

**Public Service  
Company of Colorado**  
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November 27, 1985  
Fort St. Vrain  
Unit No. 1  
P-85443

OSCAR R. LEE  
VICE PRESIDENT

Director of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Attn: Mr. H.N. Berkow, Project Director  
Special and Standardization  
Project Directorate

Docket No. 50-267

SUBJECT: Fort St. Vrain Fuel  
Surveillance Program

- REFERENCES: 1) PSC Letter, Fuller  
to Gammill, dated  
6/20/78 (P-78102)
- 2) PSC Letter, Lee to  
Johnson, dated  
5/3/85, (P-85151)
- 3) NRC Letter, Hunter  
to PSC dated 10/2/85  
(G-85404)

Dear Mr. Berkow:

In Reference 3, the NRC submitted its comments on the proposed Fort St. Vrain (FSV) Fuel Surveillance Program contained in Reference 2. The proposed program (Reference 2) sought to incorporate all prior fuel surveillance commitments into one document as well as establish a revised program which would not be primarily contingent upon the availability of DOE funding.

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As previously discussed in Reference 2, PSC restricted modifications in the original program to tasks which were determined to be research and developmental in nature or which provided no additional information beyond that already available regarding FSV fuel performance. PSC is confident the proposed modifications to the program do not in any way compromise the ability to verify FSV fuel safety.

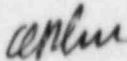
Attachment 1 contains the revised fuel surveillance program incorporating the NRC staff's comments from Reference 3. Attachment 2 is an itemized summary addressing the staff's comments in response to our original submittal. Additional information has been included in Attachment 2 to provide further clarification of the proposed fuel surveillance program.

PSC will include the approved FSV Fuel Surveillance Program in an appendix to the FSAR and will implement the program via the PSC Core Management Guides.

We request NRC approval of the FSV Fuel Surveillance Program attached to this letter.

Should you have any questions, please call Mr. M. H. Holmes at (303) 480-6960.

Very truly yours,



O. R. Lee, Vice President  
Electric Production

ORL/TK:pa

Attachments: 1) FSV Fuel Surveillance Program  
2) Comments on Fuel Surveillance Program Modifications

### FSV Fuel Surveillance Program

The Fuel Surveillance Program for the refuelings indicated shall consist of the following items as contained in Table 1.

- 1) Obtain a photographic record of all six vertical faces of at least 90% of the spent fuel elements removed from the core during refueling using the Fuel Handling Machine 35mm camera or the Cask Video Monitor.
- 2) Evaluate all photographic records for indications of significant abnormalities which could have an effect on the structural integrity of the elements in a timely manner. Significant abnormalities are any unanticipated characteristics, the origin of which is not readily explainable, which differ in nature from those observed in fuel element inspections conducted to date. Elements exhibiting stains, scratches, abrasions, minor cracks and gouges typical of prior segment inspection results would not be considered abnormal in nature.
- 3) Promptly inform the NRC of any significant abnormalities identified which could have an effect on the structural integrity of a fuel element.

- 4) At the time of refueling, five pre-characterized fuel elements will be withdrawn from the reactor and examined. This examination will include:

- a) visual examination
- b) measurements to determine graphite dimensional changes

Data evaluation and documentation of the PIE results will be provided to the NRC as it becomes available. A report of the examination results will be prepared within 12 months after withdrawal of the elements from the reactor.

- 5) PSC will perform in-core visual examination of at least 12 Segment 9 H-451 fuel element surfaces during the indicated refuelings using the Reactor Viewing Device. The surfaces to be examined during the refueling will be those of fuel elements in regions 3, 13, and 18 that are adjacent to regions being refueled and that provide a normal (right angle in the vertical plane) viewing angle to the Reactor Viewing Device. A report of inspection results will be prepared and submitted to the NRC. In addition, the inspections will be videotaped for record purposes, dependent upon equipment availability.

