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FACIL:STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
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STEWART,W.L. Arizona Public Service Co. (formerly Arizona Nuclear Power
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

See Proposed Change to Tech Specs Reports

SUBJECT: Application for amends to Licenses NPF-41,NPF-51 & NPF-74, revesing TS Section 3/4.4.4 re steam generators & associated bases.Proprietary Rev 1 to Final Rept CEN-613-P encl.Rept withheld (ref 10CFR50.91(b)(1)).

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WILLIAM L. STEWART
EXECUTIVE VICE PRESIDENT
NUCLEAR

102-03325-WLS/SAB/JRP
April 18, 1995

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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Washington, DC 20555

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Technical Specification Amendment Request
Sleeving Process for Steam Generator Tube Repair

Arizona Public Service Company (APS) is requesting amendments to the Technical Specifications for PVNGS Units 1, 2, and 3. The proposed amendments would revise the surveillance requirements for Technical Specifications Section 3/4.4.4, Steam Generators and associated Bases. These amendments would allow the installation of tube sleeves as an alternative to plugging defective steam generator tubes. The Technical Specification surveillance requirements are revised to allow steam generator tube repair using ABB Combustion Engineering Inc. (ABB-CE), Leak Tight Sleeves. The details of specific qualifications of the sleeve types are documented in a separate report, which is provided in Attachment 2. This report (CEN-613-P, January 1995) contains information which is proprietary to ABB Combustion Engineering Inc., for which an affidavit is provided. The affidavit sets forth the basis on which the information may be withheld from public disclosure by the Commission and specifically addresses the considerations listed in Paragraph (b)(4) of Section 2.790 of the Commission's regulations. Accordingly, it is respectfully requested that Attachment 2 be withheld from public disclosure in accordance with Title 10 of the Code of Federal Regulations, Section 2.790.

Attachment 3 to this letter contains APS' exceptions to ABB Combustion Engineering Inc., Report CEN-613-P, Rev. 01, dated January 1995.

It is important to note that the steam generator tube repair using ABB Combustion Engineering, Inc. welded sleeves has been utilized in commercial nuclear power plants in the past. Maine Yankee Atomic Power Company has submitted a similar request to use ABB Combustion Engineering Leak Tight Sleeves (December 6, 1994).

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The proposed amendments have been reviewed and approved by the Plant Review Board (PRB) and the Offsite Safety Review Committee (OSRC); and it has been determined that the amendments involve no significant hazards considerations.

APS requests that the proposed amendments to the Technical Specifications be reviewed and approved in a timely manner to allow the option of sleeving defective steam generator tubes during upcoming outages.

Provided in Attachment 1 to this letter are the following:

A. Description of the Proposed Amendment Request
B. Purpose of the Technical Specification
C. Need for the Technical Specification Amendment
D. Safety Analysis of the Proposed Technical Specification Amendment
E. No Significant Hazards Consideration Determination
F. Environmental Impact Determination
G. Marked-up Technical Specification Change Pages

Pursuant to 10 CFR 50.91(b) (1), a copy of this request has been forwarded to Arizona Radiation Regulatory Agency.

Should you have any questions, please contact Scott A. Bauer at (602) 393-5978.

Sincerely,

WLS/SAB/JRP/rv
Attachments

cc: L. J. Callan
K. E. Perkins
B. E. Holian
K. E. Johnston
I. Barnes
A. V. Godwin (ARRA)

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, W. L. Stewart, represent that I am Executive Vice President - Nuclear, Arizona Public Service Company (APS), that the foregoing document has been signed by me on behalf of APS with full authority to do so, and that to the best of my knowledge and belief, the statements made therein are true and correct.

W. L. Stewart

Sworn To Before Me This 18 Day Of April, 1995.

Roxanna VanDillen
Notary Public

My Commission Expires

My Commission Expires June 12, 1997

ROXANNA VANDILLEN NOTARY PUBLIC MARICOPA CO. AZ

AFFIDAVIT PURSUANT

TO 10 CFR 2.790

Combustion Engineering, Inc.)
State of Connecticut)
County of Hartford) SS.:

I, S. A. Toelle, depose and say that I am the Manager, Nuclear Licensing, of Combustion Engineering, Inc., duly authorized to make this affidavit, and have reviewed or caused to have reviewed the information which is identified as proprietary and referenced in the paragraph immediately below. I am submitting this affidavit in conjunction with the application of Arizona Public Service Company in conformance with the provisions of 10 CFR 2.790 of the Commission's regulations for withholding this information.

