VIRGINIA ELECTRIC AND POWER COMPANY
RICHMOND, VIRGINIA 23261

November 13, 2000

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555

Serial No. 00-391
NL&OS/ETS R0
Docket Nos. 50-338/-339
License Nos. NPF-4/-7

Gentlemen:

VIRGINIA ELECTRIC AND POWER COMPANY
NORTH ANNA POWER STATION UNITS 1 AND 2
REQUEST FOR ADDITIONAL INFORMATION
HALON FIRE SUPPRESSION SYSTEM IN ESGR

In a telephone conference call with the NRC staff on August 16, 2000, the NRC requested additional information with regard to the design and operation of the manual Halon fire suppression system installed in the Emergency Switchgear Rooms (ESGR) of North Anna Units 1 and 2. In addition, the staff requested we provide a detailed cost estimate to modify the Halon system to provide automatic actuation. During that call we agreed to provide the additional information in ninety days and a detailed cost estimate within 120 days. The attachment to this letter provides the requested additional information regarding the system design and operation information.

During the August 16, 2000 telephone conference call, the discussion primarily focused on the concentration of Halon necessary to adequately extinguish electrical cable fires. Likewise, several questions referenced NRC Halon tests reported in NUREG/CR-3656, "Evaluation of Suppression Methods for Electrical Cable Fires." As we discussed during the conference call, we consider it important to note that the underlying concern expressed in this series of questions is generic in nature rather than plant specific and fundamentally questions the underlying fire protection standard (NFPA 12A, "Standard on Halogenated Fire Extinguishing Agent Systems - Halon 1301"), which has formed the guidance for installed Halon systems, rather than questioning the plant specific North Anna design. Furthermore, for our plant specific application, we note that the concentration tests conducted for the North Anna ESGRs established an average concentration of Halon in excess of the NFPA 12A standard and in excess of the six percent concentration of Halon 1301 referenced in NUREG/CR-3656.

A006

If you have any further questions, please contact us.

Very truly yours,

Leslie N. Hartz
Vice President - Nuclear Engineering and Services

Attachments

1. Request for Additional Information
2. Fire Protection and Abnormal Procedures

Commitments made in this letter:

1. None

cc: U.S. Nuclear Regulatory Commission
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NRC Senior Resident Inspector
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Attachment 1

Request For Additional Information
Regarding The Manually Actuated Halon 1301 Fire Suppression System Installed
In The Emergency Switchgear Rooms
North Anna Power Station Units 1 And 2

Dominion Generation
North Anna Power Station Units 1 and 2

Attachment 1

Request For Additional Information
Regarding The Manually Actuated Halon 1301 Fire Suppression System Installed
In The Emergency Switchgear Rooms
North Anna Power Station Units 1 And 2

Dominion Generation
North Anna Power Station Units 1 and 2

REQUEST FOR ADDITIONAL INFORMATION REGARDING THE MANUALLY ACTUATED HALON 1301 FIRE SUPPRESSION SYSEM INSTALLED IN THE EMERGENCY SWITCHGEAR ROOMS (ESGRs) NORTH ANNA POWER STATION UNITS 1 AND 2

1. NFPA 12A Standard on "Halon Fire Suppression System" 1980 edition, the Code of Record (COR) for NAPS installation, Section 1-8.1.1 states that "Automatic detection and automatic suppression shall be used." Why was a manual actuated Halon 1301 fire suppression system installed in Emergency Switchgear Rooms (ESGR) in lieu of an automatic system? Provide technical justification for this deviation.

   Response:

   The ESGRs at North Anna are required to meet the requirements of Section III.G.3 of Appendix R. Section III.G.3 requires fire detection and a fixed fire suppression system be installed in the area under consideration. After significant exchanges of formal and informal communications with the NRC on this requirement, Virginia Electric and Power Company (Dominion Generation) committed to and installed manually actuated Halon fire suppression systems in the ESGRs as allowed by Section III.G.3 of Appendix R. The licensing basis for the manual Halon system is Section III.G.3 of Appendix R, and the system design was based on NFPA-12A, "Standard on Halogenated Fire Extinguishing Agent Systems - Halon 1301", 1980 edition. In accordance with paragraph 1-8.1.1 of NFPA-12A, the system can be manually actuated if acceptable to the authority having jurisdiction. In this case, the authority having jurisdiction was the NRC since the system was being installed to satisfy a NRC requirement, namely Section III.G.3 of Appendix R.

   The NRC requires that the fire suppression system installed to meet III.G.3 be a fixed system. Based on the discussion in Generic Letter 83-33, the Halon system installed in the ESGRs meets the requirements of a fixed fire protection system as required by III.G.3 since the rule only requires a fixed system and not an automatic suppression system. Furthermore, the NRC conducted an Appendix R compliance inspection at North Anna (Report No. 85-24) dated November 14, 1985. The inspection reviewed the Appendix R re-analysis and alternative shutdown methodology to determine if the protection features provided for the structures, systems, and components important to safe shutdown were in compliance with 10 CFR 50, Appendix R, Sections III.G and III.L. The inspection reviewed the design basis for the Halon suppression systems in ESGRs and concluded that: "the suppression systems appeared adequate."

   The company has taken the position that the NRC, as the authority having jurisdiction, had full knowledge at initial licensing and had explicitly permitted the installation of a manual Halon system in accordance with paragraph 1.8.1.1 of NFPA 12A, 1980 edition. As to speculation why the manual system was

proposed by Dominion Generation and permitted by the NRC, the docketed record does not provide detailed information. We surmise that then as now, spurious discharges and personnel safety was the likely motivation for the present design. Additional information on this feature was provided regarding the design, evaluation of risk, and operator actions during the NRC Integrated Inspection Report Nos. 50-338/99-01 and 50-339/99-01 dated April 12, 1999.

2. If the only method of system actuation is the switch in the main control room (MCR) what is the purpose of the abort switches?