- 6) The FTE's removed at the time of each refueling will be examined. This examination, which will be conducted following the refueling, will include:

- a) visual inspection
- b) graphite block metrology
- c) fuel block gamma scanning, subject to the availability of DOE funding for robot refurbishment.

Data evaluation and documentation of the PIE results will be forwarded to the NRC as it becomes available. A report of the results will be prepared within 12 months after withdrawal of the elements from the reactor.

- 7) Destructive PIE's of FTE-4 (Refueling 5) and FTE-6 (Refueling 7) will be performed. These destructive PIE's will consist of:

- a) fuel block disassembly
- b) non-destructive and destructive strain, stress and strength examination of graphite components
- c) fluence/temperature/burnup monitor examination
- d) FSV reference fuel rod examination using metallographic techniques to confirm predicted fuel performance (with respect to kernel migration).

Data evaluation and documentation of the PIE results will be forwarded to the NRC no later than six (6) months from receipt of the fuel elements at GA Technologies located in San Diego, CA.

In addition, PSC commits to perform destructive PIE's on a selected surveillance element following any cycle during which design basis primary coolant activity limits as established by Specification LCO 4.2.8 "Primary Coolant Activity" of the Fort St. Vrain Technical Specifications are reached.

Comments on Proposed FSV  
Fuel Surveillance Program

In prior correspondence (P-79017) PSC stated (as requested by the NRC in its letter of October 19, 1984 from Johnson to Lee) that in the event DOE funding were to be withdrawn or substantially reduced, PSC would submit a modified fuel surveillance program. DOE funding has continued to dwindle necessitating a review of the original PIE program. The original program (P-78102) included several commitments directly contingent upon DOE funding. These commitments were directed toward the confirmation of design and manufacturing techniques, or the performance of nonreference forms of fuel. The Fuel Surveillance Program described in this letter is intended to confirm fuel performance as it relates to its behavior under accident conditions and the assumptions used in the FSV FSAR.

- 1.a.) In Reference 3 the NRC tentatively agreed to the deletion of destructive PIE's for elements SURV-4 and SURV-6 provided certain fuel performance parameters (i.e. primary coolant activity) show no significant changes. As suggested, PSC has committed to a destructive PIE of those selected surveillance elements (SURV-4, SURV-6, and refuelings subsequent to the tenth refueling outage) should circulating primary coolant

activity increase to levels defined in the FSV Technical Specifications.

1.b.) Several of the 13 tasks committed to in P-78102 were of a research and development nature whose performance did not address FSV fuel safety concerns. In our previous letters, P-85005, P-81322, P-79017, P-78103 and P-78102, PSC expressly stated that the commitment to perform such fuel surveillance tasks were subject to the availability of appropriate DOE funding. The substantial reduction in scope of the DOE funded PIE program made it necessary for PSC to re-examine each task in this category and its value to the performance of FSV fuel safety verification. The following table provides a list of the original 13 tasks, as provided for under previous DOE funding, with an explanation for any modifications or deletions made as a consequence of this review. The cost for each task has also been identified.

P-78102

PIE Program

<u>Task</u>	<u>Comment</u>
1. Visual Inspection	Included in revised program
2. Graphite Block Metrology	Included in revised program
3. Fuel Block Gamma Scanning	Included in revised program subject to availability of DOE funds. Estimated cost of robot refurbishment - \$70,000
4. Fission Gas Release from Irradiated Fuel Under Storage	Deleted--Information is available from metallographic examination. Estimated cost - \$10,000
5. Fuel Block Disassembly	Included in revised program. Estimated cost - \$50,000

<u>Task</u>	<u>Comment</u>
6. Gamma Spectroscopy of Individual Fuel Rods and Graphite Components	Deleted--provides no additional safety related information; primarily R&D in nature. Estimated cost - \$30,000
7. Fuel Rod Examination and Physical Property Measurements	Deleted--provides no additional safety related information. Fuel rods will be visually examined. Estimated cost - \$70,000
8. Nondestructive and Destructive Strain, Stress and Strength Examination of Graphite Components	Included in revised program Estimated cost - \$80,000
9. Fluence/Temperature/Burnup Monitor Examination	Included in revised program Estimated cost - \$110,000

