Exelon Nuclear

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United States Nuclear Regulatory Commission
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Braidwood Station, Units 1 and 2
Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos STN 50-456 and STN 50-457

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. STN 50-454 and STN 50-455

Clinton Power Station, Unit 1
Facility Operating License No. NPF-62
NRC Docket No. 50-461

Dresden Nuclear Power Station, Units 2 and 3
Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

LaSalle County Station, Units 1 and 2
Facility Operating License Nos. NPF-11 and NPF-18
NRC Docket Nos. 50-373 and 50-374

Limerick Generating Station, Units 1 and 2
Facility Operating License Nos. NPF-39 and NPF-85
NRC Docket Nos. 50-352 and 50-353

Oyster Creek Generating Station
Facility Operating License No. DPR-16
NRC Docket Nos. 50-219

Peach Bottom Atomic Power Station, Units 2 and 3
Facility Operating License Nos. DPR-44 and DPR-56
NRC Docket Nos. 50-277 and 50-278

Three Mile Island Nuclear Station, Unit 1
Facility Operating License No. DPR-50
NRC Docket No. 50-289

A102

Quad Cities Nuclear Power Station, Units 1 and 2
Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Exelon/AmerGen 180-Day Response To NRC Generic Letter 2003-01, "Control Room Habitability"

References: (1) Letter from David B. Matthews (NRC) to Addressees, dated June 12, 2003, "NRC Generic Letter 2003-01: Control Room Habitability"

(2) Letter from Michael P. Gallagher (Exelon/AmerGen) to NRC, dated August 11, 2003, "Exelon/AmerGen 60-Day Response To NRC Generic Letter 2003-01, Control Room Habitability"

On June 12, 2003, the NRC issued NRC Generic Letter (GL) 2003-01, "Control Room Habitability" (Reference 1). The GL requested the following information.

Addressees are requested to provide the following information within 180 days of the date of this generic letter.

1. Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., GDC 1, 3, 4, 5, and 19) and that the control room habitability systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases. Emphasis should be placed on confirming:

   (a) That the most limiting unfiltered inleakage into your control room envelope (CRE) (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.

   (b) That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.

   (c) That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the American Society for Testing and Materials (ASTM) consensus standard E741, "Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution" testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

2. If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.

3. If you believe that your facility is not required to meet either the General Design Criteria (GDC), the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.

Additionally, the GL 2003-01 requested a response within 60 days of the date of the generic letter if an addressee could not provide the above requested information within 180 days. This response should address any alternative course of action the addressee proposes to take, including the basis for the acceptability of the proposed alternative course of action and the schedule for completing the alternative course of action.

Reference 2 provided the 60-day requested response information for Braidwood Station, Byron Station, Clinton Power Station, Limerick Generating Station, and Peach Bottom Atomic Power Station. These plants have committed to perform integrated CRE testing utilizing the ASTM E741 methodology to establish a measured unfiltered inleakage rate. Reference 2 committed to provide a complete GL response for these plants within 90 days of completion of each plant's test based on testing which is planned to be performed in 2004.

Accordingly, this response to GL 2003-01 provides a complete 180-day response for Dresden Nuclear Power Station, LaSalle County Station, Oyster Creek Generating Station, TMI Unit 1, and Quad Cities Nuclear Power Station. A partial 180-day response is being provided for Braidwood Station, Byron Station, Clinton Power Station, Limerick Generating Station, and Peach Bottom Atomic Power Station to address the generic letter requested information that is not dependent upon completion of the testing needed to establish a measured unfiltered inleakage rate.

The following table identifies commitments made in this document by Exelon and AmerGen. Any other actions discussed in the submittal representing intended or planned actions by Exelon and AmerGen are described to the NRC for the NRC's information and are not regulatory commitments.

COMMITMENT	COMMITTED DATE OR "OUTAGE"
Braidwood Station, Byron Station, Clinton Power Station, Limerick Generating Station, and Peach Bottom Atomic Power Station plan to perform integrated control room envelope testing utilizing the ASTM E741 methodology.	Year 2004. Updated GL response to be provided within 90 days of completion of each plant's test.
Braidwood Station Technical Specifications will be revised to include a new Section 5.0 administrative program requirement for Control Room Habitability	Technical Specification Change Request (TSCR) submittal by – September 30, 2004
Byron Station Technical Specifications will be revised to include a new Section 5.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
Clinton Power Station Technical Specifications will be revised to include a new Section 5.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
Dresden Nuclear Power Station Technical Specifications will be revised to include a new Section 5.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
LaSalle County Station Technical Specifications will be revised to include a new Section 5.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
Limerick Generating Station Technical Specifications will be revised to include a new Section 6.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
Oyster Creek Generating Station Technical Specifications will be revised to include a new Section 6.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
Peach Bottom Atomic Power Station Technical Specifications will be revised to include a new Section 5.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
TMI Unit 1 Technical Specifications will be revised to include a new Section 6.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
Quad Cities Nuclear Power Station Technical Specifications will be revised to include a new Section 5.0 administrative program requirement for Control Room Habitability	TSCR submittal by – September 30, 2004
Oyster Creek Generating Station to submit alternate source term license amendment request (LAR).	LAR submittal by December 31, 2004
Oyster Creek Generating Station to implement plant procedures to use self-contained breathing apparatus when chlorine is detected in the Control Room Envelope.	Implement plant procedures by March 31, 2004

If you have any questions or require additional information, please contact Mr. David J. Distel at (610) 765-5517.

Respectfully,

Michael P. Gallagher
Director – Licensing and Regulatory Affairs
Exelon Generation Company, LLC and
AmerGen Energy Company, LLC

Attachment 1 - 180-Day Response to NRC Generic Letter 2003-01, Braidwood Station, Units 1 and 2
Attachment 2 - 180-Day Response to NRC Generic Letter 2003-01, Byron Station, Units 1 and 2
Attachment 3 - 180-Day Response to NRC Generic Letter 2003-01, Clinton Power Station, Unit 1
Attachment 4 - 180-Day Response to NRC Generic Letter 2003-01, Dresden Nuclear Power Station, Units 2 and 3
Attachment 5 - 180-Day Response to NRC Generic Letter 2003-01, LaSalle County Station, Units 1 and 2
Attachment 6 - 180-Day Response to NRC Generic Letter 2003-01, Limerick Generating Station, Units 1 and 2
Attachment 7 - 180-Day Response to NRC Generic Letter 2003-01, Oyster Creek Generating Station
Attachment 8 - 180-Day Response to NRC Generic Letter 2003-01, Peach Bottom Atomic Power Station, Units 2 and 3
Attachment 9 - 180-Day Response to NRC Generic Letter 2003-01, Three Mile Island, Unit 1
Attachment 10 - 180-Day Response to NRC Generic Letter 2003-01, Quad Cities Nuclear Power Station, Units 1 and 2

cc: Regional Administrator, NRC Region I
Regional Administrator, NRC Region III
NRC Project Manager, NRR – Braidwood Station
NRC Project Manager, NRR – Byron Station
NRC Project Manager, NRR – Clinton Power Station
NRC Project Manager, NRR – Dresden Nuclear Power Station
NRC Project Manager, NRR – LaSalle County Station
NRC Project Manager, NRR – Limerick Generating Station
NRC Project Manager, NRR – Oyster Creek Generating Station
NRC Project Manager, NRR – Peach Bottom Atomic Power Station
NRC Project Manager, NRR – TMI Unit 1
NRC Project Manager, NRR – Quad Cities Nuclear Power Station
NRC Senior Resident Inspector – Braidwood Station
NRC Senior Resident Inspector – Byron Station
NRC Senior Resident Inspector – Clinton Power Station
NRC Senior Resident Inspector – Dresden Nuclear Power Station
NRC Senior Resident Inspector – LaSalle County Station
NRC Senior Resident Inspector – Limerick Generating Station
NRC Senior Resident Inspector – Oyster Creek Generating Station
NRC Senior Resident Inspector – Peach Bottom Atomic Power Station
NRC Senior Resident Inspector – TMI Unit 1
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station
Illinois Emergency Management Agency – Division of Nuclear Safety
R. R. Janati, Commonwealth of Pennsylvania

ATTACHMENT 1

180-Day Response to NRC Generic Letter 2003-01

Braidwood Station, Units 1 and 2

Exelon Generation Company, LLC

Attachment 1

180-Day Response to NRC Generic Letter 2003-01

Braidwood Station, Units 1 and 2

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., General Design Criteria (GDC) 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

   Response

   The control room is common for Braidwood Station Units 1 and 2 and shares the Control Room Ventilation (VC) Heating, Ventilating and Air Conditioning (HVAC) system. The VC system provides ventilation, cooling, heating, and control of environmental conditions in the Control Room Envelope (CRE). The VC system is designed to maintain functional integrity during and after a safe shutdown earthquake. Each train is provided with necessary redundant equipment and controls to maintain uninterrupted room air circulation, filtration and cooling. The single failure criterion is met for active safety related equipment. Safety related equipment is located within the seismic Category I Auxiliary Building. Standby diesel generators provide standby power to the safety related control room HVAC equipment during a loss of offsite power event. These systems are designed and operated such that an accident on one unit will not impair the ability to safely shutdown the remaining unit. A simplified schematic is shown on attached Figure 1-1.

   The CRE is comprised of the Main Control Room (MCR), Auxiliary Electric Equipment Rooms (AEER), Control Room Ventilation VC HVAC Equipment Rooms, Kitchen, Upper Cable Spreading Rooms (UCSR), Security Control Center (SCC), toilets, and other miscellaneous rooms. The CRE is designed as a low-leakage construction. All cable trays and duct penetrations are sealed. Normal access pathways between the plant and the MCR are through vestibules (two doors in series). The CRE volume is approximately 405,164 cubic feet. The free air space volume is approximately 230,837 cubic feet. The MCR volume is approximately 70,275 cubic feet.

   The VC system is designed to maintain a habitable environment and to ensure the operability of all the components in the control room. Each VC equipment train has a supply air filter unit that contains a medium efficiency filter and a normally bypassed charcoal filter, called the recirculation filter. The emergency make up filter unit for each train of VC consists of a demister, heater, prefilter, high efficiency particulate air (HEPA) filter, charcoal adsorbers, downstream HEPA filter, and a fan. The VC system is provided with redundant equipment to meet the single failure criteria. The redundant equipment is supplied with separate essential power sources during a loss of offsite power. The power supplies meet Institute of Electrical and Electronics Engineers (IEEE) 308-1974 criteria and ensure uninterrupted operation in the event of loss of normal AC power. The controls meet IEEE 279-1971. The VC system HVAC equipment is designed to seismic Category I, except for the duct mounted comfort heating coils, humidification equipment, security computer air conditioning unit, and toilet/locker room exhaust fans which are seismically supported to prevent damage to safety related equipment.

In the emergency mode, the VC system maintains the control room at a positive pressure of ≥ 0.125-inch water gauge, and the UCSR at a positive pressure of ≥ 0.02 inches water gauge, relative to areas adjacent to the CRE, as required by Technical Specification 3.7.10. Differential pressure indicators with an alarm are provided in the control room and on local HVAC panels to monitor the differential pressure between the MCR and areas adjacent to the CRE. Differential pressure indication and alarm are also provided between the VC HVAC equipment rooms and the adjacent Miscellaneous Electrical Equipment Rooms (MEER).

Radiation and ionization detectors monitor the normal VC system outside makeup air intakes. Ionization detectors continuously monitor the VC system Turbine Building makeup air intakes. Radiation detectors monitor the outlets of the emergency makeup filter units. Area radiation monitors are provided in the control room. Detection of high radiation or smoke is alarmed in the control room.

A detailed description of the CRE systems response to toxic gas and smoke are contained in the response to Item 1(b) below.

Upon high outside air radiation detection, the following automatic actions occur: the normal outside air intake is isolated, air is drawn in from the Turbine Building intake through the emergency make up filter unit (EMU), the recirculation charcoal filter bypass damper closes, and the recirculation filter inlet/outlet dampers open. The Shift Office Ventilation (VV) system, Laboratory Ventilation (VL) system, and Radwaste Ventilation (VW) system, which have ductwork passing through the CRE, are also automatically shutdown.

Upon initiation of a safety injection signal, the following automatic actions occur: the normal outside air intake is isolated, air is drawn in from the Turbine Building intake through the EMU, the recirculation charcoal filter bypass damper closes, and the recirculation filter inlet/outlet dampers open. The VV system, VL system, and VW system, which have ductwork passing through the CRE, are manually shutdown per procedure.

The normal outside air intakes consist of one bubble tight damper and one low leakage damper in series. The bubble tight dampers were tested and verified to be leak tight during original construction and following replacement of the damper blade seal. The dampers are periodically cleaned and inspected to ensure that damper and seal integrity are maintained.

Nine self-contained breathing apparatus (SCBA) intended for emergency use are located in the MCR. Additional reserve air supplies are maintained onsite to provide a total of six hours of breathing air for each of the seven emergency staff personnel.

Applicable Habitability Regulatory Requirements

GDC 1: Requires quality standards commensurate with the importance of the safety functions performed.

The Braidwood Station VC system and components are designed to seismic Category I requirements and located within a seismic Category I structure. Equipment such as comfort heaters, humidification equipment, security computer air conditioning units, and kitchen/toilet/locker room exhaust fans/recirculation units are non-safety related but seismically supported. The VC system and associated components important to safety are tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the Braidwood Station structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant.

The redundant equipment is supplied with separate essential power sources during a loss of offsite power. The power supplies meet IEEE 308-1974 criteria and ensure uninterrupted operation in the event of loss of normal AC power. The controls meet IEEE 279-1971. The electrical components are qualified in accordance with IEEE 344-1971 and IEEE 323-1974.

There are no high energy lines in the proximity of or within the CRE. VC system components are protected from externally generated missiles by missile protected intakes.

Emergency Filtration Units are designed to meet Regulatory Guide 1.52, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," Revision 2 (March 1978), with exceptions noted in the Braidwood Station Updated Final Safety Analysis Report (UFSAR) Appendix A. The charcoal efficiency is tested per ASTM D3803-1989.

In accordance with the Exelon QATR requirements, documents and records are maintained to show that required codes, standards, and specifications were followed; specified materials and correct procedures were applied; qualified personnel performed the work; and inspections and tests verified that parts and components meet the applicable specifications.

GDC 3: Requires structures, systems, and components to be designed and located to minimize the effects of fires.

The CRE is designed to meet the requirements of GDC 3. Fire protection systems meeting the requirements of GDC 3 are provided. The fire protection program for Braidwood Station, regarding the CRE is described in the Byron/Braidwood Stations Fire Protection Report. The rooms within and adjacent to the CRE are generally separated by 3-hour fire rated floor slabs and walls. Doors are typically Underwriters Laboratory

(UL) class "A." Vertical fire dampers are rated for 3 hours and horizontal fire dampers are rated for 1.5 hours. The redundant VC trains are separated by 3-hour fire rated barriers except within the area they serve (i.e., common control room, common AEER, and UCSR).

Visual inspections of fire rated seal penetrations and exposed surfaces of fire rated assemblies are performed every 18 months in accordance with the Byron/ Braidwood Fire Protection Program.

The remote shutdown panel is served by the Radwaste and Remote Shutdown Control Room HVAC (VI) system and is located in a totally separate fire zone from that of the MCR. Therefore, reactor shutdown from the remote shutdown panel in the event of a fire in the MCR is not affected. A detailed evaluation of the affects of smoke on maintaining reactor control capability from either the control room or the alternate shutdown panel is provided in the response to Item 1(b) below.

Ionization detectors are located in the VC ductwork to alert operators via alarm of a potential fire. Procedures provide guidance to manually purge the CRE or affected areas. Fire extinguishers are available to respond to an emergency. A manually actuated fire protection deluge system is provided for each charcoal adsorber bed.

The UCSR is protected by an automatic halon system. A backup carbon dioxide system can be manually actuated for the UCSR. Periodic testing verifies functionality of the halon and carbon dioxide systems.

GDC 4: Requires structures, systems, and components to be designed to accommodate the effects of accidents.

The VC system and the Auxiliary Building structure have been designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including the design basis events.

Maintenance and testing of one train of VC does not affect the ability of the opposite train of VC to perform its normal and design basis accident functions. Contingency actions, such as plant barrier impairments, may be required to perform work on dampers or doors, which are common to both trains of VC.

The VC system is housed in a missile protected structure and make up air intake openings are missile protected. There are no high energy lines in proximity to or within the CRE. A high energy line break in the Turbine Building will not adversely affect control room habitability.

The MCR is shielded by concrete walls that are three feet thick on the containment side, 3.5 feet thick on the Turbine Building side (opposite containment side), 2.5 feet thick on the remaining sides, a one-foot thick floor slab, and a two feet thick ceiling.

GDC 5: Requires that an accident in one unit will not significantly impair the orderly shutdown and cooldown of the remaining unit.

The control room is common for Braidwood Station Units 1 and 2 and shares the VC system. The VC system provides ventilation, cooling, heating, and control of environmental conditions in the control room. The VC system is designed to maintain functional integrity during and after a safe shutdown earthquake. Each train is provided with necessary redundant equipment and controls to maintain uninterrupted room air circulation, filtration and cooling. The single failure criterion is met for active safety related equipment. Safety related equipment is located within the seismic Category I Auxiliary Building. Standby diesel generators provide standby power to the safety related control room HVAC equipment during a loss of offsite power event. These systems are designed and operated such that an accident in one unit will not impair the ability to safely shutdown the remaining unit.

GDC 19: Requires a control room from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions.

The CRHS includes radiation shielding, air conditioning, air filtration, radiation monitoring, lighting, and fire protection. The Braidwood Station complies with the criteria for control room habitability in accordance with NUREG 0737, "Clarification of TMI Action Plan Requirements," Item III.D.3.4, "Control Room Habitability," as described in UFSAR Section 6.4.

The VC system is designed to ensure habitability after any of the design basis radiological accidents. In the event of an accident, the control room will automatically realign to a filtered pressurization mode. The most limiting calculated post-accident dose for control room occupancy is less than 5 rem to the whole body or the equivalent to any organ. These doses are within the dose limits specified in GDC 19. The VC system emergency mode and the control room shielding are designed to limit the occupational dose level, as required by GDC 19. The habitability systems are designed to meet GDC 19 of 10 CFR 50, Appendix A. The design basis accident for the control room area shielding is the loss-of-coolant accident (LOCA). For determining radiological dose to control room occupants, the LOCA is considered to be an upper bound of all accidents postulated to occur.

In the event of smoke entering the outside air intakes, the recirculation charcoal filter will automatically align to filter the smoke prior to entering the control room. The operator has options to select the cleaner of the two redundant outside air intakes, or select the Turbine Building intake, and/or purge the CRE. See the response to Item 1(b) for further details.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through suitable procedures from locations outside the control room are provided by the remote shutdown system, if the control room becomes inaccessible. The remote shutdown system has the capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and subsequent cold shutdown of the reactor. The remote shutdown panel is supported by a ventilation system separate from that of the control room and is located in a different fire zone than that of the control room.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

Response

The Braidwood Station control room habitability analysis was re-evaluated during the power uprate project in 2000 for design basis radiological accidents. The unfiltered inleakage value used in the control room habitability radiological dose analysis is 100 cfm.

The outside air intake bubble tight dampers were tested for zero leakage during original construction. Braidwood Station maintains and periodically inspects the bubble tight dampers, to ensure damper and seal integrity.

Pressurization of the CRE ensures leakage is out of the CRE and into adjacent areas. Normal access paths between plant areas and the CRE are double-door (two doors in series) vestibules to minimize system interaction.

The Braidwood Station VC system configuration is unique in that all HVAC equipment and ductwork is contained within the CRE. Other systems (VL, VW, and VV) with ductwork passing through the CRE are isolated during accident conditions. Furthermore, any potential leakage from the VL, VW or VV ductwork would be into the UCSR, which is within the CRE but not occupied by operators for purposes of operating the plant. The UCSR is supplied by the VC system but there is no normal return air flow back to the VC system. Air from the UCSR is exhausted out of the CRE. Should any air from VL, VW, or VV escape into the UCSR it would normally be exhausted out of the CRE.

Positive pressurization of the control room is continuously monitored with differential pressure alarms at strategic locations to ensure envelope integrity. In addition, the differential pressures are verified as required by Technical Specification 3.7.10 every 18 months on a staggered test basis.

Administrative programs (e.g., Plant Barrier Impairment Program) are in place to ensure openings in the CRE boundary are maintained and properly designed as a ventilation seal or barrier. Braidwood Station inspects the CRE pressure boundary doors every six months.

Reasonable assurance is provided that control room integrity is still within its original design assumptions and as verified during the startup phase, based on the above noted design features and existing programs and surveillances to ensure CRE integrity. Testing to verify inleakage is maintained below these assumed values has not been performed to date. Exelon is in the process of obtaining a vendor to perform an integrated inleakage test per ASTM E741 for this verification, as described in Exelon letter to the NRC dated August 11, 2003. Testing will be performed in all applicable accident modes of operation and is expected to occur in 2004. Exelon will update the NRC regarding the testing schedule once a vendor contract has been issued. Final results will be transmitted to the NRC within 90 days after completion of the test, to fully address this information request.

In conjunction with the above testing, Exelon is performing a reanalysis of radiological doses for design basis accidents using the Alternative Source Term (AST) methodology. A submittal to the NRC is expected by the end of 2004. It is further expected that the allowable unfiltered inleakage value for the radiological mode will be significantly greater than the 100 cfm currently used in the radiological analysis. This will ensure adequate margin exists.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response

During original construction and licensing of Braidwood Station, chlorine posed a credible concern based on a review of outside facilities and traffic near Braidwood Station. Prior to full power operation at Braidwood Station, the impact of chlorine via railway was no longer considered credible and the NRC approved the abandonment of the chlorine detectors provided a periodic survey for chlorine would continue to be performed in accordance with License Amendment No. 60. A periodic survey is performed every 3 years in accordance with Regulatory Guide 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release."

Analyses performed in accordance with Regulatory Guides 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release" and 1.95 concluded that no other offsite toxic chemicals were a concern for control room habitability.

Braidwood Station has a chemical control program for on-site chemicals which ensures there is no impact to the site's current control room habitability analyses. The chemical control program provides administrative guidance for the safe and proper issue, handling, storage, labeling, use, and disposal of consumable materials and chemicals. The program is designed to control the intrusion of potentially damaging chemicals into plant equipment or the environment and to optimize employee safety. This program establishes a standardized process that controls the use of chemical products to eliminate the creation of hazardous and/or mixed waste, minimize the potential for damage to plant equipment, and minimize invalidation of plant safety analyses caused by the use of chemicals.

Potential sources of smoke are from either internal or external fires. The likelihood of a major offsite fire/smoke hazard is low, since no chemical plants, no large amounts of oil storage, and no gas pipelines are located near the plant site.

The likelihood of internal equipment fire/smoke affecting control room habitability is minimized because early ionization detection is assured, fire-fighting apparatus is available, low combustible load including flame retardant cabling is used throughout the plant, and filtration and purging capability are provided. Internal sources of smoke will be detected by the ionization detectors in the return air ducts, annunciated locally and on the main control board via the fire detection control panel. On detection of ionization products in the VC return mixed air plenum, the mixed air (return air and makeup air) is automatically routed through the charcoal adsorber and annunciated on the main control board. The operator can continue to route the VC system supply air through the charcoal adsorber for smoke removal, can manually bypass the charcoal adsorber and purge the entire system with outside air, or purge affected areas in accordance with the smoke removal plan.

In the event that there is an external smoke source, ionization smoke detectors are provided at both air intakes to give an alarm in the control room. The physical separation of redundant outside air intakes provides the option of drawing makeup air to the CRE from either train depending upon the lesser smoke concentration. In case both outside air intakes have smoke, the operator has the option to draw air from the Turbine Building. On detection of ionization products in the VC return mixed air plenum, the mixed air (return air and makeup air) is automatically routed through the charcoal adsorber and is annunciated on the main control board. The operator can continue to route the system supply air through the charcoal adsorber for smoke removal, or depending on the condition of the outside air, can manually bypass the charcoal adsorber and purge the entire system with outside air. On ionization detection in the outside makeup air intake or individual return air branches, annunciation in the control room alerts the operator of an adverse condition and procedures provide actions to perform.

There are nine SCBA units available inside the MCR. Additional reserve air supplies are maintained onsite to provide a total of six hours of breathing air for each of the seven emergency personnel.

In the event that the MCR is evacuated, the plant can be shutdown to hot shutdown conditions from the remote shutdown panel and subsequently to cold shutdown conditions from the remote shutdown panel and through procedurally directed actions in the plant. The remote shutdown panel includes the necessary instrumentation and controls to maintain the unit(s) in a safe condition during hot shutdown and subsequent cold shutdown of the reactor. The remote shutdown panel is supported by a ventilation system separate from that of the MCR and is located in a separate fire zone. Control room operators can travel to the remote shutdown panel by several different pathways through the Auxiliary and Turbine Buildings. Therefore, smoke in one area of the plant should not prevent operators from traveling to the remote shutdown panel.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM*

E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

Response

Based upon industry experience, plants with high inleakage values are typically those with HVAC equipment and ductwork outside the control room boundary. The Braidwood Station VC system equipment and ductwork is located within the CRE, which precludes most of the sources for unfiltered inleakage.

Considering the low leakage design of the CRE and conservatism in the unfiltered inleakage value being used, the differential pressure test along with the current programs and inspections being performed provide adequate means to ensure that the assumed unfiltered inleakage value is being maintained within design.

Technical Specification 3.7.10 requires a surveillance to be performed every 18 months on a staggered test basis to verify positive control room pressure relative to adjacent areas and to verify the makeup air flow rate is within the original design. The design includes continuous differential pressure monitoring with alarms to ensure that the CRE integrity is not degrading. It is recognized that differential pressure monitoring alone cannot quantify CRE unfiltered inleakage. As such, Braidwood Station has committed to perform an integrated inleakage test to quantify this inleakage, as described in the response to Item 1(a) above.

The Braidwood Station Technical Specifications will be revised to include a new Section 5.0 administrative program for Control Room Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program will address the following:

- CRE Boundary/Breach Control
- CRE Integrity Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self Assessment

A license amendment request to revise Technical Specification Section 5.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the test results to be performed in accordance with ASTM E741, other tests performed, and ongoing periodic program self-assessments, a Braidwood Station Technical Specification requirement for periodic testing other than the current ΔP test is not warranted. However, if significant problems, issues, repairs, or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

<u>Response</u>

No compensatory measures are currently required to demonstrate CRE habitability for radiological releases. Therefore, there are no corrective actions needed to retire such measures.

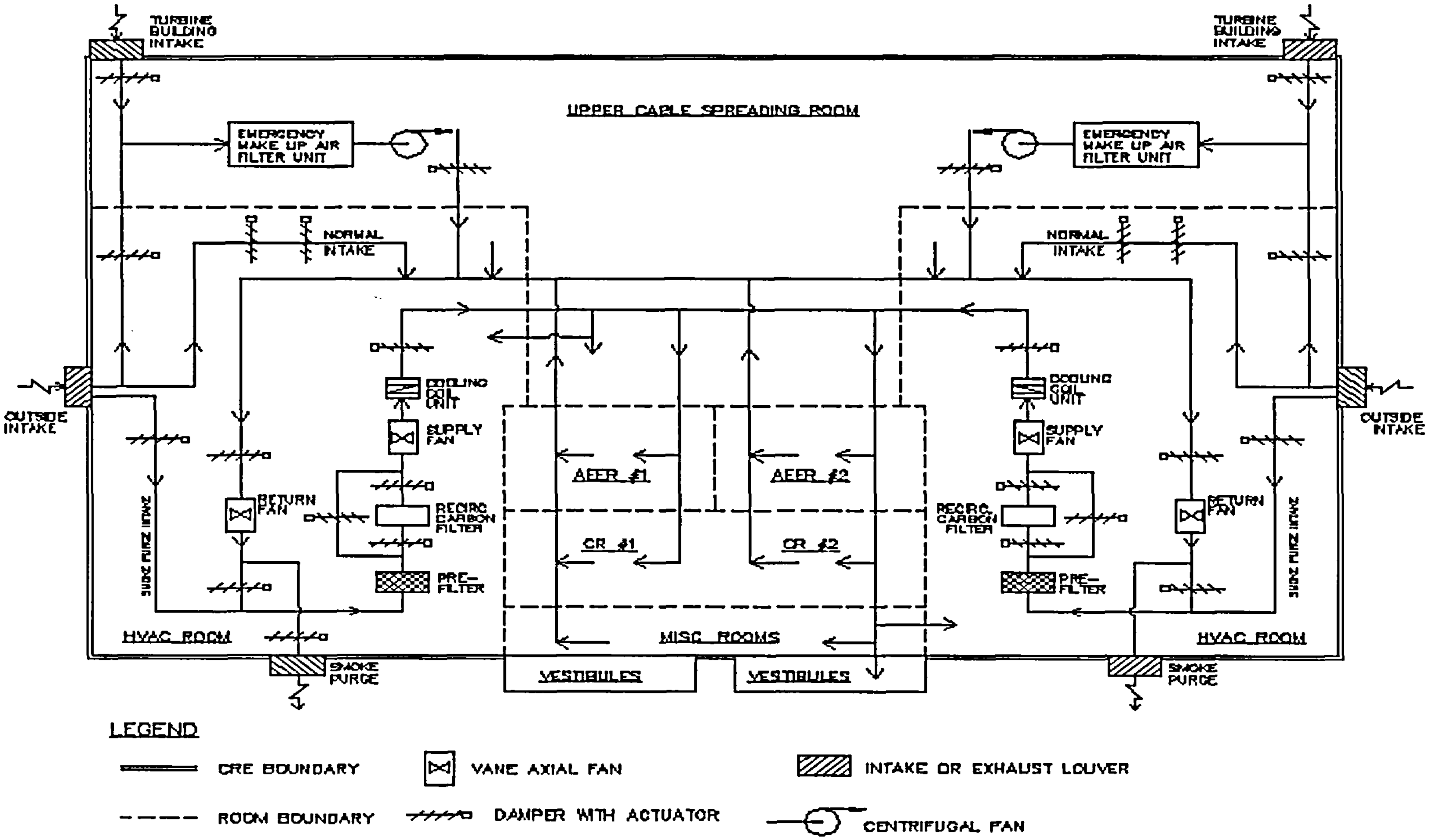
3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

<u>Response</u>

Braidwood Station is required to meet the GDC regarding control room habitability, as documented in the UFSAR for both stations. A detailed discussion of the GDCs, as they apply to both units at Braidwood Station, is contained in the response to Item 1 above.

Figure 1-1

BRAIDWOOD CONTROL ROOM ENVELOPE
HVAC SYSTEM



ATTACHMENT 2

180-Day Response to NRC Generic Letter 2003-01

Byron Station, Units 1 and 2

Exelon Generation Company, LLC

Attachment 2

180-Day Response to NRC Generic Letter 2003-01

Byron Station, Units 1 and 2

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., GDC 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

   <u>Response</u>

   The Control Room Envelope (CRE) is comprised of the Main Control Room (MCR), Auxiliary Electric Equipment Rooms (AEER), Control Room Ventilation (VC) system Heating, Ventilating and Air Conditioning (HVAC) Equipment Rooms, Upper Cable Spreading Rooms (UCSR), Security Control Center (SCC), toilets, and other miscellaneous rooms. The CRE is designed as a low-leakage construction. All cable trays and duct penetrations are sealed. Normal access pathways between the plant and the MCR are through vestibules (two doors in series). The CRE volume is approximately 405,164 cubic feet. The free air space volume is approximately 230,837 cubic feet. The MCR volume is approximately 70,275 cubic feet.

   The Byron Station Habitability Area Systems consists of two independent 100% capacity VC system equipment trains, except for the common supply and return ductwork. The VC system is common to Units 1 and 2. Each VC train consists of a supply air fan, cooling coils, heating coils, return air fan, refrigeration unit, chilled water pump, and associated piping, valves, ductwork, and filters. The system is safety related and active components are designed with redundancy to meet the single active failure criteria. The VC system equipment is located within the seismic Category I Auxiliary Building structure. The VC system Train "A" is fed from Unit 1 electrical Division 1. The VC system Train "B" is fed from Unit 1 electrical Division 2. A simplified schematic of the VC system is shown on attached Figure 2-1. All VC system components are located within the CRE.