Response:

The Halon system can be actuated by switches in the Control Room or locally outside the respective ESGR doors for each unit. The abort switch which is located on the main control panel for the Halon Suppression System in the Turbine Building basement just outside the entrance to the Unit 2 ESGR and is provided to prevent premature/inadvertent discharge of the Halon system during system testing or maintenance. The abort switch functionally overrides any system actuation. A sketch is included in Procedure 1(2)-FS-S-3 that indicates the location of these switches.

3. How is the Halon system manually actuated if the MCR has to be abandoned?

Response:

As noted above, a local control switch located outside of each ESGR doorway is provided to allow local activation of the individual ESGR Halon suppression system. Additionally, manual local actuation is available at the Halon bottles located in the Unit 1 Turbine Building basement.

4. Provide a description of the detection system currently installed in the ESGRs.

Response:

The ESGRs have smoke detectors installed throughout. The detectors are installed with a spacing of approximately 250-sq. ft. per detector. Each ESGR detection system annunciates at a local panel that in turn annunciate in the Main Control Room. The number of detectors by area within the ESGR is broken down as follows:

Area	# Detectors
1J Bus	8
1H Bus	7
Unit 1 Inst. Rack & AC Rm.	5
2J Bus	8
2H Bus	7
Unit 2 Inst. Rack & AC Rm.	5

The detection system for the ESGRs recently was reviewed onsite by the NRC and is discussed in detail in NRC Inspection Report Nos. 50-338/88-13 and 50-339/88-13, dated September 13, 1988. Also refer to the response to question # 6 below.

5. Describe the type of smoke detectors (i.e., photoelectric or ionization) installed in the ESGRs for fire detection.

Response:

The detectors installed in the ESGRs are ionization type detectors.

6. Does smoke detector spacing meet NFPA 72E Standard on, "Automatic Fire Detectors" 1983 edition, COR requirements? If not, provide justification for assurance that the detection system will detect incipient fires in time to allow operator response and manually initiate the Halon 1301 system.

Response:

The smoke detection systems in Unit 1 and 2 ESGRs were installed in 1983 to satisfy the requirements for area wide detection in 10 CFR 50 Appendix R, Section III.G.3. Professional Loss Control, Inc. performed an evaluation of the installed fire detection systems and issued a report entitled, "Fire Detection Study - Safe Shutdown Areas," dated January 14, 1985. The study was performed to evaluate the locations of fire detectors in all areas of the plant. The study used the criteria in the National Fire Protection Association (NFPA) Standard 72E-1984, "Automatic Fire Detectors," as the basis for evaluating the adequacy of fire detector locations. The study indicated that the location of ceiling level detectors provided in the switchgear rooms is not in strict compliance with NFPA 72E. However, the study also concluded the installed fire detectors provide an adequate level of early warning fire detection. Additionally, strict compliance with NFPA-72E detector location requirements would not necessarily produce a significant increase in the level of detection capability provided.

The applicable article of NFPA 72E for location of the smoke detectors in the ESGRs rooms is Article 4-3.7, Beam Construction, of Chapter 4, "Smoke Sensing Fire Detectors." Section 4-3.7.3 of this article requires that "if the beams exceed 18 in. in depth and are more than 8 ft. on centers, each bay shall be treated as a separate area requiring at least one spot-type detector." The ceiling construction of the Emergency Switchgear and Instrument Rack Rooms consists of beams and girders, all of which are over 18 in. in depth. The beams and girders form beam pockets of varying sizes. In each room there are beam pockets in which the beams exceed the 8-foot spacing criteria, and NFPA 72E would require a smoke detector in each beam pocket. There are also beam pockets in which beam spacing is below the 8-foot beam spacing criteria. A smoke detector is not required in each of the smaller beam pockets. Locating smoke detectors in strict compliance with the requirements of NFPA 72E would require 13 smoke detectors in each of the Unit 1 and 2 Emergency Switchgear Rooms.

The following criteria were used for locating the 15 detectors in each ESGR:

1. Detectors are located in each bay, which extends the width of an entire room.
2. Detectors are placed in alternating beam pockets where the bay is broken into beam pockets.

Detectors are mounted on the ceiling in the beam pocket or bay. Using the above criteria, the quantity of detectors provided is above the minimum number of detectors required by the code. The detector layout using the above design criteria does not however, meet the strict requirements of NFPA 72E, since a smoke detector is not placed in every beam pocket where the beam spacing is over 8 ft. The smoke detector layout however, is considered to be at least equivalent in effectiveness and safety to the detector arrangement required by the code.

NRC Inspection Report Nos. 50-338/88-13 and 50-339/88-13 reviewed the above evaluation of smoke detector design and concluded the existing evaluation to be acceptable. This was based on a review of the technical basis of the evaluation and field walkdown of the area which concluded that the installation of additional smoke detectors would not significantly improve detector response in the ESGRs.

7. The fire loading in the ESGRs consists of large amounts of cable insulation and electrical cabinets. What concentration of Halon 1301 is provided inside the cabinets to extinguish a fire?

Response:

The concentration of Halon inside the cabinets is expected to be the same as that for the room, which is 7% based on actual concentration tests. The plant specific concentration tests indicated an average concentration of 7% was available for over 20 minutes although the NFPA codes only specifies a 5% concentration be maintained for 10 minutes. Since the cabinets have numerous openings for air to circulate inside the cabinet for cooling, the Halon will likewise be able to freely penetrate the inside of the cabinets. This conclusion is restated in NRC Integrated Inspection Report Nos. 50-338/99-01 and 50-339/99-01 and can be found in the discussion under item F8.1 of the report.

8. Is there an automatic fire detection system installed in the electrical cabinets in the ESGRs?

Response:

No

9. Upon receipt of a fire alarm in the MCR, what actions are taken to verify that an

actual fire exists in the ESGR? Provide a copy of the portions of the procedure directing fire detector alarm response.

