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July 2, 2004

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE ENERGY CORPORATION	)	Docket Nos. 50-413-OLA
	)	50-414-OLA
	)	
(Catawba Nuclear Station	)	
Units 1 and 2)	)	

NRC STAFF'S RESPONSE TO BREDL'S
"FIRST SET OF DISCOVERY REQUESTS TO
NRC STAFF ON SECURITY PLAN SUBMITTAL"

INTRODUCTION

On June 21, 2004, the Blue Ridge Environmental Defense League (BREDL) filed its First Set of Discovery Requests to NRC Staff on Security Plan Submittal (Request) in the above-captioned matter. The Request consists of three General Interrogatories, three General Document Production Requests, twenty-six Specific Interrogatories, and three Specific Document Production Requests. The NRC Staff (Staff) filed its objections to BREDL's Request on June 23, 2004. The Staff hereby reiterates and renews each of its objections to BREDL's Request set forth in the Staff's Objection.

Without waiving these objections, the Staff hereby responds voluntarily to BREDL's interrogatories and voluntarily provides responses to BREDL's requests for production of documents. The Staff notes that it is not required to respond to BREDL's Request at this time pursuant to 10 C.F.R. § 2.744(d).[1] By providing documents in response to BREDL's Request, the

[1] 10 C.F.R. § 2.744(c) provides that if the Executive Director for Operations ("EDO") objects to producing a record or document, the requesting party must make written application to the presiding officer to compel production, and the document is then to be reviewed *in camera* by the presiding officer. 10 C.F.R. § 2.744(d) provides that the presiding officer must determine that (1) the document or record is relevant, (2) its production is not exempt from disclosure under § 2.790, (continued...)

Staff is not conceding that any of the documents provided are material to, relevant to or within the scope of the proceeding. The Staff reserves the right to object to the introduction of any of these documents or answers at hearing on the grounds that they are immaterial, irrelevant or outside the scope of the proceeding. In addition, the Staff reserves the right to amend its discovery responses through supplements as new information becomes available.

RESPONSES

I. GENERAL DISCOVERY

A. GENERAL INTERROGATORIES

GENERAL INTERROGATORY NO. 1: State the name, business address and job title of each person who was consulted and/or who supplied information for responding to each of the interrogatories, requests for admission, and requests for the production of documents posed by BREDL herein. Specifically note for which interrogatories, requests for admission and requests for production each such person was consulted and/or supplied information.

If the information or opinions of anyone who was consulted in connection with your response to any interrogatory or request for admission differs from your written answer to the discovery request, please describe in detail the differing information or opinions.[2]

STAFF RESPONSE:

1. Sherri L. Cross, Senior Safeguards Technical Analyst in the Fuel Cycle and Special Security Programs Section, Division of Nuclear Security, Office of Nuclear Security and Incident Response, U.S. Nuclear Regulatory Commission, Rockville Maryland,

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[1](...continued)
or if exempt, that its disclosure is necessary to a proper decision in the proceeding, and (3) the information contained in the record or document is not reasonably obtainable elsewhere, before ordering the EDO to produce the document.

[2] In its Objection, the Staff objected to providing information in response to the second paragraph of this interrogatory because such information is subject to the deliberative process privilege and is protected from disclosure by 10 C.F.R. § 2.740(b)(3). The Staff hereby renews and reiterates its objection to the second paragraph of General Interrogatory No. 1.

was consulted on all General and Specific Requests for the Production of Documents and on all Specific Interrogatories.

2. Albert G. Garrett, Senior Security Specialist in the Fuel Cycle and Special Security Programs Section, Division of Nuclear Security, Office of Nuclear Security and Incident Response, U.S. Nuclear Regulatory Commission, Rockville Maryland, was consulted on all General and Specific Requests for the Production of Documents and on all Specific Interrogatories.

3. Sean E. Peters, Project Manager, Project Directorate 2, Section 1, in the Division of Licensing Project Management, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Rockville Maryland, was consulted on Specific Interrogatory No. 24.

4. Alexander P. Murray, Senior Chemical Process Engineer, in the Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Rockville Maryland, was consulted on Specific Interrogatory No. 24.

> GENERAL INTERROGATORY NO. 2: Give the name, address, profession, employer, area of professional expertise, and educational and scientific experience of each person whom the Staff expects to call as a fact or expert witness at the hearing regarding Contention 5. For expert witnesses, provide a list of all publications authored by the witness within the preceding ten years and a listing of any other cases in which the witness has provided fact and/or expert testimony and/or submitted affidavit(s) or declaration(s) within the preceding four years. For purposes of answering this interrogatory, the educational and scientific experience of expected witnesses may be provided by a resume of the person attached to the response. Fact and expert witnesses should be distinguished.

STAFF RESPONSE:

The staff does not intend to call any fact witnesses. The following individuals may be called as expert witnesses testifying on the topics indicated. All other information on the witnesses can

be found in their attached resumes.[3] If, as the Staff completes its testimony on Contention 5, additional potential witnesses are identified, the Staff will supplement its Response.

1. Sherri L. Cross may be called to testify on the Staff's review of Duke's Security Plan Submittal.

2. Albert G. Garrett may be called to testify on the Staff's review of Duke's Security Plan Submittal.

> GENERAL INTERROGATORY NO. 3: For each witness identified in response to General Interrogatory No. 2 above, describe the facts and opinions to which each witness is expected to testify, including a summary of the grounds for each opinion, and identify the documents (including all pertinent pages or parts thereof), data or other information which each witness has reviewed and considered, or is expected to consider or rely on for his or her testimony.

STAFF RESPONSE:

The documents, data, and other information which each potential witness reviewed and considered or is expected to review or consider for his or her testimony are included in the attached listing of responsive documents and privilege log. The opinions to which each potential witness may testify are summarized below.

1. If she testifies, Sherri L. Cross will testify to the Staff's evaluation of Duke's Security Plan Submittal and the Staff's conclusion that the proposed revisions in the Security Plan Submittal and the exemptions to NRC regulations requested by Duke provide adequate physical security for the MOX fuel. The grounds for these opinions are contained in the Staff's Safety Evaluation.

2. If he testifies, Albert G. Garrett will testify to the Staff's evaluation of Duke's Security Plan Submittal and the Staff's conclusion that the proposed revisions in the Security Plan Submittal and the exemptions to NRC regulations requested by Duke provide

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[3] The resumes are found in Attachment B, "Professional Qualifications of Staff Witnesses and in Support of Affidavits."

adequate physical security for the MOX fuel. The grounds for these opinions are contained in the Staff's Safety Evaluation.

B. GENERAL REQUESTS FOR PRODUCTION OF DOCUMENTS

GENERAL REQUEST NO. 1: All documents in your possession, custody or control that are identified, referred to or used in any way in responding to all of the above general interrogatories and the following interrogatories and requests for admissions relating to Contention 5.

STAFF RESPONSE:

Please see the attached Listing of Responsive Documents[4] and Privilege Log.[5] As a general matter the staff notes that, while some documents may be responsive to more than one request, each document is listed only once. By providing documents in response to this request or any other portion of BREDL's Request, the Staff is not conceding that any of the answers or documents provided are material to the admitted contentions. The Staff reserves the right to object to the introduction of any of these documents at hearing on the grounds that they are immaterial, irrelevant or outside the scope of the proceeding.

GENERAL REQUEST NO. 2: All documents in your possession, custody or control relevant to each BREDL admitted contention, and to the extent possible, segregated by contention and separated from already produced documents.

STAFF RESPONSE:

Please see the attached Master Listing of Responsive Documents and Privilege Log.

GENERAL REQUEST NO. 3: All documents (including experts' opinions, workpapers, affidavits, and other materials used to render such opinion) supporting or otherwise relating to testimony or

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[4] This document is Attachment A, "Master Listing of Responsive Documents for NRC Staff's Response to the Blue Ridge Environmental Defense League's First Set of Discovery Requests to the NRC Staff."

[5] This document is Attachment C, "Privilege Log: NRC Staff Response to BREDL's First Discovery Request to NRC Staff on Security Plan Submittal."

evidence you intend to use in the hearing on each BREDL admitted contention.

STAFF RESPONSE:

Please see the attached Master Listing of Responsive Documents and Privilege Log.

II. SPECIFIC DISCOVERY

A. SPECIFIC INTERROGATORIES

SPECIFIC INTERROGATORY NO 1: Describe all methods used to verify Duke's claim that the Catawba physical security plan, plus the proposed revisions in the Security Plan Submittal, provide a physical protection system capable of protecting against the design basis threat for theft of strategic special nuclear material in 10 C.F.R. § 73.1(a)(2), including but not limited to table top exercises, security drills, force-on-force exercises, and computer models.

STAFF RESPONSE:

The methods used to evaluate Duke's Security Plan Submittal are documented in the Staff's "Review Plan for Evaluating the Physical Security Protection Measures Needed for Mixed Oxide Fuel and Its Use in Commercial Nuclear Power Reactors", dated January 29, 2004 (Review Plan), which was previously provided to BREDL.

SPECIFIC INTERROGATORY NO 2: Describe all technical analyses performed by the Staff [sic] to verify Duke's claim that the Catawba physical security plan, plus the proposed revisions in the Security Plan Submittal, provide a physical protection system capable of protecting against the design basis threat for theft of strategic special nuclear material in 10 C.F.R. § 73.1(a)(2).

STAFF RESPONSE:

The Staff's analyses associated with Duke's Security Plan Submittal are described in "Supplement 1 to Safety Evaluation for Proposed Amendments to the Facility Operating License and Technical Specifications to Allow Insertion of Mixed Oxide Fuel Lead Assemblies (TAC NOS. MC0824 and MC0825)," dated May 5, 2004 (SER), Section 3; and the Review Plan.

SPECIFIC INTERROGATORY NO 3: For each analysis described in response to Interrogatory No. 2, provide the results.

STAFF RESPONSE:

The results are provided in Sections 3 and 4 of the SER.

> SPECIFIC INTERROGATORY NO 4: Explain what the Staff means by the phrase "attractive to potential adversaries from a proliferation standpoint," as used in the Staff's Supplement 1 to the MOX LTA Safety Evaluation (May 5, 2004) (hereinafter "Supplement 1 to the MOX LTA SE"). In particular (a) define what the Staff means by "potential adversaries," in terms of numbers, training, equipment, transportation, armaments, motivations, and all other relevant characteristics including insider capabilities. (b) define what the Staff means by "attractive."

STAFF RESPONSE:

(a) The Staff used the term "potential adversaries" in its generic, commonly understood meaning to describe anyone who may want to acquire nuclear material for unauthorized purposes.

(b) The Staff's use of the term "attractive" in this context relates to the form of the material and the relative ease of converting the material into a nuclear device.

> SPECIFIC INTERROGATORY NO 5: Identify all applicable NRC statutes, regulations and regulatory guidance that contain or refer to the concept of attractiveness of special nuclear material to potential adversaries from a proliferation standpoint.

STAFF RESPONSE:

The concept of attractiveness of special nuclear material is evidenced in several NRC regulations, particularly, but not limited to 10 C.F.R. Parts 50, 70, 73, 74, and 76; along with numerous Regulatory Guides, including, but not limited to NRC Regulatory Guide 5.52.

> SPECIFIC INTERROGATORY NO 6: Explain how the NRC's regulations were applied to the concept of attractiveness of special nuclear materials to potential adversaries from a proliferation standpoint in approving the adequacy of Duke's application for an exemption from NRC security regulations under 10 C.F.R. § 73.5.

STAFF RESPONSE:

This explanation is included in the Review Plan and in Section 3 of the SER.

> SPECIFIC INTERROGATORY NO 7: Identify and describe in detail, providing bases and justification for, any analyses or evaluations that

NRC staff has performed and/or expect to rely upon in its testimony to demonstrate that 4 MOX lead test assemblies, containing a total of about 80 kilograms of weapons-grade plutonium, or 40 formula quantities of plutonium, is not attractive to potential adversaries from a proliferations standpoint due to its low Pu concentrations, composition and form (size and weight).

STAFF RESPONSE:

The Staff's analyses are provided in the Review Plan and in Section 3 of the SER.

SPECIFIC INTERROGATORY NO 8: Identify and describe in detail, providing bases and justification for, any analyses or evaluations that NRC staff has performed and/or expect to rely upon in its testimony to demonstrate that 4 MOX lead test assemblies, containing a total of about 80 kilograms of weapons-grade plutonium, represent a significant less attractive theft target, from a proliferation standpoint, as compared to the materials at Category I fuel fabrication facilities. In particular, specify in detail the characteristics of the adversary that the NRC staff assumes will find 4 MOX lead test assemblies to be significantly less attractive theft target from a proliferation standpoint, as compared to the materials at a Category I fuel fabrication facility. If the NRC staff did not have a particular adversary in mind when it made this determination, state that fact.

