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FACIL:50-438 Bellefonte Nuclear Plant, Unit 1, Tennessee Valley Au 05000438
50-439 Bellefonte Nuclear Plant, Unit 2, Tennessee Valley Au 05000439
AUTH.NAME AUTHOR AFFILIATION
MILLS,L.M. Tennessee Valley Authority
RECIP.NAME RECIPIENT AFFILIATION
ADENSAM,E. Licensing Branch 4

SUBJECT: Requests expedited review of request for exemption from ANSI N45.2.1,to increase particle size limit for purge dam paper of glue particles,per 820928 10CFR50.55(e) rept.Rev will be documented in FSAR amend.

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	RGN2		3	3	RM/DDAMI/MIB		1	0
EXTERNAL:	ACRS	41	6	6	BNL(AMDTS ONLY)		1	1
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TENNESSEE VALLEY AUTHORITY
CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

April 18, 1983

Director of Nuclear Reactor Regulation
Attention: Ms. E. Adensam, Chief
Licensing Branch No. 4
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Ms. Adensam:

In the Matter of the Application of) Docket No. 50-438
Tennessee Valley Authority) 50-439

In a letter dated September 28, 1982, TVA transmitted to the Region II office of the NRC-OIE, a 10 CFR 50.55(e) report concerning low solubility glue used for weld purge dams. Purge dam particles were appearing after construction flushing which violated particle size limits as defined by ANSI N45.2.1 to which TVA is committed. TVA stated in its report that, based on our analysis of these particles, we would request an exemption from ANSI N45.2.1 for these purge dam particles (i.e., our request is to increase the particle size limit for purge dam paper or glue particles only from 1/32 inch to 1/8 inch and also to be allowed to leave residual on the pipe wall). This commitment change will be documented in an upcoming amendment to the Bellefonte FSAR and will also result in a change to the TVA QA Topical Report.

A meeting was subsequently held at the Bellefonte Plant with Region II representatives to provide the NRC with a more detailed justification of our commitment change request. At that time, Region II officials stated that the necessary relief would have to be obtained from NRC-NRR. TVA then followed this meeting up with the submittal of a supplemental 10 CFR 50.55(e) report dated February 28, 1983, which provided NRC-OIE with the detailed information presented at the Bellefonte meeting.

We would like an expedited NRC-NRR review of our exemption request in order to prevent construction delays and additional expense which TVA might incur. We have enclosed copies of both letters to NRC-OIE with enclosures, (enclosure 1) as well as a copy of the draft FSAR change (enclosure 2). We ask that you proceed with your review of this information and provide TVA with your determination as soon as possible.

B001

If you have any questions concerning this matter, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNEESSEE VALLEY AUTHORTIY

L. M. Mills, Manager
Nuclear Licensing

Sworn to and subscribed before me
this 18th day of April 1983

Notary Public
My Commission Expires 4/8/86

Enclosures (3)
cc: U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30303

ENCLOSURE 1

Letters From TVA To NRC-OIE Region II

400 Chestnut Street Tower II

September 28, 1982

BLRD-50-438/82-27
BLRD-50-439/82-24

U.S. Nuclear Regulatory Commission
Region II
Attn: Mr. James P. O'Reilly, Regional Administrator
101 Marietta Street, Suite 3100
Atlanta, Georgia 30303

Dear Mr. O'Reilly:

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2 - INSOLUBLE GLUE USED FOR PURGE DAMS IN STAINLESS STEEL PIPING - BLRD-50-438/82-27, BLRD-50-439/82-24 - FINAL REPORT

The subject deficiency was initially reported to NRC-OIE Inspector R. V. Crlenjak on March 22, 1982 in accordance with 10 CFR 50.55(e) as NCR 1725. This was followed by our interim reports dated April 22 and June 18, 1982. As discussed with Mr. Crlenjak by telephone on September 10, 1982, our final response was delayed. Enclosed is our final report.

