

AUG 24 1984

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MEMORANDUM FOR: John Olshinski, Director  
 Division of Engineering and  
 Technical Programs, Region II

FROM: Darrell G. Eisenhut, Director  
 Division of Licensing  
 Office of Nuclear Reactor Regulation

SUBJECT: EVALUATION AND CORRECTIVE ACTIONS FOR  
 NON-QUALIFIED PAINT INSIDE CONTAINMENT  
 AT NORTH ANNA POWER STATION, UNITS NO. 1  
 AND NO. 2 (NA-1&2)

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 NRC PDR  
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 LBEngle  
 PMKreutzer

By Region II memorandum dated August 20, 1984 (J. Olshinski to D. Eisenhut), you requested a copy of the meeting notes for a meeting which took place on August 3, 1984 between the NRR staff and VEPCO for the subject noted above. A copy of the meeting summary is enclosed to this memorandum.

Region II first requested technical assistance on this subject by telephone on July 27, 1984 (S. Elrod, Reg. II to L. Engle, (NRR)). On August 1, 1984 VEPCO requested a meeting with NRR for August 3, 1984 to discuss the subject above. On August 2, 1984, NRR requested Region II attendance for the forthcoming meeting (L. Engle to S. Elrod), but Region II manpower requirements negated Region II attendance on August 3, 1984. After the subject meeting was adjourned, NRR notified Region II by telephone (L. Engle to S. Elrod) of the staff's conclusions and Region II indicated the staff's findings, regarding the licensee's corrective actions, to be acceptable to Region II.

Therefore, the enclosed meeting summary completes NRR technical assistance requested in Region II memorandum dated August 20, 1984 and specified as Task Interface Agreement No. 84-65.

*for G. Linnon*  
 Darrell G. Eisenhut, Director  
 Division of Licensing  
 Office of Nuclear Reactor Regulation

Enclosure:  
 August 3, 1984  
 Meeting Summary

cc: J. Carter  
 G. Holahan  
 T. Jordan  
 J. Sniezek

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 PKreutzer  
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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D. C. 20555

AUG 13 1984

Docket Nos.: 50-338  
and 50-339

MEMORANDUM FOR: James R. Miller, Chief  
Operating Reactors Branch #3  
Division of Licensing

FROM: Leon B. Engle, Project Manager  
Operating Reactors Branch #3  
Division of Licensing

SUBJECT: SUMMARY OF MEETING WITH THE VIRGINIA ELECTRIC  
AND POWER COMPANY (VEPCO) REGARDING NON-QUALIFIED  
PAINT INSIDE CONTAINMENT AT NORTH ANNA POWER  
STATION, UNITS NOS. 1 AND 2

Introduction

A meeting was held on Friday, August 3, 1984, with VEPCO and the NRC staff in Bethesda, Maryland regarding the subject as noted above. A list of attendees is provided in Enclosure 1.

Prior to the August 3, 1984 meeting, Region II had received allegations that certain paint inside containment at NA-1 was non-nuclear qualified. VEPCO commenced an investigation into the allegation and on Friday, July 27, 1984, Region II notified NRR that VEPCO had confirmed the existence of non-qualified paint on the surface of the lower ring ventilation ducting inside the NA-1 containment. The surface area affected was approximately 8100 square feet.

The ventilation ring in the lower level of containment consists of galvanized surfaces. Although these galvanized surfaces are designed to withstand a containment environment, infrequent boric acid solution had impinged on these galvanized surfaces and caused minor corrosion. To prevent further corrosion on the lower ring duct, VEPCO, as a preventive measure, had the ducts painted during December 1982 and January 1983.

In response to the allegation, VEPCO, in mid-Summer 1984, checked the NA-1 Protective Coating Surface Preparation Records and determined that the coatings applied to the lower ring duct were:

- (1) An alkyd primer, Mobil Chromax Red Primer, No. 13-R-50, and
- (2) A catalyzed polyamide epoxy finish, Dupont Corlar Dual Build Epoxy Enamel, No. 823-Y-67632 with Activator No. VG-Y-8839.

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Upon further investigation, VEPCO determined the Mobil Alkyd Primer was non-nuclear qualified and, although the Dupont epoxy (finish coat) was nuclear qualified, neither primer nor topcoat were approved for use on galvanized surfaces. As noted previously, the affected area was approximately 8,100 square feet of ductwork and supports which had been coated with the above noted primer and finish coats. The average dry film thickness of the coating is 5 to 6 mils.

