



September 15, 2003

L-MT-03-052
10 CFR 50.12

US Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

MONTICELLO NUCLEAR GENERATING PLANT
DOCKET 50-263
LICENSE No. DPR-22

**EXEMPTION REQUEST FROM THE REQUIREMENTS OF 10 CFR 50, APPENDIX R
SECTION III.G.2 FOR FIRE AREA IV/FIRE ZONE 1F – TORUS COMPARTMENT**

Reference 1: NRC letter to Northern States Power, "Exemption Requests – 10
CFR 50.48 Fire Protection and Appendix R to 10 CFR Part 50,"
dated June 16, 1983

In accordance with 10 CFR 50.12, the Nuclear Management Company, LLC (NMC), hereby requests the NRC authorize a permanent exemption from the automatic fire suppression system requirements of 10CFR 50, Appendix R, Section III.G.2.b as it applies to Fire Area IV/Fire Zone 1F. Fire Area IV/Fire Zone 1F corresponds to the Monticello Nuclear Generating Plant (MNGP) Torus Compartment, located at elevation 896 ft 3 in of the Reactor Building.

As a result of internal assessments of the MNGP Fire Protection Program, NMC determined that the existing exemption from 10 CFR 50 Appendix R, Section III.G.2.b for the Torus Compartment (Reference 1) did not bound the existing plant configuration and the current MNGP Appendix R Safe Shutdown Analysis. The NMC has completed an investigation into the Torus Compartment design basis and has determined that an exemption is appropriate for this area.

NMC is requesting that an exemption be authorized to MNGP as detailed in Attachment 1 of this letter. In this request, NMC has demonstrated that a level of protection equivalent to Section III.G.2 of 10 CFR 50 Appendix R is provided for the Torus Compartment. NMC has reviewed this exemption request and has determined that it is not in conflict with other legal requirements, does not present an undue risk to the public health and safety and does not endanger the common defense and security. As a result, NMC is confident that the exemption request conforms to the requirements of 10 CFR 50.12(a)(1).

Additionally, "special circumstances" exist for the requested exemption in that application of the regulation in this particular circumstance is not necessary to achieve

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the underlying purpose of Appendix R to 10 CFR 50 and compliance to the regulation would result in hardship and costs significantly in excess of those incurred by others similarly situated. As a result, NMC is confident that the exemption request also conforms to the requirements of 10 CFR 50.12(a)(2).

Therefore, NMC respectfully requests that the NRC authorize this exemption from the requirements of 10 CFR 50 Appendix R for Fire Area IV/Fire Zone 1F.

This letter makes no new commitments.

If you have any questions please contact John Fields, Senior Regulatory Affairs Engineer (763-295-1663).



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Nuclear Management Company, LLC

cc: Regional Administrator-III NRC
NRR Project Manager, NRC
Sr. NRC Resident Inspector, NRC

Attachment 1 – Exemption Request for the Torus Compartment

Attachment 1

**NUCLEAR MANAGEMENT COMPANY, LLC
MONTICELLO NUCLEAR GENERATING PLANT
DOCKET 50-263**

SEPTEMBER 15, 2003

EXEMPTION REQUEST FOR THE TORUS COMPARTMENT

11 pages follow

Attachment 1

TORUS COMPARTMENT EXEMPTION REQUEST

Fire Area IV/Fire Zone 1F

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Attachment 1

A. Exemption Requested

10 CFR 50, Appendix R, Section III.G.2.b requires, *“Separation of cables and equipment and associated non-safety circuits of redundant trains by a horizontal distance of more than 20 feet with no intervening combustible or fire hazards. In addition, fire detectors and an automatic fire suppression system shall be installed in the fire area: ...”*

In accordance with 10 CFR 50.12, Nuclear Management Company (NMC) requests the Nuclear Regulatory Commission (NRC) authorize a permanent exemption from certain requirements of 10 CFR 50, Appendix R, Section III.G.2.b as it applies to Fire Area IV/Fire Zone 1F, Torus Compartment, at the Monticello Nuclear Generating Plant (MNGP). In particular, NMC requests an exemption from the requirement for an automatic suppression system as specified in Appendix R, Section III.G.2.b.