   The VC system is designed to maintain a habitable environment and to ensure the operability of all the components in the control room. Each VC equipment train has a supply air filter unit that contains a medium efficiency filter and a normally bypassed charcoal filter, called the recirculation filter. The emergency make up filter unit for each train of VC consists of a demister, heater, prefilter, high efficiency particulate air (HEPA) filter, charcoal adsorber, downstream HEPA filter, and a fan. The VC system is provided with redundant equipment to meet the single failure criteria. The redundant equipment is supplied with separate essential power sources during a loss of offsite power. The VC system HVAC equipment is designed for seismic Category I, except for the duct mounted comfort heating coils, humidification equipment, security computer air conditioning unit, and toilet/locker room exhaust fans which are seismically supported to prevent damage to safety related equipment.

In the emergency mode, the VC system maintains the control room at a positive pressure of ≥ 0.125-inch water gage, and the UCSR at a positive pressure of ≥ 0.02 inches water gauge, relative to areas adjacent to the CRE, as required by Technical Specification 3.7.10. Differential pressure indicators with an alarm are provided in the control room and on local HVAC panels to monitor the differential pressure between the MCR and areas adjacent to the CRE. Differential pressure indication and alarm are also provided between the VC HVAC equipment rooms and the adjacent Miscellaneous Electrical Equipment Rooms (MEER).

Radiation and ionization detectors monitor the normal VC system outside makeup air intakes. Ionization detectors continuously monitor the VC system Turbine Building makeup air intakes. Radiation detectors monitor the outlets of the emergency makeup filter units. Area radiation monitors are provided in the control room. Detection of high radiation or smoke is alarmed in the control room.

A detailed description of the CRE systems response to toxic gas and smoke are contained in response to Item 1(b) below.

Upon high outside air radiation detection, the following automatic actions occur: the normal outside air intake is isolated, air is drawn in from the Turbine Building intake through the emergency make up filter unit (EMU), the recirculation charcoal filter bypass damper closes, and the recirculation filter inlet/outlet dampers open. The Shift Office Ventilation (VV) system, which has ductwork passing through the CRE, is also automatically shutdown.

Upon initiation of a safety injection signal, the following automatic actions occur: the normal outside air intake is isolated, air is drawn in from the Turbine Building intake through the EMU, the recirculation charcoal filter bypass damper closes, and the recirculation filter inlet/outlet dampers open. The VV system, which has ductwork passing through the CRE, is manually shutdown per procedure.

The normal outside air intakes consist of one bubble tight damper and one low leakage damper in series. The bubble tight dampers were tested and verified to be leak tight during original construction. Byron Station will be implementing a bubble tight damper surveillance to periodically inspect the dampers and seals to ensure that damper and seal integrity are maintained, as part of the CRE Integrity Program described in response to Item 1(c) below.

Nine self-contained breathing apparatus (SCBA) are located in the MCR intended for emergency use. Additional reserve air supplies are maintained onsite to provide a total of six hours of breathing air for each of the seven emergency staff personnel.

Applicable Habitability Regulatory Requirements

GDC 1: Requires quality standards commensurate with the importance of the safety functions performed.

The Byron Station VC system and components are designed to seismic Category I requirements and located within the seismic Category I Auxiliary Building. Equipment such as comfort heaters, humidification equipment, security computer air conditioning units, and toilet/locker room exhaust fans/recirculation units are non-safety related but seismically supported. The VC system and associated components important to safety are tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the Byron Station structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant.

The redundant equipment is supplied with separate essential power sources during a loss of offsite power. The power supplies meet Institute of Electrical and Electronics Engineers (IEEE) 308-1974 criteria and ensure uninterrupted operation in the event of loss of normal AC power. The controls meet IEEE 279-1971. The electrical components are qualified in accordance with IEEE 344-1971 and IEEE 323-1974.

There are no high energy lines within the CRE. An evaluation was done, as part of reviewing high energy line breaks in the Turbine Building, and determined that the control room environment would not be adversely affected. VC system components are protected from externally generated missiles by missile-protected intakes.

Emergency Filtration Units are designed to meet Regulatory Guide 1.52, "Design, Inspection, and Testing Criteria for Air Filtration and Adsorption Units of Post-Accident Engineered-Safety-Feature Atmosphere Cleanup Systems in Light-Water-Cooled Nuclear Power Plants," Revision 2 (March 1978), with exceptions noted in the Byron Station Updated Final Safety Analysis Report (UFSAR) Appendix A. The charcoal filters are tested per ASTM D3803-1989.

In accordance with the Exelon QATR requirements, documents and records are maintained to show that required codes, standards, and specifications were followed; specified materials and correct procedures were applied; qualified personnel performed the work; and inspections and tests verified that parts and components meet the applicable specifications.

GDC 3: Requires structures, systems, and components to be designed and located to minimize the effects of fires.

The Byron Station CRE is designed to meet the requirements of GDC 3. Fire protection systems meeting the requirements of GDC 3 are provided. The fire protection program for Byron Station, regarding the CRE is described in the Byron/Braidwood Stations Fire Protection Report. The rooms within and adjacent to the CRE are generally separated by 3-hour fire rated floor slabs and walls. Doors are typically Underwriters Laboratory (UL) class "A." Vertical fire dampers are rated for 3 hours and horizontal fire dampers are rated for 1.5 hours. The redundant VC trains are separated by 3-hour fire rated barriers except within the area they serve (i.e., common control room, common AEER, and UCSR).

Per the requirements of the Byron Station Technical Requirements Manual Section 3.10.g, visual inspections of fire rated seal penetrations and exposed surfaces of fire rated assemblies is performed every 18 months.

The remote shutdown panel is served by the Radwaste and Remote Shutdown Control Room HVAC (VI) system and is located in a totally separate fire zone from that of the MCR. Therefore, reactor shutdown from the remote shutdown panel in the event of a fire in the MCR is not affected. A detailed evaluation of the effects of smoke on maintaining reactor control capability from either the control room or the alternate shutdown panel is provided in the response to Item 1(b) below.

Ionization detectors are located in the VC ductwork to alert operators via alarm of a potential fire. Procedures provide guidance to manually purge the CRE or affected areas. Fire extinguishers are available to respond to an emergency. A manually actuated fire protection deluge system is provided for each charcoal adsorber bed.

The UCSR is protected by an automatic halon system. A backup carbon dioxide system can be manually actuated for the UCSR. Periodic testing verifies the functionality of the halon and carbon dioxide systems.

GDC 4: Requires structures, systems, and components to be designed to accommodate the effects of accidents.

The VC system and the Auxiliary Building structure have been designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including the design basis events.

Maintenance and testing of one train of VC does not affect the ability of the opposite train of VC to perform its normal and design basis accident functions. Contingency actions, such as plant barrier impairments, may be required to perform work on dampers or doors, which are common to both trains of VC.

The VC system is housed in a missile-protected structure and make up air intake openings are missile protected. There are no high-energy lines within the CRE. A high energy line break in the Turbine Building will not adversely affect control room habitability.

The MCR is shielded by concrete walls that are three feet thick on the containment side, 3.5 feet thick on the opposite containment side, 2.5 feet thick on the remaining sides, a one-foot thick floor slab, and a two feet thick ceiling.

GDC 5: Requires that an accident in one unit will not significantly impair the orderly shutdown and cooldown of the remaining unit.

The control room is common for Byron Station Units 1 and 2 and shares the VC system. The VC system provides ventilation, cooling, heating, and control of environmental conditions in the control room. The VC system is designed to maintain functional integrity during and after a safe shutdown earthquake. Each train is provided with necessary redundant equipment and controls to maintain uninterrupted room air circulation, filtration and cooling. The single failure criterion is met for active safety related equipment. Safety related equipment is located within the seismic Category I Auxiliary Building. Standby diesel generators provide standby power to the safety related control room HVAC equipment during a loss of offsite power event. These systems are designed and operated such that an accident in one unit will not impair the ability to safely shutdown the remaining unit.

GDC 19: Requires a control room from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions.

The CRHS includes radiation shielding, air conditioning, air filtration, radiation monitoring, lighting, and fire protection. The Byron Station complies with the criteria for control room habitability in accordance with NUREG 0737, "Clarification of TMI Action Plan Requirements," Item III.D.3.4, "Control Room Habitability," as described in UFSAR Section 6.4.

The VC system is designed to ensure habitability after any of the design basis radiological accidents. In the event of an accident, the control room will automatically realign to a filtered pressurization mode. The most limiting calculated post-accident dose for control room occupancy is less than 5 rem to the whole body or the equivalent to any organ. These doses are within the dose limits specified in GDC 19. The VC system emergency mode and the control room shielding are designed to limit the occupational dose level, as required by GDC 19. The habitability systems are designed to meet GDC 19 of 10 CFR 50, Appendix A. The design basis accident for the control room area shielding is the loss-of-coolant accident (LOCA). For determining radiological dose to control room occupants, the LOCA is considered to be an upper bound of all accidents postulated to occur.

In the event of smoke entering the outside air intakes, the recirculation charcoal filter will automatically align to filter the smoke prior to entering the control room. The operator has options to select the cleaner of the two redundant outside air intakes, or select the Turbine Building intake, and/or purge the CRE. See the response to Item 1(b) for further details.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through suitable procedures from locations outside the control room are provided by the remote shutdown system, if the control room becomes inaccessible. The remote shutdown system has the capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and subsequent cold shutdown of the reactor. The remote shutdown panel is supported by a ventilation system separate from that of the control room and is located in a different fire zone than that of the control room.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

Response

The Byron Station control room habitability analysis was re-evaluated during the power uprate project in 2000 for design basis radiological accidents. The unfiltered inleakage value used in the control room habitability radiological dose analysis is 100 cfm.

The outside air intake bubble tight dampers were tested for zero leakage during original construction. Pressurization of the CRE ensures leakage is out of the CRE and into adjacent areas. Normal access paths between plant areas and the CRE are double-door (two doors in series) vestibules to minimize system interaction.

The Byron Station VC system configuration is unique in that all HVAC equipment and ductwork is contained within the CRE. Other systems (VV, VL, VW) with ductwork passing through the CRE are either isolated during accident conditions or have been tested for leakage. The VV system is isolated during accident conditions, as noted in the response to Item 1 above. The VL and VW systems have been leak tested during original construction and the leakage value is included in the VC return duct inleakage. Furthermore, potential leakage from the VL, VW or VV ductwork would be into the UCSR, which is within the CRE but not occupied by operators for purposes of operating the plant. The UCSR is supplied by the VC system but there is no normal return airflow back to the VC system. Air from the UCSR is exhausted out of the CRE. Should any air from VL, VW, or VV escape into the UCSR it would be normally exhausted out of the CRE. However, the leakage from VL and VW is conservatively included in the return air duct as inleakage as noted above. The air in the VC return air ductwork is filtered by the recirculation charcoal filter unit (assumed 90% efficiency). The VV system goes to ambient pressure following a VV fan trip on a VC system high radiation signal.

Positive pressurization of the control room is continuously monitored with differential pressure alarms at strategic locations to ensure envelope integrity. In addition, the differential pressures are verified as required by Technical Specification 3.7.10 every 18 months on a staggered test basis.

Administrative programs (e.g., Plant Barrier Impairment Program) are in place to ensure openings in the CRE boundary are maintained and properly designed as a ventilation seal or barrier. Byron Station inspects the CRE pressure boundary doors every six months.

Reasonable assurance is provided that control room integrity is still within its original design assumptions and as verified during the startup phase, based on the above noted design features and existing programs and surveillances to ensure CRE integrity. Testing to verify inleakage is maintained below these assumed values has not been performed to date. Exelon is in the process of obtaining a vendor to perform an integrated inleakage test per ASTM E741 for this verification, as described in Exelon letter to the NRC dated August 11, 2003. Testing will be performed in all applicable accident modes of operation and is expected to occur in 2004. Exelon will update the NRC regarding the testing schedule once a vendor contract has been issued. Final results will be transmitted to the NRC within 90 days after completion of the test, to fully address this information request.

In conjunction with the above testing, Exelon is performing a reanalysis of radiological doses for design basis accidents using the Alternative Source Term (AST) methodology. A submittal to the NRC is expected by the end of 2004. It is further expected that the allowable unfiltered inleakage value for the radiological mode will be significantly greater than the 100 cfm currently used in the radiological analysis. This will ensure adequate margin exists.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response

During original construction and licensing of Byron Station, no significant potential for the release of toxic chemicals in the vicinity of the plant was found based on a review of outside facilities and traffic near Byron Station. Evaluations concluded that no offsite toxic chemicals were a significant concern for control room habitability. The analysis was performed in accordance with Regulatory Guide 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," and 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release." Byron Station completed a survey with the Ogle County Emergency Services and Disaster Agency on November 12, 2003, to determine if hazardous chemicals are currently being stored within a five-mile radius of the plant. Evaluation of the summary indicates that the only significant offsite hazardous chemical source within the 5-mile radius around the site is anhydrous ammonia. A postulated failure of this source would result in an acceptable concentration in the control room without isolation.

Byron Station recently completed a comprehensive review of on-site chemicals. Based on review of Byron Station calculations, the most limiting inleakage assumed for hazardous chemical analyses is 78.75 cfm and 6000 cfm outside air makeup.

Byron Station presently has a chemical control program for on-site chemicals, which ensures there is no impact to the site's current control room habitability analyses. The chemical control program provides administrative guidance for the safe and proper issue, handling, storage, labeling, use, and disposal of consumable materials and chemicals. The program is designed to control the intrusion of potentially damaging chemicals into plant equipment or the environment and to optimize employee safety. This program establishes a standardized process that controls the use of chemical products to eliminate the creation of hazardous and/or mixed waste, minimize the potential for damage to plant equipment, and minimize invalidation of plant safety analyses caused by the use of chemicals.

Potential sources of smoke are from either internal or external fires. The likelihood of a major offsite fire/smoke hazard is low, since no chemical plants, no large amounts of oil storage, and no gas pipelines are located near the plant site.

The likelihood of internal equipment fire/smoke affecting control room habitability is minimized because early ionization detection is assured, fire-fighting apparatus is available, low combustible load including flame retardant cabling is used throughout the plant, and filtration and purging capability are provided. Internal sources of smoke will be detected by the ionization detectors in the return air ducts, annunciated locally and on the main control board via the fire detection control panel. On detection of ionization products in the VC return mixed air plenum, the mixed air (return air and makeup air) is automatically routed through the charcoal adsorber and annunciated on the main control board. The operator may continue to route the VC system supply air through the charcoal adsorber for smoke removal, or depending on the condition of the outside air, may manually bypass the charcoal adsorber and purge the entire system with outside air.

In the unlikely event that there is an external smoke source, the control room ventilation normal intake and Turbine Building intake include ionization detectors which alarm locally and in the MCR. The physical separation of redundant outside air intakes provides the option of drawing makeup air to the CRE from either train depending upon the lesser smoke concentration. On detection of ionization products in the VC return mixed air plenum, the mixed air (return air and makeup air) is automatically routed through the charcoal adsorber and is annunciated on the main control board. The operator may continue to route the system supply air through the charcoal adsorber for smoke removal, or depending on the condition of the outside air, may manually bypass the charcoal adsorber and purge the entire system with outside air. On ionization detection in the outside makeup air intake or individual return air branches, annunciation in the control room alerts the operator of an adverse condition and procedures provide actions to perform.

There are nine SCBA units available inside the MCR. Additional reserve air supplies are maintained onsite to provide a total of six hours of breathing air for each of the seven emergency personnel.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through approved procedures from locations outside the control room are provided by the remote shutdown system. If the control room must be evacuated, the remote shutdown system has the capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and subsequent cold shutdown of the reactor. The remote shutdown panel is supported by a ventilation system separate from that of the control room and is located in a separate fire zone. Control room operators can travel to the remote shutdown panel by several different pathways through the Auxiliary Building and Turbine Building. Therefore, smoke in one area of the plant should not prevent operators from traveling to the remote shutdown panel.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.*

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

<u>Response</u>

Based upon industry experience, plants with high inleakage values are typically those with HVAC equipment and ductwork outside the CRE boundary. The Byron Station VC system equipment and ductwork is located within the CRE, which precludes most of the sources for unfiltered inleakage.

Considering the low leakage design of the CRE and conservatism in the unfiltered inleakage value being used, the differential pressure test along with the current programs and inspections being performed provide adequate means to ensure that the assumed unfiltered inleakage value is being maintained within design.

Technical Specification 3.7.10 requires a surveillance to be performed every 18 months on a staggered test basis to verify positive control room pressure relative to adjacent areas and verify the makeup air flow rate is within the original design. The design includes continuous differential pressure monitoring with alarms to ensure that the CRE integrity is not degrading. It is recognized that differential pressure monitoring alone cannot quantify CRE unfiltered inleakage. As such, Byron Station has committed to perform an integrated inleakage test to quantify this inleakage, as described in the response to Item 1(a) above.

The Byron Station Technical Specifications will be revised to include a new Section 5.0 administrative program for Control Room Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program will address the following:

- CRE Boundary/Breach Control
- CRE Integrity Procedure Control

- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self Assessment

A license amendment request to revise Technical Specification Section 5.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the test results to be performed in accordance with ASTM E741, other tests performed, and ongoing program self-assessments, a Byron Station Technical Specification requirement for periodic testing other than the current ΔP test is not warranted. However, if significant problems, issues, repairs, or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

Response

No compensatory measures are currently required to demonstrate CRE habitability for radiological releases. Therefore, there are no corrective actions needed to retire such measures.

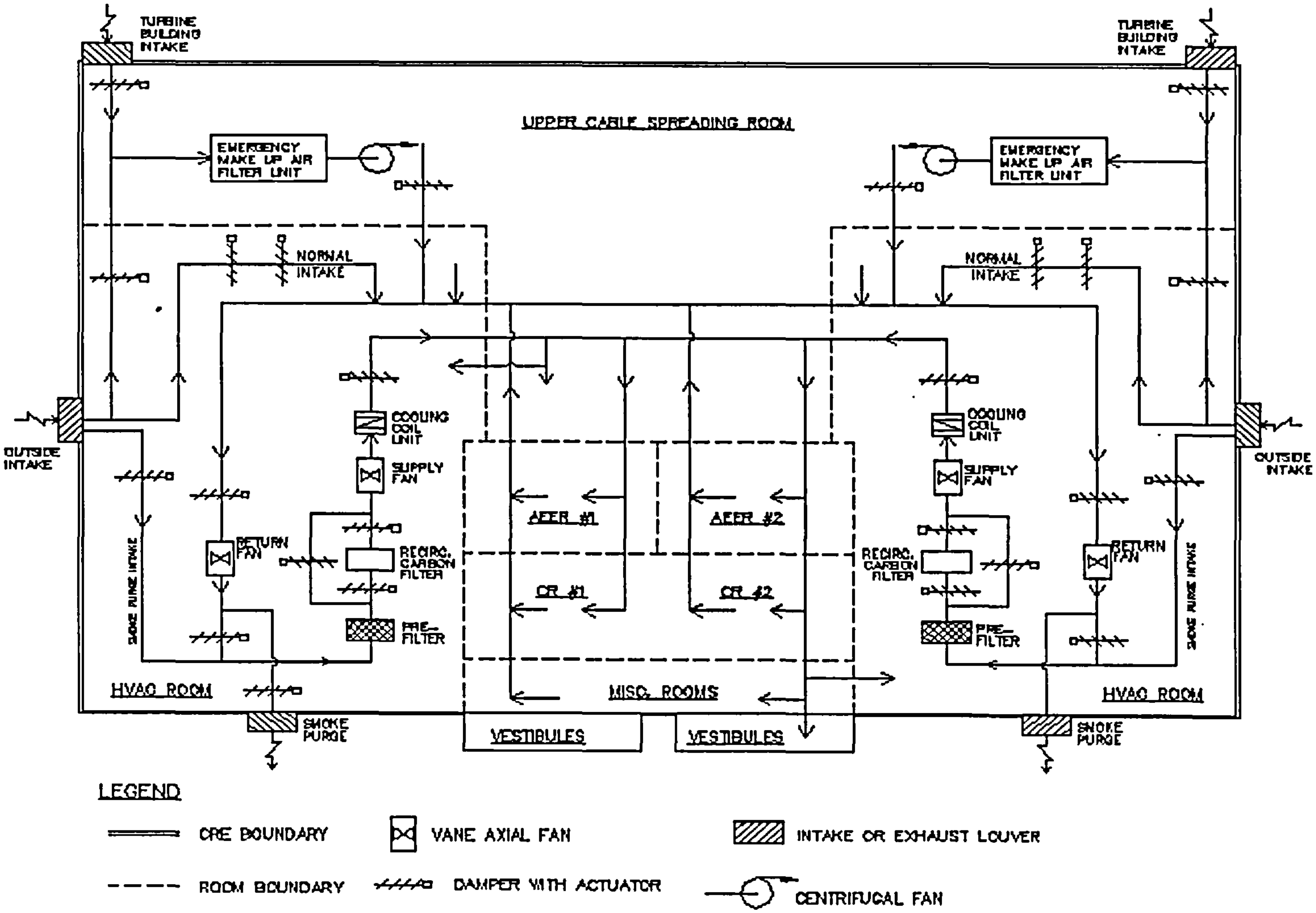
3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

Response

Byron Station is required to meet the GDC regarding control room habitability, as documented in the UFSAR for both stations. A detailed discussion of the GDCs, as they apply to both units at Byron Station, is contained in the response to Item 1 above.

Figure 2-1

BYRON CONTROL ROOM ENVELOPE
HVAC SYSTEM



ATTACHMENT 3

180-Day Response to NRC Generic Letter 2003-01

Clinton Power Station, Unit 1

AmerGen Energy Company, LLC

Attachment 3

180-Day Response to NRC Generic Letter 2003-01

Clinton Power Station, Unit 1

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., General Design Criteria (GDC) 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

   <u>Response</u>

   The Control Room Envelope (CRE) is comprised of the Control Room (CR), Computer Room, Technical Support Center, TMI Panel room, Operational Support Area, and miscellaneous office areas.

   The Clinton Power Station (CPS) CRHSs serving the CRE consist of an independent CR heating, ventilating and air conditioning (HVAC) system with supply air handling units (supply fans, cooling/heating units, and recirculation air filter units), return air fans, makeup air filter units, and chilled water units. The CR HVAC system is safety related and active components are designed with redundancy to meet single active failure criteria. The CRHS equipment is located within the seismic Category I Control Building structure. The CR HVAC system's redundant trains are physically separated. All active components are protected from internally and externally generated missiles. The power for the redundant equipment is supplied from separate essential power sources and is therefore operable during a loss-of-offsite power event. The power supply and control and instrumentation meet Institute of Electrical and Electronics Engineers (IEEE)-279, "Criteria for protection systems for Nuclear Power Generating Stations," and IEEE-308, "Standard Criteria for Class 1E Power Systems for Nuclear Power Generating Stations," criteria. All the CR HVAC equipment is designed to seismic Category I requirements, except for the locker room exhaust fan, air handling unit electric heating coil and humidification equipment, which are supported seismically.

   A simplified diagram of the CR HVAC system with the supply air handling units, makeup air filter units and locker room exhaust fan is shown on attached Figure 3-1. Locations of the normal and filtered air intakes are shown on the attached Figure 3-2.

   The habitability systems are designed to ensure that the personnel in the CRE are adequately protected during normal and accident conditions by providing adequate protection against radiation and toxic gases, in compliance with Criterion 19, "Control Room," of Appendix A, "General Design Criteria for Nuclear Power Plants," to 10 CFR 50.

The CR HVAC system is provided with two redundant outside air intakes that are physically separated from each other as shown on Figure 3-2. Radiation monitors continuously monitor the two redundant outside air intakes. In the event of high radiation detection, the radiation monitoring system will activate the alarm in the main CR, automatically start the makeup air filter train, route the supply air stream through the charcoal beds in the recirculation air filter unit associated with the operating HVAC air handling unit and trip the locker room exhaust fan. The CR operator can operate handswitches to select one of the two redundant air intakes, whichever has a lower airborne contamination level, and minimize radioactivity intake. This high radiation (Hi-Rad) mode of operation continues to pressurize the CR to ≥ 0.125 inch water gauge with respect to the adjacent areas with filtered makeup air. The CR is maintained at positive pressure with respect to adjacent areas when operating in the normal and high radiation modes to minimize the ingress of unfiltered outside air.

The CRHS makeup air filter units provide filtered outside air supply to the CRE during an accident with an offsite airborne release to maintain CR habitability. There are two 100% seismic Category I makeup air filter units consisting of a moisture separator, prefilter, electric heating coil, high efficiency particulate air (HEPA) filter, carbon adsorber, and a downstream HEPA filter. The two 100% redundant recirculation air filter units consist of a prefilter and carbon adsorber. In the Hi-Rad mode, the CR outside air intake, the makeup air filter units, and recirculation air filter units are aligned, so that all outside air must pass through both carbon adsorbers of the operating filter train before it enters the CRE.

A detailed description of the CRHS response to toxic gas and smoke are contained in the response to Item 1(b) below.

The entire CR boundary is designed for low leakage. All boundary penetrations are sealed. The access doors are of airtight design with self-closing devices. The common access door is provided with an airlock vestibule (i.e., double doors in series).

Adequate self-contained breathing apparatus and a minimum of 6 hours of bottled air are provided inside the CRE for each member of the emergency staff. Unlimited offsite supplies are available from nearby locations.

Applicable Habitability Regulatory Requirements

GDC 1: Requires quality standards commensurate with the importance of the safety functions performed.

The CPS CR HVAC system components are safety related, designed to seismic Category I requirements, and located within a seismic Category I structure. These systems and associated components important to safety are appropriately tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the CPS structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant. As described in Updated Safety analysis Report (USAR)

Section 3.2, HVAC ductwork, HVAC components, HVAC instrumentation, and hangers located in seismic Category I buildings have been designed as seismic Category I. HEPA filters, prefilters, and charcoal adsorbers are designed to meet Regulatory Guide 1.52, "Design, Testing and Maintenance Criteria for Post Accident Engineered Safety Feature Atmosphere Cleanup System Air Filtration and Adsorption Units of Light-Water-Cooled Nuclear Power Plants," with exceptions noted in USAR Table 6.5-3. Testing of filters meets the requirements of Regulatory Guide 1.52 with carbon acceptance criteria per ASTM D3803-1989, "Standard Test Methods for Nuclear-Grade Activated Carbon," and ANSI N510-1980, "Testing of Nuclear Air-Treatment Systems," as described in CPS Technical Specification 3.7.3, "Control Room Ventilation System."

In accordance with the Exelon QATR requirements, documents and records are maintained to show that required codes, standards, and specifications were followed; specified materials and correct procedures were applied; qualified personnel performed the work; and inspections and tests verified that parts and components meet the applicable specifications.

GDC 3: Requires structures, systems, and components to be designed and located to minimize the effects of fires.

The CPS CRE is designed to meet the requirements of Criterion 3. Fire protection systems meeting the requirements of Criterion 3 are provided. The fire protection program for CPS regarding the CR is described in USAR Section 9.5. The likelihood of an equipment fire affecting CR habitability is minimized because early ionization detection is assured. Fire fighting apparatus is available within the CRE outside of the CR. The CRE is bounded by 3-hour fire barriers. Ducts penetrating these boundaries are provided with 3-hour fire dampers.

Electrical wiring and equipment are surrounded by, or mounted in metal enclosures. The nuclear safety related circuits for redundant divisions (including wiring) are physically separated by space or barriers to prevent damage to both circuits by a single fire. The cable insulation is flame retardant.

Structural and finish materials for the CR and interconnecting areas have been selected on the basis of fire resistant characteristics.

Ionization smoke detectors are located in the CR HVAC return ducts and in the outside air intakes. In the event of smoke or products of combustion in the CR return air path or in the outside air intakes, ionization detectors will annunciate in the CR and air will be automatically routed through the recirculation filter units.

A detailed evaluation of the effects of smoke on maintaining reactor control capability from either the CR or the remote shutdown panel is provided in the response to Item 1(b) below.

GDC 4: Requires structures, systems, and components to be designed to accommodate the effects of accidents.

The CR HVAC system and the Control Building structure have been designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including a design basis loss of coolant accident (LOCA). All active components of the CR HVAC system are protected from internally and externally generated missiles. Normal and postulated accident effects and load combinations are described in USAR Sections 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 3.10, and 3.11.

GDC 5: Requires that an accident in one unit will not significantly impair the orderly shutdown and cooldown of the remaining unit.

Criterion 5 is not applicable since CPS is a single unit facility.

GDC 19: Requires a control room from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions.

CPS complies with the criterion for CR habitability in accordance with NUREG 0737, "Clarification of TMI Action Plan Requirements," Item III.D.3.4, "Control Room Habitability," as described in USAR Sections 3.1, 6.4, and Appendix D. The CR HVAC system is designed to ensure habitability after any of the design basis radiological accidents or a chemical release accident. The recirculation filter unit, makeup filter unit, and the CR shielding are designed to limit the occupational dose level, as required by Criterion 19. The habitability systems are designed to meet Criterion 19 of 10 CFR 50, Appendix A. In the event of outside air intake radiation detection, the CR HVAC system will automatically align to the filtered pressurization mode (i.e., Hi-Rad Mode). The most limiting calculated post-accident dose for CR ingress, egress, and occupancy is less than 5 rem to the whole body or the equivalent to any part of the body. The radiological dose analyses for all design basis accidents are discussed in the response to Item 1(a) below.

As stated in USAR Section 6.4.4.2, protection from hazardous chemicals from offsite sources is not required since the frequency of transportation of these sources is not significant. The potential for release of toxic chemicals in the vicinity of the plant, and their effect on the habitability and protection of the CR during and after such release, has been evaluated and discussed in details in USAR Section 2.2.3.1.3. The safety analysis concluded that the postulated accidents of the anhydrous ammonia portable tanks and tanker trucks used by farmers and suppliers do not adversely affect CR habitability.

The design of the CR with respect to a potential chlorine hazard meets the requirements of Regulatory Guide 1.95, "Protection of Nuclear Power Plant Control Room Operators Against an Accidental Chlorine Release." Transportation and traffic surveys have shown that the frequency of transportation or delivery of chlorine does not require protection from a potential chlorine hazard. Additionally, gaseous chlorine is not permitted on site by plant procedures and there are no other significant storage areas of chlorine within a

5-mile radius of the site. The CR operator has the ability to manually initiate CRE isolation and recirculation mode of operation for the CR HVAC system. As stated in USAR 6.4.4.2, a breathing air system consisting of fourteen (14) air bottles is capable of supplying sufficient breathing air for seven (7) operators for six (6) hours. Detailed initial training and biennial retraining in the use of this system is included in the CPS Respiratory Protection Program.

Other potentially hazardous chemicals stored on site, including sulfuric acid, carbon dioxide, and nitrogen have been evaluated in accordance with Regulatory Guide 1.78, "Assumptions for Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release." Analysis showed that accidental release of these chemicals would not affect the CR habitability.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through suitable procedures from locations outside the CR are provided by the remote shutdown system, if the CR becomes inaccessible.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

<u>Response</u>

The systems are designed to maintain habitability of the CRE during and after a design basis accident such as LOCA with a simultaneous LOOP, design basis earthquake, and single active failure of any CR HVAC system component.

The CR HVAC systems operate in filtered pressurization mode automatically upon detection of radiation in the outside air intake duct. There are two redundant outside air intakes that are physically separated as shown in Figure 3-2. The CR operator has the option to select one of the two outside air intakes, whichever is less contaminated, to take advantage of the separation of the two air intakes and minimize radioactivity intake.

Radiological analyses performed for CPS demonstrate that the LOCA is the most restrictive accident for radiological dose consideration to the CR. Dose calculations were performed in 2001, in accordance with Regulatory Guide 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors," for the source term associated with extended power uprate and with the Feedwater Leakage Control System (FWLCS) operating or in standby. The current radiological analysis following a LOCA assumes 10 cfm unfiltered inleakage, and 650 cfm of negative pressure ductwork and component inleakage filtered by the recirculation carbon filter, in the Hi-Rad Mode of operation. The calculation accounts for containment leakage, bypass leakage, main steam isolation valve leakage, feedwater penetration leakage, and a single failure of one of the operating CR HVAC trains. It was determined that with these assumed inleakages the resulting doses are well below the limits set in GDC 19. The dose values are presented in USAR Section 15.6.5.5.3.

LOCA dose reanalysis was performed in 2003 using methodology established in Regulatory Guide 1.183, "Alternative Radiological Source Terms for Evaluating Design Basis Accidents at Nuclear Power Reactors," Revision 0, and in accordance with Standard Review Plan 15.0.1, "Radiological Consequence Analyses Using Alternative Source Terms," to demonstrate compliance with dose criteria established in 10 CFR 50.67, "Accident source term." This analysis used 650 cfm filtered inleakage (upstream of the recirculation carbon filter) and 600 cfm of unfiltered inleakage into the CRE in the filtered pressurization radiation mode. The reanalysis includes LOCA, control rod drop accident, and main steam line break accident. Based upon the results of this reanalysis, the dose consequences of these limiting events are within the requirements of 10 CFR 50.67 for use with alternative source term. Based on this design basis accident reanalysis, AmerGen has submitted a license amendment request related to application of alternative source term (AST) in letter RS-03-060, dated March 19, 2003.