If you have any questions concerning this matter, please get in touch with R. H. Shell at FTS 858-2688.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuelear Licensing

RHS:DLT:ATK
Enclosure
cc: Mr. Richard C. DeYoung, Director (Enclosure)
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
cc (Enclosure):
ARMS, 640 CST2-C
J. W. Anderson, 902 HBB-K
L. S. Cox, Bellefonte
A. W. Crevasse, 401 UBB-C (2)
H. N. Culver, 249A HBB-K
H. J. Green, 1750 CST2-C
J. A. Raulston, W10C126 C-K
H. S. Sanger, Jr., E11B33 C-K
F. A. Szczepanski, 417 UBB-C
J. D. Wilcox, Bellefonte-NRC

Dupe of 8210050249 PDR

ENCLOSURE

BELLEFONTE NUCLEAR PLANT UNITS 1 AND 2
INSOLUBLE GLUE USED FOR PURGE DAMS IN STAINLESS STEEL PIPING
NCR 1725
BLRD-50-438/82-27, BLRD-50-439/82-24
10 CFR 50.55(e)
FINAL REPORT

Description of Deficiency

Some glue used in installation of purge dams in stainless steel piping appeared insoluble during flushing activities, and minor glue residual remains in piping at purge dam locations. This problem was anticipated during the resolution of nonconformance report (NCR) 835. The disposition of NCR 835 directed discontinuing the use of Elmers Glue-All and recommended using Elmers School Glue. The insoluble glue residual has been identified as Elmers Glue-All used before NCR 835 and Elmers School Glue that has been affected by heat from welding activities. When purge dams are located too close to the welds, the currently used and normally soluble Elmers School Glue will char and become much less soluble.

Safety Implications

It has been determined through tests and analyses described below that no condition adverse to the safe operation of the plant exists. This conclusion is based on the following observations:

1) The purge dams will not cause stress corrosion cracking of the pipe.

2) Very little purge dam residual remains on the pipe wall after preoperational flushing. The residual remaining will all dissolve during plant operation. Solubilized purge dam material is not harmful to the systems. Any particles that may break loose before dissolution is complete will not obstruct any piping or instrument lines.

Corrective Action

Based on the attached supporting information, TVA has concluded that glue residual left in piping systems will not cause a safety problem. Laboratory tests have shown that even the glue that was initially thought to be insoluble will dissolve. Flushing of systems thus far has shown that demineralized water flushing can achieve removal of encugh of the purge dam residue so that the possibility of large pieces breaking loose is highly unlikely. TVA will revise the acceptance criteria for proof flushing particulates to allow purge dam particles up to 1/8-inch in any dimension. This revision will be accomplished by November 8, 1982.

In addition, purge dam residual on the pipe wall will be acceptable provided that the system has met the proof-flush acceptance criteria. The reactor coolant pump seal water injection line in the Makeup and Purification System will be flushed with acetic acid to remove as much of the purge dam residue as possible. This will be accomplished by October 15, 1983. TVA has revised the welding specifications to ensure that purge dams are placed far enough from the weld to prevent charring of the glue. TVA has also increased welder awareness that substitution of the specified Elmers School Glue is not permitted. No other TVA nuclear plants are affected by this problem.

ATTACHMENT

SUPPORTING INFORMATION FOR NCR 1725

Metallurgical Testing

Metallurgical testing and chemical analysis has shown that residual purge dam materials remaining in contact with 304 stainless steel will have no detrimental effects on the piping material during operation of the plant.

The Dissolvo Water soluble purge paper (WLD-60) contributes virtually all of the halides present in the purge dam residue. Specific ion tests have shown leachable chlorides in the range of 170-200 parts per million.

Tests show that purge dam materials closer than 3/4-inch from the edge of a weld reach a temperature of approximately 600° F. At this temperature the material carbonizes to the extent that it flakes off much the same as food in a self-cleaning oven, and subsequent flushes remove the flaking material.

Two potential modes of cracking have been addressed:

1. Stress Corrosion Cracking (SCC)

   The purge dam residue is a minimum of 3/4-inch from the edge of the weld. This is beyond the distance at which residual stresses from welding are present. In the absence of tensile stress, SCC does not occur.

2. Intergranular Stress Corrosion Cracking (IGSCC)

   The heat affected zone (HAZ) of the weld extends to a maximum of approximately 3/16-inch from the edge of the welds. As stated previously, the purge dams are located a minimum of 3/4-inch from the weld and, therefore, the potentially aggressive environment is not present in the HAZ.

Additional tests performed at TVA Singleton Laboratory determined that no harmful effects should be expected even if the purge dam materials were left in contact with the base material. Samples of glue with added chloride levels of over 1000 ppm were baked on pipe samples and autoclaved at 150° F and 550° F in borated water. After 24 hours virtually all chlorides were leached from the glue at both temperatures. The 304 stainless base materials were subsequently examined microscopically for corrosive effects.

After 96 hours of exposure there was no apparent attack. Because virtually all chlorides leach out of the glue after 24 hours of exposure, TVA anticipates no adverse effects from the relatively small amount of material remaining.

