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SCE&G®
A SCANA COMPANY

July 3, 2002
RC-02-0114

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, DC 20555

Attention: Ms. K. R. Cotton

Ladies and Gentlemen:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS)
DOCKET NO. 50/395
OPERATING LICENSE NO. NPF-12
RESPONSE TO NRC BULLETIN 2001-01
CIRCUMFERENTIAL CRACKING OF REACTOR PRESSURE VESSEL HEAD PENETRATION NOZZLES

Reference: S. A. Byrne (SCE&G) letter to Document Control Desk (NRC), (Initial 30 day) Response to NRC Bulletin 2001-01, August 31, 2001, RC-01-0155

The U.S. Nuclear Regulatory Commission (NRC) issued NRC Bulletin 2001-01 to: (1) request that utilities provide information related to the structural integrity of the reactor pressure vessel head penetration (VHP) nozzles for their respective facilities, including the extent of VHP nozzle leakage and cracking that has been found to date, the inspections and repairs that have been undertaken to satisfy applicable regulatory requirements, and the basis for concluding that their plans for future inspections will ensure compliance with applicable regulatory requirements, and (2) require that all addressees provide to the NRC a written response in accordance with the provisions of 10 CFR 50.54(f).

South Carolina Electric & Gas Company (SCE&G) acting for itself and as agent for South Carolina Public Service Authority, submitted the required initial response through the above referenced letter. SCE&G hereby submits the attached in response to Item 5 of the bulletin which requires submittal of reactor vessel head inspection results within 30 days of plant restart from the next refueling outage. For VCSNS, restart from Refuel 13 occurred on June 3, 2002.

A088

These statements and matters set forth herein are true and correct to the best of my knowledge, information, and belief.

Should you have questions, please call Mr. Mel Browne at (803) 345-4141.

Very truly yours,

Stephen A. Byrne

JT/SAB
Attachment

c: N. O. Lorick
N. S. Carns
T. G. Eppink (w/o Attachment)
R. J. White
L. A. Reyes
W. R. Higgins
D. M. Deardorff
A. L. Bennett
A. R. Rice
C. H. Rice
NRC Resident Inspector
K. M. Sutton
NSRC
RTS (IEB 2001-01; 0-C-01-1241)
File (815.02)
DMS (RC-02-0114)

STATE OF SOUTH CAROLINA :
: **TO WIT** :
COUNTY OF FAIRFIELD :

I hereby certify that on the 3rd day of July 2002, before me, the subscriber, a Notary Public of the State of South Carolina personally appeared Stephen A. Byrne, being duly sworn, and states that he is the Senior Vice President, Nuclear Operations for the South Carolina Electric & Gas Company, a corporation of the State of South Carolina, that he provides the foregoing response for the purposes therein set forth, that the statements made are true and correct to the best of his knowledge, information, and belief, and that he was authorized to provide the response on behalf of said Corporation.

WITNESS my Hand and Notarial Seal

James W. Luckett, Jr.
Notary Public

My Commission Expires

10-2-2010
Date

Results of Reactor Vessel Head Inspections for NRC Bulletin 2001-01 "Circumferential Cracking of Reactor Pressure Vessel Head Penetration Nozzles" for V. C. Summer Nuclear Station

Item 5 of the Bulletin required that PWR licensees provide the following information within 30 days of the plant re-start from the next refueling outage:

a. a description of the extent of VHP nozzle leakage and cracking detected at your plant, including the number, location, size, and nature of each crack detected; BL 2001-01 Page 13 of 15

b. if cracking is identified, a description of the inspections (type, scope, qualification requirements, and acceptance criteria), repairs, and other corrective actions you have taken to satisfy applicable regulatory requirements. This information is requested only if there are any changes from prior information submitted in accordance with this bulletin.

SUMMARY

A remote visual examination of the area between the reactor vessel head insulation and the reactor vessel head was performed. Two dry thin film boron deposits and a small amount of debris were identified on the reactor vessel head. The boron traces were judged to have entered from above the insulation through insulation section seams at vessel head penetration (VHP) locations #27 and #47. Each deposit is a thin uniform thickness film indicating that the leakage occurred at relatively low temperatures. Being dry these boron film deposits do not pose a corrosion concern nor an obstacle for future inspection and detection of pressure boundary leakage. The video inspection showed no evidence of recent boric acid leakage from any Reactor Vessel Head penetration. The small amount of debris noted during this inspection is small in size and poses no safety concern. There is no indication of any degradation of materials and structural integrity is unaffected. **Thus, no indications of cracking have been detected.**

DISCUSSION

Condition Evaluation Report, CER 02-1189 was written documenting Engineering's evaluation of the video inspection performed between the reactor vessel head insulation and the reactor vessel head. Following are the results of this evaluation:

Boron Deposition Comments

A close inspection of the reactor vessel head penetrations as listed in the attached table was performed to determine if any boron deposits were present that had a "popcorn" or "stalagmite" appearance as described in sections 6.2.2 and 6.2.3 of Ref. 3. No boron deposits were found to be originating from the penetration-to-head (annulus) area.

