject: **REQUEST FOR PROPOSAL IN SUPPORT OF PARAGON FUELS
RESPONSE TO DOE RFP DE-RP02-98CH10888 FOR
MIXED OXIDE (MOX) FUEL FABRICATION AND REACTOR
IRRADIATION SERVICES**

Dear Ms. Whelan:

Washington Public Power Supply System (Supply System) is pleased to submit this offer to Paragon Fuels for work to support the irradiation of surplus weapons plutonium in the form of MOX fuel. For the irradiation services the Supply System offers its WNP-2 boiling water reactor nuclear plant located on the Hanford Reservation in the State of Washington. WNP-2's operating license does not expire until after the required completion of this mission in 2022.

As a benefit to Paragon Fuels the Supply System offers to use WNP-2 in the role as the lead Paragon Fuels reactor for lead fuel assembly irradiation as a part of the MOX fuel qualification program. WNP-2 is also offered as the lead plant for MOX reload licensing and irradiation. Our location on the Hanford Reservation has the advantage of being in a community supportive of this mission, of being close to your fuel fabricator Siemens Power Corporation, and close to Battelle who has responsibility for developing the fuel qualification program. Over the past five years we have made dramatic progress in improving WNP-2 plant safety, reliability, and production costs. Our plant continues on an improving trend in SALP and INPO ratings and has never been on the NRC watch list; an important advantage for a lead plant.

During the Base Contract scope of work the Supply System would work with you on finalizing the fuel qualification program and then irradiating up to eight lead MOX fuel assemblies to confirm the performance of the fuel design. The Supply System would support Paragon Fuels in preparing various related planning reports, prepare and submit licensing documents to the NRC for use of MOX fuel in WNP-2, design necessary modifications to WNP-2 for MOX physical security, and prepare other revisions to operating procedures and programs required to irradiate MOX fuel.

The Supply System provides for the Paragon Fuels proposal a wealth of experience in new fuel utilization which can not be provided by any of Paragon Fuels competition. We have gained this experience by successfully transitioning to new fuel vendors twice, by our lead fuel programs with advanced fuel designs, and by being the lead plant for licensing two new fuel designs in reload quantities in the U.S.

Should Paragon Fuels exercise the contract Option 1 scope then the Supply System will continue to defend and obtain all necessary permits and NRC license modifications to irradiate MOX fuel and construct the required plant modifications.

Should Paragon Fuels exercise Option 2 of the contract then the Supply System will implement all the remaining required changes and begin to irradiate MOX fuel to the required minimum burnup of 20,000 MWD/MTHM.

In addition, we will make available as a seconded employee Mr. David Larkin to fill the Paragon Fuels position of Fuel Irradiation Manager.

Our management is committed to this program and its important contribution to world security. Our Executive Board, as recently as July, went on record with a unanimous formal motion, stating their full support for offering WNP-2 for a MOX lead use fuel program and a reload fuel irradiation program.

We are confident you will find the Supply System to be a strong player on your team.

Very truly yours,

J.W. Baker
Vice President, Resources Development

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
PROPOSAL FOR A MOX LEAD FUEL ASSEMBLY PROGRAM

I. INTRODUCTION

The Washington Public Power Supply System (Supply System) is pleased to submit this unsolicited conceptual proposal for a Mixed Oxide Lead Fuel Assembly Program for DOE's review and consideration.

The Supply System proposes a joint DOE-Supply System program to fabricate, irradiate and inspect up to eight lead fuel assemblies using mixed oxide as the fissionable material. The purpose of the program would be to resolve specific technical issues which have been raised concerning the design, fabrication, and performance of mixed oxide (MOX) fuel for the disposal of excess weapons-grade plutonium in commercial power reactors.

The Supply System would provide any natural or enriched uranium required for the fuel assembly fabrication, would load and irradiate the fuel assemblies in its Boiling Water Reactor (BWR) WNP-2, and provide access to the fuel assemblies for post-irradiation inspections to characterize the fuel assemblies performance. The Supply System would process the fuel reload license for the lead fuel assemblies and perform any other plant license activities required to utilize the MOX lead fuel assemblies.

The Department of Energy (DOE) would provide funding to the Supply System for the costs of design, fabrication, licensing, transportation and incremental safeguards and security for the lead fuel assemblies. In addition, DOE would provide plutonium from its weapons stockpile to the fuel fabricator in the form of plutonium oxide for fabrication into the mixed oxide pellets.

Design and licensing of the fuel assemblies, fuel cycle calculations and assistance with plant licensing would be performed by General Electric under a separate commercial contract with the Supply System. Fabrication would be performed by either Los Alamos National Laboratory or an offshore supplier with existing or pending licensed fabrication capability working closely with General Electric to qualify the required fabrication processes. Commercial fuel components would be supplied by General Electric.

Visual receipt and post-irradiation inspections would be performed by General Electric. Hot cell inspections, if desired, could be performed by one of the DOE laboratories such as Battelle Northwest.

The proposed participants have specialized experience and capabilities that would contribute to the success of this program. The Supply System has recent experience with lead fuel assembly programs involving the most advanced BWR fuel assembly designs available from General Electric, Siemens Power Corporation and ABB Combustion Engineering. WNP-2 is one of only five plants in the U.S. still operating on an annual fuel cycle. The shorter cycle is an advantage for lead fuel assembly programs because the fuel is available more often for inspection and evaluation of results.

General Electric has the most experience with designing BWR fuel in the world and has had significant experience with designing and testing MOX fuel as much as twenty years ago and is currently developing MOX fuel designs for international customers. General Electric has been DOE's prime contractor for MOX fuel and fuel cycle designs as well as BWR systems evaluations for its Pu disposition studies.

Fuel licensing would be facilitated by the use of the General Electric GESTAR II standard fuel licensing approval process.

British Nuclear Fuel Ltd. and its predecessor, the United Kingdom Atomic Energy Authority, have been fabricating MOX fuel rods since the early 1960s. A small scale MOX fabrication facility is now operational at Sellafield. A full scale plant is under construction with first processing of plutonium scheduled for August 1997.

II. PROGRAM OBJECTIVES

The National Academy of Sciences has endorsed Light Water Reactors (LWRs) as the most timely and reliable option for disposing of excess weapons plutonium. During irradiation a significant portion of the fissionable plutonium is destroyed and the residual is protected from diversion by the high radiation dose rates emitted by the created fission products.

A significant data base of experience exists for the use of mixed oxide fuel of the "island" design in both Pressurized Water Reactors (PWRs) and BWRs. An "island" design surrounds inner fuel rods containing mixed oxide pellets with fuel rods containing only regular uranium oxide pellets. But to complete the task of disposing of the excess plutonium using "island" designs would require either a large number of reactors or an extended number of years. Thus most studies recommend moving to reloads using full mixed oxide fuel assemblies, e.g., using plutonium as the fissionable element in each of the fuel rods. Unlike most PWRs, BWRs are fortunate in that by the nature of their lattice design they are able to accommodate mixed oxide fuel assemblies through the design of the fuel pellets alone and without costly plant modifications to add additional control rods or increase the concentration or capacity of soluble boron shim systems. No reactor plant

systems or equipment modifications are necessary at WNP-2 to irradiate full MOX fuel assemblies.

Despite the extensive experience with "island" design MOX fuel, additional data on full MOX fuel assemblies with burnable poisons would strengthen the bases for qualifying and licensing full MOX core reload designs. Full MOX fuel designs have a clear benefit in disposing of the excess plutonium in a timely manner. Thus there is much to be gained in an early program of lead fuel assemblies that could resolve the significance of technical issues raised by researchers and provide verification of the adequacy of existing design computer codes, the fuel composition and tolerance to impurities, the physical fabrication processes, and the resultant nuclear burnup performance both of the MOX fuel and the burnable poisons. Early resolution would reduce the transition time to utilizing full reloads of full MOX fuel assemblies.

The objectives of the proposed MOX Lead Fuel Assembly Program include:

- Demonstrating that the process which converts the weapons pit shape into an acceptable oxide powder is compatible with commercial fuel pellet specifications for activity, density and particle size distribution.
- Demonstrating the acceptability of impurities, particularly Americium and Gallium, in the plutonium oxide powder. The propensity of these elements to evaporate preferentially during sintering or their effect on fuel performance may require their removal prior to fuel fabrication.
- Demonstrating the physical performance of the fuel specifications and fabrication processes and Quality controls that will be used to fabricate the MOX fuel.
- The effect of gadolinia in the plutonium matrix on fuel physical performance and neutronics performance. Previous "island" designs loaded gadolinia only in the uranium rods or as separate rods.
- Confirm the accuracy of existing nuclear design codes for full MOX fuel with gadolinia through the full range of fuel burnup.

In addition to the objectives above, a prompt MOX lead fuel assembly program would demonstrate to the public and foreign governments at an early date the U.S. Government's commitment to dispose of plutonium. It would move from paper studies to hardware demonstration giving more public and Congressional confidence in DOE's ability to implement a plutonium disposal program. The lead fuel assembly program experience and data will also provide the basis for Nuclear Regulatory Commission (NRC) licensing of full MOX fuel designs.

III. WORK SCOPE

A. Washington Public Power Supply System

- Overall project management of this Lead Fuel Assembly Program.
- Supply of all required natural and enriched UF₆ for the fabrication of the fuel assemblies.
- Inspection, on-site handling, and irradiation of the fuel assemblies.
- Submittal of necessary requests for Technical Specifications and licensing documents.

B. The Department of Energy

- Supply of the plutonium oxide powder for fabrication of the mixed oxide pellets and the fuel assemblies.
- Transportation of the plutonium oxide powder to the fabricator and the finished fuel assemblies to the WNP-2 site.

C. General Electric

- Design, safety analysis, and licensing process support of the fuel assemblies. Plant licensing analysis support.
- Development of commercial fabrication specifications for the fuel assemblies.
- Fabricate the fuel assembly spacers, tieplates, fuel channels and associated fuel bundle hardware. Fabricate the uranium oxide fuel rods, as needed.
- Train fabricator personnel or qualify fabricator processes including welding and inspection.
- Development and implementation of a proposed fuel inspection program on-site.

D. Fabricator

- Fabricate the MOX pellets and fuel rods to Appendix B requirements and commercial process specifications.

IV. FUEL DESIGN

The contemplated fuel mechanical design for the Lead Fuel Assembly Program is a proven commercial design. The fuel assemblies' neutronic and thermal-hydraulic designs would be compatible and similar to the existing 9x9-9X fuel used in WNP-2.

The exact design of the fuel assemblies would be finalized after discussions among Supply System, DOE and General Electric to define the exact data to be measured. Segmented rods may be used to increase the range of parameters tested.

For "island" designs approximately 20% of the fuel rods would be MOX fuel rods. These MOX rods would contain no gadolinia. Surrounding this island of MOX rods would be typical uranium and gadolinia rods. The neutronic design would be customized for the annual fuel cycles employed at WNP-2 but would contain approximately 1.4 Kg of plutonium per fuel assembly. Fuel assemblies of the "island" design could be used to investigate issues related to contaminants such as Americium and Gallium. They would also be useful for investigating the properties of plutonium oxide powder obtained from weapons pits.