This exemption request is related to fire protection features provided to comply with the aforementioned regulation and has no effect on power operation of the plant. No proprietary information is contained within this request.

B. Background

This exemption was previously requested by and granted to Northern States Power (NSP) (References G.1, G.2 and G.3). NMC research has determined that during the time frame the exemption was requested and approved, it was technically accurate in that it reflected the appropriate required safe shutdown systems and equipment contained within Fire Area IV/Fire Zone 1F. However, in 1985, a new safe shutdown analysis crediting only the minimum systems and equipment required to achieve safe shutdown was developed. This new shutdown methodology required the use of Core Spray, Safety Relief Valves and Residual Heat Removal (RHR) in the Suppression Pool Cooling mode. Prior to that time, these systems were not required to achieve safe shutdown given a fire in Fire Area IV/Fire Zone 1F. Both Division I and Division II components and cables for the Core Spray and Residual Heat Removal systems are contained within this fire area. Only one division of Safety Relief Valve control and indicating cables is located within this fire area. The impact of this revised shutdown methodology on the Fire Area IV/Fire Zone 1F exemption was not addressed when the shutdown model was revised. In addition, the Division II suppression pool temperature cable exit from the Torus Compartment and the location of the Division II suppression pool level transmitter were incorrectly depicted in Enclosure 2 of Reference G.2. Therefore, NMC is resubmitting the request for exemption.

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C. Safety Analysis/Technical Evaluation

1. Area Description

Fire Area IV/Fire Zone 1F comprises the Torus Compartment of Reactor Building, elevation 896 ft 3 in. It contains the suppression pool, various motor and air operated valves, and instrumentation. It measures approximately 134.5 ft on each side with the corners beveled and overall occupies approximately 11,700 ft². It is approximately 37 ft high. Not considering the volume occupied by the suppression pool, drywell and installed equipment, the volume of the Torus Compartment is approximately 430,000 ft³. The compartment has the appearance of being congested due to the volume occupied by the suppression pool, drywell and connecting piping. Excluding those commodities, it may be considered sparsely occupied by equipment and cables. This is reflected in the approximately 1 minute equivalent fire severity for the area. Cables in the Torus Compartment are routed in conduit with the exception of a radiax antenna and short exposed runs between devices and associated junction boxes, conduit, etc. Figures 1 and 2 provide a general arrangement of the Torus Compartment.

The Torus Compartment is normally unoccupied and not subject to regular traffic. During plant operation, it is seldom accessed. When accessed, the typical activity is walk down and inspection. There are three access points to the Torus Compartment. Two entries are on elevation 896 ft 3 in at the northwest and northeast quadrants. The third entry is in the northwest quadrant on elevation 923 ft. A catwalk rings the suppression pool at approximately 26 ft off the floor.

2. Barriers

Walls consist of 3-hour fire rated 12 in to 36 in thick concrete block or 12 in to 42 in thick reinforced concrete. The 3-hour fire rated ceiling is primarily 18 in to 24 in thick reinforced concrete. An approximately 3 X 3 ft enclosed pipe chase in the ceiling traverses approximately 30 ft vertically through Reactor Building Elevation 935 ft terminating at Elevation 962 ft, Radwaste Phase Separator Tank Room, in the Radwaste Building. A penetration seal (FZ-0531) with small annular gaps due to pipe movement exists at the 962 ft level of the pipe chase. In addition, an approximately 5.5 X 4 ft covered equipment hatch exists in the ceiling at approximate coordinates M-N/7.9. The hatch cover is 3 in thick constructed of 3/8 in checker-plate on top, approximately 2 1/4 in Pyrocrete fill and 3/8 in bottom and side plates. While the depth of the Pyrocrete exceeds that for a 3-hour barrier, the cover is not fire rated due to other assembly and mounting features. Both the seal and hatch configurations have been evaluated and found acceptable. The floor of the Torus Compartment is concrete on grade comprising the base mat of the Reactor Building. Fire doors and dampers penetrating the barriers are 3-hour fire rated.

