

Nuclear Power Business Unit
RADIATION WORK PERMIT

Revision:

COP

RWP Number:

04-142

Controlling

Work Document: Various

RG 1.16 Class: 2

Estimated Dose: 5.500

Rem

Job Title: Steam Generator Eddy Current Testing

Job Location: U-1 Containment

Job Description: Setup, Perform Tests, Teardown and Closeout ECT, Plug Removal and Installation

Radiological Assessment of Work

Significant increase in radiation levels is likely? Yes No Reason: Removal of shielding (i.e, Manways, ALARA doors.)

Significant increase in contamination levels is likely? Yes No Reason: Opening Primary system and probe changeouts.

Potential for internal dose? Yes No Reason: Opening Primary system. Changeout of E/C probes and misc. maintenance.

RWP Tasks

Task 1: Setup, Perform Tests, Teardown and Closeout ECT, Plug Removal and Installation

Task 2:

Task 3:

Task 4:

Task 5:

Task 6:

Task 7:

Task 8:

Task 9:

Task 10:

Task 11:

Task 12:

RWP Review and Approval

Prepared By:

CD

Initials

2/24/04

Date

ALARA Review By:

WWL

Initials

2-24-04

Date

ALARA Review No.:

N/A

2004-0018

Approved By:



RP Supervisor

3-28-04

Date

Terminated By:

RP Supervisor

Date

Nuclear Power Business Unit
RADIATION WORK PERMIT

Revision:

COP

RWP Number:

04-142

TASK 1: Setup, Perform Tests, Teardown and Closeout ECT, Plug Removal and Installation

Radiation Protection personnel are authorized to suspend work activities in the event of a change in job scope, changes in radiological conditions, or a failure of personnel working under the RWP to abide by the RWP conditions.

Stop Work Dose Rate: 15000mr/hr ED Dose Rate Alarm: 2500mr/hr ED Dose Alarm: 254mrem

Radiation Protection Hold Points: N/A

Do Not Handle FME From Channelhead Without RP Approval.

RP To Survey All Items Exiting The Steam Generator.

Contact RP Prior to Entering Any HRA.

Authorized Radiological Work Areas: Any RWP permits entry into RCA(s), RMA, and RA.

- HRA LHRA VHRA Cmt, Reactor Critical
 CA HCA HPCA Airborne Radioactivity Area

Expected Radiological Conditions: Data From: Current Survey Historical Data Estimated

Radiation: GA 30 to 5000 mrem/hr Contact: 100 to 20,000 mrem/hr

Contamination: 1000 to >1E6 dpm/100 cm² Internal Contamination: 1000 to >1E6 dpm/100 cm² (estimated)

Airborne Radioactivity: <.25 DAC P I₂ NG ³H (Estimated / Actual DAC)

RP Job Coverage: Routine Direct Start of Job System Breach Pre-Job Briefing Required

Special Instructions: Direct RP coverage required for any work performed on S/G while manway covers are removed. Direct coverage may be met by use of video cameras and audio communications equipment. IF AT ANY TIME AUDIO/VIDEO COMMUNICATIONS IS LOST, EVOLUTIONS WILL BE SUSPENDED UNTIL COMMUNICATIONS CAN BE RE-ESTABLISHED. See Job files 132, 133, 134, 135, 136, 137.

Nuclear Power Business Unit
RADIATION WORK PERMIT

Revision:

RWP Number:

04-142

COP

Radiological Survey Requirements:

A. Radiation: Prior to/Start of Work System Breach Other

Special Instructions: Verification Platform/Channel Head surveys required.
Hot particle surveys required for work in HPCA'S
Loop Area surveys performed per RP based on job evolution

B. Contamination: Prior to/Start of Work System Breach Other

Special Instructions: Verify conditions prior to entry. Survey to be performed per RP based on job evolution.

C. Airborne: Prior to/Start of Work System Breach Other

Special Instructions: Shiftly Platform Air Samples Required during S/G work. Grab samples required based on job evolution and radiological conditions.

III. Dose Assessment: TLD and EPD required.

Special Instructions: RP to relocate WB Dosimetry to area expected to receive the highest exposure.
Extremity Dosimetry may be required as per HPIP 1.66.
Timekeeping required when working in a dose rate >1,500 mR/hr and the worker could receive more than 25 mrem.

IV. Protective Clothing

- Coveralls, Booties, and Rubber Gloves (Minimum requirements for entering a contaminated area)
- Labcoat, Booties, and Rubber Gloves may be used only with RP permission.
- Coveralls, Double Booties or Booties and Rubber Totes/Boots, and Double Rubber Gloves to enter HCA.
- Double coveralls, Double Rubber gloves, Double Booties, Rubber Totes/Boots.⁽¹⁾
- Plastic suit, Double Rubber Gloves, Double Booties, Rubber Totes/Boots.⁽¹⁾
- Surgeon's Gloves may be substituted for Rubber Gloves with RP permission.
- Hood and Face Shield required.
- Other: See Special Instructions ⁽¹⁾Safety review may be required for additional coveralls or plastics.

Special Instructions: Additional Dress requirements as per RP. Plastic suit for all reach-ins.

Nuclear Power Business Unit
RADIATION WORK PERMIT

COP

Revision:

RWP Number:

04-142

V. Respiratory Protection:

N/A

TEDE ALARA Review:

None

Special Instructions: Additional requirements as per RP Supervision.

VI. Engineering Controls:

Special Instructions: HEPA ventilation required on opposite leg for reach-ins as much as practicable.

VII. ALARA Requirements:

See ALARA Review

LDWA: To be identified by RP

Special Instructions: Prejob briefing to cover all items in the ALARA Review.
ALARA Doors to be shut when not actively working in S/G Channelhead.

RP TO SURVEY ALL ITEMS EXITING THE STEAM GENERATOR.

Ensure ventilation is running on one channelhead at all times.
RP to be present when opening bags or equipment boxes on the 8',
Plugs removed to be placed in shielded containers

DO NOT HANDLE FME FROM CHANNELHEAD WITHOUT RP APPROVAL!!!

Foreign debris found within the S/G channel head, or primary systems may be highly radioactive and shall not be handled without RP permission.

- When working in these areas or handling equipment from these areas (such as refueling tools) workers shall monitor at least every two hours.
- Contact RP immediately if, during monitoring of protective clothing, the worker discovers >10,000 cpm above bkg using a frisker or >5 mRem/hr above bkg using an open window beta instrument.
- Contact RP immediately if, during monitoring of skin, personal clothing, or modesty garments any contamination above bkg is discovered.

Point Beach Nuclear Plant
Level 3 Pre-Job ALARA Review

COPY

REVISION 1

on
4/12/04

ALARA Review Number:	2004-0018 U1R28	Estimated dose:	5.50	Rem
----------------------	-----------------	-----------------	------	-----

Part 1: Job Description	
A. Job Description (Attach work list if appropriate)	Steam Generator Eddy Current Testing and Tube Plugging (if required).
B. Controlling job procedures.	Job specific RWPs. See the attached list of Westinghouse procedures
C. Job History/O.E./Lessons Learned	During U1R26 six old plugs were required to be removed and replaced. This required the use of several different tool heads in order to remove the plugs. This required the Eddy Current personnel to spend considerable time on the "B" manway platform, which caused more dose to be expended.
D. Dose history.	ALARA Review packages from previous refueling outages have been reviewed. The dose estimate for this job is based on the review of the following dose totals: U1R20 – 6.812 rem, U1R22 – 11.849 rem, U1R24 – 5.886 rem, U1R26 – 6.915 rem. Input from Westinghouse was also used in determining this dose goal.