STAFF RESPONSE:

The Staff's analyses are provided in the Review Plan and in Section 3 of the SER. No particular adversaries were considered. (See also answer to Specific Interrogatory 4.)

SPECIFIC INTERROGATORY NO 9: Discuss whether and to what extent this finding would remain valid for: (a) an adversary force with capabilities of the pre-9/11 design basis threat for theft of Category I quantities of strategic special nuclear material; (b) an adversary force with capabilities of the post-9/11 design basis threat for theft of Category I quantities of strategic special nuclear material, as issued to Nuclear Fuel Services ("NFS", BWXT and provided to DCS; (c) to the extent that neither (a) or (b) encompass this capability, an adversary force capable of staging an overt, armed assault that neutralizes all members of the on-site armed response force, and possesses a motor vehicle capable of transporting 4 unirradiated MOX LTAs off the site.

STAFF RESPONSE:

It was assumed that "finding" in this context is related to the Staff's determination that the material is a less attractive target. The Staff's determination was based upon the characteristics of the material, not the nature of the threat. See also the answer to Specific Interrogatory No. 8.

> SPECIFIC INTERROGATORY NO 10: Identify all applicable NRC statutes, regulations, and regulatory guidance supporting the NRC staff's allegation, as stated in the Staff's Supplement 1 to the MOX LTA SE at page 2, that 10 CRF § 73.45 and 73.46 were primarily intended to address the materials at Category I fuel cycle facilities and not Category I quantities of strategic special nuclear material not at Category I fuel cycle facilities:

STAFF RESPONSE:

See response to Specific Interrogatory No. 5. Also see NRC letter from K.L. Heitner, NRC, to R.O. Williams, Jr., subject: "Fort St. Vrain Nuclear Generating Station - Exemption from Recently Enacted Safeguards Requirements", dated January 19, 1989.

> SPECIFIC INTERROGATORY NO 11: Identify all NRC statutes, regulations and/or regulatory guidance that specifically define "Category I fuel cycle facilities" and distinguish them from other types of NRC-licensed facilities that may possess or use Category I quantities of strategic special nuclear materials.

STAFF RESPONSE:

See responses to Specific Interrogatories Nos. 5 and 10. See also, US NRC Information Digest, 2003 Edition, which distinguishes between fuel cycle facilities, operating nuclear reactors, nuclear regulatory research, radioactive waste, and other material licensees.

> SPECIFIC INTERROGATORY NO 12: Explain how the NRC Staff's distinction between materials at Category I fuel cycle facilities and MOX fuel LTAs differs from the distinction between strategic special nuclear material "other than alloys, fuel elements or fuel assemblies," and strategic special nuclear material in the form of "alloys, fuel elements, or fuel assemblies," as stated in 10 C.F.R. § 50.46(c)(5)[sic].

STAFF RESPONSE:[6]

The Staff's distinction in this context does not differ from the distinction made in the regulations. The Staff's distinction is specifically based upon the difference between strategic special nuclear material that is not in the form of alloys, fuel elements or fuel assemblies and strategic special nuclear material that is in alloys, fuel elements, or fuel assemblies. The Staff's distinction also accounts for the difference between attractiveness and portability of strategic special nuclear material that is not in the form of an alloy, fuel element or fuel assembly and the attractiveness and portability MOX fuel, which is a fuel assembly.

> SPECIFIC INTERROGATORY NO 13: Explain how the NRC Staff's distinction between materials at Category I fuel cycle facilities and MOX fuel LTAs differs from the distinction between "unalloyed or unencapsulated strategic special nuclear material" and "alloyed or encapsulated strategic special nuclear material," as stated in 10 C.F.R. § 50.46(h)(7) [sic] and 50.46(h)(8)[sic].

STAFF RESPONSE:[7]

The Staff's distinction in this context does not differ from the distinction made in the regulations. The Staff's distinction is specific to MOX LTAs, which are considered alloyed or encapsulated material. Therefore, the distinction is between MOX LTAs and unalloyed or unencapsulated strategic special nuclear material at a Fuel Cycle Facility, and is based on the relative portability and attractiveness of the two types of materials.

> SPECIFIC INTERROGATORY NO 14: Define "improvised nuclear device," as used in Supplement 1 to the MOX LTA SE. In particular, for the Staff's concept of an "improvised nuclear device," specify: (a) the assumed minimum critical mass; (b) the assumed minimum explosive yield; (c) the minimum number of casualties that would results from detonation; (d) the materials and equipment assumed to be available to an adversary for assembly of an improvised

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[6] The response is based on the assumption that the reference cited should be 10 C.F.R. § 73.46(c)(5).

[7] The response is based on the assumption that the references cited should be 10 C.F.R. §§ 73.46(h)(7) and 73.46(h)(8).

nuclear device, including neutron reflectors, neutron initiators and explosives.

STAFF RESPONSE:

According to the "2003 Nuclear Terms Handbook" issued by the US Department of Homeland Security, Office of Science and Technology, an improvised nuclear device (IND) is used to refer to any type of explosive device designed to cause a nuclear yield.

The staff assumed that the material in the MOX LTAs could not be used directly in an IND; therefore, the specific information requested in parts (a) through (d) of the interrogatory was not considered and is irrelevant.

SPECIFIC INTERROGATORY NO 15: Define "[nuclear] weapon," as used in Supplement 1 to the MOX LTA SE. In particular, describe in detail how the Staff's concept of a "[nuclear] weapon" differs from its concept of an "improvised nuclear device."

STAFF RESPONSE:

According to the "2003 Nuclear Terms Handbook" issued by the US Department of Homeland Security, Office of Science and Technology, a nuclear weapon is a device that releases nuclear energy in an explosive manner as the result of nuclear chain reactions involving the fission or fusion, or both, of atomic nuclei. The term nuclear weapon is typically used to describe the weapons built by the government as part of the national defense program, whereas an IND is typically considered a crude nuclear weapon that is not produced as part of a national defense program.

SPECIFIC INTERROGATORY NO 16: Discuss in detail how the NRC staff's conclusion in Supplement 1 to the MOX LTA SE (p.2) that "a large quantity of MOX fuel and an elaborate extraction process would be required to yield enough material for use in an improvised nuclear device or weapon" would differ from a conclusion that MOX fuel "cannot be used directly in the manufacture of a nuclear explosive device," as stated in 10 C.F.R. § 50.46(c)(5)(i)[sic].

STAFF RESPONSE:[8]

There is no difference between the two conclusions.

> SPECIFIC INTERROGATORY NO 17: Specify the minimum quantity of MOX fuel that would be required to yield enough material for use in an improvised nuclear device.

STAFF RESPONSE:

See response to Specific Interrogatory No. 14.

> SPECIFIC INTERROGATORY NO 18: Specify the minimum quantity of MOX fuel that would be required to yield enough material for use in a nuclear weapon.

STAFF RESPONSE:

See response to Specific Interrogatory Nos. 14 and 15.

> SPECIFIC INTERROGATORY NO 19: Define and discuss in detail the "elaborate extraction process" that the NRC staff concludes would be required to "yield enough material for use in an improvised nuclear device or weapon." Discuss the assumptions made by the staff as to the size, cost and detectability of the facility needed to carry out this process. Discuss the availability of technical information in the open literature regarding this process.

STAFF RESPONSE:

The staff conclusion is based upon the processes conducted at U.S. government plutonium recovery (extraction) facilities (i.e., Rocky Flats, Hanford or Savannah River). The open literature contains many references regarding plutonium chemistry. One example is J.M. Cleaveland, "The Chemistry of Plutonium," American Nuclear Society, 1979. See also the response to Specific Interrogatory 24.

> SPECIFIC INTERROGATORY NO 20: At page 3 of its January 29, 2004, Review Plan for Evaluating the Physical Security Protection Measures Needed for Mixed Oxide Fuel and Its Use in Commercial Nuclear Reactors, the Staff states that the "current NRC regulations

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[8] The response is based on the assumption that the reference cited should be 10 C.F.R. § 73.46(c)(5)(i).

for plutonium do not distinguish between the composition...or form... The concept of attractiveness in the NRC regulations relates to uranium and enrichment, as opposed to plutonium. Therefore, the staff position is that subjecting MOX fuel at power reactor sites to all the requirements associated with Category I SNM is neither appropriate or necessary." Does the staff imply or infer here that the dilution of plutonium in a uranium matrix, as is the case with MOX fuel, is functionally similar to the dilution of uranium-235 in uranium-238 to levels below 20% uranium-235, with regard to the ease of recovery of weapons-usable material from the mixture.

STAFF RESPONSE:

No.

SPECIFIC INTERROGATORY NO 21: Does the NRC staff believe that there is significant new information not considered in the development of the current NRC regulations that warrants consideration of the composition or form of Category I quantities of plutonium in establishing physical protection requirements? If so, please describe all such information in detail.

STAFF RESPONSE:

No, there is no new information.

SPECIFIC INTERROGATORY NO 22: Does the NRC staff agree that according to DOE Manual 474.1-1B, *Manual for Control and Accountability of Nuclear Materials*, Table I-4, p. 1-10 (June 12, 2003), a MOX fuel assembly containing 20 kg weapon-grade plutonium, as a "fuel assembly" containing more than 6kg of plutonium, would be considered Category I, Attractiveness Level C?

STAFF RESPONSE:

No, the staff does not agree to the statement as it relates to the MOX fuel assemblies considered in this proceeding.

SPECIFIC INTERROGATORY NO 23[9]: For each individual piece of documentation, identified in response to Specific Document Production Request No 1 below, state whether it was used before or after September 11, 2001. Also, state whether the document was

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[9] BREDL's original Request included two interrogatories labeled Specific Interrogatory No. 23 and two interrogatories labeled Specific Interrogatory No. 24. To clarify, the Staff's Response re-labels these as Specific Interrogatories Nos. 23, 24, 23a, and 24a.

a DOE order or a non-binding recommendation for implementation of DOE orders.

STAFF RESPONSE:

See list of responsive documents, which includes the requested information.

SPECIFIC INTERROGATORY NO 24: The NRC staff has pointed to the exemption granted to Public Service Company of Colorado on January 19, 1989 from the upgraded physical protection requirements for Category I fuel cycle facilities issued in November 1988, regarding the storage of unirradiated high-temperature gas-cooled reactor fuel containing highly enriched uranium (HEU), as an appropriate precedent for the exemption that it intends to grant to Duke Energy regarding storage of the 4 MOX LTAs. Please compare the physical characteristics of Fort St. Vrain fuel elements with MOX LTAs with regard to their attractiveness for theft. In particular compare (1) the amount of strategic special nuclear material in the fuel elements; (2) the weight-percent of strategic special nuclear material per fuel element; (3) the difficulty of extraction of highly enriched uranium from Fort St. Vrain gas-cooled reactor fuel in 1989, compared to the difficulty of extraction of plutonium for mixed-oxide fuel in 2004, taking into account the level of technical development of the respective treatment processes.

STAFF RESPONSE:

The Fort St. Vrain fuel elements were 14 inches across and 31 inches high, each weighing about 280 pounds, with each fuel element containing up to 900 grams of 93.15% enriched uranium. Approximately 6 elements would be required to reach a formula quantity of 5 kgs, for a total weight of approximately 1680 pounds. The MOX LTAs are over 12 feet long and weigh approximately 1500 pounds. Therefore, they are comparable with regard to attractiveness for theft. Both fuel materials are sintered ceramics, which are difficult to dissolve. Either form of fuel would require multiple-step extraction processes before the material could be used in an IND or nuclear weapon. The processes for both fuel types involve using concentrated acids at high temperatures to dissolve the fuel; usually catalysts have to be added. However, the Fort St. Vrain (HEU) fuel has a greater surface area to mass than the proposed MOX fuel, which makes the MOX fuel more difficult to dissolve. Furthermore, the separation of plutonium from the uranium in the MOX fuel requires

additional steps and a valence adjustment. This is not required for HEU fuel and makes the extraction of plutonium from MOX fuel more difficult than the extraction of HEU from Fort St. Vrain fuel.

> SPECIFIC INTERROGATORY NO 23a: In light of your response to Interrogatory 22, discuss the rationale for the NRC staff's assertion that the exemption granted in 1989 for Fort St. Vrain fuel is relevant to consideration of Duke Energy's exemption request for the MOX LTAs.