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3. Ventilation

The Torus Compartment is supplied and exhausted at a rate of 800 cfm. Given the size of the Torus Compartment, this is considered a low air change rate.

4. Safe Shutdown Capability

a. Safe Shutdown Systems in Fire Area IV / Fire Zone 1F

Cables and/or equipment for the following safe shutdown systems are contained within the Torus Compartment:

- Suppression Pool Level Monitoring
- Suppression Pool Temperature Monitoring
- Core Spray
- RHR Suppression Pool Cooling Mode
- Reactor Pressure Control

b. Systems and Equipment Required for Safe Shutdown

- Suppression Pool Level Monitoring (level transmitters and cables)

LT-7338A (Division I)
LT-7338B (Division II)

One division of level monitoring is required to support shutdown.

- Suppression Pool Temperature Monitoring Resistance Temperature Detectors (RTDs) and cables

8 Division I RTDs
8 Division II RTDs

Only one RTD of one division is required to support safe shutdown.

- Core Spray Motor Operated Valves (including cables)

MO-1749 - Division I Core Spray Test Return to Torus
MO-1750 - Division II Core Spray Test Return to Torus

Operation of one valve is required to control flow to the reactor.

- RHR Motor Operated Valves (including cables)

MO-2006 - Division I Suppression Pool Cooling Isolation Valve
MO-2008 - Division I Suppression Pool Cooling Isolation Valve
MO-2009 - Division II Suppression Pool Cooling Isolation Valve

Attachment 1

One division is required to establish suppression pool cooling.

NOTE: MO-2007 is the second Division II valve required to establish the requisite flow path. This valve and related cabling are independent of this fire area.

- Reactor Pressure Control

Cables and devices (tail pipe pressure switches) related to Division I Safety Relief Valves exist in the zone.

One division of Safety Relief Valves is required to support shutdown.

c. Separation Between Redundant Components Within Fire Area IV/Fire Zone 1F

- Suppression Pool Level Monitoring

Suppression pool level is measured at two locations. One division of suppression pool level indication is required to support post-fire shutdown. The two level transmitters are mounted on the perimeter wall on the lower level of the Torus Compartment. They are separated by approximately 100 ft on an 89° arc. The distance between the level transmitters is the shortest distance between the redundant divisions. The cables diverge even farther as they leave the transmitters as reflected on Figure 2.

- Suppression Pool Temperature Monitoring

The Suppression Pool Temperature Monitoring system is comprised of two divisions of temperature sensors with eight sensors per division. Each division averages the signals from its eight sensors (or less if some have been removed from the logic) to yield an average suppression pool temperature. This circuit configuration is the same as previously presented in Reference G.2.

A recent plant design change has upgraded the Suppression Pool Temperature Monitoring system. The upgraded system requires that only one sensor be available to consider a division operable (classified as operable but degraded). The upgraded system will automatically eliminate a failed sensor from the weighted average bulk temperature calculation provided to the control room.

Cables for each division enter the Torus Compartment via separate chases approximately 100° (110 ft) apart. They are routed in conduit around the perimeter wall of the area approximately 5 to 15 ft above the floor on the lower level of the Torus Compartment. See Figure 2 for the conduit routes.

Attachment 1

Given that only one sensor from one division is required to support safe shutdown, the critical distance for separation of intervening combustibles becomes the distance between divisional cable entries into the Torus compartment (approximately 110 ft).

- Core Spray

Core Spray valve MO-1749 (Division I) is located just below the ceiling at the east perimeter of the Torus Compartment at approximate coordinates N/8.7. Cables related to MO-1749 are contained in conduit and travel south along the ceiling approximately 6 ft whereupon they exit to the east. See Figure 1.

Core Spray valve MO-1750 (Division II) is located above the suppression pool approximately 3.5 ft below the ceiling at the west perimeter of the Torus Compartment at approximate coordinates N/3.5. Cables related to MO-1750 are contained in conduit and travel north along the ceiling before exiting through the ceiling near the west perimeter wall. See Figure 1.