Part 2: ALARA Checklist

NOTE: The following exposure reduction measures should be considered during job planning.

Section 1: Pre-Job Planning/

E. Designated low dose waiting/staging areas.	A low dose area on the 8' el. of containment should be identified for the platform worker. Time in the containment bldg. should be minimized
F. Remote job coverage equipment.	ALARA cameras and teledosimetry can be used for direct job coverage.
G. Communication devices used.	Westinghouse hard wire comm. gear should be available for use. House Telex radio systems may also be available for use
H. Services required. (lighting, air, electrical)	Services have been previously arranged.
I. Designated work area access/exit points.	S/G manway platforms should be access from the 8' el. of containment.
J. Coordination with other groups.	Coordination between Westinghouse, MTN, RP and ENG will be required.
K. Work performed outside of radiation areas: Prefabrication Disassembly Assembly	Assembly of equipment should be performed outside of the loop areas.
L. Post-job cleanup requirements.	Multiple layers of herculite, etc. should be used for covering the manway platforms. All equipment used should be surveyed and deconned as required upon removal from the loop areas.

Point Beach Nuclear Plant
Level 3 Pre-Job ALARA Review

COPY

ALARA Review Number: 2004-0018 U1R28	Estimated dose: 5.50 Rem
--------------------------------------	--------------------------

M. Special tools/equipment used to minimize time and exposure. (Use contaminated tools when practicable)	See the Westinghouse procedures for tool lists for eddy current testing and tube plugging.
N. Radwaste minimization.	Use approved radiation worker practices.
O. Work activities/equipment status that could result in significant interruption of job or changes in radiological conditions.	During probe change-out there can be an increased dose rates on the manway platforms and an increase in the potential for hot particles.

Section 2: Radiological Controls	
P. Describe temporary shielding to be used.	Shielding package #'s 15, 18, 62, 63, and 64 are to be installed on the "B" S/G platform. Shielding for the "A" S/G platform will be package #'s 94 and 95. <i>UPDATED FROM ORIGINAL. BJR 4/12/04</i>
Q. What systems/components will be filled with water or flushed to reduce job area dose rates?	None
R. Engineering controls to control airborne activity. (HEPA filters, glove bags, etc.)	The channelhead ventilation system is to be used during eddy current testing and tube plugging evolutions.
S. Attach applicable survey data.	See the S/G manway and 10' platform survey maps and discuss at pre-job briefings.

Section 3: Worker Preparation and Training	
T. Consider the following: <ul style="list-style-type: none"> Experienced workers selected. Special training, photos, drawings, video tapes available Rehearsal Mock-up training Use of fewer workers evaluated Method of shift turnovers 	Experienced workers will be used for all of the eddy current testing.

ALARA-As Low As Reasonably Achievable
RWP-Radiation Work Permit
HEPA-High Efficiency Particulate Air

Completed By: W.W. Lemerond	Date: 3-9-04
Approved By: <i>Ben J. Carbery</i>	Date: 4/12/04

Point Beach Nuclear Plant
Level 3 Pre-Job ALARA Review

COPY

ALARA Review Number:	2004-0018 U1R28	Estimated dose:	5.50	Rem
-----------------------------	-----------------	------------------------	------	------------

Part 1: Job Description

A. Job Description (Attach work list if appropriate)	Steam Generator Eddy Current Testing and Tube Plugging (if required).
B. Controlling job procedures.	Job specific RWP. See the attached list of Westinghouse procedures
C. Job History/O.E./Lessons Learned	During U1R26 six old plugs were required to be removed and replaced. This required the use of several different tool heads in order to remove the plugs. This required the Eddy Current personnel to spend considerable time on the "B" manway platform, which caused more dose to be expended.
D. Dose history.	ALARA Review packages from previous refueling outages have been reviewed. The dose estimate for this job is based on the review of the following dose totals: U1R20 – 6.812 rem, U1R22 – 11.849 rem, U1R24 – 5.886 rem, U1R26 – 6.915 rem. Input from Westinghouse was also used in determining this dose goal.

Part 2: ALARA Checklist

NOTE: The following exposure reduction measures should be considered during job planning.

Section 1: Pre-Job Planning/

E. Designated low dose waiting/staging areas.	A low dose area on the 8' el. of containment should be identified for the platform worker. Time in the containment bldg. should be minimized
F. Remote job coverage equipment.	ALARA cameras and teledosimetry can be used for direct job coverage.
G. Communication devices used.	Westinghouse hard wire comm. gear should be available for use. House Telex radio systems may also be available for use
H. Services required. (lighting, air, electrical)	Services have been previously arranged.
I. Designated work area access/exit points.	S/G manway platforms should be access from the 8' el. of containment.
J. Coordination with other groups.	Coordination between Westinghouse, MTN, RP and ENG will be required.
K. Work performed outside of radiation areas: Prefabrication Disassembly Assembly	Assembly of equipment should be performed outside of the loop areas.
L. Post-job cleanup requirements.	Multiple layers of herculite, etc. should be used for covering the manway platforms. All equipment used should be surveyed and deconned as required upon removal from the loop areas.

Point Beach Nuclear Plant
 Level 3 Pre-Job ALARA Review

COPY

ALARA Review Number: 2004-0018 U1R28	Estimated dose: 5.50 Rem
--------------------------------------	--------------------------

M. Special tools/equipment used to minimize time and exposure. (Use contaminated tools when practicable)	See the Westinghouse procedures for tool lists for eddy current testing and tube plugging.
N. Radwaste minimization.	Use approved radiation worker practices.
O. Work activities/equipment status that could result in significant interruption of job or changes in radiological conditions.	During probe change-out there can be an increased dose rates on the manway platforms and an increase in the potential for hot particles.

Section 2: Radiological Controls	
P. Describe temporary shielding to be used.	Shielding package #'s 15, 18, 62, 63, and 64 are to be installed. Shielding for the "A" S/G platform is being evaluated for installation.
Q. What systems/components will be filled with water or flushed to reduce job area dose rates?	None
R. Engineering controls to control airborne activity. (HEPA filters, glove bags, etc.)	The channelhead ventilation system is to be used during eddy current testing and tube plugging evolutions.
S. Attach applicable survey data.	See the S/G manway and 10' platform survey maps and discuss at pre-job briefings.

Section 3: Worker Preparation and Training	
T. Consider the following: <ul style="list-style-type: none"> • Experienced workers selected. • Special training, photos, drawings, video tapes available • Rehearsal • Mock-up training • Use of fewer workers evaluated • Method of shift turnovers 	Experienced workers will be used for all of the eddy current testing.

