

VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

April 5, 1979

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
Attn: Mr. A. Schwencer, Chief
Operating Reactors Branch No. 1
Division of Operating Reactors
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Serial No. 099
PO/KEB:scj
Docket Nos.: 50-280
50-281
License Nos.: DPR-32
DPR-37

Dear Mr. Denton:

Pursuant to Surry Power Station Technical Specification 6.6.3.a Virginia Electric and Power Company hereby submits its five year inservice inspection report for Units 1 and 2.

Vepco is presently preparing submittals for updating the Surry Units 1 and 2 inservice inspection programs for the final forty month periods of the first ten year intervals to the 1974 Edition of the ASME Section XI Code, with Addenda thru the Summer of 1975, as required by 10 CFR 50, Section 50.55a(g).

Examination requirements per the ASME Code are being reviewed in light of existing technology and requests for relief for those specific examinations determined to be impractical will be submitted pursuant to 10 CFR 50, Section 50.55a(g)(6)(i).

Very truly yours,

C. M. Stallings

C. M. Stallings
Vice President-Power Supply
and Production Operations

cc: Mr. James P. O'Reilly, Director
Office of Inspection and Enforcement
Region II

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VIRGINIA ELECTRIC AND POWER COMPANY

SURRY POWER STATION

UNITS 1 & 2

FIVE YEAR INSERVICE INSPECTION SUMMARY REPORT

Inservice inspections during the first five years of commercial operation at Surry Power Station Units 1 and 2 were performed in accordance with the Surry Technical Specifications with guidance provided by Section XI of the ASME Boiler and Pressure Vessel Code, 1971 Edition with addenda thru the summer of 1972.

The arrangement and detail of Surry Units 1 and 2 piping systems and associated components were designed and fabricated before any of the examination requirements of Section XI of the Code were formalized. Consequently, the performance of the examinations has been limited to the extent practical due to accessibility, geometric configuration and metallurgical characteristics.

Each inspection outage is summarized herein along with examination limitations and results. Detailed reports of the inspections are available at Surry Power Station.

The examinations performed during this period revealed no indications which would affect safe operation of the units. Typical indications reported were damaged and nicked bolt threads, arc strikes, minor gouges, rust and corrosion. The affected components were either repaired or scheduled for future maintenance depending on significance.

SURRY UNIT 1

ISI CONDUCTED FROM FEBRUARY 11 THRU 13, 1974

An inservice inspection was performed by Westinghouse at Surry Unit 1 over the period of February 11 thru February 13, 1974.

Visual and Ultrasonic Inspections performed during this outage were on the Loop "C" main coolant pump flywheel, the bolt hole ligament areas, the internal pressure boundary and the main coolant pump bolts. Inspection of the Loop "C" cold leg and hot leg stop valve studs and nuts was also accomplished.

The visual inspections performed on the various items indicated the general condition of all but one item to be satisfactory. One cold leg stop valve stud, heat number 24097, has a circumferential saw-cut of approximately one inch long by 1/8 inch deep. The notch was cut in an attempt to make an ultrasonic angle beam standard. This valve stud was replaced.

The ultrasonic inspections performed were in some cases limited to less than 100 percent of the item primarily due to geometric configuration. The ultrasonic inspection of the stop valve studs, both hot and cold legs, were inspected for approximately fifty percent of their total area utilizing a straight beam inspection from the head end of the studs. The center portion of the stud head is the only area where a back reflection from the opposite end could be maintained due to the geometric configuration of the opposite stud end. An attempt to inspect the threaded area of the studs utilizing an angle beam inspection from the nonthreaded area of the item proved unsuccessful as the reflections from the stud threads were of such a high amplitude, as compared to the available notched standard, that this inspection would not be meaningful.

An ultrasonic angle beam inspection of the main coolant pump bolts upper four inches of the threaded area appeared to be a very useful inspection. The calibration for this inspection was accomplished using the bolt notched standard supplied by Vepco and a procedure for the optional angle beam inspection. A straight beam inspection from the threaded end of the bolt was also performed to insure 100 per cent coverage of the bolt threaded area.

The ultrasonic inspection of the main coolant pump ligament areas between the bolt holes was performed from the flange face only. The supplementary examination from the bore side of the pump casing was not performed because the pump casing was half full of primary coolant water.

The ultrasonic inspections performed indicated all items tested were in satisfactory condition.

ISI CONDUCTED FROM NOVEMBER 1 THRU
DECEMBER 31, 1974 (1st REFUELING OUTAGE)

A summary report of this inspection (Report No. ISI 75-3) was sent to the NRC via letter serial no. 409 dated May 5, 1975.

ISI CONDUCTED FROM NOVEMBER 4 THRU 9, 1975
(2nd REFUELING OUTAGE)

A summary report of this inspection (Report No. ISI 75-8) was sent to the NRC via letter serial no. 873 dated February 4, 1976.