Measuring the shortest distance around the drywell from MO-1750 to the nearest point of conduit G129 for MO-1749 yields a separation between these redundant shutdown valves of approximately 130 ft.

- RHR Suppression Pool Cooling Mode

RHR valve MO-2006 (Division I) is located above the suppression pool at the east perimeter of the Torus Compartment approximately 2 ft below the ceiling at approximate coordinates N/8.5. Cables related to MO-2006 are contained in conduit and travel south from the valve approximately 10 ft, and then east to the perimeter wall whereupon they exit the Torus Compartment. See Figure 1.

RHR valve MO-2008 (Division I) is located above the suppression pool approximately 2 ft below the ceiling on the east side of the Torus Compartment at approximate coordinates P/7.8. Cables related to MO-2008 are contained in conduit and travel north from the valve approximately 6 ft, and then east to the perimeter wall whereupon they exit the Torus Compartment. See Figure 1.

RHR valve MO-2009 (Division II) is located above the suppression pool approximately 6 ft below the ceiling on the west side of the Torus Compartment at approximate coordinates P/4.5. Cables related to MO-2009 are contained in conduit and travel generally north from the valve along the ceiling for 20 to 25 ft until turning west and exiting through the ceiling approximately 3 ft from the west perimeter wall at the same location as the cables for Core Spray valve MO-1750. See Figure 1.

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The shortest distance around the drywell from MO-2009 to a Division I RHR valve or cable is to MO-2008. Measuring the shortest distance around the drywell yields a separation between these redundant shutdown valves of approximately 85 ft.

- ♦ Reactor Pressure Control

Division II Safety Relief Valve cables and components are independent of this fire area/zone.

5. Fire Hazards Analysis

a. Type, Configuration and Quantity of Combustibles

The equivalent fire severity for this fire area/zone is approximately 1 minute. Fixed combustibles consist of a single $\frac{3}{4}$ in diameter radiax antenna cable.

The antenna cable is a low energy cable routed around the perimeter of the Torus Compartment approximately 10 ft above the floor. It is routed around approximately 70% of the perimeter wall. See Figure 2 for cable route. The cable is not an ignition source. Per Generic Letter 86-10, Enclosure 2, Section 3.6, "Intervening Combustibles," this cable is considered a negligible intervening combustible. Other cables within the Torus Compartment are contained in conduit except for short runs of exposed cable that may exist between a device and its associated junction box or conduit.

Transient combustibles may consist of paper, plastic, solvents, etc. Three fiberglass ladders are stored on the floor against the perimeter wall at the locations indicated on Figure 2. The introduction of transient combustibles into this fire area/zone is administratively controlled by plant procedure.

b. Ease of Ignition and Propagation, and Heat Release Rate Potential

The arrangement of combustibles in the Torus Compartment does not support propagation of fire along the distances required to involve redundant shutdown function cables or components. Given the installation of cables in conduit, the potential for ignition within the Torus Compartment is minimized. The arrangement also results in a negligible heat release potential. The subject Core Spray and Suppression Pool Cooling valves and cables located in close proximity of the ceiling will not be subject to heat flux that could cause common failure in the event of fire.

Potential hot work activities in this fire area/zone are controlled by plant procedure.

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c. Existing Fire Protection Features

- Detection

Eight smoke detectors are provided at the ceiling (Figure 1). Four smoke detectors are provided approximately 15 to 16 ft above the floor, near the outside wall (Figure 2). This arrangement was previously documented in Reference G.2 as part of the original exemption request. In addition, the system design has been evaluated against the NFPA code of record and deviations addressed for acceptability.

- Hose Stations

Two 75 ft hose stations are located on opposite sides of the Torus Compartment in the NNE and SSW sections of the lower level (Figure 2). An additional 75 ft hose station is located on the lower level in the HPCI pump room outside the NW quadrant of the Torus Compartment through adjacent Fire Zone 1D.