Based on the above, Region II requested NRR assistance since paint expertise rested on the NRR staff. On Wednesday, August 1, 1984, VEPCO requested a meeting for Friday, August 3, 1984 with the appropriate NRR staff in Bethesda, Maryland, in order to discuss these matters.

In addition, upon the identification of non-qualified paint at NA-1, VEPCO immediately proceeded to scrutinize the NA-2 Protective Coating Surface Preparation Records. These records indicated conflicting reports as to specific applications of primer and finish coats of paint applied to the NA-2 lower ring ventilation ducts. VEPCO, therefore, determined to shut down NA-2 until such time that conflicting paint records could be unraveled. Shutdown of NA-2 commenced at approximately 18:00 hours, Thursday, August 2, 1984. It is noted that NA-1 was in a refueling outage and scheduled for restart August 12, 1984.

Upon discovery of the non-qualified paint, VEPCO initiated test programs to evaluate the performance of the applied coating under Design Basis Accident (DBA) conditions and to verify the coating materials used. Test coupons were selected from representative samples of ductwork and sent to the Oak Ridge National Laboratory (ORNL) for DBA testing. VEPCO specified that the test and procedures to be used at ORNL would be in conformance with the NA-1&2 Updated Final Safety Analysis Report (UFSAR) as specified in Appendix 3D, "Testing of Protective Coatings Under Design Basis Accident Conditions". In addition, VEPCO initiated chemical analyses to be performed by KTA-Tator to verify the generic type of coatings applied to the ductwork.

### Discussion

On Friday, August 3, 1984, VEPCO presented its meeting agenda to the staff to be followed and discussed during the meeting. A copy is provided as Enclosure 2. NRR requested Region II attendance could not be met due to existing Region II manpower requirements.

VEPCO stated that it is necessary that protective coatings within Containment remain intact on applied surfaces following postulated Loss of Coolant Accident (LOCA) environmental conditions. VEPCO further stated that the NRC approved NA-1&2 FSAR specifies that coatings applied after initial construction must meet the technical performance requirements for simulated DBA testing set forth in the American Nuclear Safety Institute (ANSI) standard N101.2-72. VEPCO went on to say that, since the coating system utilized at NA-1 on the lower ring ventilation ducts had not been nuclear qualified, corrective action was required by VEPCO.

VEPCO had evaluated various options for implementing corrective actions. These options are:

- (1) Install new ductwork which would impact the NA-1 restart schedule of August 12, 1984 by 3 months and represent significant cost expenditures and shutdown time.
- (2) Remove the non-qualified paint from the ductwork and supports by chipping and abrasive tools which would cause a non-suitable environment for NRC required electrical work underway to meet NUREG-0737, "Post TMI Requirements".
- (3) Install a stainless steel wire mesh screen over the affected surfaces of the ductwork and supports in NA-1 containment to retain any coating material which could potentially cause blockage of the containment sump screens.

Because of the above noted impacts and associated problems noted in items (1) and (2) above, VEPCO had decided to take corrective action specified in item (3) above.

VEPCO stated a stainless steel wire mesh screen would be installed over all affected surfaces of the coated ductwork and supports. The installed screen would be a 8x8 mesh per linear inch and fabricated from Type 304 stainless steel. The width of the screen opening would be 0.097 inch, which is smaller than the opening of the fine mesh sump screen (0.120 inches). Sheet metal ribs would be installed approximately every four linear feet of ductwork and the mesh screen then riveted to the metal ribs. In addition, a seismic analysis would be performed to ensure that the ductwork and supports with the increased weight would be within the envelope of design criteria.

VEPCO then provided its bases for ensuring that the proposed corrective actions for non-qualified paint would not result in any impact on the operation of safety required equipment required to mitigate the consequences of a DBA. Assuming that the non-qualified paint coating releases from the galvanized substrate following a DBA, the wire mesh surrounding the ductwork would entrap a significant portion of the paint. In addition, the entrapment of the paint particles on the mesh screen would build up on the screen as a function of time and, thereby, allow only an increasing preferential small size of paint particles to pass through the screen. Also, a large portion of the lower ring ductwork is not located in the area of containment sump and water on the floor in these areas flows to the sump at a low velocity following a postulated LOCA. A large portion of the paint particles which might escape the wire mesh screen would settle out or become entrapped elsewhere before reaching the fine mesh screen on the containment recirc pumps. Finally, any paint particles reaching the containment sump would be of a smaller size than the pump screen mesh and could be circulated through the recirc-system.

