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ENCLOSURE 2

Engineering Transmittal, ET-CEP-10-0006, Revision 0, "Evaluation of Aluminum Conduit Seal Penetration Fire Tests," dated May 13, 2010
North Anna and Surry Power Stations Units 1 and 2
(Redacted Version))

Virginia Electric and Power Company
(Dominion)

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Dominion

Engineering Transmittal

STD-GN-0041 Page 1 of 19

1. Transmittal Number:	2. Revision:	3. Station(s)	4. Unit(s):
ET-CEP-10-0006	0	☒ North Anna ☒ Surry	☒ Unit 1 ☒ Unit 2 ☐ ISFSI

5. Title:	6. Quality Classification:
Evaluation of Aluminum Conduit Seal Penetration Fire Tests	NSQ

7. ET Type	8. Required Actions?	9. FSRC Approval Req.?
☒ Implementing ☐ Non-Implementing	☐ Yes ☒ No	☐ Yes ☒ No

10. Preparation, Review, and Approval Signatures

Prepared By / Affiliation: (Print)	Signature:	Date:
		5/12/10
		5/12/10
		5/12/10
		5/12/10
		05/13/10
		5/13/10

Standard Attachments		*Reviewed & No Impact*	*Not Required*
11. ☒ Activity Checklist included as attachment	1		☐
12. ☐ Safety Review included as attachment			☒
13. ☐ 50.59/72.48 Screen included as attachment			☒
14. ☒ PRC & PRCS included as Attachment:	10	☐	☒ BD 5/4/10
15. ☒ CDS included as Attachment:	2	☐	☒ JWM 5/13/10

16. Controlled Document Review and Revision (CDRR) Requirements

☐ CDRR is NOT required.

☒ NAPS and SPS DCEs are requested to initiate CDRR upon receipt of this ET.

☐ CDRR will be required at a later date. The affected DCE(s) will be notified following _____ to initiate CDRR.

17. *Additional Attachments*	
No.	Description
3	Intertek Report No. 3197899SAT-001
4	Intertek Report No. 3197899SAT-002
5	Intertek Report No. 3197899SAT-003
6	Emails on Self-Ignition Temperatures of Neoprene and Hypalon Jacket Material
7	Evaluation Matrix of Aluminum Conduit Penetration Test Results
8	Memo – Discussion with NRC on 02/25/2010
9	Penetration Qualification Background
10	Programs Review Checklist

18. *Distribution (Original is transmitted to Records. Copies shall be sent to Primary Recipient and others identified below.)*	
Primary Recipient(s):	/ Manager SPS Nuclear Engr. Programs / Manager NAPS Nuclear Engr. Programs

Copy To?	Other Recipient / Department or Location	Copy To?	Other Recipient / Department or Location
X	/ INNS Nuclear Engineering Programs	X	/Supv. SPS Nuclear Engineering Programs
X	/ NAPS Aux. System Management	X	/Supv. NAPS Nuclear Engineering Programs
X	/ Supv. INNS Nuclear Engineering Programs	X	/ SPS Aux. System Management
X	/ NAPS Nuclear Engineering Programs	X	/ SPS Electrical Engineering
X	/ SPS Nuclear Engineering Programs	X	Records Management (Copy)
X	/ Manager INNS Nuclear Engineering Programs	X	– NAPS DCE
		X	– SPS DCE

Source Documents

CR347022 and CR347057 (Surry)
CR347193 and CR342994 (North Anna)

Record of Revision

Revision 0 – Original Issue

Purpose & Applicability

This is an implementing Engineering Transmittal (ET) that documents an evaluation of test results on aluminum conduit penetration seal configurations. This ET is in accordance with section 2.1.15 of STD-GN-0041.

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References

1. Branch Technical Position APCSB 9 .5-1
2. Appendix A to the Branch Technical Position, titled "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976,"
3. Reg. Guide (RG) 1.189, Fire Protection for Nuclear Power Plants
4. Fire Protection System Review for North Anna Power Station Units 1 and 2, dated April 1 1977
5. Fire Endurance Test on Cable Penetration Fire-Stop Seal Systems Utilizing Dow Corning Q3-6548 Silicone RTV Sealing Foam Final Report, dated February 15, 1977
6. IEEE P634/D2, "Standard for Cable Penetration Fire Stop Test Procedure," dated October 5, 1976.
7. Safety Evaluation Report For North Anna Power Station, dated March 6, 1979
8. North Anna Power Station Appendix R Report
9. Surry Power Station Appendix R Report
10. ASTM E-119, Fire Tests of Building Construction and Materials
11. Technical Report EP-0011, Fire Test Reports Surry Power Station Units 1 and 2, dated 1/11/2000
12. Technical Report EP-0016, Fire Test Reports North Anna Power Station Units 1 and 2, dated 1/11/2000
13. IEEE 634, "Standard Cable Penetration Fire Stop Qualification Test", dated April 19, 1978
14. Calculation No. 1250-111-C01, Penetration Seal Configuration Documentation Pkg. 10" DC3-6548 Silicone Foam/North Anna & Surry Power Station
15. Calculation No. 1250-111-C02, Penetration Seal Configuration Documentation Pkg. Dux Seal/Thickol/Flamemastic /Surry Power Station
16. Calculation No. 1250-111-C03, Penetration Seal Configuration Documentation Pkg. 10" DC3-6548 Silicone Foam Blockout/North Anna & Surry Power Station
17. Calculation No. 1250-111-C04, Penetration Seal Configuration Documentation Pkg. 12" DC3-6548 Silicone Foam Blockout/North Anna & Surry Power Station
18. Design Change SU-10-1024-000, "Fire Penetrations with Aluminum Conduit Repair"
19. Design Change NA-10-00116, "Aluminum Conduit Fire Barrier Penetration Modification"
20. Engineering Transmittal ET-N-10-0031, Evaluation of Aluminum Conduit Fire Penetrations not Requiring Modification"
21. 1989 Industry Study "Conduit Fire Protection Research" and NRC SER dated 10/23/1989
22. Engineering Transmittal ET-CEP-99-0031, Penetration Seal Configuration Evaluations Surry Power Station Unit 1 and 2
23. Safety Evaluation Report For Surry Power Station, dated September 19, 1979

Design Inputs

NONE

Discussion

Introduction

History
During the 2009 NRC Triennial Fire Protection Inspection at Surry Power Station (SPS), the NRC identified that sufficient documentation did not exist to qualify the use of aluminum conduits with silicone foam seals penetrating fire rated barriers (i.e. floor and wall assemblies.) This issue was entered into the SPS corrective action program (see CR347022 and CR347057). This issue was determined to be applicable to North Anna Power Station (NAPS) and entered into NAPS corrective action program as CR347193 after a review and walk downs were performed on aluminum conduit penetrations which may not have internal silicone seals.

As a result of the lack of documentation on qualification testing of silicone foam penetration seals in fire rated barriers, Dominion contracted with Transco Products, Inc. to perform testing at the Intertek Laboratories in Elmendorf, Texas. The test reports from the test are included as attachments to this ET.

Original licensing bases
NAPS UFSAR section 9.5.1.2.4.2 states:

"Conduits passing through rated fire barriers are provided with internal conduit seals as follows: a) if the conduit terminates at a distance of up to 5 feet from the fire barrier, or b) if the conduit is penetrating the Control Room pressure envelope."

Surry UFSAR section 9.10.2.8 indicates:

"Electrical cable penetrations in fire barriers surrounding safety-related areas throughout the plant are sealed using materials and methods that have been tested by Vepco to verify their effectiveness as a fire barrier. The fire test for penetration seals, as described by Vepco in a fire hazards analysis, utilized a gas burner as a flame source. The test on each specimen was conducted for 3 hours or until flame or hot gases, hot enough to ignite cables, penetrated the top of the sealing material. The test verified that penetration seals meet NRC Branch Technical Position APCSB 9.5-1.

New penetration seals are made using silicone foam or other Engineering approved fire stop material with a 3-hour fire rating. The fire stop material may be used in conjunction with an approved permanent damming material, or in conjunction with temporary damming materials which are removed."