STAFF RESPONSE:[10]

It is relevant because the Commission ruled that 10 C.F.R. Part 73 was written to apply to fuel cycle facilities and not to power reactors. The Commission recognized the difference in the characteristics of the material at the two types of facilities.

> SPECIFIC INTERROGATORY NO 24a: Identify and describe in detail, providing bases and justification for, any analyses or evaluations that the NRC staff havs [sic] performed and/or expects to rely upon in its testimony to demonstrate that the exemption to physical protection requirements granted in 1989 has any bearing on the issue of whether such exemption should be granted in 2004, given what is now known about the nature of the terrorist threat today.

STAFF RESPONSE:

See responses to Specific Interrogatories Nos. 9 and 23a.

B. SPECIFIC DOCUMENT PRODUCTION REQUESTS

> SPECIFIC DOCUMENT PRODUCTION REQUEST NO. 1: Provide all documentation to support the NRC staff's claim that the fresh MOX fuel assemblies with an SNM content of less than 10% would be designated as a DOE Category II quantity of Attractiveness Level D (low-grade) material.

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[10] The response is based on the assumption that the question refers to Specific Interrogatory No. 24, which discusses the Fort St. Vrain exemption.

STAFF RESPONSE:

The following documents are responsive to this request:

1. US Department of Energy, DOE Manual 474.1-1B, "Manual for Control and Accountability of Nuclear Materials," Jun. 13, 2003.

2. US Department of Energy, DOE Manual 473.1-1, "Physical Protection Program Manual," Dec. 23, 2002.

3. US Department of Energy, Guide for Implementation of DOE 5633.3B, "Control and Accountability of Nuclear Materials," April 1995.

SPECIFIC DOCUMENT PRODUCTION REQUEST NO. 2: Provide all documentation of Operational Safeguards Response Evaluation ("OSRE") exercises in which the mock adversary force was able to defeat the licensee's armed response force by neutralizing all the guards.

STAFF RESPONSE:

There are no documents responsive to this request.

SPECIFIC DOCUMENT PRODUCTION REQUEST NO. 3: Provide all documents that evaluate Duke's claim that the Catawba Security Plan Submittal, plus the proposed revisions in the Security Plan Submittal, provide a physical protection system that is capable of protection against the design basis threat for theft of strategic special nuclear material in 10 C.F.R. § 73.1(a)(2).

STAFF RESPONSE:

The following documents are responsive to this request:

1. Letter, J.W. Shea, NRC, to G.M. Tracy, NRC, "Review Plan for Evaluating the Physical Security Protection Measures Needed for Mixed Oxide Fuel and Its Use in Commercial Nuclear Power Reactors," Jan. 29, 2004. (ADAMS ML033560532)

2. Letter, R.E. Martin, NRC, to H.B. Barron, Duke, "Supplement 1 to Safety Evaluation for Proposed Amendments to the Facility Operating License and Technical Specifications to Allow Insertion of Mixed Oxide Fuel Lead Assemblies (TAC NOS. MC0824 and MC0825)," May 5, 2004. (ADAMS ML041260544 - SGI Attachment)

3. Letter, M.S. Tuckman, Duke, to NRC, "Revision 16 to Duke Energy Corporation Physical Security Plan and Request for Exemption from Certain Regulatory Requirements in 10 C.F.R. 11 and 73 to Support MOX Fuel Use," Sept. 15, 2003. (ADAMS ML032670641 - SGI Attachments)

4. Letter, M.S. Tuckman, Duke, to NRC, amending the February 27, 2003 application to apply only to Catawba Nuclear Station, Sept. 23, 2003. (ADAMS ML032750033)

5. Letter, R.E. Martin, NRC, to M.S. Tuckman, Duke, "William B. McGuire Nuclear Station, Units 1 and 2 and Catawba Nuclear Station, Units 1 and 2 re: Mixed Oxide Lead Fuel Assemblies," Oct. 31, 2003. (ADAMS ML033040017)

6. Letter, R.E. Martin, NRC, to H.B. Barron, Duke, "Catawba Nuclear Station, Units 1 and 2 - Request for Additional Information re: Mixed Oxide Lead Fuel Assemblies," Jan. 30, 2004. (ADAMS ML040300035 - Protected Attachment)

7. Letter, H.B. Barron, Duke, to NRC, response to NRC Staff RAI relating to the security plan, Mar. 1, 2004. (ADAMS ML040710497 - SGI Attachments)

8. Letter, H.B. Barron, Duke, to NRC, "Duke Energy Corporation Catawba Nuclear Station Units 1 & 2, Docket Nos. 50-413, 50-414 Response to Request for Additional Information," Mar. 9, 2004. (ADAMS ML040930200 - SGI Attachments)

9. Letter, R.E. Martin, NRC, to H.B. Barron, Duke, "Catawba Nuclear Station, Units 1 and 2 - Request for Additional Information re: Mixed Oxide Lead Fuel Assemblies," Mar. 31, 2004. (ADAMS ML040960162 and ML040960131)

10. Letter , H.B. Barron, Duke, to NRC, "Duke Energy Corporation Catawba Nuclear Station Units 1 & 2, Docket Nos. 50-413, 50-414 Response to Request for Additional Information (TAC Nos. MB7863, MB7864) Mixed Oxide Fuel Lead Assemblies (Security)," Apr. 13, 2004 (ADAMS ML041270162 - SGI Attachments)

Respectfully submitted,

/RA/ Margaret J. Bupp

Margaret J. Bupp
Counsel for NRC Staff

Dated at Rockville, Maryland
this 2nd day of July, 2004

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE COMMISSION

In the Matter of	)	
	)	
DUKE ENERGY CORPORATION	)	Docket Nos. 50-413-OLA
	)	50-414-OLA
(Catawba Nuclear Station	)	
Units 1 and 2)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of "NRC STAFF'S RESPONSE TO BREDL'S 'FIRST SET OF DISCOVERY REQUESTS TO NRC STAFF ON SECURITY PLAN SUBMITTAL'" in the above-captioned proceeding have been served on the following by deposit in the United States mail, first class; or as indicated by an asterisk (*), by deposit in the Nuclear Regulatory Commission's internal mail system; and by e-mail as indicated by a double asterisk (**), this 2nd day of June, 2004.

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Administrative Judge
Atomic Safety and Licensing Board Panel
Mail Stop: T-3F23
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Anthony J. Baratta** *
Administrative Judge
Atomic Safety and Licensing Board Panel
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/Margaret J. Bupp/
Margaret J. Bupp
Counsel for NRC Staff

ATTACHMENT A:
MASTER LISTING OF RESPONSIVE DOCUMENTS FOR NRC STAFF'S RESPONSE TO BREDL'S "FIRST SET OF DISCOVERY REQUESTS TO THE NRC STAFF"

1. Letter, J.W. Shea, NRC, to G.M. Tracy, NRC, "Review Plan for Evaluating the Physical Security Protection Measures Needed for Mixed Oxide Fuel and Its Use in Commercial Nuclear Power Reactors," Jan. 29, 2004. (ADAMS ML033560532)

2. Letter, R.E. Martin, NRC, to H.B. Barron, Duke, "Supplement 1 to Safety Evaluation for Proposed Amendments to the Facility Operating License and Technical Specifications to Allow Insertion of Mixed Oxide Fuel Lead Assemblies (TAC NOS. MC0824 and MC0825)," May 5, 2004. (ADAMS ML041260544 - SGI Attachment)*

3. US Department of Energy, DOE Manual 474.1-1B, "Manual for Control and Accountability of Nuclear Materials," Jun. 13, 2003. (Available at http://www.directives.doe.gov)

4. US Department of Energy, DOE Manual 473.1-1, "Physical Protection Program Manual," Dec. 23, 2002. (Available at http://www.directives.doe.gov)

5. US Department of Energy, Guide for Implementation of DOE 5633.3B, "Control and Accountability of Nuclear Materials," April 1995. (Available from the US Dept. of Energy)

6. NRC Regulatory Guide 5.52, "Standard Format and Content of a Licensee Physical Protection Plan for Strategic Special Nuclear Material at Fixed Sites (Other than Nuclear Power Plants)," Dec. 1994. (ADAMS ML003739235)

7. Letter K.L. Heitner, NRC, to R.O. Williams, Jr., "Fort St. Vrain Nuclear Generating Station - Exemption from Recently Enacted Safeguards Requirements," Jan. 19, 1989. (Attached)

8. US NRC, NUREG-1350, Volume 15, "Information Digest," 2003 Edition. (ADAMS ML032810548).

9. US Department of Homeland Security, Office of Science and Technology, "2003 Nuclear Terms Handbook." (Available from the US Dept. of Homeland Security).

10. J.M. Cleaveland, "The Chemistry of Plutonium," American Nuclear Society, 1979.

11. Letter, M.S. Tuckman, Duke, to NRC, "Revision 16 to Duke Energy Corporation Physical Security Plan and Request for Exemption from Certain Regulatory Requirements in 10 CFR 11 and 73 to Support MOX Fuel Use," Sept. 15, 2003. (ADAMS ML032670641 - SGI Attachments)*

12. Letter, M.S. Tuckman, Duke, to NRC, amending the February 27, 2003, application to apply only to Catawba Nuclear Station, Sept. 23, 2003. (ADAMS ML032750033)

*BREDL has already been provided access to information marked with an asterisk.

13. Letter, R.E. Martin, NRC, to M.S. Tuckman, Duke, "William B. McGuire Nuclear Station, Units 1 and 2 and Catawba Nuclear Station, Units 1 and 2 re: Mixed Oxide Lead Fuel Assemblies," Oct. 31, 2003. (ADAMS ML033040017)

14. Letter, R.E. Martin, NRC, to H.B. Barron, Duke, "Catawba Nuclear Station, Units 1 and 2 - Request for Additional Information re: Mixed Oxide Lead Fuel Assemblies," Jan. 30, 2004. (ADAMS ML040300035 - Protected Attachment)*

15. Letter, H.B. Barron, Duke, to NRC, response to NRC staff RAI relating to the security plan, Mar. 1, 2004. (ADAMS ML040710497 - SGI Attachments)*

16. Letter, H.B. Barron, Duke, to NRC, "Duke Energy Corporation Catawba Nuclear Station Units 1 & 2, Docket Nos. 50-413, 50-414 Response to Request for Additional Information," Mar. 9, 2004. (ADAMS ML040930200 - SGI Attachments)*

17. Letter, R.E. Martin, NRC, to H.B. Barron, Duke, "Catawba Nuclear Station, Units 1 and 2 - Request for Additional Information re: Mixed Oxide Lead Fuel Assemblies," Mar. 31, 2004. (ADAMS ML040960162 and ML040960131)*

18. Letter , H.B. Barron, Duke, to NRC, "Duke Energy Corporation Catawba Nuclear Station Units 1 & 2, Docket Nos. 50-413, 50-414 Response to Request for Additional Information (TAC Nos. MB7863, MB7864) Mixed Oxide Fuel Lead Assemblies (Security)," Apr. 13, 2004 (ADAMS ML041270162 - SGI Attachments)*

*BREDL has already been provided access to information marked with an asterisk.

Attachment B:
Professional Qualifications
of Staff Witnesses and in
Support of Affidavits

Sherri L. Cross
Senior Safeguards Technical Analyst

Employment
U.S. Nuclear Regulatory Commission, Rockville, Maryland
September 2003 - present
Sr. Safeguards Technical Analyst

Conduct technical and regulatory reviews of license applications and amendment requests with regard to physical protection and material control and accounting. Review submitted materials, request additional information, perform analyses, and document the review in safety evaluation reports. Coordinate reviews with licensees, review personnel from other sections, project managers, and management. Provide advice and guidance to other NRC divisions and offices regarding nuclear materials safeguards. Develop appropriate regulatory requirements and guidance for the safeguarding of special nuclear material.

- Lead reviewer for the Louisiana Energy Services National Enrichment Facility license application in the area of material control and accounting.
- Participated as the lead material control and accounting reviewer on an NRC task force conducting compliance reviews of DOE National Laboratories in support of a Congressional initiative to evaluate NRC licensing of the National Laboratories.
- Participated as a subject matter expert in Material Control and Accounting inspections at fuel cycle facilities.