Response:

Upon receipt of a Unit 1 or 2 ESGR smoke alarm in the Main Control Room, operations personnel in the control room will immediately dispatch an operator to the ESGR to determine if an actual fire exists. Since the Main Control Room is located on the next level above the ESGR, if the operator does not report back within approximately 5 minutes, the control room operator is directed by procedure to announce over the Gaitronics the condition of a fire in the ESGR and manually discharge the Halon system from the control room. These actions are called out in step 2.4 of Alarm Response Procedures - 1(2)-AR-D-C8. A copy of this procedure is attached.

10. Upon verification that a fire exists in the ESGR, what procedures direct the operators to manually initiate the Halon 1301 system? Provide a copy of the procedure directing the initiation of the system.

Response:

Alarm Response Procedure - 1(2)-AR-D-C8, addresses this question. Refer to the response to question 9 above.

11. Upon receipt of a fire detector alarm in the MCR, how much time will be required to verify the alarm, locate the requisite response procedure, and manually initiate the Halon 1301 suppression system?

Response:

As noted in the response to question 9 above, manual Halon initiation should occur in approximately 5 minutes after fire detector alarms are received in the control room. This information was provided and affirmed in NRC Integrated Inspection Report Nos. 50-338/99-01 and 50-339/99-01 in the discussion under item F8.1 of the report.

12. Does facility fire brigade maintain a pre-fire plan for the ESGRs? If yes, provide a copy of the manual fire-fighting pre-plan, including response time and nearest backup suppression system.

Response:

Yes, the Unit 1 and 2 ESGR fire strategy is contained in procedures 1(2)-FS-S-3. The nearest backup fire suppression would come from manual hose stations located in the ESGRs and Turbine Building basement as well as portable fire extinguishers located throughout the ESGRs. The most recent Fire brigade drills for the ESGRs resulted in the following response times by the fire brigade after the alarm was sounded. Also, as stated in response to question 9 an operator will be dispatched to the ESGR to determine if an actual fire exists. If the

operator does not report back to the main control room within approximately 5 minutes, the Halon system will be discharged. During the Fire brigade drills, the dispatched operator response to the ESGR fire was noted to be within approximately 5 minutes of the receipt of the ESGR smoke alarm in the main control room. A copy of this procedure is attached.

DATE	RESPONSE TIME (MINUTES)
8-10-00	6
8-16-00	7
8-24-00	9
8-29-00	6
9-13-00	6

13. Does ESGRs Halon system maintain a primary and secondary supply of Halon 1301 agent?

Response:

Yes. The primary supply and secondary supplies are sized to maintain seven percent Halon concentration for twenty minutes.

14. NFPA 12A, Standard for "Halon 1301 Fire Extinguishing Systems," specifies minimum soak time and concentrations for Halon 1301 based on results from testing typically flammable liquid surface fires. Appendix 2, of NFPA 12A, 1980 edition, incorporates guidance that additional higher concentrations and longer soak times are required to extinguish deep-seated fires, (a deep-seated fire is defined by NFPA as a fire involving Class A solid materials that would not be extinguished with a 5 percent concentration of Halon within 10 minutes of application). This guidance is supported by testing, sponsored by the NRC and documented in NUREG/CR-3656, "Evaluation of Suppression Methods for Electrical Cable Fires." The principle combustible material loading in the ESGR is electrical cable insulation and electrical cabinets, which may develop into a deep-seated fire if the actuation of the Halon system is delayed. Provide results of your evaluation determining that the installed Halon 1301 system will extinguish a deep-seated cable fire. Cite any test data or references that support your analysis.

Response:

The issue raised in this question is generic to the entire industry rather than specific to North Anna. As noted in the cover letter, the underlying concern is not plant specific compliance with fire protection guidance, but whether that guidance itself is adequate. As such, we believe this question to be generic in its application rather that plant specific and therefore more appropriately addressed as a generic licensing action. However, after review of the NUREG referenced, we provide the following response to address the adequacy of our specific design with respect to this generic question.

NUREG/CR-3656, "Evaluation of Suppression Methods for Electrical Cable Fires," conducted cable fire suppression tests to provide confirmatory research on suppression systems effectiveness. The report describes full scale tests on both horizontally and vertically oriented cable trays, filled with either IEEE-383 qualified cables or unqualified cables, to determine the effectiveness of Halon 1301, water sprinklers, and carbon dioxide fire suppression systems. The Halon system was determined to be capable of effectively extinguishing exposure and fully developed cable tray fires provided a minimum 6% Halon design concentration for the enclosure was maintained during testing. It was concluded the Halon quickly knocked down the flames and extinguished the fire in the exposure fire tests. Halon for the fully developed test was capable of dousing the flame of IEEE-383 cable but not preventing reinitiation of smoldering combustion. This is not expected to be a problem since the fire brigade will have responded to the alarm and be available to extinguish any isolated pockets of smoldering combustion. The minimum soak times of the tests are displayed in the following two Tables.

Table 1
Minimum Soak Time for Exposure Fires

	Cable Type		
Tray Configuration	IEEE-383	Unqualified	Test Outcome
Horizontal	10 minutes	16 minutes	No Re-ignition
Vertical	0 minutes	5 minutes	No Re-ignition

Table 2
Minimum Soak Time for Fully Developed Fires

	Cable Type		
Tray Configuration	IEEE-383	Unqualified	Test Outcome
Horizontal	15 minutes	10 minutes	No Re-ignition, trays smoking
Vertical	15 minutes	10 minutes	No Re-ignition, trays smoking

The concentration tests conducted for the ESGRs indicated an average concentration of 7% was available for over 20 minutes. This exceeds the concentration percent and soak times identified in NUREG/CR-3656. This was also identified in NRC Integrated Inspection Report Nos. 50-338/99-01 and 50-339/99-01 under item F8.1 of the report.