The NRC's original licensing requirements/guidelines for penetration seal qualifications are stated in Section D.3.d of Appendix A to BTP APCSB 9.5-1:

"Cable and cable tray penetrations of fire barriers (vertical and horizontal) should be sealed to give protection at least equivalent to that fire barrier. The design of fire barriers for horizontal and vertical cable trays should, as a minimum, meet the requirements of ASTM E-119, "Fire Tests of Building Construction and Materials," including the hose stream test. Where installed

penetration seals are deficient with respect to fire resistance, these seals may be protected by covering both sides with an - approved fire retardant material. The adequacy of using such material should be demonstrated by suitable testing."

This guideline incorporated, by reference, the specific test procedures outlined in ASTM E-119 (NFPA-251). The ASTM E-119 test was originally intended to determine the fire resisting capability of walls and floors assemblies. As such, it did not specifically address testing procedures for penetration seals. The NRC, however, determined that an adequate test procedure for penetrations seals could be adopted from the ASTM E-119 test.

As stated above, Branch Technical Position APCSB 9 .5-1 requires cable penetration of fire barriers to be sealed to give protection at least equivalent to that in a 3-hr fire barrier. On April 1, 1977, NAPS submitted a "Fire Protection System Review" indicating compliance to this requirement and it included a report (ref. 4) on a fire endurance test conducted at NAPS on December 15,1976. Similarly, SPS submitted this fire endurance test. This test report demonstrated the acceptability of a 6 inch metal sleeve with cables and an aluminum cable tray with cables penetrating a three hour rated fire barrier filled with Dow Corning Q3-6548 Silicone RTV Sealing Foam. The test was conducted in accordance with preliminary draft of IEEE P634/D2, "Standard for Cable Penetration Fire Stop Test Procedure," dated October 5, 1976. On March 6, 1979 and September 19, 1979 the NRC issued a Safety Evaluation Report on the Fire Protection Program for NAPS and SPS, respectively and concluded that the submittals identified the plant to be in compliance with Appendix A. This test along with one other test (ref. 11) performed at NAPS in November 1975 was the basis for the acceptability of the conduit penetrations in fire barriers at NAPS and SPS throughout the 1980's.

In the early 1990's, Virginia Power contracted with Impell Corporation to generate documentation for the penetration seal configurations (PSCs) existing at SPS. This led to the issuance of several calculations (ref. 14-17) used to justify the PSCs. The test reports referenced by the calculations utilized acceptance criteria/testing methods from standards IEEE P634/D2, IEEE 383-1974, ASTM E-119-1976, ASTM E-814 and NEL-PIA/MAERP. The test reports were incorporated into technical reports TR EP-0011 and TR EP-0016. SPS and NAPS adopted the test reports by reference of their respective technical report into the SPS Appendix R Report and NAPS Appendix R Report. During the 2009 NRC Triennial Fire Protection Inspection at Surry Power Station (SPS), the NRC reviewed the test reports and determined that sufficient documentation did not exist to qualify the use of aluminum conduits with silicone foam seals penetrating fire rated barriers as 3-hr fire rated.

Of these test reports, two mentioned testing on aluminum conduit sleeves (ref. profile tests 6 & 7 in TR EP-0011). The aluminum conduit sleeve configurations achieved an F-rating as opposed to a T-rating of 3 hrs for the aluminum conduit penetration seal configurations being evaluated by this ET. A discussion on F-rating and other tested penetration configurations are discussed in Attachment 9 (Penetration Qualification Background.)

Description of Evaluation

The results of the testing performed on aluminum conduits with silicone foam seals penetrating fire rated barriers at the Intertek Laboratories are analyzed by this ET.

Testing Method

The test of aluminum conduits with silicone foam seals penetrating fire rated barriers was in accordance with IEEE 634-1978 with the noted exceptions discussed in this ET. Although

ASTM E-119 is the test standard applicable in the licensing basis for NAPS and SPS, this standard was not chosen for the test because ASTM E-119 was not specifically written for testing of conduit penetrations in fire rated barriers. IEEE 634-1978 is appropriate for testing the existing aluminum conduit penetration seal configurations at NAPS and SPS since it is was written for this purpose. The NRC concurred with this assessment during discussions with Dominion Virginia Power (Attachment 8). Also, Reg. Guide 1.189 permits IEEE 634 to be used as an acceptable test standard. Previous testing to IEEE P634/D2 provided further justification for testing in accordance with IEEE 634-1978.

Compliance and Deviations
Generally, the testing was in accordance with IEEE 634-1978 except as noted below. A comparison of the test performed against the requirements of IEEE 634-1978 is discussed:

Type of Cable
The tested configurations used control cable with jacket material made of [2.390(a)(4)]. This material is representative of majority of the jacket of most instrument, control and power cables used at NAPS/SPS. In addition, penetrations were filled representing the maximum fill as discussed in the next section. This resulted in the maximum heat conduction that would challenge the cable insulation. Therefore, testing with instrument and power cables was not warranted as required by IEEE 634-1978. [2.390(a)(4)]. This temperature is used in the acceptance criteria as discussed below.

Raceway Fill
The aluminum conduit penetrations were [2.390(a)(4)]. This is representative of the maximum cable fill at NAPS/SPS. No minimum or zero % cable fill configurations were tested in accordance with IEEE 634-1978 since these are not representative of most field configurations. A minimum or zero % cable fill configuration would be bounded by a test on maximum cable fill which has more cable surface area to burn and greater heat conduction contribution through more cable conductors from the exposed side to the unexposed side of the fire barrier.

Conduit Size
[2.390(a)(4)] aluminum conduit penetrations were tested. The various sizes tested were in accordance with IEEE 634-1978. IEEE 634-1978 allows the successful testing of the largest size conduit penetration to bound the smaller tested conduit penetrations.

Supports
The cables were attached to steel support bars on the unexposed side of the fire barrier and allowed to drop freely into the furnace with no restraints. The aluminum conduits on the unexposed sides were attached to the steel support using clamps. The aluminum conduits were not supported on the exposed side. Conduit penetrations are restrained more rigorously on both sides of the fire barrier with steel bolts, nuts and washers at NAPS and SPS. Therefore, tested configurations are more conservative and would bound any field configurations. The steel supports are acceptable in accordance with IEEE 634-1978.

Cable Installation
The cables within the penetrations [2.390(a)(4)] on the unexposed side and the cable ends were sealed, not capped as required by IEEE 634-1978. Sealing achieved the same purpose since it would preclude the passage of smoke and hot gases through the cables.

The NRC concurred with this assessment during discussion as documented in Attachment 8. On the exposed side, the cable protruded at least [2.390(a)(4)] into the furnace.

Raceway Installation
Most conduits within the penetrations did not [2.390(a)(4)] on the unexposed side and [2.390(a)(4)] on the exposed side as required by IEEE 634-1978. This was done intentionally to demonstrate assorted plant conduit configurations found at SPS and NAPS.

Orientation
This test was performed with the aluminum conduit penetrations in a floor-ceiling slab. Results of the test were bounding of penetrations in the wall orientation in accordance with IEEE 634-1978.

Time-Temperature Curve
The aluminum conduit penetration configurations were subjected to the standard time-temperature curve in ANSI A2.1-1972 (same as ASTM E-119) in accordance with IEEE 634-1978.

Exposed Side Test Instrumentation, Reading Intervals and Flame Source Accuracy
Seven thermocouples on the exposed side were disposed and distributed to show the average temperature for each aluminum conduit penetration configuration. These thermocouples were placed in accordance with IEEE 634-1978. During the test of 2 of the 3 test slabs, one of the thermocouples was eliminated due to erroneous readings.

Temperature readings were taken at a minimum of [2.390(a)(4)] intervals which is more frequent than required by IEEE 634-1978.

Negative pressures of up to [2.390(a)(4)] were maintained. IEEE 634-1978 does not contain any pressure requirements on the exposed (furnace) side of the fire barrier.

The accuracy of the flame source control was such that the area under the time-temperature curve, obtained by averaging the results from thermocouple reading was within 5% tolerance of the standard time-temperature curve. This was in accordance with IEEE 634-1978.

Unexposed Side Test Instrumentation, Reading Intervals
Thermocouples were placed on the conduit sleeve surface, external seal surface, the conduit/external seal surface interface, the internal seal surface and the cable jacket surface. In some instances 2.390(a)(4)

[ ]

Temperature readings were taken at a minimum of [2.390(a)(4)] intervals which is more frequent than required by IEEE 634-1978.