The dose analysis for the Fuel Handling Accident (FHA) was performed in 2001 to determine the radiological dose at the Exclusion Area Boundary, Low Population Zone and CR using the AST. The analysis concluded that the site boundary and CR doses following a FHA using AST meet the acceptance criteria specified in 10 CFR 50.67 and Regulatory Guide 1.183. The analysis indicates that filtration is not required for FHA. Therefore, CRE inleakage is not a concern for the FHA analysis.

Based on this FHA dose analysis, AmerGen submitted a request to change the CPS Technical Specifications to eliminate certain requirements that were applicable during the movement of irradiated fuel and during core alterations. The NRC subsequently approved these changes as License Amendment No. 147 in letter from the NRC dated April 3, 2002.

The CR HVAC ductwork and components (i.e. isolation dampers, return fan, and fan connections) that are at negative pressure and are located outside the CRE boundaries are periodically tested for leakage as required by Technical Specification Surveillance Requirement (SR) 3.7.3.5. The negative pressure ductwork during the Hi-Rad Mode that is tested, is highlighted in Figure 3-3.

This leakage test is performed by isolating the return air to the inoperable train by installing blank plates at the suction of the return air fan and on the return ducts at the CRE boundaries, and by opening one of the two isolation dampers in the normal outside air intake while the other remains closed. The suction of a test blower is connected to ductwork, which negatively pressurizes the ductwork and its components at higher than the operating pressure.

The most recent Technical Specification surveillance leakage tests performed for Train A and Train B were performed in 2002 and 2000, respectively. These results demonstrated that the total inleakage value was 448.5 cfm, which is well below the analysis assumption of 650 cfm.

CR pressure is continuously monitored using local indicators. The transmitters that select the lowest reading and transmit signals to these indicators measure CR pressure relative to the area adjacent to the CR. Technical Specification SR 3.7.3.6 requires verification of CR pressure every 18 months on a staggered test basis during the Hi-Rad mode of operation.

A detailed evaluation of CRE differential pressure was performed in 1999 to validate the permanent differential pressure instrument locations. This evaluation manually measured the CRE pressure relative to all surrounding areas using a portable pressure gauge. The pressure measurements were performed with the HVAC System in the Hi-Rad Mode of operation. The results indicated that all the pressure values measured by a portable instrument were higher than the readings from the permanent indicators and were greater than 1/8-inch water gauge. This test proved that the two (2) permanent reference locations continue to provide the most conservative readings for the CRE.

Reasonable assurance is provided that CR integrity is maintained within its original design assumptions, based on the above noted design features, periodic inleakage testing of negative pressure ductwork, and other programs and surveillances to ensure CRE integrity. Tracer gas testing to verify inleakage is maintained below these assumed values has not been performed to date. AmerGen is in the process of obtaining a vendor to perform an integrated inleakage test per ASTM E741 to validate the assumed unfiltered inleakage value, as described in AmerGen letter to the NRC dated August 11, 2003. Testing will be performed in all applicable accident modes of operation and is expected to occur in 2004. AmerGen will update the NRC regarding the testing schedule once a vendor contract has been issued. Final results will be transmitted to the NRC within 90 days after completion of the test to fully address this information request.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

<u>Response</u>

<u>Response for Hazardous Chemicals</u>

Outside the Owner Controlled Area:

The potential for the release of toxic chemicals in the vicinity of the plant, and their effect on the habitability and protection of the CRE during and after a release, has been evaluated as discussed in CPS USAR Section 2.2.3.1.3. Calculations and probability analysis were performed to determine the impact of hazardous chemical release in the vicinity of the plant. The safety analysis concluded that the postulated accidents of the anhydrous ammonia portable tanks and tanker trucks used by farmers and suppliers do not affect CR habitability. In this analysis the CRE was not isolated and normal outside airflow was used.

No nearby industrial or other activities have been identified which could pose a chemical hazard to CPS. The nearest highway is State Highway 54, which passes about ¾ mile from the north of the plant. U.S. Highway 51 is located approximately 6 miles west of the plant. The nearest railroad is the Gilman Line of the Illinois Central/Canadian National Railroad, which runs parallel to Highway 54, and traverses north of the site approximately three-quarters of a mile. Effects of accidents on these transportation routes have been evaluated and it is concluded that they do not need to be considered as design basis accidents. A periodic survey of the traffic and other fixed sources within a 5-mile radius is performed every 3 years to ensure that future changes do not affect the chemical hazard evaluation.

Within Owner Controlled Area (OCA):

All hazardous materials stored within the OCA are evaluated for their toxic potential regarding CR habitability. Based on this evaluation, releases of hazardous materials stored within OCA do not need to be considered as design basis accidents.

Although toxic gas is not a concern at CPS currently, CR operators have the option of isolating the CRE manually and putting the system in recirculation mode as necessary.

Based on the above evaluation toxic gas protection of the CRE is not a concern and no toxic gas detectors are required for CPS. Therefore, inleakage testing specifically for toxic gas is not required.

Response for Smoke:

Potential sources of smoke are from either internal or external fires. The likelihood of smoke from an offsite fire is very low, since no chemical plants, no large amounts of oil storage, and no gas pipelines are located near the plant site. The likelihood of internal equipment fire/smoke affecting CR habitability is minimized because early ionization detection is provided, fire-fighting apparatus is available, low combustible load including flame retardant cabling is used throughout the plant, and filtration and purging capability are provided.

Ionization detection is provided in the outside air intakes and return air path from associated areas. Ionization detection is annunciated locally and on the main control board via the fire detection control panel. In the event that there is an external smoke source the physical separation of the two redundant outside air intakes provides the option of drawing makeup air to the CRE from either of them. Ionization detection in the outside air duct automatically realigns the supply air path through the recirculation filter unit charcoal adsorbers. Provision is made to manually purge all the room air by introducing 100% outside air into the CRE, if required. System interlocks will not permit purging if radiation is detected at the outside air intakes.

The CR and Remote Shutdown Panel (RSP) area are physically separated and located in different fire zones, and have their own HVAC systems. Thus, if the CR has to be abandoned the operators can relocate to the RSP area located in the Auxiliary Building to safely shutdown the unit.

Based on the above design features the impact of smoke will not prevent the safe operation or shutdown of the unit.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.*

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

<u>Response</u>

The negative pressure ductwork and components located outside the CRE boundaries that are vulnerable to inleakage are tested for leakage as required by Technical Specification SR 3.7.3.5 every 18 months. The duct and components of the inoperable train are isolated and subjected to a negative pressure. This test includes duct, isolation dampers, return fan, and fan connections upstream of the recirculation filter unit that is at negative pressure (see Figure 3-3). All other components located outside the CRE boundaries are under positive pressure, and therefore are not leak tested.

CR pressure is continuously monitored by permanently installed differential pressure instrumentation with respect to areas adjacent to the CRE, as described in response to Item 1(a) above. The CR pressure is verified every 18 months on a staggered basis per Technical Specification SR 3.7.3.6.

The Technical Specification SR 3.7.3.6 ΔP test confirms that there is zero inleakage at the CRE boundary by virtue of positive pressure. The Technical Specification SR 3.7.3.5 negative pressure ductwork test confirms that inleakage in the CR HVAC system located outside the CRE remains within design limits. In order to verify that the current surveillances for filtered and unfiltered inleakage are conservative and adequate, a test using ASTM Standard E741 methodology is planned in 2004.

Clinton Power Station also has Administrative programs in place (e.g., Plant Barrier Program, Hazardous Chemical Control Program, Design Control Process, and Safety Analysis Process) to ensure openings in the CRE boundary are maintained and properly designed as a ventilation seal or barrier. The integrity of the CRE is part of these programs. Periodic preventive maintenance activities for floor drains and dampers are performed to ensure CRE integrity.

The CPS Technical Specifications will be revised to include a new Section 5.0 administrative program for Control Room Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program include the following:

- CRE Boundary Breach Control
- CRE Integrity Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self Assessment

A license amendment request to revise Technical Specification Section 5.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the test results to be performed in accordance with ASTM E741, other tests performed, and ongoing program self-assessments, a CPS Technical Specification requirement for periodic testing other than the current negative duct pressure test and CRE ΔP test is not warranted. However, if significant problems, issues, repairs, or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

   Response

   No compensatory measures are currently required to demonstrate CRE habitability for radiological releases. Therefore, there are no corrective actions needed to retire such measures.

3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

   Response

   As noted in the USAR Section 1.2.2.1, the CPS design conforms to the requirements given in 10 CFR 50, Appendix A. Specific compliance is discussed in response to Item 1 above.

FIGURE 1
SIMPLIFIED CONTROL ROOM HVAC SYSTEM (VC) DIAGRAM

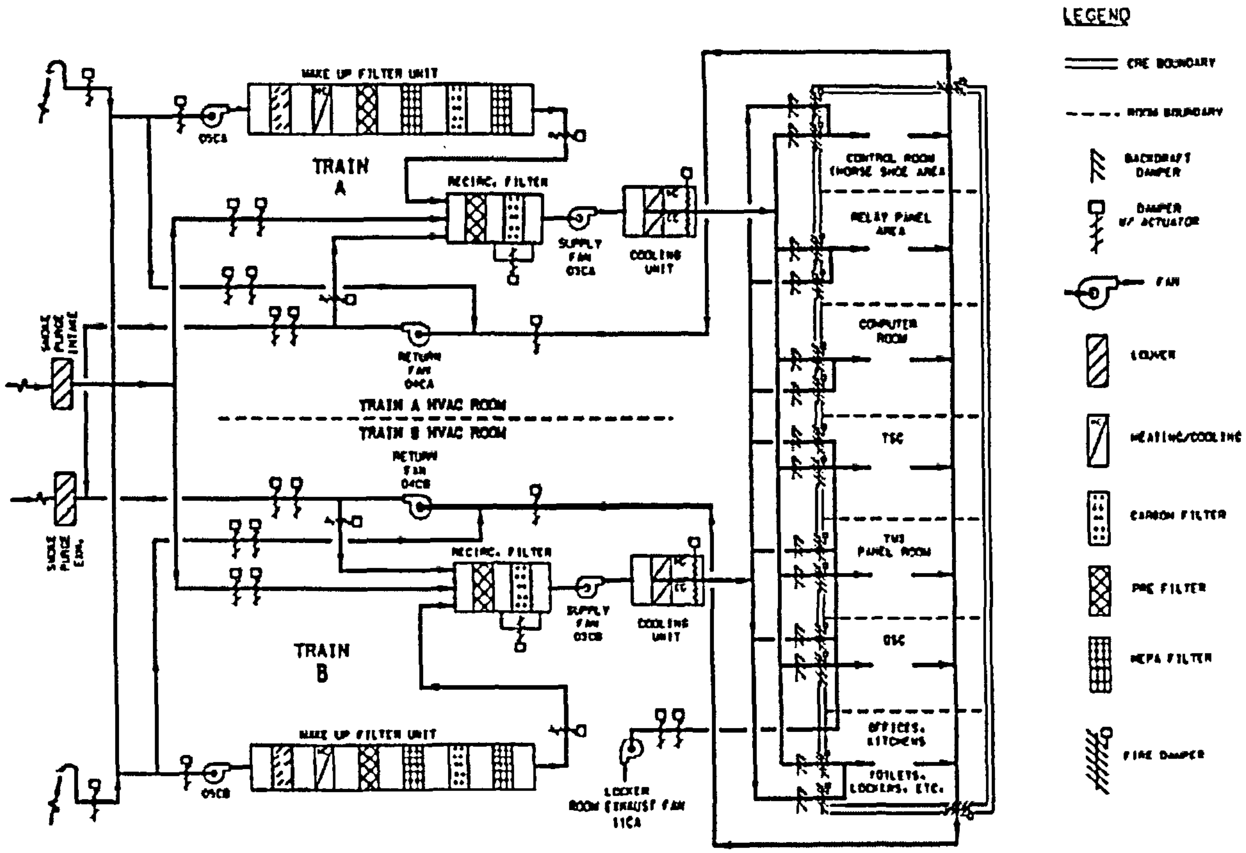
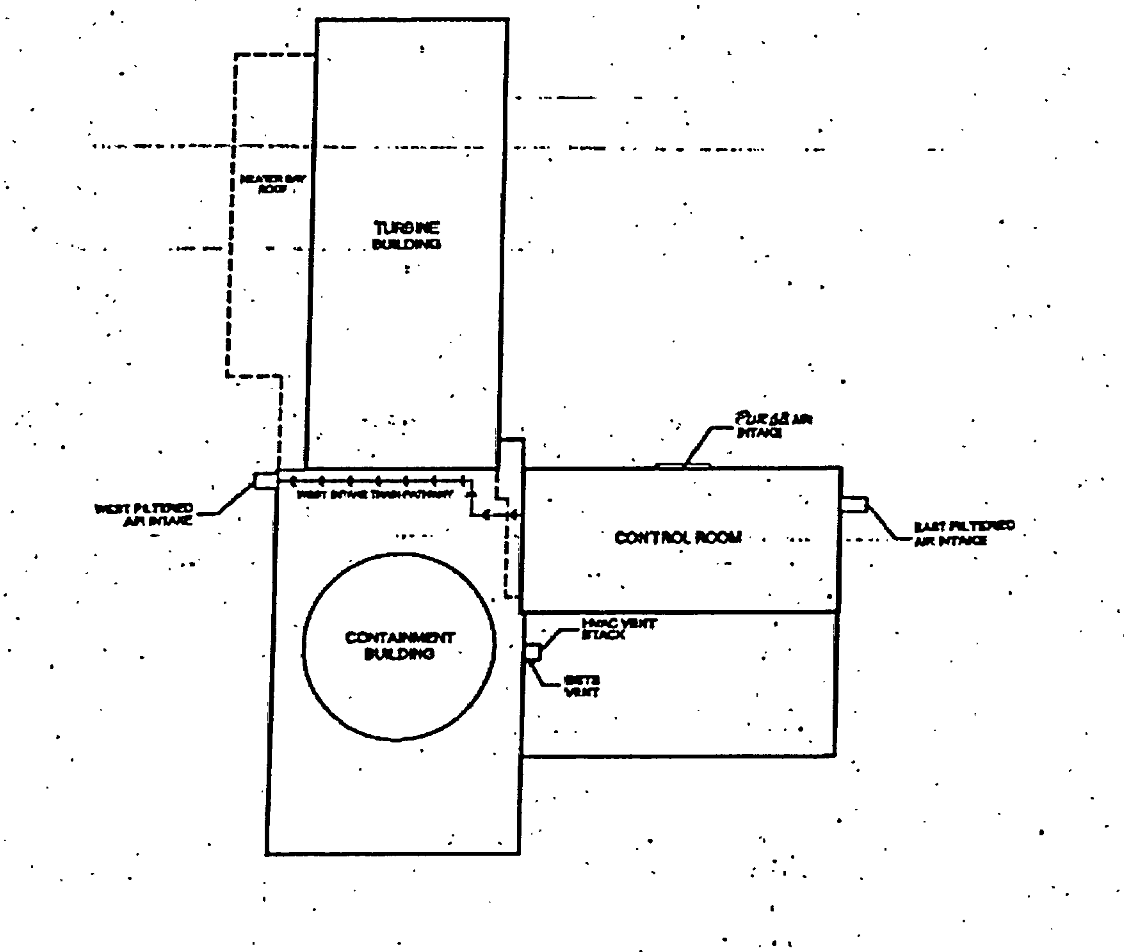


Figure 3-1

Figure 3-2

Figure 2: Release and Intake Layout



Note: The east and west filtered air intakes are used for normal and accident conditions.

Figure 3. Simplified VC Diagram - A Train Hi Rad Mode

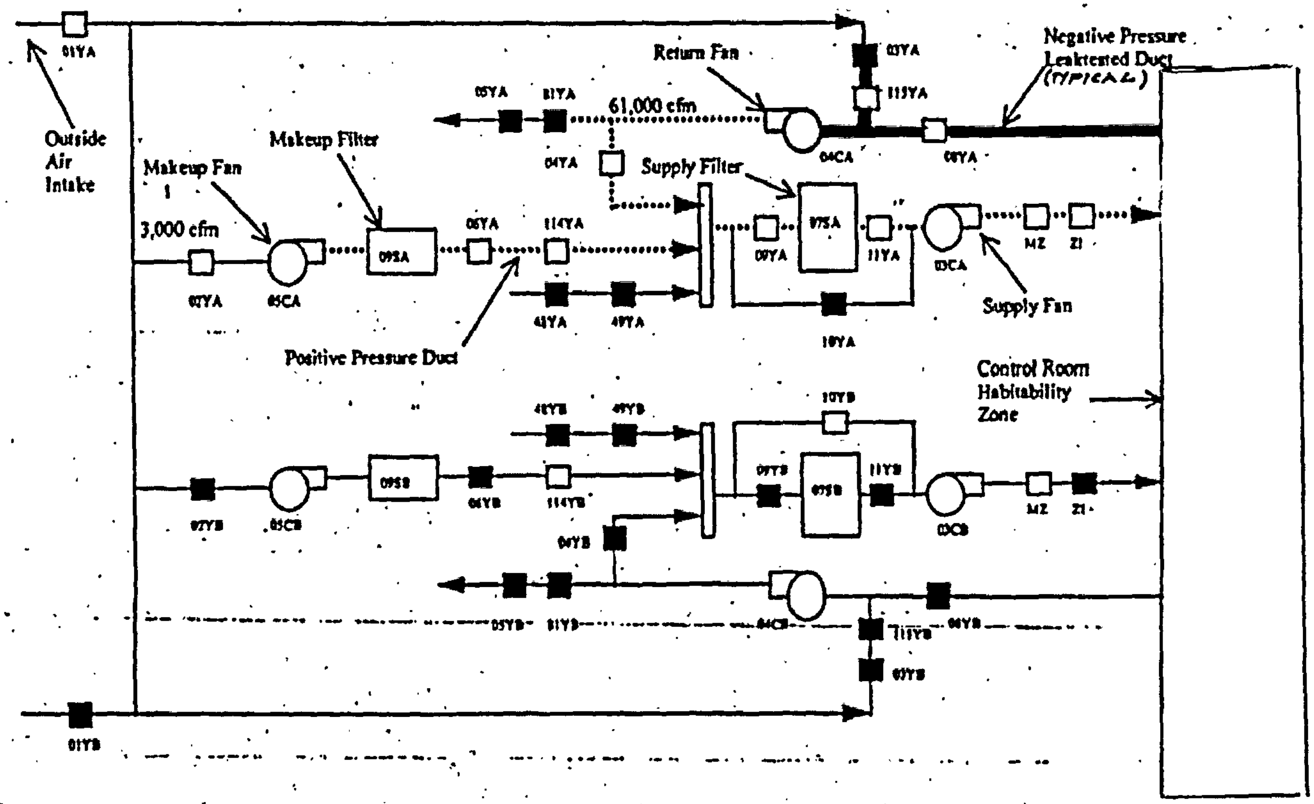


Figure 3-3

ATTACHMENT 4

180-Day Response to NRC Generic Letter 2003-01

Dresden Nuclear Power Station, Units 2 and 3

Exelon Generation Company, LLC

Attachment 4

180-Day Response to NRC Generic Letter 2003-01

Dresden Nuclear Power Station, Units 2 and 3

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., GDC 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

Response

The following is a description of the Dresden Nuclear Power Station (DNPS) Control Room Envelope (CRE) and supporting habitability systems. Additional details are provided in the DNPS Updated Final Safety Analysis Report (UFSAR) Sections 6.4, Habitability Systems, and 9.4, Air Conditioning, Heating, Cooling, and Ventilation Systems.

Control Room (CR) heating, ventilation, and air conditioning (HVAC) systems are designed to maintain a habitable environment and ensure the operability of all components in the CRE under all station operating conditions in accordance with NUREG-0800, Standard Review Plan (SRP) 6.4, Control Room Habitability System, or 10 CFR 50 Appendix A, General Design Criteria (GDC) for Nuclear Power Plants, Criterion 19, "Control Room." GDC 19 and SRP 6.4 require adequate radiation protection to permit access to and occupancy of the control room under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body or its equivalent to any part of the body for the duration of the design basis accident (DBA). The worst-case DBA for habitability considerations is the postulated loss-of-coolant accident (LOCA) with the main steam isolation valve leakage at Technical Specification limits.

The DNPS Unit 1, 2 and 3 common CRE is a Class I structure located in the Class II Unit 2 Turbine Building structure. The CRE is comprised of the main CR, which includes kitchen, toilet, and locker rooms, and the CR Train "B" HVAC Equipment Room. The Train "A" HVAC Equipment Room, Auxiliary Computer Room, and the Auxiliary Electric Equipment Room are not included in the CRE. Simplified diagrams of the CRE are included in Figures 4-1, 4-2, and 4-3. Note that DNPS does not have a remote safe shutdown panel. Safe shutdown operator actions are performed in accordance with DNPS Safe Shutdown Procedures.

The DNPS CRHSs are comprised of a Train "A" HVAC system, a Train "B" HVAC system, an Air Filtration Unit (AFU), and a smoke detection system. The Train "A" HVAC system is a non-safety related multi-zone system, located in the Unit 2 Turbine Building, at elevation 549', directly above the Train "B" HVAC Equipment Room. This equipment is installed outside of the CRE using common ductwork with the CRE Train "B" HVAC system. The Train "A" system is comprised of an Air Handling Unit (AHU); return air fan, and two 35-ton 50% refrigeration-condensing units (RCUs) cooled by the service water system. The Train "A" system is the primary HVAC train for the CRE and can be isolated from the Train "B" system by air operated safety related isolation dampers in the event of a radiological event or the failure of the Train "A" system. These isolation dampers fail to the Train "B" system operating mode since the Train "B" system is powered from the emergency bus during the loss of offsite power (LOOP) or loss of instrument air. The Train "B" CR HVAC system is a safety related single zone system, which provides cooling in the event Train "A" HVAC system fails. This system is located in the Train "B" HVAC Equipment Room Class I structure within the CRE directly adjacent to the main CR, elevation 534'. The Train "B" HVAC system provides cooling to the CRE through the use of a 90–ton RCU. The RCU is normally cooled by the Service Water system. However, on the loss of the Service Water system, the RCU may be cooled by the safety related Containment Cooling Water (CCSW) system.

Train "A" HVAC system is continuously monitored for smoke through the outside air damper and the return air ducts. Upon detection of smoke in the Train "A" outside air intake, the CR ventilation system will automatically configure the Train "A" system in the recirculation mode and isolate outside air intake. This will prevent the intake of smoke into the CRE in the event of fire outdoors. Upon detection of smoke in the return air ducts of the CRE, fire detector annunciations will occur in the CR and the Fire Protection Panel. Operator actions will be performed in accordance with the appropriate DNPS Annunciator Procedures. Manual initiation of smoke purge mode of operation is provided.

The CR HVAC system provides radiation protection by pressurizing the CRE with filtered air, isolating outside air intakes, and isolating the kitchen and locker room exhaust fan dampers. This isolation/pressurization mode of protection is manually initiated upon receipt of a high radiation alarm from the Reactor Building Ventilation System Radiation Monitors installed upstream of the secondary containment isolation valves. Operator actions include starting Train "B" AHU, RCU, one AFU Booster fan, and placing the CRE in isolation mode. By design and analysis these actions must be completed within 40 minutes of the receipt of a high radiation alarm, during a DBA, to ensure personnel exposures are maintained within SRP 6.4 and GDC 19 requirements. The AFU and its associated components provide filtration of pressuring air. This equipment is located in the CRE Train "B" Equipment Room adjacent to the Train "B" AHU and RCU. This unit provides filtration for 2000 cubic feet per minute (cfm) makeup outside air to maintain CR pressure at $\geq$ 0.125 inches water gauge relative to adjacent areas of the CRE when the CRHS is in the isolation/pressurization mode. The AFU can be used in conjunction with either Train "A" or Train "B" systems. The AFU is comprised of an outside air inlet isolation damper, prefilter, electric heating coil, high efficiency particulate air (HEPA) prefilter, fire protection deluge, activated charcoal adsorber, HEPA after filter, and two 100%-capacity booster fans with air operated outlet isolation dampers.

The makeup air intake and exhaust dampers for both Train "A" and Train "B" systems are zero leakage bubble tight dampers. The exhaust dampers for the kitchen and locker room/toilet exhaust fans are leak tight.

The CR HVAC system does not provide automatic toxic gas protection to the CRE in case of either an onsite or offsite toxic chemical accident. Area Chemical Surveys are periodically performed in accordance with guidance provided by Regulatory Guide 1.78. An analysis of the results of these surveys have been evaluated and the estimated probabilities of CR uninhabitability due to release of toxic gases are an order of magnitude below the SRP 2.2.3 criterion for realistic estimates. Therefore, the potential for toxic gas release is not considered to be credible.

Applicable Habitability Regulatory Requirements

Conformance with NRC General Design Criteria (GDC)

DNPS Units 1, 2 and 3 were originally designed and constructed prior to the issuance of GDC' s. Proposed GDC' s were issued in July 1967, during the construction of the plant. These proposed criteria were not adopted as regulatory requirements at the time DNPS was built. The proposed GDC' s were used by the Atomic Energy Commission (AEC) to evaluate the original design of Dresden Station. This evaluation indicated that based on the applicant's understanding of the intent of the proposed GDC' s, DNPS fully satisfies the intent of the criteria. The proposed GDC' s contained many aspects, which required modification or clarification prior to adoption of the current GDC' s. By Staff Requirements Memorandum (SRM), SECY-92-223, issued on September 18, 1992, the Commission (with all Commissioners agreeing) approved the staff proposal to not apply the GDC to plants with construction permits issued prior to May 21, 1971. At the time of promulgation of Appendix A to 10CFR Part 50, the Commission stressed that the GDC were not new requirements and were promulgated to more clearly articulate the licensing requirements and practices in effect at that time. While compliance with the intent of the GDC is important, each plant licensed before the GDC were formally adopted was evaluated on a plant specific basis, determined to be safe, and licensed by the Commission. Furthermore, current regulatory processes are sufficient to ensure that plants continue to be safe and comply with the intent of the GDC. Backfitting the GDC would provide little or no safety benefit while requiring an extensive commitment of resources. Contained herein is an evaluation of the design basis of DNPS relative to the proposed and current GDC' s.

Proposed GDC 1 – Quality Standards (associated with current GDC 1)

The reactor facility's essential components and systems were designed, fabricated, erected and perform in accordance with the specified quality standards which are, as a minimum, in accordance with applicable codes and regulations. These systems and associated components important to safety are appropriately tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the DNPS structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant.

Proposed GDC 3 – Fire Protection (associated with current GDC 3)

DNPS CRE is designed to meet the requirements of GDC 3. Fire Protection Systems meeting the requirements of GDC 3 are installed. The CR HVAC system is designed to isolate and maintain design conditions within the CR during fires in either the CR or the auxiliary computer room or outside the emergency zone. Smoke detectors, located in the CR return air ducts, will annunciate in the CR and fire protection panel exterior to the CR, and the Train A HVAC system will be manually switched to the smoke purge mode for smoke evacuation of the CRE. During this mode the Train "A" HVAC system provides 100% outside air. This will prevent recirculation of smoke through the return air ducts into occupied areas in the event of a fire while exhausting 100% of the return air outside. The smoke purge mode is only available on the Train "A" system. A smoke detector in installed in the outside air duct, which will automatically switch the Train "A"

HVAC system to recirculation mode. This will prevent the intake of smoke into the CRE in the event of fire outdoors. Self-contained breathing apparatus (SCBA) units are staged in the CRE in the event of a radioactive, toxic, or smoke event. In addition, a bank of emergency air bottles is located in the Unit 2 Battery Room, and can be connected to the SCBA's by fifty (50) foot length hoses stored in the CR.

The DNPS fire protection program for the CRE is described in DNPS UFSAR 6.4, 9.4, and 9.5, Other Auxiliary Systems. The CRE is separated from other adjacent areas by three (3) hour fire rated walls, ceilings, and floors. The safety related Train "B" equipment and power supplies are located within the CRE and would not be affected by a fire external to the CRE. A fire in the CR would not affect DNPS safe shut down capabilities because safe shut down paths are defined by DNPS Safe Shutdown Procedures for extensive fire damage requiring safe shutdown by local equipment.

Proposed GDC 43 – Accident Aggravation Prevention (associated with current GDC 4)

Components of the Engineered Safety Features (ESF) which are required to function after design basis accidents or incidents are designed to withstand the most severe forces and environmental effects, including missiles from plant equipment failures anticipated from the events, without impairment of performance capability and without accentuating adverse aftereffects of the accident.

Proposed GDC 4 – Sharing of Systems (associated with current GDC 5)

DNPS Units 1, 2, and 3 share some systems and components as specified in UFSAR Sections 1.2.4 and 6.23. This sharing does not result in undue risk to the health and safety of the public.

The reactor facility consists of two boiling water reactor generating units located on a common site. The design criteria and performance objectives for systems and components located on a single unit site are equally applicable to the systems and components shared between two units on a common site. Additional design criteria have been used in the design of Units 2 and 3. These stipulate that:

A. Equipment and facilities are shared only when it can be done without compromising or interfering with the independent operation of Units 2 and 3;
B. For unshared equipment, the equipment and its controls will be physically separated and identified;
C. Operation or safe shutdown of either Unit 2 or 3 will not be precluded as a result of reactor operator error or equipment malfunction in the other unit; and
D. Operation or safe shutdown of either Unit 2 or 3 after a postulated design basis accident in the other unit will not be precluded because of the shared equipment or facilities.

Proposed GDC 11 – Control Room (associated with current GDC 19)

In response to NUREG 0737, Item III.D.3.4, "Control Room Habitability," DNPS committed to the installation of a redundant safety related Train "B" HVAC system meeting the intent of NUREG 0737, Item III.D.3.4, SRP 6.4, and GDC 19, "Control Room."

The plant is provided with a centralized CR having adequate shielding, fire protection, air conditioning, and facilities to permit access and continuous occupancy under 10CFR 20 limits during all design basis accident situations. The plant design does not contemplate the necessity for evacuation of the CR. However, if it is necessary to evacuate the CR, the design does not preclude the capability to bring the plant to a safe, cold shutdown from outside the CR. The necessary plant controls, instrumentation, and alarms for safe and orderly operation are located in the CR. These include such controls as the control rod position indication, the reactor core heat removal system, and reactor coolant system leakage detection system.

Current GDC 19 – Control Room

In response to NUREG 0737 Task Action Plan Item III.D.3.4, "Control Room Habitability," DNPS committed to install a redundant CR HVAC system (Train "B").

The CRHS' s are designed so that radiation exposure of CR personnel does not exceed the limits of NUREG-0800, SRP 6.4, or of GDC 19. GDC 19 and SRP 6.4 require adequate radiation protection to permit access to and occupancy of the CR under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body for the duration of the DBA. Satisfactory radiation protection is based on pressurizing the CR emergency zone with filtered outdoor air no later than 40 minutes after radiation has been detected in the Reactor Building ventilation manifolds. In addition, both the intake and exhaust dampers are isolated manually, and the non-habitable areas are isolated manually from the emergency zone, when radiation is detected in the Reactor Building Ventilation System exhaust air manifolds. Therefore, the DNPS design meets the intent of GDC 19.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

<u>**Response**</u>

Radiological analyses performed for DNPS demonstrate that the LOCA, with main steam isolation valve leakage at Technical Specification limits, is the worst-case design basis accident for radiological dose consideration to the CR. The LOCA radiological analysis assumes that there is 263 cfm of unfiltered inleakage into the CRE in the pressurized radiation mode of operation. For all other accidents, the normal (unfiltered) mode of HVAC operation is assumed. Radiological dose to CR operators is analyzed for both modes of operation and have been determined to be acceptable per SRP 6.4 and GDC 19.

In January 1997, two Unfiltered Air Inleakage tests were performed on the DNPS CRE, in accordance with ASTM Standard E741. The CRE consisted of the main CR and the Train "B" HVAC Equipment Room. The Train "A" CR HVAC system isolation/pressurization mode was tested and the quantified unfiltered air inleakage into the CRE was 162 cfm +/- 91 cfm. The Train "B" CR HVAC system isolation/pressurization mode was tested and the quantified unfiltered air inleakage into the CRE was 156 cfm +/- 86 cfm (Reference Figures 4-4 and 4-5).

Therefore, the most limiting measured unfiltered inleakage is bounded by the value assumed in the DNPS design basis radiological analyses for CR habitability.

