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SUBJECT: Forwards response to NRC Bulletin 88-005 & Suppls 1 & 2 re mfg of pipe fittings & flanges.

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Reference:
1. Letter from Charles E. Rossi, NRC to all holders of operating license or construction permits for nuclear power reactors, dated May 6, 1988. Subject: NRC Bulletin No. 88-05.

2. Letter from Charles C. Rossi, NRC to all holders of operating licenses or construction permits for nuclear power reactors, dated June 15, 1988. Subject: NRC Bulletin No. 88-05, Supplement 1.

3. Letter from Charles C. Rossi, NRC to all holders of operating licenses or construction permits for nuclear power reactors, dated August 3, 1988. Subject: NRC Bulletin No. 88-05, Supplement 2.

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
NRC Bulletin 88-05 and Supplements 1 and 2
File: 88-055-026

Please find attached the response to NRC Bulletin 88-05 and Supplements 1 and 2. If you have any questions, please contact Mr. A. C. Rogers of my staff.

Very truly yours,

D. B. Karner
Executive Vice President

ACR/JMQ/pvk
Attachment

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STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Donald B. Karner, represent that I am Executive Vice President of Arizona Nuclear Power Project, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority to do so, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Donald B. Karner

Donald B. Karner

Sworn to before me this 12 day of September, 1988.

Nora E. Meador

Notary Public

My Commission Expires:

My Commission Expires April 6, 1991

PALO VERDE NUCLEAR GENERATING STATION
UNITS 1, 2 AND 3

REPORT ON
NRC BULLETIN 88-05

Arizona Nuclear Power Project
September 12, 1988

1620K/0057K

TABLE OF CONTENTS

		PAGE
	Executive Summary	ii
I.	Response Program Plan and Execution	1
II.	Results	4
III.	Summary	7

EXECUTIVE SUMMARY

On May 13, 1988, Arizona Nuclear Power Project, along with other U.S. utilities received NRC Bulletin 88-05. This Bulletin identified manufacturers of pipe fittings and flanges who had falsified some certifications of the properties and strength of the material used for manufacture of these components.

Based on discussions with other utilities, NUMARC, and the issuance of a supplement to the Bulletin on June 17, 1988, a very labor intensive program was established to identify suspect pipe fittings and flanges. Subsequent to the identification and location of material from suspect suppliers, field hardness testing of each item was begun.

On August 3, 1988, NRC temporarily suspended all related activities by utilities, except for a report. As of August 3, 1988, ANPP had identified approximately eighteen hundred pieces of suspect material and had tested three hundred ninety one pieces. Approximately 20% of the tested pieces did not meet specifications. However, these pieces have been shown to be suitable for intended service due to the inherent margins in the design. No safety concerns were identified.

The basis for the NRC's suspension of the effort was that the reported measurement and analytical results from all utilities showed that, even with below specified values, there existed enough conservatism so as not to represent a safety concern. This is consistent with the test results and analytical evaluations accomplished at Palo Verde.

I. RESPONSE PROGRAM PLAN AND EXECUTION

The Response Program developed by ANPP consisted of the following key elements:

A. Records Review

1. Receiving Records/N-5/Section XI Data Extraction

Receiving records were reviewed to determine if Certified Material Test Reports (CMTR's) were supplied by West Jersey Manufacturing Company (WJM) and Piping Supplies Incorporated (PSI). In parallel, the N-5/Section XI Code Data Packages (CDP) were reviewed to identify the suspect heat numbers installed in safety related systems.

2. Suspect Heat Numbers

Resulting from the review of the receiving records, 203 suspect heat numbers were identified at the time the project was suspended with the issuance of Supplement 2.

3. Warehouse Location

A manual search of all storage areas at the PVNGS warehouse was initiated for location of WJM material. From the total number of items checked (10,061), 77 were marked as WJM, material then quarantined, and documented on four Warehouse Deficiency Notices (WDN's). An additional 116 items, supplied by manufacturers other than WJM, were discovered to have suspect heat numbers. These items were documented on two WDN's and quarantined.

4. Manual Takeoff (MTO)

To expedite the location of the suspect material for testing the CDP summary sheets were scanned for heat numbers identified from review of the receiving records. Approximately 1800 suspect pieces were identified in the manual takeoff.

5. Accessibility of Suspect Material Located

- Accesibility for testing was determined by conditions such as high radiation areas, buried and impact on power generation.

B. Testing of Suspect Material

ANPP was represented at the NUMARC workshop for proper use of the Equotip hardness tester. This took place on June 30, 1988.

After proper preparation of the carbon and stainless steel materials, hardness testing was conducted exclusively by the

Equotip method. Visual and magnetic inspections were also performed for stainless steel.

Test results have been evaluated and are on file.

C. Analysis of Test Results

1. Fittings and Flanges

The evaluation of the suspect flanges/fittings has been documented on, and controlled by, Engineering Evaluation Requests (EERs) for each system/subsystem and Unit.

Analysis of tested flanges (SA 182 or SA 105) were based on the following:

- Stainless Steel Material (SA-182)

  The SA-182 specification does not specify a min/max hardness for austenitic stainless steel since it is supplied in the annealed condition. ANPP obtained hardness readings of stainless steel flanges as a method of detecting potential unannealed or non-austenitic material. Brinell hardness readings were converted into Rockwell numbers to establish the annealed condition and eliminate any corrosion concerns.

- Carbon Steel Material (SA-105)

  High hardness readings were evaluated for weldability, which is the principle concern. If the installed item had acceptable weld inspections, sustained bolt-up loads, hydrostatic tests, proof testing, functional tests and pre-service/in-service inspections that were conducted, then there existed objective rationale for a "use-as-is" disposition.