Traces of boric acid were noted on 20 of the 66 penetrations or on the insulation at the top of the tube associated with the penetration. The deposits were very thin films of dried boron that originated from above the reactor vessel head insulation and trickled down the tubes.

Boric acid did reach the vessel head at two locations (penetrations 27 and 47) as evidenced by a thin dry film on the tube and on the vessel head surface. No corrosion was noted on the head surface. As discussed in Ref. 2, a dry film of boron is not considered to be a corrosion threat to carbon steel materials. Thus there is no concern with leaving this thin film of boron on the head surface. Condition Evaluation Report, CER 02-1189 was written to address this condition and document the Engineering evaluation.

After the video inspection, Quality Control inspection personnel inspected the top surface of the reactor vessel head with particular attention at VHPs #27 and #47. This inspection was performed from the crane looking down on the vessel head assembly. No signs of boric acid residue were found on the top surface of the head insulation or at the top of the CRDM and conoseal housings. Based on this, it is likely that the leakage occurred between the second and third refueling outages at penetration 47 (conoseal) as noted in our 15 day response (Reference 1). The conoseal connections were modified in the fourth refueling outage with no leakage observed since.

The boron deposits are all consistent with leakage at relatively low temperatures. Each deposit is a thin film that has uniform thickness, indicating that the leakage was allowed to trickle and dry. This would indicate that the leakage occurred during shutdown conditions where the metal temperatures were relatively low and the boron concentrations were relatively high. In contrast, a leak at higher temperatures would evaporate quickly when contact was made with the hot surfaces, leaving a buildup at that point of contact instead of a uniform film.

Dirt, Debris, and Miscellaneous Comments

1. Insulation collars on several unidentified tubes were not fully flush with the bottom of the insulation. This is considered a cosmetic item and no corrective action is needed.

2. Small amounts of debris (dust, dirt, etc.) adjacent to several of the tubes and on the general area of the vessel head were noted. This debris is small in size and is not considered to be a concern. Most of this debris had accumulated on the uphill side of the tubes. None of these accumulations are considered large enough to conceal any boric acid deposits.

3. In addition to this small debris, a nail, washer, bolt, and lock-washer were seen on the video. These items are also not a concern because they are very small (cannot cause any damage to the head), the area on the top of the head is encapsulated by the insulation, and there is no air flow in this area to move the objects.

4. No signs of pitting or corrosion were noted on any of the tube surfaces or on the surface material of the vessel head.

TABLE
REACTOR VESSEL HEAD PENETRATION RESULTS

#	Boric Acid Inspection Remarks	Other Remarks
1	Possible evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	1. Small amount of debris around the tube. 2. Insulation collar around the tube is not fully flush with the insulation.
2	No boron deposits were observed.	1. Small amount of debris around the tube. 2. Insulation collar around the tube is not fully flush with the insulation.
3	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	1. Slight amount of debris. 2. Washer on vessel head next to the tube.
4	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	No debris noted.
5	No boron deposits were observed.	Small amount of debris around tube.
6	No boron deposits were observed.	1. Small amount of debris around the tube. 2. Insulation collar around the tube is not fully flush with the insulation. 3. Nail found between this tube and tube 10.
7	No boron deposits were observed.	No debris.
8	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	Small amount of debris around the tube.
9	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	1. Small amount of debris around the tube. 2. Possible piece of steel wool coming out from the insulation.
10	No boron deposits were observed.	1. Small amount of debris on the uphill side of the tube. 2. Nail found between this tube and tube 6.
11	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	Small amount of debris.
12	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	1. Small amount of debris around the tube. 2. Piece of steel wool coming out between collar and insulation.
13	No boron deposits were observed.	Slight amount of debris on uphill side of tube.
14	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	No debris.