ALARA-As Low As Reasonably Achievable
 RWP-Radiation Work Permit
 HEPA-High Efficiency Particulate Air

Completed By: W.W. Lemerond	Date: 3-9-04
Approved By: <i>Brian Carle</i>	Date: <i>3/16/04</i>

**SG Eddy Current Inspection and Repair Radiation Exposure Reduction
Suggestions**

RERS Number	Suggestion Description	Status summary
93-0013	Implement ventilation fixture to facilitate eddy current inspection in both SG channel heads concurrently	Closed, implemented
94-0083	Westinghouse should have an extra plugging carousel to allow loading in a low dose area.	Closed, denied QA concerns
95-0024	Use remote dose rate monitor on s/g manway platforms during eddy current testing	Closed, AM-2s have been purchased
95-0159	Do eddy current on only one manway at a time.	Closed, rejected
96-0101	Post ALARA alert signs in s/g eddy current equipment storage area	Closed, Addressed in NP 8.4.12
98-0019	Design and make up extended air sampling units for S/G channel head air sampling	Closed, implemented
99-0014	Use 4" PVC pipe to shielded container on 10' platform for hot probe disposal	Closed, rejected, new probe technology has improved life span

This list is current through RERS number 2000-0012

COPY

Steam generator eddy current inspection

AFS number	Suggestion description	Status summary
89-0035	HP communication system	closed, improve use of existing
89-0036	HP camera system	closed, implemented
89-0037	Shield area on platform	closed, used as needed
89-0038	Use battery pack/hood system	closed, not necessary
89-0039	Manway shield doors	closed, implemented
89-0040	manway diaphragm storage location	closed, implemented
89-0041	Train on high activity material handling	closed, implemented
89-0042	Improve electricity availability in loops	closed, under installation
91-0001	Briefing too long	closed, form revised
92-0008	Move Westinghouse to HP desk from back of El. 8'	closed, HP input to be used
92-0009	EC probe disposition listed on RWP	closed, included in HPGD
92-0032	Repair EC penetration	open

COPY

**STEAM GENERATOR
PRIMARY SIDE SERVICES
FOR
NUCLEAR MANAGEMENT COMPANY, LLC
AT
Point Beach Nuclear Power Plant**

VOLUME 1 TECHNICAL PROCEDURES

<u>DOCUMENT TITLE</u>	<u>NUMBER</u>	<u>REVISION</u>
Steam Generator Material and Equipment Accountability	NMC-400-001	00
Visual Examination of Tube Plug, Tubesheet Plug and Sleeve Welds	QAIP-1-VT	13
Removal of Westinghouse (Ribbed) Mechanical Tube Plugs from 7/8" O.D. Steam Generator Tubes using a Mounting Plate Drill with Hydraulic Feed	STD-100-212	03
Welded Tube/Tubesheet Plug Removal Utilizing the Phase III Drill Assembly	STD-100-215	06
Interpretation of Torque Trace Charts Westinghouse (Rolled) Mechanical Tube Plugging	STD-100-219	05
Primary Side Tube/Sleeve Removal/Full Length Tubesheet Boring	STD-100-221	06
Steam Generator Tube Stabilization Device Installation	STD-100-228	03
Marking Steam Generator Tubes	STD-400-017	06
Checkout and Operation of the Steam Generator Tube In Situ Pressure Test System	STD-400-173	05
GENESIS 2000 Control System Operation	STD-400-190	10
Steam Generator Primary Side Equipment Checkout	STD-400-191	02


<u>DOCUMENT TITLE</u>	<u>NUMBER</u>	<u>REVISION</u>
Steam Generator Services Training Administration (Windsor/Chattanooga)	STD-400-192	03
Remote (Rolled) Mechanical Tube Plug Installation Utilizing Computerized Control System	STD-410-081	12
Manual (Rolled) Mechanical Tube Plug Installation/Removal Utilizing Computerized Control System	STD-410-082	06
Remote (Rolled) Mechanical Tube Plug Removal Using AMI Power Supply	STD-410-084	06
Remote Installation and Removal of the GENESIS 2000 Manipulator	STD-NSS-074	11
Setup and Checkout of the GENESIS 2000 Manipulator	STD-NSS-078	13

COPY

EDDY CURRENT PROCEDURES

<u>DOCUMENT TITLE</u>	<u>NUMBER</u>	<u>REVISION</u>
ECT ACQUISITION AND ANALYSIS PROCEDURES		
Multifrequency Eddy Current Testing of Non- Ferromagnetic Steam Generator Tubing	NMC-400-002	02
Analysis of Bobbin Coil Eddy Current Data	NMC-400-003	03
Analysis of Rotating Coil Eddy Current Data	NMC-400-004	03
Eddy Current Data Management	NMC-400-005	03
Eddy Current Independent QDA	NMC-400-006	02
Eddy Current Site Specific Performance	NMC-400-007	02
Guidelines for Steam Generator Eddy Current Data Quality Requirements	MRS-GEN-1127	01

E State Change History

Initiate	Done
	8/20/2003 9:57:01 PM
by admin	Owner (None)

E Section 1

Activity Request Id: CAP045790

Activity Type: CAP

Submit Date:

2/12/1996 12:00:00 AM

One Line Description: Damage In Foreign Steam Generator Internals

Detailed Description: THE U.S. NUCLEAR REGULATORY COMMISSION (NRC) IS ISSUING THIS INFORMATION NOTICE TO ALERT ADDRESSEES TO RECENT FINDINGS OF DAMAGE TO STEAM GENERATOR INTERNALS, NAMELY SUPPORT PLATES AND WRAPPER, AT FOREIGN PWR FACILITIES. IT IS EXPECTED THAT RECIPIENTS WILL REVIEW THE INFORMATION FOR APPLICABILITY TO THEIR FACILITIES AND CONSIDER ACTIONS, AS APPROPRIATE, TO AVOID SIMILAR PROBLEMS. HOWEVER, SUGGESTIONS CONTAINED IN THIS INFORMATION NOTICE ARE NOT NRC REQUIREMENTS; THEREFORE, NO SPECIFIC ACTION OR WRITTEN RESPONSE IS REQUIRED.

DESCRIPTION OF CIRCUMSTANCES: IN APRIL 1995 DURING A ROUTINE EDDY CURRENT INSPECTION OF THE STEAM GENERATOR TUBING AT A FOREIGN FACILITY, ANOMALOUS SUPPORT PLATE SIGNALS WERE OBSERVED AT THE UPPERMOST SUPPORT PLATE. THE STEAM GENERATORS ARE SIMILAR BUT NOT IDENTICAL TO WESTINGHOUSE MODEL 51 STEAM GENERATORS. THE SUPPORT PLATES ARE OF THE DRILLED HOLE TYPE AND FABRICATED FROM CARBON STEEL. VIDEO CAMERA INSPECTIONS WERE CONDUCTED TO INVESTIGATE THE ANOMALOUS SIGNALS AND REVEALED THAT A SIGNIFICANT PORTION OF THE SUPPORT PLATE HAD WASTED AWAY. PIECES OF THE AFFECTED REGION OF THE SUPPORT PLATE WERE FOUND RESTING ON THE NEXT LOWER SUPPORT PLATE.

SUBSEQUENT INVESTIGATION HAS IDENTIFIED CHEMICAL CLEANING PERFORMED IN 1992 AS THE CAUSE OF THE SUPPORT PLATE DAMAGE. REVIEW OF PREVIOUS EDDY CURRENT DATA SHOWS THAT THE ANOMALOUS SUPPORT PLATE SIGNALS WERE PRESENT IN INSPECTIONS DATING BACK TO 1993 WHEN THE FIRST INSERVICE INSPECTION FOLLOWING CHEMICAL CLEANING WAS PERFORMED. SUPPORT PLATE SIGNALS OBTAINED IMMEDIATELY PRIOR TO THE CHEMICAL CLEANING WERE NORMAL. THE FOREIGN REGULATORY AUTHORITY BELIEVES THAT PIPES USED TO DIRECT THE CHEMICAL SOLUTION INTO THE STEAM GENERATORS WERE INSTALLED INCORRECTLY, TOO CLOSE TO THE UPPER SUPPORT PLATE. THIS CAUSED AN EXCESSIVELY HIGH IMPINGEMENT VELOCITY OF THE CLEANING SOLUTION AGAINST THE SUPPORT PLATE WHICH IS BELIEVED TO HAVE BEEN SUFFICIENT TO RENDER INEFFECTIVE THE CORROSION INHIBITOR IN THE CLEANING SOLUTION. U.S. INDUSTRY REPRESENTATIVES STATED DURING RECENT MEETINGS WITH THE NRC STAFF THAT CHEMICAL CLEANINGS WHICH HAVE BEEN PERFORMED IN THE U.S. INVOLVE DIFFERENT CLEANING AGENTS AND INHIBITORS THAN THAT USED AT THE FOREIGN FACILITY AND INVOLVE LESS RISK FOR PRODUCING SIMILAR DAMAGE.