15. Halon 1301 concentration in the NRC sponsored tests was higher than the design concentration of the ESGRs Halon system. What are the concentrations to classify the system as operable?

Response:

The NUREG/CR-3656 tests indicated a 6% concentration was adequate. The design for North Anna's ESGRs have been tested to show maintenance of a 7% concentration. Therefore, the North Anna Halon system envelops the NUREG test and is considered to be capable of extinguishing the postulated test fire. Refer to response to question 14 above.

16. Halon 1301, when exposed to a deep-seated fire for long periods of time decomposed into toxic and corrosive products of decomposition. Describe effect of decomposition products on electronic components in the ESGRs.

Response:

As noted in our response to question 14, this issue is also an issue that is generic to the industry rather than being plant specific to North Anna. The underlying concern is not plant specific compliance to fire protection guidance, but rather whether the guidance itself is adequate. As such, we believe this question to be generic in its application rather than plant specific and therefore more appropriately addressed as a generic licensing action.

However, we provide the following response to address the adequacy of our specific design with respect to this generic question. From the original licensing design perspective of North Anna, the toxic and corrosive products of Halon 1301 decomposition would only potentially effect equipment in one ESGR fire area. Shutdown procedures are written such that equipment located in the ESGR in which the fire occurs is not relied upon to achieve and maintain safe shutdown of the plant. Therefore, any effects that decomposition products would have on electronic components would be addressed as startup concerns and are not expected to prevent the Halon from performing its suppression function on the fire. Furthermore, the ability to accomplish safe shutdown of the plant is not affected by this consideration as equipment in the ESGR fire area is not relied on to achieve and maintain safe shutdown of the plant.

17. Section 4, Chapter 6 of the "SPFE Handbook of Fire Protection Engineering," Second Edition, states that leakage should be evaluated for a Halon 1301 system to ensure that the required concentrations are maintained for the entire soak time. Provide results of your analysis of the fire area for leakage effects.

Response:

The Control Room pressure envelope includes the Main Control Room and the Unit 1 and 2 ESGRs. This pressure envelope is controlled by procedures to be able to maintain the Control Room at a positive pressure of at least 0.05" water gauge relative to the adjacent areas. Differential pressure gauges are located in the Control Room and in the auxiliary shutdown panels in the ESGRs, which are monitored periodically to ensure that positive pressure is being maintained. These surveillances ensure that leakage through the penetrations in the MCR pressure envelope are maintained within Technical Specification limits.

0-PT-76.4, "Control Room Bottled Air Pressurization System Test", is performed

to demonstrate that the bottled air system can maintain the pressure envelope positive for at least one hour. The minimum airflow rate of the bottled air system is 340 cfm. During a recent completion of the PT (12/14/97), the average air flow rate during the 60 minutes was 395.4 cfm. It can be assumed that leakage out of the Control Room envelope during the test equaled the bottled airflow into the envelope. During a 10 minute period, total leakage would have been approximately 395 cfm x 10 minutes = 3,950 cubic feet. This is only 1.1% of the total volume of the envelope. This program of surveillances, periodic tests, and maintenance provide reasonable assurance that the control room pressure boundary is being maintained tight and, therefore, the Halon system is also expected to maintain its design concentration.

There are two barriers that are not part of the control room pressure envelope, the control room floor and the wall separating Unit 1 and 2 ESGRs. The only openings in these two barriers are closed automatically by the Halon system (dampers). Since most of the barriers are also pressure envelope barriers, there is assurance that these barriers will be very tight. Even if the two non-pressure-envelope-barriers have a higher leak rate, total leakage from the ESGR volume during a 10-minute Halon soak time is expected to be less than 5% of the volume. Therefore, the Halon concentration will be maintained in the room similar to or better than the original system acceptance tests.

18. Have any plant modifications, subsequent to the qualification tests of the Halon 1301 system been made in the ESGRs that could potentially affect Halon 1301 agent concentrations? What subsequent testing or evaluation was performed to ensure that proper concentrations were maintained for the required soak time?

    Response:

    No, the design change process controls modifications to the ESGR envelope and any boundary modification would require boundary testing. Refer to response to question 17 for recent periodic test results that confirm the present pressure boundary integrity of the MCR.

19. We acknowledge that the licensing basis for NAPS ESGRs fire suppression system is manual actuation of the Halon system. However, the 1997 edition of NFPA 12A, Section 3-7.1.2, requires that the agent discharge should be substantially completed in a nominal 10 seconds. The reason for the rapid discharge time includes: to prevent the fire from becoming deep-seated, to keeping unwanted products of decomposition to a minimum level, and to achieve complete dispersal of agent throughout the enclosure. In the case of delayed actuation of Halon 1301 system, the fire may become deep-seated and required a long soak time. Due to delayed actuation, the agent will decompose into hazardous and corrosive products; these products are toxic to personnel and can damage electronic components. Long soaking times are usually difficult to maintain without an extended agent discharge, and at high agent concentrations the system is rather expensive. Provide a level of effort and cost estimate on interfacing the existing detection system to the existing Halon system such that the system will have automatic actuation.

Response:

As noted in the cover letter, a detailed cost estimate will be provided in our 120-day response.

20. Have any fires occurred in the North Anna ESGRs? Please provide details.

Response:

There have been no fires in the ESGRs. A fire is defined as an event in which a fixed suppression system actuates or manual fire fighting actions are necessary to control or suppress a fire.