The full MOX fuel design would contain a mixture of plutonium and uranium in all fuel rods. A different combination of licensed fuel mechanical components would be used to maximize the bypass flow area. This reduces the void reactivity coefficient, thereby reducing the impact of pressurization transient events.

The full MOX fuel assembly would contain approximately 5.3 Kg of plutonium. Up to twenty of the rods would contain gadolinia for power distribution and reactivity control.

Full reloads of MOX fuel would be planned under the provisions of General Electric's existing Standard Application for Reactor Fuel (GESTAR-II) Amendment 22. GESTAR provides a NRC approval process that incorporates generic acceptance criteria with which General Electric licenses new BWR fuel designs. Safety analysis and licensing for a small number of test fuel assemblies need not be as rigorous as those for full reloads. NRC approval for a test program is not expected to be a critical path task but having the GESTAR process as a backup is a distinct advantage.

V. PRECHARACTERIZATION, MANUFACTURING AND QUALITY ASSURANCE

All of the mechanical properties of the lead fuel assemblies would be characterized during fabrication so that post-irradiation observations and measurements can be correlated to initial conditions. Archive samples of pellets, powder, and fuel cladding will be maintained for the lifetime of the program.

Fabrication of UO₂ fuel rods and mechanical components would be performed to commercial specifications provided by General Electric. General Electric would also provide the MOX fuel fabrication specifications. Fabrication would also be performed to NRC Appendix B requirements with the process and final fuel assemblies inspected by qualified Supply System inspectors.

VI. IRRADIATED FUEL INSPECTION PLAN

Since a major objective of the lead fuel assembly program is to demonstrate the satisfactory performance of the MOX fuel designs as well as gather data for design computer code benchmarking, it is desirable to implement a measurement program for the lead fuel assemblies at the WNP-2 site.

Operational data would be provided for benchmarking design codes. This would include operating power level data, temperatures, pressures, control rod patterns, and power shape measurements.

The program would primarily involve visual inspections of the spacers, selected fuel rods, oxide thickness, and bundle and rod lengths.

Hot cell examinations of segmented or full length rods are subject to further discussion and definition of the program.

VII. SCHEDULE

Lead fuel assemblies under this proposal can be loaded for irradiation within twenty-four to thirty-six months of a binding agreement or contract with DOE, the Supply System and the selected MOX fabricator.

Lead fuel assemblies can be loaded into WNP-2 as early as the refueling occurring in the spring of 1998 if DOE approval is obtained by December 1995. Fabrication of lead fuel assemblies on this time schedule is subject to the availability of MOX pellet capacity at the chosen fabricator in late 1997. An accelerated schedule would necessarily result in added costs.

A detailed cost estimate has not been prepared for this proposal but would be developed should DOE indicate an interest in proceeding with discussions.

NEI FUEL CYCLE 95 CONFERENCE

Dave Larkin

NUEXCO - At the conference Franchone Oshinowo of Edlow International informed me that Nuexco had contacted them about two weeks ago regarding removing 10-12 cylinders of UF₆ from Siemens. Since Nuexco had earlier suggested they had no other material at Siemens in cylinders this was a cause for some alarm. Nuexco's Earl Hoellen denied that Nuexco had any plans to remove material from Siemens. Jim Nordhal of Siemens was then contacted and he had no knowledge of any Nuexco plans for shipments but promised to investigate upon his return to Bellevue. Al Mouncer of Legal was informed of the information and he promised to pursue this with counsel in Denver. Upon my return I had a call from Gary Ward of Siemens informing me that there were no plans by Nuexco to move any material from Siemens.

SALES AND LOAN OPPORTUNITIES - Tony Schillmoller of GE is interested in additional loans of EUP. He mentioned that they have discovered that the WNP-1 material is "way out of specs" on technetium. This indicates a contamination during the enrichment process with reprocessed uranium. This creates an environmental problem for fabrication plants especially for those using dry conversion processes which must use "technetium traps" to remove the material.

Discussions were also held with Jeff Wyvill, Bill Burns and Dick Matheney of ABB CENO about their interest in borrowing EUP. When our EUP that we obtained through our Nuexco loan contracts can be moved from Siemens both GE and ABB CENO will be considered for loans until WNP-2 requires the enrichment for reloads.

NUCLEAR INDUSTRY - Speakers provide the obligatory mourning for the state of the nuclear industry and visions of hope for the future. It was pointed out that by the year 2000, 36% of the baseload generating plants will be over 30 years old. Even with some plant life extensions the U.S. will need 200 Gigawatts of new generating capacity by 2010.

Meanwhile nuclear plant performance continues to improve. In 1994, ten plants had refueling outages that were shorter than 40 days.

INTERNATIONAL TRADE - It is now almost inevitable that the Agreement for Cooperation between the US and EURATOM nations will lapse on December 31, 1995 before a new agreement can be negotiated. The immediate consequences of a lapse are that NRC export licenses for enriched uranium and fuel shipments to the ten countries now covered by the agreement would lose their validity. This would prevent certain European nuclear firms with US subsidiaries from fully integrating their operations. It would also preclude the shipments of feed material from the US to enrichers in Europe. It would also mean that DOE could not approve transfers of source or SNM exported from the US and already in Europe from being transferred to another EURATOM country.

The Supply System had questioned whether the lapse of the agreement would impact our ability to ship uranium feed for the next reload to ABB in Sweden. This does not appear to be a concern according to Jay Kraemer, a partner of the law firm of Fried, Frank, Harris, Shriver and Jacobson.

He confirmed what I had noted earlier, that the US has separate Agreements for Cooperation with Austria, Finland, Portugal, Spain and Sweden that will remain in force even with the lapse of the agreement with EURATOM.

Jean-Claude Blanquart from the EURATOM Supply Agency discussed the unique role his agency plays in nuclear materials in the EURATOM countries. All contracts for nuclear fuel materials coming from inside the Community or from outside must be co-signed by the Agency or the contract is invalid. The Agency applies a policy of diversification of supply sources by limiting the share from any country. In practice this has been applied almost exclusively to CIS countries from which the Agency seeks to limit uranium to no more than 20% of the total consumed in the Community. For enrichment services the CIS "limit" is 15% of the market share. The Agency also encourages reasonable prices that cover normal production costs thus limiting "dumping".

By contrast the US has applied trade restrictions to CIS uranium and enrichment that has limited the quantities that can be imported by the current "market" prices. More recently, the Commerce Department has utilized the concept of matching sales in which each pound of Russian uranium must be matched with a pound of new US produced uranium. During 1994 this led to fourteen matched sales for natural uranium and one matched sale of enrichment services.

URANIUM - Bob George of DOE's Uranium Revitalization Office requested an interview with me to gain a utility manager's perspective on saving the U.S. uranium industry. Bob appears to favor letting the industry compete on its own economic merits but his job is to "grow" the industry.

Roland MacDonald of the Department of Commerce announced that in an effort to close the enrichment bypass of the Suspension Agreements, DOC has issued instructions to US Customs that all imports of uranium, from any country, must be accompanied by a statement identifying the country in which the uranium was mined, converted, enriched, and fabricated. This will be a great pain since this information is often not available. We will face this issue when our next reload is shipped to us from Sweden.

CONVERSION SERVICES - Dustin Garrow of CONVERDYN discussed the supply-demand picture for conversion services over the next ten years. There are only five conversion plants world-wide and their production capacity is insufficient to cover the demand throughout this period. Thus utilities will have to rely on inventory stockpiles to meet the shortfall in the near term. In the longer-term blending down of weapons high enriched uranium may fill the gap. The first shipment from Russia of up to 6 MTU of high enriched uranium is scheduled to occur in early 1995. Blending of this material to meet commercial specs will slow its introduction into the market place. It can be anticipated that spot market prices for conversion services will continue their recent increases as available supplies continue to tighten.

ENRICHMENT SERVICES - The status of the enrichment services market was given by Beatrice Gillet from Cogema which markets production from the French Eurodif diffusion plants. To minimize supply risks she advised utilities to diversify their supply sources, use a producer rather than a trader, choose a supplier with inexpensive energy contracts, choose a supplier with

predictable stable pricing policies, choose a supplier in a country which supports nuclear power, and return to longer term commitments. In other words, choose Cogema instead of USEC.

Despite the sales pitch Beatrice had noteworthy information on the problems with getting the enrichment values tied up in weapons-materials to the market. The US agreed in 1994 to purchase 500 tons of high enriched uranium from Russia over a twenty year period beginning in 1994. The material was to be blended down to low enriched uranium in Russia before shipping to the US. However, no material has been shipped yet because of problems with the quality of the material. The problem is that for years the Russians reprocessed uranium and used the material as feed for the enrichment plants. Enrichment concentrated the trace impurities leading to higher radioactivity from transuranics and fission products as well as neutron absorber isotopes of uranium which must be compensated for by increasing enrichment assays. Currently the specs of the blended material exceed ASTM standards and would create problems for the fuel fabricators. US weapons-uranium is cleaner than the Russian material but is not free of minor isotopes and other contaminants.

FUEL MANAGEMENT - Duke Power reported that they have 85 people in six groups working on all aspects of fuel management for their plants. Duke performs all core design except for LOCA analysis. To optimize costs they enter data on their current core plus the next two reloads on a spreadsheet. They have also made innovative use of PRA to assess the risk of a new fuel design or design feature. They also use the PRA group to look at the probabilities of generation to determine the risk in setting the fuel delivery dates.

Northern States Power described the ongoing push to ever cheaper fuel costs through higher fuel exposures and accompanying smaller batch sizes. To achieve the next plateau of cost improvement enrichments will have to exceed 5%. This is a problem since fabricators, enrichers, shippers and utilities have licensed their facilities for less than 5% enrichments. Progress toward these higher burnups may be blocked however by the concern with experimental data that indicates fuel failures at higher exposures associated with reactivity insertion accidents. Pat Lacy of Utility Resource Associates argued that this concern will lead to new NRC fuel limits that will restrict higher burnup and may lead to a retreat from the current emphasis on 24 month fuel cycles.

Optimizing fuel cycle lengths was a subject of two papers. Stan Wozniak presented the analysis that Wisconsin Public Service performed justifying moving from an annual cycle to an 18-month fuel cycle at Kewaunee. In their system the higher nuclear fuel costs was roughly balanced by the cost savings by eliminating outage time. The real benefit (77%) then came from sales of the nuclear generated electricity during the eliminated outage since in their system nuclear generated electricity is cheaper than alternatives. Stan's analysis was balanced by a paper from Sweden for nuclear plants in a predominantly hydro system. There nuclear generation costs are higher than the variable costs of hydro power, particularly during the summer months of run-off, and their analysis will not justify longer than annual fuel cycles. The results are no great surprise for the Supply System where analysis of optimum fuel cycles have been performed many times over the past twenty years.