THE SUPPORT PLATE DAMAGE AT THE FOREIGN FACILITY EFFECTIVELY ELIMINATED LATERAL SUPPORT TO TUBES WITHIN THE AFFECTED REGION. LATERAL SUPPORT PROVIDES VIBRATIONAL STABILITY AND THE ABILITY TO SUSTAIN EARTHQUAKE AND LOSS-OF-COOLANT-ACCIDENT LOADINGS. ACCORDINGLY, ALL TUBES FOUND NOT TO BE SUPPORTED AT THE UPPERMOST SUPPORT PLATE WERE PLUGGED.

BASED ON THIS EXPERIENCE, THE FOREIGN UTILITY CAREFULLY EXAMINED THE SUPPORT PLATE EDDY CURRENT SIGNALS AT OTHER PWR FACILITIES. AT ONE OF THESE UNITS, WITH STEAM GENERATORS SIMILAR BUT NOT IDENTICAL IN DESIGN TO WESTINGHOUSE MODEL 51 STEAM GENERATORS, EDDY CURRENT SIGNALS INDICATIVE OF SUPPORT PLATE LIGAMENT CRACKS WERE FOUND AT THE UPPERMOST SUPPORT PLATE. THE SUPPORT PLATES ARE OF THE DRILLED HOLE TYPE AND ARE FABRICATED FROM CARBON STEEL. SUBSEQUENT VISUAL INSPECTION CONFIRMED THE PRESENCE OF LIGAMENT CRACKS NEAR THE PERIPHERY OF THE SUPPORT PLATE. PART OF THE SUPPORT PLATE PERIPHERY WAS OBSERVED TO BE ENTIRELY BROKEN AWAY IN THE VICINITY OF A RADIAL SEISMIC SUPPORT. THE STEAM GENERATORS AT THIS FACILITY HAVE NOT BEEN CHEMICALLY CLEANED. REVIEW OF PAST EDDY CURRENT RESULTS INDICATES THAT THE INDICATIONS OF LIGAMENT CRACKS DATE BACK AT LEAST 9 YEARS. IT IS NOT CLEAR WHETHER THE LIGAMENT CRACKS WERE PRESENT PRIOR TO INITIAL SERVICE OR WHETHER THE CRACKS MAY HAVE

DEVELOPED SHORTLY THEREAFTER. THE CAUSE OF THESE CRACKS IS UNDER INVESTIGATION BY THE FOREIGN UTILITY AND STEAM GENERATOR MANUFACTURER. TUBES WHOSE LATERAL SUPPORT WAS POTENTIALLY AFFECTED BY THESE CRACKS HAVE BEEN PLUGGED. PRESS REPORTS INDICATE THAT SIMILAR INDICATIONS OF SUPPORT PLATE LIGAMENT CRACKS HAVE RECENTLY BEEN FOUND AT OTHER FACILITIES IN THE SAME COUNTRY WITH SIMILAR STEAM GENERATORS. VISUAL INSPECTIONS CONDUCTED IN JUNE 1994 AT A FOREIGN PWR FACILITY REVEALED THE BOTTOM OF THE WRAPPER HAD DROPPED DOWN BY 20 MILLIMETERS IN ONE STEAM GENERATOR AND BY 5 MILLIMETERS IN ANOTHER STEAM GENERATOR. THE STEAM GENERATORS ARE SIMILAR BUT NOT IDENTICAL TO WESTINGHOUSE MODEL 51 STEAM GENERATORS. THE VISUAL INSPECTIONS WERE PERFORMED THROUGH HANDHOLES LOCATED ABOVE THE TUBESHEET. FURTHER INVESTIGATION REVEALED THAT WRAPPER WELDS AT EACH OF SIX VERTICAL SUPPORTS IN THE FIRST STEAM GENERATOR AND AT THREE OF SIX VERTICAL SUPPORTS IN THE SECOND STEAM GENERATOR HAD FAILED, ALLOWING THE DOWNWARD DISPLACEMENT OF THE WRAPPER. THE CAUSE OF THIS OCCURRENCE IS UNDER INVESTIGATION BY THE FOREIGN UTILITY AND THE STEAM GENERATOR MANUFACTURER. THEIR PRELIMINARY ASSESSMENT IS THAT UNANTICIPATED AXIAL RESTRAINT AGAINST DIFFERENTIAL THERMAL EXPANSION BETWEEN THE WRAPPER AND STEAM GENERATOR PRESSURE VESSEL SHELL LED TO SIGNIFICANT LOADING OF THE WRAPPER VERTICAL SUPPORTS. THIS UNANTICIPATED RESTRAINT BETWEEN THE WRAPPER AND SHELL MAY HAVE BEEN DUE TO DIFFERENTIAL THERMAL EXPANSION BETWEEN SUPPORT PLATE NUMBER 7 AND THE SHELL, PREVENTING RELATIVE AXIAL MOTION BETWEEN THE WRAPPER AND SHELL AT THIS ELEVATION, DURING TRANSIENTS INVOLVING THE AUXILIARY FEEDWATER. POOR QUALITY OF THE WRAPPER WELDS AT THE VERTICAL SUPPORT MAY ALSO HAVE BEEN A CONTRIBUTING FACTOR. IMPLICATIONS OF A COMPLETE FALL OF THE WRAPPER HAVE BEEN ASSESSED BY THE FOREIGN UTILITY TO INCLUDE THE POTENTIAL FOR LOSS OF FEEDWATER, DAMAGE TO THE LARGEST RADIUS TUBE U-BENDS, LOOSE PARTS, AND TUBE RUPTURE. ACCORDINGLY, THE FOREIGN UTILITY HAS IMPLEMENTED TEMPORARY REPAIRS TO STABILIZE AND MONITOR THE WRAPPERS PENDING FURTHER INVESTIGATION REGARDING LONG-TERM RESOLUTION OF THIS MATTER. DISCUSSION WAS ILLUSTRATED BY THE FOREIGN EXPERIENCE, SUPPORT PLATE SIGNAL ANOMALIES DURING EDDY CURRENT TESTING OF THE STEAM GENERATOR TUBES MAY BE INDICATIVE OF SUPPORT PLATE DAMAGE OR LIGAMENT CRACKING. THE SIGNAL ANOMALIES AT THE FOREIGN UNITS WERE PRESENT FOR SEVERAL YEARS BEFORE THEY WERE FIRST IDENTIFIED BY THE DATA ANALYSTS. THE ELECTRIC POWER RESEARCH INSTITUTE (EPRI) HAS INITIATED AN EFFORT, IN RESPONSE TO THE FOREIGN EXPERIENCE, TO DEVELOP A QUALIFIED PROCEDURE FOR DETECTING SUPPORT PLATE LIGAMENT CRACKS. THE STEAM GENERATOR TUBE SUPPORT PLATES FUNCTION TO SUPPORT THE TUBES AGAINST LATERAL DISPLACEMENT AND VIBRATION AND TO MINIMIZE BENDING MOMENTS IN THE TUBES DURING ACCIDENTS. DAMAGE AND/OR CRACKING OF THE SUPPORT PLATES CAN IMPAIR THE ABILITY OF THE SUPPORT PLATES TO PERFORM THIS FUNCTION AND, THUS, MAY POTENTIALLY IMPAIR TUBE INTEGRITY. IN ADDITION, THE STAFF HAS RECENTLY APPROVED A 3 VOLT PLUGGING CRITERIA FOR TWO U.S. PLANTS BASED, IN PART, UPON EVIDENCE FROM INSPECTIONS USING EPRI PRELIMINARY PROCEDURES THAT THE TUBE SUPPORT PLATES ARE CAPABLE OF LOCALLY CONSTRAINING THE TUBES AGAINST TUBE RUPTURE. KNOWN INSTANCES OF SUPPORT PLATE CRACKING/DAMAGE IN THE U.S. HAVE GENERALLY INVOLVED SUPPORT PLATES WITH SIGNIFICANT DENTING. THE POTENTIAL FOR SUPPORT PLATE CRACKS HAS TENDED NOT TO BE OF SIGNIFICANT CONCERN IN RECENT YEARS SINCE THE STEAM GENERATORS MOST AFFECTED BY DENTING HAVE BEEN REPLACED AND, IN ADDITION, THE INDUSTRY HAS BEEN SUCCESSFUL IN CONTROLLING DENTING PROGRESSION IN OPERATING STEAM GENERATORS. THE FOREIGN EXPERIENCE SERVES TO HIGHLIGHT THAT THERE ARE OTHER MECHANISMS WHICH MAY LEAD TO SUPPORT PLATE DAMAGE AND/OR CRACKING. BASED ON THE INFORMATION AVAILABLE TO THE NRC STAFF, IT IS NOT YET KNOWN WHETHER STEAM GENERATORS IN THE U.S. ARE VULNERABLE TO THE TYPE OF WRAPPER DAMAGE OBSERVED AT THE FOREIGN UNIT. THE STAFF WILL CONTINUE TO MONITOR INFORMATION ON SUPPORT PLATE AND WRAPPER DAMAGE AS IT BECOMES AVAILABLE FROM FOREIGN AUTHORITIES.

