SIEMENS

October 23, 1996
RAC:96:068

Document Control Desk
ATTN: Chief, Planning, Program and Management Support Branch
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Overheads for October 23, 1996 NRC Meeting

Attached are the overheads presented by Siemens Power Corporation in the October 23, 1996 meeting with the NRC. The purpose of this meeting was to review the requirements needed to license a reload containing mixed oxide fuel. Some of the information presented on the overheads is proprietary to SPC. The overheads with the proprietary information are marked as proprietary. In accordance with the requirements of 10 CFR 2.790(b), an affidavit is attached to support the withholding of this information from public disclosure.

If you have any questions, or if I can be of additional assistance, please call me at (509) 375-8290.

Very truly yours,

R. A. Copeland
Product Licensing

/smg

Attachments

cc: Mr. Egan Wang (USNRC)

Ltr Encl
1 1
Add: Egan Wang 010H-5

A045 2 Exxon YC01 Change NRC POR Ltr Encl
1 1 w/out Prop
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AFFIDAVIT

STATE OF WASHINGTON)
) ss.
COUNTY OF BENTON)

I, R. A. Copeland being duly sworn, hereby say and depose:

1. I am a member of Product Licensing for Siemens Power Corporation ("SPC"), and as such I am authorized to execute this Affidavit.

2. I am familiar with SPC's detailed document control system and policies which govern the protection and control of information.

3. I am familiar with the attachment from the letter from R. A. Copeland to the NRC Document Control Desk dated October 23, 1996 with the subject "Overheads for October 23, 1996 NRC Meeting," referred to as "Document." Information contained in this Document has been classified by SPC as proprietary in accordance with the control system and policies established by SPC for the control and protection of information.

4. The Document contains information of a proprietary and confidential nature and is of the type customarily held in confidence by SPC and not made available to the public. Based on my experience, I am aware that other companies regard information of the kind contained in the Document as proprietary and confidential.

5. The Document has been made available to the U.S. Nuclear Regulatory Commission in confidence, with the request that the information contained in the Document will not be disclosed or divulged.

6. The Document contains information which is vital to a competitive advantage of SPC and would be helpful to competitors of SPC when competing with SPC.

7. The information contained in the Document is considered to be proprietary by SPC because it reveals certain distinguishing aspects of SPC licensing methodology which secure competitive advantage to SPC for fuel design optimization and marketability, and includes information utilized by SPC in its business which affords SPC an opportunity to obtain a competitive advantage over its competitors who do not or may not know or use the information contained in the Document.

8. The disclosure of the proprietary information contained in the Document to a competitor would permit the competitor to reduce its expenditure of money and manpower and to improve its competitive position by giving it valuable insights into SPC licensing methodology and would result in substantial harm to the competitive position of SPC.

9. The Document contains proprietary information which is held in confidence by SPC and is not available in public sources.

10. In accordance with SPC's policies governing the protection and control of information, proprietary information contained in the Document has been made available, on a limited basis, to others outside SPC only as required and under suitable agreement providing for nondisclosure and limited use of the information.

11. SPC policy requires that proprietary information be kept in a secured file or area and distributed on a need-to-know basis.

12. Information in this Document provides insight into SPC licensing methodology developed by SPC. SPC has invested significant resources in developing the methodology as well as the strategy for this application. Assuming a competitor had

available the same background data and incentives as SPC, the competitor might, at a minimum, develop the information for the same expenditure of manpower and money as SPC.

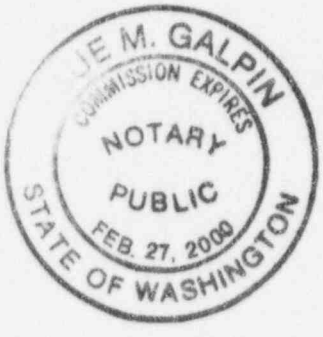
THAT the statements made hereinabove are, to the best of my knowledge, information, and belief, truthful and complete.

FURTHER AFFIANT SAYETH NOT.

SUBSCRIBED before me this 18th day of October, 1996.

