

LICENSEE EVENT REPORT

CONTROL BLOCK: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

(PLEASE PRINT OR TYPE ALL REQUIRED INFORMATION)

0 1 N J S G S 1 2 0 0 - 0 0 0 0 0 0 - 0 0 3 4 1 1 1 1 4 5
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

CON'T

0 1 REPORT SOURCE L 6 0 5 0 0 0 2 7 2 7 1 1 3 0 8 2 8 0 6 0 8 8 3 9
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

EVENT DESCRIPTION AND PROBABLE CONSEQUENCES (10)

0 2 On November 21, 1982, during a routine refueling outage, an operator discovered leakage
0 3 from a weld of the service water piping to No. 12 Component Cooling Heat Exchanger.
0 4 Subsequent radiography revealed that the weld and a number of similar joints were de-
0 5 graded. No other failures were observed. Due to the extent of the problem, the inci-
0 6 dent constituted the failure of a component which could prevent by itself the ful-
0 7 fillment of the functional requirement of a safety system. The event is reportable in
0 8 accordance with Technical Specification 6.9.1.8e.
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

0 9 SYSTEM CODE W B 11 CAUSE CODE B 12 CAUSE SUBCODE A 13 COMPONENT CODE P I P E X X 14 COMP. SUBCODE Z 15 VALVE SUBCODE Z 16
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

17 LER NO. REPORT NUMBER 8 2 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

ACTION TAKEN B 18 FUTURE ACTION X 19 EFFECT ON PLANT C 20 SHUTDOWN METHOD Z 21 HOURS 0 9 6 0 22 ATTACHMENT SUBMITTED Y 23 NPRO-4 FORM SUB. Y 24 PRIME COMP. SUPPLIER L 25 COMPONENT MANUFACTURER P 4 3 2 26
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

CAUSE DESCRIPTION AND CORRECTIVE ACTIONS (27)

1 0 Investigation showed that the degradation is related to the type of filler metal used
1 1 coincident with biofouling and the corrosive environment of the Service Water System.
1 2 Based on testing results, the degraded welds were repaired utilizing an improved
1 3 filler metal. All welds were satisfactorily tested; a sample which was x-rayed will
1 4 be re-examined during the next refueling.
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 5 FACILITY STATUS H 28 % POWER 0 0 0 29 OTHER STATUS N/A 30 METHOD OF DISCOVERY A 31 DISCOVERY DESCRIPTION Operator Observation 32
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 6 ACTIVITY CONTENT RELEASED OF RELEASE Z 33 Z 34 AMOUNT OF ACTIVITY N/A 35 LOCATION OF RELEASE N/A 36
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 7 PERSONNEL EXPOSURES NUMBER 0 0 0 37 TYPE Z 38 DESCRIPTION N/A 39
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 8 PERSONNEL INJURIES NUMBER 0 0 0 40 DESCRIPTION N/A 41
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

1 9 LOSS OF OR DAMAGE TO FACILITY TYPE Z 42 DESCRIPTION N/A 43
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

2 0 PUBLICITY ISSUED N 44 DESCRIPTION N/A 45
7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

NAME OF PREPARER R. Frahm

PHONE: (609) 935-6000 Ext. 4309

NRC USE ONLY



PSEG

Public Service Electric and Gas Company P.O. Box E Hancocks Bridge, New Jersey 08038

Salem Generating Station

June 14, 1983

Mr. J. Allan
Acting Regional Administrator
USNRC
Region 1
631 Park Avenue
King of Prussia, Pennsylvania 19406

Dear Mr. Allan:

LICENSE NO. DPR-70
DOCKET NO. 50-272
REPORTABLE OCCURRENCE 82-091/01X-1
SUPPLEMENTAL REPORT

Pursuant to the requirements of Salem Generating Station
Unit No. 1 Technical Specifications, Section 6.9.1.8e,
we are submitting supplemental Licensee Event Report for
Reportable Occurrence 82-091/01X-1.

Sincerely yours,

J. M. Zupko, Jr.
General Manager -
Salem Operations

RF:kls

CC: Distribution

TE22
11

Report Number: 82-091/01X-1
Report Date: 06-08-83
Occurrence Date: 11-30-82
Facility: Salem Generating Station Unit 1
Public Service Electric & Gas Company
Hancock's Bridge, New Jersey 08038

IDENTIFICATION OF OCCURRENCE:

Plant Systems - Weld Degradation on No. 12 Component Cooling Heat Exchanger Service Water Piping.

This report was initiated by Incident Report 82-464.