TABLE
REACTOR VESSEL HEAD PENETRATION RESULTS

#	Boric Acid Inspection Remarks	Other Remarks
15	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	No debris.
16	No boron deposits were observed.	Small amount of debris on the uphill side of the tube.
17	No boron deposits were observed.	1. Surface scratch at base of tube. 2. Small amount of debris around tube.
18	No boron deposits were observed.	No debris.
19	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	1. Small amount of debris on the uphill side of the tube. 2. Insulation collar around the tube does not appear to be flush with the insulation.
20	No boron deposits were observed.	1. Small amount of debris around the tube. 2. Possible slight scratch on tube surface.
21	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	1. Housing appears to have a slight surface scratch. 2. Small amount of debris around tube
22	No boron deposits were observed.	1. Small amount of debris/dust around tube. 2. Brownish stain on head on the uphill side of the tube.
23	No boron deposits were observed.	Small amount of debris around the tube.
24	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	Small amount of debris on the uphill side of the tube.
25	No boron deposits were observed.	Small amount of debris noted on the uphill side of tube.
26	No boron deposits were observed.	Small amount of debris/dust around tube.
27	Small amount of boron deposit noted at top of insulation, with trickle down the tube. Thin film on the head between this tube and tube 47. The film was dry, nearly transparent, and uniform in thickness. No evidence of any degradation of the reactor vessel head surface.	Small amount of debris noted on the uphill side of tube.

TABLE
REACTOR VESSEL HEAD PENETRATION RESULTS

#	Boric Acid Inspection Remarks	Other Remarks
28	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	Small amount of debris around the tube.
29	No boron deposits were observed.	Small amount of debris around the tube.
30	Evidence of boron deposit on the tube. Deposit was a dried film that originated from above the insulation and did not reach the vessel head.	No debris.
31	No boron deposits were observed.	Small amount of debris around the tube.
32	No boron deposits were observed.	Small amount of debris around the tube.
33	No boron deposits were observed.	1. No debris noted. 2. Possible small scratches on the tube.
34	No boron deposits were observed.	
35	No boron deposits were observed.	Small amount of debris on the uphill side of the tube.
36	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	Small amount of debris on the uphill side of the tube.
37	No boron deposits were observed.	Piece of debris (metal sliver) at base of tube.
38	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	Small amount of debris on the uphill side of the tube.
39	No boron deposits were observed.	Small amount of debris around the tube.
40	No boron deposits were observed.	1. Slight amount of debris. 2. Lockwasher on vessel head next to the tube.
41	No boron deposits were observed.	Small amount of debris on the uphill side of the tube.
42	Boron noted at top insulation around the tube, but no boron noted on tube.	No debris.
43	No boron deposits were observed.	View was obstructed by insulation. No debris was noted.
44	Not identified on video inspection.	N/A
45	No boron deposits were observed.	Slight amount of debris.
46	No boron deposits were observed.	Dust/debris around tube
47	Small amount of boron deposit noted at top of insulation, with trickle down the tube. Thin film on the head between this tube and tube 27. The film was dry, nearly transparent, and uniform in thickness. No evidence of any degradation of the reactor vessel head surface.	No debris.

TABLE
REACTOR VESSEL HEAD PENETRATION RESULTS

#	Boric Acid Inspection Remarks	Other Remarks
48	No boron deposits were observed.	Video inspection did not show the bottom of the tube.
49	No boron deposits were observed.	View was obstructed by insulation. No debris was noted.
50	No boron deposits were observed.	View was a distant shot – small amount of debris around the tube.
51	No boron deposits were observed.	View was a distant shot – small amount of debris around the tube.
52	No boron deposits were observed.	Small amount of debris around the tube.
53	No boron deposits were observed. (Conoseal tube)	No debris.
54	No boron deposits were observed.	View was obstructed by insulation.
55	No boron deposits were observed.	No debris.
56	No boron deposits were observed.	View was obstructed by insulation. No debris was noted.
57	No boron deposits were observed.	View was obstructed by insulation. No debris was noted.
58	Evidence of very slight boron deposit (dried trickle) on the tube. Deposit was a dried thin film that originated from above the insulation and did not reach the vessel head.	No debris.
59	No boron deposits were observed.	Video inspection did not show the bottom of the tube.
60	No boron deposits were observed.	No debris.
61	No boron deposits were observed.	No debris.
62	No boron deposits were observed.	View was a distant shot – small amount of debris around the tube.
63	No boron deposits were observed.	View was a distant shot – small amount of debris around the tube.
64	No boron deposits were observed.	View was obstructed by insulation. No debris was noted.
65	No boron deposits were observed.	View was obstructed by insulation. No debris was noted.
Vent Pipe	No boron deposits were observed.	Small bolt laying next to vent piping penetration.

Reference

1. *PWR Materials Reliability Program Response to NRC Bulletin 2001-01 (MRP-48),* EPRI, Palo Alto, CA: 2001. 1006284.

2. *Boric Acid corrosion Guidebook*, EPRI Report TR-102748, November 2000

3. *Visual Examination for Leakage of PWR Reactor Head Penetrations on Top of RPV Head*, EPRI Report TR-1006296, Revision 1