



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

JUL 26 1983

MEMORANDUM FOR: Victor Benaroya, Chief
Chemical Engineering Branch
Division of Engineering

THRU: Robert Ferguson, Section Leader
Chemical Engineering Branch
Division of Engineering

FROM: Dennis Kubicki
Chemical Engineering Branch
Division of Engineering

SUBJECT: TRIP REPORT: FIRE PROTECTION SITE AUDIT - BYRON
STATION UNITS 1 AND 2

Plant Name: Byron Station Units 1 and 2
Docket Numbers: 50-454 and 50-455
Licensing Stage: OL
Responsible Branch: LB -1; L. Olshan, PM
Chemical Engineering Branch Reviewer: D. J. Kubicki

Between July 12 and 15, 1983, we conducted our fire protection site audit at the Byron Station, Units 1 and 2. A representative of our consultant, Gage Babcock & Associates, participated.

As a result of the audit, we reached several agreements regarding the adequacy of the fire protection program. In addition, we expressed a number of concerns/questions pertaining to previous applicant commitments; the justification for particular fire protection designs; and the degree of compliance with our fire protection criteria. A summary of these issues is enclosed. The applicant agreed to respond to our concerns.

Dennis Kubicki
Dennis Kubicki
Chemical Engineering Branch
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Enclosure: As stated

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cc: See next page

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Enclosure
Chemical Engineering Branch/Fire Protection Section
Byron Station, Units 1 and 2
Docket Nos. 50-454 and 50-455

Introduction

Between July 12 and 15, 1983, we conducted our fire protection site audit at the Byron Station, Units 1 and 2. A representative of our consultant, Gage Babcock and Associates participated.

As a result of the audit, we reached a number of agreements regarding the adequacy of the fire protection program. In addition, we expressed a number of concerns pertaining to previous applicant commitments; the justification for particular fire protection designs; and the degree of compliance with our fire protection criteria. The agreements and concerns can be summarized as follows:

Agreements

1. The applicant has designed those components required for hot shut-down so that rupture or inadvertent operation of fire suppression systems will not adversely affect the operability of these components. Where necessary, appropriate protection is provided to prevent impingement of water spray on components required for hot shut-down. Redundant trains of components that are susceptible to damage from water spray are physically separated so that manual fire suppression activities will not adversely affect the operability of components not involved in the postulated fire.
2. The installation of a third fixed repeater for emergency communications on the roof of the elevator machine room in the Turbine Building provides reasonable assurance that a single fire could not interrupt emergency communications in the plant. This modification complies with Section C.5.g of BTP CMEB 9.5.1.

3. Because of the complete, area wide, automatic fire detection and suppression systems; the steel pipe construction and the insulation for the cooling water pipes in the diesel generator rooms, a fire in Room 1B will not damage cooling water pipes for both diesel generators before being detected and extinguished. Therefore, the routing of cooling water lines for diesel generator 1A through the room containing diesel generator 1B is an acceptable deviation from the technical requirements of Section III.G of Appendix R.
4. With the exception of the two doors identified in item 16 (below), the non-U.L. labeled doors, identified in Section 2-3 of the applicant's Fire Protection Report, will achieve an equivalent level of safety to labeled fire doors and is, therefore, an acceptable deviation from the technical requirements of Section C.5.a of BTP CMEB 9.5.1.

Concerns

The following is a list of fire protection concerns raised during the audit.

1. In the August 16, 1982 revision to the Fire Protection Report, the applicant committed to seal fire barrier penetrations with material having a fire resistance rating comparable to the ratings of fire walls and floor/ceiling assemblies. This necessitates that sealant material be installed to an appropriate depth consistent with its U.L. listing. We observed that RTV silicon sealant material was installed in the plant in thicknesses greater than the depth of the concrete floor slab. This configuration does not appear to be consistent with the listing of the material. We are concerned that this sealant material will not be able to withstand anticipated fire exposures. The applicant should verify that penetration seals featuring silicon foam, as installed in the plant, are equivalent to the rating of the structural assembly.

2. The following features of the fire protection program were observed to be incomplete:

- The installation of penetration seals in fire walls and fire rated floor/ceiling assemblies.
- The provision of seismic supports for the hydrogen supply piping routed through the Aux. Building.
- The installation of fire proofing for steel structural elements.
- The installation of fire hose nozzles, hose houses and hose-house fire fighting equipment.
- The third repeater for the plant emergency communications network.
- The O.S. Y-type sectional control valve at the discharge outlet for the fire pumps to avoid the necessity of shutting off one fire pump in order to test the other.