Hose Stream Test
A hose stream was delivered through a 1.5 inch nozzle set at a discharge angle of 15 degrees with a nozzle pressure of 75 psi and a minimum discharge of 75 gpm with the tip of

the nozzle at a maximum 10 ft from the exposed face. The hose stream was applied for a duration of 2.5 minutes per 100 ft^2 of the test slab surface. This was in accordance with Regulatory Guide 1.189 which is acceptable to the NRC. This hose stream test is different from IEEE 634-1978 which requires a 30 degree angle. IEEE 634 criteria is acceptable per Regulatory Guide 1.189.

Acceptance Criteria
The fire endurance test of the aluminum cable conduit penetration configuration was considered acceptable provided the following was met:

a) There was no passage of flame or gases hot enough to ignite the cable or fire stop material on the unexposed side. This was compliant with IEEE 634-1978.
b) Transmission of heat through the conduit penetration configuration after three hours did not raise the temperature on its unexposed surface above the self-ignition temperature of the outer cable covering, the cable conduit penetration fire stop material, or material in contact with the cable penetration fire stop. [2.390(a)(4)

] Reg. Guide 1.189 permits temperatures higher than 700°F when justified in terms of cable insulation ignitability.
c) The conduit penetration configuration withstood the hose stream test without the hose stream causing an opening through the test specimen. This was compliant with IEEE 634-1978.

NOTE: The acceptability criteria used in the fire endurance test at NAPS on December 15,1976, established by IEEE P634/D2, required that there be no passage of flame or gases hot enough to ignite the cable on the unexposed side of the penetration, and that the temperature on the unexposed side has not been raised more than 250° F above the initial temperature. This criteria was not included this test. In cases where temperatures exceeded 250° F above the initial temperature the specimens were evaluated.

Evaluation
This ET evaluates the fire endurance test performed by Intertek Laboratories on aluminum conduits with silicone foam seals penetrating fire rated barriers. The test reports are in attachments 3, 4 and 5. The results of the test are evaluated against the following fire endurance test criteria:

a) There was no passage of flame or gases hot enough to ignite the cable or fire stop material on the unexposed side.
b) Transmission of heat through the conduit penetration configuration after three hours did not raise the temperature on its unexposed surface above the self-ignition temperature of the outer cable covering, the cable conduit penetration fire stop material, or material in contact with the cable penetration fire stop. 2.390(a)(4)

[ ]

c) The conduit penetration configuration withstood the hose stream test without the hose stream causing an opening through the test specimen.

The test involved test specimens grouped into twelve (12) categories placed into [2.390(a)(4)] which were tested on three separate days. The test report identifies the twelve categories which can be described as follows:

2.390(a)(4)

The test specimens in groups 1, 2, 3, 4, 5, 6 and 12 represent aluminum conduit penetration baseline configurations that exist at NAPS and SPS. The test specimens in groups 7 through 11 represent potential modifications to existing aluminum conduit penetration configurations that are considered as possible fixes to existing configurations that may not be found acceptable.

Results

The test reports in attachments 3 (test slab 1), 4 (test slab 2) and 5 (test slab 3) of this ET are formatted as follows:

1) The main body describes the testing method, the slab and penetration construction, testing and evaluation methods, the testing and evaluation results.
2) Appendix A provides the Q/A receiving reports.
3) Appendix B provides the slab construction drawing.
4) Appendix C provides Test Procedure No. TR-242 which describes the test method.
5) Appendix D provides the thermocouple locations.
6) Appendix E provides the temperature data from the thermocouples.
7) Appendix F provides the pictures during the test.
8) Appendix G provides information on calibrated equipment.

Summary Table

To present the test data in Appendix E of each of the test reports in an easy to understand format, the maximum temperature reading and the duration time before failure (where applicable) for each thermocouple in Appendix D in each of the test reports was summarized as follows:

Table 1 – Summary of Thermocouple Readings from Slab 1

2.390(a)(4)

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Table 2 – Summary of Thermocouple Readings from Sla

2.390(a)(4)

NON-PROPRIETARY

Table 3 – Summary of Thermocouple Readings from Slab 3

2.390(a)(4)

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Group 1

[redacted] 2.390(a)(4)

Group 2

[redacted] 2.390(a)(4)

Group 3

[redacted] 2.390(a)(4)

Group 4

[redacted] 2.390(a)(4)

[ ] 2.390(a)(4)

Group 5

[ ] 2.390(a)(4)

Group 6

[ ] 2.390(a)(4)

Group 7

[ ] 2.390(a)(4)

Group 8

[ ] 2.390(a)(4)

2.390(a)(4)

Group 9

2.390(a)(4)

Group 10

2.390(a)(4)

Group 11

2.390(a)(4)

[2.390(a)(4)]

Group 12

[2.390(a)(4)]

Observations

Appendix F of each test report in attachments 3, 4 and 5 contains pictures of the condition of the internal and external penetration seals and aluminum conduits after the hose stream test. In general,

[2.390(a)(4)]

Attachment 7 of this ET summarizes the test results, the modifications and combustible controls required for the existing configurations.

Smoke Seals

[2.390(a)(4)]

Equivalent smoke seals were evaluated in 1989 Industry Study "Conduit Fire Protection Research" and NRC SER dated 10/23/1989 (reference 21). The 101 conduits tested in this study included a mixture of galvanized pipe, IMC and EMT electrical conduits. [2.390(a)(4)]

[2.390(a)(4)]

3/4" Conduits

[2.390(a)(4)]

Special Considerations

[2.390(a)(4)]

Margin

[2.390(a)(4)]

Administrative Measures

[2.390(a)(4)]

Conclusion

The fire endurance test performed by Intertek Laboratories on aluminum conduits with silicone foam seals penetrating fire rated barriers provided useful results for the resolution of the issues identified in this ET. The results show the following:

[2.390(a)(4)]

2.390(a)(4)

Precautions and Limitations

NONE

Recommendations

NONE

Required Actions

None. Attachment 2, Controlled Document Summary, block 10 provides for CDRR control of documents requiring revision of CM-AA-FPA-101.

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Attachment 1 ET CEP 10-0006 Rev 0 Pg 1of 1

Activity Checklist

VPAP-3001 – Attachment 2 Page 1 of 1

1. Identification of Governing Document	2. Applicable Station	3. Applicable Unit
ET CEP 10-0006 REV 0	[x] North Anna Power Station [x] Surry Power Station	[x] Unit 1 [x] Unit 2 [ ] ISFSI

4. Brief Description of the Entire Activity

ET CEP 10-0006 REV 0 evaluates the test results on aluminum conduit penetration seal configurations..

5. Is the activity bounded by another change that has already been determined to require NRC approval? [ ] Yes [x] No	If YES, Identify the source document: **(Skip to Block 8)**
6. Is the activity based on a source document that has already been reviewed in accordance with VPAP-3001 or DNAP-3004? [ ] Yes [x] No	If YES, Identify the source document or attach a copy of the completed review. **(Skip to Block 8)**

7. General Screen (Definitions are provided in VPAP-3001)

NOTE: UFSAR and ISFSI SAR are to be used interchangeably when completing this Checklist.

A. Does this activity require a change to the Operating License, Technical Specifications (station or ISFSI), Technical Specification Bases, ISFSI License, or the Technical Requirements Manual?	[ ] Yes [x] No
B. Does this activity alter (temporarily or permanently) the **design** of a Structure, System, or Component (SSC) described in the UFSAR?	[ ] Yes [x] No
C. Does this activity alter (temporarily or permanently) the **function, ability to function, or method of performing a function** of an SSC described in the UFSAR?	[ ] Yes [x] No
D. Does this activity alter a **numeric** value associated with design or performance requirements that has **not** been previously reviewed in accordance with VPAP-3001 or DNAP-3004?	[ ] Yes [x] No
E. Does this activity modify **how SSCs are operated or controlled** as described, outlined, or summarized in the UFSAR?	[ ] Yes [x] No
F. Does this activity perform **a test or experiment** that is **not** described in the UFSAR?	[ ] Yes [x] No
G. Does this activity involve a change in a **calculational method** that supports the function of an SSC described in the UFSAR?	[ ] Yes [x] No
H. Does this activity involve a temporary modification, as defined in VPAP-1403?	[ ] Yes [x] No
I. Does this activity involve a change, test, or experiment that may affect the **environment**?	[ ] Yes [x] No

Note: If any response to Question 7 is "Yes," a Safety Review (IAW VPAP-3001) and Regulatory Screen (IAW DNAP-3004) must be performed. If any response to Question 8 or 9 is required, if all responses are "No," then answer Questions 8 and 9 "N/A."