WEAPONS MATERIAL DISPOSAL

My paper on the Supply System proposal to burn weapons-plutonium as MOX fuel in our reactors was relatively well received. Questions from the floor confirmed the concern for MOX fuel containing gallium. The proposal to complete assembly of lead MOX fuel assemblies at WNP-2 was questioned on the radiological hazards grounds should workers inadvertently break a MOX rod exposing the Pu to the air. While I suspect the risk of such a failure is low and the risks of releasing Pu in the air even smaller, still we may need to consider final assembly of leads underwater. I was approached afterwards by the Project leader for weapons disposal studies at Los Alamos who expressed great interest in participating in any proposal we might advance.

SPENT FUEL - Ron Milner provide DOE's status on the federal high-level waste program which still projects an operational repository in 2010 assuming that the Yucca Mountain site is found to be suitable by 1998. Tunneling at the test site passed the 444 meter level on March 15, slightly behind the latest schedule, on its way to a planned 1280 meter characterization test loop. This loop is for testing only and will not be a part of the ultimate repository. For the interim DOE is seeking Congressional approval to develop and supply to customers multi-purpose canisters that could be used for storage today, and for transportation and burial in the future. Approval to proceed with the multi-purpose canisters is not expected before 1997. With the pressure on deficit reduction in Congress it will be difficult to obtain access to sufficient Waste Fund dollars to maintain the 2010 repository goal. In 1996 the funding request is for \$630-million, up from \$380-million two years ago. By 1999 the budget request will be \$836-million.

Janice Owens presented NARUC's perspective on the funding issue when she confirmed that several state PUCs are considering disallowing inclusion of the 1 mill/kwhr fee in utility rate bases if DOE does not begin accepting spent fuel in 1998 as required by contract. NARUC is a strong supporter of the Upton-Towns spent fuel legislation.

In the interim utilities are running out of on-site storage space and are turning to dry cask or module storage. Six utilities have received NRC site-specific licenses for dry spent fuel storage and one utility is using the newly available general license. The most popular choices have been the concrete VSC-24 storage cask and the concrete NUHOMS module. Metal casks are being used at two sites but are generally more expensive and thus less popular.

Scott Northard of Northern States Power discussed the recent reversal by the Mescalero Tribe on further pursuit of a spent fuel storage project on Apache lands. The Tribe had rejected the project but a revote was taken which approved proceeding. Twelve utilities have expressed serious interest in the project and commitments from them to proceed are scheduled by May 12, 1995. An NRC license would be submitted by December of 1996 with first operation planned in 2002.

A U.S. Utility View of Using Former Weapons Material

Presented by Dave Larkin
Washington Public Power Supply System

NEI FUEL CYCLE '95 CONFERENCE
San Diego, California
April 4, 1995

I. Introduction

Good afternoon, ladies and gentlemen.

By way of background, I am the Program Manager for Nuclear Fuel at Washington Public Power Supply System. In this capacity, I am responsible for nuclear fuel supply, on-site spent fuel storage projects, and support of the Supply System's proposal to burn excess weapons-grade plutonium from the dismantlement of this country's weapons in WNP-2, our operating nuclear plant. The Supply System is the only organization with NRC licensed facilities to come forward and actively entertain the use of plutonium in commercial reactors.

Today I will discuss the factors that lead to our interest in using the excess plutonium, our overall proposal, and recent developments.

II. The Washington Public Power Supply System

For those of you who may not be familiar with the Supply System, we are a municipal corporation and joint operating agency of the State of Washington that is empowered to finance, acquire, construct, and operate facilities for the generation and transmission of electric power.

The Supply System currently operates WNP-2, a 1,120 megawatt boiling water nuclear power plant, located on the Hanford Reservation, as well as a 27.5 megawatt hydroelectric facility, the Packwood Lake Project. The Supply System also owns two partially completed nuclear power plants, including WNP-1, which is a 65% complete pressurized water nuclear power plant located adjacent to the operating WNP-2 plant on the Hanford Reservation.

All electricity produced by the Supply System projects is delivered to electrical distribution facilities owned and operated by the Bonneville Power Administration (BPA), which in turn distributes the electricity to utility systems or large industrial users throughout the Pacific Northwest. Bonneville Power Administration is an arm of the federal Department of Energy.

III. Background

In the next several years, it is anticipated that the President will declare approximately 50 metric tonnes of weapons-grade plutonium surplus to national security requirements. The Department of Energy (DOE) is currently examining alternatives for the long term storage and/or disposal of this material and is preparing a Programmatic Environmental Impact Statement (PEIS) on the options. The PEIS is scheduled to be issued in the spring of 1996 with the Record of Decision (ROD) to follow approximately a month later.

Most of the alternatives being considered would require long-term storage until the technology for disposal could be developed. A near-term alternative that is gathering increasing interest and support is to fuel existing commercial reactors with mixed oxide fuel containing the excess plutonium.

As the National Academy of Sciences and other knowledgeable participants in the plutonium disposition discussion have recognized, the use of weapons-grade plutonium as MOX fuel in existing commercial reactors is among the most viable and desirable options for dispositioning of this material. The reactor-use option would invoke a conventional technology to convert weapons-grade plutonium into a highly diversion-resistant and environmentally manageable form (spent nuclear fuel), while at the same time extracting economic value from the material by using it to produce electricity.

Studies by General Electric have identified that three currently operating large BWRs could complete the task of burning up the 50 tonnes of plutonium in 23 years.

IV. Supply System Dual Purpose Concept

Last year the Supply System announced its intention to explore the possibility of fueling two of our nuclear power plants with mixed oxide (MOX) fuel, comprising a mixture of uranium and surplus weapons-grade plutonium from U.S. stockpiles. The proposal was to use the WNP-2 facility, a General Electric boiling water reactor currently in operation, and the WNP-1 facility, a partially completed B&W pressurized water reactor, to assist the federal government in disposing of weapons-grade plutonium. Under our proposal, WNP-2 would have been converted, and the WNP-1 reactor completed, to burn surplus plutonium while generating electricity for commercial consumption, thereby offsetting much of the cost to taxpayers of disposing of this excess material.

With the present emphasis on cutting the federal budget deficit there is more pressure on DOE to select options that do not require the outlay of large sums of capital dollars. For that reason our emphasis this year has been on the use of our operating reactor WNP-2 to support the plutonium disposition mission. Because of the large water gaps between the fuel channels, the large void coefficient of reactivity and the lattice design using channeled fuel assemblies no changes to the BWR plant, systems, equipment or materials is necessary to use MOX fuel in BWRs.

As presently envisioned, the Supply System's concept would involve arrangements under which DOE would process plutonium into MOX fuel. The MOX fuel would be delivered to WNP-2 on the Hanford Reservation, and after fueling the plant, spent MOX fuel would be returned to DOE for storage and disposal.

The reactor would remain the property of the Supply System and, importantly, would be operated by the Supply System as a NRC-licensed facility. DOE would pay for plant operation and maintenance costs, and the revenues resulting from the sale of power would serve as a credit against the federal government's costs. The generated power would be sold at competitive market rates to BPA.

V. Utility Benefits and Risks of the Dual Purpose Concept

Why would an operator of a commercial nuclear plant want to consider getting involved in a weapons-grade plutonium disposal program? The over-riding incentive has to be economic. Nuclear plant operators are under increasing pressure from new independent power producers who can offer attractive initial pricing for new generation. Purchase of such power frees utilities from the inherent risks of rigidly regulated large thermal power plants and also avoids the investment of fresh capital.

In the Pacific Northwest that pressure has come largely from newly proposed natural gas combined cycle turbines with offered prices in the range of 27 mills/Kwhre. Current costs of power from WNP-2 are in the range of 32-35 mills/Kwhre and we must reduce them to approximately 27 mills/Kwhre in the near term if our plant is to survive as a viable resource. By contract, all of our power goes to BPA who is also contractually obligated to pay for the capital costs of our plants as well as the operating budgets. BPA is under enormous pressure to hold or cut the costs of their power. As much as 50% of BPA's present load is at risk if costs can not be contained rapidly. With major fixed costs to restore salmon runs and to finance conservation, BPA has little maneuvering room should their customers begin to desert them.

But the use of MOX brings certain political and financial risks to the owner of a nuclear plant in the U.S. The reprocessing option, and use of plutonium in civilian reactors, has experienced opposition from both the government and several anti-nuclear groups over the past twenty-five years. Licensing of MOX brings with it the possibility of public hearings and very vocal opposition from both private citizens as well as local governments. Capital modifications of Pressurized Water Reactors to enable the use of MOX fuel, raises financial risks from both the state regulators, on inclusion in the rate base, as well as from investors and stockholders. Not all utilities will want to consider using MOX fuel, even if there are some financial incentives, as presently fuel charges are often passed through to rate payers.

VI. Unique Features of the Supply System Proposal

The Supply System proposal has a number of virtually unique features that make it more attractive to the federal government than contracting with other commercial plants.

Our location and the history of our local community is an inherent advantage. Our plant is located on the controlled Hanford Reservation where much of the plutonium was produced and stored. The nearest significant population is some twelve miles away in Richland which is a community which understands and has traditionally supported nuclear power. Traffic toward the plant is limited to Supply System workers or employees of the DOE Hanford contractors.

A completed building originally planned as a federally owned fabrication facility for fast breeder reactor fuel is located on the Hanford Reservation less than two miles from WNP-2. This facility has no other use and could be converted to use to produce commercial plant MOX fuel at a substantial cost savings to the government. Fabrication and handling of the plutonium could then take place entirely on the protected Hanford Reservation. Transportation of the finished MOX fuel to WNP-2 would be a short trip on restricted access roads.

From the overall government standpoint, burning plutonium in WNP-2 is the most cost effective option. Bonneville Power Administration is obligated to pay for the retirement of the bonds used to finance construction. In addition, as long as BPA finds the plant cost effective the government has the obligation to pay for our annual fuel and operating costs. Our proposal would shift only a portion of that cost to the general taxpayer while leaving the bulk of the costs to be recaptured through Pacific Northwest ratepayer purchases of electricity.

VII. Proposed Lead Fuel Assembly Program

While there is a significant amount of experience with "island" design MOX fuel from recycled plutonium, disposing of the weapons-grade plutonium on an accelerated schedule will lead to full MOX reload designs. To resolve any issues involved the Supply System is proposing that DOE sponsor a lead fuel program of four MOX fuel assemblies for operation in WNP-2. If the program were initiated in September 1995, the fuel assemblies could be introduced into WNP-2 in May 1997. The incremental cost to DOE during fiscal year 1996 is estimated to be less than \$3-million.

The Supply System would provide the required natural and enriched uranium for the four lead fuel assemblies. General Electric would design the fuel assemblies and use the supplied uranium to build any UO₂ rods and all other fuel assembly hardware at Wilmington, NC. The rods and hardware would be assembled into a bundle and shipped to WNP-2 in Washington. Meanwhile, DOE would produce the MOX fuel pellets and load them into fuel cladding supplied by GE. The facilities at the Los Alamos laboratory in New Mexico could be modified to produce the MOX pellets and load full length rods. The finished MOX fuel rods would be shipped to the WNP-2 site in Washington.

At the WNP-2 site the MOX fuel rods would be loaded into the fuel bundles supplied by GE, inspected and then loaded into the reactor for operation.