Attachment 2

Fire Protection and Abnormal Procedures

Dominion Generation
North Anna Power Station Units 1 and 2

SMOKE DET SYS SMOKE INDICATION TROUBLE

1.0 Probable Cause
- 1.1 Smoke or heat detected by the Robertshaw Panel in one or more of the monitored zones
- 1.2 Fault or power failure in any of the Robertshaw Panel zones
- 1.3 Unit 1 RCP Temperature greater than 575°F
- 1.4 Alarm on 1-EI-CB-97, Fire Protection Panel

2.0 Operator Action
- 2.1 Determine which zone is in alarm. Use 0-OP-52.9, Robertshaw Fire Panel, as a guide for Robertshaw Panel alarms. (Reference 3.4)
- 2.2 Refer to 1-AR-19, Fire Protection Panel as necessary.
- 2.3 Dispatch personnel to alarm location to investigate for fire.
- 2.4 IF actual fire, THEN go to 0-FCA-0, Fire Protection Operations Response.
- 2.5 In the event of a Unit 1 Emergency Switchgear Room (ESR) smoke alarm (Zone 6) IMMEDIATELY send an Operator to the ESR to determine if a fire exists.
  - 2.5.1 IF a fire exists OR the operator does NOT report back within approximately 5 minutes, THEN announce over Gaitronics and manually discharge the ESR Halon System from the Unit 1 Fire Protection Panel in the Control Room. Initiate 0-OP-52.6, Halon 1301 System.
  - 2.5.2 IF NO fire exists AND Halon HAS been initated, THEN within 60 seconds of initiation, send an operator to push AND hold the ABORT pushbutton for the affected Unit UNTIL the system is reset.
- 2.6 IF any of the following Zone alarms is alarming AND no fire exists, THEN reset alarm as follows:
  - * Zone 156 at 1-FP-CP-59, U1 N-16 Monitoring enclosure - RMP 1500
  - * Zone 157 at 2-FP-CP-54, U2 N-16 Monitoring enclosure - RMP 1600
  - * Zone 158 at 1-FP-CP-53, U1 Cable Penetration - RMP 0600
  - * Zone 159 at 1-FP-CP-54, U1 Emergency Switchgear Room -RMP 1100
  - * Zone 160 at 2-FP-CP-51, U2 Cable Penetration - RMP 0700
  - * Zone 163 at 2-FP-CP-53, U2 Emergency Switchgear Room - RMP 1200
  - 2.6.1 Send an Operator to locally reset alarm at the Remote Monitoring Panel (RMP).
  - 2.6.2 Have Operator place the miniture Normal/Disconnect switch (located on the front of the module inside the panel) to DISCONNECT position, then place switch in NORMAL.
  - 2.6.3 Have Operator in the Control Room reset alarm in Control Room.
- 2.7 IF a Unit 1 RCP Heat Detector (Zone 70, 71, 72) is in ALARM, THEN do the following:
  - 2.7.1 Monitor the following:
    - a. Control Board Annunciators.
    - b. RCP Temperatures indicators.
    - c. P-250 Computer printout.
  - 2.7.2 IF an actual RCP fire exists, THEN GO TO 1-E-0, Reactor Trip or Safety Injection and trip the affected RCP.
- 2.8 IF no indication of fire, THEN notify Instrument Department.
- 2.9 Refer to Technical Requirements Manual for minimum required detectors.

3.0 References

- 3.1 Technical Requirements Manual
- 3.2 DC-78S-68A, Smoke Detector System
- 3.3 DCP 83-18, Additional Smoke Detectors
- 3.4 CTS 02-92-2280-010, Revise smoke detection trouble actions to include the Robertshaw Panel
- 3.5 DCP 93-114, Connection of RCP Fire Detection Panels to Robertshaw Alarm Panel
- 3.6 1-E-0, Reactor Trip or Safety Injection
- 3.7 0-FCA-0, Fire Protection - Operations Response
- 3.8 0-OP-52.9, Robertshaw Fire Panel
- 3.9 11715-ESK-10D, 10BAH
- 3.10 Instrument Loop 11715-FP-084
- 3.11 1-AR-19, Fire Protection Panel
- 3.12 0-OP-52.6, Halon 1301 System

4.0 Actuation

- 4.1 Zone Smoke / Heat Detectors
- 4.2 Circuit failure
- 4.3 RCP Heat Sensor 1-FPM-DET-51, 1-FPM-DET-52, or 1-FPM-DET-53

-END-

SMOKE DET SYS SMOKE INDICATION/ TROUBLE

1.0 Probable Cause
- 1.1 Smoke or heat detected by the Robertshaw panel in one or more of the monitored zones
- 1.2 Fault or power failure in any of the Robertshaw Panel zones
- 1.3 Unit 2 RCP Temperature greater than 575°F
- 1.4 Alarm on 2-EI-CB-97, Fire Protection Panel

2.0 Operator Action
- 2.1 Determine which zone is in alarm. Use 0-OP-52.9, Robertshaw Fire Panel, as a guide for Robertshaw Panel alarms. (Reference 3.2)
- 2.2 For alarms on 2-EI-CB-97, Fire Protection Panel, refer to 2-AR-13, Fire Protection Panel.
- 2.3 Dispatch personnel to alarm location to investigate for fire.
- 2.4 IF actual fire, THEN go to 0-FCA-0, Fire Protection Operations Response.
- 2.5 In the event of a Unit 2 Emergency Switchgear Room (ESR) smoke alarm (Zone 36) IMMEDIATELY send an operator to the ESR to determine if a fire exists.
  - 2.5.1 IF fire exists OR the operator does NOT report back within approximately 5 minutes, THEN announce over Gaitronics and manually discharge the ESR Halon System from the Unit 2 Fire Protection Panel in the Control Room. Initiate 0-OP-52.6, Halon 1301 System.
  - 2.5.2 IF NO fire exists AND Halon HAS been initated, THEN, within 60 seconds of initiation, send an operator to push AND hold the ABORT pushbutton for the affected Unit UNTIL the system is reset.
- 2.6 IF a Unit 2 RCP Heat Detector (Zone 66, 67, or 68) is in ALARM, THEN do the following:
  - 2.6.1 Monitor the following:
    - a. Control Board Annunciators
    - b. RCP Temperature Indicators
    - c. P-250 Computer Printout
  - 2.6.2 IF an actual RCP fire exists, THEN GO TO 2-E-0, Reactor Trip or Safety Injection, and trip the affected RCP.
- 2.7 IF no indication of fire, THEN notify Instrument Department.
- 2.8 Refer to Technical Requirements Manual for minimum required detectors.