U.S. Department of Energy - Rocky Flats Field Office, Golden, Colorado
November 1995 - September 2003
Material Control and Accountability Team Lead

Managed the Department of Energy (DOE) programs for material control and accountability (MC&A), security systems, vulnerability analyses (VA), and the Site Safeguards and Security Plan (SSSP). Developed local safeguards and security policy to meet the Rocky Flats closure mission, since current DOE orders and policy are not written to address protection needs for a closure site

- Received Secretary of Energy "Pride" award for excellence in Material Control and Accountability, 1997.
- In 1996 directed completion of a physical inventory of 100% of the accountable nuclear material items to re-establish a baseline, and ensured completion of physical inventories at the required frequency.
- Eliminated the unmeasured nuclear material backlog.
- Strengthened the MC&A controls to ensure the ability to stop work when out of compliance with MC&A requirements.
- Successfully implemented International Safeguards.
- Lead the verification and validation of the 1998 SSSP update.
- Participated as a controller/evaluator in numerous force-on-force performance tests.
- Achieved substantial improvements in the area of security systems compliance.
- Provided analysis and review of the testing and operation of a new perimeter intrusion detection and assessment system.

U.S. Department of Energy - Rocky Flats Field Office, Golden, Colorado
January 1994 - November 1995
Technical Program Officer

This was a key program management position for a major, high-visibility, technology development program within the Department of Energy. Served as the single point of contact for all Office of Technology Development (EM-50) activities at Rocky Flats. Represented the Rocky Flats Field Office to the DOE Headquarters Technology Development Council comprised of the Deputy Assistant Secretary (DAS) for Technology Development, the Associate DAS, the EM-50 Office Directors, and the other operations office contacts. Provided programmatic control and administrative guidance to the contractor technology development program; interfaced with other EM programs to ensure that new, innovative technologies are included in waste processing programs; supported Headquarters in program formulation, execution, and evaluation of the technology development program; interfaced with the private sector to establish partnerships for the development of technologies and the transfer of technologies to the private sector for commercialization; and coordinated related technology development activities among operations offices, national laboratories, and academia.

- Successfully hosted the first technology demonstration in conjunction with the Western Governor's Association as part of the DOIT (Demonstrate On-Site Innovative Technologies) program.

U.S. Department of Energy - Rocky Flats Field Office, Golden, Colorado
March 1991 - January 1994
Program Manager

Provided technical expertise for review, analysis, coordination, and appraisal of contractor activities related to nuclear material management and shipping program management. Established policy, objectives, and procedures for the management and storage of nuclear materials at Rocky Flats. Oversight of shipping program activities including the design, testing, certification, procurement, and maintenance of nuclear material shipping containers and the development and implementation of program plans and schedules for nuclear material shipments. Subject matter expert for queries, reviews, and appraisals related to the Rocky Flats materials management and shipping operations.

- Planned, scheduled, and executed the first nuclear materials shipment since the curtailment of production operations in 1989.
- Directed the development, design, and certification of a Type B nuclear material shipping container and the subsequent shipment of nuclear weapons components from the site. This was the first major plutonium operation to occur at Rocky Flats since 1989.

U.S. Department of Energy - Richland Operations Office, Richland, Washington
July 1988 - March 1991
Project Engineer

Provided technical direction and oversight of environmental compliance and permitting activities for the Hanford Waste Vitrification Plant (HWVP). Reviewed, evaluated, and

made recommendations to management on budgets and schedules; maintained control of the HWVP project by constant measurement of progress against established technical scope, schedules, and estimates; and provided day-to-day management of the combined efforts of contractors, Federal employees, and Regulatory Agencies to accomplish the project objectives. Consulted and advised staff and management in understanding the environmental and permitting requirements and the impact of these requriements on other project activities. Provided written and oral input to management on a regular basis.

- Negotiated an innovative Resource Conservation and Recovery Act permitting approach with the State of Washington.

Education

- B.S., Chemical Engineering, Washington State University, 1988
- Associate's Certificate in Project Management, The George Washington University, 1992

Specialized Training

- Completed United States Department of Energy Technical Qualifications for Safeguards and Security; 2000.
- The following list of courses offered by the United States Department of Energy, Nonproliferation and National Security Institute, Safeguards and Security Central Training Academy have been completed:
  - MCA-101D, Introduction to Nuclear Materials Control and Accountability; 1996
  - MCA-104D, Introduction to MC&A Measurement Programs; 1997
  - MCA-110, Basics of Nuclear Materials Accountability; 2001
  - MCA-111, Materials Accounting for Nuclear Safeguards; 1996
  - MCA-112, Nuclear Materials Management and Safeguards System (NMMSS) I; 1997
  - MCA-260, Nuclear Material Physical Inventories; 2000
  - MCA-120, Basics of Nuclear Materials Control; 1998
  - MCA-121, Tamper Indicating Devise (TID) Program; 1998
  - MCA-130, Statistical Concepts in MC&A; 1996
  - MCA-343, Gamma-Ray Spectroscopy for Nuclear Materials Accounting; 1999
  - PHY-100DB, Introduction to Physical Security; 2002
  - PHY-128D, Introduction to Basic Survey; 1999
  - CTA-140, Vulnerability Assessment Fundamentals; 1997
  - CTA-200, Site Safeguards and Security Plan Workshop; 1996
  - PFT-345D, Weapons of Mass Destruction Workshop, 1999

Professional Societies

- Institute of Nuclear Materials Management
- Tau Beta Pi Engineering Honor Society, past member

Publications

- J.H. LaRue and S.L. Cross, "Permitting of the Hanford Waste Vitrification Plant," WHC-SA-1000-FP, presented at Waste Management '91, Tucson, Arizona, February 24-28, 1991.
- F.W. Lamb, S. Cross, and D. Sherrill, "Accountability Measurements of Holdup at Rocky Flats Environmental Technology Site," presented at the Institute of Nuclear Materials Management 39th Annual Meeting, Naples, Florida, July 26-30, 1998.

Albert G. Garrett
Senior Security Specialist

Experience

Over 24 years of progressive experience with the Nuclear Regulatory Commission (NRC), the Department of Energy (DOE), DOE support service contractors, and DOE facility operating contractors in positions ranging from laboratory technician to Safeguards and Security Specialist.

Employment

U.S. Nuclear Regulatory Commission, Rockville, Maryland
September 2003 - present
Senior Security Specialist

Participate in the establishment, implementation, and oversight of the NRC regulatory programs for ensuring the physical protection of nuclear material and nuclear fuel cycle facilities. Develop and implement related regulations, regulatory guidance and technical positions. Perform technical reviews, analyses, and evaluations in support of physical protection licensing actions. Keep abreast of technological and policy developments to analyze the impacts to NRC and non-NRC physical protection programs and NRC regulatory requirements.

Provide expert judgement pertaining to the physical protection of domestic nuclear material and nuclear fuel cycle facilities. Assess facility compliance with applicable NRC and IAEA physical protection standards. Review and evaluate licensee physical protection, guard training and qualification, and safeguards contingency plans to determine implementation approach to support licencing activities. Identify trends in operational experience, and develop remedial actions, as warranted.

Provide expert technical review of proposed rule changes, international standards and agreements, regulatory guides, technical positions, policy statements and other documents related to physical protection. Develop policy options regarding major technical generic physical protection issues and analyze advantages and disadvantages of those options. Represent the Agency at conferences and technical meetings concerning revisions to related international agreements/standards. Communicate and coordinate NRC activities with staff and managers of internal and external organizations involved with NRC regulation. Represent the NRC in interactions with such organizations and members of the public.

Department of Energy, Rocky Flats Field Office (RFFO), Golden CO
December 1996 to September 2003
Safeguards and Security Specialist

Responsible for oversight of the Rocky Flats Environmental Technology Site facility operating contractor in the areas of safeguards and security (S&S) planning and implementation of the Material Control and Accountability (MC&A) program. Duties with the RFFO Safeguards and Security Division included: Team lead for Site Safeguards and Security Plan (SSSP) review of S&S planning efforts and documentation, specifically vulnerability assessments (VAs); the Acceptance and Validation (performance) Testing Program; special nuclear material (SNM) access controls and surveillance; and material measurement, control, containment, detection and assessment elements. Performed reviews, surveillances, and surveys to determine/assure adherence to applicable DOE Orders, contractual and safety requirements, and budgetary discipline. Also represented the DOE at public meetings, in addition to providing oral and written presentations to all levels of DOE/Headquarters (HQ), DOE/RFFO, and Site management.

Served as a technical expert and technical advisor to the RFFO S&S Director. Provided technical support and advice to the Director on complex issues related to interpret and evaluate SSSP. Responsible for recommending concepts and program direction; for performing surveillance, analysis, formulation, implementation, coordination, evaluation, and verification of operational S&S technical activities and programs related to SSSP requirements at a nuclear facility. Lead the SSSP verification and validation (V&V) Team effort for RFFO through five iterations. In addition, served as a topical area lead for the annual S&S Periodic Survey of the Rocky Flats Site contractor. Also participated in annual S&S surveys for the Albuquerque, Oak Ridge, and Savannah River DOE Area Offices, supplementing the inspection team.

Additional duties included performing integrated planning for international inspections; e.g., International Atomic Energy Agency and Russian Federation. Integrally participated in the DOE MC&A Quality Panel and Fissile Materials Assurance Working Group from 1996 to 2003. Was an active participant in the development of DOE 474 series Orders, and was involved in the effort to develop a new criteria based DOE Order generation, working with personnel from various national laboratories. Performed DOE Authorized Derivative Classifier functions, as well as supporting the DOE Central Training Academy in training development and as an adjunct instructor.

Science Applications International Corporation (SAIC), Rocky Flats, Golden, CO.
November 1993 to December 1996
Physical Scientist/Engineer Generalist

Similar to duties described above, providing the DOE, RFFO, MC&A Team with oversight of the facility operating contractors. Duties also included performing integrated planning for international inspections for the International Atomic Energy Agency and Russian Federation. Provided oral and written presentations to all levels of DOE/HQ, DOE/RFFO, and plant management.

EG&G, Rocky Flats, Rocky Flats Plant, Golden, CO.
August 1990 to October 1993

- June 1992 to November 1993, Security Analyst, Security Operations & Administration - Principal contributor to the first SSSP ever approved for Rocky Flats. Performed security VAs and authored numerous vulnerability assessment reports for all Rocky Flats plutonium facilities. Completed VAs using table-top (VISA) and computer software (ASSESS) methods; developed and documented performance testing of the security system; acted as a classified Computer System Security Officer; and provided training in the VA process. Responsible for oral and written presentations to all levels of DOE/HQ, DOE/RFFO, and facility management.

- June 1991 to June 1992, Principal Engineer, Safeguards Planning and Assessment - Performed investigations of anomalies in regard to the MC&A program. Participated in table-top VAs, providing MC&A expertise; was instrumental in development, documentation, and coordination of the Rocky Flats performance testing program. Provided training in the MC&A audit process; and was responsible for oral and written presentations to all levels of Rocky Flats plant management.

- August 1990 to June 1991, Principal Engineer, Safeguards Measurements (SM) - Maintained and calibrated non-destructive assay (NDA) systems; developed, administered and reviewed measurement control programs; developed NDA operating and measurement control procedures; and authored several procedures, surveillance programs, and Program Management Plans.

Rockwell International, Rocky Flats Plant, Golden, CO.
June 1980 to August 1990

- August 1989 to August 1990, Administrator, Safeguards Measurements Development and Assessment - Developed and implemented the initial Rocky Flats plutonium (Pu) holdup measurement program. In this capacity, I supervised an engineering staff of 12 in developing, documenting, validating, and administering the fledgling program. Provided oral and written presentations to the Defense Nuclear Facilities Safety Board, DOE/HQ, DOE/RFO, and Rocky Flats plant management.

- June 1988 to August 1989, Senior Engineer, SP&A - Developed, performed and administered the Nuclear Materials Safeguards (NMS) self-assessment program. Performed MC&A internal audits; implemented and administered a tracking system for audit/survey findings; and performed ad hoc surveys of MC&A systems/procedures. Presented survey results, in oral and written form, to all levels of Rocky Flats management.

- October 1984 to June 1988, Development Specialist/Master Technician, Chemistry Standards Laboratory - Certified NDA measurement standards, utilizing calorimetry/gamma spectroscopy; evaluated electronics; developed and monitored measurement control data;

and supervised 6 Technicians in a calorimetry gamma spectroscopy laboratory. Additionally, was Material Balance Area (MBA) Custodian.

- June 1981 to October 1984, Laboratory Technician, General Laboratory - Performed laboratory analyses in Atomic Absorption, Radio Chemistry, Wet Chemistry, Gas Chromatography and Furnace Methods. Nominated for 1983 Technician of the Year while still in the training program.