- Extinguishers

Portable dry chemical extinguishers are located in adjacent quadrant rooms: Fire Zones 1C (RCIC pump room), 1G (CRD pump room), and 1E (HPCI pump room).

D. Hazard Assessment

The following discusses hazards that exist in the fire zone and substantiates that they do not pose a potential threat to the ability to achieve post-fire safe shutdown.

1. Combustibles

As noted above, a radiax antenna is routed through approximately 70% of the perimeter wall of fire zone. The cable is low energy and not an ignition source. Per Generic Letter (GL) 86-10, Enclosure 2, Section 3.6, "Intervening Combustibles," this cable is considered a negligible intervening combustible. Other cables within the fire zone are contained in conduit except for short runs that may be exposed between a device and its associated junction box or conduit. In addition, potential hot work is controlled by plant procedure. Per GL 86-10, Enclosure 2, Section 3.6.2, transient materials (such as paper, plastic, solvents, ladders, etc.) are not considered as an intervening combustible.

The arrangement of combustibles in the Torus Compartment does not support propagation of fire along the distances required to involve redundant function safe shutdown cables or components. Given the installation of cables in conduit, the potential for ignition within the Torus Compartment is minimized. The

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arrangement also results in a negligible heat release potential. The subject Core Spray and RHR Suppression Pool Cooling valves and cables located in close proximity to the ceiling will not be subject to heat flux that could cause common failure in the event of fire. In addition, the installed detection system would detect a fire in its incipient stage and provide an alarm to the control room. Control room operators would, in turn, summon the fire brigade.

2. Separation of Redundant Safe Shutdown Equipment

Significant spatial separation exists between redundant function safe shutdown equipment and cables. The Torus Compartment lacks combustibles of the magnitude and type necessary to support and sustain a postulated fire. In addition, the installed detection system would detect a fire in its incipient stage and provide an alarm to the control room. Control room operators would, in turn, summon the fire brigade.

3. Risk Significance

The Monticello Individual Plant Examination of External Events (IPEEE) has identified the core damage frequency (CDF) contribution due to a fire in the Torus Compartment (Fire Area IV/Fire Zone 1F) as $2.92E-9$. This contribution is considered not risk significant.

E. Justification for Exemption Request – 10 CFR 50.12 Requirements

10 CFR 50.12(a) identifies that the Commission may grant an exemption from the requirements of 10 CFR 50 provided certain criteria are met. The requested exemption from the requirements of 10 CFR 50 Appendix R, Section III.G.2.b for the lack of an automatic suppression system in Fire Area IV/Fire Zone 1F, Torus Compartment, meets the criteria of 10 CFR 50.12 as discussed below.

1. 10 CFR 50.12(a)(1) – Authorized by law

The requested exemption does not present an undue risk to the public health and safety nor will it endanger the common defense and security, for the reasons stated below.

Redundant safe shutdown equipment and cables are separated by distances that significantly exceed the minimum 20 ft required by the regulation. Insufficient combustibles exist in the Torus Compartment to produce and sustain a postulated fire of the magnitude that would place redundant safe shutdown equipment or cables at risk. In addition, the installed detection system would detect a postulated fire in its incipient stage and provide an alarm to the control room. Control room operators, in turn, would summon the fire brigade leading to prompt extinguishment of any fire.

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2. 10 CFR 50.12(a)(2) - Special circumstances are present

- a. 10 CFR 50.12(a)(2)(ii) – *Application of the regulation in the particular circumstances would not serve the underlying purpose of the rule or is not necessary to achieve the underlying purpose of the rule*

Significant spatial separation exists between redundant safe shutdown equipment and cables. The Torus Compartment lacks combustibles of the magnitude and type necessary to support and sustain a postulated fire. In addition, the installed detection system would detect a postulated fire in its incipient stage and provide an alarm to the control room. Therefore, it may be concluded that the underlying purpose of the rule is met without providing an automatic suppression system.