Subsequent to the above testing, DNPS implemented a zero leakage tolerance program performing differential pressure testing of the CRE relative to adjacent areas every 24 months. This testing is done in accordance with Technical Specification requirements. DNPS performs visual inspections, in accordance with existing procedures, of the ductwork, dampers, AHUs, AFUs, etc. to ensure that the equipment is in good working order and there has been no degradation of the walls, ceiling, floor, penetrations, doors, or equipment seals. This inspection is periodically performed every 18 months. DNPS has implemented a Plant Barrier Control Program that controls the impairment of plant barriers during maintenance activities. The program evaluates wall and ceiling penetrations, opening doors, duct access, and equipment access. This program provides assurance that seals, penetrations, equipment and duct barriers are controlled to ensure plant barriers are maintained in their as designed condition.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response

An assessment was performed that included both deterministic and probabilistic analyses and took no credit for toxic gas monitoring. The analyses showed that the frequency of an offsite release of ammonia or methyl chloride resulting in a radiological event exceeding 10 CFR 100 releases was far below the SRP 2.2.3 guideline for consideration as a design basis event. Also, the criteria and acceptance guidelines of the Electric Power Research Institute "PSA Applications Guide" and Regulatory Guide 1.174 are met with substantial margin. Therefore, these offsite hazardous chemical releases are not considered credible.

Onsite hazardous chemical usage and storage is controlled by approved station procedures, which addresses CR habitability considerations.

Operator action is required to isolate the CRE for other offsite and onsite chemicals whose CR concentrations do not exceed toxicity limits within two minutes after detection of odor. Two minutes is considered to be adequate time for the operators to take appropriate protective actions (isolate CRE and don SCBA' s) per Regulatory Guide 1.78.

SCBAs are available in the CR in sufficient quantities for operator use in the event of a release of hazardous materials that could affect plant operation. Use of SCBA gear by the operators is reviewed in annual qualification training courses. Based on the above, unfiltered air in-leakage testing of the toxic gas isolation mode is not required.

An assessment of offsite hazardous chemicals in stationary facilities within a 5 mile radius of the plant was performed in 2000 and is performed every 5 years in accordance with existing predefined maintenance requirements.

The capabilities for prompt hot shutdown of the reactor and subsequent cold shutdown is performed through DNPS Safe Shutdown procedures from locations outside the CR if the CR becomes uninhabitable.

In the event when smoke is generated from within the CR, the HVAC system can quickly purge the area of smoke. For an event where smoke is generated from sources external to the CR, the CRE can be isolated, thereby minimizing intrusion of smoke from outside. SCBA and bottled air are available for use by CR operators if required.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.*

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

Response

It is recognized that ΔP surveillance alone cannot verify or quantify CRE unfiltered inleakage. Therefore, in January 1997 two Unfiltered Air Inleakage tests were performed on the DNPS CRE, in accordance with ASTM Standard E741. The scope of this testing and the test results are described in response to Item 1(a) above.

DNPS has implemented differential pressure testing of the CRE relative to adjacent areas every 24 months in accordance with Technical Specification Surveillance Requirement 3.7.4.4. Using observed differential pressure values trended during the performance of periodic surveillances and measured filter velocities and airflows through the AFU, calculations have been performed to determine the size of open pathways for inleakage into the negative pressure ductwork and size of openings out of the pressure boundary of the CRE. The installations of CRE penetrations and barrier impairments have been observed since 1997. Calculations have been developed and verified for each installation of CRE barrier impairment or penetration installation. The impacts relative to CRE differential pressure have been calculated to within hundredths of an inch of water gauge pressure. Thus, potential degradation due to CRE pressure boundary breaches is appropriately recognized and analyzed. DNPS performs visual inspections, in accordance with existing procedures, of the ductwork, dampers, AHUs, AFUs, etc. to ensure that the equipment is in good working order and there has been no degradation of the walls, ceiling, floor, penetrations, doors, or equipment seals. This inspection is periodically performed every 18 months. DNPS has implemented a Plant Barrier Control Program that controls the impairment of plant barriers during maintenance activities. The program evaluates wall and ceiling penetrations, opening doors, duct access, and equipment access. This program ensures that seals, penetrations, equipment and duct barriers are controlled to ensure plant barriers are maintained in their as designed condition.

The DNPS Technical Specifications will be revised to include a new Section 5.0 administrative program for CR Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program include the following:

- CRE Boundary/Breach Control
- CRE Integrity Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self Assessment

A license amendment request to revise Technical Specification Section 5.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the test results performed in accordance with ASTM E741, other tests performed, and ongoing periodic program self-assessments, a DNPS Technical Specification requirement for periodic testing other than the current ΔP test is not warranted. However, if significant problems, issues, repairs, or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

<u>Response</u>

At DNPS, there are no compensatory measures credited to demonstrate CR habitability in any design basis radiological accident. Therefore, there are no corrective actions needed to retire such measures.

3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

Response

As noted in response to item 1, the proposed GDC (issued July 1967) were used by the AEC as guidance in evaluating the original design of DNPS. That review showed that based on the applicant's understanding of the intent of the proposed GDC, it was concluded that the DNPS fully satisfies the intent of the criteria. A detailed discussion of the GDC' s as applicable to DNPS is provided in response to Item 1 above.

Figure 4-1

CONTROL ROOM EMERGENCY ZONE

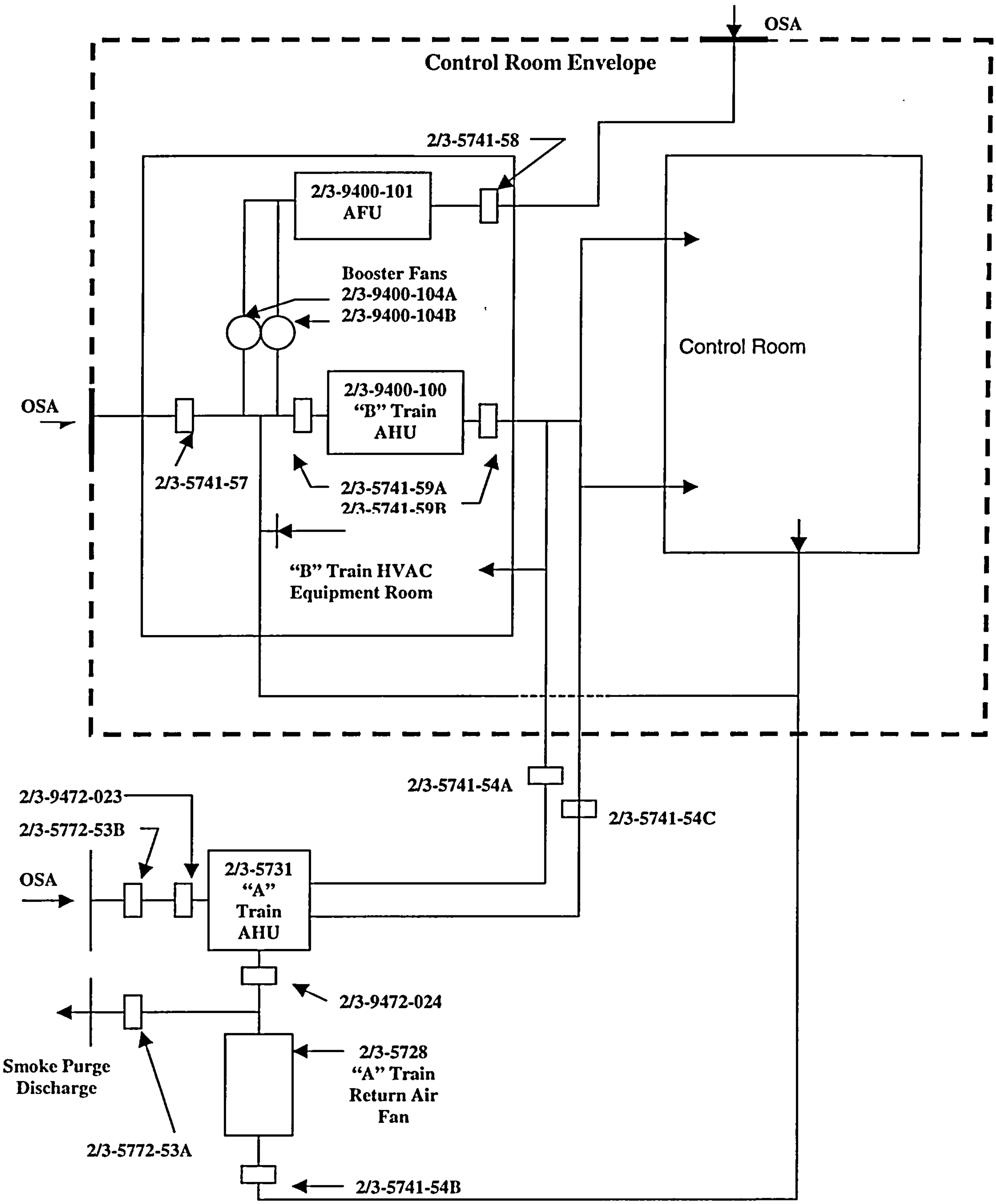
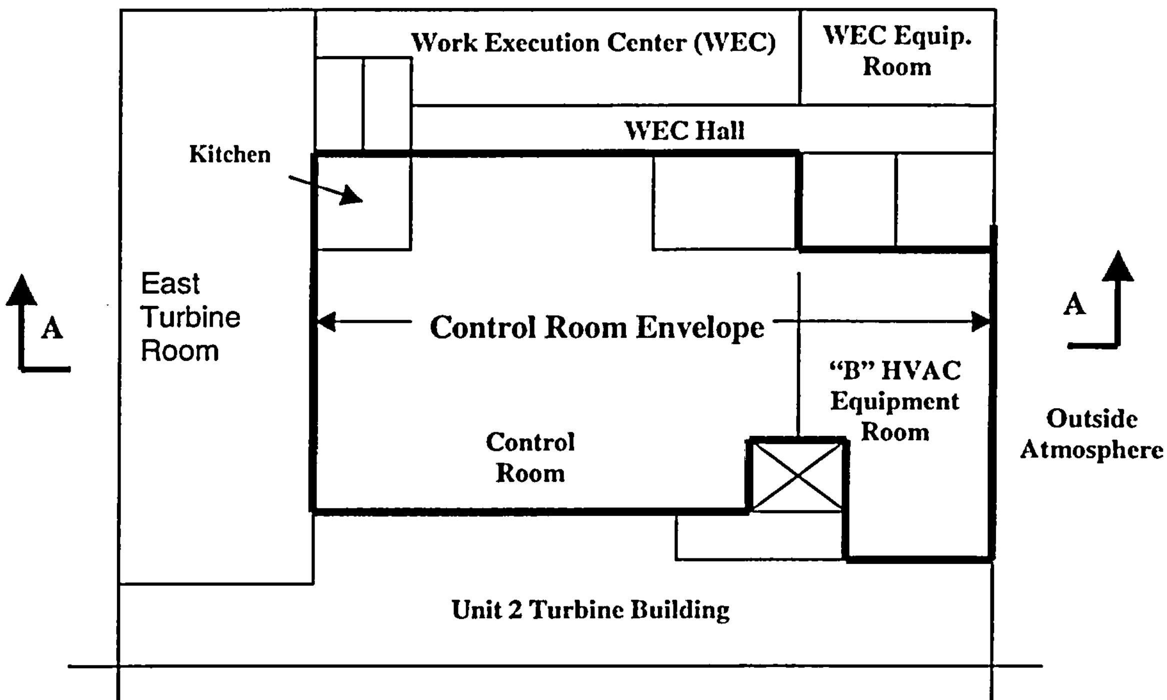
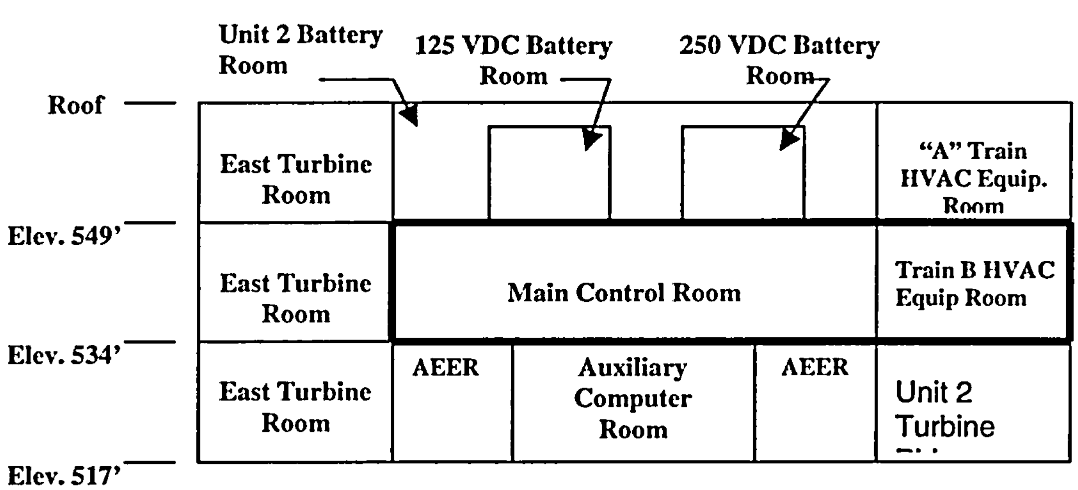


Figure 4-2

CONTROL ROOM EMERGENCY ZONE AND ADJACENT AREAS



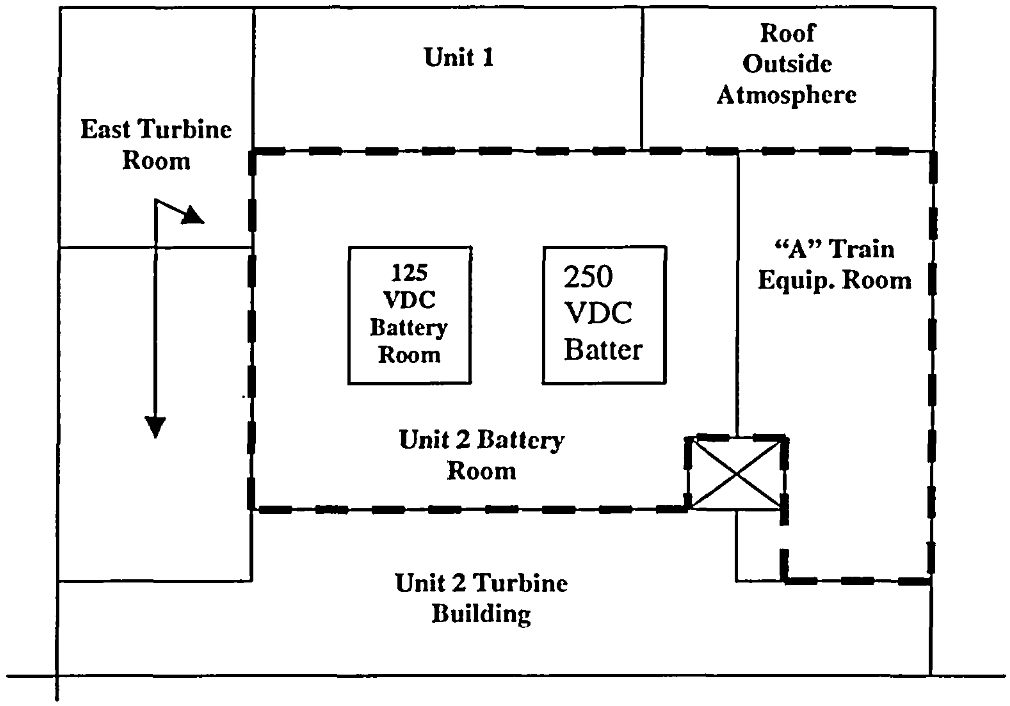
Plan View Elevation 534' Control Room Envelope
Bold Line indicates Control Room Envelope Boundary



Section AA
Bold Line indicates Control Room Envelope Boundary

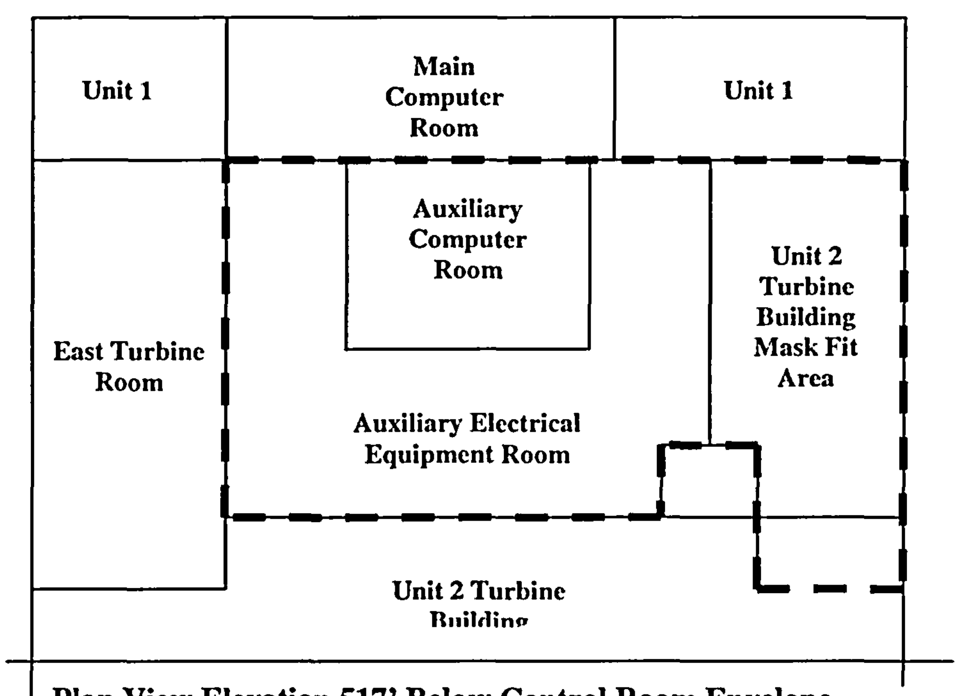
Figure 4-3

CONTROL ROOM EMERGENCY ZONE AND ADJACENT AREAS



Plan View Elevation 549' Above Control Room Envelope

Indicates Control Room Envelope Boundary



Plan View Elevation 517' Below Control Room Envelope

Indicates Control Room Envelope Boundary

Figure 4-4

CONTROL ROOM TRAIN A HVAC SYSTEM ISOLATIN /PRESSURIZATION
Measured Unfiltered Inleakage 162 (+/- 91) cfm

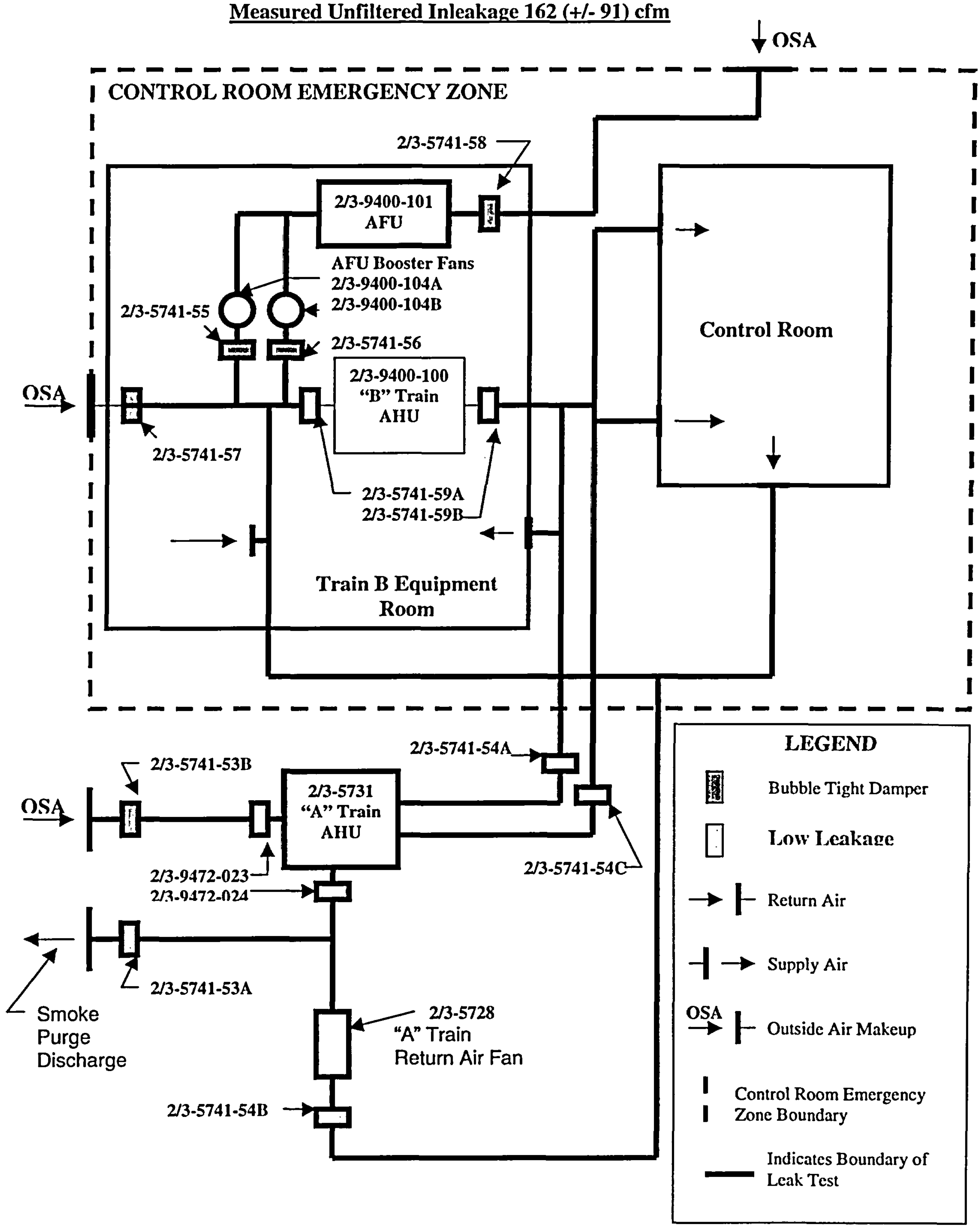
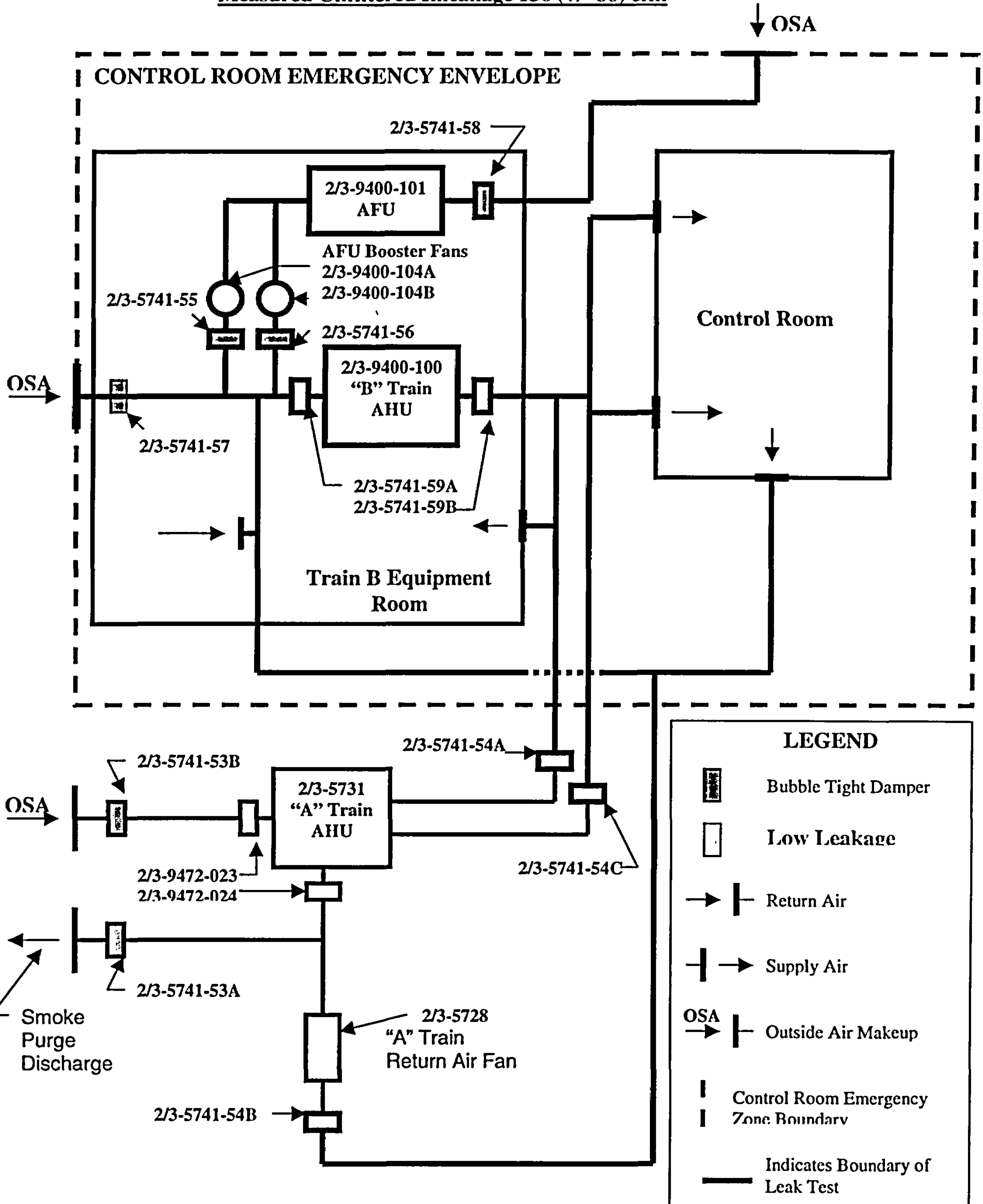


Figure 4-5

CONTROL ROOM TRAIN B HVAC SYSTEM ISOLATIN /PRESSURIZATION
Measured Unfiltered Inleakage 156 (+/- 86) cfm



ATTACHMENT 5

180-Day Response to NRC Generic Letter 2003-01

LaSalle County Station, Units 1 and 2

Exelon Generation Company, LLC

Attachment 5

180-Day Response to NRC Generic Letter 2003-01

LaSalle County Station, Units 1 and 2

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., GDC 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

   Response

   The Control Room Envelope (CRE) at LaSalle County Station (LSCS) is comprised of the Control Room (CR) and the Auxiliary Electric Equipment Room (AEER). The Main Security Control Center (MSCC) and toilet room are located inside the CR. There is a common CR for Unit 1 and Unit 2 and it is not adjacent to the AEER, but is physically separate from it (Refer to Figure 5-1). The CR, AEER and their associated ventilation systems are designed to ensure habitability during all normal and abnormal station operating conditions. In the event the CR becomes uninhabitable, each reactor can be brought to cold shutdown by the Remote Shutdown System located outside of the CR.

   The CR and AEER Heating Ventilation, and Air Conditioning (HVAC) systems are Engineered Safety Feature (ESF) systems and are common to both units. The systems are safety related and active components are designed with redundancy to meet single active failure criteria. They are designed to Seismic Category I requirements except for the duct mounted comfort heating coils which are seismically supported. The system equipment is located within a seismic Category I Auxiliary Building structure. The equipment is supplied with separate essential power sources and is operable during a loss of offsite power. The control instrumentation and power supply to the systems are designed to meet Institute of Electrical and Electronics Engineers (IEEE)-279 and IEEE-308 criteria.

   There are two redundant Trains "A" and "B" for each of the AEER and the CR HVAC systems. The CR Emergency Make Up (EMU) air system provides outside pressurization air and is common to both the AEER and the CR HVAC systems. The normal operating line up is to operate Trains "A" of the AEER and CR HVAC systems together or Train "B" of both systems. Trains "A" of the HVAC and EMU systems are located in Unit 1, while Trains "B" are located in Unit 2. The equipment for Train "A" of the CR and the AEER HVAC systems is powered from Unit 1 Division 2 busses and equipment for Train "B" is powered from Unit 2 Division 2 busses. A simplified diagram of the CR and AEER HVAC systems including EMU air is shown on attached Figures 5-2 and 5-3.

   The CRE is maintained habitable following anticipated accidents. The CR consists of the common CR for Unit 1 and 2, MSCC, and toilet room all on elevation 768'-0" in the Auxiliary Building. The AEER consists of Unit 1 and 2 AEER located on elevation 731'-0" in the Auxiliary Building.

The CR and AEER ductwork was leak tested during startup. All cable tray and duct penetrations are sealed. The CR zone served by its HVAC system in the emergency mode or the isolation mode is approximately 117,000 cubic feet and the AEER zone served by its HVAC system is approximately 74,000 cubic feet.

The CR and AEER HVAC equipment room at elevation 786'-6" are part of the Auxiliary Building, but outside the CRE boundary. The negative pressure CRE ductwork's longitudinal seams are sealed Pittsburgh lock seams and the traverse joints are gasketed companion angle and were tested for leak-tightness. No other system's ducts traverse the CRE. CRE boundary isolation dampers are gasketed low leakage construction and were tested for leak tightness.

Each CR and AEER HVAC system has a supply fan, supply air filter unit, air conditioning coils, refrigeration condensing unit, return fan, ducts, and dampers. The supply air filter unit contains a medium efficiency filter and a normally bypassed charcoal filter, called the recirculation filter. The EMU provides filtration for CR and AEER outside air during a high radiation accident or detection of smoke to provide filtration to maintain CR habitability. The EMU consists of two (one for each train) 100% seismic Category I filter units designed and constructed to comply with the intent of Regulatory Guide 1.52. The EMU consists of a moisture separator, pre-filter, electric heating coil, high efficiency particulate air (HEPA) filter, carbon adsorber, and a downstream HEPA filter. During normal operation, the recirculation charcoal filter and the EMU are in bypass mode.

The EMU is activated automatically upon detection of radiation or smoke at the CRE HVAC systems outside air intake. Upon detection of smoke or radiation in the outside air, the normally bypassed EMU is automatically aligned for treatment of outside pressurization air. The normally bypassed recirculation charcoal filter is manually aligned to filter all supply air entering the CRE. In the pressurization mode, a positive pressure of ≥ 1/8 inch water gauge relative to all adjacent areas is maintained in the CR and AEER. Positive pressure inside the CR and the AEER precludes infiltration of potentially contaminated air into the CRE.

Ammonia detectors, ionization detectors, and radiation monitors continuously monitor the CR and AEER room outside air intakes. Detection of high radiation, ammonia, or smoke is alarmed in the CR. Radiation and smoke related protection functions are automatically initiated. Ammonia related protection functions are manually initiated. Pressure differential indicators are provided in the CR to monitor the pressure differential between the CR and Turbine Building and CR and surrounding offices in the Auxiliary Building. Detailed descriptions of the CRE system's operation as it pertains to ammonia and smoke are contained in the response to Item 1(b) below.

The CR is supplied by three separate and independent breathing air subsystems that are each comprised of three 300 cubic foot air cylinders with appropriate pressure regulators, low-pressure alarms and facemasks. Two of these subsystems are for the Unit 1 and Unit 2 CR operators, while the third system supplies a manifold in the CR which can support the senior reactor operator, the CR technical adviser, and a third user as deemed necessary. All three subsystems are designed to provide a minimum of 6 hours of breathing air for each user.

In addition to the subsystems mentioned above, self-contained breathing Air-Paks are located in the CR. These portable Air-Paks are intended for emergency use. Each Air-Pak has a nominal 1/2 hour air-breathing bottle, which is rechargeable. A self-contained recharging system is provided for refilling expended air bottles on a timely basis to assure an adequate air supply to emergency personnel.

Applicable Habitability Regulatory Requirements

GDC 1: ***Requires quality standards commensurate with the importance of the safety functions performed.***

The LSCS CR and AEER HVAC systems, including EMU components, are safety related, designed to seismic Category I requirements, and located within a seismic Category I structure. These systems and associated components important to safety are appropriately tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the LSCS structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant. As described in LSCS UFSAR Section 3.2, the ducts were designed and constructed as seismic category I. HEPA filters, prefilters, and charcoal adsorbers are designed and constructed to meet the intent of Regulatory Guide 1.52, Revision 2 with exceptions noted in the LSCS UFSAR Section 6.4 and Appendix B. Testing of filters meets the requirements of Regulatory Guide 1.52, Revision 2 with carbon acceptance criteria per ASTM D3803-1989 and ANSI N510-1989, as described in LSCS Technical Specification 5.5.8. System dampers with electro-hydraulic operators were designed to IEEE 323. Fire dampers are qualified by Underwriters Laboratory (UL).