CONDITIONS PRIOR TO OCCURRENCE:

Mode 6 - Rx Power 0 % - Unit Load 0 MWe.

DESCRIPTION OF OCCURRENCE:

On November 21, 1982, during a routine refueling outage, an operator discovered leakage from a weld on the service water piping to No. 12 Component Cooling Heat Exchanger. Subsequent radiography on November, 23, 1982, showed internal corrosion of the joint. X-rays of similar joints, both vendor supplied and field made, revealed that a majority of the welds inspected contained possible degradation. Due to the significant number of problems apparent by November 30, 1982, it was decided that the occurrence involved the potential for loss of the component cooling capability assumed in the FSAR. Prompt notification of the NRC was performed on November 30, 1982, with written confirmation transmitted later that day.

The joints in concern were on 4 to 24 inch diameter stainless steel service water piping to the heat exchanger. The 316 stainless steel piping had been installed during the previous refueling outage, to improve system resistance to the abrasive action of silt-laden service water. This type of installation had been previously tested by replacing selected portions of Service Water System piping exposed to highly turbulent, high velocity flow. No adverse results were indicated by inspection of the test piping.

The replacement heat exchanger piping system consisted of a number of piping subassemblies welded together in the field into the complete system. Shop subassembly welds utilized a combination weld of 316 stainless steel root pass and 16-8-2 filler metal. The subassemblies were welded together using backing rings and 308 stainless steel filler metal.

Samples of the degraded welds were removed from the affected pipe assemblies and sent to PSE&G Research Corporation for evaluation. Radiographic and visual inspection of stainless steel piping in other areas of the Service Water System revealed that the test piping was in excellent condition. Since the plant was in the refueling mode of

DESCRIPTION OF OCCURRENCE: (cont'd)

operation, only one of the component cooling loops was required for residual heat removal and boration capabilities. The redundant loop remained operable throughout the occurrence.

APPARENT CAUSE OF OCCURRENCE:

Based on numerous tests of the samples, it was concluded that extensive bio-fouling corrosion of the circumferential welds had occurred. Minimum corrosion was evident in the base pipe material. Barnacles had grown inside the system in low velocity areas where they could attach themselves to the piping walls. The organisms had sealed off the inner diameter piping surface at the point of their attachment. At the weld locations, concentration cells formed. The barnacles, on dying, released sulfides which caused corrosion and pitting in the Austenitic stainless steels. Additionally, the backing ring used in the field welds acted as a crevice to accelerate corrosion.

ANALYSIS OF OCCURRENCE:

The operability of the Component Cooling System ensures that sufficient cooling capacity is available for continued operation of safety related equipment during normal and accident conditions. The redundant cooling capacity of the system, assuming a single failure, is consistent with the assumptions used in the accident analyses.

It is possible that the system piping degradation involved in the occurrence, coincident with an assumed failure of the redundant operating loop, could have resulted in insufficient cooling capacity in the event of an accident. The degradation thus constitutes failure or malfunction of one or more components which prevents or could prevent, by itself, the fulfillment of the functional requirements of system(s) used to cope with accidents in the FSAR. The occurrence is therefore reportable in accordance with Technical Specification 6.9.1.8e.

CORRECTIVE ACTION:

Accelerated corrosion tests on weld specimens utilizing various material filler wire were performed. Results showed that ER Ni Cr Mo-3 (INCO 625) filler metal offered the best corrosion resistance and best compatibility with the 316 stainless piping. Based on the findings, all welds in the stainless steel piping to No. 12 Component Cooling Heat Exchanger were repaired using the INCO 625 filler metal.

Where welds were accessible from inside the piping, cladding of existing welds was performed following satisfactory weld repair (as indicated by liquid penetrant testing). Inaccessible weld joints were cut, reprepared, and rewelded using the INCO filler wire. Final repair welds were all penetrant tested, with a sample being radiographically examined. Results of testing, including a hydrostatic test, were satisfactory.

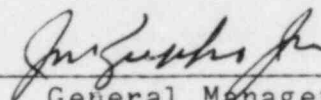
CORRECTIVE ACTION: (cont'd)

No. 12 Component Cooling Heat Exchanger piping repairs were completed and on January 17, 1983, the associated loop was restored to operation. Follow-up radiographic and visual inspection will be performed during the next refueling on the sample welds.

FAILURE DATA:

Pullman Power Products
Type 316SS Piping Components

Prepared By R. Frahm



General Manager -
Salem Operations

SORC Meeting No. 83-077