Initiator:	(None)	Initiator Department:	(None)
Date/Time of Discovery:	8/20/2003 9:57:01 PM	Date/Time of Occurrence:	8/20/2003 9:57:01 PM

on only one side of the device, the additional jet force from the spray cause the monorail track to flex, and the spray nozzle buggy to spray off center at tubes rather than down tube lanes. Jet spray from sludge lancing equipment is well known to be able to wear away Inconel tube metal when the spray impinges on the tube rather than down the tube lane. During normal and correct equipment operation, the spray dwell time on SG tubes is not long enough to produce measurable wall loss due to erosion; however, misdirected spray nozzles or other equipment malfunctions can cause unwanted loss of tube wall thickness.

The corrective action identified in the subject OE included the return to the older style, 4-nozzle sludge lancing equipment.

Summary Analysis and Recommendations for Additional Actions:

The specific incident of sludge lance (SL) operation induced steam generator (SG) tube damage that is described in the subject OE, is unlikely to occur at Point Beach since the apparent cause of the tube damage is attributed and isolated to a specific type of sludge lance equipment that is not utilized at Point Beach. Nevertheless, this issue has broader implications that require the creation of several new actions in the Point Beach CAP system.

Corrective Action 1: An action item should be created to ensure that any sludge lancing equipment utilized at Point Beach during U2R26 is fully qualified for use in the specific SG models in service at both Unit 1 and Unit 2. The due date shall be Nov. 20, 2003, to allow time for CA closeout.

Corrective Action 2: The Point Beach SG Program should be revised to reflect this new requirement. The due date for this CAP shall be Dec. 11, 2003 to allow time for CA closeout.

Analysis of this event in broader terms that encompass not only this OE, but also industry history of SL operations and SG inspection practices, and regulatory authority positions, leads to a conclusion that an additional corrective action is necessary. The concern is that the sequence of outage tasks at Point Beach creates the possibility that safety significant SG tube damage could occur without knowledge of same, and that the plant could start up with degraded tubes that exceed the plugging criteria.

The industry history is replete with incidents whereby secondary side activities, particularly SL, has damaged tubes. The subject OE is but one example. Previous examples just in the last couple of years include banging of tubes upon installation of the travel rails for the SL spray buggy and damage to tubes by sharp corners on the SL buggy. In an incident that occurred in 1998, as reported by NRC Information Notice 2001-16, changes in SL parameters caused through wall holes to be worn in SG tubes, resulting in primary to secondary leakage at startup. The NRC Information Notice made clear "the importance of carefully monitoring the tubes after secondary side activities", and that "inspections should be comprehensive and take into account the potential for degradation induced by secondary side activities." (Ref. 2) It is clear from the many incidents of tube damage that vendor analysis and control of changes to SL equipment and procedures is not sufficient to preclude SG tube damage, and that future incidents of tube damage are likely.

The issue at Point Beach is that SL is typically scheduled to occur following SG tube ECT inspections. Very few utilities schedule SG work in this sequence, unless secondary side SG repairs are being conducted in which case SL is necessarily scheduled after such repairs take place, since welding and machining operations on the secondary side could create loose parts.

Thus, a third Action should be created:

Corrective Action 3: Re-examine the sequence of SG maintenance and inspection activities at Point Beach, especially for the next Unit 1 inspection during Spring 2004. Greater recognition should be given to the potential for SL operation to inflict safety significant damage to SG tubes, and therefore SL operations should be performed either prior to or parallel to ECT inspections, unless other secondary side SG repair activities dictate otherwise. The due date for this action should be scheduled for April 3, 2004 before the Unit 1 or before the Unit 1 Outage schedule is locked in.

Discussion:

Industry experience is replete with examples of secondary side SG tube damage induced by Sludge Lance operations similar to damage described in the subject OE and NRC Information Notice 2001-16. Other reports of tube damage include banging and scratching of tubes during SL equipment installation and denting of tubes from sharp corners on the SL spray buggy. In an incident that occurred in 1998, as reported by NRC Information Notice 2001-16, changes in SL parameters caused through wall holes to be worn in SG tubes, resulting in primary to secondary leakage at startup. The NRC Information Notice made clear "the importance of carefully monitoring the tubes after secondary side activities", and that "inspections should be comprehensive and take into

account the potential for degradation induced by secondary side activities."

It is clear from the many incidents of tube damage that vendor analysis and control of changes to SL equipment and procedures is not sufficient to preclude SG tube damage, and that future incidents of tube damage are likely. While all of these problem have been addressed at the time of discovery, the potential continues to exist for repeat incidents or for a malfunction of SL equipment that could cause high pressure spray to be localized and concentrated on a small area of the tube, causing through wall tube erosion.

Many utilities have long required SL vendors to qualify SL operations. Even so, modifications are often made to equipment or procedures that have unforeseen ramifications as this particular OE demonstrates. In this OE case the equipment was modified with additional spray nozzles to clean and index ten tube rows at a time rather than four rows. The additional spray force caused the monorail track to twist directing spray directly at tubes rather than obliquely at the tubesheet.

To address the potential for safety related tube damage, most utilities perform SL prior to or in parallel with ECT examinations. SL is capable of not only damaging tubes by misdirected spray and equipment tube/interactions, but also moving and relocating loose parts and foreign objects that may exist on top of the tubesheet. By sequencing SL to follow ECT, two key benefits are realized:

- 1) ECT will have a high likelihood of detecting a loose part whose final resting place is adjacent to a tube and in a position to inflict damage normal subsequent plant operation, and
- 2) ECT will have a high likelihood of detecting tube damage induced by the SL operation.