<u>Task</u>	<u>Comment</u>
10. Nondestructive Burnup Determination on Fuel Rods	Deleted--provides no additional safety related information; information available from burnup monitors; primarily R&D in nature intended to identify a method other than use of burnup monitors for determining burnup. Estimated cost - \$10,000
11. Fuel Performance Examination	Partially deleted--unable to perform TRIGA activation tests due to reduction in DOE Funding. Metallographic examination remains in revised program and provides all necessary information. Estimated cost - \$90,000

<u>Task</u>	<u>Comment</u>
12. Simulated Core Heatup Experiments	Deleted--Appropriate furnace was never built due to reduction in DOE funding; provides no additional information above that provided in P-78157 dated 7/24/79. Estimated cost - \$10,000
13. Destructive Fission Product Examination	Deleted--provides no additional safety related information on fuel performance. Primarily R&D in nature. Estimated cost - \$10,000
2) The NRC requested that the revised program define "significant abnormalities" as used in Items 2) and 3). The revised program includes a definition of what will be considered abnormal in nature consistent with prior FSV examination results.	
3) The NRC's comment requiring a specific time frame for the reporting of program results has been incorporated	

consistent with the schedule established in the original program (P-78102).

- 4) The NRC's comments require that records of the visual examination of the "canyon walls" be established and maintained. This requirement has been incorporated as requested.

- 5) The NRC's comment requested an explanation of what was meant by the stipulation that performance of gamma scanning would be subject to the availability of the gamma scanning robot.

Gamma scanning as included in the original program was committed to strictly on a contingency basis. This contingency was based upon the availability of DOE funds to provide for construction of and refurbishment of the robot. The gamma scanning robot was developed by GA under DOE funding specifically for FSV fuel examinations and would always be available for these examinations provided funds for its refurbishment were included in the DOE program. It is our understanding that funds for this device will not be available in FY '87 but may be included in FY '88.

Information obtained from gamma scanning does not provide additional data on fuel particle performance. The value of gamma scanning is confined to power distribution information and verification of nuclear design calculations and is not vital to the verification of FSV fuel safety. Therefore, PSC does not commit to the performance of gamma scanning without appropriate DOE funding.

- 6) The NRC staff requested our schedule for completion of subitems d,e,f, and g of the commitment to perform destructive PIE on FTE-2. Due to technical difficulties encountered with the FSV Fuel Handling Equipment, PSC has been unable to ship FTE-2 to GA Technologies for performance of these items. Provided that the Fuel Handling Equipment is operational and favorable weather conditions continue to exist, it is currently anticipated that shipment of the fuel test element will be possible no later than December 31, 1985.

GA estimates completion of the PIE within six (6) months from the arrival of FTE-2 at the GA hot cell facility. A report of the examination results will be submitted by PSC to the NRC.

PSC will inform the NRC of any changes in this schedule should they occur.

Table 1  
Fuel Surveillance Program

	Refueling No.							
<u>Item No.</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9</u>	<u>10 and after</u>	
1	X	X	X	X	X	X	X	
2	X	X	X	X	X	X	X	
3	X	X	X	X	X	X	X	
4	X	X	X			X		
5	X	X	X	X	X			
6	X	X	X	X				
7		X		X				

### References

- 1) P-78102, PSC letter Fuller to Gammill, 6/20/78
- 2) P-78103, PSC letter Fuller to Gammill, 6/20/78
- 3) P-79017, PSC letter Fuller to Gammill, 1/24/79
- 4) P-81322, PSC letter Lee to Novak, 12/11/81
- 5) P-85005, PSC letter Lee to Johnson, 1/18/85
- 6) P-85151, PSC letter Lee to Johnson, 5/3/85
- 7) G-85404, NRC letter Hunter to PSC, 10/2/85