8. Maintaining the UFSAR

Does this activity require revising the UFSAR or ISFSI SAR? [ ] Yes [x] No	If "YES," Initiate a Change Request in accordance with VPAP-2803 and obtain the signature of a qualified Regulatory Screener as a reviewer.

9. Results and References

9a. [x] Based on the results of the completed Activity Checklist, the activity has no impact on the design, function, ability to function, method of performing the function, or control or operation of a SSC described in the UFSAR (i.e., the change activity is safe) and the activity can be implemented without prior regulatory approval.

List documents used to perform the General Screen.

North Anna Power Station Appendix R Report Rev 27
Surry Power Station Appendix R Report, Rev. 30
North Anna Power Station UFSAR Section 9.5.
Surry Power Station UFSAR Section 9.10

9b. Conclusion

Administrative change to void an outdate reference document that has been superseded by current information.

10. Preparer Name (Print)	11. Title Nuclear Engineer	
12. Preparer Signature		13. Date 5/12/10
14. Reviewer Name (Only Required if Preparer is not AC Qualified) or IAW Block 8	15. Title.	
16. Reviewer Signature N/A		17. Date

Key: UFSAR-Updated Final Safety Analysis Report which includes the plant specific UFSAR and the ISFSI FSAR;

1. Station [x] Surry [x] North Anna	2. Unit [x] 1 [x] 2	3. Change Document Type and Number ET CEP 10-0006 Rev. 0

4. Change Document Title
Evaluation of Aluminum Conduit Seal Penetration Fire Tests

Section A - Procedures

5. Item Number	6. Change Required?	7. Item	8. Priority?	9. Person Contacted (If Applicable)
A1	[ ] Yes [x] No	*Periodic Test Procedures		
A2	[ ] Yes [x] No	*Station Operating Procedures		
A3	[ ] Yes [x] No	*Annunciator Procedures		
A4	[ ] Yes [x] No	*Emergency Procedures (EOPs)		
A5	[ ] Yes [x] No	*Abnormal Procedures		
A6	[ ] Yes [x] No	*Maintenance Procedures		
A7	[ ] Yes [x] No	*Chemistry Procedures		
A8	[ ] Yes [x] No	*Health Physics Procedures		
A9	[ ] Yes [x] No	Admin. Procedures (Except VPAP-2103N, VPAP-2103S, VPAP-2203, and VPAP-2401)		
A10	[ ] Yes [x] No	Loss Prevention Procedures		
A11	[ ] Yes [x] No	#Security Procedures		
A12	[ ] Yes [x] No	Engineering Technical Procedures (e.g., DRP, NAT, PAP, GEP) (Other than those specified in A1, C18, C22, and C23)		
A13	[ ] Yes [x] No	*Emergency Planning Implementing Procedures (EPIPs)		
A14	[ ] Yes [x] No	North Anna Plant Logs		
A15	[ ] Yes [x] No	Surry Plant Logs		
A16	[ ] Yes [x] No	SAMGs (Nuclear Safety Analysis) **[Commitment 3.2.27]**		
A17	[ ] Yes [x] No	Nuclear Design Control Program (NDCM Series)		
A18	[ ] Yes [x] No	Engineering STD- Series		
A19	[ ] Yes [x] No	Engineering Implementing Procedures (NASES, SSES, etc.)		
	[ ] Yes [x] No			
	[ ] Yes [x] No			

Section B - Computer Databases/Software

B1	[ ] Yes [x] No	Chesterton Valve Packing Database		
B2	[ ] Yes [x] No	Plant Computer Software, piping configuration, or electrical one-line-displays		
B3	[ ] Yes [x] No	#ERF Computer Software (Surry)		
B4	[ ] Yes [x] No	#Simulator Hardware/Software		
B5	[ ] Yes [x] No	Software Master List		
B6	[ ] Yes [x] No	Post Maintenance Testing Database		
B7	[ ] Yes [x] No	Maintenance Check Valve Database		

Key: DRPs-Design Reference Procedures; SAMGs-Severe Accident Management Guidelines; ERF-Emergency Response Facility;
***-Normally treated as priority; #-Normally treated as non-priority**

1. Station [x] Surry [x] North Anna	2. Unit [x] 1 [x] 2	3. Change Document Type and Number ET CEP 10-0006 Rev. 0

5. Item	6. Change Required?	7. Item	8. Priority?	9. Person Contacted (If Applicable)
Section B - Computer Databases/Software - Continued				
B8	[ ] Yes [x] No	Maintenance Relief Valve Database		
B9	[ ] Yes [x] No	Snubber Tracking Database		
B10	[ ] Yes [x] No	#Local Area Network Software		
B11	[ ] Yes [x] No	Motor Operated Valve (MOV) Database		
B12	[ ] Yes [x] No	Air Operated Valve (AOV) Database		
B13	[ ] Yes [x] No	Bill of Materials		
B14	[ ] Yes [x] No	Equipment Data System (EDS)/Q-List		
B15	[ ] Yes [x] No	Secondary Piping and Component Inspection Database		
B16	[ ] Yes [x] No	North Anna VPSLL Database		
B17	[ ] Yes [x] No	Accident Analysis Design Basis Document (AADBD)		
B18	[ ] Yes [x] No	Single Point Vulnerability (SPV) Database		
B19	[ ] Yes [x] No	Equipment Performance Information Exchange (EPIX)		
Section C - Other Controlled Documents				
C1	[ ] Yes [x] No	*Plant Drawings		
C2	[ ] Yes [x] No	.Procurement Specifications (e.g., NAP-0036, NAP-0079/SUP-0073, NAP-0078/SUP-0072, NAS-2094/NUS-2206)		
C3	[ ] Yes [x] No	Installation Specifications		
C4	[ ] Yes [x] No	System and Plant Design Basis Documents		
C5	[ ] Yes [x] No	*Design Calculations		
C6	[ ] Yes [x] No	Class 1 Stress Reports		
C7	[ ] Yes [x] No	Appendix R Report		
C8	[ ] Yes [x] No	Station Electrical Load List		
C9	[ ] Yes [x] No	Qualifications Document Review Packages		
C10	[ ] Yes [x] No	Environmental Zone Descriptions		
C11	[ ] Yes [x] No	EQ Master List		
C12	[ ] Yes [x] No	EQ Maintenance Manual		
C13	[ ] Yes [x] No	EQ Procurement Manual		
C14	[ ] Yes [x] No	*Technical Specifications		
C15	[ ] Yes [x] No	*North Anna Technical Requirements Manual		
C16	[ ] Yes [x] No	*Surry Technical Requirements Manual		
C17	[ ] Yes [x] No	Updated Final Safety Analysis Report (UFSAR)		
C18	[ ] Yes [x] No	*Curve Book (NAPS SC- Series and SPS DRP-3)		

Key: Q-List-Quality List; VPSLL-Virginia Power Station Load List; EQ-Environmental Qualification;
*** - Normally treated as priority; #-Normally treated as non-priority**