Opposite sequencing defeats this capability, and any incurred damage is only detected in subsequent outage inspections as evidenced by this and other documented OEs, or by manifest tube leaks as documented in the NRC Information Notice (Ref. 2). There are reasons to perform SL after ECT. In the case of this OE, secondary side SG repairs that have the potential to create loose parts dictate that SL be performed following the repair operation. There may be other reasons as well that outweigh the potential for leaving tubes degraded by SL operations or relocated lose parts in service.

12/8/2003 4:07:18 PM - KLESPER, THOMAS:

This action requested the plant to consider performing sludge lancing before or in parallel to eddy current testing. The purpose of performing sludge lancing earlier in the outage is to detect any damage to the tubes that faulty sludge lance equipment could cause and to ensure that the secondary side is accessible in the event that potential loose parts (PLPs) are detected by eddy current testing. PLPs delays during U2R26 cost more the \$85,000. Note that when, Eddy Current and Sludge Lancing are performed in parallel, inspection by rotating probe of the first row is completed near the end of the work. This inspection detects potential damage to the tubes closest to the sludge lance equipment. Note also that there are other controls in place to ensure that the vendor's sludge lancing equipment does not damage tubes. Sludge lancing has not damaged tubes at PBNP.

The latest U1R28 steam generator outage schedule is attached, and eddy current and sludge lancing are performed in parallel. Westinghouse has been informed of the preliminary schedule dates.

12/10/2003 3:41:01 PM - SCHULTZ, ERIC:

The overall conclusion related to the above OE is that given equally weighted choices, sludge lancing should be done first or in parallel with ECT. However, sufficient controls are in place (reference other actions related to this OE/CAP) such that this sequence is not required. The requirement to use qualified sludge lancing processes as well as maintaining awareness of industry OE/issues related to sludge lancing will serve to ensure that damage does not go undetected. This action may be closed.

Hot Buttons: (None)

Section 4

QA Supervisor: (None) Licensing Supervisor: (None)

Section 5

Project:	CAP Corrective Actions	State:	Done
Active/Inactive:	Inactive	Owner:	(None)
AR Type:	Parent	Submitter:	KLESPER, THOMAS

Assigned Date: 8/5/2003 Last Modified Date: 12/15/2003 10:04:47 AM
 Last Modifier: PFAFF, SCOTT Last State Change Date: 12/15/2003 10:04:47 AM
 Last State Changer: PFAFF, SCOTT Close Date: 12/15/2003 10:04:47 AM

NUTRK ID:

Child Number: 0

References:

Update:

Import Memo Field:

CAP Admin: PBNP CAP Admin Site: Point Beach

OLD_ACTION_NUM:

Cartridge and Frame:

Attachments and Parent/Child Links

Linked From CAP032443 by admin (8/4/2003 1:22:15 PM)

SG_1208.pdf (130134 bytes) by KLESPER, THOMAS (12/8/2003 3:41:32 PM)

Change History

12/10/2003 3:41:01 PM by SCHULTZ, ERIC

Owner Changed From SCHULTZ, ERIC To PBNP CAP Admin

CAP Admin Changed From (None) To PBNP CAP Admin

12/15/2003 10:04:47 AM by PFAFF, SCOTT

Owner Changed From PBNP CAP Admin To (None)

Last Modified Date Changed From 12/10/2003 3:41:01 PM To 12/15/2003 10:04:47 AM

Last State Change Date Changed From 12/10/2003 3:41:01 PM To 12/15/2003 10:04:47 AM

Last State Changer Changed From SCHULTZ, ERIC To PFAFF, SCOTT






Close Date Changed From Unassigned To 12/15/2003 10:04:47 AM

Last Modifier Changed From SCHULTZ, ERIC To PFAFF, SCOTT

State Changed From Quality Check To Done Via Transition: Complete and Close

Active/Inactive Changed From Active To Inactive


[-] State Change History


<p>Initiate  by KLESPER, THOMAS</p>	<p>Assign Work 8/4/2003 1:19:10 PM Owner SHERWOOD, GARY</p>	<p>Assign  by SHERWOOD, GARY</p>	<p>Conduct Work 8/5/2003 11:34:53 AM Owner KLESPER, THOMAS</p>	<p>Work Complete  by KLESPER, THOMAS</p>	<p>Review & Approval 12/10/2003 8:02:25 AM Owner SCHULTZ, ERIC</p>	<p>Approved  by SCHULTZ, ERIC</p>	<p>Quality Check 12/10/2003 3:13:45 PM Owner PBNP CAP Admin</p>
<p>Complete and Close  by PFAFF, SCOTT</p>	<p>Done 12/15/2003 10:04:47 AM Owner (None)</p>						

[-] Section 1

Activity Request Id: CA032508
 Activity Type: Corrective Action Submit Date: 8/4/2003 1:19:10 PM
 Site/Unit: Point Beach - Common

[-] One Line Description: Revise SG Program to Reflect Qualification Requirements of Sludge Lance Equip
 Activity Requested: This Corrective Action was initiated to revise the Point Beach SG Program to reflect the new requirement (potential damage to Secondary side tubes). The due date for this CAP should be Dec. 11, 2003 to allow time for CA closeout.

[-] CATPR: N Initiator: PULVERMACHER, JAMES


Initiator Department: A Assessment PB Responsible Group Code: EPI Engineering Programs
 Inspection Services PB

Responsible Department: Engineering Activity Supervisor: SCHULTZ, ERIC

Activity Performer: KLESPER, THOMAS

[-] Section 2

Priority: 4 Due Date: 12/11/2003

[-] Mode Change Restraint: (None) Management Exception From PI?: N

[-] QA/Nuclear Oversight?: N [-] Licensing Review?: N

NRC Commitment?: N [-] NRC Commitment Date:

[-] Significance Level: D

[-] Section 3

Activity Completed: 8/4/2003 1:10:44 PM - KLESPER, THOMAS:

References:

1. OE 15901 SG Sludge Lance Damage, Feb. 11, 2003
2. NRC Information Notice 2001-16: Recent Foreign and Domestic

Experience with Degradation of Steam Generator Tubes and Internals, Oct. 31, 2001

Event Brief:

The subject OE discusses the discovery of Steam Generator (SG) tube damage discovered in February 2003 that was induced by sludge lancing operations on the SG secondary side. The defective tubes experienced as much as 50% wall loss, and five tubes had to be plugged.

The apparent cause of the defects was the use of new sludge lancing equipment by the vendor, Westinghouse, that allowed ten row coverage vs. the previous coverage of four rows. With nozzles on only one side of the device, the additional jet force from the spray cause the monorail track to flex, and the spray nozzle buggy to spray off center at tubes rather than down tube lanes. Jet spray from sludge lancing equipment is well known to be able to wear away Inconel tube metal when the spray impinges on the tube rather than down the tube lane. During normal and correct equipment

operation, the spray dwell time on SG tubes is not long enough to produce measurable wall loss due to erosion; however, misdirected spray nozzles or other equipment malfunctions can cause unwanted loss of tube wall thickness.

The corrective action identified in the subject OE included the return to the older style, 4-nozzle sludge lancing equipment.

Summary Analysis and Recommendations for Additional Actions:

The specific incident of sludge lance (SL) operation induced steam generator (SG) tube damage that is described in the subject OE, is unlikely to occur at Point Beach since the apparent cause of the tube damage is attributed and isolated to a specific type of sludge lance equipment that is not utilized at Point Beach. Nevertheless, this issue has broader implications that require the creation of several new actions in the Point Beach CAP system.