The information for which proprietary treatment is sought is contained in the following document:

CEN-613-P, Revision 01, "Arizona Public Service Co. Palo Verde Units 1, 2 & 3 Steam Generator Tube Repair Using Leak Tight Sleeves, FINAL REPORT," January 1995.

This document has been appropriately designated as proprietary.

I have personal knowledge of the criteria and procedures utilized by Combustion Engineering in designating information as a trade secret, privileged or as confidential commercial or financial information.

Pursuant to the provisions of paragraph (b) (4) of Section 2.790 of the Commission's regulations, the following is furnished for consideration by the Commission in determining whether the information sought to be withheld from public disclosure, included in the above referenced document, should be withheld.

1. The information sought to be withheld from public disclosure, which is owned and has been held in confidence by Combustion Engineering, is the steam generator welded sleeving installation and inspection methods.

2. The information consists of test data or other similar data concerning a process, method or component, the application of which results in substantial competitive advantage to Combustion Engineering.

3. The information is of a type customarily held in confidence by Combustion Engineering and not customarily disclosed to the public. Combustion Engineering has a rational basis for determining the types of information customarily held in confidence by it and, in that connection, utilizes a system to determine when and whether to hold certain types of information in confidence. The details of the aforementioned system were provided to the Nuclear Regulatory Commission via letter DP-537 from F. M. Stern to Frank Schroeder dated December 2, 1974. This system was applied in determining that the subject document

herein is proprietary.

4. The information is being transmitted to the Commission in confidence under the provisions of 10 CFR 2.790 with the understanding that it is to be received in confidence by the Commission.

5. The information, to the best of my knowledge and belief, is not available in public sources, and any disclosure to third parties has been made pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

6. Public disclosure of the information is likely to cause substantial harm to the competitive position of Combustion Engineering because:

   a. A similar product is manufactured and sold by major pressurized water reactor competitors of Combustion Engineering.

   b. Development of this information by Combustion Engineering required tens of thousands of manhours and millions of dollars. To the best of my knowledge and belief, a competitor would have to undergo similar expense in generating equivalent information.

   c. In order to acquire such information, a competitor would also require considerable time and inconvenience developing

improved tooling and installation processes for steam generator welded sleeves.

d. The information required significant effort and expense to obtain the licensing approvals necessary for application of the information. Avoidance of this expense would decrease a competitor's cost in applying the information and marketing the product to which the information is applicable.

e. The information consists of improved tooling and installation processes for steam generator welded sleeves, the application of which provides a competitive economic advantage. The availability of such information to competitors would enable them to modify their product to better compete with Combustion Engineering, take marketing or other actions to improve their product's position or impair the position of Combustion Engineering's product, and avoid developing similar data and analyses in support of their processes, methods or apparatus.

f. In pricing Combustion Engineering's products and services, significant research, development, engineering, analytical, manufacturing, licensing, quality assurance and other costs and expenses must be included. The ability of Combustion Engineering's competitors to utilize such information without similar expenditure of resources may enable them to sell at prices reflecting significantly lower costs.

g. Use of the information by competitors in the international

marketplace would increase their ability to market nuclear steam supply systems by reducing the costs associated with their technology development. In addition, disclosure would have an adverse economic impact on Combustion Engineering's potential for obtaining or maintaining foreign licensees.

Further the deponent sayeth not.

S. A. Toelle

S. A. Toelle
Manager
Nuclear Licensing

Sworn to before me
this 1st day of February, 1995

Laurie J. White
Notary Public

My commission expires: 8/31/99

ATTACHMENT 3

ARIZONA PUBLIC SERVICE COMPANY EXCEPTIONS TO

COMBUSTION ENGINEERING INC.