The applicant should verify that these features of the fire protection program will be completed by fuel load.

3. To comply with Section C.6.a of BTP CMEB 9.5.1, electrical circuits associated with automatic fire suppression systems, including fire detection circuits, are required to be Class "A" supervised such that system activation is possible automatically under a single break or ground fault condition. Information was unavailable during the audit to completely verify this design feature in the plant. With the exception of the redundant fire detection systems in the cable spreading rooms, (where activation of either system initiates fire suppression system discharge), the applicant should verify that all circuits associated with automatic fire suppression systems are class "A", including those circuits from the local fire alarm panels to the suppression system actuating mechanism.

4. In the August 16, 1982 revision to the Fire Protection Report, the applicant committed to comply with Section C.5.d of BTP CMEB 9.5.1 and with Section C.7.b, with the exception that an automatic fire suppression system will not be installed in "offices" in the control room complex. We observed that the computer related storage area adjacent to the control room is not equipped with an automatic fire suppression system which is not consistent with these commitments.

5. To comply with Section C.6.c of BTP CMEB 9.5.1, interior manual hose stations should be installed so as to be able to reach any location that contains, or could present a fire exposure hazard to safety related equipment with at least one effective hose stream. We observed that because of the present location of manual hose stations, it may not be possible to reach all areas of the computer room and cable riser area on elevation 451 feet. The applicant should conduct a hose stretch test to verify the adequacy of the existing design.

We also observed that because of congested conditions in certain plant areas, such as the cable spreading rooms, it may not be possible to utilize existing manual hose stations because of the inability to fully deploy the woven-jacketed fire hose. In such areas, to comply with Section C.6.c of BTP CMEB 9.5.1, it will be necessary to replace the woven-jacketed hose with a hard rubber type.

6. In the August 16, 1982 revision to the fire Protection Report, the applicant committed to seal fire barrier penetrations with material having a fire resistance rating comparable to the rating of fire walls and floor/ceiling assemblies. Information was unavailable during the audit to verify that bus duct penetrations of fire rated assemblies have been sealed internally with an appropriate fire rated material. The applicant should confirm that such penetrations are sealed to maintain the integrity of the barrier. In addition,

we observed that fire dampers were installed in a "ganged" configuration in several large ventilation openings in fire barriers, such as the diesel generator room exhaust vents. This arrangement does not appear to be consistent with the listing of the damper. The applicant should verify that the installation of the dampers in a ganged configuration will achieve a fire rating equivalent to that of the barriers in which they are installed.

7. In the August 16, 1982 revision to the Fire Protection Report, the applicant committed to comply with NFPA Standards 13 and 15 in the design and installation of fixed water extinguishing systems. We observed that manual discharge valves for the water deluge fire suppression systems protecting charcoal filters would be inaccessible during a fire because of their closeness to the filters and the limited access in the area. This condition appears contrary to the commitment.
8. To comply with Section C.5.b of BTP CMEB 9.5.1 and Section III.G of Appendix R, structural steel forming a part of or supporting fire barriers should be protected to provide fire resistance equivalent to that required of the barrier. We observed that in the upper and lower cable penetration areas and in the Auxiliary Building General Floor area, on elevations 346 feet through 426 feet, the structural steel supporting the floors was unprotected. We are concerned that a fire could cause the collapse of such elements and effect components/cables of redundant shutdown divisions located within the same floor elevation or on vertically adjoining elevations. The applicant should provide protection for such structural steel commensurate with the fire exposure and the degree of separation between redundant shutdown divisions (see concern in item 18 below).

We are also concerned that openings in non-fire rated barriers, such as equipment hatches, removable concrete slabs, and unprotected stairway openings in the Auxiliary Building General Floor areas would subject redundant shutdown divisions, which are located on different elevations, to loss from a single fire. The applicant should provide fire protection commensurate with the hazard and in accordance with Section C.5.b of our fire protection guidelines or demonstrate that at least one shutdown division would remain free of damage from a vertically propagating fire.