ISI CONDUCTED FROM OCTOBER 17, 1976 THRU
JANUARY 21, 1977 (3rd REFUELING OUTAGE)

INTRODUCTION

An inservice examination of the reactor vessel, Class 1 components, certain auxiliary piping systems, sensitized stainless steel piping and designated welds of high energy lines was conducted at Surry Unit 1 from October 17, 1976 thru January 21, 1977. Examinations were performed in accordance with the Examination Program for Refueling Outage Core III-IV.

Examination procedures were approved prior to the examinations, and certifications relative to personnel, equipment and materials were reviewed and determined to be satisfactory. Examinations were witnessed by a Code Authorized inspector from The Hartford Steam Boiler Inspection and Insurance Company.

RESULTS

Vepco examinations resulted in numerous indications of arc strikes, weld splatter, rust and corrosion being found by visual methods on the low head SIS piping (T.S. Item 7.2) and the sensitized stainless steel piping (T.S. Item 8.1.2). These indications were not judged to be serious enough for immediate corrective action; therefore were scheduled for removal during future maintenance.

Westinghouse examinations resulted in a total of 52 reportable indications being noted. The term "reportable indication", as applied to Westinghouse inservice inspection, is a broad term reference to which the following classification has been assigned to clarify usage.

Indications are classified as follows:

Class 1 - Flaw indication. Exceeds reportable requirements. This classification requires a repair.

A total of 10 indications were in this classification and all were

repaired to a no indication (NI) condition. Six were due to damaged threads on bolts and four were surface indications that were removed by light blending or grinding. Refer to Table 1 for details.

Class 2 - Flaw indication. Exceeds reportable requirements and is acceptable. This classification requires a disposition. A total of 38 indications are in this classification and the dispositions have been satisfied. Refer to Table 1 for details.

Class 3 - Flaw indication. Less than reportable requirements -- noted for reference only. This classification is applied to note flaw areas that might be of interest to future examiners. There is one indication in this classification. Refer to Table 1 for details.

Class 4 -- Geometric indication. Noted for reference only. this classification is applied to note geometric indication areas that might cause interpretation difficulty for future examiners. There are two indications in this classification.

Both areas were detected ultrasonically with a 45° beam angle and were investigated with 45° and 60° beam angles, and with 5 MHz and dual element high resolution straight beam transducers to confirm the lack of flaws.

The weld crown was removed from the indication area of weld 10 on the 4" pressurizer spray line (T.S. Table 4.2-1, Item No. 8.1.1, W ISO VPA044/S) to allow scanning across the weld and half node investigation.

The indication areas on weld 18 of Loop 2 main steam line (T.S. 4.15, W ISO VPA102) produce simultaneous reflections from the I.D. and O.D. with an apparent flaw indication between these two. Finger damping of the weld crown affects both the O.D. signal and the apparent mid-wall flaw indication. The mid-wall signal is caused by a mode conversion (and the resulting velocity change) due to the I.D. surface configuration.

A review of the appropriate construction radiographs revealed no flaws in or near the areas producing these reflectors.

Class 5 - Minor indications. Typical or characteristic. Condition is acceptable. This classification is applied to light surface corrosion or oxidation, light scratches or grinding marks, small rounded dents, etc.
There are no indications in this classification.

Class 6 - Indications outside of examination zone. Noted for assistance only. This classification is applied to indications outside of the 1 "T" examination area that are noted or reported as aid or assistance to the construction contractor or owner. There was one indication in this classification that was repaired to a no indication condition. Refer to Table 1 for details.

LIMITATIONS

Some of the arrangements and details of the piping system and components were designed and fabricated before the access and examination requirements of Section XI of the Code could be applied; consequently some examinations are limited or not practical due to geometric configuration or accessibility. Generally these limitations exist at all fitting to fitting joints such as elbow to tee, elbow to valve, reducer to valve etc., where geometry and sometimes surface condition preclude ultrasonic coupling or access for the required scan length.

The limitations exist to a lesser degree at pipe to fitting assemblies, particularly where the weld is not ground flush with the pipe O.D. surface. At these joints examinations can be conducted from the pipe side, however, the fitting again limits or precludes examination from the opposite side. When the weld surface is flat, the fitting side examination is replaced by a calibrated straight beam examination on the weld as allowed by the Code.

For the reactor coolant pump integrally welded supports visual and surface examination was substituted for the volumetric examination required by Section XI of the Code. This is allowable for Category K items as amplified on T.S. page 4.2-13 and Table 4.2-1, item no. 5.6.

For the augmented inspection of the high energy line outside the containment as required by T.S. 4.15, examination of three (3) main steam line welds was not performed due to location within the wall penetration and determination of inaccessibility by inspection personnel.