REPORT CEN-613-P, REVISION 1

Attachment 3

ARIZONA PUBLIC SERVICE COMPANY EXCEPTIONS TO COMBUSTION ENGINEERING INC. REPORT CEN-613-P, REVISION 1

Regulatory Guide 1.121 Plugging Limit for CE Leak Tight Sleeves

Combustion Engineering assumed the original design conditions for the PVNGS Steam Generators in Section 8 of CEN-613-P. In 1994, APS elected to reduce the primary temperature from 621 °F to 611 °F in an effort to reduce corrosion rates in Alloy 600. For most of the structural assessments in Section 8, the use of the original design conditions is either conservative or has a negligible effect. However, in assessing structural margin with regard to Reg Guide 1.121 required margins of 3ΔP, APS performed a separate assessment based on a higher primary-to-secondary differential pressure resulting from the reduction in primary temperature.

From page 8-8 of CEN-613-P

Primary Pressure P_{pri} = 2250 psig

Secondary Pressure P_{scc} = 980 psig (originally 1070 psig)

Differential Pressure $\Delta P = P_{pri} - P_{scc}$ = 1270 psi

Average Pressure $P_{ave} = 0.5 (P_{pri} + P_{scc})$ = 1615 psi

From page 8-8

$t = 3\Delta P R_{is} / S_u - P_{ave}$ = 3 (1.270) (0.2805) / 80.0 - 1.615 = 0.0136 inch

% allowable degradation = 0.0300 - 0.0136 / 0.0300 = 54.67 %

The allowable degradation for the 3ΔP criterion is limiting compared to 57.0 % allowable degradation for MSLB as given on page 8-10 of CEN-613-P.

In establishing a criteria for Reg Guide 1.121 plugging margin, an allowance for ECT uncertainty and defect growth rate should be applied. Typically, for Alloy 600 tubing a 10% allowance for ECT uncertainty and 10% allowance for growth rate was applied in establishing plugging limits. This would indicate that the plugging limit for sleeve defects should be 34.67%. APS will incorporate a 35% limit within the PVNGS Technical Specifications. Rounding up is still considered conservative given enhanced corrosion resistance of Alloy 690 and recent improvements in ECT probe design and resolution techniques.

Post Weld Heat Treatment Recommendation

Recent industry experience with forced shutdown events associated with tube failures at sleeve junctions was assessed by APS. The root cause of these events has been attributed to the lack of proper post-installation stress relief and/or the imposition of high stresses due the tube growth restrictions at locked tube supports. The material and design of the PVNGS steam generator supports minimizes the potential for locked supports. The tube supports are of eggcrate design and are constructed of ferritic stainless steel. The large flow area in the eggcrate design provides better irrigation and reduces the potential for steam blanketing, therefore, the tube-to-tube support vehicles are less likely to be blocked by crud, boiler water deposits and corrosion products. Since the support material is type 409 ferritic stainless steel, it is not susceptible to magnetite corrosion which has resulted in denting and lockup at plants with carbon steel supports. These conclusions have been confirmed during tube pull activities conducted in PVNGS Unit 2.

Although CE does not require post-weld heat treatment (PWHT) in all applications, APS will require that a post-weld stress relief be conducted for all sleeve installations. The CE specified PWHT temperature range is 1300 to 1425 °F. APS will require a more restrictive range about a nominal PWHT temperature of 1400 °F.

ATTACHMENT 1

TECHNICAL SPECIFICATION AMENDMENT REQUEST

SLEEVING PROCESS FOR STEAM GENERATOR TUBE REPAIR

A. DESCRIPTION OF THE PROPOSED AMENDMENT REQUEST

The proposed amendments would revise the surveillance requirements for Technical Specification Section 4.4.4, Steam Generators and its associated Bases. These amendments would allow the installation of tube sleeves as an alternative to plugging defective steam generator tubes at Palo Verde Nuclear Generating Station using ABB Combustion Engineering Inc., Leak Tight Sleeves.

The acceptance criteria for steam generator inservice inspections will be revised to allow sleeving as an acceptable means of repairing defective tubes. Reporting requirements have been added for those defect locations spanned by a sleeve.