  Low hardness readings, for the most part, were evaluated using the "Report on Generic Analysis and Evaluation of Suspect Material Identified in NRCB 88-05" which was prepared by Bechtel for NUMARC/EPRI. Using implied strength values for the sub-standard material and based on the hardness tests; compliance with code design rules is generically established using conservative bounding assumptions. Tables are utilized to determine acceptability of the flange in service for the life of the plant without replacement. Specific calculations per NC3658 of ASME Section III, for moment loads of flanges/pipe sizes not addressed by the generic tables, are completed on a case by case basis.

2. Lugs

The PVNGS identification process determined that WJM had supplied lugs to Pullman Power Products, who in turn furnished them to PVNGS.

These lugs held a reduced priority within the overall plan for the following four reasons: (1) they did not form part of a pressure boundry, (2) they were cut from plate material (3) they were not in the category of pipe fittings and (4) felt that the lug sizes were chosen from a few standard sizes and not specifically designed for each application thereby providing extensive conservatism.

A plan was developed to address lug material, however, it has been suspended since the receipt of Supplement 2.

D. Bases for Continued Operation (BCO)

As required by the Bulletin, the inaccessible suspect pieces identified prior to Supplement 2 have been reported and a BCO is on file at ANPP.

For the suspect pieces identified prior to Supplement 2, with test results below acceptable limits, a BCO is on file.

E. Contacting Equipment Suppliers

A listing of original equipment manufacturers (OEM) was prepared in anticipation of their participation in the effort for component supplied equipment. At the time of Supplement 2, they had not been contacted. This effort was therefore, suspended.

F. Primary Piping Supplier Contract

Pullman Power Products was the primary piping supplier for the three units at PVNGS.

Pullman was contracted to provide a suspect heat number list from their Palo Verde records to ensure the accuracy of the review.

G. Non-Safety Related

The non-safety related flanges/fittings have no documented traceability and can only be identified by complete system walkdowns. Due to the low probability of failures as a result of testing and evaluations performed on safety related flanges/fittings, no further actions are contemplated. This effort was therefore suspended.

II. RESULTS

A. Quantities

The following represents a tabulation of the quantity of suspect pieces identified per unit and system. An approximation of this data was reported to the NRC, Region V on August 10, 1988:

Number of Suspect Pieces (all flanges)

SYSTEM DESIGNATOR:		UNIT 1	UNIT 2	UNIT 3	TOTAL
Aux. Feedwater	AF	15	0	9	24
Chemical/Volume Control	CH	23	21	13	57
Contain. Leak Test System	CL	0	2	2	4
Containment Purge	CP	2	2	1	5
Condensate Transfer	CT	15	12	0	27
Diesel Fuel Oil	DF	4	3	0	7
Diesel Generator	DG	8	6	30	44
Essential Chilled Water	EC	14	12	15	41
Essential Cooling Water	EW	3	0	24	27
HVAC Control Bldg.	HJ	0	1	0	1
Nuclear Cooling Water	NC	23	0	16	39
Fuel Pool Cooling Water	PC	18	8	9	35
Reactor Coolant	RC	12	0	4	16
Steam Generator	SG	21	0	0	21
Safety Inspection	SI	76	0	60	136
Spray Pond	SP	460	445	433	1,338
		694	512	616	1,822

- of the 1,822 suspect pieces:

  1,262 have been evaluated on EERs* as of August 3, 1988

- of the 1,262 evaluated:

  593 are accessible
  669 are not accessible

- of the 593 accessible for testing:

  391 were tested as of August 3, 1988

- of the 391 tested:

  318 are acceptable
  73 failed hardness

81% of those tested are acceptable and do not require further evaluation.

*EERs - Engineering Evaluation Requests

B. Testing

1. Of the 391 pieces that were tested, the test results categorized by process system and unit are as follows:

	UNIT 1 TEST RESULTS		UNIT 2 TEST RESULTS		UNIT 3 TEST RESULTS	
SYSTEM	FAIL	PASS	FAIL	PASS	FAIL	PASS
AF		15			1	8
CH		13		1		
CT		7				
DF		4				
DG	1	7		6	12	17
EC	3	11				
EW	1	2				
NC	1	22				
PC		15				
RC		16				
SG	18	2				
SI		42				
SP	31	114	5	14		
SQ		2				

2. Of the 73 pieces that failed, 11 pieces failed high and 62 pieces failed low. Groupings of high and low carbon steel test value ranges (BHN - 137-187 being acceptable) by unit, and process system, are as follows:

a) Below Acceptable hardness Range (BHN - 136)

Hardness Test Value	Unit	DG	EW	SG	SP
117-126					
	1			2	5
	2				4
	3	3			
127-136					
	1	1	1	16	24
	3	6			

b) Above Acceptable hardness range (BHN - 187)

Hardness Test Value	Unit	AF	DG	EC	NC	SP
188-197						
	1			2		2
	2					1
	3		1			
198-207						
	1			1		
	3	1				
208-217						
	3		1			
>217						
	1				1**	
	3		1*			
Actual Hardness Value:		241*			222**	

III. SUMMARY

As described herein, ANPP established a Response Program Plan, mobilized a work force, and executed the Plan in an efficient and conservative manner. Extensive efforts and costs were expended to assure the capability to properly respond to the Bulletin and anticipated new direction.

The results of testing and the subsequent evaluation of the results has determined that a safety concern does not exist.