EXAMINATIONS

Examinations were conducted to review as much of the examination zone as was practical, within geometrical, metallurgical and physical limitations. When 100% of the required examination could not be achieved, the examination was considered to be partial (PAR) and so noted. Generally PAR's are noted at fitting-to-fitting assemblies (as explained under LIMITATIONS) and in areas where integrally welded supports, lugs, or hangers, etc., preclude access to some part of the examination area.

Ultrasonic examinations that produced greater than reference level sensitivity, from reflectors that are characteristic of metallurgical structure or the I.D. and O.D. surfaces of an item were acknowledged only. Examples of areas that generally produce such geometric indications:

- (1) I.D. weld prep or root and or the crown overlay or toe.
- (2) the I.D. radius of the tube sheet on the channel head to tube sheet weld of steam generators, when examining from the tubesheet side.
- (3) the metallurgical structure of the cast main coolant piping.
- (4) responses from the thread areas of bolting.

Geometric responses from these areas are characteristic of the examination and are not considered relevant for reporting length or depth.

TABLE 1

<u>W CLASS</u>	<u>AREA EXAMINED</u>	<u>T.S. TABLE 4.2-1 ITEM NO.</u>	<u>W ISO</u>	<u>ITEM DESCRIPTION</u>	<u>CONDITIONS</u>
1	Reactor vessel closure head conoseal bolting	1.11	VPA151	Maron clamp assembly	missing base metal
1	Steam generator manway bolting	3.5	VPA154	bolts B2,B3,B27,C3 & C7	damaged threads, nicks on threads and bolt heads
1	2" CVCS letdown piping	8.2.2	VPA59/S	piece 18	1/8" linear indication
1	8" containment spray ring #1	8.2.1	VPA74/S	piece 32	arc strike
1	8" containment spray ring #2	8.2.1	VPA75/S	piece 6B	two linear indications
2	Reactor vessel closure head conoseal bolting	1.11	VPA151	jacking screw assembly	small nicks
2	Pressurizer manway bolting	2.6	VPA153	bolts 1-16	minor nicks and gouges on bolt heads
2	Steam generator manway bolting	3.5	VPA154	bolts A4,5,8,21,22,23,24,25,26;B4,5,6,25,26;C2,4,5,6,18,20,22	minor nicks on threads
3	Loop A 6" & 2" SIS hot leg piping	8.2.2	VPA71/S	piece 30	small hole in grind mark
6	Loop A 2" SIS cold leg piping	8.2.2	VPA68/S	piece 54	arc strike

SURRY UNIT 2

ISI CONDUCTED FROM MAY 13 THRU 15, 1974

INSPECTION SUMMARY

An inservice inspection was performed by Westinghouse at Surry Unit 2 over the period of May 13, thru May 15, 1974.

Visual and Ultrasonic Inspections performed during this outage were on the Loop "C" main coolant pump flywheel, the bolt hole ligament areas, the internal pressure boundary and the main coolant pump bolts. Inspection of the Loop "C" cold leg and hot leg stop valve studs and nuts was also accomplished.

The visual inspections performed on the various items indicated the general condition of all items to be satisfactory.

The ultrasonic inspections performed were in some cases limited to less than 100 percent of the item primarily due to geometric configuration.

The ultrasonic inspection of the stop valve studs, both hot and cold legs, were inspected for approximately fifty percent of their total area utilizing a straight beam inspection from the head end of the studs. The center portion of the stud head is the only area where a back reflection from the opposite end could be maintained due to the geometric configuration of the opposite stud end.

An ultrasonic angle beam inspection of the main coolant pump bolts upper four inches of threaded area was performed. The calibration for this inspection was accomplished using the bolt notched standard supplied by VEPCO and the procedure for the optional angle beam inspection. A straight beam inspection from the threaded end of the bolt was also performed to insure 100 percent coverage of the bolt threaded area.

The ultrasonic inspection of the main coolant pump ligament areas between the bolt holes was performed from the flange face only. The supplementary examination from the bore side of the pump casing was not performed because the pump casing was half full of primary coolant water.

The ultrasonic inspections performed indicated all items tested were in satisfactory condition.

ISI CONDUCTED FROM SEPTEMBER, 1974 THRU JULY, 1975 (OUTAGE CORE I-II)

A summary report of this inspection (Report No. ISI 75-7) was sent to the NRC via letter serial no. 813 dated December 18, 1975.

ISI CONDUCTED FROM APRIL 21, 1976 THRU
JUNE 1, 1976 (OUTAGE CORE II-III)

SUMMARY

Inservice examinations were performed on Class 1 components, auxiliary piping systems, sensitized stainless steel piping, component supports and support structures at Surry Unit 2 from April 21, 1976 thru June 1, 1976.

Visual, surface and volumetric nondestructive testing methods were utilized for the component inspections.