This proposed Technical Specification amendment modifies Section 4.4.4, as follows:

a) Section 4.4.4.4(a), Acceptance Criteria is revised to add the definition of "Tubing or Tube," and "Tube Repair." The definition of defect was expanded to include a reference to the repair limit. The definition of plugging limit was expanded to include a reference to the repair limit and include sleeving as an alternative to tube plugging. In addition, the discussion of operability in Section 4.4.4.4(b) was revised to include repaired tubes after sleeving and a reference of the methodology to be used.

b) Reporting requirements of Section 4.4.4.5 have been revised to include the reporting of sleeved tubes, in addition to the reporting of plugged tubes.

c) Table 4.4-2 "Steam Generator Tube Inspection" is revised to reference sleeved tubes, in addition to plugged tubes described in the steam generator inspection program.

Additionally, the Bases for Technical Specification 3/4.4.4 has been revised to: (1) reflect that defective steam generator tubes can be repaired by sleeving; (2) reference the applicable document for steam generator tube sleeving; and (3) add a discussion related to inservice inspection of sleeved tubes.

B. PURPOSE OF THE TECHNICAL SPECIFICATION

The surveillance requirements for inspection of the steam generator tubes ensure that the structural integrity of this portion of the Reactor Coolant System (RCS) will be maintained. The inservice inspection program for the steam generators is essential in order to maintain surveillance of the conditions of the tubes in the event that there is evidence of mechanical damage or progressive degradation due to design, manufacturing errors, or inservice conditions that lead to corrosion. Inservice inspection of steam generator tubing also provides a means of characterizing the nature and cause of tube degradation so that corrective measures can be taken.

C. NEED FOR THE TECHNICAL SPECIFICATION AMENDMENT

Operating experience throughout the industry indicates that steam generator tube repair techniques using sleeves can be applied permitting the affected tube to remain in service and reduce the impact on reactor coolant flow rates. Several specific defect locations observed at PVNGS, such as, the expansion transition above the tubesheet, the flow distribution plate and eggcrate supports are considered candidate locations for repair via sleeving. However, current Technical Specifications require a tube that exhibits a through-wall defect of 40 percent or greater to be removed from service by means of a tube plug. The tube plug isolates flow through the tube, thereby removing the tube from service.

As tubes are plugged, the effective heat transfer area of the steam generator is reduced and the differential pressure across the steam generator is increased. This results in reduced coolant flow rate available for core cooling.

The purpose of a sleeve is to repair specified steam generator tube defects in order to maintain the original function and integrity of the tube. The sleeving methodology consists of inserting and welding a sleeve to the inside of the defective original tube, bridging the defect and forming a new pressure boundary. By spanning the degraded section of tube, the sleeve and sleeve joint maintain the structural integrity of the steam generator tube under normal and accident conditions, and prevent leakage should a through-wall breach in the tube wall at the original defect location develop.

The installation of a sleeve(s) into a tube results in an additional flow restriction within the primary system, with an associated increase in pressure drop in the steam generator. The effects of this flow restriction on plant operation are evaluated in the same manner that tube plugging effects are analyzed. Attachment 2 projects the reduction in primary coolant flow resulting from sleeving and calculates a thermal-hydraulic equivalency ratio for different sleeve configurations. The report indicates that the use of sleeves in lieu of tube plugs can significantly reduce the impact of steam generator corrosion on tube plugging margins. Information regarding thermal-hydraulic equivalence permits assessment of the post-repair impact of sleeves and plugs on established plugging margins for LOCA and non-LOCA events. This information will be used to determine sleeving and plugging limits per steam generator to ensure the limits are maintained.

The proposed amendment allows for sleeve installation in the Palo Verde steam generators, according to the qualifications and technologies discussed in the attached report. APS requests that sleeving be included as an approved alternative to tube plugging for defects identified at the expansion transition, flow distribution plate and eggcrate supports.

D. SAFETY ANALYSIS OF THE PROPOSED TECHNICAL SPECIFICATION AMENDMENT

The proposed amendment will allow the use of tubing sleeves to repair steam generator tubes which exhibit degradation and can be sleeved. The Technical Specification amendment will reference ABB Combustion Engineering Inc., Report CEN-613-P, "Arizona Public Service Co., Palo Verde Units 1, 2, and 3, Steam Generator Tube Repair Using Leak Tight Sleeves," Revision 01, dated January 1995.