- June 1980 to June 1981, Chemical Operator, Plutonium Recovery

- January 1981 to April 1981, Security Guard, Rockwell International Plant Protection

Professional Societies

- Institute of Nuclear Materials Management
- Membership Committee of the Institute of Nuclear Materials Management

Publications

F.X. Haas, J.B. Glick, and A.G. Garrett, "Holdup Measurements of Plutonium in Glovebox Exhausts", Proceedings of the 4th International Conference on Facilities Operations-Safeguards Interface, Albuquerque, NM, October 1991.

J.B. Glick, F.X. Haas, A.G. Garrett, P.A. Russo, G.A. Sheppard, M.C. Miller, E.C. Piquette, T.R. Renz, "A New Approach to Performing Holdup Measurements on Glovebox Exhausts", Proceedings of the 32nd annual INMM meeting, New Orleans, LA, July 1991.

G.A. Sheppard, P.A. Russo, M.C. Miller, T.R. Renz, E.C. Piquette, F.X. Haas, J.B. Glick, and A.G. Garrett, "Models for Gamma Ray Holdup Measurements at Duct Contract", Proceedings of the 32nd annual INMM meeting, New Orleans, LA, July 1991.

J.G. Fleissner, C.P. Oertel, and A.G. Garrett, "A High Count Rate Gamma-Ray Spectrometer System for Plutonium Isotopic Measurements", Proceedings of the 26th annual INMM meeting, Albuquerque, NM, July 1985.

Education and Specialized Training

- Course work towards an Associates Degree in Computer Science, Front Range Community College, Denver, CO, 33 credit hrs, not complete.
- More than 6000 hrs of classroom training/practical experience in Atomic Absorption, Radio Chemistry, Wet Chemistry, and Gas Chromatography through the Rockwell International Analytical Laboratory Technician Training Program, Rocky Flats, Golden, CO, June 1981 to October 1984.
- More than 6000 hrs of training/practical experience in NDA Standard Certification, electronics evaluation; and measurement control program development operating calorimetry/gamma spectroscopy measurement systems in the Rocky Flats Chemistry Standards Laboratory, October 1984 to June 1988.
- Research and Test Reactors (G106), NRC Headquarters, January 2004
- The George Washington U., Quality for Project Managers, Oct. 2002,
- The George Washington U., Project Leadership, Management, and Communications, Sept. 2001

- The George Washington U., Managing Projects in Organizations, Sept. 2001
- DOE CTA, Weapons of Mass Destruction Workshop, PFT-345D, Golden, CO, February 1999.
- DOE CTA, Basic Risk Management, CTA-141D, Golden, CO, December 1998.
- DOE CTA, Basics of Nuclear Materials Control, MCA-120, Phoenix, AZ, July 1998.
- DOE CTA, Nuclear Materials Management and Safeguards System (NMMSS) I, MCA-112, Albuquerque, NM, August 1997.
- DOE CTA, Introduction to MC&A, MCA-104D, Golden, CO, October 1996.
- DOE CTA, Statistical Concepts in MC&A, MCA-130, Naples, FL, July 1996.
- DOE CTA, Site Safeguards and Security Plan Workshop, CTA-200, Golden, CO, May 1996.
- DOE CTA, Materials Accounting for Nuclear Safeguards, MCA-111, Los Alamos, NM, March 1996.
- DOE CTA, MC&A Det. Element/Evaluation Approaches Workshop, Albuquerque, NM, April 1995.
- DOE CTA, Basic Instructor Training, MIT-111, Albuquerque, NM, June 1993.
- DOE CTA, Analytical System and Software for Evaluating Safeguards and Security (ASSESS), CTA-240, Albuquerque, NM, August 1992.
- DOE CTA, Vulnerability Assessment Fundamentals CTA-140, Albuquerque, NM, Aug.1992.
- DOE CTA, Measurement Control Workshop, Albuquerque, NM, February 1991.
- MODSIM/SIMSCRIPT software, CACI Inc., LaJolla, CA, January 1991.
- DOE CTA, Gamma Ray Assay, MCA-343, Los Alamos, NM, August 1990.
- Auditing for Effectiveness, Rocky Flats Plant, Management Analysis Company, April 1989.
- DOE CTA, MC&A Survey Procedures, MCA-150, Albuquerque, NM, August 1988.

Sean E. Peters
Project Manager

EDUCATION

University of Oklahoma, Norman, OK

December, 1995, Bachelor of Science, Aerospace Engineering, cum Laude.

EXPERIENCE

U.S. Nuclear Regulatory Commission Rockville, MD

12/01 - 3/02 (Rotation), 07/03 - Present, Project Manager - Division of Licensing Project Management

Review and process license amendment applications concerning the design and operation of commercial nuclear reactors.

Prepare Federal Register Notices of impending staff review on amendment applications, and facilitate the review.

Prepare correspondence from the NRC to Congress, other government agencies, local governments, and public citizens.

Facilitate meetings between the NRC technical staff and commercial nuclear plant licensees.

12/00 - 03/01 (Rotation), 05/01 - 07/03, Reactor Engineer - Division of Systems Safety Analysis

Review amendment applications concerning the design and operation of reactor systems and engineered safety features.

Review design basis accidents and plant safety analyses.

Review topical reports related to reactor system design and operation.

Prepare and update regulatory guidance and standard review plans.

U. S. Nuclear Regulatory Commission, Region I, King of Prussia, PA

09/99 - 5/01, Reactor Engineer/Reactor Inspector - Division of Reactor Safety

Independently plan and prepare for the scope of assigned inspections to obtain information through direct observation and verification of licensee activities.

Perform inspections of reactor facilities to observe and assure conformance to NRC rules and regulations, inspection procedures, and orders.

Write reports of inspection findings to document whether the facility is operated safely, the licensee's management control program is effective, and regulatory requirements are satisfied.

Coordinate inspection findings into overall licensee assessment

Perform miscellaneous duties in support of the region-based inspection program.

Penn Ventilation, Philadelphia, PA

06/99 - 9/99, Mechanical/Aerodynamic Design Engineer

Design and test industrial fans and components.

BOEING-Advanced Products Development Group– Bay Area Technology (Contractor), Houston, TX

4/98 – 05/99, Mechanical Design Engineer

Design structural and mechanical hardware for the Delta IV and International Space Station programs.

Coordinate design efforts with Huntsville, AL and Huntington Beach, CA design groups.

Assigned to a task force to acquire new projects for the Houston branch.

Utilize machining, casting, welding, sheet metal, extrusions, composites, polymers, and adhesives indesign process.

Lockheed Martin Engineering and Science Services, Houston, TX

9/96 – 4/98, Mechanical Design Engineer

Designed and analyzed structural and mechanical hardware for NASA, including space, aircraft, zero gravity training, and ground handling hardware.

Coordinated design duties of one Associate Engineer (Electrical) and one Associate Engineer (Mechanical), and interfaced with an aircraft maintenance company, an internal Lockheed customer, and NASA on the Cosmic Dust Collector - YB57 project.

Utilized machining, welding, sheet metal, polymers, and soft goods in design process.

Boeing Aerospace Operations, Midwest City, OK

1/96 – 9/96, Field Service Engineer

Managed projects and support for C-22, C-137 (Air Force 1 & 2), EC-18, TC-18, and E-8 military aircraft.

Provided engineering and project engineering support for VC-25 (Air Force 1), E-4, and T-38 military aircraft.

Prepared and presented, to Air Force Management, the monthly executive summary of the C-22 weapon systems.

Evaluated field and depot level aircraft maintenance problems.

Provided solutions to engineering and maintenance inquiries.

Reported to the federal government the aircraft utilization hours.

Evaluated FAA Airworthiness Directives and Boeing service literature for implementation in maintenance planning.

University of Oklahoma Department of Aerospace and Mechanical Engineering Norman, OK

9/94 – 9/96, Principle Investigator

Designed and developed a Department of Energy Liquid Natural Gas (LNG) project.

Analyzed LNG spray properties for further implementation in heavy engine design.

Utilized phase-Doppler laser, sheet laser, oxygen analysis systems, and Schlieren photographic systems to acquire and analyze LNG spray properties.

Supervised two Research Interns during data acquisition process.

Published and presented the report "Characteristics of Liquid Natural Gas Sprays in a Quiescent Medium," Energy Week Conference and Exhibition, Energy Engineering, 1996.

Diamond Shamrock (McKee Plants), Sunray, TX

5/95 - 8/95, Summer Engineer

Developed process and safety management CAD drawings for plant maintenance.

Improved process and instrumentation diagrams.

University of Oklahoma School of Civil Engineering, Norman, OK

6/94 - 8/94, Research Intern

Designed, manufactured, and evaluated various aseismic structural components for implementation in earthquake resistant building design.

Performed shear, tensile, compression, energy damping, and seismic testing.

Generated and presented weekly research status reports.

Presented a technical seminar on the research results to a professor panel.

ACHIEVEMENTS

Engineering

1994-1995 AIAA/ United Technologies/Pratt & Whitney Undergraduate Individual Aircraft Design Competition - 3rd Place Award Recipient.

Energy Week Conference & Exhibition

January 28-30, 1997 – Emerging Energy Technology - Speaker.

PUBLICATIONS

"Characteristics of Liquid Natural Gas Sprays in a Quiescent Medium," Energy Week Conference & Exhibition, Energy Engineering, 1996.

HONORS

Honors Graduate (cum Laude); President's Honor Roll; Dean's Honor Roll; Honors Scholar Scholarship; Aerospace and Mechanical Engineering Department Scholarship; College of Engineering Scholarship; Philip Morris Scholarship; UROP (Undergraduate Research Opportunities Program) project funding award.

TRAINING

Westinghouse Station Nuclear Engineer Course (SNE-594) (At Westinghouse facilities in Monroeville, PA) Perspectives on Reactor Safety (R-800)

Westinghouse Technology Course (R-304P)

Westinghouse Advanced Technology (R-504P)

Westinghouse Simulator (R-624P)

General Electric Technology course (R-104B)

Nuclear Reactors Concepts (R-100)

PRA Technology and Regulatory Perspectives (P-111)

Root Cause/Incident Investigation Workshop (G-205)

Reactor Inspection and Oversight Program (G-200)

Inspecting for Performance (G-303)

Boeing Structural Repair Manuals Course

Geometric Dimensioning and Tolerancing Course – Lockheed
Geometric Dimensioning and Tolerancing Course – Boeing
Leadership Training – Boeing
Unigraphics Training Course - Advanced
Pro-E Training course – Beginning

CURRICULUM VITAE
ALEXANDER PETER MURRAY

EDUCATION

MS, Chemical Engineering, Carnegie-Mellon University, Pittsburgh, PA (1985)

BS, Chemical Engineering, Carnegie-Mellon University, Pittsburgh, PA (1978 - includes one year of study at Imperial College, London)

CLEARANCE

Active NRC "Q" Security Clearance; inactive DOE "Q" and DOD "Top Secret" Security Clearances.

SUMMARY OF PROFESSIONAL EXPERIENCE

Mr. Murray has twenty-six years of experience in chemical and nuclear engineering fields, and leadership, covering a wide range of areas, including the following:

- waste management, including vitrification
- waste minimization
- nuclear fuel fabrication, fuel cycles, and SNF options, including dry storage
- fissile material disposition and MOX
- uranium processes, including depleted uranium management and disposition
- enrichment processes, including gaseous diffusion plant (GDP), gas centrifuge, ion exchange, chemical, and laser
- decontamination and decommissioning of nuclear facilities
- plant operations
- program planning, estimation, and budgeting
- team leadership and direction
- corrosion
- nuclear reactors and energy systems
- separation methods
- regulatory requirements and impacts
- design and mathematical modelling
- safety and environmental analyses
- risk, probability, and consequence modeling (FTA, LOPA, and human factors)
- chemical analyses

Mr. Murray typically functions as the lead or Team Leader, and organizes, trains, and leads a team of 3-10 people. Mr. Murray has also functioned as project manager and as Acting Section Chief.

He is currently employed at the United States Nuclear Regulatory Commission, in Maryland, where he is performing technical, regulatory, and safety reviews on high level waste (HLW) treatment and vitrification programs, enrichment processes, and fuel cycle facilities (including mixed oxide - MOX). Consequence, probability, and risk analyses are or have been an integral part of his assignments on MOX, GDP amendments and safety reports, and on TWRS. He is also working on vulnerability assessments for

nuclear fuel cycle facilities. Mr. Murray has made presentations to NRC staff on risk, enrichment, fuel fabrication, and HLW. Previously, he worked for seven years at Science Applications International Corporation (SAIC), also in Maryland, in waste, environmental, regulatory, safety and risk analysis, and fuel cycle related programs in support of the U.S. Department of Energy, other agencies, and industry. Consequence, probability, and risk analyses were an integral part of the safety reviews. Prior work also included twelve years at the Westinghouse Science and Technology Center, near Pittsburgh, where he held various positions in the Materials Applications and Chemical Engineering Departments. At Westinghouse, Mr. Murray was involved in a wide range of areas, including test apparatus design and fabrication, experimentation and interpretation, technical evaluations and appraisals, regulatory aspects, safety and risk reviews, reactors and plant site work, project estimation and negotiation, and marketing. Typical technical areas included waste management, decontamination and decommissioning, fuel cycles, reactor cycles, fuel fabrication, reprocessing, recycle and MOX, enrichment, and uranium recovery.