9. We observed several discrepancies in the description of fire protection features in the applicant's Fire Protection Report from what was observed in the plant. Such discrepancies include the description of fire proofing for structural steel, the extent of fire detection in safety related plant areas, the nature of fire doors and the lack of a fire hazard's analysis and fire protection for the "Med-Chem" area on elevation 401 feet.
10. In our Safety Evaluation Report, we stated that an oil collection system for each reactor coolant pump was required in accordance with Section C.7.a of BTP CMEB 9.5.1. Based on observations of conditions in containment as they pertain to the fire hazard posed by the reactor coolant pumps, our conclusion regarding the need for an RCP oil collection system remains unchanged.
11. In the August 16, 1982 revision to the Fire Protection Report, the applicant committed to comply with NFPA Standard No. 20 regarding the installation of fire pumps. We observed that an unlisted controller has been installed for the electric motor driven fire pump which is not consistent with that commitment.

12. In the August 16, 1982 revision to the Fire Protection Report, the applicant committed to comply with Section C.5.d(1), "Control of Combustibles" of BTP CMEB 9.5.1. In the diesel generator rooms and at the Auxiliary Fuel Pump Room, we observed that curbs were not provided at doorways into these areas and therefore, a potential existed for a diesel fuel fire to propagate through the doorway into adjoining areas. The applicant should provide curbs at these doorways to be consistent with their commitment.

13. In the Fire Protection Report, the applicant committed to comply with NFPA Standard No. 13 in the design of automatic sprinkler systems. We observed that the ceiling level sprinklers over the lube oil drain tank were obstructed, which is contrary to that commitment.

14. To comply with Section C.5.g(1) of BTP CMEB 9.5.1, fixed self-contained lighting consisting of fluorescent or sealed beam units with individual 8-hour minimum battery power supplies should be provided in all plant areas that need to be manned for safe shutdown and all routes to these areas. We observed that the Essential Safety Features Switchgear Room has not been provided with 8-hour battery powered emergency lighting as required. All other areas of the plant that are accessed for safe shutdown have been provided with emergency lighting off of individual battery units or the station batteries. The use of station batteries represents a deviation from our fire protection guidelines. To be considered acceptable, the applicant would have to demonstrate that a fire in an area containing emergency lighting off of the station batteries would not affect battery powered emergency lighting in all other plant areas.

15. The August 16, 1982 revision to the Fire Protection Report identifies equipment located within the Control Room Refrigeration Equipment Rooms being necessary for safe shutdown. We observed that components and cables from both shutdown division are vulnerable to damage from a fire in this room and therefore do not meet the guidelines of Section C.5.b of BTP CMEB 9.5.1.
16. Labeled fire doors were not provided at the Auxiliary Fuel Pump Room and at the doorway in the fire wall at Column L-11 on elevation 401 feet, as committed to in the Fire Protection Report.
17. We observed that, because of the absence of an automatic fire suppression system and the lack of a fire wall between redundant divisions, both RHR pumps and related cabling are vulnerable to a fire located in the containment spray pump area. To satisfy the guidelines in Section C.5.b of BTP CMEB 9.5.1, the unprotected openings in the wall separating the Division 11 RHR pump room from the containment spray pump area should be protected to prevent the passage of smoke and heat.
18. We observed that, because of the absence of automatic fire suppression systems, area-wide smoke detection systems and/or physical separation between redundant divisions, both trains of shutdown related cabling and components are vulnerable to damage from a single fire in the following plant areas:
 - Non segregated bus duct area
 - Aux. electrical equipment room
 - Aux. building general area, Elevation 346 feet
 - Aux. building general area, Elevation 364 feet
 - Aux. building general area, Elevation 401 feet
 - Aux. building general area, Elevation 426 feet
 - Containment.

The fire protection for these areas is not in accordance with the guidelines in BTP CMEB 9.5.1 or Section III.G of Appendix R. Outside containment, the applicant should completely protect one shutdown division with a one-hour fire rated barrier wherever redundant divisions are located within 20 feet of one another or located more than 20 feet apart but the intervening space contains combustible material. In addition, complete area-wide fire detection and automatic fire suppression are required. Inside containment, the fire protection guidelines of Section C.7.a of BTP CMEB 9.5.1 apply. To facilitate our evaluation of any deviation from our guidelines and to evaluate the adequacy of the applicant's response to Item 8 (above), the applicant should provide color coded drawings showing the relative location of redundant shutdown related cables for all fire areas.

NOTE Because no safe shutdown analysis was provided for Unit 2, our evaluation applies only to Unit 1.