- b. 10 CFR 50.12(a)(2)(iii) - *Compliance would result in undue hardship or other costs that are significantly in excess of those contemplated when the regulation was adopted, or that are significantly in excess of those incurred by others similarly situated*

The Commission has previously granted exemption for the lack of an automatic suppression system in Torus Compartments at other facilities. Two example configurations are:

- Separation of redundant safe shutdown equipment and cables exceeds 50 ft, equivalent fire severity is minimal, neither detection nor suppression is provided in the area (References G.4 and G.5).
- Separation of redundant safe shutdown equipment and cables exceeds 75 ft, equivalent fire severity is minimal, detection is provided, automatic suppression system is not provided (Reference G.6).

Given that the underlying purpose of the rule is met as discussed above, significant hardship and cost would be incurred for a negligible increase in fire safety for the area. Also, additional undue risk associated with inadvertent operation would be realized were an automatic suppression system installed.

F. Conclusion

The above evaluation and discussion substantiates the validity of the requested exemption from 10 CFR 50 Appendix R, Section III.G.2.b for Fire Area IV, Fire Zone 1F, Torus Compartment. The following attributes of the area support a conclusion that the basis for approval of the original exemption is maintained given the addition of the five safe shutdown valves to the request:

- Significant spatial separation (approximately 85 ft) exists between redundant safe shutdown equipment and cables of each system

Attachment 1

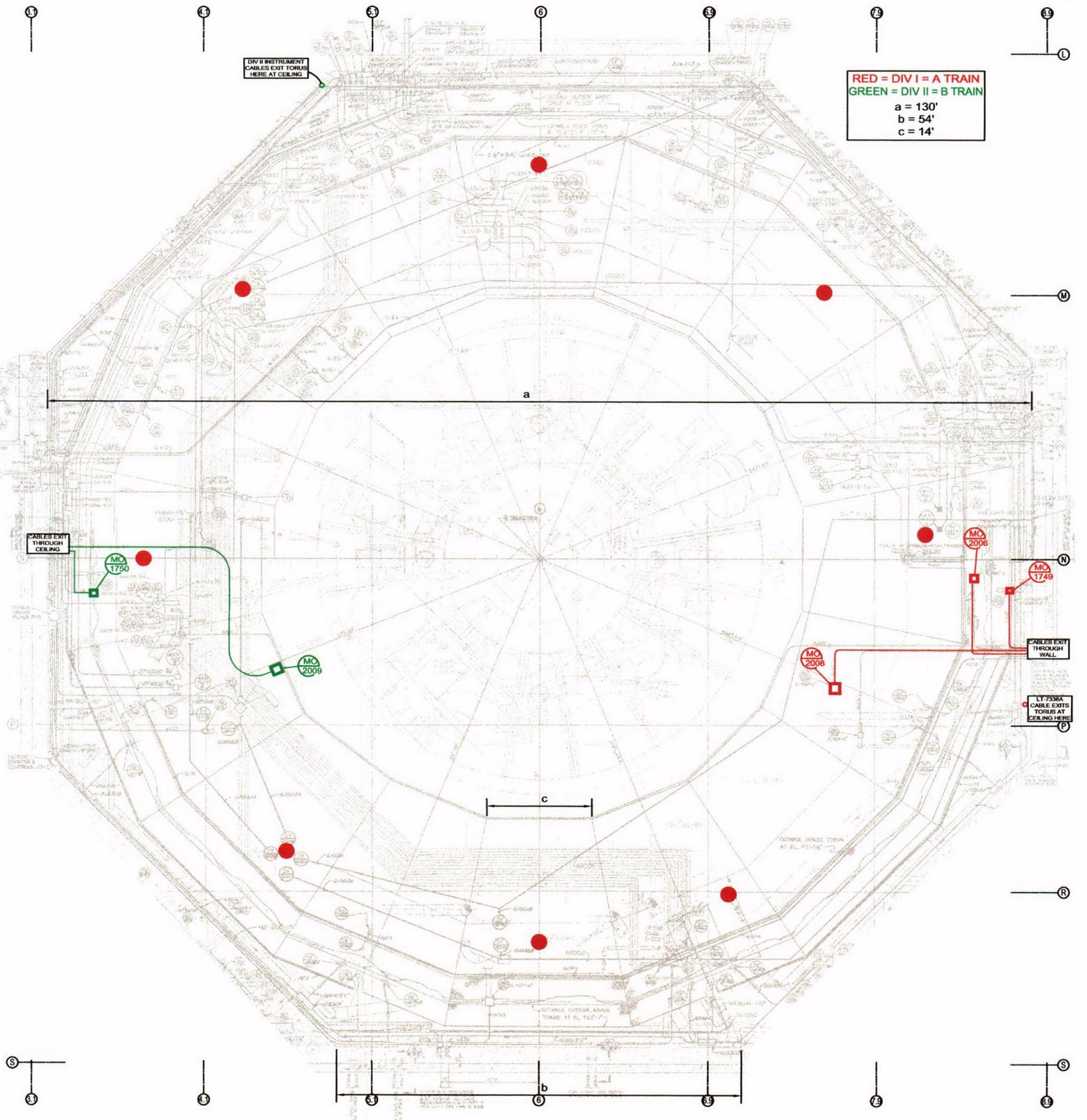
- Cables, other than the antenna cable, are installed in conduit throughout the Torus Compartment with the exception of short exposed runs between devices and associated junction boxes, conduit, etc.
- Lack of in-situ intervening combustibles of the magnitude required to sustain and propagate fire across the expanse necessary to damage redundant safe shutdown equipment or cables
- Lack of combustible load to develop significant heat flux (approximately 1 minute)
- Installed early warning detection alarms in the control room
- Hot work and transient combustibles are administratively controlled by plant procedures
- Fire in the Torus Compartment was determined not to be a significant contributor to CDF per the IPEEE report.