Mr. Murray has conducted safety analyses on submittals from DOE and contractors related to the processing of the Hanford Tank Waste, a presentation on NRC risk goals and HLW risks for staff, safety analysis report upgrades related to the gaseous diffusion plants (GDPs), license amendments for GDPs, and MOX (chemical safety and integrated safety analysis - ISA) reviews. He has visited many nuclear facilities and sites.

Mr. Murray led the efforts to produce the TWRS Program Summary Report, which has undergone management review and has been issued as a NUREG report. He also led the preparation, acceptance, and presentation of a TWRS safety paper at Waste Management'01 (the Tucson conference) that discussed risk and safety related to HLW processing at Hanford.

After joining the Enrichment section, he took the lead in the analysis and presentation on gas centrifuge technology, safety, and status to Commissioner Merrifield and the Deputy Director of NMSS. He also was a principal organizer and an instructor for several sections of the Fuel Cycle Course (F201) given annually since December 2000.

Mr. Murray was asked to participate in a trip to German facilities related to the proposed PBMR. He provided valuable insights into the reactor, fuel cycle, and waste management areas. Many of the issues he identified were embodied in the subsequent letter from management to the potential applicant for a PBMR.

Mr. Murray is the lead chemical safety reviewer for MOX in which he interacts with a team of fifteen people. He works closely with reviewers in the areas of safety analysis, plant systems, fire protection, and criticality safety.

Mr. Murray has led the reviews of two documents on DU. These were the PEIS and the roadmap document. He was the lead author on correspondence back to DOE on these two documents and identified the regulatory and program concerns involved.

PROGRAMMATIC AND TECHNICAL BACKGROUND

- waste management, including vitrification: LLW, RMW, HLW, and hazardous waste management; treatment/storage/disposal alternatives; technologies, such as thermal (incineration and plasma), oxidation (wet, supercritical), electrochemical, and separations (ion exchange, solvent extraction, electrical); waste encapsulation, such as by cementation, vitrification (joule, induction, gel-glass, MAWS); performance assessments; regulatory requirements/compliance, disposal site parameters, economics.
- waste minimization: process modifications, waste separations/segregation, economics.
- nuclear fuel cycles: aqueous and nonaqueous technologies, reprocessing, MOX/recycle fuel cycles and reactor designs, spent fuel parameters, cask designs/parameters, regulatory impacts, thermal/fast cycles, reactor designs, economics.
- fissile material disposition and MOX: methods, isotopic effects, limits, impacts, regulations, economics.
- uranium processes: uranium recovery, refining, purification, blending, fluorination, conversion, enrichment (gaseous diffusion, centrifuge, and AVLIS), defluorination, fuel fabrication (pellet and particle), metal production, regulatory aspects, depleted uranium management/conversion/applications, economics.
- decontamination and decommissioning: reactor systems and components, fuel fabrication plants, enrichment (GDP - diffusion) plants, metal and concrete surfaces, regulatory requirements, sites, technologies, economics.
- plant operations: walk throughs/inspections, safety and readiness reviews, chemical and radiological surveys, assessments.
- corrosion: material selection, testing, and evaluation
- energy systems: batteries, fuel cells, and fluidized bed technologies, economics.
- separation methods: solvent extraction, ion exchange, electrochemical, chromatographic, molecular recognition agents, precipitation, laser.
- design and mathematical modelling: physical properties, chemical reactors, nuclear reactor degraded core analyses, speciality chemical plants, fuel fabrication, nuclear reactor systems, economics.
- safety and environmental analyses: safety analysis report analyses/reviews, fault tree analysis, HAZOP studies, NEPA analyses/preparation/reviews, operational readiness inspections/reviews, regulatory compliance (RCRA, TSCA, CAA).
- risk analysis and management
- chemical analyses: water, coolants, organic compounds, low-levels of metals.
- course teacher

WORK SUMMARY AND HIGHLIGHTS

Mr. Murray has twenty-six years of experience in engineering and scientific programs, particularly as they relate to the nuclear industry. His efforts have covered theoretical and experimental research, development, technical evaluations, facility and process design synthesis, safety and viability reviews, consequence and risk analysis, economic analyses and assessments, plant site applications and implementation, and program reviews. Mr. Murray has numerous publications and patents.

Mr. Murray is familiar with several types of reactor technologies (e.g., PWR, BWR, PHWR, GCR, and LMR) and their characteristics, such as typical operating conditions, off-normal events, and potential accidents. He has been involved with both system and system performance and safety analyses. In the

past, he has worked with thermal hydraulic and degraded core analyses. He has evaluated dose consequence methodologies and estimates. He has reviewed accident handbooks (DOE and NRC).

Mr. Murray has experience in nuclear fuels and nuclear fuel processes, and their parameters. He has designed and analyzed pellet and particle fuel based, manufacturing processes for dense, ceramic oxide fuels for power reactors (primarily LWR and LMFBR). He has designed carbide fuel manufacturing routes. He has tested key parts of the manufacturing processes, including purification, precipitation, and calcination, using uranium. He has investigated the parameters involved with fuel performance and spent fuel storage and (ultimately) disposal. This includes detailed knowledge of potential repository requirements. He has studied spent fuel reprocessing and tested (non-active or uranium only) relevant unit operations. He has visited many fuel cycle facilities, including the BNFL and Cogema plants in Europe, the GDP's, and two fuel fabrication facilities. Mr. Murray has also analyzed nuclear fuel cycle alternatives for DOE programs, including HEU and plutonium fuels (MOX), and their disposition. He has extensive experience with the waste treatment, minimization, and management aspects of the fuel cycle, including the regulations governing radioactive, mixed, and hazardous wastes from these facilities. He has tested, demonstrated, and implemented absorption and extraction processes for uranium recovery from fuel plant waste streams, recovering the enriched uranium and converting mixed wastes into separate radioactive and hazardous forms suitable for disposal. In related fuel plant applications, he has tested and demonstrated TBP and solvent recovery/recycle, and eliminating traces from the process effluents. This eliminated mixed waste generation by the process.

Mr. Murray has been involved in numerous evaluations of the backend of the fuel cycle. In addition to reprocessing and spent fuel technologies, he has assessed the processing methodologies for neutralized and acidic HLW. The assessments investigated technologies, process and facility safety, design, regulations, waste form compatibility, and economics.

Mr. Murray has been a key team member of waste management programs for nuclear related activities. This has included a component repair facility with high radiation fields (typically 1-5 R/hr, sometimes > 40 R/hr at 12 inches), that required analyses, design, vendor selection criteria, and start-up support/technical assistance. The effort was very successful and allowed the facility to triple its throughput, eliminate mixed waste, and halve its radwaste generation. He has been involved with testing and implementing evaporator/crystallizer, precipitation, ion exchange, electrolytic, oxidation, cementation, vitrification (LLW and HLW), and thermal technologies for waste management. He has tackled these areas in an integrated approach consisting of:

a. fuel cycle/process familiarity
b. effluent/back-end treatment
c. facility/process improvement and waste minimization (i.e., less waste or a different classification)
d. regulatory understanding and guidance, including NRC and EPA regulations (RCRA/TSCA), and DOE guidance
e. NRC/EPA/DOE waste categorization criteria and approaches
f. safety and risk analyses, and performance (of system and wastes)

Mr. Murray has been heavily involved in the programs for the management of Depleted Uranium (DU). He generated and performed technology/viability assessments of DU management alternatives. He led a team that designed facilities for DU conversion, applications, storage, and disposal, at throughput capacities up to 28,000 te/yr. The analyses included process design, conceptual plant and site

arrangements, conceptual equipment designs, workforce requirements, environmental effects (effluents, emissions, wastes etc.), regulatory requirements, transportation considerations, conceptual safety analyses, consequence and risk assessment, and full cost estimates. These programs indicated that the use of DU as the principal shielding material in spent fuel management offered numerous environmental, economic, and programmatic benefits, and, conceivably, the program could pay for itself. He also produced conceptual designs of spent fuel containers for multipurpose use incorporating DU as the principal shielding material, in PWR 12 and 24 assembly configurations. These designs offered many potential benefits, including a lower weight, disposal site compatibility, and the elimination of labyrinthine cooling passages.

Mr. Murray has conducted numerous cost analyses for major programs and projects, using both manual and computer based methods. A partial list include fuel cycle facilities, spent fuel casks and storage, reactor applications, chemical and energy plants, and decommissioning activities. He has used analogy (top-down) and accrual (bottoms-up) estimating approaches. As examples, his efforts on the cost estimates for the decommissioning of the gaseous diffusion plants identified approaches to realize potential savings of tens of billions of dollars, while his analyses for HLW processing recommended approaches with radionuclide separations because of tremendous potential savings and reductions in waste volumes requiring geologic disposal.

Mr. Murray has participated in many programs on decontamination of radioactive components and surfaces, and the decommissioning of facilities. He has directed and performed the experimental testing for decontamination method research, development, and qualification, often using radioactive artifacts, and subsequently followed through with equipment design, assembly, and nuclear plant application. He has been involved in the design of systems for entire loop and major component decontamination. He has investigated decontamination methods for fuel facilities and designed application systems. He has developed mathematical models for predicting decontamination results. He has been involved in walkdowns and requirements for decommissioning facilities and sites, to either greenfield or brownfield criteria, most recently for Army test reactors. Mr. Murray is also well versed in the area of waste management, including regulatory guidelines, technology, risk analysis, process research and development, and plant implementation. He has successfully demonstrated ion exchange, electrolytic, coagulation, and oxidation treatment processes for spent decontamination media and solutions. These methods allow for solution regeneration (for reuse) or solidification and disposal, with large volume reduction factors.

Mr. Murray has extensive experience in the analytical areas of processes and facilities. He has developed, calibrated, and qualified chemical analytical techniques for process monitoring and control, including wet chemical, titration, UV/visible spectrometry, electrode, GC, HPLC, and AA methods. He has calibrated and applied radiochemical techniques for testing and processes, including ratemeters and single and multi-channel analyzers. He has extensive radiochemical test experience, including the use of hundreds of actual, radioactive plant specimens (both PWR and BWR) in NRC-licensed facilities. Mr. Murray has used computers extensively, for equipment/instrument control, mathematical analysis, and process modelling. Mr. Murray has experience working at plant sites and in assisting compliance with environmental and waste related regulations.

Mr. Murray has been involved in many programs related to energy systems, including combustion systems, air cleanup processes, batteries, and fuel cell systems, including fault tree and failure analyses.

PROFESSIONAL EMPLOYMENT AND EXPERIENCE

Nuclear Regulatory Commission (NRC) - September 2000 to Present

Mr. Murray currently holds the position of "Senior Chemical Process Engineer/Reviewer" in the Mixed Oxide FacilityLicensing Section of the Special Projects Branch, Fuel Cycle Safety and Safeguards, in the NRC Office of Nuclear Material Safety and Safeguards (NMSS). He is the chemical safety reviewer for the GDPs and the MOX application, hazards/risk/ISA analyst for GDP/MOX issues, the technical knowledge expert for gas centrifuge and advanced enrichment technologies (AET), and the Technical Program Manager for TWRS and the TWRS Closeout. Some highlights include:

- Briefings of Upper Management and Commissioner Merrifield on Gas Centrifuge Enrichment Technology.
- Briefing to Commissioners Merrifield and McGaffigan on PBMR fuel cycle issues.
- Organizer and instructor for F201S "Fuel Cycle Course."
- Briefing of staff on gas centrifuge technology, safety, and status.
- WM'01 presentation on Hanford HLW and risk.
- Technical reviewer for HAUP and Cold Trap amendments (GDP).
- Project Manager Certification

Nuclear Regulatory Commission (NRC) - August 1997 to September 2000

Mr. Murray held the position of "Senior Chemical Process Engineer" in the Tank Waste Remediation Systems (TWRS) section of the Special Projects Branch, Fuel Cycle Safety and Safeguards, in the NRC Office of Nuclear Material Safety and Safeguards (NMSS). He successfully completed and passed all of the qualification requirements for the position. Some of his duties have included the following:

- Lead and coordination of safety reviews on major submittals by BNFL Inc., including the Standards Requirement Document (SRD), the Hazards Analysis Report (HAR), the Integrated Safety Management Program (ISMP), the Initial Safety Analysis Report (ISAR), and the Design Safety Features (DSF) deliverable.
- Lead reviewer in the general, chemical safety, hazards analysis, and safety analysis areas for the BNFL and LMAES reviews.
- Generation of internal guidance and position papers, including sections of draft Standard Review Plans and Commission/Issue papers.
- Organized and principal coauthor of a technical position paper on process safety concerns at TWRS facilities. This paper considers a risk-informed, performance based approach to safety, by evaluating potential process hazards, dose consequences, and frequencies, and identifies items that are likely to be relied upon for safety.
- Coauthor of a technical position paper on materials considerations and concerns with TWRS facilities and their potential safety and risk implications.
- Reviewed Gaseous Diffusion Plant (GDP) safety analyses and upgrades (SARUPS), including the process safety aspects.
- Assigned as an AVLIS reviewer for process hazards and accident analyses.
- Participated in general technical, safety, and regulatory reviews, including DOE documents, the depleted Uranium (DU) EIS from DOE, NRC contractor (primarily CNWRA) reports, the NRC fuel cycle accident analysis handbook, and fuel cycle facility submittals, as needed.
- Technical Program Manager for CNWRA activities on TWRS.