The objective of the program would be to resolve any issues with the use of gadolinia and gallium in mixed-oxide rods. Boiling Water Reactors use a burnable poison called gadolinium to shape reactor power in the fuel assemblies. Prior U.S. experience is limited to using gadolinium only in UO₂ rods. Weapons makers have added gallium to the Pu metal to form an alloy. There are some questions as to whether this gallium must be removed prior to being used as reactor fuel. If gallium need not be removed from the fuel then the overall program costs may be reduced.

The lead fuel would also be used to validate the application of current fuel and core design computer codes to MOX in modern designs to extended burnups. Earlier U.S. experience was limited to fuel designs of 25 years ago. Modern fuel is burned to twice that of fuel batch averages in the 1970s and the accuracy of design codes needs to be revalidated prior to going to full MOX fuel loads.

Finally, the program would:

1. Validate MOX fabrication, transportation, and handling logistics for use of the Los Alamos facilities until a production scale fabrication plant can be constructed;
2. Demonstrate that Los Alamos can fabricate pellets and load fuel rods that meet commercial specifications for performance and fuel integrity;
3. Demonstrate or identify issues for transportation of MOX;
4. Demonstrate at WNP-2, MOX handling procedures and security; and
5. Demonstrate overall program special nuclear material accountability to IAEA standards.

VIII. Conclusion

In closing, I would suggest that the Supply System's proposal would provide a cost-effective viable approach to a near-term start at disposing of the excess weapons material. Extracting the energy contained in the plutonium recoups valuable benefits from the enormous expenditure that went into our defense programs over decades.

An early decision to start with a small lead fuel assembly program would give momentum to the commercial reactor burnup option, at a relatively small cost.

It would be real tests in real reactors rather than paper and computer studies.

And the answers that it would provide would hasten the day when the first full MOX reloads go into commercial reactors.

MOX PROGRAM ACQUISITION STRATEGY
COMMENTS AND CLARIFICATION QUESTIONS

CONSORTIA ISSUES

1. The PAS expresses the desire for a single contract with a consortia. We should emphasize our support for the concept of a single contract with a consortia.
2. The PAS says that the consortia must be lead by either a utility or a NSSS vendor. See A.2.1.1. We should attempt to get this changed to utility or nuclear fuel fabricator. *While Siemens is an NSSS vendor in Europe they are not in the U.S. and because of the issues regarding foreign ownership and control it would be wiser not to rely on the Siemens NSSS activities in Europe.*
3. The consortia leader is required to be U.S. - owned. *This could be a real problem for our consortia but at the same time a real help. Clearly BNFL and Cogema are owned by foreign owned, but so is Siemens. GE and Westinghouse are the only U.S. owned NSSS or nuclear fuel fabricators. For the purpose of this procurement is Siemens foreign-owned?*
4. The consortia leader must also not be owned by an entity controlled or unduly influenced by a foreign government (See section C.3). The Secretary can waive this prohibition if it is essential to the national security interests of the United States. *I have reviewed the CFR sections referenced and should DOE wish to knock out consortia they have wide latitude to do it. The consortia must answer eleven questions to enable DOE to make a determination of whether an entity is foreign controlled or influenced. These questions include asking; whether more than 5% of stock is owned or controlled by a foreign interest, do foreign interests hold management positions, is more than 10% of your gross income from foreign contracts, are you indebted to foreign interests, do you derive any income from Communist countries, and do citizens of foreign countries employed by you or likely to visit your offices in a capacity which may permit them to have access to classified data or special nuclear material. Siemens would not be clean on several of these questions though any one is probably not a show-stopper. DOE must evaluate the significance of any foreign interest or influence. (This issue of foreign control or influence also flows down to subcontractors at any tier.)*
5. The consortium must be a legal entity capable of assuring financial responsibility and accountability to DOE (A.2.1.1). This is probably an area where more clarification should be sought at the Argonne meeting. *Does our current Teaming arrangement satisfy this requirement? I believe it doesn't and a consortium entity must be incorporated Siemens has always assumed that would be necessary. Who does the Supply System contract with, the consortium entity or Siemens? The entity would have no assets of its own and any fuel contract would need to be fully backed financially by Siemens.*
6. The Qualification criteria specifies that the program/project management organization must have held a prime contract for interdisciplinary, nuclear industry or a

government project of at least \$100M. *This probably disqualifies the Supply System and Entergy. Does Siemens qualify? Raytheon?*

MOX FABRICATION FACILITY ISSUES

1. DOE is requiring that the MOX plant have adequate space to fabricate both LWR and CANDU MOX fuel. *Should seek clarification as to whether this is intended to mean that either fuel must be accommodated or does DOE contemplate that both fuel types would possibly be fabricated at the same time. What is the impact of these space requirements on multiple uses of FMEF?*
2. DOE has stated that converting the surplus materials to plutonium oxide powder will be performed by DOE and its contractors and is out of scope for this procurement. (A.1.1.1) *We should provide comments or seek clarification on whether an unsolicited option to perform this conversion is possible as part of the procurement. Since we see this as one of our significant cost advantages over the competition we should try to open this up.*
3. Note that no contract is signed until the Surplus Plutonium Disposition ROD is issued in 1998.

LUA ISSUES

1. Consortia must demonstrate how lead assemblies will be fabricated domestically (A.1.4.1). Note, however, that A.2.3.4 provides an out if significant cost or schedule savings result. *This domestic requirement is to our advantage and we should comment favorably on this. We could argue that the foreign source for qualification fuels is not necessary for cost or schedule savings. We could ask how sending weapons material to a foreign fabricator could be in compliance with the restrictions on giving foreign contractors access to weapons data or material (48 CFR904).*
2. DOE proposes to select the site for a pilot line for lead fuel fabrication. *This could undercut one of our advantages. We should comment that the consortiums should provide their own proposals for this and keep this out of the DOE scope.*
3. Does oxide derived through aqueous process present any drawbacks technically or from the basis of giving the NRC and utilities comfort that the leads represent the reload fuel adequately for licensing? Should we wait until 2001 for the hydride process oxide?
4. Can the available powder that is gallium free provide the assurances and data required by the utilities and NRC? *This material is not weapons-grade and also has undergone additional processing by DOE that may not make it prototypical.*

IRRADIATION SERVICES

1. For the base scope of work for reactor irradiation services must the preparation and submittal of license modification application cover all reactors offered by the

- consortium or only the lead plant? *Entergy may not want to submit an application for their plants until the Supply System has successfully paved the road.*
2. To provide flexibility in plutonium disposition rate DOE is requesting that the MOX design be as interchangeable with LEU fuel as possible. *Need to do some evaluation of this since early indication from Siemens is that it would be difficult to make the heavily loaded MOX bundles (85% MOX rods) neutronically similar to the LEU bundles, especially the SVEA-96 LEU bundles.*
 3. The PAS requests the consortium to have an inventory of LEU bundles or a timely source of LEU bundles. Notification is at least greater than one year. *The notification period is long enough that an inventory of completed LEU fuel assemblies should not be necessary. However, some thought needs to be given to a source of enriched uranium to build the LEU bundles.*
 4. Fresh MOX storage is to be large enough to accommodate at least one reload. *This should not be an issue except for the added burden of security costs until the fuel is loaded into the core.*
 5. PAS specifies that the consortium must not require more than two qualification and licensing efforts. *This is acceptable if it applies only to the fuel design (Atrium-10, etc.) but we would expect a licensing effort for each reactor even if the design is identical.*
 6. DOE prefers higher burnups to minimize spent fuel but also doesn't want us to exceed European MOX experience data base. *Does the Siemens design exceed the European database. French are still trying to get permission to take MOX to burnup levels seen by LEU fuel.*
 7. MOX unirradiated security requirements need clarification. Will physical requirements in 10 CFR 73 and the NRC current requirements be sufficient? Is storage in the spent fuel pool adequate physical protection without a separate storage bunker?
 8. Can we get dimensional data on the SSTs? *Backup documentation indicates that SST wouldn't fit into ANO's fuel receipt bay without modification.*

PROPOSAL PRICING ISSUES

1. Need to include the procurement costs for the certified MOX fuel assembly shipping containers.
2. Include cost of outreach program in MOX plant community and at each reactor plant community.
3. Need to include the costs for DOE security clearances.
4. Will DOE consider fixed price proposals for optional scopes? *Team concept was to offer DOE financial protection by offering fixed prices. PAS anticipates use of cost reimbursement for several items.*
5. Need clarification on how DOE expects consortium to benefit financially from contract? *During irradiation the PAS contemplates DOE receiving a fee for the MOX plant but the consortium to eat the costs of irradiation and D&D of the MOX plant. Free plutonium and depleted uranium is insufficient incentive to utilities if they have to pay full MOX fabrication price. What about "Irradiation fee"?*

PROCUREMENT PROCESS

1. Does DOE intend to award only one contract for the base scope of work, i.e., conceptual MOX plant design and license applications?
2. Will there be a Best and Final Proposal request?
3. Will there be negotiations with prospective consortia?

PROPOSAL

1. Utility Data that needs to be collected:
 - Startup testing requirements for MOX.
 - Identify reactor modifications required.
 - Identify operational changes required; training, procedure modifications, etc.
 - LUA requirements.
 - Past LUA experience.
 - Approach to safeguards and security at the plant.
 - Licensing approach
 - Plant regulatory history.
 - Plant power costs, past and future.
 - MOX public affairs programs.
 - Plant operational performance.

Burning Former Weapons Material in Commercial Reactors

by Dave Larkin

Washington Public Power Supply System

Last year the Supply System announced its intention to explore the possibility of fueling two of our nuclear power plants with mixed oxide (MOX) fuel, comprising a mixture of uranium and surplus weapons-grade plutonium from U.S. stockpiles. The proposal was to use the WNP-2 facility, a General Electric boiling water reactor currently in operation, and the WNP-1 facility, a partially completed B&W pressurized water reactor, to assist the federal government in disposing of weapons-grade plutonium. Under our proposal, WNP-2 would have been converted, and the WNP-1 reactor completed, to burn surplus plutonium while generating electricity for commercial consumption, thereby offsetting much of the cost to taxpayers of disposing of this excess material. The Supply System is the only organization with NRC licensed facilities to come forward and actively entertain the use of plutonium in commercial reactors.

In the next several years, it is anticipated that the President will declare approximately 50 metric tonnes of weapons-grade plutonium surplus to national security requirements. The Department of Energy (DOE) is currently examining alternatives for the long term storage and/or disposal of this material and is preparing a Programmatic Environmental Impact Statement (PEIS) on the options. The PEIS is scheduled to be issued in the spring of 1996 with the Record of Decision (ROD) to follow approximately a month later. Most of the alternatives being considered would require long-term storage until the technology for disposal could be developed.

The reactor-use option would invoke a conventional technology to convert weapons-grade plutonium into a highly diversion-resistant and environmentally manageable form (spent nuclear fuel), while at the same time extracting economic value from the material by using it to produce electricity. Studies by General Electric have identified that three large BWRs could complete the task of burning up the 50 tonnes of plutonium in 23 years.

The Supply System proposal has a number of virtually unique features that make it more attractive to the federal government than contracting with other commercial plants. Our location on the controlled Hanford Reservation where much of the plutonium was produced and stored, and the history of our local community is an inherent advantage.