3.0 References
- 3.1 DCP 78-68A, Smoke Detector System
- 3.2 CTS 02-92-2280-010, Revise smoke detection trouble actions to include the Robertshaw Panel
- 3.3 Technical Requirements Manual
- 3.4 DCP 92-004, Annunciator Windows Engraving and Relocation
- 3.5 DCP 93-115, Connection of RCP Fire Detection Panels to Robertshaw Alarm Panel
- 3.6 2-E-0, Reactor Trip or Safety Injection
- 3.7 0-FCA-0, Fire Protection - Operations Response
- 3.8 0-OP-52.9, Robertshaw Fire Panel
- 3.9 2-AR-13, Fire Protection Panel

3.10 0-OP-52.6, Halon 1301 System

4.0 Actuation

4.1 Zone Smoke / Heat Detectors

4.2 Circuit failure

4.3 RCP Heat Sensor 2-FPM-DET-51, 2-FPM-DET-52 or 2-FPM-DET-53

-END-

VIRGINIA POWER	PROCEDURE NO: 1-FS-S-3	
NORTH ANNA POWER STATION	UNIT NO: 1	REVISION NO: 7
PROCEDURE TYPE: LOSS PREVENTION FIRE STRATEGY	EFFECTIVE DATE: ON FILE	EXPIRATION DATE: N/A

PROCEDURE TITLE:

UNIT 1 EMERGENCY SWITCHGEAR INSTRUMENT RACK AND AIR CONDITIONING ROOMS SERVICE BUILDING ELEV. 254 FT (S-54) SAFE SHUTDOWN EQUIPMENT

REVISION SUMMARY:

- **NON-UPGRADED PROCEDURE**
- Incorporated enhancements to Fire Strategies per NRC ESGR Halon System Inspection - Exit Notes, dated 02-12-99. Added Caution prior to Step 3.0.4, Attack Routes, to exercise care when entering to minimize the loss of halon. Added 3.0.5.f to minimize ejecting smoke into an area where operator actions may be warranted.

USE OF HAND-HELD RADIOS PROHIBITED INSIDE THE EMERGENCY SWITCHGEAR ROOMS.

Writer: John Field / Elizabeth Henshaw	**Reviewer:** R. Fleshman

ELECTRONIC DISTRIBUTION — APPROVAL ON FILE

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1 Unit 1 Emergency Switchgear Room Service Building Elevation 254' (S-54)	**9**

UNIT 1 EMERGENCY SWITCHGEAR ROOM
SERVICE BUILDING ELEVATION 254' (S-54)

1.0 LIFE SAFETY: Little or no occupancy expected.

2.0 FIRE HAZARD - (Fire Severity - 64 min.)

2.0.1 Ordinary Combustibles

a. Cable Insulation - 65,851 lbs.

b. Misc. Class "A" - 60 lbs.

c. Charcoal (Air Conditioning Room) 240 lbs.

2.0.2 Flammable Liquids and Gases

a. Grease - 2 lbs.

2.0.3 Electrical Hazards

a. 4160V Busses

b. 480V MCCs

c. 120V AC and DC

2.0.4 Radiological Considerations

a. None

2.0.5 Special Hazards

a. High Voltage (Electrical fire most likely).

3.0 FIRE FIGHTING PRACTICES:

3.0.1 Fire Detection System

a. Smoke Detectors

1. Alarms locally and in Control Room (Zone 6, 7)

2. Instrument Rack Room (Zone 36)

3. Air Conditioning Room (Zone 37)

3.0.2 Fixed Fire Suppression System

a. Manual Total Flooding Halon System Protects Area - may be initiated by depressing manual dump button 1-FP-PB-01, located on the right side (Unit 2), of Fire Door S-54-8 or in the Control Room.

3.0.3 Manual Fire Suppression Systems

a. Hand-held radios. Contact Control Room immediately, give brief summary and maintain contact.

b. Tactics: This area is protected by an installed suppression system. IF an attack is initiated, THEN use the following:

1. Fire Extinguishers

2. Hose Stream

3.0.4 Attack Routes - Access doors are NOT supervised.

* * * *

e. 1-JI-1 located 254' level Emergency Switchgear Room across from Battery Room 1-IV.

f. Minimize ejecting smoke into an area where operator action may be warranted.

3.0.6 Salvage

a. Minimize damage to electrical equipment using CO_2 where possible.

3.0.7 Overhaul

a. Search adjacent areas for fire extension.

3.0.8 Equipment Restoration

a. Restore all fire brigade equipment to staging area.

b. Restore all hose racks to operability.

NOTE: IF Halon has been initiated, THEN there are 4 dampers which may need resetting.

c. Notify Shift Supervisor of Loss Prevention if there is a need to reset dampers.

4.0 SPECIAL NOTES:

4.0.1 Construction

a. Type - Min. 3 hr. rating - constructed of reinforced concrete block 12 in. thick.

b. Opening - Min. rated to walls.

4.0.2 Important Equipment

a. Solid State Protection System - input, output, and logic cabinets - Safety Related.

b. Process Racks - protection and control - Safety Related.

c. Auxiliary Relay Cabinets - Safety and Non-Safety Related.

d. Control Rod position indication racks.

e. "H" Train Emergency Load Center (480V)

f. "J" Train Emergency Load Center (480V)

4.0.3 Location of Shutdowns

a. Electrical - as per direction of Shift Supervisor.

b. Mechanical - as per direction of Shift Supervisor.

REDUNDANT SAFE SHUTDOWN

1. Safe Shutdown can be achieved through the use of Unit 2 Safe Shutdown equipment located in separate fire areas.

2. Safe Shutdown can be achieved using the Auxiliary Control Panel if the Control Room Safe Shutdown equipment is impaired.