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After 96 hours of exposure there was no apparent attack. Because virtually all chlorides leach out of the glue after 24 hours of exposure, TVA anticipates no adverse effects from the relatively small amount of material remaining.

TVA can anticipate no harmful effects on the stainless steel pipe as a result of purge dam residuals remaining in contact with the stainless steel pipe during system operation.

Acetic Acid Testing and Flushing

Laboratory testing was performed to determine what solvents are available that could be used to remove the glue from the pipe. Testing showed that acetic acid was the most promising solvent. Acetic acid aided in the removal of the noncharred glue; however, it did not have an appreciable effect on the charred glue. The second interim report on NCR 1725 stated that acetic acid would be tried out on a system that had not been previously flushed. Since there were no systems available that had not been flushed, the trial was run on the Reactor Building Spray System (with the exception of the spray headers and the sodium hydroxide tank and piping).

The Reactor Building Spray System had been previously flushed with water, but removal of a flanged spool piece revealed noncharred purge dam residual on the pipe wall. Thus the pipe interior could be visually inspected before and after the acetic acid flush. The system was flushed with 5 percent acetic acid for approximately 24 hours at temperatures up to 145° F. Inspection of the piping after the acetic acid flush showed that most of the purge dam residuals had been removed from the pipe wall.

Autoclave Tests

Autoclave testing was performed to determine what effect high temperature water will have on charred glue since it is the most insoluble. Stainless steel coupons were prepared using both Elmers Glue-All and Elmers School Glue. Coupons were baked in an oven at 400° F and 500° F to simulate purge dams that were placed too close to the welds. Half of the coupons representing all of the above conditions were soaked in acetic acid to simulate acetic acid flushing of the piping systems.

The coupons were placed in the autoclave which contained borated water representative of reactor coolant. The autoclave was operated at temperatures ranging from 200° F to 500° F to identify temperature effects on the glue. The test results show that the charred glue will dissolve, and that the autoclave temperature is the only variable that has an effect on the dissolution rate of the charred glue. At 200° F, about 6 percent of the charred glue dissolved in 90 hours. At 300° F, 19 percent of the charred glue dissolved in 78 hours; at 400° F, 84 percent of the charred glue dissolved in 51 hours; and at 500° F, over 93 percent of the charred glue dissolved in 40 hours.

These results show that given enough time, the glue deposits will eventually dissolve. The results also show that any glue particles that get into the reactor will dissolve in the reactor, since it operates at 600° F.

Demineralized Water Flushing

Several systems have been flushed with demineralized water to date. These include the Spent Fuel Cooling and the Reactor Building Spray Systems. Three flow paths on the Spent Fuel Cooling System were flushed with unheated demineralizer water. One flow path could not meet the acceptance criteria of 1/32-inch by 1/16-inch particle size. However, the particles were less than 1/8-inch. The flow path was then flushed with 180° F water. After the hot water flush, the acceptance criteria could still not be met, even though the particles being detected were still less than 1/8-inch. Spool pieces were removed so that the pipe interior could be visually examined. Reactor building spray train B was also flushed with cold demineralized water before the acetic acid flush. The path was flushed to the 1/32-inch 1/16 inch particulate acceptance criteria with demineralized water. Inspection of the pipe interior after the flush showed some noncharred purge dam glue ridges in the pipe. Flushing of these and other flow paths has demonstrated that the systems can be flushed to a point where only tightly adherent glue ridges are left in the pipe and that only small particles break loose from these ridges during system operation.

Safety Analysis of Particulates

All of the systems were analyzed with respect to problems which could be caused by particulates breaking loose from purge dam residuals during plant operation. The analysis was based on the assumption that glue particles up to 1/8-inch could be present in the operating systems. Based on this analysis, plant safety will not be compromised with glue particles up to 1/8-inch present in the Waste Disposal (WD), Chemical Addition and Boron Recovery (CA&BR), Reactor Building Spray (RBS), Core Flooding (CF), Decay Heat Removal (DHR), Spent Fuel Pool Cooling and Cleanup (SFPCC), and Makeup and Purification (MU&P) Systems. Pumps in the RBS, DHR, SFPCC and MU&P Systems are equipped with cyclone separators in the seal water supply so that particles in the seal water would be removed before getting to the pump seals. The water in instrument sense lines is stagnant; therefore, it is highly unlikely that purge dam particles could find their way into instrument lines or cause problems.

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