1. Station [x] Surry [x] North Anna	2. Unit [x] 1 [x] 2	3. Change Document Type and Number ET CEP 10-0006 Rev. 0

Section C - Other Controlled Documents - Continued

5. Item Number	6. Change Required?	7. Item	8. Priority?	9. Person Contacted (If Applicable)
C19	[ ] Yes [x] No	Training Programs (e.g. NCRODP)		
C20	[ ] Yes [x] No	#North Anna Setpoint Document		
C21	[ ] Yes [x] No	North Anna PLS Document		
C22	[ ] Yes [x] No	MOV Operating Bands (NAPS 0-DRP-1 and SPS 1/2-DRP-7)		
C23	[ ] Yes [x] No	AOV Setpoints (NAPS 0-DRP-2 and SPS 0-DRP-10)		
C24	[x] Yes [ ] No	Fire Protection Program (CM-AA-FPA-101)	Non-Priority	Dean Tolete
C25	[ ] Yes [x] No	Security Plan		
C26	[ ] Yes [x] No	Vendor Technical Manuals		
C27	[ ] Yes [x] No	Inservice Testing (IST) Valve Program		
C28	[ ] Yes [x] No	Inservice Testing (IST) Pump Program		
C29	[ ] Yes [x] No	Inservice Inspection (ISI) Program		
C30	[ ] Yes [x] No	Augmented Inservice Inspection Program		
C31	[ ] Yes [x] No	Spare Part Stocking Level Requirements and Procurement Spare Parts		
C32	[ ] Yes [x] No	Emergency Plan		
C33	[ ] Yes [x] No	Preventive Maintenance (PM) Program		
C34	[ ] Yes [x] No	Surry Operations Checklists		
C35	[ ] Yes [x] No	Regulatory Guide 1.97 Technical Report		
C36	[ ] Yes [x] No	Westinghouse Process Control Instrument Scaling Implementation Procedure Technical Report		
C37	[ ] Yes [x] No	Environmental Protection Plan		
C38	[ ] Yes [x] No	Virginia Power Oil Discharge Contingency Plan		
C39	[ ] Yes [x] No	Oil SPCC Plan (VPAP-2203)		
C40	[ ] Yes [x] No	#Offsite Dose Calculation Manual (VPAP-2103N and VPAP-2103S)		
C41	[ ] Yes [x] No	Maintenance Rule Program		
C42	[ ] Yes [x] No	Fire Fighting Strategies		
C43	[ ] Yes [x] No	Lube Program		
C44	[ ] Yes [x] No	In Containment Banned/Restricted Materials		
C45	[ ] Yes [x] No	North Anna Cable and Raceway Program (STD-GN-0026)		
C46	[ ] Yes [x] No	**Technical Report EE-0101 Setpoint Bases Document for NAPS and SPS		
C47	[ ] Yes [x] No	License Renewal (Aging Management) Program		

Key: SPCC-Spill Prevention, Control, and Countermeasures; PLS-Precautions, Limitations, and Setpoints;
NCRODP-Nuclear Control Room Operator Development Program;
***- Normally treated as priority; #-Normally treated as non-priority**
****- Not a priority document and not applicable to the 90 day clock. Notify Corporate Electrical/I&C/Computers If marked "Yes"**

1. Station	2. Unit	3. Change Document Type and Number
[x] Surry [x] North Anna	[x] 1 [x] 2	ET CEP 10-0006 Rev. 0

Section C - Other Controlled Documents - Continued

5. Item Number	6. Change Required?	7. Item	8. Priority?	9. Person Contacted (If Applicable)
C48	[ ] Yes [x] No	System Monitoring Plans		
C49	[ ] Yes [x] No	Condition Monitoring Program		
C50	[ ] Yes [x] No	**Technical Report NE-0994, Safety Analysis Limits for Technical Specification Instrumentation Companion to EE-0101 for North Anna, Surry, and Kewaunee Power Stations		
C51	[ ] Yes [x] No	**Technical Report NE-1200, Key Operator Actions Assumed in the Safety Analyses for Surry and North Anna Power Stations		
C52	[ ] Yes [x] No	ASME Section VIII Pressure Vessel Program		
C53	[ ] Yes [x] No	Surry Time Critical Operator Actions (0-DRP-049) **[Commitment 3.2.31]**		
C54	[ ] Yes [x] No	North Anna Time Critical Action Validation and Verification (0-GOP-17.0)		
C55	[ ] Yes [x] No	Containment Recirculation Sump GSI-191 Program		
	[ ] Yes [x] No			

Key: SPCC-Spill Prevention, Control, and Countermeasures; PLS-Precautions, Limitations, and Setpoints;
NCRODP-Nuclear Control Room Operator Development Program;
***- Normally treated as priority; #-Normally treated as non-priority**
****- Not a priority document and not applicable to the 90 day clock. Notify Nuclear Safety Analysis if marked "Yes".**

10. Remarks (Attach additional pages if needed.)

Evaluate and revise CM-AA-FPA-101 for combustible controls to preclude contact of transient combustibles with penetration seal configurations.

Key: ASME-American Society of Mechanical Engineers;
***- Normally treated as priority; #-Normally treated as non-priority**

NON-PROPRIETARY

Intertek Test Report

Report Number: 3197899SAT-001, Rev. 1

Original Issue Date: February 25, 2010

Revised Date: April 15, 2010

Product Evaluated: Penetration Firestops

Evaluation Property: Fire Resistance

TEST REPORT

REPORT NUMBER: 3197899SAT-001 Rev. 1
ORIGINAL ISSUE DATE: February 25, 2010
REVISED DATE: April 15, 2010

NON-PROPRIETARY

EVALUATION CENTER
16015 Shady Falls Road
Elmendorf, TX 78112
(voice) 210-635-8100
(fax) 210-635-8101
www.intertek.com

RENDERED TO

TRANSCO PRODUCTS, INC.
55 E. Jackson Blvd, Suite 2100
Chicago, IL 60604

This report contains proprietary information and cannot be used without the written approval of Dominion Virginia Power.

PRODUCT EVALUATED: Penetration Firestops
EVALUATION PROPERTY: Fire Resistance

Report of Testing of Penetration Firestops for compliance with the applicable requirements of the following criteria: *Modified IEEE Std 634-1978, IEEE Standard Cable Penetration Fire Stop Qualification Test, April 19, 1978, Approved December 15, 1977.*

1 Table of Contents

Pages 3 through 181 of
Intertek Test Report Number 3197899SAT-001, Rev. 1
are Proprietary and therefore being Withheld from Public Disclosure
Pursuant to 2.390(a)(4)

NON-PROPRIETARY

Intertek Test Report

Report Number: 3197899SAT-002, Rev. 1

Original Issue Date: February 25, 2010

Revised Date: April 15, 2010

Product Evaluated: Penetration Firestops

Evaluation Property: Fire Resistance

TEST REPORT

REPORT NUMBER: 3197899SAT-002 Rev. 1
ORIGINAL ISSUE DATE: February 25, 2010
REVISED DATE: April 15, 2010
NON-PROPRIETARY

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PRODUCT EVALUATED: Penetration Firestops
EVALUATION PROPERTY: Fire Resistance

Report of Testing of Penetration Firestops for compliance with the applicable requirements of the following criteria: *Modified IEEE Std 634-1978, IEEE Standard Cable Penetration Fire Stop Qualification Test, April 19, 1978, Approved December 15, 1977.*

1 Table of Contents

Pages 3 through 188 of
Intertek Test Report Number 3197899SAT-002, Rev. 1
are Proprietary and therefore being Withheld from Public Disclosure
Pursuant to 2.390(a)(4)

NON-PROPRIETARY

Intertek Test Report

Report Number: 3197899SAT-003, Rev. 1

Original Issue Date: March 30, 2010

Revised Date: April 15, 2010

Product Evaluated: Penetration Firestops

Evaluation Property: Fire Resistance

TEST REPORT

Intertek

REPORT NUMBER: 3197899SAT-003 Rev. 1
ORIGINAL ISSUE DATE: March 30, 2010
REVISED DATE: April 15, 2010

NON-PROPRIETARY

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RENDERED TO

TRANSCO PRODUCTS, INC.
55 E. Jackson Blvd, Suite 2100
Chicago, IL 60604

This report contains proprietary information and cannot be used without the written approval of Dominion Virginia Power.