In accordance with the Exelon QATR requirements, documents and records are maintained to show that required codes, standards, and specifications were followed; specified materials and correct procedures were applied; qualified personnel performed the work; and inspections and tests verified that parts and components meet the applicable specifications.

GDC 3: ***Requires structures, systems, and components to be designed and located to minimize the effects of fires.***

The LSCS CRE is designed to meet the requirements of GDC 3. The fire protection program for LSCS, regarding the CR and AEER is described in LSCS UFSAR Section 9.5. The CR and AEER are separated from each other and other parts of the Auxiliary Building by 3-hour fire rated floor slabs. Three-hour fire rated walls separate the CR and AEER from the Reactor and Turbine Buildings. The CR ventilation system Train "A" and AEER ventilation system Train "A" are supplied from Unit 1 electrical Division 2. The "B" Trains are fed from Unit 2 Division 2. These redundant trains are separated by a greater than 3-hour fire rated barrier except as described in UFSAR Appendix H.4.3. A fire in the CR would not affect the AEER ventilation as no AEER ventilation system components or cables are located in this zone. Therefore, reactor shutdown from the remote shutdown panel in the AEER could still be accomplished. Additional design details, including remote shutdown capability, are described in UFSAR Appendix H.4.3.

Ionization detectors are located in the return duct of the CR ventilation system, and the outside pressurization air duct, which is common to the CR and AEER. Ionization detectors are also provided in CR as well as above the false ceiling. A fire in the CR would be detected by the ionization detectors in the room and in the HVAC return duct or by the ionization detectors above the false ceiling, which alarm locally and on the CR fire protection panels. Ionization detectors are also provided in the AEER rooms and in the return duct of the AEER ventilation system. Detection of smoke is annunciated in the fire protection panel in the CR. Provision is made for purging areas served by the CR and AEER HVAC systems by using a 100% outside air supply and exhausting 100% of the air. The CR and AEER HVAC systems including EMU are designed to operate during postulated fire events to ensure safe plant operation.

A detailed evaluation of the effects of smoke on maintaining reactor control capability from either the CR or the remote shutdown panel is provided in the response to Item 1(b) below.

GDC 4: ***Requires structures, systems, and components to be designed to accommodate the effects of accidents.***

The CR and AEER HVAC systems including the EMU, and the Auxiliary Building structure have been designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including the design basis LOCA. Normal and postulated accident effects and load combinations are described in LSCS UFSAR Chapter 3. Environmental and missile design bases are in accordance with GDC 4.

GDC 5: ***Requires that an accident in one unit will not significantly impair the orderly shutdown and cooldown of the remaining unit.***

As described above the CR is common for LSCS Units 1 and 2 and shares the CR HVAC systems. The divisional AEERs share the common AEER HVAC systems. The CR and AEER HVAC systems provide ventilation, cooling, heating, and control of environmental conditions in the CR and AEER. The CR and AEER HVAC systems are designed to maintain functional integrity during and after a safe shutdown earthquake. Each system is provided with redundant equipment and controls to maintain uninterrupted room air circulation and cooling. The single failure criterion is met for active safety related equipment. Safety related equipment is located within the seismic Category I Auxiliary Building. Standby diesel generators provide standby power to the safety related CR and AEER HVAC equipment during a loss of offsite power event. These systems are designed and operated such that an accident in one unit will not impair the ability to safely shutdown the remaining unit, as described in UFSAR Sections 6.5 and 9.4.1.

GDC 19: ***Requires a control room from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions.***

The LSCS complies with the criteria for CR and AEER habitability in accordance with NUREG 0737, "Clarification of TMI Action Plan Requirements," Item III.D.3.4, "Control Room Habitability," as described in UFSAR Section 6.4. The CR and AEER HVAC Systems are designed to ensure habitability after any of the design basis radiological accidents or a chemical release accident. The EMU and the CR and AEER shielding are designed to limit the occupational dose level as required by GDC 19. The habitability systems are designed to meet GDC 19 of 10 CFR 50, Appendix A. In the event of outside smoke or radiation accident, the CR will be automatically aligned to the filtered pressurization mode. In the event of an offsite ammonia accident, the CR will be manually isolated through remote controls when the predetermined ammonia concentration is detected in the CR air intake plenum and alarmed in the CR. The necessity for automatic ammonia isolation is not required to satisfy GDC 19, because the CR operators would have sufficient time to don breathing apparatus (if required) after an alarm is sounded in the CR. The most limiting calculated post-accident dose for CR occupancy is less than 5 rem to the whole body or the equivalent to any organ. These doses are within the dose limits specified in GDC 19.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through suitable procedures from locations outside the CR are provided by the remote shutdown system, if the CR must be evacuated. The remote shutdown system has the capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and subsequent cold shutdown of the reactor.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

Response

The CRE at LSCS is designed to be habitable during all normal and abnormal operating conditions. The CRE and its associated HVAC systems are designed to protect the operators from postulated radiological releases.

The systems are designed to maintain habitability of the CRE during and after a design basis accident (DBA) such as a loss-of-coolant accident (LOCA) with a simultaneous loss of offsite power (LOOP), design basis earthquake, and single active failure of any CRE HVAC system component. The HVAC systems operate in the pressurization mode automatically upon detection of smoke or radiation in the outside air intake.

Dose calculations were performed in 1997 in accordance with Regulatory Guide 1.3, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Loss of Coolant Accident for Boiling Water Reactors," to determine CR and AEER thyroid, whole body and beta skin doses. The calculation accounts for containment leakage, main steam isolation valve leakage, Emergency Core Cooling System component leakage as well as a single failure of one of the operating HVAC trains. Filtered inleakage of 1200 cfm for the CR and 1400 cfm for the AEER, and unfiltered inleakage of 7 cfm for the CR and 6 cfm for the AEER were assumed in the analysis and determined to be acceptable per the dose calculation and satisfies the requirements of GDC 19. The assumed filtered inleakage is upstream of the recirculation carbon filter, while the assumed unfiltered inleakage is downstream of the recirculation carbon filter. The commonly used CR access door is provided with air locks, and there is no unfiltered inleakage assumed due to egress/ingress.

In 1998, CRE inleakage testing was performed on both trains in accordance with ASTM Standard E 741 using sulfur hexafluoride as a tracer gas. The tracer gas test method was constant injection, Technique Number 2, per ASTM E 741-93, "Standard Test Method for Determining Air Change in a Single Zone by Means of a Tracer Gas Dilution." The test was performed with the CR and AEER HVAC systems in the pressurization mode and it was determined that the limiting measured inleakage value for the CR was 673 scfm with an uncertainty of +/–169 scfm and the AEER was 940 scfm with an uncertainty of +/–316 scfm. The 1998 inleakage test was an integrated test with the capability to determine inleakage on the various sections of the system. All CR and AEER ductwork and components downstream of the recirculation carbon filter are at positive pressure, except for one connection between the supply fan (vane axial) inlet and the recirculation carbon filter housing, which is of leak tight design. The measured air inleakages for both the CR and AEER HVAC systems are less than the values assumed in the radiological analyses and as such satisfy the requirements of GDC 19.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response

Response for Hazardous Chemicals:

Prior to obtaining the operating license, LSCS considered and evaluated potential hazards to the station from nearby industry, transportation routes and military facilities. As documented in Section 2.2.3 of NUREG 0519, the NRC concluded that the facility is adequately protected and can be operated with an acceptable degree of safety with regards to potential offsite accidents occurring as a results of activities at a nearby industrial, military and transportation facilities.

Prior to obtaining the operating license, LSCS also evaluated effects of toxic chemicals and concluded that there was a potential impact from chlorine and anhydrous ammonia from nearby transportation routes. LSCS installed redundant chlorine and ammonia detectors in each outside air intake to protect the CR operators against any accidental release. The NRC concluded (Section 6.4.2 of NUREG 0519) there was adequate protection to the CR habitability area with respect to toxic gas hazards and the requirements of Regulatory Guides 1.78 and 1.95 were satisfied.

The habitability of the CRE was evaluated using the procedures described in Regulatory Guides 1.78 and 1.95 based on supplemental surveys performed in 1986 and 1987. This evaluation indicated that no offsite storage or use of chlorine occurs at any industry nor is transported within 5 miles of the CR. Also there was no onsite hazard of chlorine. The NRC issued Amendment Nos. 38 (Unit 1) and 20 (Unit 2) authorizing LSCS to eliminate chlorine detectors. The NRC also issued Amendment Nos. 61 and 42 authorizing LSCS to delete ammonia detection monitoring instrumentation from the Technical Specifications, but stated LSCS should maintain the ammonia detection instruments operable in the manual mode to provide indication, at a minimum, to station personnel. The ammonia detectors are maintained functional at LSCS.

Outside of Owner Controlled Area:

An analysis was performed to evaluate the realistic aggregate probability of causing uninhabitable conditions in the CR as a result of an accidental release of anhydrous ammonia in the vicinity of LSCS. This analysis concluded that the aggregate probability was sufficiently low such that the postulated ammonia spill accident would not be a design basis event, i.e., probability < 1.0E-7. If an event were to occur, LSCS procedures provide instructions to CR operations personnel for evaluating the impact of a chemical release on plant personnel and operations. A review of this evaluation showed anticipated scenarios that formed the basis of the realistic probabilities. Inleakage was not a parameter considered in these analyses. In these events, the results of the dispersion analyses resulted in toxic gas concentrations (Seneca Port Authority 79.4 ppm, barge traffic 6.6 ppm, tanks on leased land 99.7 ppm) in the CR being less than 100 ppm within two minutes which is below the toxicity limit of 100 ppm (reference Regulatory Guide 1.78, "Evaluating the Habitability of a Nuclear Power Plant Control Room During a Postulated Hazardous Chemical Release," Revision 0). These analyses were reviewed and approved by the NRC in License Amendments No. 42 and No. 61, dated January 18, 1989 for Unit 1 and Unit 2, respectively. Additionally, it is noted that the above values are well below the revised toxicity limit of 300 ppm contained in Regulatory Guide 1.78, Revision 1.

An additional analysis was performed to include 1200 cfm of ammonia inleakage into the CR ventilation system through the negative pressure ductwork on the 786'-6" elevation of the Auxiliary Building. This analysis concludes that within two minutes from detection (reference Regulatory Guide 1.78) there is no change from the concentrations noted above. This is because the toxic ammonia release occurs outside of the Auxiliary Building and the initial concentration of toxic gas in the Auxiliary Building would be zero and build up over time, similar to the CR.

As noted above detection of ammonia at the CR outside air intakes is alarmed in the CR and in accordance with procedures, operators will align the operating train in the recirculation mode after determining validity of the signal and if required will wear self-contained breathing apparatus (SCBAs).

Within Owner Controlled Area (OCA):

The LSCS OCA chemical control program provides administrative guidance for the safe and proper issue, handling, storage, labeling, use, and disposal of consumable materials and chemicals. The program is designed to control the intrusion of potentially damaging chemicals into plant equipment or the environment and to optimize employee safety. This program establishes a standardized process that controls the use of chemical products to eliminate the creation of hazardous and/or mixed waste; minimize the potential for damage to plant equipment, and minimize invalidation of plant safety analyses caused by the use of chemicals.

One of the elements of this program requires that prior to performing any chemical cleaning, chemical decontamination, or other chemical evolution that may result in the release of significant quantities of toxic gases or volatile fumes inside any ventilation zone that has the potential for communicating with an operating train from the Standby Gas Treatment, CR Ventilation, or AEER Ventilation systems, Engineering must be contacted to evaluate the evolution and delineate alternate ventilation lineups, charcoal chemical testing, or other contingency measures required to perform the chemical evolution without degrading the plant's safety related charcoal adsorbers or invalidation of plant safety analyses caused by the use of chemicals.

Smoke Assessment:

Potential sources of smoke are from either internal or external fires. However, no external fire/smoke hazard threatens the plant safety, since no chemical plants, no large amounts of oil storage, and no gas pipelines are located near the plant site. The likelihood of internal equipment fire/smoke affecting CR habitability is minimized because early ionization detection is assured, fire-fighting apparatus is available, low combustible load including flame retardant cabling throughout the plant, and filtration and purging capability are provided.

In the unlikely event that there is an external smoke source, the physical separation of the two redundant outside air intakes provides the option of drawing makeup air to the CRE from either one of the air intakes depending upon the lesser contamination level. Ionization detection is provided in the outside and return air paths from associated areas. Ionization detection is annunciated locally and on the main control board via the fire detection control panel. Ionization detection in the outside air duct automatically isolates the normal outside air intakes and realigns the outside air path through the EMU.

Internal sources of smoke will be detected by the ionization detectors in the return air ducts, annunciated locally and on the main control board via the fire detection control panel, and automatically position dampers to pass all the supply air delivered to the CRE through the recirculation filter units. Provisions are made in the system to remove smoke from the CRE environment by purging with 100% outside air.

The alignment of the CRE HVAC and filtration systems in response to smoke in the outside air intake is identical to the radiological alignment. As such the infiltration rate will be the same as measured during the LSCS confirmatory tracer gas testing, described in response to Item 1(a) above. The alignment of the CRE HVAC and filtration systems in response to smoke in the return air is slightly different in that the normal outside air intake path is not isolated and the EMU is not started. However, because the normal outside airflow rate is the same as the EMU flow rate and shares the same ducting utilized by the EMU, any difference in the inleakage rate due to the configuration is insignificant. The allowable radiological inleakage rate of 1400 cfm is mixed with approximately 20,000 cfm of return air from either the CR or the AEER and provides significant dilution of any smoke. Regardless of the source of smoke from either external or internal sources, all supply air to the CRE is filtered through the recirculation filter units, which are capable of removing smoke particulates and odors. In addition, there are three breathing air subsystems that can provide a minimum of six hours of breathing air for each user in the CR.

As described above the CR and remote shutdown panels are physically separated and have their own HVAC and filtration systems. Thus if the CR must be evacuated the operators can relocate to the AEER where the remote shutdown panel is located to safely shut down the unit.

In conclusion, in the highly unlikely event of a fire the impact of smoke infiltration into the CRE will not prevent the safe operation or shutdown of the units.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the*

ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

<u>Response</u>

The CR at LSCS is common to both Unit 1 and Unit 2. There are two trains of ventilation systems that are redundant to each other. The ventilation system for the AEER is similar to the CR ventilation system. EMUs (one per train) provide pressurization air to the ventilation systems of both CR and AEER.

Significant improvements were made to the CRE boundary and the associated ventilation systems during 1997 and 1999. Improvements included sealing of the CR and the AEER boundary, replacements of several pieces of ductwork, maintenance work on fans, maintenance on damper seals and the CRE door seals. Modifications were made on CR and AEER ventilation systems to improve their performance. Modifications included rerouting of ductwork and installation of backdraft dampers on the outside pressurization air duct (See Figures 5-2 and 5-3) to eliminate any short circuiting of air between CR and AEER ventilation systems. Further sealing of the AEER boundary was performed in 2000 to increase margin. The work performed resulted in an increased ΔP in the AEER.

In 1998, a test was performed in accordance with ASTM Standard E741-93 to determine air inleakage into the CR, AEER and their associated system boundaries. This test is not required by the Technical Specification but was performed to verify that air inleakage into the CRE boundaries was less than what was assumed in the dose calculation. Performance of tracer gas testing provided LSCS with a quantitative measurement of inleakage into the CR and AEER system boundary.

A surveillance test is performed every two years to verify integrity of the CR as required by the Technical Specifications. The surveillance measures the ΔP between the CR and areas adjacent to it. Similar testing is performed for the AEER and its adjacent areas. As part of this surveillance, a functional test is performed to ensure that the system dampers align as designed. System logic is also verified to demonstrate compliance with Technical Specifications.

Differential pressure in the CRE can be affected by several factors. It can be affected by the tightness of the CR boundary. The boundary includes walls, doors, air handling units, and ductwork including associated dampers. A tighter CRE boundary will encounter less air inleakage. The ΔP is also affected by how much pressurization air is brought into the system. Higher quantities of outside pressurization air will result in a higher ΔP in the CR and the AEER. Air inleakage can potentially enter the system from all areas that are under negative pressure. Air leaking into the system would have a similar effect as the outside pressurization air. Higher inleakage into the CRE boundary will result in a higher ΔP in the CRE. A positive ΔP in the CR or AEER does not reduce inleakage into the system because air can leak in from the negative pressure parts of the system.

Since the measurement of inleakage via the tracer gas test in 1998, the ΔP test required by Technical Specifications has been performed in 1998, 2000 and 2002. The results show that as leaks in the positive part of the CRE were identified and sealed, the ΔP in the CRE went up and that it was proportional to the sealing efforts. More sealing resulted in higher ΔP in the CRE. A correlation was also established between the ΔP in the CRE and the amount of pressurization air (from EMU) introduced into the system. The ΔP in the CRE went up with an increase in outside pressurization air and went down with a decrease in the outside pressurization air. In conclusion, the ΔP in the CRE increased with the sealing effort and fluctuated proportionately with changes in the amount of pressurization air introduced into the CRE. Thus an increase in the CRE ΔP that cannot be attributed to the sealing effort or increase in EMU flow may be an indication of an increased air inleakage from portions of the system under negative pressure.

Total system flows for the CR and AEER are verified during the filter testing program using pitot traverses. The EMU flows and the system flows are consistent and within the measurement accuracies of the instrument. Based on the results of the surveillances, there is reasonable assurance that air inleakage into the CR and the AEER envelopes have not increased since the air inleakage test performed in 1998.

LSCS also has a Plant Barrier Impairment (PBI) program that controls all impairments in the power block. The procedure provides guidance and clarification on actions necessary to evaluate and compensate for impaired Fire, Ventilation, Security, Occupational Radiation, Post LOCA Radiation Environmental Qualification, Flood, High Energy Line Break, and Missile Barriers. The integrity of the CR and AEER boundaries is part of this program. Prior to breaching any CR or AEER boundary, a PBI permit is required and an evaluation is performed on any necessary actions required prior to or during the performance of the work.

The maintenance work planning process ensures that all work on plant systems, structures, and components will be performed using appropriate documents such as work orders using the latest drawings and procedures. Walk downs are performed by engineering personnel at least quarterly to identify deficiencies in the CRE.

Any modifications performed (temporary or permanent) are reviewed for impact on HVAC systems. The configuration control process provides direction for development of testing requirements and acceptance criteria for configuration changes including disposition of failed tests.

The LSCS Technical Specifications will be revised to include a new Section 5.0 administrative program for Control Room Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program will address the following:

- CRE Boundary/Breach Control
- CRE Integrity Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods

- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self Assessment

A license amendment request to revise Technical Specification Section 5.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the test results performed in accordance with ASTM E741, other tests performed, and ongoing periodic program self-assessments, a LSCS Technical Specification requirement for periodic testing other than the current ΔP test is not warranted. However, if significant problems, issues, repairs, or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

Response

No compensatory measures are required to demonstrate CRE habitability for radiological releases. Therefore, there are no corrective actions needed to retire such measures.

3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

Response

LSCS meets the GDC that are applicable to control room habitability. A detailed discussion of the GDC as applicable to LSCS is provided in the response to Item 1 above.

Figure 5-1

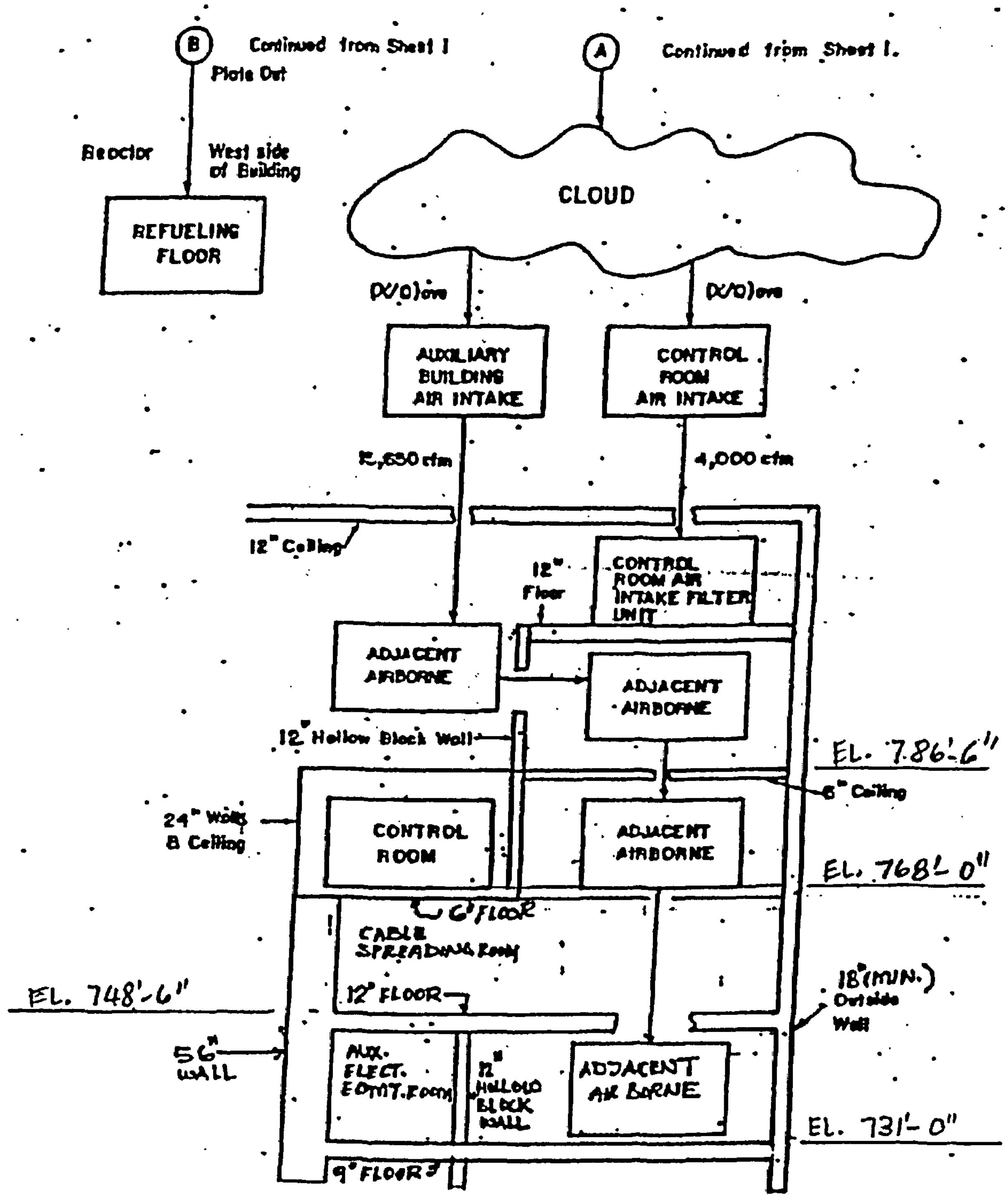

B
Continued from Sheet I
Plate Out
A
Continued from Sheet I.
Reactor
West side of Building
REFUELING FLOOR
CLOUD
(X/Q)ave
(X/Q)ave
AUXILIARY BUILDING AIR INTAKE
CONTROL ROOM AIR INTAKE
4,000 cfm
12" Ceiling
12" Floor
CONTROL ROOM AIR INTAKE FILTER UNIT
ADJACENT AIRBORNE
ADJACENT AIRBORNE
12" Hollow Block Wall
EL. 786'-6"
6" Ceiling
24" Walls & Ceiling
CONTROL ROOM
ADJACENT AIRBORNE
EL. 768'-0"
6" FLOOR
CABLE SPREADING Room
12" FLOOR
18"(MIN.) Outside Wall
EL. 748'-6"
56" WALL
AUX. ELECT. EQMT. Room
12" HOLLOW BLOCK WALL
ADJACENT AIR BORNE
EL. 731'-0"
9" FLOOR

Figure 5-2

SIMPLIFIED P&ID OF CONTROL ROOM HVAC SYSTEM

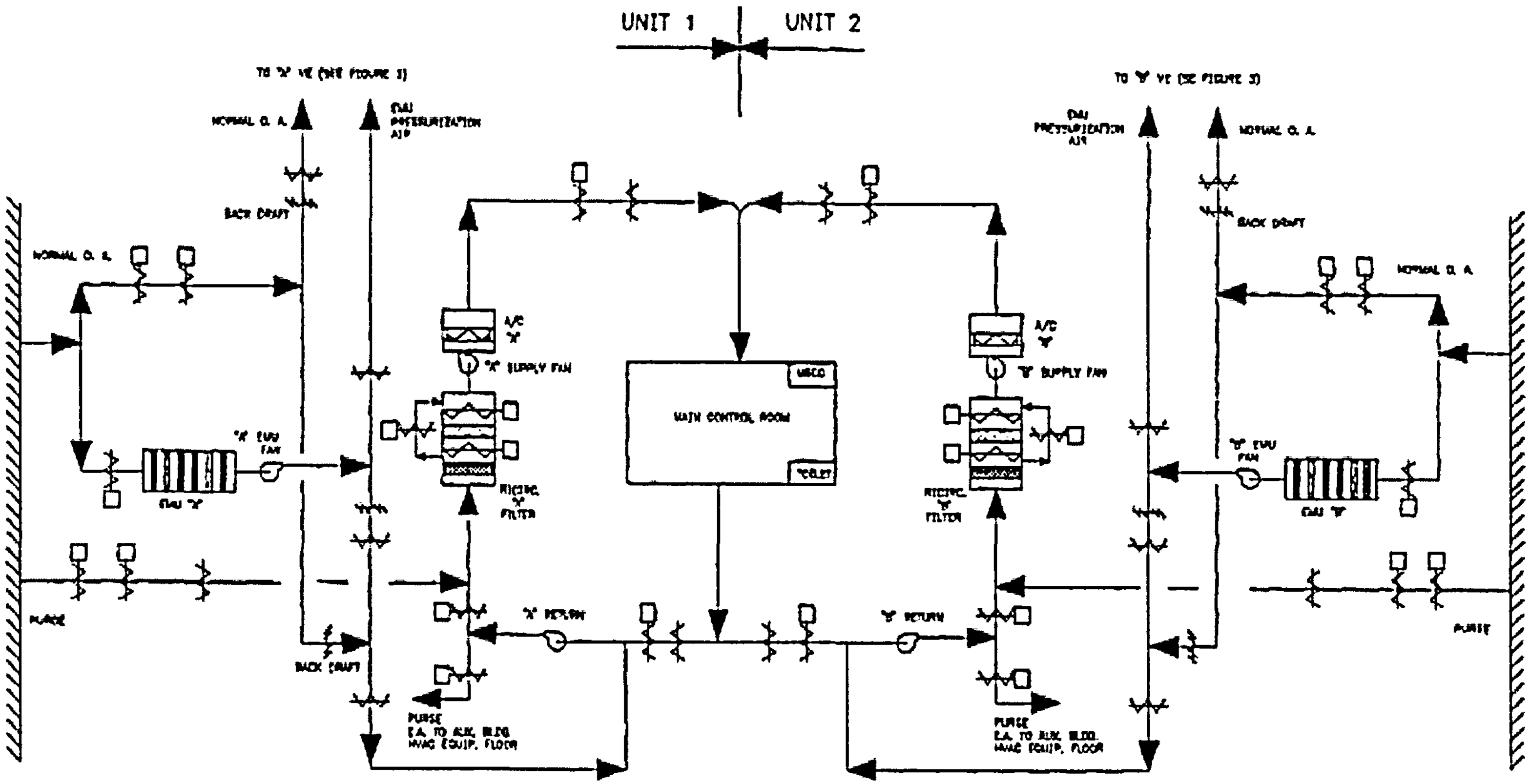
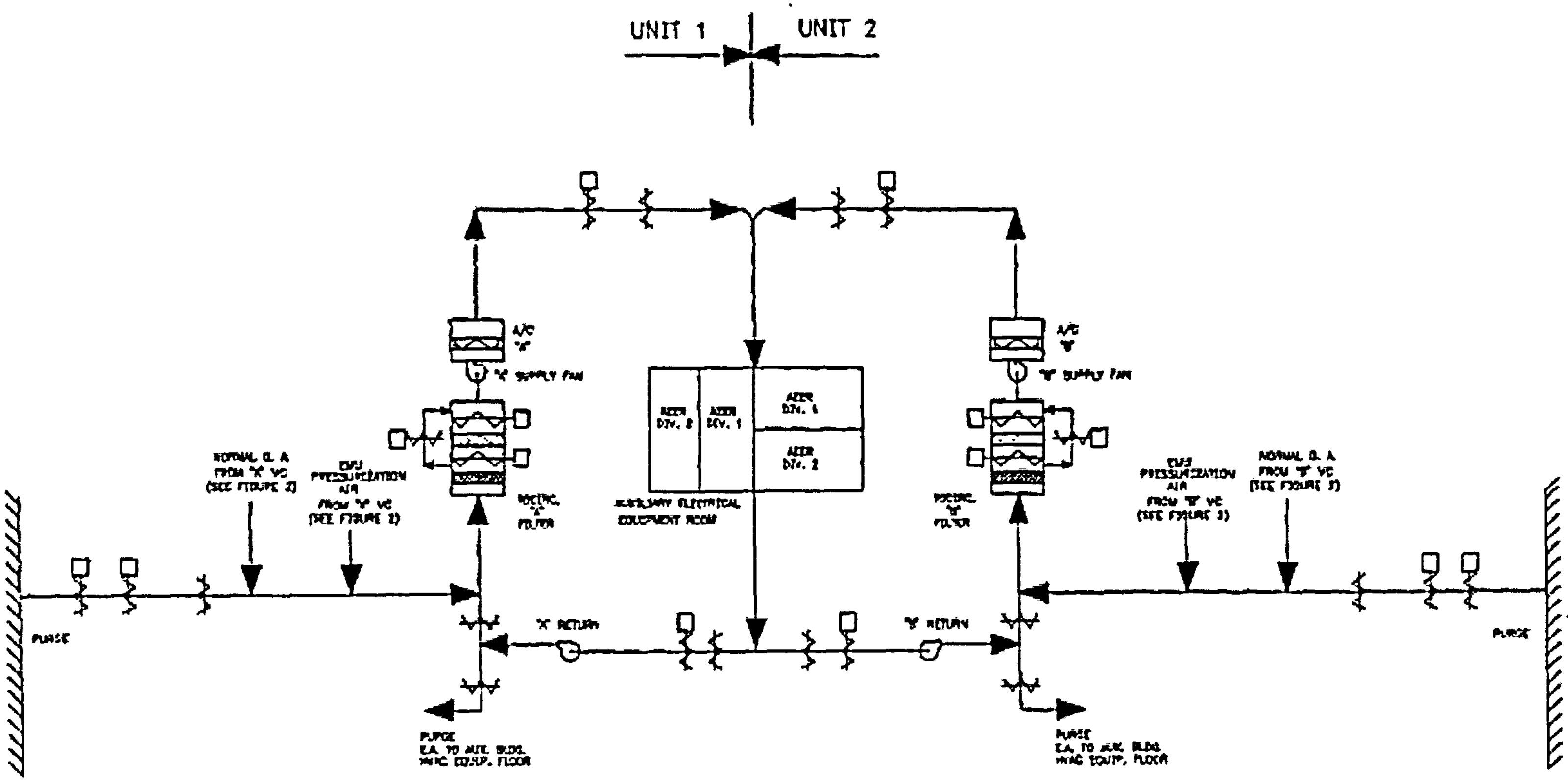


Figure 5-3

SIMPLIFIED P&ID OF AUXILIARY ELECTRICAL EQUIPMENT ROOM HVAC SYSTEM



ATTACHMENT 6

180-Day Response to NRC Generic Letter 2003-01

Limerick Generating Station, Units 1 and 2

Exelon Generation Company, LLC

Attachment 6

180-Day Response to NRC Generic Letter 2003-01

Limerick Generating Station, Units 1 and 2

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., General Design Criteria (GDC) 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

   Response

   The following provides a description of the design and operation of the Limerick Generating Station (LGS) Control Room Heating, Ventilation and Air Conditioning (HVAC) System and Control Room Emergency Fresh Air Supply (CREFAS) System. The Limerick Control Room HVAC System and CREFAS System are common to Units 1 and 2. The systems are safety related and active components are designed with redundancy to meet single active failure criteria. A simplified schematic of the Control Room HVAC System and CREFAS is shown on attached Figure 6-1.

   The Control Room HVAC System consists of two independent 100% capacity trains. Each train consists of a 100% capacity supply air-handling unit and a 100% capacity return air fan. The two trains share common supply and return ducts. Normal alignment of the Control Room HVAC System is with one train operating and the second train in standby. The Control Room HVAC System equipment is located within the seismic Category I control structure. The Control Room HVAC System is designed to remain operable during normal, shutdown, and accident conditions.