VEPCO then provided the staff with an update on the status of paint conditions at NA-2. VEPCO stated that its decision to shutdown NA-2 the previous day was due to the uncertainty and validity of paint records which might verify paint qualification on the NA-2 lower ring ventilation ducting. This ducting had been painted in April and May 1983 to mitigate corrosive effects as in the case for NA-1. VEPCO stated that the NA-2 Protective Coating Surface Preparation Records indicated that the following coatings were applied over the galvanized surface.

- (1) Primer: Keeler and Long White Epoxy Primer 6548
- (2) Finish: Keeler and Long White Epoxy Finish 6548.

VEPCO stated that at this time the above identified primer and finish coats present a coating system which is nuclear qualified over carbon steel surfaces. However, disparities in paint records could not provide 100 percent assurance that the identified coatings were in place on the affected ring duct surface area. Therefore, test coupons had been prepared and expedited to ORNL for DBA testing as in the case for NA-1.

Finally, VEPCO stated that paint procedures and records will be reviewed and revised to provide stricter quality control for verifying qualified paint inside containment is properly applied and nuclear qualified.

### Conclusions

The NRC staff recessed to consider VEPCO's proposals and determined the following, which was presented to VEPCO.

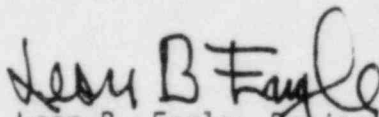
- (1) The results of particle-dynamic calculations of particle interactions and granular flow have shown that grading of small size fines can in certain cases collect on surfaces with openings of greater size than the particle fines in question. The staff suggested the licensee assure themselves that such interaction would not take place.
- (2) The staff finds VEPCO's corrective action (as discussed above) to be acceptable for NA-1. Should final analysis confirm similar problems for NA-2 ring duct ventilation paint, the proposed corrective measures are also acceptable for NA-2.
- (3) VEPCO's corrective measures are acceptable on a short term and long term basis providing the results of the Comanche Peak Task Force (non-qualified paint) identify no new generic concerns.
- (4) The staff also recommends that VEPCO upgrade quality control for qualified paint records inside containment and the procedures for application of surfaces inside containment.

Subsequent Events Related To Meeting Summary

The meeting was adjourned at approximately 2:00 pm, Friday, August 3, 1984, wherewith NRR called Region II at approximately 2:30 pm and stated the staff's conclusions as stated above. Region II indicated the staff's finding, regarding the licensee's corrective action to be acceptable to Region II.

On Tuesday, August 7, 1984, VEPCO informed NRR that preliminary tests conducted by ORNL had confirmed degradation of both NA-1&2 paint samples under simulated DBA conditions. In the case of NA-1, a significant 75-80% of sample surface was observed to be blistered. For NA-2, a 10-20% flaking was observed in a failure adhesion test. ORNL testing is not scheduled to be completed until approximately September 1, 1984. Therefore, the corrective measures identified above will be implemented at both NA-1&2.

The corrective measures will be completed at NA-1 prior to restart, now scheduled for August 23, 1984. NA-2 was officially placed in its refueling outage on August 9, 1984 and the corrective measures will be completed prior to restart (not yet officially established).



Leon B. Engle, Project Manager  
Operating Reactors Branch #3  
Division of Licensing

Enclosures:  
As stated

List of Attendees  
for  
Meeting With VEPCO  
on  
August 3, 1984

Subject of Meeting: Non-Qualified Paint Inside Containment

NRC

V. Benaroya  
S. P. Chan  
L. B. Engle  
J. S. Guo  
D. Sells  
F. Witt

VEPCO

J. M. Anderson  
R. M. Berryman  
M. L. Bowling  
J. O. Eastwood  
A. D. Fraley  
R. B. Green  
R. Hardwick

AGENDA

INTRODUCTION

M. L. BOWLING

DISCUSSION OF COATINGS APPLIED

R. M. BERRYMAN

DISCUSSION OF CORRECTIVE ACTION  
TO BE TAKEN

R. M. BERRYMAN



ATTENDEES

M. L. BOWLING

A. D. FRALEY

R. HARDWICK

R. M. BERRYMAN

R. B. GREEN

J. M. ANDERSON

J. O. EASTWOOD

POTENTIAL UNQUALIFIED COATING  
CONTAINMENT AIR COOLING AND PURGING SYSTEM  
NORTH ANNA UNIT NO. 1

- Ventilation ring duct in the lower level of containment was coated in December, 1982 and January, 1983 to mitigate corrosion.
  
