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May 22, 1986
Fort St. Vrain
Unit No. 1
P-86383

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

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

Docket No. 50-267

SUBJECT: Fort St. Vrain Fuel
Surveillance Program

REFERENCES: 1) PSC Letter, Lee to
Berkow, dated 11/27/85
(P-85443)

2) NRC Letter, Heitner to
Walker, dated 04/10/86
(G-86189)

Dear Mr. Berkow:

Public Service Company of Colorado is pleased to respond to the recent NRC review comments on the Fort St. Vrain Fuel Surveillance Program (original submittal dated November 27, 1985). Attachment 1 lists the NRC comments and the corresponding PSC responses. Attachment 2 is the revised Fuel Surveillance Program document. Revised portions of the document are denoted by a margin bar.

If you have further questions or comments on this program, please contact Mr. Erik Neilsen, Nuclear Fuels and Analysis Department, (303) 480-6985.

Very truly yours,

H. L. Brey by Milt McBride

H. L. Brey, Manager
Nuclear Licensing and Fuels

HLB/EN:pa

Enclosures

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Public Service Company of Colorado's (PSC) Responses to NRC Comments (April 10, 1986) on the Proposed Fuel Surveillance Program for the Fort St. Vrain Nuclear Generating Station

Docket No. 50-267
TAC #57625

NRC COMMENT 1

Reference : Item 3

The word "promptly" should be defined. A more definite time is needed as to when this information will be submitted to the NRC.

PSC RESPONSE 1

As used in the context of Item 3, PSC defines "promptly" as within 72 hours of discovery and confirmation of any significant abnormality.

NRC COMMENT 2

Reference: Item 4

A brief, preliminary report on the results of this examination should be submitted to the NRC during the refueling, prior to returning the reactor to power. Also, the word "prepared" in the last sentence should be changed to "submitted."

PSC RESPONSE 2

The examinations in Item 4 are detailed visual and metrology examinations performed in the Hot Service Facility (HSF) or, if necessary, in an off-site Hot Cell. HSF availability during the refueling outage may be severely limited by control rod drive and orifice assembly surveillance activities or other plant maintenance. Hence, these detailed examinations might be delayed until after return to power, in which case a preliminary report could not be prepared. The current commitment in Item 4, in conjunction with Item 3 as modified above, is adequate to keep NRC informed of fuel surveillance results in a timely manner.

PSC agrees that the word "prepared" should be changed to "submitted."

NRC COMMENT 3

Reference: Item 5

Videotaping of the inspections is desirable, but if PSC cannot guarantee that it will be done, it cannot be considered to be part of the Fuel Surveillance Program.

PSC RESPONSE 3

The last sentence of Item 5 has been deleted.

NRC COMMENT 4

Reference: Item 6

If PSC cannot guarantee that the gamma scanning will be done, item C cannot be considered to be part of the Fuel Surveillance Program. Also, the word "prepared" in the last sentence should be changed to "submitted."

PSC RESPONSE 4

Item 6C has been deleted from the Fuel Surveillance Program. The word "prepared" has been changed to "submitted" in the last sentence of Item 6.

NRC COMMENT 5

Reference: Proposed Item 8

This additional item should state that if the primary coolant activity increases to more than twice that expected per FSAR Table 3.7-1 (5260 curies) the full Fuel Surveillance Program proposed by PSC in letter P-78102, dated June 20, 1978, shall be required, unless PSC at that time can justify the elimination of some of the thirteen items.

PSC RESPONSE 5

As explained in letter GP-0028, March 19, 1979, the "expected" activity levels shown in FSAR Tables 3.7-1 and 3.7-2 were calculated assuming that fission product release characteristics of the fuel in the Fort St. Vrain core would be the same as those of the fuel irradiated in the GAIL IV experiment. They represented GA's best estimate, at the time when the FSAR was written, of the equilibrium primary coolant system activity.

Calculations performed during the design of the plant indicated that less than 1% of the coated fuel particles would fail in service. Nevertheless, to provide for the possibility that particle failure modes unforeseen during the design of the reactor might exist, a second set of primary circuit activity levels were calculated - the "design" activity levels. The "design" activities were calculated assuming a nonmechanistic average particle failure of 5%.

All accident analyses in Chapter 14 of the FSAR use "design" activity levels as initial source terms. For the purpose of making a judgement with regard to public health and safety, it is not the "expected" activity which is of interest, but rather the "design" values of the gas-borne activity.

Technical Specification LCO 4.2.8, Primary Coolant Activity, and Upgraded Technical Specification 3/4.4.1 define limiting conditions of operation which are directly derived from the "design" gas-borne activity levels in the FSAR. Accordingly, compliance with the LCOs assures that the maximum levels of gas-borne activity in the primary coolant are consistent with the assumptions used in FSAR accident analyses. In retrospect, the choice of the word "expected" was unfortunate. Its use for large HTGR applications was abandoned by GA.

If primary coolant activity was to reach a level twice that "expected" per the FSAR, activity would still be well within Technical Specification limits. Performance of the entire PIE program discussed in P-78102 would add nothing to our understanding of fuel performance relative to the information to be gained from the PIE program described in P-85443. Justification for deleting some of the thirteen items would be identical to that provided in Attachment 2 to P-85443.

NRC COMMENT 6

Reference: Proposed Item 9

This additional item should state that if the primary coolant activity limits in Technical Specification 3/4.4.1, "Primary Coolant Activity," are exceeded, the full Fuel Surveillance Program proposed by PSC in letter P-78102, dated June 20, 1978, shall be required, and a sufficient number of PIEs shall be made during the next refueling to determine the cause of the excess activity release from the fuel.

PSC RESPONSE 6

If the design basis primary coolant activity limits as established by Technical Specification LCO 4.2.8 are exceeded, PSC commits to a sufficient number of PIEs (commencing with the next refueling) to determine the cause of the excess activity levels.

This item would replace the last paragraph of Attachment 1 to P-85443. The item is worded nonquantitatively because the appropriate PIE program in response to high activity levels would be determined by the manner in which the LCO limits are exceeded. For example, while high noble gas activity would be indicative of fuel particle coating failure, high circulating iodine activity could be caused by higher than expected diffusivity in the graphite webs or lower than expected sorptivity, (again conditions unrelated to fuel failure).

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) PSC commits to inform the NRC within 72 hours 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 submitted to the NRC 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.

6) The FTEs 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.

   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 submitted to NRC within 12 months after withdrawal of the elements from the reactor.

7) Destructive PIEs of FTE-4 (Refueling 5) and FTE-6 (Refueling 7) will be performed. These destructive PIEs 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.

If the design basis primary coolant activity limits as established by Technical Specification LCO 4.2.8. are exceeded, PSC commits to a sufficient number of PIEs (commencing with the next refueling) to determine the cause of the excess activity levels.

Table 1

Fuel Surveillance Program

Item No.	Refueling No. 4	5	6	7	8	9	10 and after
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			