A completed building originally planned as a federally owned facility for fast breeder reactor fuel is located less than two miles from WNP-2. This facility has no other use and could be converted to produce commercial plant MOX fuel at a substantial cost savings to the government. Fabrication and handling of the plutonium could then take place entirely on the protected Hanford Reservation.

While there is a significant amount of experience with "island" design MOX fuel from recycled plutonium, disposing of the weapons-grade plutonium on an accelerated schedule will lead to full MOX reload designs. To resolve any issues involved, the Supply System is proposing that DOE sponsor a lead fuel program of four MOX fuel assemblies for operation in WNP-2. If the program were initiated in September 1995, the fuel assemblies could be introduced into WNP-2 in May 1997.

The Supply System would provide the required natural and enriched uranium for the four lead fuel assemblies. General Electric would design the fuel assemblies and use the supplied uranium to build any UO₂ rods and all other fuel assembly hardware at Wilmington, NC. The rods and hardware would be assembled into a bundle and shipped to WNP-2 in Washington. Meanwhile, DOE would produce the MOX fuel pellets and load them into fuel cladding supplied by GE. The facilities at the Los Alamos laboratory in New Mexico could be modified to produce the MOX pellets and load full length rods. The finished MOX fuel rods would be shipped to the WNP-2 site in Washington.

The objective of the program would be to resolve any issues with the use of gadolinia and gallium in mixed-oxide rods. Boiling Water Reactors use a burnable poison called gadolinium to shape reactor power in the fuel assemblies. Prior U.S. experience is limited to using gadolinium only in UO₂ rods. Weapons makers have added gallium to the Pu metal to form an alloy. There are some questions as to whether this gallium must be removed prior to being used as reactor fuel. If gallium need not be removed from the fuel then the overall program costs may be reduced. The lead fuel would also be used to validate the application of current fuel and core design computer codes to MOX in modern designs to extended burnups. Earlier U.S. experience was limited to fuel designs of 25 years ago. Modern fuel is burned to twice that of fuel batch averages in the 1970s and the accuracy of design codes needs to be revalidated prior to going to full MOX fuel loads.

A U.S. UTILITY VIEW OF USING FORMER WEAPONS MATERIAL

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ABSTRACT

In the next several years, it is anticipated that the President will declare approximately 50 metric tonnes of weapons-grade plutonium surplus to national security requirements. The Department of Energy is examining alternatives for the disposal of this material and is scheduled to issue their decision in August of 1996. One option would be to burn this material as fuel in commercial reactors.

Last year the Supply System announced its intention to explore the possibility of fueling two of its nuclear power plants with mixed oxide (MOX) fuel. This fuel would be comprised of a mixture of uranium and surplus weapons-grade plutonium. Sales of generated electricity would help off-set the costs of destroying the plutonium.

The Supply System proposal has a number of virtually unique features that make it quite attractive to the federal government, including our plants location on the restricted access Hanford Reservation. Retrofitting an existing plutonium fuel facility at Hanford could be done to provide for MOX fabrication capability. Then both the fabrication and handling of the plutonium could take place entirely on the protected Hanford Reservation.

While there is a significant amount of experience with "island" design MOX fuel from recycled plutonium, disposing of the weapons-grade plutonium on an accelerated schedule would require full MOX reload designs. To resolve any issues involved, the Supply System is proposing that DOE sponsor a lead fuel program of four MOX fuel assemblies for operation in WNP-2. A decision to proceed by October 1995 could lead to loading the fuel in the spring of 1997.

The objective of the program would be to resolve any technical issues with the use of gadolinia and gallium in mixed-oxide rods. The lead fuel would also be used to validate the application of current fuel and core design computer codes to MOX in modern designs to extended burnups.

THE WASHINGTON PUBLIC POWER SUPPLY SYSTEM

For those of you who may not be familiar with the Supply System, we are a municipal corporation and joint operating agency of the State of Washington that is empowered to finance, acquire, construct, and operate facilities for the generation and transmission of electric power.

The Supply System currently operates WNP-2, a 1,120 megawatt boiling water nuclear power plant, located on the Hanford Reservation, as well as a 27.5 megawatt hydroelectric facility, the Packwood Lake Project. The Supply System also owns two partially completed nuclear power plants. One of these is WNP-1, which is a 65% complete pressurized water nuclear power plant located adjacent to the operating WNP-2 plant on the Hanford Reservation.

All electricity produced by the Supply System projects is delivered to electrical distribution facilities owned and operated by the Bonneville Power Administration (BPA), which in turn distributes the electricity to utility systems or large industrial users throughout the Pacific Northwest. Bonneville Power Administration is an arm of the federal Department of Energy.

BACKGROUND

In the next several years, it is anticipated that the President will declare approximately 50 metric tonnes of weapons-grade plutonium surplus to national security requirements. The Department of Energy (DOE) is currently examining alternatives for the long term storage and/or disposal of this material and is preparing a Programmatic Environmental Impact Statement (PEIS) on the options. The draft PEIS is scheduled to be issued in December 1995 and the final PEIS in July 1996 with the Record of Decision (ROD) to follow approximately a month later.

DOE's screening of available options has narrowed the field to four alternatives: 1) Storage of the plutonium for up to 50 years while developing additional disposal options, 2) Burning the plutonium as mixed oxide fuel in reactors, 3) Mixing the plutonium with radioactive materials for direct disposal in the high-level waste repository, and 4) Burial directly in deep boreholes.

Other options such as sending the plutonium to the sun in rockets were considered but rejected either because of cost, immature technology or because implementation would be untimely. The general criterion on timing is that an acceptable option must be usable within a decade and the mission completed within thirty years. The near-term alternative that is gathering increasing interest and support is Option 2, to fuel existing commercial reactors with mixed oxide fuel containing the excess plutonium.

As the National Academy of Sciences and other knowledgeable participants in the plutonium disposition discussion have recognized, the use of weapons-grade plutonium as MOX fuel in existing commercial reactors is among the most viable and desirable options for dispositioning of this material. The reactor-use option invokes a conventional, proven technology to convert weapons-grade plutonium into a highly diversion-resistant and environmentally manageable form (spent nuclear fuel), while at the same time extracting economic value from the material by using it to produce electricity.

Using a spent fuel standard for the final product makes the remaining plutonium after burning in the reactor very diversion resistant. The resulting bare spent fuel would be highly radioactive with dose rates exceeding 100 rems/hour at one meter that would make extensive radiation shielding necessary to divert the residual plutonium. To gain physical possession of the spent fuel a terrorist would have to transport a concrete or metal cask weighing 125 tons, too large for conventional truck shipments. Processing of the spent fuel to extract the plutonium would require sophisticated chemical processing equipment set up in a heavily shielded and remotely controlled facility.

Studies by General Electric have identified that three currently operating large BWRs could complete the task of burning up the 50 tonnes of plutonium in 23 years. Additional reactors could be used if the policy is to complete the task in a shorter time period.

Alternative reactor burn options include construction of new reactors either solely for that purpose or as a new production facility for weapons-tritium. Ontario Hydro has also expressed some interest in using their existing commercial reactors of the CANDU heavy water design for this mission. Recently the Canadian government has expressed

their support for the use of the CANDU reactors for plutonium disposition.

SUPPLY SYSTEM DUAL PURPOSE CONCEPT

Last year the Supply System announced its intention to explore the possibility of fueling two of our nuclear power plants with mixed oxide (MOX) fuel using a mixture of uranium and surplus weapons-grade plutonium from U.S. stockpiles. The proposal was to use the WNP-2 facility, a General Electric boiling water reactor currently in operation, and the WNP-1 facility, a partially completed B&W pressurized water reactor, to assist the federal government in disposing of weapons-grade plutonium. Under our proposal, WNP-2 would have been converted, and the WNP-1 reactor completed, to burn surplus plutonium while generating electricity for commercial consumption, thereby offsetting much of the cost to taxpayers of disposing of this excess material.

With the present emphasis on cutting the federal budget deficit there is more pressure on DOE to select options that do not require the outlay of large sums of capital dollars. For that reason our emphasis this year has been on the use of our operating reactor WNP-2 to support the plutonium disposition mission. Because of the large water gaps between the fuel channels, the large void coefficient of reactivity and the lattice design using channeled fuel assemblies, no changes to the BWR plant, systems, equipment or materials is necessary to use full MOX fuel in BWRs. Most Pressurized Water Reactors would have to make some modifications to the plant in order to accommodate full MOX fuel assemblies. The most common change would be added control rods to off-set the reactivity characteristics of the fresh MOX fuel.

As presently envisioned, the Supply System's concept would involve arrangements under which DOE would process plutonium into MOX fuel. Typically the weapons-plutonium is in the form of metal pits. These pits must be processed chemically to form plutonium dioxide. Commercial fuel vendors would be used to design the fuel, license it with the NRC, and develop the fabrication process specifications. Either DOE or a commercial vendor would do the actual fabrication of the plutonium fuel rods. The MOX fuel would be delivered to WNP-2 on the Hanford Reservation, and after fueling the plant, spent MOX fuel would be returned to DOE for storage and disposal.

The reactor would remain the property of the Supply System and, importantly, would be operated by the Supply System as a NRC-licensed facility. Thus it would receive

the same level of safety scrutiny as other commercial plants that are regulated by the NRC. DOE would pay for plant operation and maintenance costs, and the revenues resulting from the sale of power would serve as a credit against the federal government's costs. The generated power would be sold at competitive market rates to BPA.

UTILITY BENEFITS AND RISKS OF THE DUAL PURPOSE CONCEPT

Why would an operator of a commercial nuclear plant want to consider becoming involved in a weapons-grade plutonium disposal program? The over-riding incentive has to be economics. Nuclear plant operators are under increasing pressure from new independent power producers who can offer attractive initial pricing for new generation. Purchase of such power frees utilities from the inherent risks of rigidly regulated large thermal power plants and also avoids the investment of fresh capital.

In the Pacific Northwest that pressure has come largely from newly proposed natural gas combined cycle turbines with offered prices in the range of 27 mills/Kwhre or less. Current costs of power from WNP-2 are in the range of 32-35 mills/Kwhre and we must reduce them to approximately 27 mills/Kwhre or less in the near term if our plant is to survive as a viable resource.

By contract, all of our power goes to BPA who is also contractually obligated to pay for the capital costs of our plants and their operating budgets. BPA is under enormous pressure to hold or cut the costs of their power. As much as 50% of BPA's present load is at risk if costs can not be contained rapidly. With major fixed costs to restore salmon runs and to finance conservation, BPA has little maneuvering room should their customers begin to desert them.

But the use of MOX brings certain political and financial risks to the owner of a nuclear plant in the U.S.

The reprocessing option, and use of plutonium in civilian reactors, has been opposed by both the government and several anti-nuclear groups over the past twenty-five years. Licensing of MOX brings with it the possibility of public hearings and very vocal opposition from both private citizens as well as local governments.

Using weapons-grade plutonium in fresh fuel also brings with it some added operational costs.