Corrective Action 1: An action item should be created to ensure that any sludge lancing equipment utilized at Point Beach during U2R26 is fully qualified for use in the specific SG models in service at both Unit 1 and Unit 2. The due date shall be Nov. 20, 2003, to allow time for CA closeout.

Corrective Action 2: The Point Beach SG Program should be revised to reflect this new requirement. The due date for this CAP shall be Dec. 11, 2003 to allow time for CA closeout.

Analysis of this event in broader terms that encompass not only this OE, but also industry history of SL operations and SG inspection practices, and regulatory authority positions, leads to a conclusion that an additional corrective action is necessary. The concern is that the sequence of outage tasks at Point Beach creates the possibility that safety significant SG tube damage could occur without knowledge of same, and that the plant could start up with degraded tubes that exceed the plugging criteria.

The industry history is replete with incidents whereby secondary side activities, particularly SL, has damaged tubes. The subject OE is but one example. Previous examples just in the last couple of years include banging of tubes upon installation of the travel rails for the SL spray buggy and damage to tubes by sharp corners on the SL buggy. In an incident that occurred in 1998, as reported by NRC Information Notice 2001-16, changes in SL parameters caused through wall holes to be worn in SG tubes, resulting in primary to secondary leakage at startup. The NRC Information Notice made clear "the importance of carefully monitoring the tubes after secondary side activities", and that "inspections should be comprehensive and take into account the potential for degradation induced by secondary side activities." (Ref. 2) It is clear from the many incidents of tube damage that vendor analysis and control of changes to SL equipment and procedures is not sufficient to preclude SG tube damage, and that future incidents of tube damage are likely.

The issue at Point Beach is that SL is typically scheduled to occur following SG tube ECT inspections. Very few utilities schedule SG work in this sequence, unless secondary side SG repairs are being conducted in which case SL is necessarily scheduled after such repairs take place, since welding and machining operations on the secondary side could create loose parts.

Thus, a third Action should be created:

Corrective Action 3: Re-examine the sequence of SG maintenance and inspection activities at Point Beach, especially for the next Unit 1 inspection during Spring 2004. Greater recognition should be given to the potential for SL operation to inflict safety significant damage to SG tubes, and therefore SL operations should be performed either prior to or parallel to ECT inspections, unless other secondary side SG repair activities dictate otherwise. The due date for this action should be scheduled for April 3, 2004 before the Unit 1 or before the Unit 1 Outage schedule is locked in.

Discussion:

Industry experience is replete with examples of secondary side SG tube damage induced by Sludge Lance operations similar to damage described in the subject OE and NRC Information Notice 2001-16. Other reports of tube damage include banging and scratching of tubes during SL equipment installation and denting of tubes from sharp corners on the SL spray buggy. In an incident that occurred in 1998, as reported by NRC Information Notice 2001-16, changes in SL parameters caused through wall holes to be worn in SG tubes, resulting in primary to secondary leakage at startup. The NRC Information Notice made clear "the importance of carefully monitoring the tubes after secondary side activities", and that "inspections should be comprehensive and take into account the potential for degradation induced by secondary side activities."

It is clear from the many incidents of tube damage that vendor analysis and control of changes to SL equipment and procedures is not sufficient to preclude SG tube damage, and that future incidents of

tube damage are likely. While all of these problem have been addressed at the time of discovery, the potential continues to exist for repeat incidents or for a malfunction of SL equipment that could cause high pressure spray to be localized and concentrated on a small area of the tube, causing through wall tube erosion.

Many utilities have long required SL vendors to qualify SL operations. Even so, modifications are often made to equipment or procedures that have unforeseen ramifications as this particular OE demonstrates. In this OE case the equipment was modified with additional spray nozzles to clean and index ten tube rows at a time rather than four rows. The additional spray force caused the monorail track to twist directing spray directly at tubes rather than obliquely at the tubesheet.

To address the potential for safety related tube damage, most utilities perform SL prior to or in parallel with ECT examinations. SL is capable of not only damaging tubes by misdirected spray and equipment tube/interactions, but also moving and relocating loose parts and foreign objects that may exist on top of the tubesheet. By sequencing SL to follow ECT, two key benefits are realized:

- 1) ECT will have a high likelihood of detecting a loose part whose final resting place is adjacent to a tube and in a position to inflict damage normal subsequent plant operation, and
- 2) ECT will have a high likelihood of detecting tube damage induced by the SL operation.

Opposite sequencing defeats this capability, and any incurred damage is only detected in subsequent outage inspections as evidenced by this and other documented OEs, or by manifest tube leaks as documented in the NRC Information Notice (Ref. 2). There are reasons to perform SL after ECT. In the case of this OE, secondary side SG repairs that have the potential to create loose parts dictate that SL be performed following the repair operation. There may be other reasons as well that outweigh the potential for leaving tubes degraded by SL operations or relocated lose parts in service.

11/25/2003 2:49:55 PM - KLESPER, THOMAS:
Include a reference to OE 052861 regarding use of the Series II system on model 44F Steam Generators

12/7/2003 11:07:19 AM - KLESPER, THOMAS:
NP 7.7.18 "Requirements for Steam Generator Secondary Side Activities" was revised on September 24th, 2003. Step 4.2.1 was revised to stated "Sludge Lancing shall be performed ... using a qualified vendor process and approved vendor procedures." By requiring the process to be qualified (that is, tested on similar steam generators with a letter from the vendor stating that the equipment has not and should not damage PBNPs tube) helps ensure that sludge lancing equipment will not damage PBNPs generators. In this case, Westinghouse had tested their new system, however not to the extent necessary. Industry OE discovered a design weakness. Westinghouse has stated that they intend to make design and process improvements to address the tube wear concerns.

The point is, simply requiring the process to be qualified will not prevent reoccurrence. It will help and this is only one step in a multi-step corrective action program. In addition to the qualification requirement, the procedure is being revision again to include references to industry OE. The reference to the OE will help the Steam Generator Engineer find and review OE when vendor sludge lancing procedures are reviewed for use at PBNP. NP 7.7.18 revision 2 is in progress and adds two industry OE, reference 5.9 and 5.10.

12/10/2003 8:02:25 AM - KLESPER, THOMAS:
NP 7.7.18 revision 2 was issued today. The document can be viewed in EDMS. Step 4.2.1 and references 5.9 to 5.13 / bases B-3 capture the concern.

12/10/2003 3:13:45 PM - SCHULTZ, ERIC:
Revisions to NP 7.7.18 have been completed to address the requirement to use qualified lancing processes as well as adding references to relevant OE items. This action is complete.

