UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

May 4, 2005

SECRETARY

DOCKETED 05/05/05
SERVED 05/06/05

Alexander P. Murray
Senior Chemical Process Engineer
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards

Dear Mr. Murray:

I am responding to your March 28, 2005 memorandum to the Commissioners, in which you asked the Commission to block issuance of the construction authorization (CA) for the mixed-oxide (MOX) fuel fabrication facility (MFFF), and to intervene in the agency process for resolving the Differing Professional Views (DPVs) and Differing Professional Opinions (DPOs) you had submitted during reviews of the application for the CA.

Under the NRC's regulations, the Commission has an adjudicatory role in the MFFF proceeding. Because of this role, I trust you will understand that all members of the Commission must remain impartial during the pendency of the proceeding. It would be inappropriate at this time for any of the Commissioners to discuss or comment on issues involved in this matter.

Because your letter and its first attachment discuss matters that could become issues in contention in the adjudication, I am placing the letter and its first attachment in the adjudicatory record. See 10 CFR 2.348, Separation of Functions, subsection (c). In addition, I am referring your memorandum to the Commission to the Executive Director for Operations for consideration of your concerns regarding the resolution of your DPVs/DPOs.

A copy of your memorandum, its first attachment, and this response will be served on the Atomic Safety and Licensing Board and the participants in the MFFF proceeding.

Sincerely,

/RA/

Andrew L. Bates
Acting Secretary of the Commission

Attachments:
1. March 28, 2005 memorandum from A. Murray to NRC Commissioners
2. First attachment to March 28, 2005 memorandum ("Safety Concerns And Differing Viewpoints and Opinions on MOX," presentation by A. Murray to Advisory Committee on Reactor Safeguards, December 2004)

cc: MFFF Service List
EDO

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

MEMORANDUM
MARCH 28TH, 2005

TO: Chairman Nils J. Diaz
Commissioner Edward McGaffigan, Jr.
Commissioner Jeffrey S. Merrifield
Commissioner Gregory B. Jaczko
Commissioner Peter B. Lyons

FROM: Alexander P. Murray, Senior Chemical Process Engineer
Mixed Oxide Facility Licensing Section
Special Projects Branch
Division of Fuel Cycle Safety
and Safeguards (FCSS)
Office of Nuclear Material Safety
and Safeguards (NMSS)

Alesc

SUBJECT: SAFETY CONCERNS REGARDING THE PROPOSED MIXED OXIDE FUEL FABRICATION FACILITY (MFFF)
[MOX FACILITY - DOCKET NUMBER: 070-03098]

As the lead chemical safety reviewer for the MOX license application, I am neither an advocate nor a detractor of the proposed facility - I am impartial. However, as the lead reviewer for chemical safety at the proposed facility, I am looking for docketed reasonable assurances of adequate safety in the review of the MOX Construction Authorization Request (CAR), per 10 CFR Part 70, and using the MOX Standard Review Plan (SRP; NUREG-1718) for guidance and acceptance criteria. As you may be aware, I have raised safety concerns regarding the proposed MOX facility during NRC reviews of the MOX CAR and related information. I have submitted six Differing Professional Views (DPVs) and two Differing Professional Opinions (DPOs) so far on significant safety issues that involve life and death issues, such as explosions and toxic chemical releases (the "death cloud").

Since I have returned from Agency travel, it has come to my attention that NRC staff have been briefing upper management and your Technical Assistants (TAs) on MOX, the draft Final Safety Evaluation Report (FSER), my nonconcurrence on the draft FSER, and safety issues, including DPVs and DPOs that I have authored. Suffice it to say I have not been asked to provide any information, nor prepare or review any briefing materials, nor invited to or briefed about the meetings. Historically, the MOX Program has inadequately communicated issues and differing opinions. Consequently, I cannot attest to the accuracy of the information provided on the FSER nonconcurrence, safety issues, and DPVs/DPOs.

Please note that I am the best source for information and discussions regarding my safety concerns and DPVs/DPOs. I have attached a summary presentation that I made to the ACRS last December. In the interests of fairness and the NRC principles of good regulation, please contact me directly if you have any questions.