While burned MOX fuel assemblies, as compared to spent uranium fuel assemblies, will need no additional security measures, fresh MOX fuel assemblies will. During the period from receipt of the MOX fuel until completion

of loading the fuel into the reactor it is anticipated that security guards will be posted at all times on the reactor refueling floor. Access to the refueling floor would be controlled to those having a need to be there. These requirements will add to the utility cost of using the MOX fuel.

Capital modifications of Pressurized Water Reactors to enable the use of MOX fuel, raises financial risks from both the state regulators, on inclusion in the rate base, as well as from investors and stockholders. Not all utilities will want to consider using MOX fuel, even if there are some financial incentives, as presently fuel charges are often passed through to rate payers.

UNIQUE FEATURES OF THE SUPPLY SYSTEM PROPOSAL

The Supply System proposal has a number of virtually unique features that make it more attractive to the federal government than contracting with other commercial plants.

Our location and the history of our local community are inherent advantages. Our plant is located on the controlled Hanford Reservation where much of the plutonium was produced and is stored. The nearest significant population is some twelve miles away in Richland that is a community that understands and has traditionally supported nuclear power. Traffic on the highway leading to the plant is limited to Supply System workers or employees of the DOE Hanford contractors.

A completed building originally planned as a federally owned fabrication facility (the Fuels and Material Examination Facility or FMEF) for fast breeder reactor fuel is located on the Hanford Reservation less than two miles from WNP-2. This facility has no other use and could be converted to produce commercial plant MOX fuel at a substantial cost saving to the government. Fabrication and handling of the plutonium could then take place entirely on the protected Hanford Reservation. Transportation of the finished MOX fuel to WNP-2 would be a short trip on restricted access roads.

Licensing and construction of a new MOX fuel fabrication facility in the U.S. is estimated to cost \$600-million. Retrofitting the existing FMEF at Hanford would save at least \$300-million of this cost.

From the overall government standpoint, burning plutonium in WNP-2 is the most cost effective option. The federal government through the Bonneville Power Administration is already obligated to pay for the retirement of the bonds used to finance WNP-2's construction. In addition,

as long as BPA finds the plant cost effective the government has the obligation to pay for our annual fuel and operating costs. Our proposal would shift only a portion of that cost to the general taxpayer while leaving the bulk of the costs to be recaptured through Pacific Northwest rate-payer purchases of electricity.

This proposal has been discussed with DOE, the NRC and several members of Congress. Acceptance or rejection of the proposal is still on hold until DOE completes their formal environmental review process.

PROPOSED LEAD FUEL ASSEMBLY PROGRAM

While there is a significant amount of experience with "island" design MOX fuel from recycled plutonium, disposing of the weapons-grade plutonium on an accelerated schedule will lead to full MOX reload designs.

In the "island" design only about 20% of the fuel rods would contain plutonium mixed with uranium. The other rods would be fueled only with uranium as in WNP-2's current fuel designs. The plutonium disposed of with the "island" design would be limited to about 0.186 metric tons of plutonium per reactor operating year. In the full MOX design, all fuel rods would contain plutonium mixed with uranium. If WNP-2 were loaded with this design it would be able to dispose of 0.755 metric tons of plutonium per reactor operating year.

To resolve any issues involved the Supply System is proposing that DOE sponsor a lead fuel program of four MOX fuel assemblies for operation in WNP-2. If the program was approved and initiated in the fall of 1995, the fuel assemblies could be introduced into WNP-2 in May 1997. The incremental cost to DOE during fiscal year 1996 is estimated to be less than \$3-million.

The Supply System would provide the required natural and enriched uranium for the four lead fuel assemblies. General Electric would design the fuel assemblies and use the supplied uranium to build any UO₂ rods and all other fuel assembly hardware at Wilmington, NC. The rods and hardware would be assembled into a bundle and shipped to WNP-2 in Washington. Meanwhile, DOE would produce the MOX fuel pellets and load them into fuel cladding supplied by GE. The facilities at the Los Alamos laboratory in New Mexico could be modified to produce the MOX pellets and load full length rods. Alternately, the MOX fuel pellets and fuel rods could be fabricated by BNFL at their commercial MOX fabrication plant in England. The finished MOX fuel rods would be shipped to the WNP-2 site in Washington.

At the WNP-2 site the MOX fuel rods would be loaded into the fuel bundles supplied by GE, inspected and then loaded into the reactor for operation. The objective of the program would be to resolve any issues with the use of gadolinia and gallium in mixed-oxide rods. Boiling Water Reactors use a burnable poison called gadolinium to shape reactor power in the fuel assemblies. Prior U.S. experience is limited to using gadolinium only in UO₂ rods. Thus there is no data to verify the predictions of the design computer models.

Weapons makers have added gallium to the Pu metal to form an alloy. There are some questions as to whether this gallium must be removed prior to being used as reactor fuel. If gallium need not be removed from the fuel then the overall program costs may be reduced.

The lead fuel would also be used to validate the application of current fuel and core design computer codes to MOX in modern designs to extended burnups. Earlier U.S. experience was limited to fuel designs of 25 years ago. Modern fuel is burned to twice that of fuel batch averages in the 1970s and the accuracy of design codes needs to be revalidated prior to going to full MOX fuel loads. Finally, the program would:

1. Validate MOX fabrication, transportation, and handling logistics for use of the Los Alamos facilities until a production scale fabrication plant can be constructed;
2. Demonstrate that Los Alamos can fabricate pellets and load fuel rods that meet commercial specifications for performance and fuel integrity;
3. Demonstrate or identify issues for transportation of MOX;
4. Demonstrate at WNP-2, MOX handling procedures and security; and
5. Demonstrate overall program special nuclear material accountability to IAEA standards.

CONCLUSION

In closing, I believe that the Supply System's proposal would provide a cost-effective viable approach to a near-term start at disposing of the excess weapons material. Ex-

tracting the energy contained in the plutonium recoups valuable benefits from the enormous expenditure that went into our defense programs over decades.

An early decision to start with a small lead fuel assembly program would give momentum to the commercial reactor burnup option, at a relatively small cost.

It would provide a signal to the Russians that the U.S. is serious about an early reduction of nuclear weapons and sets an example for a reciprocal effort.

It would be real tests in real reactors rather than paper and computer studies.

And the answers that it would provide would hasten the day when the first full MOX reloads go into commercial reactors.

Lead MOX Assembly Program

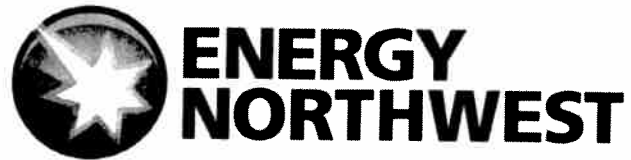
Program Benefits

The proposed program is to fabricate four MOX fuel assemblies of an "island" design and operate them in WNP-2 for up to five years. If the program were initiated in September 1995, the fuel assemblies would be introduced into WNP-2 in May 1997. The cost to DOE during their fiscal year of 1996 is estimated to be less than \$3-million. This program helps to resolve technical issues or confirm current technology as being adequate for a mission of disposing of weapons-grade plutonium in commercial nuclear plants. Specifically, the proposed lead fuel assembly program in WNP-2 will:

- Resolve any issues with the use of gadolinia and gallium in mixed-oxide fuel rods. Boiling Water Reactors use a burnable poison called gadolinium to shape reactor power in the fuel assemblies. Prior U.S. experience is limited to using gadolinium only in UO₂ rods. Weapons makers have added gallium to the Pu metal to form an alloy. There are some questions as to whether this gallium must be removed prior to being used as reactor fuel. European MOX experience would not answer these issues.
- Validate the application of current fuel and core design computer codes to MOX in modern designs to extended burnups. Earlier U.S. experience was limited to fuel designs and fuel lifetimes of 25 years ago. Modern fuel is burned to twice that of fuel in the 1970s and the accuracy of design codes needs to be revalidated prior to going to full MOX fuel loads.
- Validate MOX fabrication, transportation, and handling logistics for use of the Los Alamos facilities until a production scale fabrication plant can be constructed. Demonstrates that Los Alamos can fabricate pellets and load fuel rods that meet commercial specifications for performance and fuel integrity. Demonstrate or identify issues for transportation of MOX. Demonstrate at WNP-2, MOX handling procedures and security. Demonstrate overall program special nuclear material accountability to IAEA standards.

Fuel Process Logistics

- The Supply System would provide required natural and enriched uranium for the four lead fuel assemblies.
- General Electric would design the fuel assemblies and use the supplied uranium to build the UO₂ rods and all other fuel assembly hardware at Wilmington, NC. The rods and hardware would be assembled into a bundle and shipped to WNP-2 in Washington.
- The Los Alamos laboratory in New Mexico would produce the MOX fuel pellets, load them into fuel cladding supplied by GE, and seal them by welding using equipment supplied by GE. The finished MOX fuel rods (about 60) would be shipped to the WNP-2 site in Washington.
- At the WNP-2 site the MOX fuel rods would be loaded into the fuel bundles supplied by GE, inspected and then loaded into the reactor for operation.



Request for Public Records Control No 2010-02

Second Mailing dated March 18, 2010

Attachment 5

Document titled
"Questions for BPA"
no date (4 Pages)

Questions for BPA

What is the objective of using MOX fuel in CGS? Is the objective to test BWR MOX Lead Use Assemblies (LUA) only or is the final objective to implement reload quantities of MOX fuel in CGS?

What is the source of the plutonium? Is the source weapons-grade plutonium or is the source reactor-grade plutonium? The source determines the distribution of plutonium 240, 241 and 242 isotopes. The weapons-grade material has a greater concentration of fissionable isotopes and lower concentration of absorber isotopes. This results in a lower enrichment to achieve the equivalent burnup level and a different fuel reactivity change with burnup during the operating cycle.

What is the purity of the plutonium? What is the gallium content? Gallium is known to react with a number of metals and alloys including zirconium.

What is the source of funding and resources should CGS decide on pursuing the use of MOX fuel?

How would the timeline be established for the implementation of MOX fuel?

Process

Would CGS be giving up operating margin and/or flexibility to implement MOX fuel?

What computer codes have received NRC approval for licensing of MOX fuel? Who holds these codes and are they available to a vendor in support of a CGS effort to implement MOX fuel?

What magnitude of uncertainties would be applied to the analyses of MOX fuel and applied to the core monitoring system? Would GNF reduced uncertainties still be applicable?

The use of MOX fuel will have an impact on the plant source term and will require evaluation. Although the fission products from MOX fuel are the same as from Low Enriched Uranium (LEU) fuel, the distribution of the fission products is different. For example, one atom of I-131 is created in 2.86 percent of all U-235 fissions, whereas one atom of I-131 is created in 3.86 percent of all PU-239 fissions.

Since the MOX fuel pellet is a mixture of PuO_2 and UO_2 they are not as homogeneous as a LEU fuel pellet. This difference has the potential to impact the diffusion of fission gases. The fission gas release rate of MOX fuel is greater than for LEU fuel. Additionally, MOX fuel has a higher fuel temperature due to lower thermal conductivity.

.Due to the higher neutron energy spectrum of MOX fuel compared to LEU fuel, the impact of the fluence on vessel materials will have to be evaluated. With the change in neutron fluence due to MOX fuel, would there be any required changes to reactor vessel or component surveillance programs?