Combustion Engineering Inc., Report CEN-613-P, "Arizona Public Service Co., Palo Verde Units 1, 2, and 3, Steam Generator Tube Repair Using Leak Tight Sleeves," Rev. 01, dated January 1995, contains information regarding ABB-CE's extensive testing, installation and operating experience with the proposed sleeves, as well as design and operating conditions specific to PVNGS for assessing structural margins required by the ASME Code and Regulatory Guide 1.121, "Bases for Plugging Degraded PWR Steam Generator Tubes." The sleeves are manufactured from corrosion resistant, thermally treated Alloy 690, procured to the requirements of Section III of the ASME Code. The design analysis performed by ABB-CE demonstrates that sleeve installation restores the integrity of the tube to its original design condition.

The effect of sleeve installation on steam generator heat removal capability and system flow rate was assessed for up to two thousand sleeved tubes in each steam generator. Information regarding thermal-hydraulic equivalence has been developed to permit assessment of the post-repair impact of sleeves and plugs on established plugging margins for LOCA and non-LOCA events.

Recent industry experience with forced shutdown events associated with tube failures at sleeve junctions was assessed by APS and ABB-CE. The root cause of these events has been attributed to the lack of proper post-installation stress relief and/or the imposition of high stresses due to tube growth restrictions at locked tube supports. The material and design of the PVNGS steam generator supports minimizes the potential for locked supports. This conclusion has been substantiated via tube pull activities conducted in PVNGS Unit 2. The proposed sleeving process requires that post-weld stress relief be conducted for all sleeve installations, as discussed in Attachment 3.

Report CEN-613-P, Rev. 01 demonstrates that the repair of degraded steam generator tubes using tube sleeves will result in tube bundle integrity consistent with the original design basis. The sleeve dimensions, materials, and joints were designed to the applicable ASME Code. An extensive analysis and test program was undertaken to prove the adequacy of tube sleeve repair. The proposed amendments have no significant effect on the configuration of the plant, and the change does not affect the way in which the plant is operated. Based upon the results of the

analytical and test programs described in the attached report, the tube sleeve fulfills its intended function and meets or exceeds established design criteria.

Evaluation of sleeved tubes indicates no detrimental effects on the sleeve-tube assembly resulting from reactor system flow, coolant chemistries, or thermal and pressure conditions. Structural analyses of the sleeve-tube assembly, using demonstrated margins of safety, have established sleeve-tube integrity under normal and accident conditions. Structural analyses have been performed for sleeves which span the tube at the top of the tubesheet and which span the tube at the flow distribution plate or eggcrate support. Mechanical testing has been performed to support the analyses. Corrosion testing of typical sleeve-tube assemblies have been completed and reveal no evidence of sleeve or tube corrosion considered detrimental under anticipated service conditions.

The installation of ABB-CE leak tight sleeves, including welder and process qualification, and nondestructive examination (NDE), meets or exceeds the requirements defined in ASME Section XI. Although identified as an option in Attachment 2, APS will require post-weld stress relief of all sleeve installations.

Regulatory Guide 1.121, issued for comment, entitled "Bases for Plugging Degraded PWR Steam Generator Tubes" defines required structural margin for tubes with part through-wall and through-wall cracking. The requirements of Regulatory Guide 1.121 are extended to the ABB-CE sleeve design in order to determine the level of degradation which will require removal of the sleeve from service by plugging. ASME Code allowables were used for this evaluation. The Regulatory Guide also indicates that allowances for NDE uncertainty and operational growth be accounted for in establishing defect through-wall limits. Based on the results of this evaluation, a defined degradation limit assuming 10% eddy current uncertainty and a growth rate of 10% per operating cycle, a sleeve Technical Specification plugging limit was established.

Regulatory Guide 1.83, "Inservice Inspection of Pressurized Water Reactor Steam Generator Tubes" was used as the basis for determining the inservice inspection requirements for sleeves installed at PVNGS.

The use of sleeves will not impact the dose consequence estimates contained within the PVNGS UFSAR. By design, the ABB-CE sleeves are leak tight and therefore primary-to-secondary leakage is prevented if the steam generator tube is breached within the sleeve joint boundary. Design analysis and qualification testing demonstrate sleeve structural integrity is maintained for normal and postulated accident loading.