I am concerned that the NRC is giving the appearance of expediting approval of the MOX CAR, given that there are significant safety issues requiring resolution. I note that the ACRS letter from February (ACRSR-2113) mentions some of the same safety concerns. The Department of Energy has indicated there is a delay in the program - some press reports indicate this delay could be six months or longer. Given this situation, why are we rushing to issue the CAR approval in the next few weeks? Is it not our regulatory responsibility to use the delay to resolve these safety issues and/or establish an issue tracking system and completion schedule?

In addition, I have concerns about the DPO process:

- I had filed two DPVs (NMSS-DPV-2002-03 and NMSS-DPV-2003-01) - one on modeling chemical effects, which expressed concerns about the lack of site specific validation and quality assurance of the predictive code used by the applicant (this could underestimate potential consequences - it may be a generic issue for many NRC safety codes), and the other on chemical consequences from NRC-regulated chemicals, which could have fatal consequences to most workers onsite, with a "not unlikely" likelihood, due to a lack of controls. Both DPV Panels agreed with me essentially 100%. Subsequent management actions did not address the core concerns of these DPVs. I requested reviews as DPOs. However, the DPO reviews came to the conclusion that no further actions are necessary. I request that the Commission review these apparently contradictory DPO and DPV results and provide a resolution.

- I had filed three DPVs on chemical consequence limits, solvent flammability, and waste issues. The "system" has delayed and/or denied these DPVs for erroneous reasons - as an example, the "system" refuses to consider the DPV on waste issues even though they are mentioned as a concern in the aforementioned ACRS letter. The NTEU has filed grievances regarding these DPVs. I request that the Commission direct the "system" to process these DPVs immediately.

As noted at the December 2004 ACRS Meeting, I have also expressed concerns about the safety review process, including an excessive emphasis on schedule and the potential for unqualified reviewers making safety conclusions. As noted in the second attachment, myself and others are attempting resolution through normal channels, but may need assistance.

Please contact me if you have any questions or would like to meet individually on these matters.

Attachment:
"Safety Concerns" presentation from the December 2004 ACRS Meeting
Memorandum on Project Manager and Technical Reviewer Interactions

cc:
Dale Yeilding, NTEU

Safety Concerns and Differing Viewpoints and Opinions on MOX

Alex Murray
Lead Chemical Safety Reviewer
NMSS/FCSS/SPB/MOFLS

Overview

Provide feedback on:

- **Safety Review Process**
- **Previously Open Items**
- **DPVs/DPOs**

Note:

I am impartial – neither for nor against the proposed facility.

I am concerned some safety issues remain and need to be addressed now and not at the License Application stage.

Safety Review Process

Two Step Licensing:

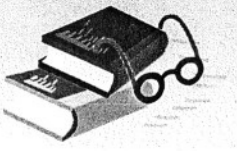
- **Step 1:**
  - Construction Permit
  - Present
- **Step 2:**
  - Licensing – possession and use
  - Future (next year)
- Concern is the balance between the two and how much can be deferred and revisited later in the licensing stage, particularly for commitments

Safety Regulations

- Part 70.23(b): NRC approved when it has determined the DBs of the PSSCs, and QA plan, provide reasonable assurance of protection
- Part 70.61: Compliance with Performance requirements
- 70.64(a): Address the Baseline Design Criteria

Commitments are not mentioned

Safety Guidance



SRP:

- Chapter 8 for chemical safety
- Arranged for two-part licensing review
- Commitments may be acceptable

On MOX, accepted PSSCs and DBs that:

- In general, have less information than SRP mentions
- Are not RAGAGEP
- Rely on future efforts and experiments to define current PSSCs and DBs

RAGAGEP = Reasonable And Generally Accepted Good Engineering Practice

Diverse Viewpoints

Part of NRC strategic plan – safety and effectiveness goals

- Staff/management discussions
- Nonconcurrences
- Differing Professional Views and Opinions (DPVs and DPOs)

Some Observations

- A voting - not a consensus - process
- Nonconcurrences written – but not accessible by the public
- DPV/DPO only practical route to upper management and public
- Prevailing staff/management and MOX management often involved in DPV/DPO process – objectivity and independence unclear
- Unclear if staff have adequately followed QA and documentation needs
- A number of workshops are being conducted to address some of these issues