3. IF fire occurs in the area, THEN protect Safe Shutdown equipment panels in this area.

4. Assume all instrumentation racks contain Safe Shutdown equipment.

ATTACHMENT 1

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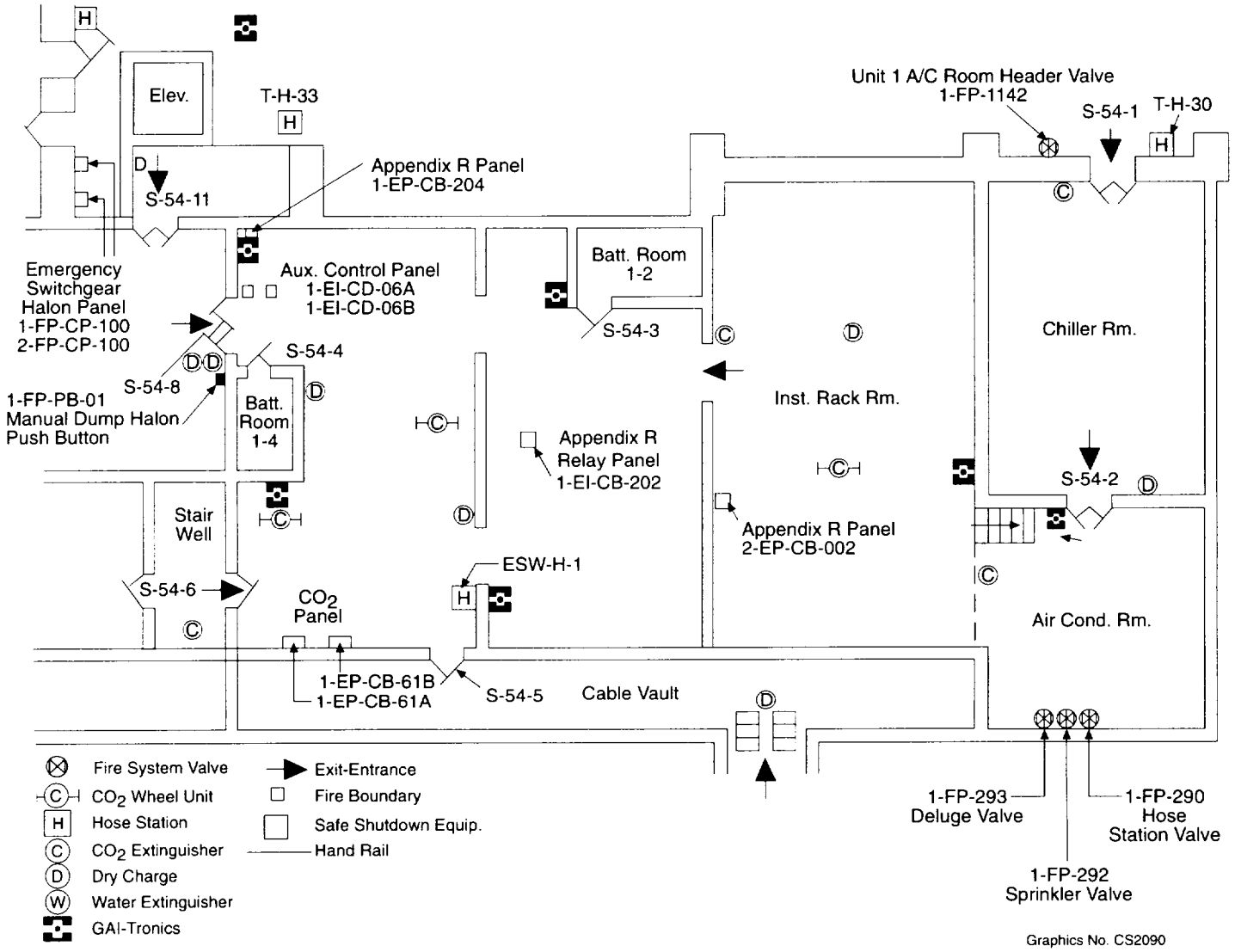
UNIT 1 EMERGENCY SWITCHGEAR ROOM

SERVICE BUILDING ELEVATION 254' (S-54)



UNIT 1

AIR CONDITION ROOM AIRHANDLING ROOM
EMERGENCY SWITCHGEAR & RELAY ROOM
INSTRUMENT RACK ROOM

VIRGINIA POWER **NORTH ANNA POWER STATION**	PROCEDURE NO: 2-FS-S-3	
	UNIT NO: 2	REVISION NO: 5
PROCEDURE TYPE: LOSS PREVENTION FIRE STRATEGY	EFFECTIVE DATE: ON FILE	EXPIRATION DATE: N/A

PROCEDURE TITLE:

UNIT 2 EMERGENCY SWITCHGEAR INSTRUMENT RACK AND AIR CONDITIONING ROOMS SERVICE BUILDING ELEV. 254 FT (S-54) SAFE SHUTDOWN EQUIPMENT

REVISION SUMMARY:

- **NON-UPGRADED PROCEDURE**
- Incorporated enhancements to Fire Strategies per NRC ESGR Halon System Inspection - Exit Notes, dated 02-12-99. Added Caution prior to Step 3.0.4, Attack Routes, to exercise care when entering to minimize the loss of halon. Added 3.0.5.f to minimize ejecting smoke into an area where Operator actions may be warranted.

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UNIT 2 EMERGENCY SWITCHGEAR ROOM SERVICE BUILDING ELEVATION 254' (S-54)

1.0 LIFE SAFETY: Little or no occupancy expected.

2.0 FIRE HAZARD - (Fire Severity - 64 min.)

2.0.1 Ordinary Combustibles

a. Cable Insulation - 55,947 lbs.

b. Misc. Class "A" - 150 lbs.

c. Charcoal (Air Conditioning Room) 240 lbs.