Requests for changes to Technical Specifications to allow the installation of sleeves in steam generator tubes at other nuclear facilities (i.e., GINNA, Prairie Island, ANO, and Zion) have been previously submitted to the NRC and approved.

E. NO SIGNIFICANT HAZARDS CONSIDERATION DETERMINATION

The Commission has provided standards for determining whether a significant hazards consideration exists as stated in 10 CFR 50.92. A proposed amendment to an operating license for a facility does not involve a significant hazards consideration if operation of the facility in accordance with a proposed amendment would not: (1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) Create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) Involve a significant reduction in a margin of safety. A discussion of these standards as they relate to the amendment request follows:

Standard 1 -- Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

The proposed amendment to permit the use of steam generator tube sleeves as an alternative to tube plugging is a safe and effective repair procedure that does not require removing a tube from service. Mechanical strength, corrosion resistance, installation methods, and inservice inspection techniques of sleeves have been shown to meet NRC acceptance criteria.

Analytical verifications were performed using design and operating transient parameters selected to envelope loads imposed during normal operating and accident conditions. Fatigue and stress analysis of sleeved tube assemblies were completed in accordance with the requirements of Section III of the ASME Code. The results of qualification testing, analysis and plant operating experience at other facilities demonstrates that the sleeving process is an acceptable means of maintaining steam generator tube integrity. The sleeve configuration has been designed and analyzed in accordance with the structural margins specified in Regulatory Guide 1.121. Furthermore, the installed sleeve will be monitored through periodic inspections on a sample basis with eddy current techniques. A sleeve-specific plugging margin, per the recommendations of RG 1.121, has been specified with appropriate allowances for NDE uncertainty and defect growth rate.

The consequences of accidents previously analyzed are not increased as a result of sleeving activities. The hypothetical failure of the sleeve would be bounded by the current steam generator tube rupture analysis contained in the PVNGS UFSAR. Due to the slight reduction in diameter caused by the sleeve wall thickness, it is expected that the primary release rates would be less than assumed for the steam generator tube rupture analysis, and therefore would result in lower total primary fluid mass

release to the secondary system. Additionally, further conservatism is introduced if the break were postulated to occur at a location on the tube higher than the location where a sleeve is installed. The overall effect would be reduced steam generator tube rupture release rates. The minimal reduction in flow area associated with a tube sleeve has no significant affect on steam generator performance with respect to heat transfer or system flow resistance and pressure drop. The installation of sleeves rather than plugging also maintains a greater heat transfer surface in the steam generator. In any case, the impacts are bounded by evaluations which demonstrate the acceptability of tube plugging which totally removes the tube from service. Therefore, in comparison to plugging, tube sleeving is considered a significant improvement with respect to steam generator performance. The cumulative impact of multiple sleeved tubes was evaluated to ensure the effects remain within the analytical design bases.

Recent industry experience with forced shutdown events associated with tube failures at sleeve junctions was assessed by APS and ABB-CE. The root cause of these events has been attributed to the lack of proper post-installation stress relief and/or the imposition of high stresses due the tube growth restrictions at locked tube supports. The material and design of the PVNGS steam generator supports minimizes the potential for locked supports. The tube supports are of eggcrate design and are constructed of ferritic stainless steel. The large flow area in the eggcrate design provides better irrigation and reduces the potential for steam blanketing, therefore, the tube-to-tube support crevices are less likely to be blocked by crud, boiler water deposits and corrosion products. Since the support material is type 409 ferritic stainless steel, it is not susceptible to magnetite corrosion which has resulted in denting and lockup at plants with carbon steel supports. These conclusions have been substantiated via tube pull activities conducted in PVNGS Unit 2. Although ABB-CE does not require post-weld heat treatment in all applications, APS will require that a post-weld stress relief be conducted for all sleeve installations.

APS has incorporated an integrated leakage monitoring program, utilizing equipment, procedure upgrades and administrative shutdown limits significantly lower than Technical Specification requirements. The program is designed to provide plant operators with the ability to detect and respond to changes in primary-to-secondary leakage and shutdown the unit prior to a significant leak or steam generator tube rupture, should sleeve or tube degradation exceed expected values. The program is designed to reduce the probability of steam generator tube rupture events.

Therefore, based on the above, the proposed amendment does not significantly increase the probability or consequences of an accident previously evaluated.