   The CREFAS System also consists of two independent 100% capacity trains. Each train has a seismic Category I air filtration unit which consists of an electric heating coil, prefilter, High Efficiency Particulate (HEPA) filter, a charcoal adsorber and a second HEPA filter, and a 100% capacity return air fan for treatment of recirculated control room air and/or outside supply air. The CREFAS system operates following a Design Basis Accident (DBA), chlorine, or toxic chemical accident. The CREFAS System is safety-related and designed to seismic Category I requirements. The CREFAS System utilizes the Control Room HVAC System as a flow path to and from the control room whenever CREFAS is in operation. The Control Room HVAC System and CREFAS System equipment are served by redundant power supplies, designed to meet IEEE 279 and IEEE 308.

   Radiation monitors, toxic chemical detectors, and chlorine detectors continuously monitor outside air at the control room envelope outside air intake. The detection of high radiation, chlorine or toxic chemical release is alarmed in the control room. Related protection functions are simultaneously initiated.

Upon high radiation detection, control room habitability is maintained through automatic initiation of CREFAS in the radiation isolation mode. In the radiation isolation mode of CREFAS, the normal fresh air intake is isolated; the control room outside air exhaust is isolated; and contaminated fresh air is rerouted so that all outside air must pass through the CREFAS before it enters the control room. A portion of the control room air is also recirculated through the CREFAS. In the radiation isolation mode, the CREFAS System maintains the CRE under a positive pressure (1/8 inch water gauge) relative to adjacent areas (turbine enclosure and auxiliary equipment room) to inhibit the infiltration of outside air, as required by Technical Specifications. A simplified schematic of the Control Room HVAC System and CREFAS with CREFAS in the radiation isolation mode is shown on attached Figure 6-2.

The Control Room HVAC System also monitors chlorine and other toxic chemical contamination in the outside air intake plenum. The system automatically isolates the control room upon chlorine detection. It also provides indication to control room operators upon detection of high toxic chemical concentration for manual isolation of the control room utilizing controls available in the control room. To maintain control room habitability during a chlorine or toxic chemical isolation, the Control Room HVAC system is totally isolated from the outside supply and exhaust paths, with the CRE at neutral pressure (with respect to the turbine enclosure and auxiliary equipment room) and the CREFAS recirculating a portion of the control room air. A simplified schematic of the Control Room HVAC System and CREFAS with CREFAS in the chlorine isolation mode is shown on attached Figure 6-3.

The Control Room Envelope (CRE) is maintained under habitable conditions following an accident. The envelope consists of the control room, peripheral offices at the west and east ends, toilet room, and utility room, which are all on elevation 269'-0". CRE construction joints and penetrations for cable, pipe, HVAC duct, HVAC equipment, dampers, and steam-tight doors have been specifically designed for leak-tightness. The CRE zone served by the HVAC system in the emergency mode or the isolation mode is approximately 126,000 cubic feet. The control room is common for Units 1 and 2.

The HVAC equipment room at elevation 304' is a part of the control structure, but outside the CRE boundary. The control room ductwork in the HVAC equipment room is gas tight welded construction and was tested for leak-tightness during startup testing.

Full-faced pressure demand self-contained breathing apparatus (SCBA) rated for 1 hour per cylinder and protective clothing are available for control room operators. A 6-hour onsite bottled air supply is provided by charged cylinders.

<u>Applicable Habitability Regulatory Requirements</u>

GDC 1: ***Requires quality standards commensurate with the importance of the safety functions performed.***

The LGS Control Room HVAC System and CREFAS System components are safety related, designed to seismic Category I requirements, and located within a seismic Category I structure. These systems and associated components important to safety are appropriately tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the Limerick Generating Station structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant. As described in LGS UFSAR Section 3.2, seismic Category I ducts were designed and constructed in accordance with appropriate sections of the AISI Code. HEPA filters, prefilters, and charcoal adsorbers are designed to meet Regulatory Guide 1.52 (July 1976) with exceptions noted in the LGS UFSAR Section 6.5. Testing of filters meets the requirements of Regulatory Guide 1.52, Rev. 2 (March 1978) with acceptance criteria per ASTM D3803-1989 and ANSI N510-1980, as described in LGS Technical Specification 3/4.7.2. System dampers with electro-hydraulic operators were designed to IEEE 323. Fire dampers are labeled by Underwriters Laboratory (UL).

In accordance with the Exelon QATR requirements, documents and records are maintained to show that required codes, standards, and specifications were followed; specified materials and correct procedures were applied; qualified personnel performed the work; and inspections and tests verified that parts and components meet the applicable specifications.

GDC 3: ***Requires structures, systems, and components to be designed and located to minimize the effects of fires.***

The LGS control room is designed to meet the requirements of GDC 3. Fire protection systems meeting the requirements of GDC 3 are provided. The fire protection program for LGS, regarding the control room complex, conforms to NRC Branch Technical Position BTP CMEB 9.5-1, Item C.7.b, as described in LGS UFSAR Section 9A. The control room is separated from other parts of the control structure by 3-hour fire rated floor slabs. Three-hour fire rated walls separate the control room from the reactor enclosures and turbine enclosures. Additional design details, including remote shutdown capability, are described in UFSAR Section 9A. Raceways and control panels in the control room are equipped with smoke detectors and have been designed to incorporate divisional separation in order to maintain the independence of redundant divisions of safety related cables and electrical devices. Provision is made for purging areas served by the Control Room HVAC system of smoke from a fire by using a 100% fresh air supply and exhausting 100% of the air. The Control Room HVAC System and CREFAS System are designed to operate during postulated fire events to ensure safe plant operation.

A detailed evaluation of the effects of smoke on maintaining reactor control capability from either the control room or the alternate shutdown panel is provided in the response to Item 1(b) below.

GDC 4: ***Requires structures, systems, and components to be designed to accommodate the effects of accidents.***

The Control Room HVAC System, CREFAS System, and the control enclosure structure has been designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including the design basis loss-of-coolant accident (LOCA). Normal and postulated accident effects and load combinations are described in LGS UFSAR Sections 3.6, 3.8, 3.9, 3.10, and 3.11. Environmental and missile design bases are in accordance with GDC 4.

GDC 5: ***Requires that an accident in one unit will not significantly impair the orderly shutdown and cooldown of the remaining unit.***

The control enclosure and support subsystems are shared between both units. The control room is designed to remain functional during and following the most severe natural phenomena. Therefore, the sharing of structures does not impair the ability to perform their safety functions.

Seismic Category I structures that house safety-related systems and equipment are discussed in LGS UFSAR Section 3.8.

GDC 19: ***Requires a control room from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions.***

A control room is provided with appropriate controls and instrumentation and is located to permit personnel to operate the unit safely under normal conditions or maintain it in a safe condition under accident conditions. The control room and associated post-accident ventilation systems are designed in accordance with seismic Category I requirements.

The design of the control room permits access and occupancy during accidents. Sufficient shielding and ventilation are provided to permit occupancy of the control room for a period of 30 days following the LOCA, without receiving more than a 5 rem integrated whole body dose or its equivalent to any part of the body. An analysis of exposures within the control room for each of the postulated accidents is presented in Chapter 15 of the LGS UFSAR.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through suitable procedures from locations outside the control room is provided by the remote shutdown system, if the control room must be evacuated. The remote shutdown system has the capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and subsequent cold shutdown of the reactor. The remote shutdown system panel contains controls for one loop of the Residual Heat Removal (RHR) system with associated RHR Service Water support, basic Reactor Core Isolation Cooling system equipment, reactor recirculation system (suction valve of one recirculation pump), and three

Main Steam Relief Valves. AC power supplies for these systems can also be controlled from the remote shutdown panel.

LGS UFSAR Section 7.4 contains further detailed discussion of remote shutdown capabilities. The control room and the remote shutdown panels conform to GDC 19.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

Response

Radiological analyses performed for LGS demonstrate that the LOCA is the most restrictive accident for radiological dose consideration to the control room. The LOCA analysis assumes that there is 50 cfm of unfiltered inleakage in addition to the 525 cfm of assumed filtered supply air from the CREFAS into the CRE in the pressurized radiation mode of operation. In the neutral pressure chlorine isolation mode, 525 cfm (unfiltered) is assumed. For all other accidents, the normal (unfiltered) mode of HVAC is assumed. Radiological dose to control room operators is analyzed for both modes of operation and have been determined to be acceptable per GDC-19.

Reasonable assurance is provided that control room integrity is still within its original design assumptions and as verified during the startup phase, based on above noted design features and existing programs and surveillances to ensure CRE integrity. Testing to verify inleakage is maintained below these assumed values has not been performed to date. Exelon is in the process of obtaining a vendor to perform an integrated inleakage test per ASTM E741 for this verification, as described in Exelon letter to the NRC dated August 11, 2003. Testing will be performed in all applicable accident modes of operation and is expected to occur in 2004. Exelon will update the NRC regarding the testing schedule once a vendor contract has been issued. Final results will be transmitted to the NRC within 90 days after completion of the test, to fully address this information request.

In conjunction with the above testing, Exelon is performing a reanalysis of radiological doses for design basis accidents using the Alternative Source Term (AST) methodology. Submittal to the NRC is expected in February 2004. It is further expected that the allowable unfiltered inleakage value for the radiological mode will be increased to at least that value assumed in the chlorine isolation mode. This will ensure adequate margin exists.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response

In the chlorine or toxic chemical isolation mode for the control room, inleakage is assumed to be 525 cfm based on the normally expected full flow for conservatism.

SCBA are available in the control room in sufficient quantities for operator use in the event of a release of hazardous materials that could affect plant operation. Spare bottles are available as well as the capability to refill empty bottles. In the event that refilling of bottles is prevented due to the event, bottles can be filled at alternate locations (e.g., Peach Bottom, TMI, or Oyster Creek) under Exelon control.

Testing to verify inleakage is maintained below the assumed value has not been performed to date. However, Exelon is in the process of obtaining a vendor to perform an integrated inleakage test per ASTM E741 for this verification. Testing will be performed in all applicable accident modes of operation and is expected to occur in 2004, as discussed in Item 1(a) above. Final results will be transmitted to the staff within 90 days after completion of the test. Test acceptance criteria for inleakage in the chlorine isolation mode is currently set at < 525 cfm. This value is used in the current hazardous material assessment based on the normal intake flow and will be retained.

Onsite hazardous chemical usage and storage is controlled by approved station procedures, which addresses control room habitability considerations. An assessment of offsite hazardous chemicals in stationary facilities within a 5-mile radius of the plant was performed in 2002. Results were found to be acceptable. Offsite mobile sources of hazardous chemicals are evaluated using risk to reflect the probability of a release from such a source.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through approved procedures from locations outside the control room is provided by the remote shutdown system, if the control room must be evacuated. The remote shutdown system panel contains controls for one loop of the RHR system with associated RHR Service Water support, basic Reactor Core Isolation Cooling system equipment, reactor recirculation system (suction valve of one recirculation pump), and three Main Steam Safety Valves. AC power supplies for these systems can also be controlled from the remote shutdown panel. LGS UFSAR Section 7.4 contains further detailed discussion of remote shutdown system capabilities.

The remote shutdown panel is located in the control enclosure on the 289' elevation, one elevation above the control room. Easy access to the Remote Shutdown Panel is obtained via the turbine enclosure and a stairwell. Use of SCBA will not inhibit operator travel between the control room and the remote shutdown system panel.

For an event where smoke is generated from within the control room, the HVAC system can quickly purge the area of smoke. For an event where smoke is generated from sources external to the control room, Main Control Room HVAC can be isolated through the initiation of CREFAS via a chlorine isolation, thereby minimizing intrusion of smoke from outside. SCBA are available for use by control room operators. Procedure guidance exists as to when SCBAs should be worn.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a ΔP surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your differential pressure (ΔP) surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.*

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

<u>Response</u>

LGS Technical Specification 4.7.2 requires measurement of control room ΔP relative to adjacent areas. The frequency for this test is once per 24 months. It is recognized that this surveillance alone cannot quantify CRE unfiltered inleakage. As such, LGS has committed to performing an integrated inleakage test per ASTM E741 to quantify this inleakage.

The LGS Technical Specifications will be revised to include a new Section 6.0 administrative program for Control Room Habitability. This program will ensure procedures and processes are in place such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program will address the following:

- CRE Boundary/Breach Control
- CRE Integrity Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self-Assessment

A license amendment request to revise Technical Specification Section 6.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the test results to be performed in accordance with ASTM E741, other tests performed, and ongoing periodic program self-assessments, a LGS Technical Specification requirement for periodic testing other than the current ΔP test is not warranted. However, if significant problems, issues, repairs, or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

Response

No compensatory measures are currently required to demonstrate control room habitability for any design basis radiological accident. Therefore, there are no corrective actions needed to retire such measures.

3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

Response

LGS is required to meet the GDC regarding control room habitability, as documented in the Updated Final Safety Analysis Report for both units. A detailed discussion of the GDCs, as they apply to both units at LGS, may be found in response to Item 1 above

Figure 6-1

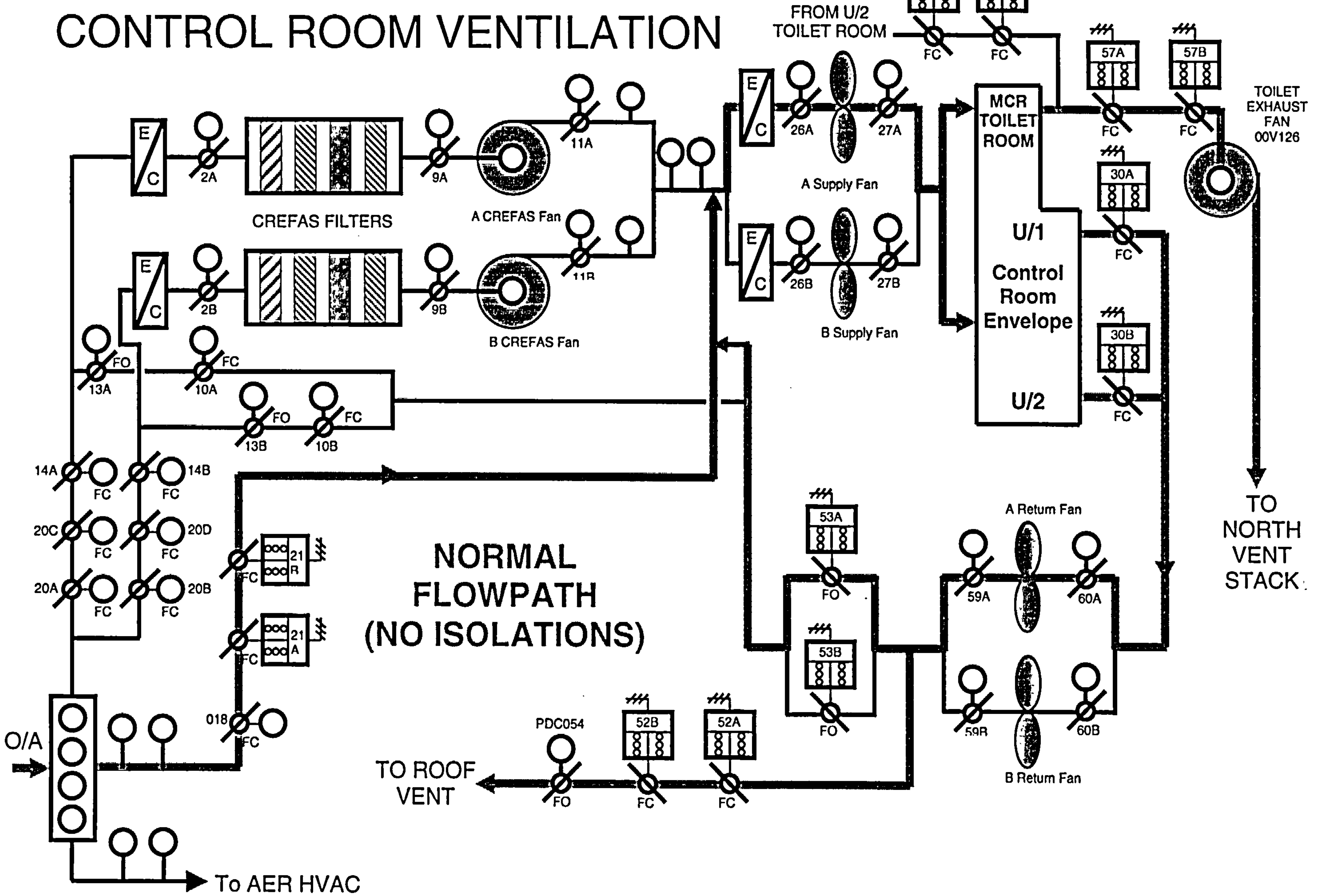

CONTROL ROOM VENTILATION
FROM U/2 TOILET ROOM
71A
71B
57A
57B
TOILET EXHAUST FAN 00V126
MCR TOILET ROOM
U/1
Control Room Envelope
U/2
30A
30B
A Supply Fan
B Supply Fan
26A
27A
26B
27B
CREFAS FILTERS
A CREFAS Fan
B CREFAS Fan
2A
2B
9A
9B
11A
11B
13A
10A
13B
10B
14A
14B
20C
20D
20A
20B
21 B
21 A
018
FO
FC
NORMAL FLOWPATH (NO ISOLATIONS)
53A
53B
A Return Fan
B Return Fan
59A
60A
59B
60B
TO NORTH VENT STACK
PDC054
52B
52A
TO ROOF VENT
O/A
To AER HVAC

Figure 6-2

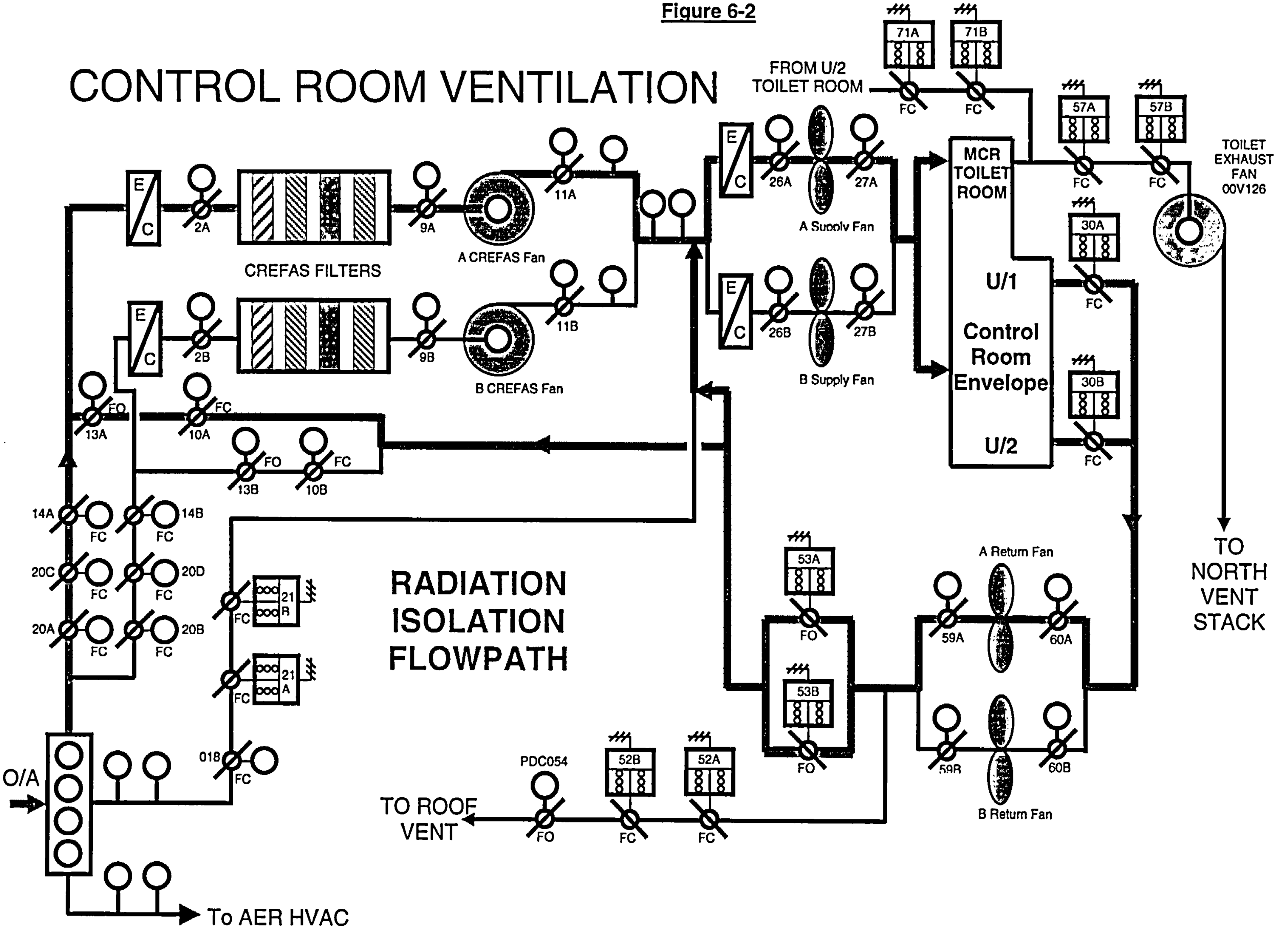
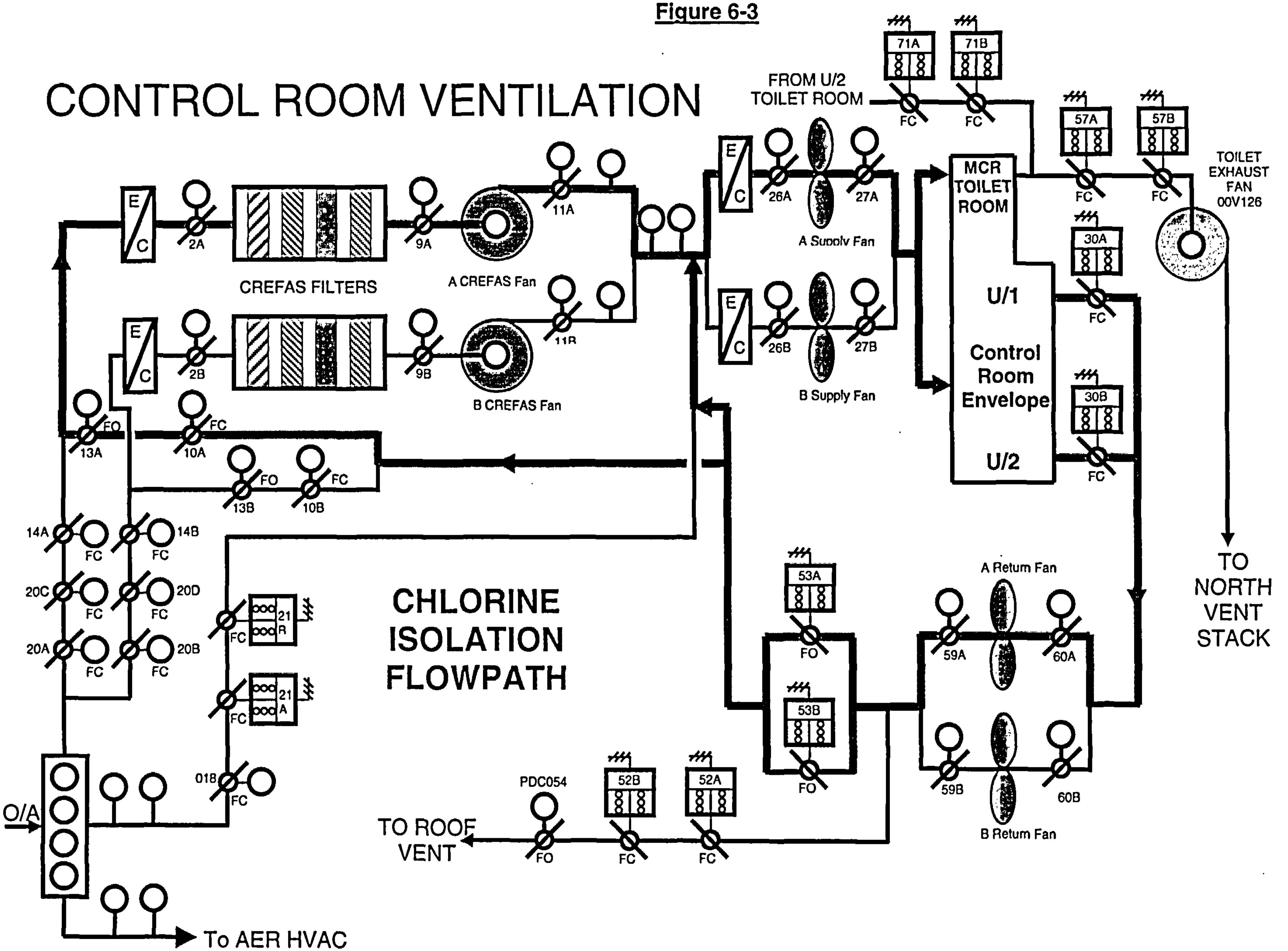

CONTROL ROOM VENTILATION
FROM U/2 TOILET ROOM
71A
71B
FC
57A
57B
TOILET EXHAUST FAN 00V126
MCR TOILET ROOM
E C
2A
CREFAS FILTERS
9A
A CREFAS Fan
11A
26A
27A
A Supply Fan
2B
9B
B CREFAS Fan
11B
26B
27B
B Supply Fan
30A
30B
U/1
Control Room Envelope
U/2
FO
13A
10A
13B
10B
14A
14B
20C
20D
20A
20B
21 R
21 A
018
O/A
To AER HVAC
RADIATION ISOLATION FLOWPATH
53A
53B
A Return Fan
59A
60A
59B
60B
B Return Fan
TO NORTH VENT STACK
PDC054
52B
52A
TO ROOF VENT

Figure 6-3


CONTROL ROOM VENTILATION
FROM U/2 TOILET ROOM
71A
71B
FC
FC
57A
57B
TOILET EXHAUST FAN 00V126
MCR TOILET ROOM
U/1
Control Room Envelope
U/2
30A
30B
E
C
2A
9A
11A
CREFAS FILTERS
A CREFAS Fan
2B
9B
11B
B CREFAS Fan
26A
27A
A Supply Fan
26B
27B
B Supply Fan
13A
FO
10A
FC
13B
10B
14A
14B
20C
20D
20A
20B
21 B
21 A
018
O/A
To AER HVAC
CHLORINE ISOLATION FLOWPATH
53A
53B
FO
A Return Fan
59A
60A
59B
60B
B Return Fan
TO NORTH VENT STACK
PDC054
52B
52A
TO ROOF VENT

ATTACHMENT 7

180-Day Response to NRC Generic Letter 2003-01

Oyster Creek Generating Station

AmerGen Energy Company, LLC

Attachment 7

180-Day Response to NRC Generic Letter 2003-01

Oyster Creek Generating Station

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., General Design Criteria (GDC) 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

   <u>Response</u>

   The following provides a description of the design and operation of the Oyster Creek Nuclear Generating Station Control Room Heating, Ventilating, and Air Conditioning (HVAC) System. The overall system is safety-related, with the majority of components being augmented quality. The system is designed with redundancy to mitigate the effects of single active component failures. The Control Room Envelope (CRE) consists of the control room panel area, Shift Supervisor's office, toilet, kitchen, and the adjacent lower cable spreading room. A simplified schematic of the Control Room HVAC System is shown on attached Figure 7-1.

   The Control Room HVAC System consists of two independent Trains "A" and "B". Train "A" is the backup (LAG) system and Train "B" is the primary (LEAD) system. Train "A" consists of one supply fan with a rated capacity of 14,000 cfm, steam coils for heating and a three-stage refrigeration unit for cooling. Steam for heating is provided by the auxiliary boiler and water for cooling is provided by the Turbine Building Closed Cooling Water System. Backup power for the Train "A" supply fan is provided from Emergency Diesel Generator 1 from unit substation 1A2. Train "B" consists of one supply fan with a rated capacity of 14,000 cfm, an electric heating coil for heating and a four-stage refrigeration unit for cooling. Train "B" heating and cooling is electric. Backup power for the Train "B" supply fan is provided from Emergency Diesel Generator 2 from unit substation 1B3. Both trains share a common supply and return duct contained within the control room envelope and within the upper cable spreading room. The Control Room HVAC System does not contain High Efficiency Particulate Air (HEPA) filters or charcoal adsorbers.

   Each system has four manual operating modes designated as normal, purge, partial recirculation, and full recirculation. The normal mode is designed to automatically maintain a comfortable temperature and a slightly higher than atmospheric pressure in the control room. The purge mode brings in 100% outside air in order to clear smoke or fumes from the control room. The partial recirculation mode minimizes the use of outside air while maintaining a positive pressure of at least 0.125 inches water gauge in the control room in order to minimize control room operator dose post accident (Figures 7-2 and 7-3). The full recirculation mode closes all outside air dampers to minimize the intrusion of toxic gas into the control room. Both trains are provided with a fan only mode, which bypasses the heating and cooling functions of the system. The fan only mode can be used in a loss of offsite power event in order to minimize loading on the emergency diesel generators.

Applicable Habitability Regulatory Requirements

GDC 1: ***Requires quality standards commensurate with the importance of the safety functions performed.***

The Oyster Creek Control Room HVAC System is overall safety-related, seismic Class I, and is located in the seismic Class I section of the Turbine Building. The majority of components are augmented quality and required to be operable after a seismic event. The system is designed with redundancy to mitigate the effects of single active component failures. Fire dampers are labeled by Underwriter's Laboratory (UL). The system and associated components important to safety are appropriately tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the station structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant. In accordance with the Exelon QATR requirements, documents and records are maintained to show that required codes, standards, and specifications were followed; specified materials and correct procedures were applied; qualified personnel performed the work; and inspections and tests verified that parts and components meet the applicable specifications.

GDC 3: ***Requires structures, systems, and components to be designed and located to minimize the effects of fires.***

The Oyster Creek Control Room meets the requirements of GDC 3. The fire protection program regarding the control room complex conforms to NRC Branch Technical Position BTP APSCB 9.5-1, Appendix A, and is described in UFSAR Section 9.5.1. The Control Room complex is separated from Main Office Building and Turbine Building by a three-hour rated concrete floor, and two and three-hour rated walls. Exteriors walls are non-rated but adequate since the fire exposure potential from outside locations is minimal. Redundant divisions of safety related equipment are protected by fuses and circuit breakers such that a damaging electrical fire is not a credible threat. Select panels in the control room are equipped with smoke detectors, which isolate the ventilation system and activate the local Halon fire suppression system. Area wide smoke detectors are provided throughout the CRE, which isolate the Control Room HVAC System and can initiate a water suppression system in the lower cable spreading room. In case of a fire within the Control Room, the Control Room HVAC system can be placed in purge mode, which supplies 100% outside air to remove smoke from the control room. The ventilation supply ducts are equipped with smoke detectors, which cause the ventilation system to isolate, preventing the intrusion of smoke into the control room from outside areas. Alternative shutdown capability is provided in case the control room must be evacuated.

A detailed evaluation of the effects of smoke on maintaining reactor control capability from either the Control Room or the remote shutdown panel is provided in the response to Item 1(b).

GDC 4: ***Requires structures, systems, and components to be designed to accommodate the effects of accidents.***

The Control Room HVAC System has been designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, and testing. Equipment used to mitigate the consequences of accidents were either designed to be compatible with postulated accidents or protected against the dynamic effects of postulated accidents. The extent to which the design bases for structures were formulated to accommodate the effects of accidents is discussed in UFSAR Sections 3.8 and 3.9. The assessment of the capability of mechanical and electrical components to withstand environmental conditions is discussed in UFSAR Section 3.11. UFSAR Section 3.5 discusses missile protection and UFSAR Section 3.6 discusses protection from dynamic effects. Environmental and missile design bases are in accordance with GDC 4.

GDC 5: ***Requires that an accident in one unit will not significantly impair the orderly shutdown and cooldown of the remaining unit.***

Oyster Creek is a single unit facility.

GDC 19: ***Requires a control room from which actions can be taken to operate the nuclear power unit safely under normal conditions and to maintain it in a safe condition under accident conditions.***

A control room is provided with appropriate controls and instrumentation and is located to permit personnel to operate the unit safely under normal conditions or maintain it in a safe condition under accident conditions. Oyster Creek complies with the criteria for control room habitability in accordance with NUREG 0737, "Clarification of TMI Action Plan Requirements," Item III.D.3.4, "Control Room Habitability," as described in UFSAR Section 6.4. The Control Room HVAC System is designed to ensure habitability after any of the design basis radiological accidents or a toxic gas release accident. Control room shielding is designed to limit the occupational dose level. In the event of a radiological accident, the Control Room HVAC system will be placed in partial recirculation. The most limiting calculated doses for control room occupancy for the 30 days following an accident are within the dose limits for whole body and skin as specified in 10 CFR 20 and GDC 19. An analysis of exposures within the control room for each of the postulated accidents is presented in UFSAR Section 6.4.4.1. The current Oyster Creek licensing basis does not have requirements for thyroid dose. In the event of a toxic gas release, the control room HVAC system will be placed in full recirculation. Control Room operators have sufficient time to don breathing apparatus before the toxicity limit is reached in the control room if a chlorine gas release were to occur at the New Radwaste chlorination facility, which is the only onsite source of toxic gas.