Public Comment

"The NRC needs to act as a regulator and conduct thorough safety reviews [of the MOX facility]"

(public comment during August 2002 public meeting on MOX, North Augusta, South Carolina)

Comments on Previous Open Items

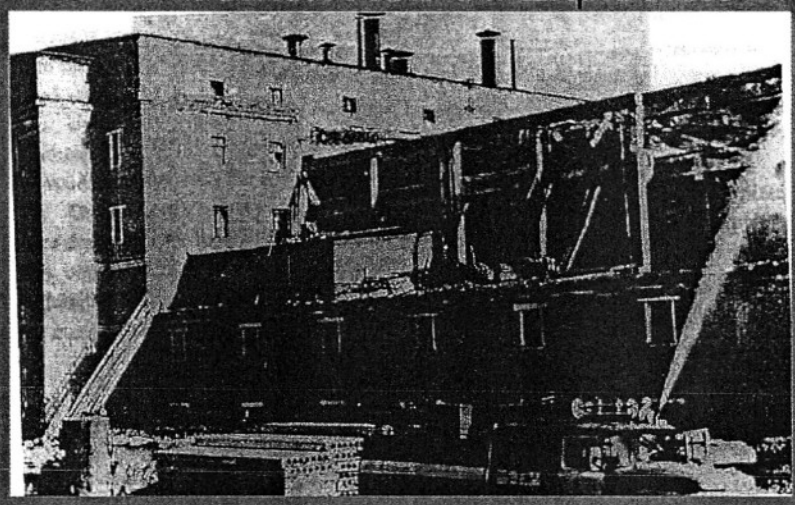
FSER Issues discussed earlier today and at November 2003 ACRS meeting

- CS-01: Red Oil
- CS-02: HAN/Hydrazine
- AP-03: Electrolyzer /Titanium Fire
- MP-01: Uranium Burnback
- CS-05b: Chemical Limits/TEELs
- CS-10: Control Room Habitability
- CS-09, AP-02, AP-08, and AP-09: Flammability

CS-01: Red Oil

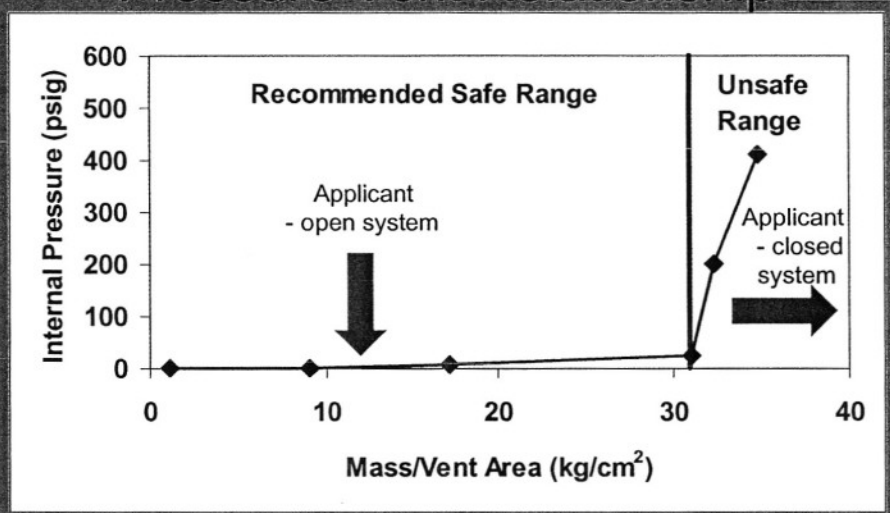
- Nitrated TBP/organic compound mixtures
- Potential for significant damage and release of materials
- Open Systems:
  - Limited information provided by applicant
  - Acceptable because clearly based on test data
- Closed Systems:
  - Limited information provided by applicant
  - Clearly contradicts DOE/DNFSB RAGAGEP
  - In range identified as "unsafe"

Why I am concerned - Tomsk Red Oil Explosion



CS-01: Red Oil

Pressure Vent Relationship



My Conclusions:

- Approach for closed systems does not provide adequate assurances of safety:
  - Corresponds to 1 control parameter (T)
  - Common mode failure – heat transfer and vent
  - Inadequate margin
  - Uncertainties not adequately considered
  - High aspect ratio design will likely result in higher pressures and temperatures, and phase separation
  - No assurance quench system and 125 C limit will prevent red oil reactions
- No assurance approach can meet Part 70 requirements for a Construction Permit

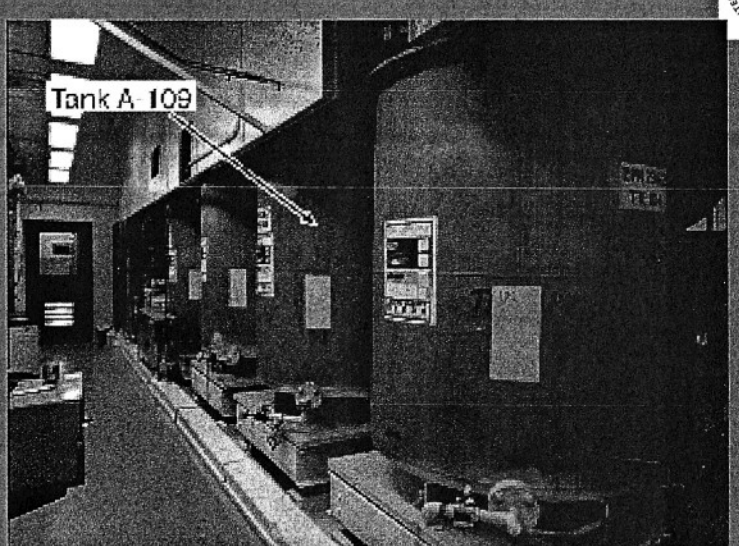
My Recommendation

- Impose DOE/DNFSB RAGAGEP as permit condition
- Give applicant the opportunity to provide assurances about their strategy in the license application

CS-02: HAN/Hydrazine

- Potential for rapid pressurization
- Two cases:
  - Case 1 – without NO_X
  - Case 2 – with NO_X addition
- Case 1 modeled as a system of PDEs to identify regions of stability and margin.

PRF Room Prior to Accident



Why I am concerned - PRF Accident Scene

My Conclusions

- Case 1: no NO_X
  - Have only checked the mathematics
  - NRC model/software guidance for making a safety decision not followed
  - Contradictory design bases with hydrazoic acid
- Case 2: with NO_X
  - Applicant removed flow control
  - Cited standards accommodate flow design not flow control
- No assurance of meeting Part 70 criteria for construction permit

Recommendation

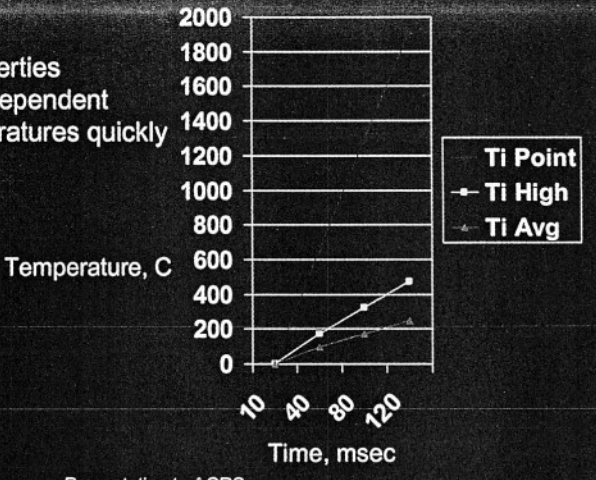
- Case 1: no NO_X
  - Have applicant commit to schedule to resolve DB conflict early after CAR/permit
- Case 2: with NO_X
  - Propose applicant's original flow control as permit condition
  - Give applicant the opportunity to provide assurances about their strategy in the license application

AP-03: Electrolyzer/ Titanium Issues

- Potential for titanium interactions and fires
- Applicant's strategy using RAGAGEPs
- Active and passive engineered controls (AECs and PECs)
- Active control terminates power, which removes the initiator for the event
- Find the approach of AECs and PECs meets Part 70 requirements