- Protective Coating Surface Preparation Records indicate that the coatings applied were:
  - (1) An alkyd primer, Mobil Chromax Red Primer, No. 13-R-50
  - (2) A catalyzed polyamide epoxy finish, Dupont Corlar Dual Build Epoxy Enamel, No. 823-Y-67632 with Activator No. VG-Y-8339
  
- The Mobil Alkyd Primer is not nuclear qualified. The Dupont epoxy is nuclear qualified but neither primer or topcoat is approved for use over galvanized surfaces.
  
- Approximately 8,140 ft.<sup>2</sup> of ductwork and supports have been coated. Average dry film thickness of the coating is approximately 5-6 mils.

CORRECTIVE ACTION  
UNIT NO. 1

- It is necessary that protective coatings within Containment remain intact following a postulated LOCA.
- UFSAR states that coatings applied after initial construction must meet the technical performance requirements for simulated DBA testing set forth in ANSI N101.2-72.
- Since the coating system utilized has not been nuclear qualified, corrective action will be taken.
- The corrective action will be to install a stainless steel wire mesh screen over the coated surfaces of the ductwork and supports in Unit No. 1 Containment to retain any coating material which could potentially cause blockage of the sump screens.

DESCRIPTION OF PROTECTIVE COVERING SYSTEM  
UNIT NO.

- A stainless steel wire mesh screen will be installed over all surfaces of the coated ductwork and supports.
- Screen to be installed will be 8 X 8 mesh per linear inch fabricated from Type 304 stainless steel. The width of the opening is 0.097 inch.
- The maximum width of the opening is smaller than the opening in the fine mesh sump screen (0.120 inch).
- Sheet metal ribs will be installed around the ductwork and the wire mesh screen will be riveted to the metal ribs.
- A seismic analysis will be performed to ensure that the ductwork and supports will meet design criteria with the increased weight.

SAFETY EVALUATION  
UNIT NO. 1

- Assuming that the unqualified coating releases from the substrate following a postulated LOCA, it is unlikely that paint would pass through the wire mesh surrounding the ductwork.
- Any paint particles that might pass through the protective screen would be of a size that would pass through the sump screens.
- A large portion of the ductwork is not in the vicinity of the containment sump and water on the floor in these areas flows to the sump at a low velocity following the postulated LOCA.
- Paint particles which may escape the wire mesh screen that do not settle out or become entrapped elsewhere will pass through the fine mesh screens on the pump suction and be circulated through the system.
- Therefore, there will be no impact on the operation of safety related equipment required to mitigate the consequences of the accident.

UNQUALIFIED COATING TEST PROCEDURE  
UNIT NO. 1

- Test programs were initiated to evaluate the performance of the applied coating under DBA conditions and to verify the coating material used.
- Test coupons were selected from representative samples of the ductwork and sent to ORNL for DBA testing. The test procedure to be used will be as specified in Appendix 3D of the UFSAR.
- Chemical analyses will be performed by KTA-Tator to verify the generic type of coatings applied to the ductwork.

PROTECTIVE COATING APPLIED TO  
CONTAINMENT AIR COOLING AND PURGING SYSTEM  
NORTH ANNA UNIT NO. 2

- Ventilation duct in lower level of Unit No. 2 containment was coated in April and May, 1983.
  
- Protective Coating Surface Preparation Records indicate that the following coatings were applied over the galvanized substrate:
  - (1) Primer: Keeler and Long White Epoxy Primer 6548
  - (2) Finish: Keeler and Long White Epoxy Finish 6548
  
- Coating system applied is nuclear qualified over carbon steel surfaces.
  
- Test coupons have been prepared and sent to ORNL for DBA testing.