

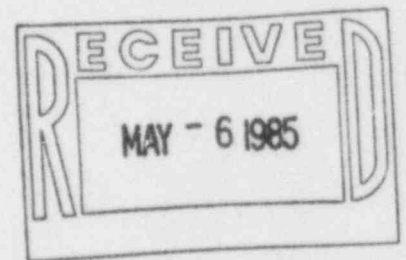
**Public Service  
Company of Colorado**  
P.O. Box 840  
Denver, CO 80201-0840

OSCAR R. LEE  
VICE PRESIDENT

May 3, 1985  
Fort St. Vrain  
Unit No. 1  
P-85151

Regional Administrator  
Region IV  
U. S. Nuclear Regulatory Commission  
611 Ryan Plaza Drive, Suite 1000  
Arlington, TX 76011

Attn: Mr. E. H. Johnson



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, Fuller  
to Gammill, dated  
1/24/79, P-79017  
3) PSC letter, Lee to  
Johnson, dated  
1/18/85, P-85005

Dear Mr. Johnson:

In Reference 3, Public Service Company of Colorado (PSC) committed to develop and submit for NRC approval a Fuel Surveillance Program document which would consolidate all previous PSC fuel surveillance commitments that have not currently been completed. Attached is a modified Fuel Surveillance Program. Also attached is a summary of Refueling 3 Fuel Surveillance Commitments and Current Status. These programs incorporate past commitments with modifications necessitated by reductions in DOE funding.

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PSC's current commitments, subject to DOE funding, include destructive Post Irradiation Examination's (PIE) of the following fuel elements:

| <u>Refueling</u> | <u>Element</u> |
|------------------|----------------|
| 3                | FTE-2          |
| 4                | SURV-4         |
| 5                | FTE-4          |
| 6                | SURV-6         |
| 7                | FTE-6          |

In Reference 2, PSC stated that in the event DOE funding were to be withdrawn from the Fort St. Vrain (FSV) fuel surveillance program or substantially reduced, PSC would submit a modified fuel surveillance program. DOE funding continues to dwindle and, as a result, it has become necessary for PSC to re-examine the PIE program.

The attached Fuel Surveillance Program, which PSC will fund even if DOE funds are not available, proposes destructive PIE's of the following fuel elements:

| <u>Refueling</u> | <u>Element</u> |
|------------------|----------------|
| 3                | FTE-2          |
| 5                | FTE-4          |
| 7                | FTE-6          |

The destructive PIE's of surveillance elements SURV-4 and SURV-6 would be eliminated.

Based on the following information, PSC believes that this modification is reasonable and does not compromise the intent or the safety value of the FSV Fuel Surveillance Program. Destructive PIE's of SURV-4 and SURV-6 were intended to:

- 1) provide data demonstrating satisfactory performance of the H-327 graphite, and
- 2) provide early indication data on the performance of FSV reference fuel relative to FSV fuel with the highest exposure (equilibrium core - 1800 EFPD).

With regard to item 1, the FSV Fuel Surveillance Program continues to include extensive nondestructive PIE's of five (5) precharacterized H-327 graphite fuel elements to be removed during refuelings 3, 4, 5 and 6. The results of these nondestructive PIE's, in combination with the visual and photographic examinations described in the attachment, will provide adequate information regarding H-327 performance. Any significant abnormalities in the performance of H-327 graphite would be detected during these examinations.

It should also be noted that beginning with Reload Segment 9 H-327 graphite is being phased out and replaced by H-451 graphite. The FTE's and the five (5) precharacterized surveillance elements inserted as part of Reload Segment 9 are H-451 graphite. Since destructive PIE's of the FTE's will still be performed, adequate data on the performance of H-451 graphite will be available.

Concerning item 2, metallography examinations have been conducted on reference FSV fuel rods from the Segment 1 surveillance element and the Segment 2 fuel element with the cracked web. In both cases, the performance of the coated fuel particles was satisfactory. No kernel migration was observed in the Segment 1 and Segment 2 elements.

The table below shows the estimated exposure (EFPD) that will be accumulated by the surveillance elements and the FTE's:

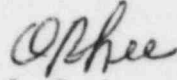
| <u>Refueling</u> | <u>Element</u>         | <u>Exposure(EFPD)</u> |
|------------------|------------------------|-----------------------|
| 1                | Segment 1 surveillance | 174 (actual)          |
| 2                | Segment 2 cracked web  | 363 (actual)          |
| 3                | FTE-2                  | 484 (actual)          |
| 4                | SURV-4                 | 958                   |
| 5                | FTE-4                  | 1084                  |
| 6                | SURV-6                 | 1558                  |
| 7                | FTE-6                  | 1684                  |

FTE-2, FTE-4 and FTE-6 each contain 88 FSV reference fuel rods. The destructive PIE's performed on these fuel elements will include metallography of FSV reference fuel rods. Accordingly, destructive PIE results for FSV reference fuel will still be available over a wide range of exposures if destructive PIE's of SURV-4 and SURV-6 are deleted.

It should also be noted that the list of destructive PIE tasks in the attached Fuel Surveillance Program and Refueling 3 Surveillance Commitments and Current Status does not include all of the items originally listed in the PIE program submitted in Reference 1. These deleted tasks either supply no important additional information concerning FSV reference fuel or are of a research and development nature involving nonreference fuel types, the performance of which is not relevant to the verification of FSV fuel safety.

PSC further proposes to include the approved FSV Fuel Surveillance Program in an appendix to the FSAR and to implement the program via the PSC Core Management Guides. PSC requests that the NRC review and approve the attached Fuel Surveillance Program. If you have any questions regarding this request, please contact Mr. M. H. Holmes at (303) 571-8409.