Mr. Murray has attended numerous training courses related to computer applications, technical areas, and the regulatory environment.

Science Applications International Corporation (SAIC) - January 1990 to August 1997

Mr. Murray held a senior engineer/senior staff position at SAIC in Germantown, Maryland, and was primarily involved in numerous projects for the Department of Energy (DOE), primarily for the Offices of Environmental Management, Nuclear Energy, and Defense Programs (EM, NE, and DP, respectively). Mr. Murray also participated in NRC, Department of the Army, outside funded, and SAIC-funded programs. He provided assistance in the following areas:

1. Environmental compliance and waste management at enrichment sites: Mr. Murray assisted DOE-NE with these issues for the Paducah and Portsmouth sites. Activities have included assisting DOE with NEPA documentation, FFCA's, regulations, noncompliance and exceedences, WAC's, RMW, PCB TSD, line item projects (LIP's), FSR/CDR's, and scrap metal disposition. Mr. Murray identified approaches for eliminating waste inventories and for reducing program costs.
2. Environmental Restoration and Waste Management Five-Year Plan: Mr. Murray provided assistance and written contributions to the Corrective Activities and Waste Management sections of the FY 92-96 and FY 93-97 plans.
3. Decontamination and Decommissioning (D&D) Activities: Mr. Murray has participated in and provided input to DOE and D&D workshops and planning committees. Mr. Murray has also been heavily involved in reviewing and providing assistance to the D&D evaluations of the gaseous diffusion plants in the DOE Complex, and identified routes to both meet regulatory and risk requirements, and achieve potential savings in the tens of billions of dollars. He reviewed and made recommendations for the activities planned for the K-33 re-industrialization efforts, including costs, approaches, technologies, and end states. He has provided input to reactor D&D plans and the DOE RDDT&E program. He has also provided analyses and recommendations to DOE-DP on canyon D&D activities. Mr. Murray has made presentations to the National Academy of Sciences on D&D approaches and costs.
4. Waste Management Operations: Mr. Murray has provided assistance and support to the DOE Office of Waste Operations, principally for activities at the Oak Ridge and Hanford sites. Activities have included LLW, RMW, and HLW TSD analysis, in such areas as technologies, regulations (NRC and DOE regulations, and DOE Orders, such as 5820.2A [waste] and the General Design Criteria [GDC]), environmental compliance, safety and risk analyses, and economic analysis, including value engineering.
5. Regulatory Compliance: Mr. Murray has assisted DOE in the review and analysis of regulatory issues. These efforts have included compliance agreements, compliance reports (SEN-7's/SEN-7A's), regulatory agency rulemakings, and proposed regulations (e.g., CAA, HAP's).
6. Technical and Safety/Risk Reviews: Mr. Murray has participated in several technical and readiness reviews of DOE facilities, including the 299-H Decontamination Facility at Savannah River, the Consolidated Incineration Facility at Savannah River, and the Oak Ridge TSCA Incinerator. He has also participated in DOE "Tiger Team" verifications and reviews of NEPA, construction project, design, and SAR documentation.
7. High-Level Waste Safety: Mr. Murray has provided technical input as requested to the HLW Tank Safety Task Force. This has included safety/risk reviews, evaluations, analyses, and postulated mechanisms for tank phenomena, such as periodic tank ventings.
8. Technology Development: Mr. Murray analyzed and provided information related to separations, waste form, mixed waste, D&D, and related technologies. This has included separations technologies for HLW pretreatment and vitrification. Mr. Murray has conducted regulatory and technology assessments, and cost/benefit analyses. He has formulated approaches that provide

potential cost reductions of tens of billions of dollars. He has analyzed vitrification processes for both HLW and LLW, and has identified potential synergisms for DOE sites.

9. Spent Nuclear Fuel (SNF) and Related Technologies: Mr. Murray has contributed to programs on DOE and commercial SNF. This has included storage methods, site and systems analyses, regulatory/safety/risk reviews, shielding requirements and materials, reprocessing, waste management, HLW vitrification, and disposal.
10. Fissile Material Disposition: Mr. Murray has provided insight on disposition alternatives, technologies, and related issues for plutonium and high-enriched uranium. This has included analyses on MOX fuel cycles, safety/risk, and impacts upon the SNF management system.
11. Fuel Cycle and Enrichment Processes: Mr. Murray has analyzed isotopic enrichment methods, including gaseous diffusion, centrifuge, and laser isotope separation (AVLIS). For AVLIS, he has also investigated methods for its integration into the current fuel cycle including conceptual plant designs for metal and oxide conversion, safety/risk issues, and purification of the enriched product. The latter included leading an experimental test program.
12. Environmental Impact Statement (EIS) Support: Mr. Murray is a coauthor on several sections of the EIS on foreign research reactor spent fuel. He has also provided analyses and input for the depleted uranium disposition and fissile materials storage/disposition EIS's.
13. Design, Engineering, Safety/Risk, and Cost Analyses: Mr. Murray routinely conducted design, engineering, and cost analyses to assist decision makers. For many potential alternatives and programs with limited information, he conducted a design effort to allow the estimation and consideration of all impacts from implementation. He has conducted the engineering of actual SSC's within the design, developed specifications, and estimated capital, operating, and program costs.
14. NRC Program Support: Mr. Murray has supported NRC programs dealing with metal decontamination and recycle, including its risk/dose effects and costs. He has also participated in reviews of SNF dry storage applications and observed site tests.
15. Department of the Army: Mr. Murray was involved in assessing the status of shutdown reactors, including contamination levels, regulatory status, and equipment inspection. He also generated D&D options and provided cost estimates.
16. Depleted Uranium (DU) Applications and Shielding: Mr. Murray generated management alternatives for DU, and led a team that designed facilities and estimated parameters for conversion, shielding applications, long-term storage, and disposal. He has also generated cask designs suitable for multipurpose use (storage, transportation, and disposal) that incorporate DU as the principal shielding member and are lighter and do not require labyrinthine cooling passages.

Westinghouse Science and Technology Center/Research and Development Center (STC/R&D) - July 1978 to January 1990

Mr. Murray started his career at STC and held various Junior and Senior engineering positions in the Materials Applications and Chemical Engineering Departments at STC. He has been involved in test apparatus design and fabrication, prototype design and fabrication, field and plant work, experimental tests and interpretation, technical evaluation, safety and regulatory analyses, performance assessments, troubleshooting, project estimation and negotiation, and marketing. Programs have included work in the following areas:

- Electrolytic corrosion/dissolution of metals
- Chemical and electrolytic decontamination of nuclear components
- Decontamination and waste treatment applications at plant sites
- Chemical cleaning of nuclear steam generators and heat exchangers
- Corrosion processes

- Nuclear fuel processes and reprocessing chemistry
- Reactor technologies and system analyses
- Safety, risk, and dose assessments
- Crystallizer/evaporator development and field installation
- Low-level nuclear waste treatment processes and reprocessing chemistry
- Fuel cell system analyses and development (PAFC, MCFC, and HTSOE), FTA/ failure analyses, and experimental fuel-processing systems and reformers
- Separation processes, including ion exchange, solvent extraction, membrane, and electrochemical
- Isotope enrichment processes (uranium, boron, and zirconium), based upon ion exchange, lasers, solvent extraction, and chemical reaction
- Chemical analysis, including high purity water
- Printed circuit board manufacture
- Evaluation and testing of paints and coatings
- Implementation of technology at customer facilities

From 1988 to 1990, Mr. Murray worked almost exclusively on the Full RCS (Reactor Coolant System) Decontamination Program, which was a utility-industry sponsored initiative for resolving the greater inspection and maintenance requirements in the increasing radiation dose rate environment of mature nuclear powerplants. Ultimately, the program's goal was to increase safety and reduce risk. He was a key team member in Task 1 (process qualification/corrosion testing), Task 4 (waste management), and Task 7 (conceptual equipment arrangement and layout at the plant). For Task 1, he led a team that designed, built, and operated a large, stainless steel test loop (about the size of an average two-story house), and investigated chemistry, boron, and resin effects. In Task 4, he evaluated the waste ramifications of full RCS decontamination, including oxide inventory, radionuclides, reagent/resin quantities, and regulatory/disposal site impacts. Under Task 7, Mr. Murray participated in design synthesis and analysis for decontamination at the powerplant, using Indian Point 2 as the representative site.

Mr. Murray has been involved in chemical cleaning programs for heat exchangers and steam generators. Most significantly, this culminated with a program in 1989 that took just four months from initial conception and marketing, through chemical and corrosion testing, system design, fabrication, and field use on a CCW system at an operating reactor site, with Mr. Murray performing as the program engineer. The CCW represents the component cooling water system, which is a safety grade system for cooling the main reactor pumps and other components, and includes several large components and heat exchangers. The onsite application remained within the plant's technical specifications and allowed the recovery of most of the approach temperature margin, avoiding the need to shut the plant during the summer months.

Mr. Murray has made several significant contributions to the continued operations and improvements at the Pump Repair Facility at the Westinghouse Cheswick site. The PRF decontaminated and repaired highly radioactive, large components from commercial and naval reactors. Mr. Murray analyzed the decontamination and waste treatment operations at the facility, and suggested improvements. He also participated in the design for the facility's expansion, recommending processes, hardware, and potential vendors. His efforts contributed to a 300% increase in throughput while reducing the radwaste generation by 50%, and improved regulatory compliance.

Mr. Murray has been involved in the design and system analyses of phosphoric acid, molten carbonate, and solid oxide fuel cell systems, including the stack manufacturing processes. Mr. Murray participated in the design, fabrication, and testing of a 10 KW catalytic reformer, based upon methane feed. He also led a team that designed, constructed, and tested a 5 KW fuel processor for diesel fuel.

Mr. Murray has conducted extensive studies on decontamination processes for surfaces, metallic and nonmetallic, and homogeneous contamination. He has developed new processes, conducted both radioactive and nonradioactive tests - one program involved over 200 tests with radioactive materials. He has developed mathematical models, and designed decontamination systems and processes. He has tested coatings for their usefulness in radioactive applications and their protection (from contamination) of the underlying surfaces.

Mr. Murray has been involved with the design and testing of separations processes, including ion exchange, solvent extraction, pressurized swing absorption, membrane, distillation, precipitation, and crystallization, to name a few.

Mr. Murray has designed nuclear fuel processes for various reactor types. These have included pellet and particle fuel, in oxide and carbide forms. He has also investigated, designed, and estimated costs for various aspects of the fuel cycle, including reprocessing methods and processes. He has designed heavily shielded facilities for radiochemical processing.

Mr. Murray investigated many waste processing routes, including vitrification of both HLW and LLW, and qualification of the waste forms to meet regulatory requirements. For LLW, he developed methods for producing borate type glasses from PWR waste streams, including sample production. For HLW, he investigated glass frit and glass former based processes for neutralized waste, such as that found at Savannah River, Hanford, and West Valley. He was also involved in the synthesis and analysis of lower temperature processes based upon alkoxide/gel-glass technologies.