2.0.2 Flammable Liquids and Gases

a. Grease - 2 lbs.

2.0.3 Electrical Hazards

a. 4160V Busses

b. 480V MCCs

c. 120V AC and DC

2.0.4 Radiological Considerations

a. None

2.0.5 Special Hazards

a. High Voltage (Electrical fire most likely).

3.0 FIRE FIGHTING PRACTICES:

3.0.1 Fire Detection System

a. Smoke Detectors - Alarms locally and in Control Room (Zone 6, 7)

3.0.2 Fixed Fire Suppression System

a. Manual Total Flooding Halon System Protects Area - may be initiated by depressing manual dump button 2-FP-PB-02, located on the right side (Unit 2) of Fire Door S-54-11 or in the Control Room.

3.0.3 Manual Fire Suppression Systems

a. Hand-held radios. Contact Control Room immediately, give brief summary and maintain contact.

b. Tactics: This area is protected by an installed suppression system. IF an attack is initiated, THEN use the following:

1. Fire Extinguishers

2. Hose Stream

3.0.4 Attack Routes - Access doors are NOT supervised.

* * * *

e. 2-JI-1 located 254' level Emergency Switchgear Room across from Battery Room 2-IV.

f. Minimize ejecting smoke into an area where operator action may be warranted.

3.0.6 Salvage

a. Minimize damage to electrical equipment using CO_2 where possible.

3.0.7 Overhaul

a. Search adjacent areas for fire extension.

3.0.8 Equipment Restoration

a. Restore all fire brigade equipment to staging area.

b. Restore all hose racks to operability.

NOTE: IF Halon has been initiated, THEN there are 4 dampers which may need resetting.

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4.0 SPECIAL NOTES:

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4.0.2 Important Equipment

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ATTACHMENT 1

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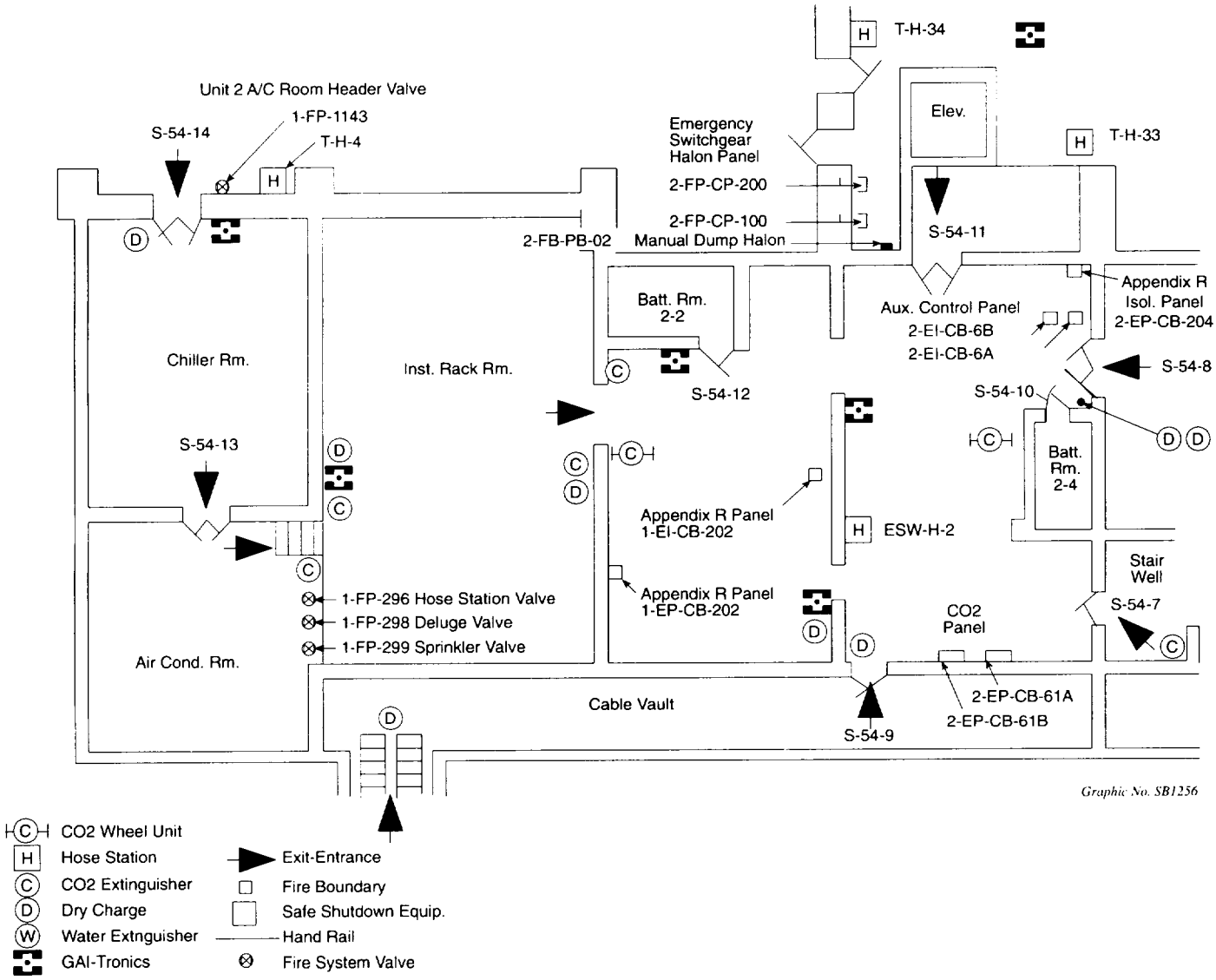
UNIT 2 EMERGENCY SWITCHGEAR ROOM
SERVICE BUILDING ELEVATION 254' (S-54)



UNIT 2
AIR CONDITION RM. AIRHANDLING RM.
EMERGENCY SWITCHGEAR & RELAY RM.
INSTRUMENT RACK RM.