Very truly yours,



O. R. Lee, Vice President  
Electric Production

HLB/JCS:pa

Attachments

### Fuel Surveillance Program

The fuel surveillance program for the refuelings indicated shall consist of the following items as applicable per 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.
- 3) Promptly inform the Nuclear Regulatory Commission 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 (5) 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.

- 5) PSC will perform in-core visual examination of at least twelve (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. The inspections will be videotaped for record purposes, if practical.
- 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 availability of the gamma scanning robot

Data evaluation and documentation of the PIE results will be forwarded to the NRC as they become available.

- 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) examine FSV reference fuel rods 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 as they become available.

Table 1

Fuel Surveillance Program

| <u>Item No.</u> | <u>4</u> | <u>5</u> | <u>Refueling No.</u> |          |          | <u>9</u> | <u>10 and after</u> |
|-----------------|----------|----------|----------------------|----------|----------|----------|---------------------|
|                 |          |          | <u>6</u>             | <u>7</u> | <u>8</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        |          |          |                     |

**REFUELING 3 FUEL SURVEILLANCE COMMITMENTS**  
**AND CURRENT STATUS**

PSC committed to the following surveillance program during and after refueling 3:

- 1.a. Commitment: In Reference 1, PSC committed to the following:  
Photographs of all six sides of all remaining Segment 3 fuel elements (approximately 175 elements at this point in the refueling) will be obtained with the FHM 35 mm camera. The film utilized is high quality, high density special film. Processing and printing time for the film is approximately three (3) weeks. The film will be removed for processing as the refueling proceeds. In this respect, all pictures will be available for examination prior to return to power operation.

Status: Photographs of the approximately 175 elements were taken. However, due to problems with the camera and film, photographs of only 91 elements were acceptable. This leaves 84 elements to be photographed. (See 1.b.)

- 1.b. Commitment: In References 2 and 3, PSC committed to photograph Segment 3 elements in conjunction with spent fuel shipping. This commitment refers to the 84 elements which were not acceptably photographed.

Status: Eighty-four (84) Segment 3 fuel elements (Regions 13 and 22) remain to be photographed. These 84 fuel elements will be photographed in conjunction with spent fuel shipping. Spent fuel shipping is presently scheduled to recommence in August, 1985.

2. Commitment: The above mentioned photographs will all be evaluated by knowledgeable personnel before return to power operations. If in the evaluation process evidence of cracking is apparent, the NRC will be notified immediately. PSC will evaluate any evidence of fuel element cracking on a case by case basis in terms of further investigations. We will keep the NRC abreast of any evaluations and/or investigations.

Status: The photographs of the 156 Segment 3 fuel elements have been evaluated with no evidence of element cracking. This information was provided to the NRC in References 4 and 5. After photographs of the remaining 84 Segment 3 fuel elements are taken, processed, and printed, they will be evaluated by knowledgeable personnel. PSC will keep the NRC abreast of any evaluations and/or investigations.

3. Commitment: For two Segment 3 elements whose operational history is believed to be similar to the two Segment 2 elements which have previously been found to be cracked, an additional visual examination of all six sides for each of the two Segment 3 elements will be performed with the FHM cask TV camera. If, for some reason, the FHM cask TV camera is not available, these elements will be examined during the Post-Irradiation Examination (PIE) program in the Hot Service Facility (HSF).

Status: The two Segment 3 elements whose operational history and location were similar to the cracked Segment 2 elements were examined with the FHM cask camera. This examination was videotaped and is available on site for NRC review. There is no evidence of cracking on these two elements. The NRC was informed of this in Reference 2.

4. Commitment: A PIE program will be conducted for 50 to 60 Segment 3 fuel and reflector elements in the HSF. This examination will be similar to those previously performed. The selection of elements will be based on prudent PSC and GA Technologies engineering judgement, for the purpose of detecting cracks, other signs of structural damage, or other features of interest. The selection will take into account the current understanding of the cause of the Segment 2 fuel elements' cracks.

Status: Item complete. PIE report submitted to the NRC in Reference 6.

5. Commitment: PSC will make its best effort to begin the PIE program within two months of the start of power operation (>2% power) in fuel cycle 4. In the event that this program schedule can not be met, the NRC will be informed, and a new schedule will be provided. Based on past PIE program activities, the fuel element inspection in the HSF will be complete within 40 days after it is started. Again, any evidence of fuel element cracking that is discovered during the PIE program will be immediately reported to the NRC. A formal written report will be submitted as soon as it is available.

Status: Item complete. PIE report submitted to the NRC in Reference 6.

6. Commitment: Perform the following PIE on FTE-2:

- a) Visual inspection
- b) Graphite block metrology
- c) Fuel block gamma scanning subject to availability of gamma scanning robot
- d) Fuel block disassembly
- e) Nondestructive and destructive strain, stress, and strength examination of graphite components
- f) Fluence/temperature/burnup monitor examination
- g) Examine one FSV reference fuel rod using metallographic techniques to confirm predicted fuel performance (with respect to kernel migration)

Status: Sub items a, b, and c are complete. PIE report submitted to the NRC in Reference 6. Work on sub items d, e, f, and g has not been initiated.

REFERENCES

1. P-84053, letter from Warembourg to Collins, dated 2/15/84.
2. P-84076, letter from Warembourg to Collins, dated 3/6/84.
3. P-84104, letter from Warembourg to Collins, dated 4/6/84.
4. P-85011, letter from Gahm to Johnson, dated 1/17/85.
5. P-85031, letter from Gahm to Johnson, dated 1/31/85.
6. P-85096, letter from Brey to Johnson dated 3/21/85.