There appears to be the potential for a slight increase in dose during fuel receipt and handling operations which will have to be evaluated.

Technical Specifications and the Columbia Generating Station license would have to be revised to support the use of MOX fuel.

Who would fabricate the BWR MOX fuel assemblies? Fabrication of the MOX fuel assemblies would have to meet Appendix B requirements. Due to the plutonium, is it possible for the MOX assemblies to be fabricated overseas? Is there any security concerns associated with access oversight of the fabrication activities?

Due to the presence of plutonium, changes to the on site security requirements will be necessary. Changes to the ISFSI security requirements may also be required with MOX assemblies in dry cask storage.

The MOX fuel assemblies for Duke were transported by DOE with appropriate security support. The use of DOE would probably result in additional transportation costs. Is there any special transportation permitting required? Is this the only option available for transportation?

Are there approved shipping containers for BWR MOX fuel assemblies? Has the appropriate analyses been performed for shipment of BWR MOX fuel assemblies? Is HAZMAT support required along the travel route?

Since the MOX fuel pellets are not as homogeneous as those of UO₂, are they more fragile? If so, the MOX assemblies may require special handling.

Changes to Special Nuclear Material (SNM) control and accounting would also be required to account for the presence of plutonium. There may be security requirement associated with the plutonium accounting information.

With the use of MOX fuel, is there any startup physics testing that should be considered? Would it be appropriate to perform a local criticality?

Are there any special controls or processes associated with the post-irradiation inspection of MOX fuel assemblies?

What would be required to establish a working relationship with our current fuel vendor (GNF) to support the use of MOX fuel assemblies in CGS?

Is the available plutonium in a form useable by the fuel fabrication facility? If not what will it take to get the plutonium into an acceptable form for the fuel vendor?

Are there any special security requirements that would prevent CGS from sharing MOX fuel information with the industry?

Would revision or changes be required to the C of C for the dry storage casks?
Would MOX fuel be bounded by the existing radiation analyses for dry cask storage?

Technical

The use of MOX compared to LEU impacts thermal conductivity, fission gas release, fuel pellet swelling and pellet radial power distribution. Due to the higher fission gas release from MOX fuel, may need to increase the fuel rod plenum volume.

What should be the fuel pellet density to match existing MOX fuel performance to allow comparison to the existing data?

The energy spectrum of the neutron flux for the MOX fuel impacts the delayed neutron fraction, void reactivity effect and the prompt neutron lifetime.

The use of MOX fuel would require analysis of control rod withdrawal error and fuel assembly misloading.

The MOX fuel assembly's principle fissile material is Pu-239. Pu-239 is a more effective thermal and epithermal neutron absorber than U-235. As a result, control rods and burnable poisons have reduced worth when compared to UO₂ fuel. This effect will also impact storage of MOX fuel in the Spent Fuel Pool. The difference in neutron absorption may have an impact on scram timing values, Shutdown Margin and use of burnable poisons. Would there be a change to the Standby Liquid Control system concentration or parameters? BPWS may have to be revised.

The difference in the buildup and burnup characteristic of plutonium isotopes in MOX fuel results in a flatter fuel reactivity curve (reactivity drops off less steeply with burnup) than an equivalent LEU fuel reactivity curve. Can the core monitoring system account for the difference to monitor thermal limits? How to account for the thermal hydraulic performance of MOX fuel under changing conditions compared to the UO₂ fuel assemblies.

To ensure that we remain within the licensing basis, would CGS have to do any plant modifications such as change of setpoints or flow rates?

With 24 month fuel cycles, CGS would need to make sure that MOX fuel burnup limits do not become the limiting factor in core reload design and operation.

CGS will have to evaluate fuel handling accident, specifically damage of an irradiated fuel assembly. We will also have to evaluate damage to an un-irradiated fuel assembly due to the plutonium present in a new assembly.

A MOX fuel assembly has approximately 2% greater decay heat when compared to an equivalent LEU assembly. This will require evaluation of the impact on the Spent Fuel Pool Cooling and shutdown cooling.

What impact does the MOX fuel neutron energy spectrum have on the core coefficients such as void coefficient, temperature coefficient, doppler coefficient, etc? The impact could affect such AOOs such as Feedwater Controller Failure and other core cooling events.

Since the use of MOX fuel decreases the worth of poisons, the impact of xenon would also be diminished. What impact would this have on preconditioning, thermal limits and the ability to maneuver the plant?

Due to the difference between MOX and UO₂ neutron flux, would there be any impact on the potential for channel bow with the use of MOX fuel assemblies?

Is there any reason to believe that MOX fuel is less reliable than LEU fuel? If a MOX assembly were to fail, would the existing CGS procedural guide still be adequate? Would there be any change to power suppression testing process and sampling?

Since MOX fuel has a different fission product distribution, is the off gas system performance still adequate should a MOX assembly fail? Would there be any change in expected radiation levels while sampling or operating with a failed MOX fuel assembly?

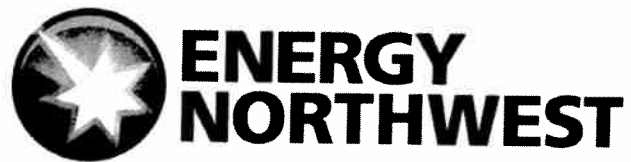
Is power suppression of a failed MOX fuel assembly as effective as suppression of a failed LEU assembly?

Comments

I have contacted GNF concerning MOX fuel. They currently have new computer codes that when approved by the NRC, expected sometime 2009 or 2010; the codes will be capable of evaluating MOX fuel.

GNF stated that GNF-J (Japan) has information on MOX fuel. I requested that any information that GNF could provide would be appreciated. A teleconference is being set up with GNF for early January 2008.

Since the pursuit of MOX fuel would be a significant investment of time, resources and dollars, CGS will have to understand the potential benefits.



Request for Public Records Control No 2010-02

Second Mailing dated March 18, 2010

Attachment 6

Document titled
"The Use of MOX Fuel"
no date (3 Pages)

The use of MOX Fuel

Assumptions

The source of plutonium is from reprocessed spent fuel.

No significant physical plant modifications required to utilize MOX fuel.

MOX fuel exposure limits would not impact continued operation with 24 month fuel cycles.

With approved methods for MOX fuel, there would be no additional cost associated with the core reload licensing process.

Since there is no domestic source for BWR MOX fuel fabrication, the assemblies would have to be fabricated overseas. This would increase the lead time and impacts the time table for core reload development.

Cost Items

Cost of reprocessed plutonium.

Fabrication costs of MOX fuel assemblies. (Discussions with GNF indicate the MOX assembly fabrication is 5-8 times (\$250,000 - \$400,000) the cost of fabrication for a LEU assembly.)

Cost of transportation of completed fuel assemblies from overseas fabrication facility to CGS.

Modify the Columbia Generating Station operating license and Technical Specifications to support use of MOX fuel.

Obtain NRC approval of computer codes to support licensing of BWR MOX fuel (nucleonic, transient, LOCA).

Various required analyses, such as:

- Spent fuel pool shutdown margin

- Fuel handling accident (both fresh and used assemblies)

- Control rod withdrawal error

- Fuel assembly misleading

- Impact of MOX fluence on reactor vessel materials

- Impact of MOX on source term

- LOCA

Changes to security requirements to support transportation and presence of MOX

Licensing of dry casks for storage of exposed MOX fuel

Revise Special Nuclear Material control and accounting processes. May require specialized software upgrades.

Evaluate impact use of MOX fuel on channel bow.

Increased travel costs to support oversight of MOX assembly fabrication overseas and second fabrication location for UO₂ assemblies.

There would be an impact on CGS internal resources due to additional training, documentation revision and analysis to operate with both MOX and LEU fuel assemblies.

Columbia is a single unit utility and as such does not have sufficient internal resources to pursue the implementation of MOX fuel without supplementing the current fuel staff.

Considerations without Costs Assigned

Since there is no domestic BWR that is utilizing MOX fuel, there is a risk associated with being the first domestic BWR utility to pursue the use of MOX fuel assemblies.

Licensing considerations may preclude use of fuel assemblies from a vendor other than the one that is fabricating and licensing the MOX fuel assemblies as long as MOX assemblies are in use. This may tie ENW to a single fuel vendor for both MOX and LEU fuel as long as MOX fuel is in use.

No costs assigned to activities associated with political or public intervention. There may be legal and other costs incurred with decision to utilize MOX fuel assemblies.

Since source of plutonium is from reprocessed spent fuel, handling of the new assemblies will result in additional radiation exposure.

Use of both MOX and UO₂ assemblies for a core reload will require different handling requirements depending on the fuel being handled. The net impact will be that we will have two (2) distinct fuel receipt activities.

Items such as dry cask storage and spent fuel pool heat load will require evaluation and analysis to address the impact of MOX fuel.

Conclusion

It does not make sense from an economic perspective or risk perspective for Columbia to pursue the use of MOX fuel. Multi-unit utilities have looked at the use of MOX and determined that the cost of doing so is not competitive with the use of LEU. As a single unit utility, ENW does not have the advantage of scale to spread the cost of pursuing MOX fuel. Additionally, since Columbia would be the first domestic BWR utility to pursue the use of MOX fuel, we would be assuming significant financial and operational risk.

It has been estimated that the cost of uranium would need to reach several hundred dollars a pound (currently \$70/lb) for MOX to become competitive. This is only for the fabrication of a fuel assembly and does not take into account to costs associated with handling and implementing the use of MOX fuel.