PRODUCT EVALUATED: Penetration Firestops
EVALUATION PROPERTY: Fire Resistance

Report of Testing of Penetration Firestops for compliance with the applicable requirements of the following criteria: *Modified IEEE Std 634-1978, IEEE Standard Cable Penetration Fire Stop Qualification Test, April 19, 1978, Approved December 15, 1977.*

1 Table of Contents

Pages 3 through 188 of
Intertek Test Report Number 3197899SAT-003, Rev. 1
are Proprietary and therefore being Withheld from Public Disclosure
Pursuant to 2.390(a)(4)

2.390(a)(4)

2.390(a)(4)

2.390(a)(4)

NON-PROPRIETARY

2.390(a)(4)

NON-PROPRIETARY

2.390(a)(4)

NON-PROPRIETARY

2.390(a)(4)

NON-PROPRIETARY

2.390(a)(4)

NON-PROPRIETARY

2.390(a)(4)

NON-PROPRIETARY

2.390(a)(4)

NON-PROPRIETARY

Dominion®

Memorandum

May 5, 2010

To: Phil Bradley
Department: Nuclear Engineering Program
Location: INNS 3SE

From: Dean Tolete
Department: Nuclear Engineering Program
Location: INNS 3SE

Telephone Call with NRC on 2/25/2010

Attendees:
Bill Miller (NAPS)
Dean Tolete (INNS)
Mark Salley (NRC)
Gabriel Taylor (NRC)
Brian Metzger (NRC)

On 2/25/2010, Dominion held a teleconference call with members of the NRC Fire Protection group to clarify their position on aspects of the fire testing being performed on aluminum conduit penetration seal configurations.

The following is the response by the NRC:

1. [2.390(a)(4)] The same type of jacket is typically used for instrumentation cable. Power cables used at the sites are of armored cable type and are not run in conduits but rather in cables trays and therefore were not tested. [2.390(a)(4)]
2. The cable fill tested is representative of maximum load fill for a conduit at the sites which the NRC previously indicated was acceptable in our last phone call. IEEE 634-1978 requires that a type test evaluate maximum and minimum load fill. Dominion believes that our testing is not a type test since we are not marketing our configurations which is what vendors typically do with their products and therefore are required by this standard to account for various possible cable fills. **NRC agreed that maximum load fill representative of the field configurations need only be tested unless Dominion has many aluminum penetrations without cables.**

Dominion®

Memorandum

3. [2.390(a)(4)

4.]

5. The hose stream test is in accordance with RG 1.189 which uses 1.5" fog nozzle @ 15° and 75 PSI. The NRC previously indicated that was acceptable in our last phone call. **NRC agreed that the RG 1.189 requirement is more rigorous to test and therefore is acceptable.**

6. [2.390(a)(4)

]

7. The above issues were evaluated against IEEE 634-1978. The NRC previously indicated that Dominion needed to utilize a national standard and comply with it. This standard is not our commitment but is similar to ASTM E-119 which is our requirement in BTP 9.5-1. However, ASTM E-119 was not written for penetration seals. **NRC wanted a test standard written for penetration of fire barriers to be used and IEEE-634-1978 is acceptable even though it is not the requirement of BTP 9.5-1.**
8. If IEEE 634 is acceptable as discussed in item 7 above, is the 1978 version acceptable over a more current version like 2004 version. **NRC agrees that the code of record version can be used.**

Penetration Qualification Background

NRC requirements and guidelines for fire barrier penetration seals are contained in various documents. The extent to which these requirements or guidelines are applicable to a specific plant depends on plant age, commitments established by the licensee in developing the fire protection plan, the staff safety evaluation reports (SERs) and supplements, and the license conditions pertaining to fire protection. The goal is to provide a fire barrier penetration seal that will remain in place and retain its integrity when subjected to an exposure fire, and subsequently, a fire suppressing agent. This will provide reasonable assurance that the effects of a fire are limited to discrete fire areas and that one division of safe-shutdown-related systems will remain free of fire damage.

To validate reasonable assurance that a fire barrier penetration seal will have the required fire-resistance capability or fire rating (1, 2, or 3 hours), a representative penetration seal test assembly is subjected to a qualification fire endurance test. The test methods involve the furnace-fire exposure of a full-scale fire barrier penetration seal test specimen. The test specimens are representative of the construction for which a fire-resistance rating is desired, as to materials, workmanship, and such details as the dimensions of parts. The heat input to the test furnace is controlled so that the average temperature in the furnace follows as closely as possible the time-temperature curve specified in the test standard.

The standards used to test and rate penetration seals specify the standard time-temperature curve defined in American Society for Testing and Materials (ASTM) E - 119, "Standard Test Methods for Fire Tests of Building Construction and Materials." This time-temperature curve, which is generally accepted for evaluating and rating the fire resistance of all types of building fire barriers, is considered to represent a severe fire exposure. However, the fire endurance tests are not intended to model any specific room fire or the conditions under which the seals will be exposed during a fire, but rather provide a specific standard fire exposure against which similar fire-rated assemblies can be evaluated. The test standards and the NRC regulations and guidance documents specify fire test acceptance criteria that involve the measured response of the test specimen at the time into the standard fire exposure that corresponds to the desired barrier rating.

In all cases, the test specimen is also exposed to a hose stream test after the fire exposure. For example, a fire barrier penetration seal design is said to have a fire-resistance rating of 3 hours if the tested specimen meets the specified acceptance criteria during at least 3 hours of the standard fire exposure and the hose stream test. In this example, the fire-resistance rating qualifies the seal design for use as a 3-hour fire-rated barrier.

Therefore, assessments of fire test results consider both the test standard that was used and the acceptance criteria that apply. In general, the acceptance criteria ensure that the penetration seal does not burn through during the fire exposure, remains in place during the fire and hose stream exposure, prevents the passage of flames or gases hot enough to ignite combustibles that may be on the non-fire side of the test specimen, and limits the transmittal of heat through

the seal and any penetrating items (as determined by measuring the temperature rise on the nonfire side of the seal and any penetrating items). An independent testing authority is to be used to qualify penetration fire barriers by tests conducted in accordance with the provisions of the aforementioned guidelines. Decades of experience with the test standards by the nuclear and general building industries have provided adequate assurance that they are appropriate for qualifying fire barrier penetration seals. Hundreds of qualification-type fire endurance tests of a wide variety of penetration seal designs and materials have been performed by material manufacturers, installation contractors, test laboratories, research organizations, licensees, and others. The NRC has observed fire endurance tests of fire barrier penetration seals and reviewed fire test reports during licensing reviews and inspections. On the basis of these eyewitness accounts and reviews, the NRC has concluded that fire endurance tests have established the fire-resistive capabilities of the penetration seal materials, designs, and configurations installed in nuclear power plants.

NUREG 1552 indicates that the NRC has accepted the following industry standards for qualifying penetration seals:

(1) ASTM E-119;

(2) National Fire Protection Association (NFPA) 251, "Standard Methods of fire Tests of Building Construction and Materials";

(3) ASTM E-814, "Standard Method of Fire Tests of Through-Penetration Fire Stops"; and

(4) Institute of Electrical and Electronics Engineers (IEEE) 634, "Standard Cable Penetration Fire Stop Qualification Test."

In addition, UL tests and approves penetration seals in accordance with American National Standards Institute/UL 1479, "Fire Tests of Through-Penetration Firestops," and other organizations, such as American Nuclear Insurers (ANI) and Factory Mutual (FM), also have test methods and standards for conducting penetration seal fire endurance tests. The NRC has also accepted the installation of penetration seals that had been qualified in accordance with these test standards. There are variations between the test standards and the test acceptance criteria. Note that the IEEE-634 standard and American Nuclear Insurers Standard NEL/PIA-MAERP are referenced in the NUREG 1552 document.

ASTM E- 814 establishes two ratings, F and T for every penetration seal tested. An F rating is based upon flame occurrence on the unexposed surface, while the T rating is based on the temperature rise as well as flame occurrence on the unexposed side of the fire stop. The test used by Underwriters Laboratory (UL) for listing penetration seals is based on ASTM E-814, so all UL listed seals have F and T ratings.

Penetration seal testing is also discussed in section 4.2.1.5.b of Regulatory Guide 1.189, "Fire Protection for Nuclear Power Plants". This section states "An independent testing authority should qualify penetration fire barriers by tests conducted in accordance with the provisions of NFPA-251 or ASTM-E119. In addition, ASTM-E814 or IEEE-634 could be used in the development of a standard fire test (note that IEEE-634 was withdrawn on April 9, 1990, hence the standard should not be used for any new testing after that date).

The acceptance criteria for the seal testing are as follows:

1. The fire barrier has withstood the fire endurance test without passage of flame or the ignition of cables on the unexposed side for a period of time equivalent to the fire resistance rating of the barrier.