The capability to achieve and maintain hot shutdown and the capability for subsequent cold shutdown through suitable procedures from locations outside the control room is provided through the use of the remote shutdown panel, local shutdown panels and local manual operation, if the control room must be evacuated. The remote shutdown panel has the capability for placing the reactor in hot shutdown, including the necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and subsequent cold shutdown of the reactor. The remote shutdown panels conform to GDC 19. UFSAR Section 7.5.2.4.2 contains more information on remote shutdown capabilities.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

Response

All intake air into the OCNGS control room is unfiltered. Other than a "bag" type roughing filter (40% efficient by ASHRAE standards), there is no other air filtration associated with the control room (intake or recirculation). Therefore, no credit for filtration is assumed in the radiological analyses. Design basis radiological analyses are performed using the full 2,000 cfm flow seen during the partial recirculation mode. Additionally, design basis radiological analyses are performed for the supply of 100% outside air to the CRE. In both cases the radiation exposure to personnel occupying the control room is limited to less than the GDC 19 limits.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response

Hazardous chemicals stored onsite include up to three 150 lb cylinders of chlorine gas used in the New Radwaste chlorination system. Analysis showed that there is sufficient time for operators to don self-contained breathing apparatus (SCBA) before the chlorine concentration within the control room reaches incapacitation levels. SCBAs are available in the control room in sufficient quantities for operator use in the event of a release of hazardous materials that could affect plant operation. Spare bottles are available as well as the capability to refill empty bottles. In the event that refilling of bottles is prevented due to the event, bottles can be filled at alternate locations (e.g., Peach Bottom, Limerick, or TMI) under Exelon/AmerGen control. Procedures to require the use of SCBAs by operators when chlorine is detected in the CRE are currently being developed for implementation in the first quarter of 2004.

Onsite hazardous chemical usage and storage is controlled by approved station procedures, which address control room habitability considerations. An assessment of offsite hazardous chemicals in stationary facilities within a 5-mile radius of the plant was performed in 2002. Results were found to be acceptable. Offsite mobile sources of hazardous chemicals are evaluated using risk to reflect the probability of a release from such a source. The risk of such accidents is negligible.

In an event where smoke is generated from within the control room, the Control Room HVAC system can be placed in purge mode, which supplies 100% outside air to remove smoke from the area. SCBAs are available for use by control room operators if needed. Intrusion of smoke from areas outside the control room is prevented by a smoke detector in the air supply duct to the control room supply fan and a back-draft or gravity type smoke damper in the return air register in the control room. The smoke detector automatically shuts off the Control Room supply fan when smoke is detected, preventing smoke from a fire in an outside area being drawn into the control room. The back-draft damper allows airflow out of the control room, but not into the control room. If the supply fan is shut off due to a fire in the lower cable spread room, the back-draft damper closes preventing the intrusion of smoke into the control room.

If the control room must be evacuated, the capability to achieve prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through suitable procedures from locations outside the control room is provided by the alternate shutdown system. The alternate shutdown system has the capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and subsequent cold shutdown of the reactor.

Alternative shutdown capability relies on the use of the Alternative Control Stations (ACSs), specifically the Remote Shutdown Panel (RSP) and several Local Shutdown Panels (LSP). These ACSs are provided for fire safe shutdown in the event of a fire in the Control Room Complex. Each ACS includes transfer/isolation switches and relays that are used to transfer control of the safe shutdown components from the control room to the control switches located at the ACSs.

Operators are dispatched to the Remote Shutdown Panel, Local Shutdown Panels and local devices to place and maintain the plant in a safe shutdown condition. The Remote Shutdown Panel, Local Shutdown Panels and the local devices relied upon are located outside the Control Room Complex. Egress paths have emergency lights and are protected by rated barriers from the CRE. The location of the ACSs are as follows: RSP and LSP-1A2 are located in the 480V Switchgear Rooms, LSP-DG2 is located in the diesel building, LSP-1B3 and LSP-1B32 are located outside near the intake area, LSP-1D is located in the 4160V Switchgear area and LSP-1AB2 is located in Rx. Bldg. 23'.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.*

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

Response

Oyster Creek Technical Specification 4.17 requires measurement of Control Room ΔP in the partial recirculation mode relative to adjacent areas to verify CRE integrity. The frequency for this test is at least once every refueling outage. All air intake for the Oyster Creek Control Room is unfiltered. Even with 100% outside air flow (14,000 cfm) to the Control Room the 30-day integrated dose rates are within GDC 19 limits for beta and gamma doses. It is recognized that this surveillance alone cannot verify or quantify CRE unfiltered inleakage. However, limiting inleakage under accident conditions is not required to meet GDC 19 limits for Oyster Creek. Therefore, no periodic testing other than the existing ΔP test will be performed. The Oyster Creek alternate source term (AST) analysis, submitted in April 1997 and modified in April 2000, has shown that Control Room operator dose (including thyroid dose) is within acceptable limits for 100% unfiltered outside air supply under accident conditions. Although this AST analysis, through discussions with the NRC staff, will be resubmitted as a License Amendment Request with further analytical modifications, results are expected to continue to be acceptable. This License Amendment Request to incorporate AST into the OCNGS licensing basis is planned to be submitted to the NRC by December 31, 2004.

The Oyster Creek Technical Specifications will be revised to include a new Section 6.0 administrative program for Control Room Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program will address the following:

- CRE Boundary/Breach Control
- CRE Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self Assessment

A license amendment request to revise Technical Specification Section 6.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the existing tests performed and ongoing periodic program self-assessments, an OCNGS Technical Specification requirement for periodic testing other than the current ΔP test is not warranted.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

Response

No compensatory measures are currently required to demonstrate control room habitability for any design basis radiological accident. Therefore, there are no corrective actions needed to retire such measures.

3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

Response

OCNGS meets the GDC that are applicable to control room habitability. A detailed discussion of the GDC as applicable to OCNGS is provided in response to Item 1 above. An AST license amendment request submittal is being used to address control room operator thyroid doses not previously addressed.

Figure 7-1

CONTROL ROOM HVAC SYSTEM FLOW DIAGRAM

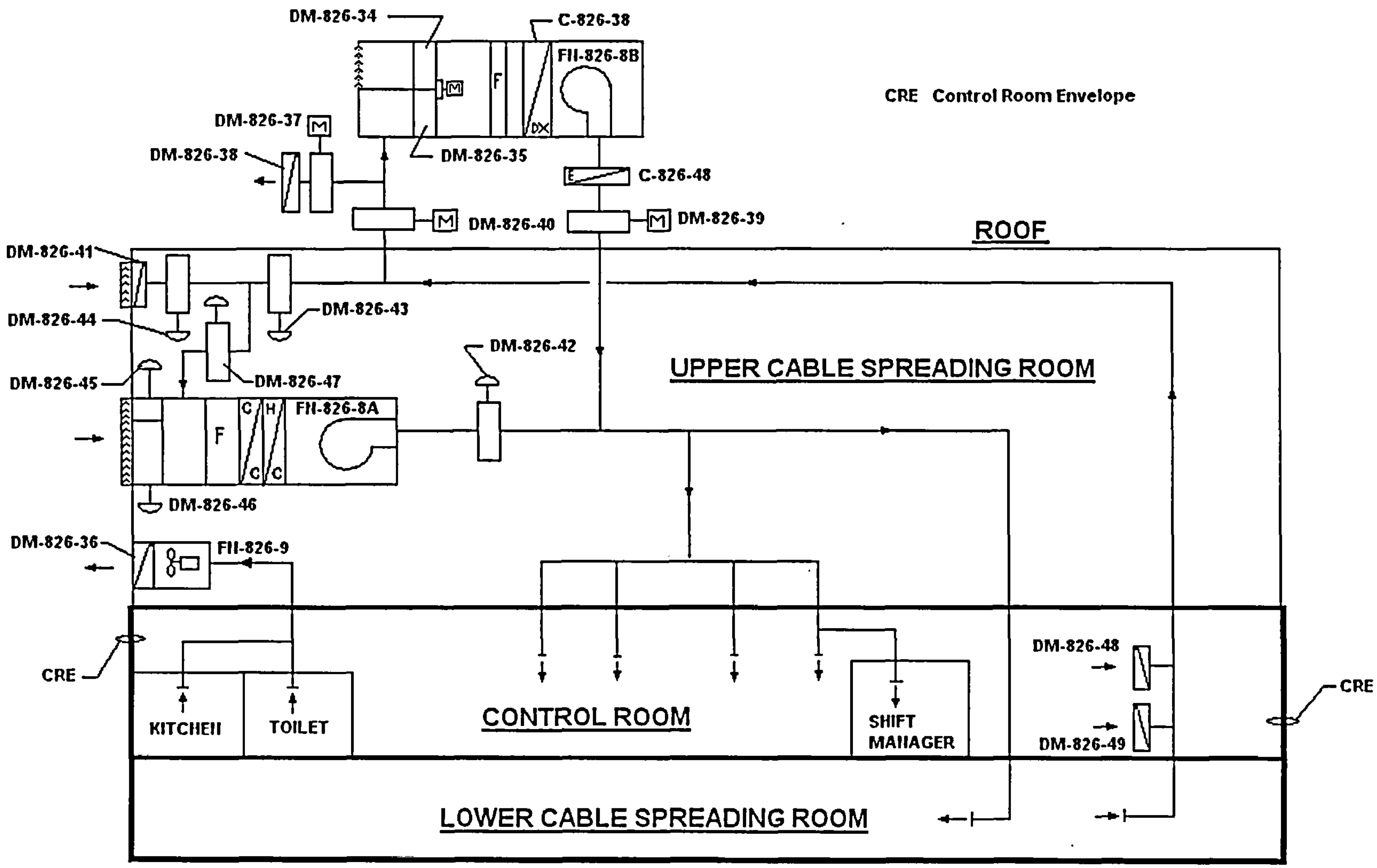


Figure 7-2

Control Room HVAC System Flow Diagram "B" System in Partial Recirculation Mode

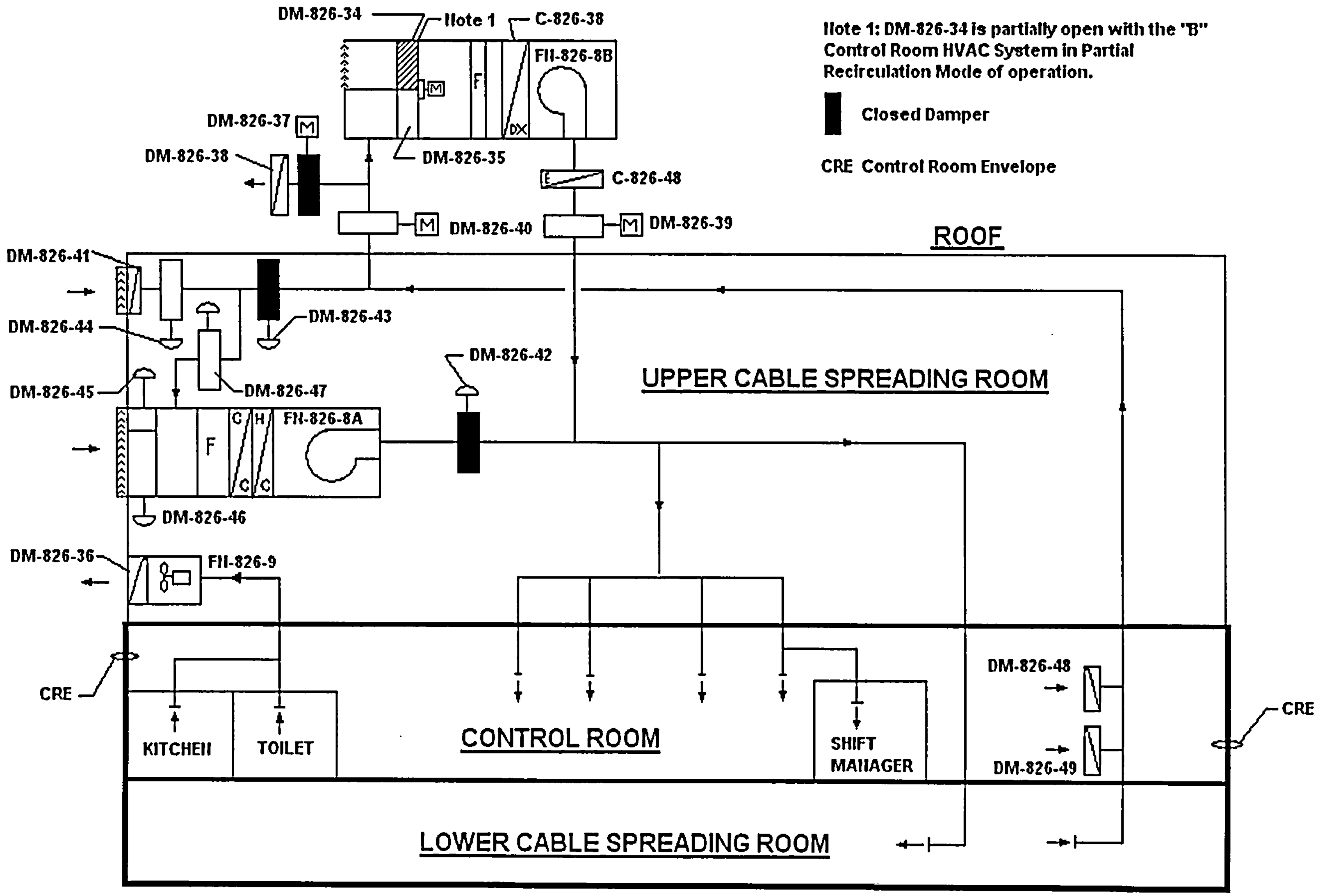
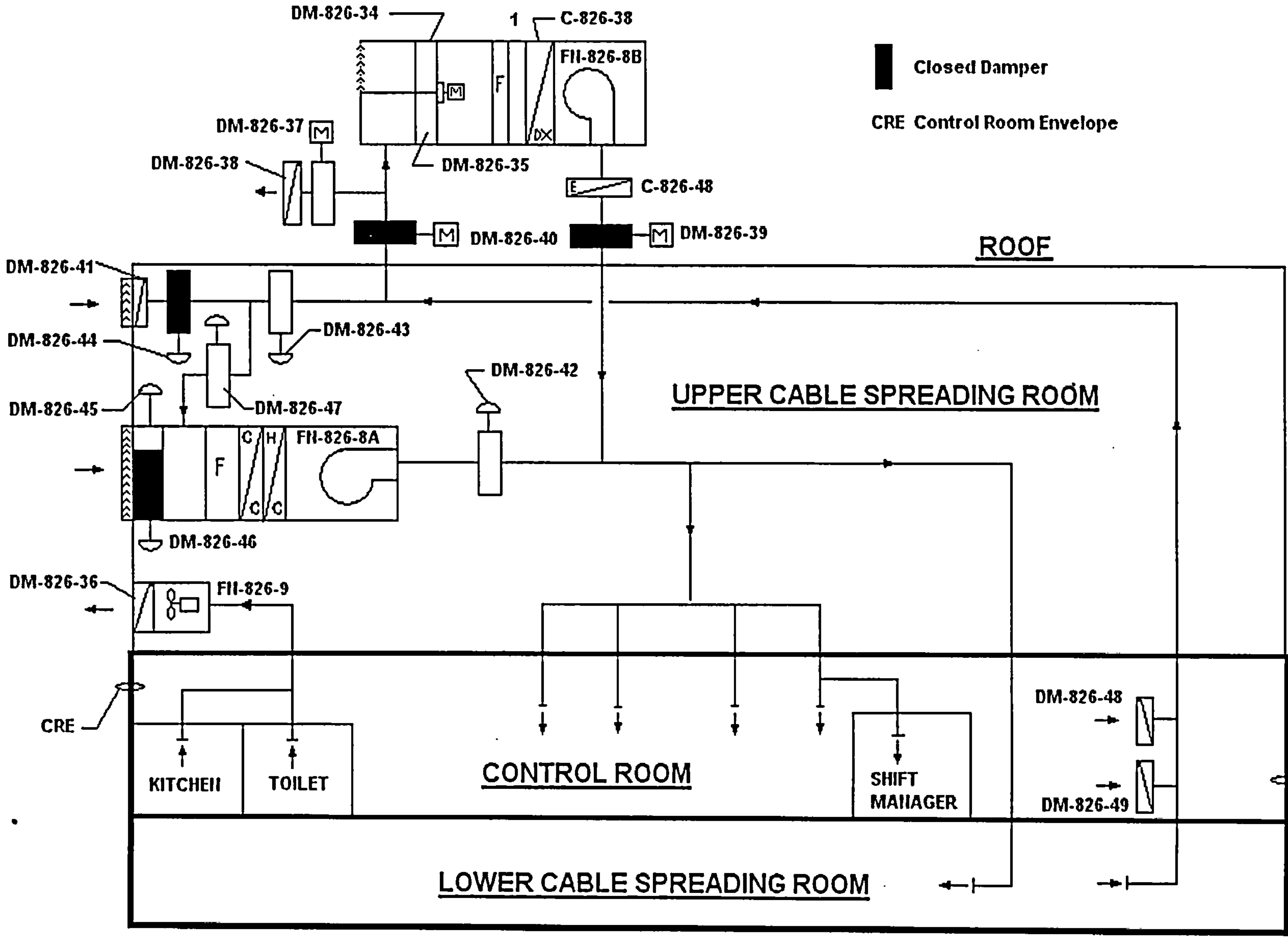


Figure 7-3

Control Room HVAC System Flow Diagram
"A" System in Partial Recirculation Mode



ATTACHMENT 8

180-Day Response to NRC Generic Letter 2003-01

Peach Bottom Atomic Power Station, Units 2 and 3

Exelon Generation Company, LLC

Attachment 8

180-Day Response to NRC Generic Letter 2003-01

Peach Bottom Atomic Power Station, Units 2 and 3

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., General Design Criteria (GDC) 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

   <u>Response</u>

   The Peach Bottom Atomic Power Station (PBAPS) Control Room (CR) Heating, Ventilating and Air Conditioning (HVAC) system consists of the Control Room Fresh Air Supply (CRFAS) System, the Control Room Emergency Ventilation (CREV) Filter System, the Control Room Air Conditioning Ventilation (A/C Vent) Supply System, the Control Room Return Air System, and the Control Room Toilet Exhaust System.

   The CRFAS and CREV HVAC systems are safety related, and are common to Peach Bottom Units 2 and 3. The CR HVAC system is designed to provide a suitable environment for continuous personnel occupancy as well as operability of control room equipment and instrumentation under normal and accident conditions.

   The CR HVAC system provides isolation, filtration, ventilation, cooling, heating, and humidification. The primary (safety related) function of the CR HVAC system is to provide isolation, filtration, and ventilation during normal plant operation as well as during design basis accident (DBA) conditions. The non-safety related function of the CR HVAC system is to provide cooling, heating, and humidification during normal plant operations.

   The CR HVAC system is designed with sufficient capacity and redundancy such that no single active failure can prevent the safety related portion of the system from performing its function. In addition, the CR HVAC system is located inside a seismic Category I structure and is protected against natural phenomena. A simplified diagram of the CR HVAC system can be found on Figure 8-1.

   The CRFAS provides conditioned outside air to the Main Control Room, Shift Supervisors Office, Shift Managers Office, Auxiliary Offices, Lunch Room and Toilet Room. This system consists of two 100% capacity redundant CRFAS fans, a roll filter common to both fans, and a preheat coil common to both fans.

   The CRFAS system is supplied with outside air from the Outside Air Intake Plenum (common to both fans). Under normal conditions, this outside air is conditioned via the CR A/C Vent Supply system prior to discharging the air to the control room via a common discharge plenum. Normally, only one CRFAS fan is in-service and the redundant fan is in auto-standby. The auto-standby fan initiates automatically when a low differential pressure condition is sensed across the running fan. There are four in-line radiation detectors mounted in the Outside Air Intake Plenum with two flow detectors mounted in the duct upstream of the CRFAS fans for continuous monitoring.

Upon receiving a high radiation or low flow signal, as sensed by the associated instruments, the CRFAS system, the A/C supply system, and the Control Room Return Air System are automatically isolated and the CREV Filter System initiates to provide the control room with filtered, fresh outside air. These conditions also initiate alarms in the Main Control Room. The majority of filtered fresh air is then exfiltrated to the Turbine Building, thus maintaining a positive pressure in the Main Control Room.

The CREV Filter System consists of two 100% capacity filter units and redundant CREV supply fans. Each filter unit consists of a charcoal filter bank and a bank of High Efficiency Particulate Air (HEPA) filters upstream and downstream of the charcoal filter. Upon a high radiation or low flow signal, the CR HVAC system is automatically aligned to reroute the fresh air supply through the CREV system. In addition to the four radiation detectors, there are two additional in-line radiation detectors mounted in the duct downstream from the filters and upstream from the CREV supply fans. The CREV system utilizes the common discharge duct used by the CRFAS system to provide filtered air to the control room. In the emergency mode (high radiation or low flow), the CREV system maintains the control room at a positive 0.1 inches of water gauge relative to the surrounding areas to minimize infiltration of outside air as required by Technical Specification 3.7.4.

The safety related portions of the CR HVAC systems (CREV and CRFAS supply fans and associated dampers) are fed from Class 1E power supplies and have sufficient electrical and physical separation such that no single active failure event can prevent the system from achieving its design requirements.

The Control Room Envelope (CRE) is maintained under habitable conditions following an accident. The envelope consists of the Main Control Room, the Shift Supervisors Office, Shift Managers Office, Auxiliary Offices, Lunchroom, and Toilet Room (all on elevation 165"-0"). CRE construction joints and penetrations for cable, pipe, HVAC equipment, dampers, and doors have been specifically designed for leak-tightness. The CRE zone served by the HVAC system in the emergency mode is approximately 176,000 cubic feet.

The HVAC equipment room at elevation 165', (in the Radwaste Building), is adjacent to the Control Room structure, and is outside the CRE boundary. The Control Room HVAC ductwork system in the HVAC system equipment room is of welded construction and was tested for leak-tightness. Dampers in the Control Room HVAC system are designed for air-tight construction.

Full-faced pressure-demand self-contained breathing apparatus (SCBA), rated for 2 hours are available for use by control room operators. Additional bottles (approximately 100) are available for use and are staged at various locations throughout the plant. A fill station is located at Unit 1 for the filling of additional air pack bottles. Operators are tested and trained annually to maintain qualification for use of the air packs.

Applicable Habitability Regulatory Requirements

PBAPS Units 2 and 3 were issued Operating Licenses on August 8, 1973 and July 2, 1974, respectively, following issuance of a Construction Permit on January 31, 1968. During the construction licensing process for PBAPS, the units were evaluated against the current Atomic Energy Commission (AEC) draft of the 27 General Design Criteria (GDC) for nuclear power plants rather than the 70 criteria proposed in July, 1967. PBAPS UFSAR Appendix H documents a subsequent review demonstrating that PBAPS Units 2 and 3 conform with the intent of the AEC (NRC) proposed GDC for Nuclear Power Plants, 10 CFR 50 Appendix A, July 1967. By Staff Requirements Memorandum (SRM), SECY-92-223, issued on September 18, 1992, the Commission (with all Commissioners agreeing) approved the staff proposal to not apply the GDC to plants with construction permits issued prior to May 21, 1971. At the time of promulgation of Appendix A to 10CFR Part 50, the Commission stressed that the GDC were not new requirements and were promulgated to more clearly articulate the licensing requirements and practices in effect at that time. While compliance with the intent of the GDC is important, each plant licensed before the GDC were formally adopted was evaluated on a plant specific basis, determined to be safe, and licensed by the Commission. Furthermore, current regulatory processes are sufficient to ensure that plants continue to be safe and comply with the intent of the GDC. Backfitting the GDC would provide little or no safety benefit while requiring an extensive commitment of resources.

GDC 1: ***Requires quality standards commensurate with the importance of the safety functions performed.***

GDC 1 is similar to AEC 1. Peach Bottom Atomic Power Station was evaluated in accordance with AEC 1 (as documented in UFSAR Appendix H).

The PBAPS Control Room Emergency HVAC System and the Control Room Normal HVAC System are safety related, designed to seismic Category I requirements, and located within a seismic Category I structure. These systems and associated components important to safety are appropriately tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that PBAPS structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant. As described in PBAPS UFSAR Section 10.14.3, seismic Category I ducts were designed and constructed in accordance with appropriate sections of the AISI Code. Testing of filters meets the requirements of Regulatory Guide 1.52, Rev. 2 (March 1978) with acceptance criteria per ASTM D3803-1989 and ANSI N510-1980, as described in PBAPS Technical Specification 5.5.7.

In accordance with the Exelon QATR requirements, documents and records are maintained to show that required codes, standards, and specifications were followed; specified materials and correct procedures were applied; qualified personnel performed the work; and inspections and tests verified that parts and components meet the applicable specifications.

GDC 3: ***Requires structures, systems, and components to be designed to minimize the effects of fires.***

The CR HVAC system is designed to meet the intent of requirements annotated in GDC 3 (which is similar to AEC 3). The fire protection program for PBAPS, regarding the control room complex, conforms to NRC Branch Technical Position BTP APCSB 9.5-1, Appendix A, as described in Fire Protection Program Chapter 3.

The control room complex for fire protection program (Fire Area 25) includes the cable spreading room (elev. 150'), the computer room (elev. 150'), Radwaste building fan room, Control Room, instrument lab, shop, and offices (elev. 150'). This area has a 3-hour fire rated concrete wall. The area above the control room suspended ceiling contains 26 cables trays. None of these 26 cable trays are safety related. Of the 26 cable trays, 23 contain only cable that is of flame retardant construction. The remaining three cable trays have been covered with a fire retardant coating. Additionally, heat detectors were installed in all trays above the control room ceiling.

In the event of a fire in the control room complex, the control room HVAC system can be changed over to 100% purge mode to the outside to clear smoke from the control room. The control room complex ventilation system can be manually isolated to prevent smoke from entering the area as a result of a fire in other areas of the plant. Early warning fire detectors have been provided in the peripheral rooms. Openings in walls separating the main control room and peripheral rooms have been closed. All doors to enclosed rooms within the control room complex have been provided with self-closing mechanisms.

In the event a fire in the control room complex forced an evacuation of the main control room, the plant can be safely shut down. Refer to Chapter 5 of the PBAPS Fire Protection Program.

In an event a fire develops in the CR, since none of the equipment for the CR HVAC system are located in the Control Room, the CR HVAC system can be placed in 100% Purge mode using the A/C supply fans, with the Return Air fans discharging to atmosphere at the Radwaste building roof.

A detailed evaluation of the effects of smoke on maintaining reactor control capability from either the control room or the alternate shutdown panel is provided in the response to Item 1(b) below.

GDC 4: ***Requires structures, systems, and components to be designed to accommodate the effect of accidents.***

The Control Room HVAC System, CRFAS System, Main Control Room structure, and the Radwaste Building structure have been designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including the design basis LOCA. Normal and postulated accident effects and load combinations are described in PBAPS UFSAR Sections 14.9 and 12.3.4. Environmental and missile design bases are in accordance with GDC 4.

The Control Room walls are designed to withstand the force of missiles associated with a tornado or with the turbine-generator, and thus protect equipment in the control room vital to a safe shutdown of the plant.

The CRE boundaries are designed to minimize interchange of exterior radioactive gases or toxic vapors into the habitability area. The CRE is designed specifically for leak-tightness. The Control Room is maintained at a slightly positive pressure with respect to the surrounding areas during normal operation and accident conditions. The CRE functions to provide an airtight containment to meet design requirements of AEC Criterion 4 and AEC Criterion 11.

GDC 5: ***Requires that an accident in one unit will not significantly impair the orderly shutdown and cooldown of the remaining unit.***

GDC 5 is similar to AEC 4. PBAPS was evaluated in accordance with AEC 4. The CR HVAC system is designed to perform its safety function in the event of an accident in one unit, and to achieve an orderly shutdown and cooldown in the other unit to conform to AEC 4 as documented in UFSAR Appendix F.2.

The Control Room HVAC System is located inside a seismic Category I structure (the Control Structure within the Radwaste Building), and is protected against natural phenomena to meet the requirements of AEC 4.

The Control Room HVAC system is provided with redundant equipment and controls to maintain the Control Room habitable during normal and accident conditions. As described above, the system meets single failure criterion for active safety related equipment. The safety related equipment is provided with standby power supplies from the Emergency Diesel Generators during loss of offsite power event. Enough redundancy is built into the Control Room HVAC system such that an accident in one unit will not prevent the ability to safely shutdown the remaining unit.

GDC 19: ***Requires a control room from which actions can be taken to operate the nuclear power unit safety under normal conditions and to maintain it in a safe condition under accident conditions.***

GDC 19 is similar to AEC 11. PBAPS was evaluated in accordance with AEC 11. The plant is provided with a common control room having shielding protection, air conditioning, and facilities to permit access and continuous occupancy within GDC 19 dose limits during design basis accident situations.

The plant design, therefore, does not contemplate the necessity for evacuation of the main control room. Nevertheless, equipment is provided to bring the plant to safe shutdown from outside the main control room in the event that it is necessary to evacuate the control room.

PBAPS complies with the criteria for control room habitability in accordance with NUREG 0737, "Clarification of TMI Action Plan Requirement," Item III.D.3.4. "Control Room Habitability," as described in a letter dated March 23, 1982, response to NUREG 0737, Item III.D.3.4. The CR HVAC system is adequate to provide safe, habitable conditions within the control room under both normal and accident conditions, including loss-of-coolant accidents and that occupancy can be maintained under accident conditions without personnel receiving radiation exposures in excess of limits imposed by GDC 19.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

Response

The current PBAPS CRE unfiltered inleakage value assumed in the design basis radiological analysis for control room habitability is 10 cfm.

Reasonable assurance is provided that control room integrity is still within its original design assumptions and as verified during the startup phase, based on above noted design features and existing programs and surveillances to ensure CRE integrity. Testing to verify inleakage is maintained below these assumed values has not been performed to date. Exelon is in the process of obtaining a vendor to perform an integrated inleakage test per ASTM E741 for this verification, as described in Exelon letter to the NRC dated August 11, 2003. Testing will be performed in all applicable accident modes of operation, and is expected to occur in 2004. Exelon will update the NRC regarding the testing schedule once a vendor contract has been issued. Final results will be transmitted to the NRC within 90 days after completion of the test, to fully address this information request.

Additionally, PBAPS has submitted a License Amendment Request, Exelon letter to the NRC dated July 14, 2003, for implementation of Alternative Source Terms (AST). This request contains information that demonstrates compliance with regulatory requirements with an unfiltered inleakage value of up to 1,600 cfm for all accidents. This value represents more than 50% of the fan-driven intake flow. It is expected that the measured inleakage will be well below this analytical assumption; and therefore, substantial margin will be provided to the analysis limits.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response

Hazardous Chemical Assessment:

Although the PBAPS HVAC system does not have a toxic gas mode, an evaluation was performed to assess the impact of toxic gas on control room habitability as part of the response to NUREG 0737, "Clarification of TMI Action Plan Requirements." As part of this response, control room habitability was assessed in accordance with NUREG 0737, including Standard Review Plans 2.2.2 through 2.2.3, and 6.4, Regulatory Guide 1.78 (Hazardous Chemical Releases), and Regulatory Guide 1.95 (Accident Chlorine Releases). This assessment included toxic and radioactive gases that are stored on-site as well as off-site, which could potentially impact control room habitability. The unfiltered in-leakage for this analysis was assumed to be 10 cfm.

The off-site assessment evaluated the number of hazardous chemical shipments per year via rail within 5 miles of the control room and the probability of an accident occurring, which could impact control room habitability. This evaluation concluded that, based on a low probability of an event occurring, PBAPS does not require protection from offsite hazardous chemicals.

In June 2002, an updated assessment of offsite hazardous material was performed. This assessment determined that an accident at other facilities within the 5-mile radius of PBAPS would not produce significant amounts of hazardous chemicals that would impact the habitability of the control room.