Request for Public Records Control No 2010-02

Second Mailing dated March 18, 2010

Attachment 7

MOX Fuel Overview Presentation
Jerry Lewis, Reactor Fuel Engineering
dated January 10, 2008
(7 Slides)



**ENERGY
NORTHWEST**
People · Vision · Solutions

Jerry Lewis
Reactor Fuel Engineering
10 Jan 2008

MOX Fuel Overview

MOX Fuel at Columbia

- **Objective**
 - **Pilot Only or Full Reload Quantities**
- **Business Case**
 - **Impact on plant Operation**
 - **Financial**
- **Source of Funding**
- **Timeline**

MOX Fuel Implementation

- Fabrication
 - No Domestic BWR MOX Fabrication
- Analyses
 - Codes NRC approved for MOX
 - Account for UO_2 & PuO_2 Differences
 - Documentation of Analyses

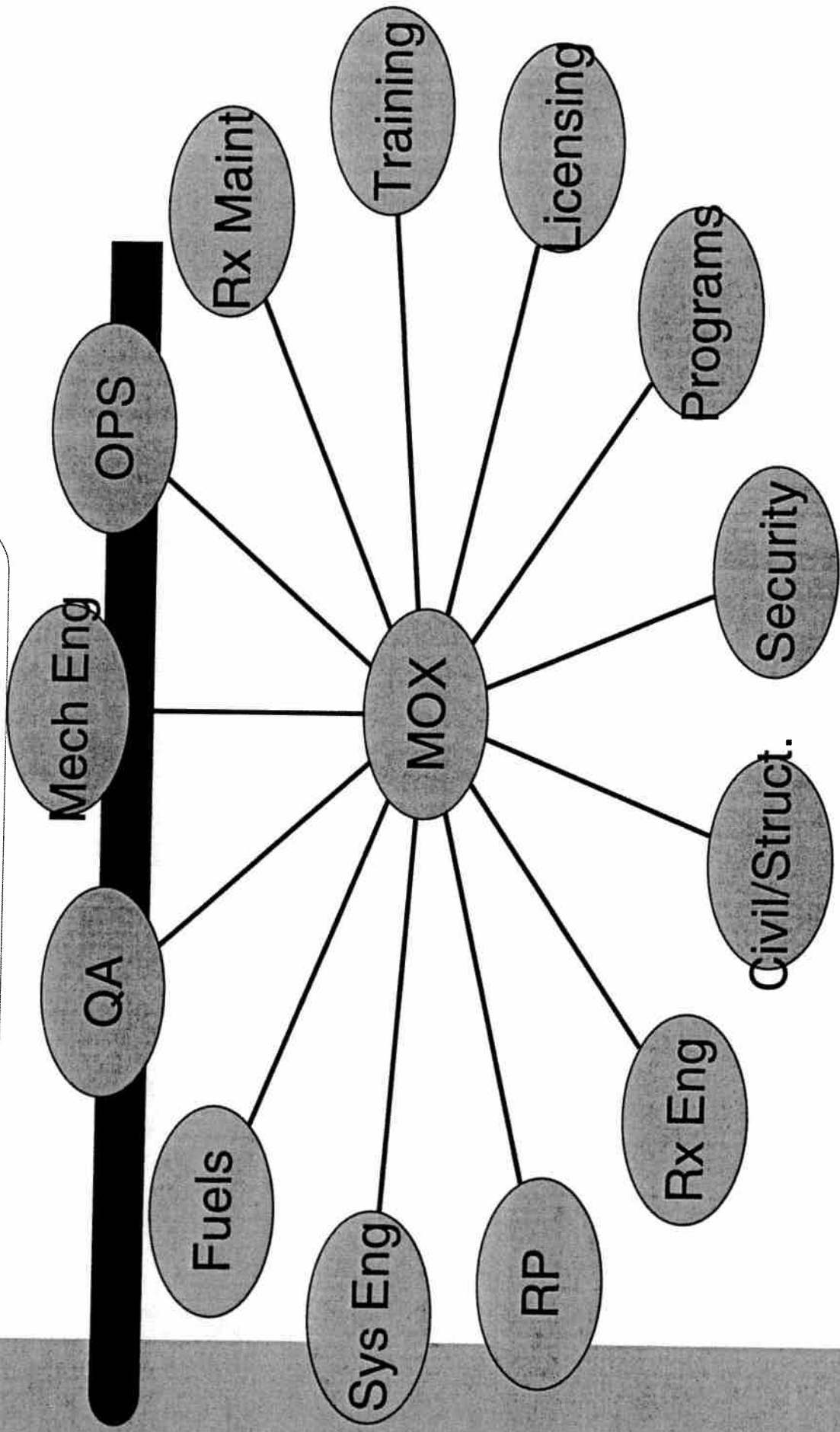
MOX Fuel Implementation


- Regulatory
 - Technical Specification Changes
 - Revision to CGS License
 - NRC Approvals
 - Dry Cask Storage
 - Special Nuclear Material Tracking
 - Source Term

MOX Fuel Implementation

- Security
 - Transportation
 - Changes to Site Security
 - Changes to ISFSI Security
- Revision of plant processes

Impacted CGS Organizations





Questions

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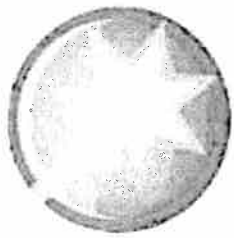
Request for Public Records Control No 2010-02

Second Mailing dated March 18, 2010

Attachment 8

Draft Results from
August 4, 2009 Senior Staff FY11-20
Strategic Planning Session
no date (8 Slides)

Partnering for a Powerful Future



**ENERGY
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**Draft Results from August 4, 2009
Senior Staff FY11-20 Strategic
Planning Session**

Schedule for Completion

Date	Responsibility	Activity
July	Board of Directors	Review/revise draft Initiatives
July/August	Senior Staff Planning Session(s)	Develop draft tasks by year
August	Executive Board Retreat	Review/revise draft initiatives
September	Senior Staff	Develop draft Strategic Plan
September/October	Senior Staff	Assess budget impacts
October	Board of Directors	Review/revise draft Strategic Plan
December	Staff	Finalize FY11 Strategic Plan
December	Staff	Document mailout to Board of Directors
January	Board of Directors	Review final Strategic Plan
January	Executive Board	Approve final Strategic Plan



Current Status – Discussion of Draft Strategic Initiatives

- ✧ Provide Power Supply Solutions Senior Sponsor: Baker
 - ▣ Tier 2 Power Supply
 - Firm/Shape Wind/Other Intermittent Generation
 - Baseload Generation
 - Offer Power Pool Solution
 - Conservation

|

Current Status – Discussion of Draft

Strategic Initiatives (cont'd)

✧ Public Power Leadership through

Communication/Education

Senior Sponsor: Parrish/Olson

- ▣ Industry Knowledge
- ▣ Communication Plan
 - In current FY10 Strategic Plan
- ▣ Member Engagement
- ▣ Political Initiatives
- ▣ Market Analysis

✧ Maximize Current Resources

- ▣ Cost of Power
- ▣ Reliability
- ▣ People Development

Senior Sponsor: Oxenford/Baker



**ENERGY
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FY11-20 Strategic Planning "Partnering for a Powerful Future"

Strategic Initiative: Provide Power Supply Solutions

Senior Sponsor: Jack Baker

Actions	Enabling Milestones by Fiscal Year				FY20 Success Measures	New Resource Requirements/ Funding	Responsible Individual
	FY10	FY11	FY12				
Provide Tier 2 Power Supply Solutions							
Firm/Shape Wind/other intermittent Generation	Market two 50-MWE Gas Peaking Options for BPA/Others						Tom Krueger
Renewable Generation	Permit for Radar Ridge	Complete construction of Radar Ridge (60 MW)	Complete Mustang Ridge Wind				Tom Krueger
	Develop Participants Committee for Mustang Ridge		Market 3 - 50 MW Adage Biomass Plants		Develop/Operate Renewable Resources of (500 MW)		Tom Krueger
	Market 3 - 50 MW Adage Biomass Plants		Build 15 MW of Solar				Tom Krueger
	Develop interest for Solar	Build 5 MW of Pilot Solar in Northwest				1-2 New Generation Development Staff; 1 to 2 new communications staff support; ~\$1M from BDF for FY10, 11 & 12; Operations fee from CGS and new resources;	Tom Krueger
Baseload Generation	Market 150 MW Natural Gas Plant	Build 150 MW of Natural Gas			Build 300 MW of New Baseload		Tom Krueger
	Modular Nuclear: Form and execute participants committee; decide if we want to proceed with COL. If decide to continue, execute project planning				Have participants funding for new nuclear		Tom Krueger
Offer Power Pool Solution							Jack Baker
Conservation		Aggregate 5 members for conservation marketing and programs			Participate in 25 MW of Conservation/Energy Efficiency		Mike Price



FY11-20 Strategic Planning “Partnering for a Powerful Future”
Strategic Initiative: Public Power Leadership through Communication/Education
Senior Sponsor: Rochelle Olson and Dale Atkinson

Enabling Milestones by Fiscal Year						
Actions	FY10	FY11	FY12	FY20 Success Measures	New Resource Requirements/ Funding	Responsible Individual
Industry Knowledge	Create Speakers Bureau			25 speaker bureau members		Olson
	Recruit employees for speakers bureau			20 independent author members		Olson
	Leveraging EN News to communicate industry issues	Create independent authors program		Employee engagement: 25% employee participate in industry issues actually respond to NEI requests, this information obtained through survey		Olson
Communication Plan	Implement Communication Plan	Continue implementing plan	Continue implementing plan	Member Engagement: 75% of memberships actively engaged in assisting w/ regional communications	3 FTEs to implement communication plan	Olson
	Completion of Baseline Survey			Percentage increase achieved for each implemented objective as determined by follow-up surveys		Olson
	Hiring needed resources (open positions in public relations)					Olson
	Member site visits	Member site visits	Member site visits			Olson
Member engagement Political Initiatives	Develop goals and issues: E.g. Coops in EN, Hydro and RPS, New Nuclear			Achievement of identified goals		
	Create Talking Points	Build informed audiences	Continue to build informed audiences	Stronger Partnership with Stakeholders	Build informed audiences	
	Coordinate Member Briefings	Continue to coordinate Member Briefings	Continue to coordinate Member Briefings		Coordinate Member Briefings	
	Develop Collaboration strategies	Influence Legislation	Continue to influence Legislation		Influence Legislation	
Market Analysis	Summarize all member IRPs to determine Member needs in the aggregate	Develop consensus within the membership for going forward strategies to meet member needs through periodic workshops with Member managers and other key staff				
	Determine external resources required for market assessment and provide information to members					



FY11-20 Strategic Planning “Partnering for a Powerful Future”

Strategic Initiative: Maximize Current Resources

Senior Sponsors: Scott Oxenford, Sudesh Gambhir, Jack Baker and Al Mouncer

Enabling Milestones by Fiscal Year						
Actions	FY10	FY11	FY12	FY20 Success Measures	New Resource Requirements /Funding	Responsible Individual
Cost of Power	Finalize CGS Up-rate plans	Implement Appendix K uprate of CGS		Appendix K Uprate and New CGS Output (Increase of ~ 25MW) Includes new condenser replacement below	\$10 Million	Oxenford
	MOX Fuel Studies	Implement MOX Fuel		Reduced Fuel Costs		Oxenford
	Power Conserve House loads	Power Conserve House loads	Power Conserve House loads	1 MW Reduced CGS House loads	\$100K	Gambhir
	Perform plant work efficiency improvement study	Implement plant work efficiency improvement plan		Improved Efficiencies at outage costs	\$500k	Gambhir
	Established revised Cost of Power targets and modify LRP	Transition to "Cycle" Budget and Planning		Cost of Power on two-year cycle		Oxenford
Reliability		Install new CGS condenser		2.5% unplanned CGS loss rates by 2013		Oxenford
	Develop a forced outage readiness and refuel outage improvement strategy	Gather data to support improvement strategy plan/changes	Implement outage improvement strategy	Outage Improvements: R20 stretch goal 65 days & R21 stretch goal of 25 days	\$ 1.5 million	Gambhir
			Identify long-term solutions to bearing and gearbox reliability challenges at Nine Canyon Wind			Oxenford
People Development	Packwood- Replace bus duct generator to transformer					Baker
	Develop more effective tools: (1) Leadership development (2) Succession planning and (3) Knowledge retention	Implement new tools	Implement new tools			Baker
						Mouncer



Executive Board Retreat

- ✧ Question – What are the actions the Executive Board is going to take to ensure the Board of Directors has more input and is more engaged in future EN endeavors?
 - ▣ Pertaining to the staff
 - ▣ Pertaining to the EB