2. The temperatures recorded on the unexposed side of the fire barrier are analyzed and demonstrate that the maximum temperature does not exceed 325°F, or 250°F above ambient temperature. Higher temperatures at through-penetrations may be permitted when justified in terms of cable insulation ignitability.

3. The fire barrier remains intact and does not allow projection of water beyond the unexposed surface during the hose stream test.

The guidance in IEEE-634 is bounded by these acceptance criteria.

Additional guidance on penetration seals is provided in the NRC's Generic Letter 86-10, Enclosure 2, Section 8.19.1, which states:

"8.19.1 Penetration Designs Not Laboratory Approved

QUESTION: Where penetration designs have been reviewed and approved by the NRC but have not been classified by an approved laboratory, will it be necessary to submit an exemption request?

RESPONSE: No

This guidance states that the following penetration seals are acceptable for Appendix A:

a. Those which have been reviewed and approved by the NRC, and

b. Those which have been classified by an approval laboratory (such as UL).

Five basic penetration seal configurations were used in the construction of Surry:

a. Foam and Cerafiber Seal This penetration seal configuration consists of 10 inches of Dow Corning Q3- 6548 Silicone RTV foam, with 1 inch of Cerafiber or Cerablanket as permanent damming materials on each end. The total depth of foam and permanent damming material is a minimum of 12 inches.

b. Cable Tray Seal This penetration seal configuration consists of the same combination of foam and cerafiber described in Configuration A with the addition of a

piece of Marinite XL or I board permanently attached to both sides of the penetration. The board has a cut out to allow for passage of the tray.

c. 12 - Inch Foam Seal This penetration seal configuration consists of 12 inches of Dow Corning 03- 6548 Silicone RTV foam. Nonpermanent damming materials are used to form the seal. These damming materials are removed upon completion of the penetration sealing process.

d. Grouted Penetrations Penetrants which are permanently grouted into the fire barrier with grout or concrete and no silicone foam are considered to be a homogeneous part of the barrier, and are not considered to be individual penetration seals. The grouted penetrations at Surry are generally filled to the thickness of the barrier with grout or concrete material. The mortar has cured and is an integral part of the barrier's construction. In block walls, the grout is the thickness of the block and is equivalent to the mortar joint customarily used to tie the individual construction materials together, forming a monolithic barrier.

e. Dux Seal, Thickol, and Flamemastic Seal This penetration seal consists of 1-1/2 inches of 'Thickol" bounded by two metal or Micarta plates and 2 inches of "Dux Seal." Two 1/8" coatings of Flamemastic are applied on each end of the penetration. These materials are no longer used to repair damaged penetrations or seal new penetrations.

Documentation of **Configurations A** and **B** penetration seals' fire resistance testing is contained in a test report entitled, "Fire Endurance Test of Cable Penetration Fire-Stop Seal Systems Utilizing Dow Corning Q3-6548 Silicone RTV Sealing Foam," dated February 15, 1977, conducted in-house by Virginia Electric and Power Company.

The testing was not performed to ASTM E-119, nor was it tested by an independent laboratory. However, the testing was based on a similar test procedure, and the acceptance criteria for a 3-hour fire resistance rating was achieved. The test report was then submitted to the NRC as an appendix to Supplement 1 dated December 15, 1977 to the "Fire Protection Systems Review" Report for North Anna Power Station. The report was reviewed and approved for both Surry and North Anna as indicated by the following statement from the Surry Fire Protection Safety Evaluation Report dated September 19, 1979:

> "Any seals which must be replaced will be sealed using silicone foam installed as approved by the NRC staff for use at North Anna Power Station, Units 1 and 2."

Therefore, based on Generic Letter 86-10, Enclosure 2, Section 8.19.1, these penetration seals are acceptable for Appendix R.

Configuration C was tested to ASTM E-814 at Construction Technology Laboratories and is documented in a report entitled, "Fire and Hose Stream Tests of Cable Tray Seals - Dow Test No. 4," dated October, 1984.

The test report references three standards: ASTM E-119, ASTM E-814, and IEEE 634. The flame test is the same between all three standards, but there are slight differences between the three standards in regards to the hose stream test and the acceptance criteria. Two separate hose stream tests were performed, and the report expresses the results of the testing in relationship to the acceptance criteria of both ASTM E-814 and IEEE 634. The referenced report is equivalent to one conducted by Underwriters Laboratories (U.L.) since the test procedure used by U.L. for classifying penetration seals is identical to ASTM E-814.

The subject test report states that no passage of flame occurred through either of the two penetration seals which were tested during the 3 hour fire test. The report also states that one of the penetration seals passed the ASTM E-814 hose stream test. Since these are the acceptance criteria for an F rating in accordance with ASTM E-814 (i.e., no passage of flame and no projection of water through the penetration seal), it is concluded that the penetration seal configuration has a 3-hour F rating. The reason that failure of the other cable tray penetration seal during the hose stream test is not a concern is that the seal had already been subjected to and passed an IEEE 634 hose stream test. This test probably weakened the seal, leading to its failure during the ASTM E-814 hose stream test.

The acceptance criteria for a T rating in accordance with ASTM E-814 include the two criteria for a F rating plus a "maximum allowable temperature rise" criteria of 250°F above initial temperature or maximum temperature of 325°F. The test report states that the temperature criteria for a T rating were exceeded at several measuring points on the cable; therefore, the penetration seal does not have a 3-hour T rating.

The acceptance criteria for IEEE 634 also includes a "maximum allowable temperature rise" criteria, although it is higher than the ASTM E-814 criteria. Since the temperature criteria defined by IEEE 634 was exceeded at one measuring point on one penetration seal, the penetration seal does not have a 3-hour rating per IEEE 634.

It is concluded that the penetration seal is satisfactory since it passes the criteria for a 3- hour F rating, and the temperature limits for a 'T' rating are not required for operating plants. The basis for this conclusion is that the NRC's criteria for penetration seals, according to GL 86-10, seems to be whether or not the seal has been classified by an approved laboratory. Seals which are classified by Underwriter's Laboratories are listed with both an F and T rating. It is not uncommon for penetration seals to have a 3-hour F rating and a much lower I rating. In a power plant, there is no storage or other combustible material adjacent to the cables where they go through penetration seals. Therefore, even if the cables get very hot during a fire on one side of the penetration seal, it will be of no consequence on the unexposed side. Based on these observations, the temperature criteria for a T rating is not critical, the F rating is the critical factor.

Configuration D, grouted penetrations, does not require specific qualification testing and does not require periodic surveillance. Under a typical exposure fire, the grouted seal is expected to remain intact just as the barrier itself, and is not subject to the design parameters which impact the fire resistance rating of a silicone foam seal. Documentation of this configuration is contained in Engineering Transmittal, CEP 99- 0031.

Documentation of **Configuration E** penetration seal fire resistance testing is contained in a test report entitled, "Cable Penetration Fire Stop Test", conducted in-house by Virginia Electric and Power Company in November, 1975. [See Profile Test No. 2] This seal configuration was reviewed and approved by the NRC in the Surry SER dated September 19, 1979 Section 4.9.1 which states:

> "Electrical Cable and Conduit Penetrations"
>
> Electrical cable and conduit penetrations in fire barriers surrounding safety related areas throughout the plant are sealed using materials and methods which have been tested by the licensee to verify their effectiveness as a fire barrier. We have reviewed the procedures used for these tests and conclude that the existing penetration seals are adequate for most areas of the plant. The licensee's commitments to upgrade penetrations in fire barriers surrounding areas of high combustible loadings are included in the separate discussions for each area in section 5.0 of this report. Any seals which must be replaced will be sealed using silicone foam installed as approved by the NRC staff for use at North Anna Power Station, Units 1 and 2. We find that, subject to the implementation of the modifications described in this report, the protection of electrical cables and conduit penetrations satisfies the objectives identified in Section 2.2 of this report and is, therefore, acceptable."

Virginia Power provided an additional submittal to the NRC, dated October 31, 1980, which included assurance that the fire barriers in question were sealed to have a fire rating at least equivalent to the test criteria described by the fire hazards analysis. The NRC accepted this verification in Supplement 1 to Fire Protection Safety Evaluation Report, Dated September 19, 1980.