Review and approval of examination procedures, personnel qualifications, UT instrument and calibration, block certifications, couplant certifications, and liquid penetrant certifications, were completed prior to start of the inservice inspection.

On the pressurizer spray line, ultrasonic examinations were performed at reference sensitivity due to high noise level in this specimen. All other ultrasonic examinations were performed at a minimum of 2X sensitivity.

LIMITATIONS

The piping systems of the Surry Unit 2 plant contain welds and adjacent base material which are inaccessible for 100% examination. Component configurations restricted angle beam examination of welds and "IT" on each side as required by the Code. These welds were examined (except where noted otherwise) by the following techniques: (1) 100% angle beam of the weld and IT from the pipe side; (2) longitudinal wave inspection of the pipe side, weld metal and component areas where search unit contact is possible within the one weld thickness zone; and (3) partial angle beam examination from the component side, search unit contact permitting. This technique satisfies code requirements for inspection of the weld, but does not inspect base metal for IT on component side of the weld.

For the reactor coolant pump integrally welded supports visual examination was substituted for the volumetric examination required by Section XI of the Code. This is allowable for Category K items as amplified on T.S. page 4.2-13 and Table 4.2-1, item no. 5.6.

INDICATIONS

Visual examinations resulted in the following reportable indications:

Steam Generator "A"

Hot and cold manway bolting inspected revealed thirteen (13) bolts with nicks on threads.

Steam Generator "B"

Hot and cold manway bolting inspected revealed two (2) bolts with nicks on threads.

Steam Generator "C"

Hot and cold manway bolting inspected revealed nine (9) bolts with nicks on threads.

The threads were "chased" and cleaned up and bolts were re-examined and determined acceptable.

Surface examinations resulted in the following reportable indication:

Loop "C" Hot Leg High Head SIS

Liquid penetrant examination revealed a reportable indication on weld #4. This indication was later ground, re-examined and determined acceptable.

Ultrasonic examinations resulted in no reportable indications.

ISI CONDUCTED FROM SEPTEMBER 13, 1977 THRU
OCTOBER 8, 1977 (OUTAGE CORE III-IV)

INTRODUCTION

An inservice examination of the reactor vessel, Class 1 components, certain auxiliary piping systems, sensitized stainless steel piping and designated welds of high energy lines was conducted at Surry Unit 2 from September 13, 1977 thru October 8, 1977. Examinations were performed in accordance with the Examination Program for Refueling Outage Core III-IV.

Examination procedures were approved prior to the examinations, and certifications relative to personnel, equipment and materials were reviewed and determined to be satisfactory. Examinations were witnessed by a Code Authorized Inspector from The Hartford Steam Boiler Inspection and Insurance Company.

RESULTS

The only indications reported within the areas examined during this outage were on non-code items, examined by plant personnel in accordance with the Tech. Spec. Table 4.2-1, Item 7.2.

The indications were detected by visual examinations and were all evaluated as being minor and not requiring immediate correction.

LIMITATIONS

Some of the arrangements and details of the piping system and components were designed and fabricated before the access and examination requirements of Section XI of the Code could be applied; consequently some examinations are limited or not practical due to geometric configuration or accessibility. Generally these limitations exist at all fitting to fitting joints such as elbow to tee, elbow to valve, reducer, to valve etc., where geometry and sometimes surface condition preclude ultrasonic couplant or access for the required scan length.

The limitations exist to a lesser degree at pipe to fitting assemblies, particularly where the weld is not ground flush with the pipe O.D. surface. At these joints examinations can be conducted from the pipe side, however, the fitting again limits or precludes examination from the opposite side. When the weld surface is flat, the fitting side examination is replaced by a calibrated straight beam examination on the weld as allowed by the Code.

EXAMINATIONS

Examinations were conducted to review as much of the examination zone as was practical, within geometrical, metallurgical and physical limitations. When 100% of the required examination could not be achieved, the examination was considered to be partial (PAR) and so noted. Generally PAR's are noted at fitting-to-fitting assemblies (as explained under LIMITATIONS) and in areas where integrally welded supports, lugs, or hangers, etc., preclude access to some part of the examination area.

Ultrasonic examinations that produced greater than reference level sensitivity, from reflectors that are characteristic of metallurgical structure or the I.D. and or O.D. surfaces of an item were acknowledged only. Examples of areas that generally produce such geometric indications:

- (1) I.D. weld prep or root and or the crown overlay or toe.
- (2) the I.D. radius of the tube sheet on the channel head to tube sheet weld of steam generators, when examining from the tubesheet side.
- (3) the metallurgical structure of the cast main coolant piping.
- (4) responses from the head

Geometric responses from these areas are characteristic of the examination and are not considered relevant for reporting length or depth.

Ultrasonic examinations resulted in no reportable indications.