AP-03: Electrolyzer/Titanium Issues – Rapid Heating Possible

- Assumed constant properties
- Geometry and system dependent
- Potential for high temperatures quickly



MP-01: UO_2 Burnback

- UO_2 Burnback reactions can damage HEPA filters directly or indirectly (igniting fibers/dust on the filters)
- Strong function of particle size
- Use of applicant UO_2 values produces higher loadings than staff calculations
  - Exceed threshold for one HEPA unit
  - 50-80% of threshold if distributed over C4 HEPAs
  - Contribution from other material on HEPAs not included

Burnback

- One or more features need to be identified as PSSCs and credited for safety
- Recommendation:
  - Propose permit condition that elevates intermediate HEPA filters to PSSCs for this event

CS-05b: Chemical Limits

Four Issues:

- Chemical releases – discussed as DPV/DPO later
- Modeling:
  - Dispersion Modeling – discussed as DPV/DPO
  - Phenomenological Modeling – addressed in FSER
- Chemical Limits – this discussion

Chemical Limit Concerns

- Findings from RDSER not addressed:
  - TEELs not independent, peer/public reviewed
  - TEELs not endorsed by a regulator
  - Certain TEEL values have increased substantially during review of the CAR
- Procedural Issues:
  - Policy decision – qualified staff not involved
  - Prior staff evaluations of limits not considered
  - Public not involved
  - Other regulators not consulted

Chemical Limit Concerns (cont.)

- Safety Issues not addressed:
  - Why are significantly higher values acceptable?
  - Why are values that frequently change acceptable?
  - What is appropriate for determining PSSCs and DBs?
- Recommendation: NRC needs a task force of qualified staff to address chemical limits

CS-10: Habitability

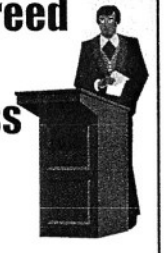
- Safety function of ECR HVAC is to maintain habitability
- Applicant's limits do not correspond to habitability
- Proposed permit condition applies habitability limits

Flammability Issues

- Applicant proposed NFPA 69 as design basis
- Applicant identified PSSCs for various areas
- Some PSSCs may not function as interlocks for NFPA 69 exception
- Staff has accepted NFPA 69 and expressed need for clear calculational basis for any exception with interlocks, for the license application

DPVs/DPOs

- 5 DPVs filed
- MD 10.159 DPV/DPO process changed in May 2004
- 2 DPVs went through full process
- 2 Management appointed panels agreed essentially 100% with the DPVs
- Actions and response did not address safety issues
- Both pursued as DPOs



DPV/DPO Process Changed

- Process has DPO and DPO Appeal, no DPV
- Authority delegated to NMSS for DPOs on MOX
- NMSS has signature authority for MOX
- Consolidation of MOX issues mentioned

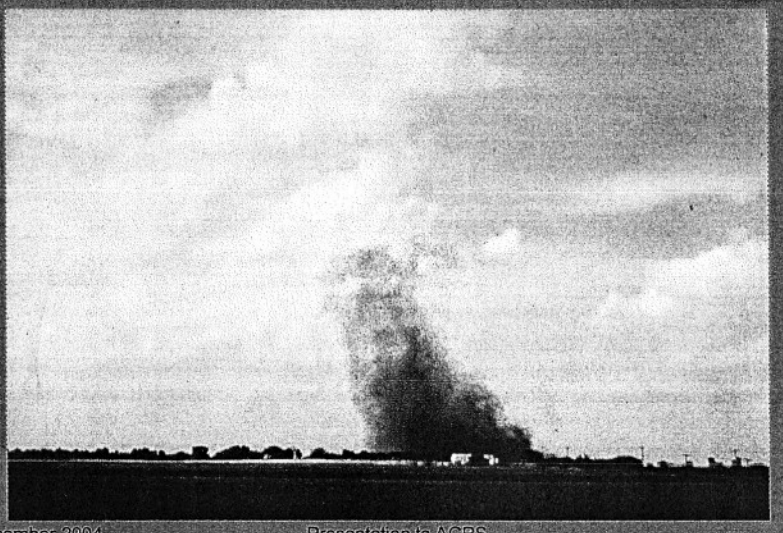
DPV/DPO on Chemical Consequences

- DPV expressed concerns about chemical releases regulated by NRC
- Applicant has stated:
  - Not unlikely event
  - Radiation dose received (10s of mrem to 5-10 rem)
  - Not regulated because below 70.61
- Event has the potential for multiple fatalities, perhaps all operators outside the ECRs