These features assure that in the unlikely event of a fire in the Torus Compartment, one train of equipment, on a shutdown function basis, will be available to support post-fire shutdown. Consequently, the addition of an automatic suppression system to the fire area/zone would not provide a significant enhancement to the existing fire protection features. Consistent with the previously approved exemption, the level of fire safety provided is equivalent to the technical requirements of 10 CFR 50 Appendix R, Section III.G.2.b.

G. References

1. Northern States Power letter to NRC, "Fire Protection and Safe Shutdown Analysis for Meeting the Requirements of Appendix R, Section III.G.2, Including Exemption Requests," dated June 30, 1982.
2. Northern States Power letter to NRC, "Clarification of Information Provided in Support of Request for Relief from Requirements of 10 CFR Part 50, Appendix R, Section III.G," dated October 28, 1982.
3. NRC letter to Northern States Power, "Exemption Requests – 10 CFR 50.48 Fire Protection and Appendix R to 10 CFR Part 50," dated June 16, 1983.
4. Iowa Electric Light and Power Company letter to NRC, "Duane Arnold Energy Center, Docket No: 50-331, Op. License No: DPR-49, 10 CFR 50, Appendix R Exemption Requests," dated September 28, 1984.
5. NRC letter to Iowa Electric Light and Power Company, "Exemption from Appendix R to 10 CFR Part 50 Concerning Separating Redundant Trains by 3-hour fire barriers and Providing Automatic Fire Suppression and Detection Systems (TAC 55994)," dated October 14, 1987.
6. NRC letter to Nebraska Public Power District, "Exemption Requests – 10 CFR 50.48 Fire Protection and Appendix R to 10 CFR Part 50," dated September 21, 1983.