Hot Buttons: (None)

☐ Section 4

QA Supervisor: (None) Licensing Supervisor: (None)

☐ Section 5

☑ Project:	CAP Corrective Actions	☑ State:	Done
☑ Active/Inactive:	Inactive	☑ Owner:	(None)

AR Type: Parent ⚙ Submitter: KLESNER, THOMAS
Assigned Date: 8/5/2003 ⚙ Last Modified Date: 12/15/2003 10:04:47 AM
⚙ Last Modifier: PFAFF, SCOTT ⚙ Last State Change Date: 12/15/2003 10:04:47 AM
⚙ Last State Changer: PFAFF, SCOTT ⚙ Close Date: 12/15/2003 10:04:47 AM

NUTRK ID:

Child Number: 0

References:

Update:

Import Memo Field:

CAP Admin: PBNP CAP Admin Site: Point Beach

OLD_ACTION_NUM:

Cartridge and Frame:

 Attachments and Parent/Child Links [Linked From CAP032443](#) by admin (8/4/2003 1:19:12 PM) Change History

12/10/2003 3:13:45 PM by SCHULTZ, ERIC

Owner Changed From SCHULTZ, ERIC To PBNP CAP Admin

Last Modified Date Changed From 12/10/2003 8:02:25 AM To 12/10/2003 3:13:45 PM

12/15/2003 10:04:47 AM by PFAFF, SCOTT

State Changed From Quality Check To Done Via Transition: Complete and Close

Active/Inactive Changed From Active To Inactive

Owner Changed From PBNP CAP Admin To (None)

Last Modified Date Changed From 12/10/2003 3:13:45 PM To 12/15/2003 10:04:47 AM







Last Modifier Changed From SCHULTZ, ERIC To PFAFF, SCOTT

Last State Change Date Changed From 12/10/2003 3:13:45 PM To 12/15/2003 10:04:47 AM

Last State Changer Changed From SCHULTZ, ERIC To PFAFF, SCOTT

Close Date Changed From Unassigned To 12/15/2003 10:04:47 AM

[-] State Change History

<p>Initiate  by SHERWOOD, GARY</p>	<p>Assign Work 6/10/2003 4:32:10 PM Owner SHERWOOD, GARY</p>	<p>Assign  by SHERWOOD, GARY</p>	<p>Conduct Work 6/13/2003 4:59:03 PM Owner SHERWOOD, GARY</p>	<p>Update  by SHERWOOD, GARY</p>	<p>Conduct Work 7/30/2003 8:26:20 AM Owner KLESPPER, THOMAS</p>	<p>Work Complete  by KLESPPER, THOMAS</p>	<p>Review & Approval 3/7/2004 8:47:28 AM Owner HAWKI, LOYDE</p>
<p>Approved  by HAWKI, LOYDE</p>	<p>Quality Check 3/8/2004 2:16:17 PM Owner PBNP CAP Admin</p>	<p>Complete and Close  by PFAFF, SCOTT</p>	<p>Done 3/12/2004 6:59:54 AM Owner (None)</p>				

[-] Section 1

Activity Request Id: CA031252
Activity Type: Corrective Action **Submit Date:** 6/10/2003 4:32:10 PM
Site/Unit: Point Beach - Unit 1
 One Line Description: Incorporate OE 15529 into the Unit 1 S/G Degradation Assessment for spring 2004
Activity Requested: Incorporate OE 15529 into the unit 1 steam generator degradation assessment for the spring 2004 inspections.
 CATPR: N **Initiator:** PULVERMACHER, JAMES
Initiator Department: A Assessment PB **Responsible Group Code:** EPI Engineering Programs Inspection Services PB
Responsible Department: Engineering **Activity Supervisor:** HAWKI, LOYDE
Activity Performer: KLESPPER, THOMAS

[-] Section 2

Priority: 3 **Due Date:** 3/15/2004
 Mode Change Restraint: (None) **Management Exception From PI?:** N
 QA/Nuclear Oversight?: N **Licensing Review?:** N
NRC Commitment?: N **NRC Commitment Date:**
 Significance Level: D

[-] Section 3

Activity Completed: 6/9/2003 12:22:51 PM - SHERWOOD, GARY:
 Mr John Arhar, Steam Generator Engineer at Diablo Canyon (805-545-4629), was contacted to discuss the specific findings at DC 2. The steam generators at DC 2 are Westinghouse Series 51 steam generators, with 1600 MA tubes and carbon steel support plates with drilled holes. The steam generators have 15 EFPYs of operating time. Approximately 5% of the tubes are plugged, with another 25% of the tubes degraded with a combination of PWSCC at the low row Ubends and ODSCC at the tube support intersections.

During the most recent outage at DC 2, circumferential cracking was discovered in the ubends of rows 3 through 10. In previous outages, inspections were limited to the low row ubends (ie rows 1 and 2), due to previous industry experience. The DC 2 degradation assessment did not anticipate the existence of the defects in rows 3 through 10.

DC 2 has denting at the tube support plate intersections, resulting in conditions which can initiate ODSCC. Axial cracking was noted at the TSP intersections this outage and previous outages. After discovering the axial cracking, DC 2 lowered their threshold to inspect TSP intersections with plus point probes to bobbin coil indications greater than 1 volt and plugged all bobbin coil indications greater than 1.2 volts.

2/23/2004 1:54:49 PM - KLESPER, THOMAS:

The draft Degradation Assessment (DA) discusses the Diablo Canyon concluding that Point Beach 1 Alloy 600 TT tubing was stress relieved after bending and it is less susceptible to PWSCC, refer to section 2.3.6. Therefore, it is regarded as unnecessary to perform a +Point sample of U-bends beyond Row 2. With both the Seabrook and Braidwood incidents, the industry is rethinking this assumption.

There is a pending requisition requesting Westinghouse to determine the highest stressed U-bend regions.

3/7/2004 8:47:28 AM - KLESPER, THOMAS:

The Degradation Assessment for U1R28 is attached and section 2.3.6 addresses Diablo Canyon. Point Beach 1 Alloy 600 TT tubing was stress relieved after bending and it is less susceptible to PWSCC. The Seabrook issues mentioned in the 2/23/04 update is also addressed in section 2.3.2. The Seabrook issue is outside the scope of this CAP and is being addressed in CA055982. The Seabrook issue affects PBNP.

The Diablo Canyon issue is addressed in the attached DA. The Diablo Canyon can be closed.

Hot Buttons: (None)

[-] Section 4

QA Supervisor: (None) Licensing Supervisor: (None)

[-] Section 5

Project:	CAP Corrective Actions	State:	Done
Active/Inactive:	Inactive	Owner:	(None)
AR Type:	Parent	Submitter:	SHERWOOD, GARY []
Assigned Date:	6/13/2003	Last Modified Date:	3/12/2004 6:59:54 AM
Last Modifier:	PFAFF, SCOTT []	Last State Change Date:	3/12/2004 6:59:54 AM
Last State Changer:	PFAFF, SCOTT []	Close Date:	3/12/2004 6:59:54 AM

NUTRK ID:

Child Number: 0

References:

Update:

Import Memo Field:

CAP Admin: PBNP CAP Admin [] Site: Point Beach

OLD_ACTION_NUM:

Cartridge and Frame:

[-] Attachments and Parent/Child Links

[] [Linked to CAP032180: OE15778 -\(Update to OE15529\) - Steam Generator Tube Plugging Due to Stress Corr](#) by admin (6/10/2003 4:32:17 PM) []

[WEP-04-35.pdf](#) (5060118 bytes) by KLESPER, THOMAS (3/7/2004 8:35:01 AM) []

[-] Change History

3/8/2004 2:16:17 PM by HAWKI, LOYDE
 Last State Changer Changed From KLESPER, THOMAS To HAWKI, LOYDE
 CAP Admin Changed From (None) To PBNP CAP Admin

3/12/2004 6:59:54 AM by PFAFF, SCOTT
 Active/Inactive Changed From Active To Inactive
 Owner Changed From PBNP CAP Admin To (None)
 Last Modified Date Changed From 3/8/2004 2:16:17 PM To 3/12/2004 6:59:54 AM
 Last Modifier Changed From HAWKI, LOYDE To PFAFF, SCOTT
 Close Date Changed From Unassigned To 3/12/2004 6:59:54 AM
 State Changed From Quality Check To Done Via Transition: Complete and Close
 Last State Change Date Changed From 3/8/2004 2:16:17 PM To 3/12/2004 6:59:54 AM

Last State Changer Changed From HAWKI, LOYDE To PFAFF, SCOTT