NRC Assessment

- Management/staff
  - 1,500 mg/m^3 at 100 meters for N_2O_4 (in EIS)
  - "Immediately lethal"
- My assessment:
  - Estimated concentrations could be higher
  - Facility design exacerbates hazard
  - Safe havens not PSSCs
  - Unlikely operators could reach safe havens or exits

N_2O_4 Release Example



DPV Panel Findings

- DPV Panel agreed essentially 100%
  - Recommended the issue be re-opened or a new open issue established
  - Also recommended more guidance and review of safety evaluation process
- NRC Office/Division not in alignment with Panel report and decided:
  - Enough information on the docket, no need for the open item
  - Some guidance provided
- Review of safety evaluation process resulted in a chilling effect

Draft DPO Report

- No further action needed as safety issue is addressed
- Applicant has made blanket commitments without exception to:
  - Codes and standards with habitability requirements
  - 70.64 BDC for chemical safety – habitability implied as part of BDC
- Therefore, applicant is required to maintain habitability in all structures at the proposed facility

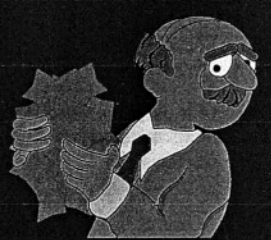
Summary of DPV/DPO on Chemical Modeling (I)

- Multiple codes available for dispersion and consequence estimation
- Applicant initially selected ARCON96, MACCS2, and ALOHA codes
- Applicant subsequently used only ARCON96 code

ARCON96 (coincidentally) produces lowest consequence results

Summary of DPV/DPO on Chemical Modeling (II)

- Applicant provided input meteorology info
- No verification and validation info provided
- No QA/qualification info provided



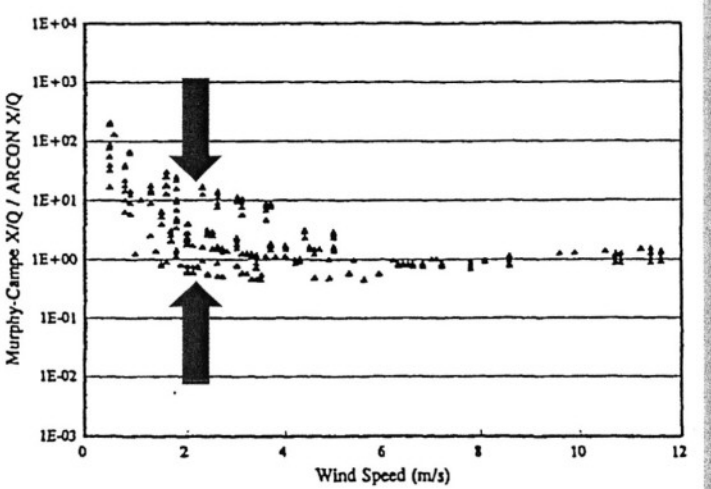
Fundamentally, no data
On docket to support
Site specific safety code
Use at SRS MOX site

Summary of DPV/DPO on Chemical Modeling (III)

Authored DPV/DPO because:

- Matter closed – no reconsideration by local mgmt
- Safety significant:
  - potentially underestimate consequences by 1-2 orders of magnitude
  - Safety controls may be unidentified
- Submitted December 2002

Model/Data Comparisons (I)