Sue M. Galpin

Sue M. Galpin
NOTARY PUBLIC, STATE OF WASHINGTON
MY COMMISSION EXPIRES: 2/27/00



NRC Meeting on Licensing MOX Reloads

Siemens Power Corporation

October 23, 1996

Agenda

- Introduction/Utility Activity--J. Burn WPPSS
- SPC Response to DOE MOX Plans
- Siemens Experience with MOX Fuel
- Review of US Codes and Methods
- Reactor Licensing Issues
- Summary/Conclusions

Goal: Review License Needs for Reload Fuel and Reactors and Identify Issues Not Addressed

- SPC has reviewed US codes and methods needed to support MOX
- Relatively small number of reload modifications are required
- Limited number of reactor issues to be resolved

DOE May Issue Contract to Dispose of Weapons Grade Pu by Burning it in Commercial Reactors

- Have estimated 50 MT of weapons grade plutonium to dispose
- One alternative is to fabricate into mixed oxide fuel for use in commercial reactors
- Contract would require the fabrication and use of MOX fuel

Siemens Has Experience in Fabricating MOX

- Previously provided MOX in US to Big Rock Point and R. E. Ginna reactors
- Developed Hanau facility in Germany for MOX fabrication
  - Initial facility provided 35 MThm/yr
  - Upgraded facility to provide 120 MThm/yr (not operated due to change in licensing policy of state)

European Experience is Technical Basis for Fabrication and Use of MOX

- Siemens inserting reloads of ATRIUM-10 MOX fuel in Gundremmingen starting in 1997
- Working with consortium of US BWR licensees to supply similar ATRIUM-10 designs in US
- Note: Gadolinia to be used in only UO_2 rods

Reload Licensing Requires Approved Design Codes, Methods, and Criteria

- SPC is reviewing currently approved methodology and criteria for applicability

- Review focused on Chapters 4 and 15 of SRP

Design Methods Review

- Mechanical design
  - RODEX2--Fuel performance code, gives FGR, pellet densification/swelling, cladding strain, cladding oxidation, etc. as function of exposure
  - RAMPEX--Cladding stress during transients
  - Generic BWR design criteria

- Thermal hydraulic design
  - XCOBRA--Steady state thermal hydraulic analysis
  - ANFB--Critical power correlation
  - Safety limit methodology

Design Methods Review (Continued)

- Non-LOCA transient
  - COTRANSA2--System response code
  - XCOBRA-T--Transient fuel thermal hydraulic code
  - STAIF--Frequency domain code to determine susceptibility to power instabilities

- LOCA--EXEM BWR evaluation model
  - RELAX--System response code, hot channel code
  - FLEX--Time to reflood
  - HUXY--Fuel rod heatup

Design Methods Review (Continued)

- Neutronic design
  - CASMO-3G--Cross section code
  - MICROBURN-B--Core simulator

MOX Fuel Changes in the Neutronic Kinetics Have to be Incorporated in the Transient Analyses

- Control rod worths decreased
- Lower delayed neutron fraction and shorter prompt neutron lifetime
- Void fraction reactivity is more negative

BWR Transients and Accidents Have Only Small Impact from MOX Fuel

- CRDA is limiting reactivity transient
  - Reduced control rod worth, increased temperature and void reactivity feedback tend to compensate for the smaller delayed neutron fraction
  - Net impact is not significantly changed
- Pressurization transients affected by void reactivity and increases ΔCPR which will require slightly higher operating limit
- DNB controlled by heat flux
  - LHGR limits set to provide similar peak heat fluxes
  - Geometry unchanged from standard fuel

Stability and Shutdown Margin Concerns are Helped by ATRIUM-10 Design

- Because of smaller rod worth, MOX fuel has less shutdown margin than UO_2. Central water canister provides additional hot to cold reactivity change which improves shutdown margin.

- The more negative void reactivity feedback is mitigated by part length rods in ATRIUM-10. Thus the design compensate for any stability changes from the MOX fuel.

LOCA Response Not Significantly Changed by MOX

- SPC will use EXEM BWR LOCA model
- Impact of MOX on neutronics not significant in LOCA event
- Geometry and system response unchanged

Reduction in Boron Worth Will Require SLCS Analysis

- Current SLCS boron levels must be assessed to assure sufficient shutdown

- If not, either the boron level can be increased or enriched boron used

MOX Impact on Reactor Licensing is Limited

- Three major issues based on DOE sponsored evaluations
  - New fuel storage
  - Spent fuel storage
  - Security
- Reactor systems not changed by the use of MOX