AWARDS, HONORS, AND PROFESSIONAL AFFILIATIONS

Technical Awards

1. 2004 - Special Act Award (for Moscow Workshop on MOX), U.S. NRC, February 2004.
2. Project Manager Certification, U.S. NRC, September 28, 2001.
3. 2001 - Special Performance Award, U.S. NRC, July 24, 2001.
4. 2001 - Instant Cash Award (for TWRS, others), U.S. NRC, January, 2001.
5. 2000 - Special Act Award (for TWRS), U.S. NRC
6. 1999 - Special Performance Award, U.S. NRC
7. 1991 Certificate of Appreciation for assisting with the DOE-EM Five Year Plan
8. 1989 Westinghouse Signature Award of Excellence Recipient
9. 1984 Westinghouse Engineering Achievement Award
10. Nineteen Westinghouse patent disclosure awards
11. Three Westinghouse invention awards
12. Eleven Westinghouse patent issue awards
13. Two Westinghouse Patent Plaques (1987 and 1989)

Professional Societies

- Tau Beta Pi (Engineering Honor Society)
- American Nuclear Society
- American Institute of Chemical Engineers
- The Electrochemical Society
- Society for Analytical Chemists of Pittsburgh

Patents

- Fuel Cell Reformer Design - 2 patents granted
- Nuclear Decontamination Technology - 8 patents granted
- Radioactive Waste Treatment - 1 patent granted
- Invention Awards from Westinghouse - 2 on chemical agent sensors and 1 on energy buffer systems
- Patent disclosures in Westinghouse - 80; patent disclosure awards - 19
- Depleted Uranium Processing and Radiation Shielding - 2 patents granted

1. S.M. Mirsky, S.J. Krill, Jr., and A.P. Murray, "Process for Making Uranium Carbide," Number 6,599,490, July 29, 2003.
2. S.J. Krill, Jr., S.M. Mirsky, and A.P. Murray, "Radiation Shielding Materials and Containers Incorporating Same," Number 6,372,157, April 16, 2002.
3. A.P. Murray, "Method for Decontaminating A Pressurized Water Nuclear Reactor System," Number 5,024,805, June 18, 1991.
4. A.P. Murray, C.G. Slater, and R.W. White, "Ceric Acid Decontamination Of Nuclear Reactors," Number 4,880,559, November 14, 1989.
5. T.S. Snyder and A.P. Murray, "Electrolytic Decontamination Apparatus And Encapsulation Process," Number 4,792,385, December 20, 1988.
6. A.P. Murray and C.G. Slater, "Method Of Decontaminating Radioactive Metal Surfaces," Number 4,729,855, March 8, 1988.
7. A.P. Murray, C.G. Slater, M.C. Skriba, and L.F. Becker, "Improved Ozone Oxidation Treatment," Number 4,685,971, August 11, 1987.
8. A.P. Murray, C.G. Slater, and R.W. White, "Ceric Acid Decontamination Of Nuclear Reactors," Number 4,657,596, April 14, 1987.
9. A.P. Murray, "Hypohalite Oxidation In Decontaminating Nuclear Reactors," Number 4,654,170, March 31, 1987.
10. A.P. Murray, S.L. Weisberg, and L.F. Becker, Jr., "Decontamination Of Metal Surfaces In Nuclear Power Reactors," Number 4,587,043, May 6, 1986.
11. A.P. Murray and T.S. Snyder, "Decontamination Using Electrolysis," Number 4,537,666, August 27, 1985.
12. F.R. Spurrier, E.A. DeZubay, A.P. Murray, and E.J. Vidt, Slab Reformer," Number 4,504,447, March 12, 1985.
13. F.R. Spurrier, E.A. DeZubay, A.P. Murray, and E.J. Vidt, Slab Reformer," Number 4,430,304, February 7, 1984.

ARTICLES, PRESENTATIONS, AND REPORTS

1. NMSS-DPV-2003-01
2. Draft Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina, Revision 1, U.S. Nuclear Regulatory Commission, April 30, 2003, contributor to Sections 5 (Safety Assessment of the Design Basis), 6 (Nuclear Criticality Safety), 7 (Fire Protection), and 11 (Plant Systems), and Lead Senior Technical Reviewer/Author for Sections 8 (Chemical and Process Safety), 11.2 (Aqueous Polishing Process and Chemistry), and 11.3 (Mixed Oxide Process System Description and Review). (ADAMS Accession Number ML031270081)
3. NMSS-DPV-2002-03
4. Draft Safety Evaluation Report on the Construction Authorization Request for the Mixed Oxide Fuel Fabrication Facility at the Savannah River Site, South Carolina, U.S. Nuclear Regulatory Commission, April 30, 2002, contributor to Sections 5 (Safety Assessment of the Design Basis), 6 (Nuclear Criticality Safety), 7 (Fire Protection), and 11 (Plant Systems), and Lead Senior Technical Reviewer/Author for Sections 8 (Chemical and Process Safety), 11.2 (Aqueous Polishing Process and Chemistry), 11.3 (Mixed Oxide Process System Description and Review), and Appendix B (Discussion of the MOX Process).
5. Toll Transfer Facility License Amendment Review
6. High Assay Upgrade Program (HAUP) License Amendment Review
7. A.P. Murray et al, Overview and Summary of NRC Involvement with DOE in the Tank Waste Remediation System-Privatization (TWRS-P) Program, NUREG-1747, U.S. Nuclear Regulatory Commission, August 2001.
8. A.P. Murray, G.C. Comfort, and M. Tokar, "NRC Involvement with the Tank Waste Remediation System Privatization (TWRS-P) at Hanford," Waste Management'01 (WM'01), Tucson, AZ, February, 2001.
9. M. Srinivasan, A.P. Murray, and M.N. Baker, "Materials Considerations of Proposed Tank Waste Remediation Systems (TWRS)," Point Paper, U.S. NRC, April 27, 2000.
10. A.P. Murray, M.N. Baker, L.W. Chang, and M. Srinivasan, "Process Safety of Proposed Tank Waste Remediation Systems (TWRS)," Point Paper, U.S. NRC, May 27, 1999.
11. Standard Review Plan for the Review of a License Application for the Tank Waste Remediation System Privatization (TWRS-P) Project, NUREG-1702, U.S. Nuclear Regulatory Commission, March 2000, contributor to Sections 3 (Integrated Safety Analysis) and 6 (Chemical Safety).
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ABS Consulting/PSI
ABS Consulting/PSI

ATTACHMENT C
PRIVILEGE LOG:
NRC STAFF RESPONSE TO BREDL'S
"FIRST DISCOVERY REQUEST TO NRC
STAFF ON SECURITY PLAN SUBMITTAL"

DOCUMENT	PRIVILEGE	RATIONALE
A.G. Garrett, MOX White Paper, October 2003.	Deliberative Process.	The Agency's final position on the topics covered in this paper are reflected in the Review Plan and the Safety Evaluation. Therefore, disclosure of this document is not necessary to a proper decision in the proceeding. *See* 10 C.F.R. §§ 2.774(b), 2.790(5).
E-mail from Glenn Konzek, DOE-Richland, to Sherri Cross, NRC, subject: MOX Categorization, dated November 4, 2003.	Deliberative Process.	The Agency's final position on the topic covered in this e-mail is reflected in the Review Plan and the Safety Evaluation. Therefore, disclosure of this document is not necessary to a proper decision in the proceeding. *See* 10 C.F.R. §§ 2.774(b), 2.790(5).

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE ENERGY CORPORATION	)	Docket Nos. 50-413-OLA
	)	50-414-OLA
	)	
(Catawba Nuclear Station	)	
Units 1 and 2)	)	

SUPPLEMENTAL AFFIDAVIT OF ALBERT G. GARRETT

COUNTY OF MONTGOMERY	)	
	)	SS:
STATE OF MARYLAND	)	

Albert G. Garrett, having first been duly sworn, does hereby state as follows:

1. I am employed as a Senior Security Specialist in the Fuel Cycle and Special Security Programs Section, Division of Nuclear Security, Office of Nuclear Security and Incident Response, U.S. Nuclear Regulatory Commission in Rockville Maryland. A statement of my professional qualifications is attached hereto.

2. I have reviewed the foregoing "NRC Staff Response to BREDL's First Set of Discovery Requests to NRC Staff on Security Plan Submittal" of the NRC Staff, in general and in particularity as it pertains to the Specific Interrogatories, and verify that the responses are true and correct to the best of my information and belief.

CIRCE E. MARTIN NOTARY PUBLIC MONTGOMERY CO., MD.

Albert G. Garrett

Sworn to before me this
30th day of June, 2004

Circe E Martin

Notary Public
My commission expires: March 1, 2007

CIRCE E. MARTIN
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires March 1, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE ENERGY CORPORATION	)	Docket Nos. 50-413-OLA
	)	50-414-OLA
	)	
(Catawba Nuclear Station	)	
Units 1 and 2)	)	

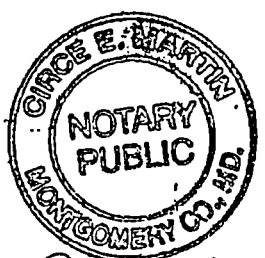
SUPPLEMENTAL AFFIDAVIT OF SHERRI L CROSS

COUNTY OF MONTGOMERY	)	
	)	SS:
STATE OF MARYLAND	)	

Sherri L. Cross, having first been duly sworn, does hereby state as follows:

1. I am employed as a Senior Safeguards Technical Analyst in the Fuel Cycle and Special Security Programs Section, Division of Nuclear Security, Office of Nuclear Security and Incident Response, U.S. Nuclear Regulatory Commission in Rockville Maryland. A statement of my professional qualifications is attached hereto.

2. I have reviewed the foregoing "NRC Staff Response to BREDL's First Set of Discovery Requests to NRC Staff on Security Plan Submittal" of the NRC Staff, in general and in particularity as it pertains to the Specific Interrogatories, and verify that the responses are true and correct to the best of my information and belief.



Sherri L. Cross

Sworn to before me this
1st day of July, 2004

Notary Public
My commission expires: March 1, 2007

CIRCE E. MARTIN
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires March 1, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE ENERGY CORPORATION	)	Docket Nos. 50-413-OLA
	)	50-414-OLA
	)	
(Catawba Nuclear Station	)	
Units 1 and 2)	)	

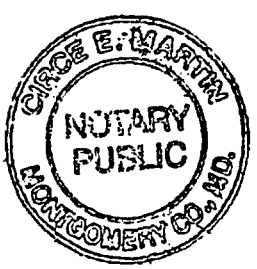
SUPPLEMENTAL AFFIDAVIT OF SEAN E. PETERS

COUNTY OF MONTGOMERY	)	
	)	SS:
STATE OF MARYLAND	)	

Sean E. Peters, having first been duly sworn, does hereby state as follows:

1. I am employed as a Project Manager, Project Directorate 2, Section 1, in the Division of Licensing Project Management, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission in Rockville Maryland. A statement of my professional qualifications is attached hereto.

2. I have reviewed the foregoing "NRC Staff Response to BREDL's First Set of Discovery Requests to NRC Staff on Security Plan Submittal" of the NRC Staff, in general and in particularity as it pertains to Specific Interrogatory 24, and verify that the responses are true and correct to the best of my information and belief.



Sean E. Peters

Sworn to before me this
1st day of July, 2004

Circe E Martin

Notary Public
My commission expires: March 1, 2007

CIRCE E. MARTIN
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires March 1, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
DUKE ENERGY CORPORATION	)	Docket Nos. 50-413-OLA
	)	50-414-OLA
	)	
(Catawba Nuclear Station	)	
Units 1 and 2)	)	

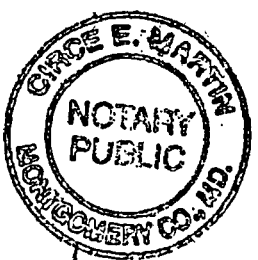
SUPPLEMENTAL AFFIDAVIT OF ALEXANDER P. MURRAY

COUNTY OF MONTGOMERY	)	
	)	SS:
STATE OF MARYLAND	)	

Alexander P. Murray, having first been duly sworn, does hereby state as follows:

1. I am employed as a Senior Chemical Process Engineer, in the Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission in Rockville Maryland. A statement of my professional qualifications is attached hereto.

2. I have reviewed the foregoing "NRC Staff Response to BREDL's First Set of Discovery Requests to NRC Staff on Security Plan Submittal" of the NRC Staff, in general and in particularity as it pertains to Specific Interrogatory 24, and verify that the responses are true and correct to the best of my information and belief.



Alexander P. Murray
Alexander P. Murray

Sworn to before me this
1st day of July, 2004

Circe E. Martin
Notary Public
My commission expires: March 1, 2007

CIRCE E. MARTIN
NOTARY PUBLIC STATE OF MARYLAND
My Commission Expires March 1, 2007