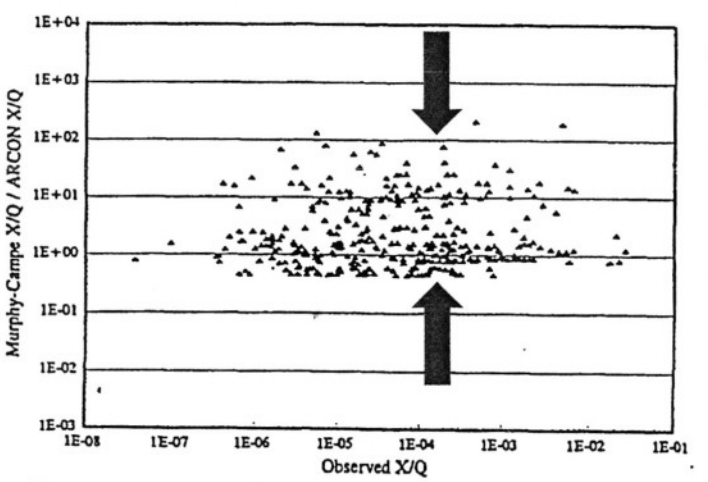


- Applicant Using SRS Wind speed Of 2.2 m/sec
- Which value to use?

Figure 27 Murphy-Campe / ARCON concentration ratios by wind speed
(based upon data from 7 reactor sites in NUREG/CR-6331 on ARCON96)

39

Model/Data Comparisons (II)



- Applicant Using Circa 3E-4
- Which value to use?

Figure 28 Murphy-Campe / ARCON concentration ratios by observed concentration
(based upon data from 7 reactor sites in NUREG/CR-6331 on ARCON96)

40

DPV Panel Findings

<u>Essentially agreed with DPV:</u>

- Panel noted generic use of ARCON96 OK
  - **<u>but</u>** site specific application for MOX not verified/validated against site test data
- NRC guidance on software not followed
- Staff guidance on code selection and user needs

Office/Division Responses

<u>On DPV/DPO Appeal, not in alignment with DPV Panel Report:</u>

- Docketed information available
- MDs and NUREG/BR-0167 (Software QA Guidance) not useful
- Sufficient staff guidance available
- RES user-need memo for development/application of scientific codes

DPO Appeal

Three Main Points:

- Information cited is not V&V
- No adequate QA on applicant's code
- Safety issues remain

Received DPO Report Monday (12/13), from a quick review:

- DPO appeal denied
- Implies V&V for site-specific application not needed

DPV on Waste Management Concerns

- Safety issues refer to premature closure of Open Items AP-05 and AP-06. Applicant should:
  - Confirm MFFF wastes are treated to meet SRS WACs and will be accepted
  - Identify PSSCs and DBs for the waste unit, such as an inventory limit DB and shutdown requirement
- Clearly within NRC regulatory authority

Waste DPV

NRC:

- Delayed the DPV for about a year
- Denied the DPV – waste is under DOE jurisdiction

Subsequently:

- NTEU filed a grievance on the process
- I requested the ACRS/ACNW review the DPV and the safety issues

DPVs on Chemical Limits and Flammability

NRC:

- Delayed the DPV for about 10 months
- Asked for resubmission

Subsequently:

- NTEU filed a grievance on the process

Summary

- Process and specific safety concerns
- Potential for more DPOs
- We – NRC, applicant, and DOE - need to do a good job and address these issues

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
DUKE COGEMA STONE & WEBSTER	)	Docket No. 70-3098-ML
	)	
(Savannah River Mixed Oxide Fuel Fabrication Facility)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing LETTER FROM ANDREW L. BATES TO ALEXANDER P. MURRAY REGARDING CONSTRUCTION AUTHORIZATION (CA) FOR THE MIXED OXIDE (MOX) FUEL FABRICATION FACILITY (MFFF) have been served upon the following persons by U.S. mail, first class, or through NRC internal distribution.

Office of Commission Appellate Adjudication
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

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

Administrative Judge
Charles N. Kelber
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Administrative Judge
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Washington, DC 20004

Docket No. 70-3098-ML
LETTER FROM ANDREW L. BATES TO ALEXANDER P. MURRAY
REGARDING CONSTRUCTION AUTHORIZATION (CA) FOR THE
MIXED OXIDE (MOX) FUEL FABRICATION FACILITY (MFFF)

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Harmon, Curran, Spielberg
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Washington, DC 20036

[Original signed by Emile L. Julian]

Office of the Secretary of the Commission

Dated at Rockville, Maryland,
this 6th day of May 2005