Programs Review Checklist

Page 1 of 3

STD-GN-0001
Attachment 5

Document Number:	Station:
ET CEP 10-0006 Rev. 0	☒ North Anna ☒ Surry ☐ Other

Mark "Yes" or "No" for each item, based on the associated instructions for that item.
DCPs - Items with "Yes" require ER&D Section 3.0 discussion.
Other than DCP - Items with "Yes" require Programs Review Checklist Supplement discussion.
No discussion is required for items checked "No". Discussion may be provided at preparer's discretion.

Subject	YES	No
1. Updated Final Safety Analysis Report (VPAP-2803)	☐	☒
2. Technical Specifications and Facility Licenses (LI-AA-101-1001)	☐	☒
3. Fire Protection/Appendix R (VPAP-2401) (STD-GN-0021)	☒	☐
4. Environmental Qualification (CM-NA-EQ-100 & CM-SU-EQ-100)	☐	☒
5. Station Security (Safeguards DNAP-2503)	☐	☒
6. Electrical Systems Analysis (STD-EEN-0026)	☐	☒
7. Containment Recirculation Sump GSI-191 Program	☐	☒
8. Seismic (VPAP-0312) (STD-GN-0038)	☐	☒
9. Human Factors (STD-GN-0005)	☐	☒
10. In Containment Banned/Restricted Materials (STD-MAT-0006)	☐	☒
11. Station Computer Software/Hardware (DNAP-0306)	☐	☒
12. Plant Computer Systems (STD-GN-0028)	☐	☒
13. Plant Flooding	☐	☒
14. Heavy Loads (VPAP-0809)	☐	☒
15. Post-Accident Monitoring (Reg. Guide 1.97) (STD-GN-0035)	☐	☒
16. Heating, Ventilation and Air Conditioning (HVAC)	☐	☒
17. Simulator	☐	☒
18. Setpoints, Station Curves, Instrument Scaling & Instrument Uncertainty Calculations (VPAP-0303) (STD-GN-0030)	☐	☒
19. Flow-Accelerated Corrosion (FAC) Program (ER-AA-FAC-10 & ER-AA-FAC-1002)	☐	☒
20. Electromagnetic Interference Review (STD-EEN-0225 & STD-EEN-0308)	☐	☒
21. Equipment Data System (EDS) (VPAP-0310)	☐	☒
22. ALARA (VPAP-2102) (STD-GN-0019)	☐	☒
23. Cumulative Effects on Plant Systems	☐	☒
24. Operating Experience and Recent NRC and Industry Concerns	☐	☒
25. Impact of/on Other Design Changes	☐	☒
26. Equipment Added, Removed, or Modified	☐	☒
27. System and Plant Design Basis Documents (CM-AA-DBD-1001)	☐	☒
28. Removable Blocks and Other Barriers	☐	☒
29. Environmental Impact (Non-Radiological) (VPAP-0109 & 2810)	☐	☒
30. Masonry Block Walls (STD-CEN-0040)	☐	☒
31. Training	☐	☒
32. Recommended Spare Parts	☐	☒

Programs Review Checklist
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Subject	Yes	No
33. Labeling (OP-AA-1200)	☐	☒
34. Abandonment of Equipment or Spare of Electrical Equipment	☐	☒
35. Vendor Technical Manuals (VTMs) (VPAP-0602)	☐	☒
36. Reactivity Management (OP-AP-300)	☐	☒
37. Equipment/System Response Times	☐	☒
38. Technical Requirements Manual (LI-AA-101)	☐	☒
39. Maintenance Rule (ER-AA-MRL-100)	☐	☒
40. Containment Heat Sink Tracking and Evaluation (NF-AA-NSA-5008)	☐	☒
41. Motor Operated Valves (MOV) (VPAP-0805)	☐	☒
42. Air Operated Valves (AOV) (VPAP-0816)	☐	☒
43. Common Cause Failure	☐	☒
44. SSC (Structure, System or Component) Operation and Control	☐	☒
45. Protection and Control Analysis	☐	☒
46. Personnel and Equipment Safety	☐	☒
47. Emergency Plan	☐	☒
48. Nuclear Material Control (VPAP-1406)	☐	☒
49. License Renewal Rule Program and Aging Management Activities (ER-AA-AMP-101)	☐	☒
50. Chemical Reactivity	☐	☒
51. Early Site Permitting Program (North Anna)	☐	☒
52. Protective Coatings – Inside/Outside Containment (DNES-VA-MAT-1004 and 1007)	☐	☒
53. Single Point Vulnerability (SPV) (ER-AA-PRS-1005)	☐	☒
54. Boric Acid Corrosion Control Program (BACCP) (ER-AP-BAC-10)	☐	☒
55. Generic Letter (GL) 89-13 Program (NASES-3.20 and ER-SU-5314)	☐	☒
56. Inservice Inspection	☐	☒
57. Inservice Testing	☐	☒
58. Appendix J Program (NASES-3.18 for NAPS and 0-NSP-CT-100 for SPS)	☐	☒
59. Time Critical Operator Actions (TCOAs) (0-OSP-TCA-001)	☐	☒
60. Heat Exchanger Program (ER-AA-HTX-10 & ER-AA-HTX-1003)	☐	☒
61. B.5.b Program (EP-AA-505 - when implemented)	☐	☒
62. Cyber Security (IT-AA-CYB-103)	☐	☒
63. Other Concerns	☐	☒

Dominion

NON-PROPRIETARY

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Document Number:	Station:
ET-CEP-10-0006, REV. 0	☒ North Anna ☒ Surry ☐ Other

Appendix R

The Appendix R/Fire Protection control procedure for fire barriers is affected by this ET. Attachment 2, Controlled Document Summary, block 10 provides for CDRR control of documents requiring revision of CM-AA-FPA-101.

ENCLOSURE 3

Application for Withholding from Public Disclosure
and
Affidavit of J. Alan Price

Virginia Electric and Power Company
(Dominion)
North Anna and Surry Power Stations Units 1 and 2

10 CFR § 2.390

APPLICATION FOR WITHHOLDING AND AFFIDAVIT OF J. ALAN PRICE

I, J. Alan Price, Vice President – Nuclear Engineering, state that:

1. I am authorized to execute this affidavit on behalf of Virginia Electric and Power Company (Dominion).

2. Dominion is submitting for the NRC's information Dominion Engineering Transmittal (ET), ET-CEP-10-0006, Revision 0, "Evaluation of Aluminum Conduit Seal Penetration Fire Tests," dated May 13, 2010. ET-CEP-10-0006, Revision 0, contains the test reports for aluminum conduit penetration configuration fire tests performed for Surry and North Anna Power Stations Units 1 and 2. The Proprietary Version of the ET contains proprietary commercial information that should be held in confidence by the NRC pursuant to the policy reflected in 10 CFR §§ 2.390(a)(4) because:

a. This information is being held in confidence by Dominion.

b. This information is of a type that is held in confidence by Dominion, and there is a rational basis for doing so because the information contains sensitive commercial information regarding fire barrier test protocol and the results of that testing.

c. This information is being transmitted to the NRC in confidence.

d. This information is not available in public sources and could not be gathered readily from other publicly available information.

e. Public disclosure of this information would create substantial harm to the competitive position of Dominion by disclosing test configurations and the associated test results for various aluminum conduit penetrations to other parties whose commercial interests may be adverse to those of Dominion. Furthermore, Dominion has expended significant engineering resources in the development of the information. Therefore, the use of this confidential information by competitors would permit them to use the information developed by Dominion without the expenditure of similar resources, thus giving them a competitive advantage.

3. Accordingly, Dominion requests that the designated document be withheld from public disclosure pursuant to the policy reflected in 10 CFR §§ 2.390(a)(4).

Virginia Electric and Power Company

J. Alan Price
Vice President –Nuclear Engineering

STATE OF Virginia

COUNTY OF Henrico

Subscribed and sworn to me, a Notary Public, in and for the County and State above named, this 7th day of September, 2010.

GINGER LYNN MELTON
Notary Public
Commonwealth of Virginia
310847
My Commission Expires Apr 30, 2013

My Commission Expires: 4/30/13
I was commissioned a notary as Ginger L. Alligood.