UPPER TORUS SSD VALVES



RED = DIV I = A TRAIN
 GREEN = DIV II = B TRAIN
 a = 130'
 b = 54'
 c = 14'

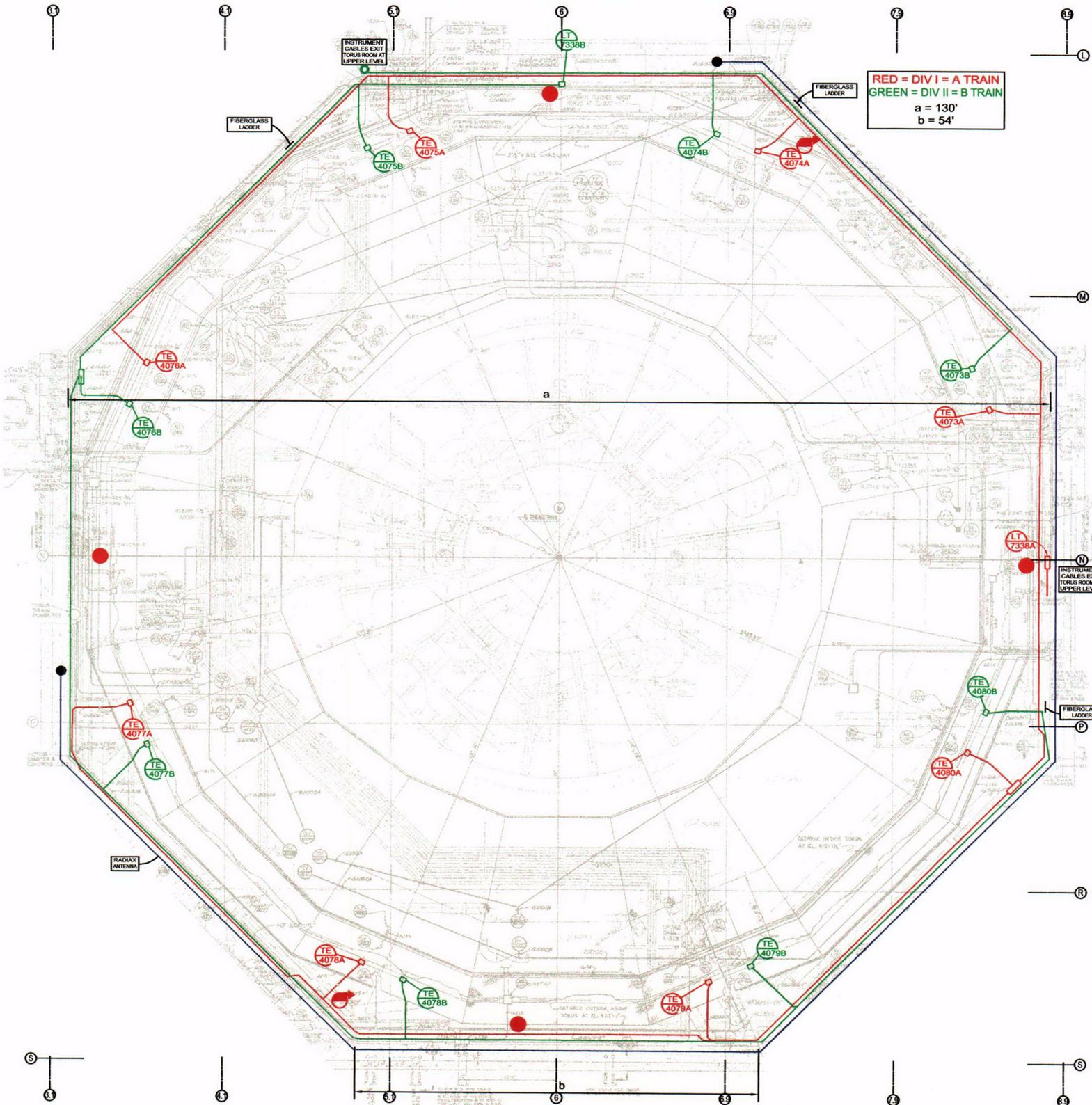
Figure 1

Legend

- - SMOKE DETECTOR AT CEILING

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LOWER TORUS INSTRUMENTS



RED = DIV I = A TRAIN
 GREEN = DIV II = B TRAIN
 a = 130'
 b = 54'

Figure 2

Legend

-  - HOSE STATION
-  - SMOKE DETECTOR ON OUTSIDE WALL APPROX 16' ABOVE FLOOR

CO2