Standard 2 -- Does the proposed change create the possibility of a new or different kind of accident from any accident previously evaluated?

A sleeved steam generator tube performs the same function in the same passive manner as an unsleeved steam generator tube. Tube sleeves are designed, qualified, and maintained under the stress and pressure limits of Section III of the ASME Code and Regulatory Guide 1.121.

The installation of the sleeve, including weld and welder qualification and nondestructive examination (NDE), meets or exceeds the requirements of ASME Section XI. Three types of NDE are conducted. Ultrasonic Testing (UT) is performed to verify the adequacy of the tube to sleeve weld assuring proper fusion. Eddy current testing (ET) is performed following each installation to establish baseline data for each sleeve in order to monitor future degradation of the primary to secondary pressure boundary. Visual inspections may be performed to verify or ascertain the mechanical and structural condition of a weld. Critical conditions which are checked include weld width and completeness, and the absence of visibly noticeable indications such as cracks, pits, and burn through.

ABB Combustion Engineering Inc., Report CEN-613-P, "Arizona Public Service Co., Palo Verde Units 1, 2, and 3, Steam Generator Tube Repair Using Leak Tight Sleeves," Revision 01, January 1995, demonstrates that the repair of degraded steam generator tubes using tube sleeves will result in tube bundle integrity consistent with the original design basis. An extensive analysis and corrosion and mechanical test programs were undertaken to prove the adequacy of tube sleeve repair. The proposed amendments have no significant effect on the configuration of the plant, and the change does not effect the way in which the plant is operated. Based upon the results of the analytical and test programs described in the ABB Combustion Engineering Inc. report, the tube sleeve fulfills its intended function and meets or exceeds established design criteria. Therefore, the proposed change does not create the possibility of a new or different kind of accident from any accident previously evaluated.

Standard 3 -- Does the proposed change involve a significant reduction in a margin of safety?

Evaluation of the sleeved tubes indicates no detrimental effects on the sleeve-tube assembly resulting from reactor system flow, coolant chemistries, or thermal and pressure conditions. Structural analyses of the sleeve-tube assembly, using demonstrated margins of safety, have established sleeve-tube integrity under normal and accident conditions. Structural analyses have been performed for sleeves which span the tube at the top of the tubesheet and which span the flow distribution plate or eggcrate support. Mechanical testing has been performed to support the analyses. Corrosion testing of typical sleeve-tube assemblies has been completed and reveals no evidence of sleeve or tube corrosion considered detrimental under anticipated service conditions.

Based upon the testing and analyses performed, the installation of tube sleeves will not result in a significant reduction in a margin of safety.

Steam generator tube integrity is maintained under the same limits for sleeved tubes as for unsleeved tubes, i.e., Section III of the ASME Code and Regulatory Guide 1.121. The portions of the installed sleeve assembly which represents the reactor coolant pressure boundary can be monitored for the initiation and progression of sleeve/tube wall degradation, thus satisfying the requirements of Regulatory Guide 1.83. The degradation limit at which a sleeve/tube boundary is considered inoperable has been analyzed in accordance with Regulatory Guide 1.121 and is specified. Eddy current detectability of flaws has been verified by ABB Combustion Engineering. The Technical Specifications continue to require monitoring and restriction of primary to secondary system leakage through the steam generators. A conservative integrated leakage program employed by APS provides reasonable assurance than an orderly unit shutdown will occur prior to a significant increase in leakage due to failure of a sleeved or unsleeved tube. The minimal reduction in reactor coolant system flow, due to sleeving, is considered to have an insignificant impact on steam generator operation during normal operation or accident conditions and is bounded by tube plugging evaluations. Therefore, this change does not involve a significant reduction in a margin of safety.

F. ENVIRONMENTAL IMPACT DETERMINATION

APS has determined that the proposed amendment involves no change in the amount or type of effluent that may be released offsite, and there is no increase in individual or cumulative occupational radiation exposure. As such, operation of PVNGS Units 1, 2, and 3, in accordance with the proposed amendment, does not involve an environmental impact.

G. MARKED-UP TECHNICAL SPECIFICATION PAGES

UNIT 1	UNIT 2	UNIT 3
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3/4 4-15	3/4 4-15	3/4 4-15
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