The on-site toxic chemical evaluation revealed that of all the chemicals stored onsite, only chlorine had the potential for impacting control room habitability. Based on this previous evaluation, a modification was previously implemented to replace chlorine gas with sodium hypochlorite for use in the water treatment plant thereby eliminating chlorine gas.

In addition, a comprehensive program exists at PBAPS for spill prevention control and responses. This is documented in the "Storage Tanks and Spill Prevention Response Plan" and PBAPS Procedure SE-6, "Pollution Incident Protection Procedure".

The Storage Tank and Spill Prevention Response Plan documents chemicals that are on-site, the quantity stored at a specific location, spill prevention strategy, and actions that need to be taken in the event of spill. This plan outlines responsibilities of organizations (such as Operations, Chemistry, and Environmental) for implementation of this program, and for ensuring safe operation of systems such that spills are prevented and/or managed appropriately to minimize the impact on safety.

Smoke Assessment:

Alternative shutdown capability has been provided outside of the CRE to ensure that safe shutdown can be achieved in the event of a fire in the control room, cable spreading room, computer room, or emergency shutdown panel area. Alternative shutdown capability relies on the use of four types of alternative control stations. Each alternative control station (ACS) includes transfer/isolation switches than can be used to transfer control of the safe shutdown components from the control room to the control switches located on the ACS. The transfer/isolation switches also provide electric circuit isolation between alternative shutdown circuits and circuits that could be affected by a fire in one of the four areas of concern. The alternate control stations include the HPCI Alternative Control Station, Emergency Switchgear Alternative Control Stations, Diesel Generator Alternative Control Stations, and the Automatic Depressurization System (Relief Valve) Alternative Control Stations.

When the decision has been made to shut the plant down from outside the control room because of a fire in either the control room, cable spreading room, computer room, or emergency shutdown panel area, the operators will scram the reactor and close the main steam isolation valves before leaving the control room. The operators will then proceed to the various alternative control stations and operate the transfer/isolation switches to take manual control of the systems needed for achieving safe shutdown. Detailed analysis has been performed to show that the operators can safely travel from the control room to the alternate shutdown panel in the event of an evacuation and continue to place the plant in a safe condition.

If fire or smoke is present in the Control Room and Control Room evacuation is required, the ability exists to safely shutdown the unit via the Alternate Shutdown Panel as discussed in plant Procedure SE 10, "Alternate Shutdown Restoration."

It is assumed that a significant fire in the control room envelope would result in leaving the control room for the alternate shutdown panel. A fire that does not force evacuation of the control room is considered to be small and it is unlikely the smoke conditions will make the control room uninhabitable. The fire will be quickly identified and extinguished, since the control room is constantly occupied. Smoke will be removed by the normal ventilation system over time. The current ventilation rate for the control room is 16.5 air changes per hour. This air turnover rate ensures that smoke will be dissipated quickly once the source of the smoke is extinguished. If necessary, smoke can be removed from the CR using smoke ejectors setup at the doorways to evacuate the smoke into the Turbine Building or Radwaste Building. The control room is capable of being purged with 100 percent outside air. A once-through flow is established using the air conditioning supply fans, with the return air fans discharging to atmosphere at the radwaste building roof. If the smoke conditions deteriorate, the operators can activate the alternate shutdown panel.

For a fire external to the control room where smoke infiltrates into the control room, the CRE will have a positive pressure as compared to adjacent rooms. Therefore, it is unlikely that smoke will enter from a fire in which the smoke is contained within the plant. However, since the control room does draw in air from the outside it is possible for an external fire to result in smoke entry into the control room. Smoke entry into the CRE from an exterior source would be gradual and the fire condition would be known to the control room personnel since it would take a large fire to result in this condition. The control room ventilation system could be placed in recirculation mode. In the recirculation mode the outside air coming into the control room envelope is limited. If smoke conditions did worsen, time would be available to don SCBA's.

The PBAPS control room operators have the capability to don SCBA's in the event of a smoke/fire event. There is one (1) pack and one (1) spare bottle stored in the control room for each operator. This will allow for a two-hour usage during the smoke incident. Additional bottles are available for use, staged at various locations throughout the plant (approximate total is 100 bottles). A fill station is located at Unit 1 for the filling of additional air pack bottles. Operators are tested and trained annually to maintain qualification for use of the air packs.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.*

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

<u>Response</u>

PBAPS Technical Specification 3.7.4 requires measurement of control room ΔP relative to adjacent areas. The frequency for this test is once every 24 months. It is recognized that this surveillance alone cannot quantify CRE unfiltered inleakage. As such, PBAPS has committed to performing an integrated inleakage test per ASTM E741 to quantify this inleakage.

The PBAPS Technical Specifications will be revised to include a new Section 5.0 administrative program for Control Room Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program will address the following:

- CRE Boundary/Breach Control
- CRE Integrity Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self-Assessment

A license amendment request to revise Technical Specification Section 5.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the expected integrated inleakage tracer gas test results to be performed in accordance with ASTM E741 and substantial inleakage margin available between the proposed AST analyses and the expected inleakage test results, other tests performed, and ongoing periodic program self-assessments, a PBAPS Technical Specification requirement for periodic inleakage testing other than the current ΔP test is not warranted. However, if significant problems, issues, repairs, or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

Response

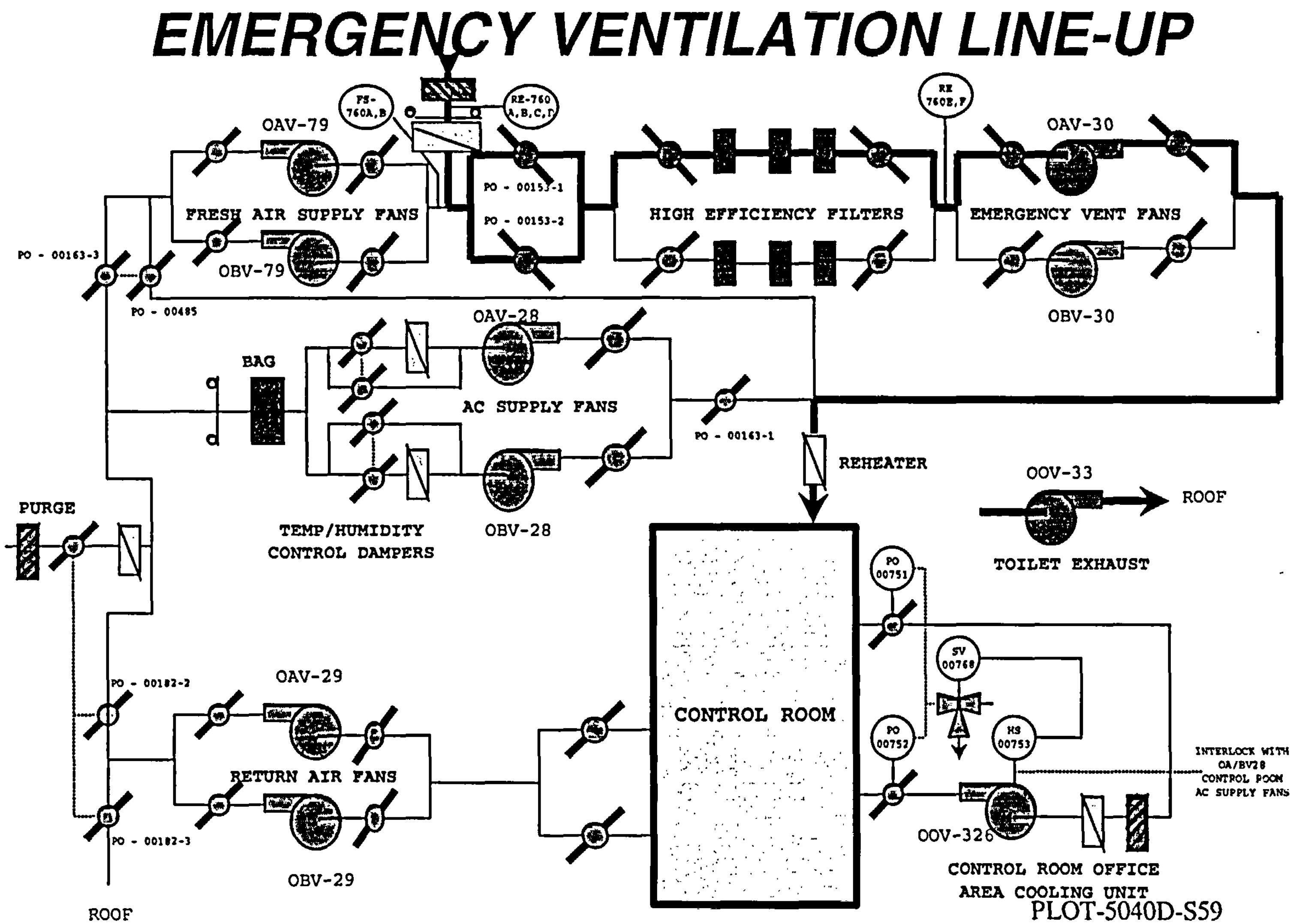
No compensatory measures are currently required to demonstrate control room habitability in any design basis radiological accident. The current licensing basis utilizes TID-14844 source term. All radiological accidents have been re-analyzed using AST and Regulatory Guide 1.183, and submitted to the NRC for approval in July 2003.

3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

Response

As stated in Item 1 above, PBAPS Units 2 and 3 were evaluated against the current AEC draft of the 27 GDC for nuclear power plants rather than the 70 criteria proposed in July 1967. PBAPS UFSAR Appendix H documents a subsequent review demonstrating that PBAPS Units 2 and 3 conform with the intent of the AEC (NRC) proposed GDC for Nuclear Power Plants, 10 CFR 50 Appendix A, July 1967. A detailed discussion of the GDC' s, as applicable to PBAPS, is provided in response to Item 1 above.

Figure 8-1



PLOT-5040D-S59

Figure 8-2

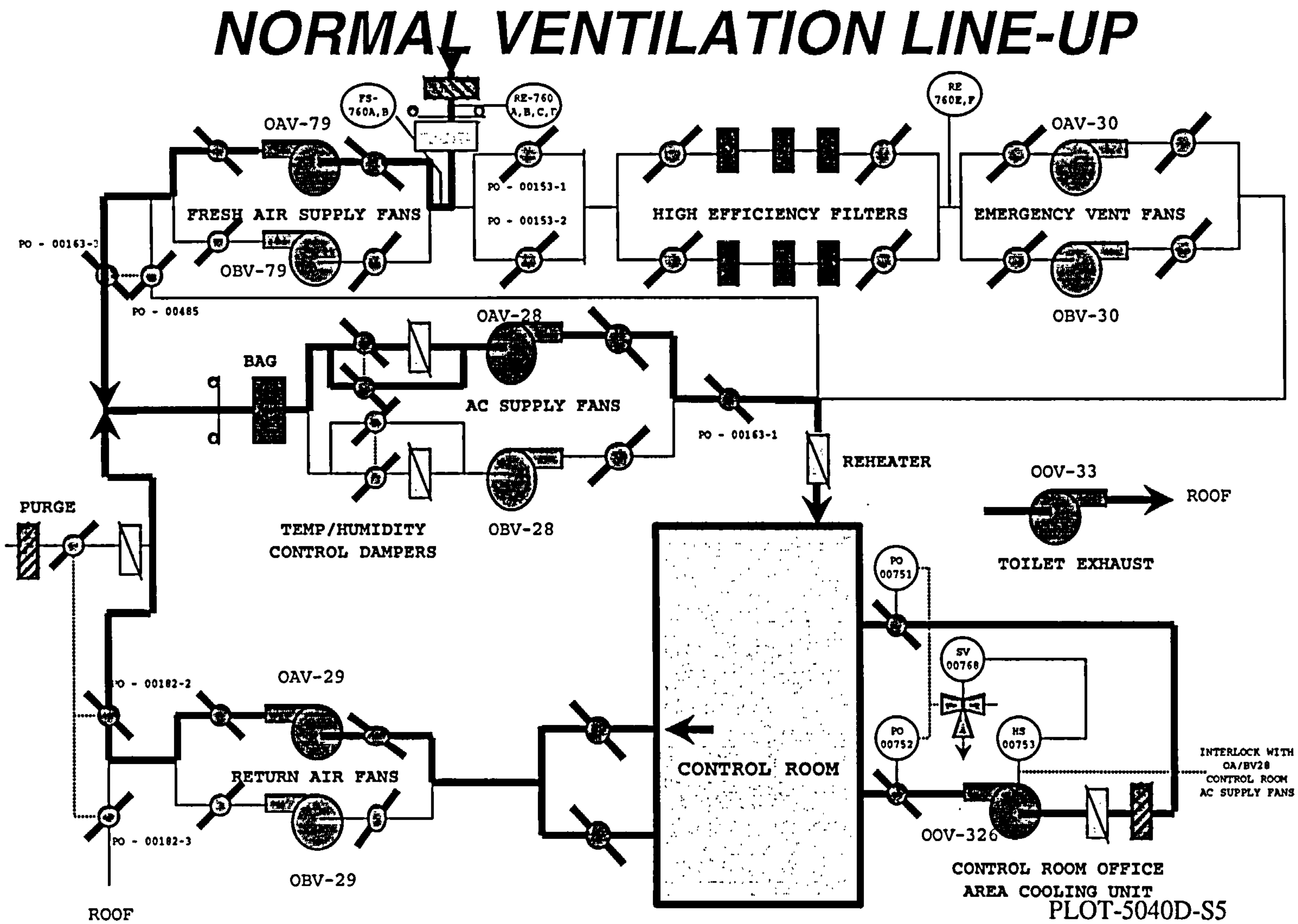
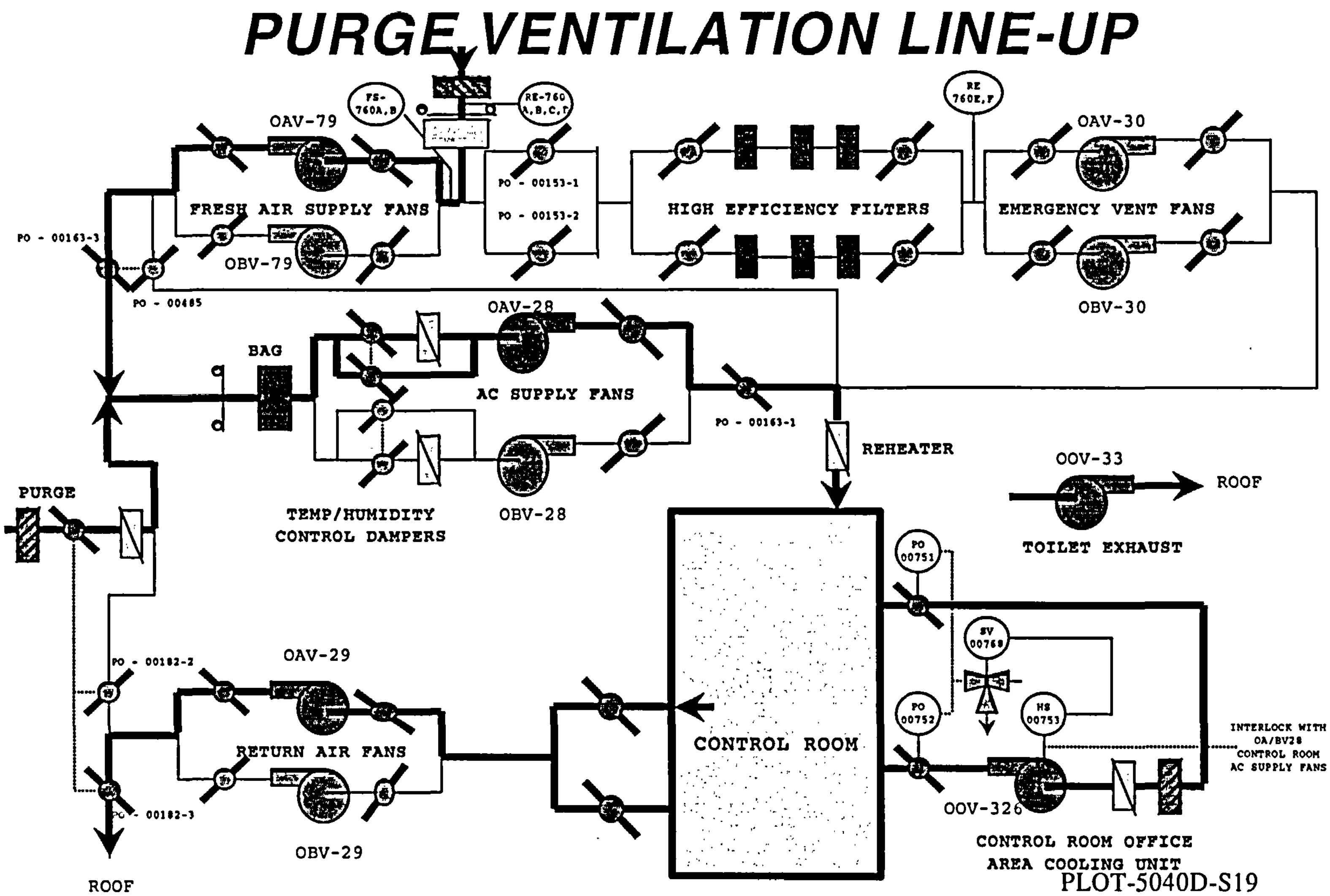

NORMAL VENTILATION LINE-UP
FS-760A,B
RE-760A,B,C,D
RE 760E,F
OAV-79
FRESH AIR SUPPLY FANS
OBV-79
PO - 00153-1
PO - 00153-2
HIGH EFFICIENCY FILTERS
OAV-30
EMERGENCY VENT FANS
OBV-30
PO - 00163-3
PO - 00485
BAG
OAV-28
AC SUPPLY FANS
OBV-28
PO - 00163-1
REHEATER
TEMP/HUMIDITY CONTROL DAMPERS
PURGE
OOV-33
ROOF
TOILET EXHAUST
PO 00751
SV 00768
PO 00752
HS 00753
INTERLOCK WITH OA/BV28 CONTROL ROOM AC SUPPLY FANS
PO - 00182-2
OAV-29
RETURN AIR FANS
OBV-29
PO - 00182-3
ROOF
CONTROL ROOM
OOV-326
CONTROL ROOM OFFICE AREA COOLING UNIT
PLOT-5040D-S5

Figure 8-3


PURGE VENTILATION LINE-UP
FS-760A,B
RE-760 A,B,C,D
RE 760E,F
OAV-79
FRESH AIR SUPPLY FANS
OBV-79
PO - 00153-1
PO - 00153-2
HIGH EFFICIENCY FILTERS
OAV-30
EMERGENCY VENT FANS
OBV-30
PO - 00163-3
PO - 00485
BAG
OAV-28
AC SUPPLY FANS
OBV-28
PO - 00163-1
REHEATER
TEMP/HUMIDITY CONTROL DAMPERS
PURGE
OOV-33
ROOF
TOILET EXHAUST
PO 00751
SV 00768
PO 00752
HS 00753
INTERLOCK WITH OA/BV28 CONTROL ROOM AC SUPPLY FANS
PO - 00182-2
OAV-29
RETURN AIR FANS
OBV-29
PO - 00182-3
ROOF
CONTROL ROOM
OOV-326
CONTROL ROOM OFFICE AREA COOLING UNIT
PLOT-5040D-S19

ATTACHMENT 9

180-Day Response to NRC Generic Letter 2003-01

Three Mile Island, Unit 1

AmerGen Energy Company, LLC

Attachment 9

180-Day Response to NRC Generic Letter 2003-01

Three Mile Island, Unit 1

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., General Design Criteria (GDC) 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

Response

The following provides a description of the design and operation of the TMI Unit 1 Control Building Ventilation System (CBVS). The system is safety-related and is designed and operated to satisfy single active failure criteria. A simplified schematic of the CBVS System is shown on attached Figure 9-1.

The CBVS is served by two normal duty supply fans (AH-E-17A/B), each sized to handle 100% of the required air supply. These fans have sufficient capacity to move air at the required rate against the total system resistance, including roughing filters, cooling coil, electric preheating coil, duct system, reheating coil, and air distribution device.

There are two emergency duty supply fans (AH-E-18A/B), each sized to handle 100% of the required air supply. These fans have sufficient capacity to move air at the required rate against the total system resistance, including the roughing, high efficiency particulate air (HEPA), and charcoal filters, cooling coil, electric preheating coil, duct system, reheating coil, and air-distribution device.

There are two normal duty filter banks, each sized to handle 100% of the required air supply. These filter banks are for roughing service only and are rated for an average ASHRAE efficiency between 80 and 85%.

There are two emergency duty filter banks, each sized to handle 100% of the required air supply. These filter banks are for the complete removal of particulate and gaseous contaminants, which may be radioactive. These filter banks consist of: (1) roughing cells rated for an average ASHRAE efficiency between 80 and 85%, (2) HEPA cells rated for an efficiency of 99.97% on 0.3-micron-diameter particles, and (3) charcoal cells which meet the requirements of ASTM D3803-1989.

There are two cooling coil banks, each sized for 100% of the design load. There are two mechanical water chillers, and two chilled water pumps, each sized for 100% of the design load.

The CBVS equipment is located within the seismic Category I Control Building structure, which is designed for the hypothetical aircraft incident. Provisions have been made for the Control Building air to be recirculated and to isolate the Control Building Envelope

(CBE), in case of Engineered Safeguard Signal, Air Intake Tunnel detection, or Control Building high radiation signals. During Control Building High Radiation Signal the air is recirculated through HEPA and charcoal filters. Fresh air is drawn through the underground ventilation tunnel, which has been provided with protection against combustible vapors, incipient explosions, and fires. The system monitors radioactive contamination inside the Main Control Room.

The Control Building Envelope (CBE) is maintained under habitable conditions following an accident. The CBE includes Control Building Elevations 380'-0" (Mechanical Equipment Rooms), 355'-0" (Main Control Room), 338'-6" (Cable/Relay Room), and 322'-0" (Alternate Shutdown Area), excluding Stairwell and Control Building Hallway (patio).

While the CBVS is in the Emergency Recirculation mode of operation, the Main Control Room (CBE Elevation 355'-0") is maintained at a positive pressure of ≥ 0.10 inches water gauge with respect to areas outside the CBE. Provisions have been incorporated as necessary into applicable procedures to account for ventilation system single active component failures, and maintain the required positive pressure. A positive pressure of ≥ 0.10 inches water gauge is not a criterion for the entire CBE. The pressure requirement in the cubicles of the CBE, other than the Main Control room, is that they are maintained at a positive pressure with respect to the areas outside the CBE. CBVS booster fans AH-E-95A and AH-E-95B assist in delivering air to Elevation 322'-0". Each fan is sized to handle 100% of the required flow. Fan AH-E-95A or AH-E-95B are required for the ventilation system to perform its design basis function of maintaining the CBE at a positive pressure with respect to outside adjacent areas. The return fans AH-E-19A and AH-E-19B are also required for the ventilation system to perform its safety function.

The Control Building supply and return system is operated from the control room and runs continuously. During normal operation the CBVS normal operating fans AH-E-17A/B supply a mixture of outside air and recirculated air to Control Building Elevations 380', 355', 322', and to controlled access Elevation 306' (excluding the Hot Tool Room).

The CBVS emergency recirculation mode takes place automatically upon initiation of an engineered safeguard signal (reactor building 4 psig signal), outside air intake tunnel hazard detection, or high radiation level detected in the control room. In the emergency recirculation mode, the isolation dampers AH-D-28 and AH-D-617 close. In the emergency recirculation mode of operation associated with an engineered safeguard signal or air intake tunnel hazard detection signal, the system normal operating fan AH-E-17A/B continues to operate in the recirculation mode through the normal filter bank.

In the emergency mode of operation associated with a high radiation signal from the control room, the system's normal operating fan AH-E-17A/B is shut down and the system emergency fan AH-E-18A/B is manually started to recirculate all the air from Elevations 322', 338', and 355' through the emergency filter bank consisting of HEPA and charcoal filters.

In the emergency mode of operation the CBVS recirculates air conditioned, filtered air to the Control Building Envelope only.

The outside air is monitored for combustible gases. In the event of a combustible gas signal, only the normal CBVS supply (AH-E-17A/B) and return fans (AH-E-19A/B) will continue to operate. This will place the Control Building in a recirculation mode (without outside air) using the normal supply and return fans.

The air intake tunnel is 455 feet long and provides a long residence time for any gas entering the air intake structure. The Control Building and air intake structure are approximately 350 feet and 70° azimuthally apart. Due to the geometric arrangement of the Control Building, air intake structure, and radiation source, the arrival of radioactive gas at these points at the same time is precluded.

The emergency CBVS equipment is served by redundant, Class 1E power supplies, designed to meet IEEE 279 and IEEE 308.

The CBVS equipment room at Elevation 380' is a part of the control structure, and is inside the CBE boundary.

Applicable Habitability Regulatory Requirements

TMI Unit 1 has been designed and constructed taking into consideration the general criteria for nuclear power plant construction permits as listed in the proposed AEC General Design Criteria, dated July 1967. By Staff Requirements Memorandum (SRM), SECY-92-223, issued on September 18, 1992, the Commission (with all Commissioners agreeing) approved the staff proposal to not apply the GDC to plants with construction permits issued prior to May 21, 1971. At the time of promulgation of Appendix A to 10CFR Part 50, the Commission stressed that the GDC were not new requirements and were promulgated to more clearly articulate the licensing requirements and practices in effect at that time. While compliance with the intent of the GDC is important, each plant licensed before the GDC were formally adopted was evaluated on a plant specific basis, determined to be safe, and licensed by the Commission. Furthermore, current regulatory processes are sufficient to ensure that plants continue to be safe and comply with the intent of the GDC. Backfitting the GDC would provide little or no safety benefit while requiring an extensive commitment of resources.

Proposed GDC 1: Quality Standards (associated with current GDC 1)

The TMI Unit 1 emergency CBVS components are safety related, designed to seismic Category I requirements, and located within a seismic Category I structure. These systems and associated components important to safety are appropriately tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the TMI Unit 1 structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant. The emergency CBVS meets the intent of the requirements of Regulatory Guides 1.78 and 1.95 for detection and automatic isolation capabilities for hazardous chemicals. The emergency CBVS components are suitable for emergency plant operation and design basis event environmental parameters. Testing of emergency CBVS filters meets the requirements of Regulatory Guide 1.52, Rev. 2 (March 1978) with acceptance criteria per ASTM D3803-1989 and ANSI N510-1980, as described in TMI Unit 1 Technical Specifications 3.15.1 and 4.12.1. Fire dampers are labeled by Underwriters Laboratory (UL).

In accordance with the Exelon QATR requirements, documents and records are maintained to show that required codes, standards, and specifications were followed; specified materials and correct procedures were applied; qualified personnel performed the work; and inspections and tests verified that parts and components meet the applicable specifications.

Proposed GDC 3: Fire Protection (associated with current GDC 3)

The TMI Unit 1 control room is designed to meet the requirements of GDC 3. Fire protection systems meeting the requirements of GDC 3 are provided. The fire protection program for TMI Unit 1 conforms to Appendix A to NRC Branch Technical Position BTP APCSB 9.5-1, and 10 CFR 50 Appendix R, as described in the TMI Unit 1 Fire Hazards Analysis Report (FHAR). All penetrations through walls, ceilings and floors of the control room are provided with 3-hour rated fire seals. All duct penetrations through these walls, ceilings and floors are provided with three-hour rated fire dampers. The control room is separated from other parts of the control structure by 3-hour rated barriers. Control Building HVAC ducts are provided with smoke detectors, which alarm in the control room and close specific dampers to isolate ventilation to specific Control Building areas sensing combustion products. Control panels in the control room are equipped with smoke detectors, which alarm in the control room. In addition, an Incipient Detection System monitors six areas on the 322'-0" elevation and two areas on the 338'-6" elevation of the CBE. This system further enhances the ability to detect a fire in its incipient stage. Provision is made for purging areas served by the CBVS of smoke from a fire. The CBVS is designed to operate during postulated fire events to ensure safe plant operation. Additional design details, including remote shutdown capability, are described in the TMI Unit 1 FHAR.

A detailed evaluation of the effects of smoke on maintaining reactor control capability from either the control room or the alternate shutdown panel is provided in the response to Item 1(b) below.

Proposed GDC 43: Accident Aggravation Prevention (associated with current GDC 4)

The TMI Unit 1 CBVS and the control building structure has been designed to accommodate the effects of and to be compatible with the environmental conditions associated with normal operation, maintenance, testing, and postulated accidents, including the design basis LOCA. Normal and postulated accident effects and load combinations, and environmental and missile design bases are described in TMI Unit 1 UFSAR Section 5.4. The TMI Unit 1 control room is located in a Class 1 structure, which is designed for the hypothetical aircraft incident. Fresh air is drawn through an underground ventilation tunnel, which is provided with protection against combustible vapors, incipient explosions, or fires. The tunnel is also designed for the hypothetical aircraft incident. The CBVS has redundant fans and chillers and is provided with a radiation detector and smoke detectors with appropriate alarms and interlocks.

Proposed GDC 4: Sharing of Systems (associated with current GDC 5)

TMI Unit 1 does not share any components connected with safety features or engineered safeguards control systems. The TMI Unit 1 Control Building structure and control room are separate from the Unit 2 facilities. Unit 2 is in a post-defueling monitored storage condition. Therefore, there is no credible accident at TMI Unit 2 that could impact TMI Unit 1 control room habitability.

Proposed GDC 11: Control Room (associated with current GDC 19)

TMI Unit 1 complies with the criteria for control room habitability in accordance with NUREG 0737, "Clarification of TMI Action Plan Requirements," Item III.D.3.4, "Control Room Habitability," as described in UFSAR Section 7.4.5. The CBVS is designed to ensure habitability after any of the design basis radiological accidents or fires. The emergency air filter trains and the control room shielding are designed to limit the occupational dose level, as required by GDC 19. The habitability systems are designed to meet GDC 19 of 10 CFR 50, Appendix A. In the event of a design basis accident in the reactor building, combustible gas detection in the air intake tunnel, or control room radiation detection, the control room will be placed in the pressurized filtered recirculation configuration. The TMI Unit 1 control room is maintained at a positive pressure in the emergency recirculation mode of operation. The most limiting calculated post-accident radiation doses for control room ingress, egress, and occupancy (on a rotating shift basis) are less than 5 rem total effective dose equivalent (TEDE) for the duration of the accident. This dose is within the dose limits specified in GDC 19 and 10 CFR 50.67-Accident source term.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through suitable procedures from locations outside the control room is provided by the remote shutdown system, if the control room becomes inaccessible. The remote shutdown system has the capability for prompt hot shutdown of the reactor, including necessary instrumentation and controls to maintain the unit in a safe condition during hot shutdown, and subsequent cold shutdown of the reactor. The remote shutdown panels conform to GDC 19.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

Response

TMI Unit 1 control room envelope tracer gas testing was performed in August 2000 to establish a measured air inleakage rate into the Control Building Envelope (CBE) with the CBVS in the emergency recirculation mode. The testing was performed with procedures based on the methodology described in ASTM E741-93, "Standard Test Method for Determining Air Change Rate in a Single Zone by Means of a Tracer Gas Dilution." The tests determined that the most limiting air inleakage rates were 233 $\pm$ 129 scfm for the "A" ventilation train and 189 $\pm$ 103 scfm for the "B" ventilation train.

The TMI-1 design basis radiological accident analyses for control room habitability assume a value of 1,000 scfm unfiltered air inleakage into the CBE. The CBE unfiltered inleakage rate of 1,000 scfm represents a factor of approximately three (3) over the most limiting measured unfiltered inleakage rate determined by the TMI Unit 1 tracer gas test results. The design basis radiological analysis conservatively assumes that the emergency ventilation system is manually initiated 30 minutes after the postulated Loss-of-coolant accident (LOCA). Also, during the initial 30 minutes a total of 4,000 cfm unfiltered air flow is assumed into the CBE. This value represents one-half of the maximum outside air intake flow and is conservative since the ventilation system is shutdown during this period with essentially zero flow. The current licensing basis for TMI Unit 1 incorporates the alternative source term in accordance with 10 CFR 50.67, as approved by the NRC in License Amendment No. 235, dated September 19, 2001. The TMI Unit 1 design basis LOCA calculated control room operator dose is 4.7517 rem TEDE, which remains within the 10 CFR 50.67 limit of 5 rem TEDE.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

Response

Hazardous Chemical Assessment

Unfiltered air inleakage test results are not incorporated into hazardous chemical assessments for TMI Unit 1. There are no chemical releases/spills onsite or offsite postulated to require control room isolation. All chlorine containers in excess of 150 lbs. have been removed from the TMI Unit 1 site. Administrative controls prohibit the procurement, ordering and delivery of chlorine cylinders greater than 150 lbs. Therefore, onsite releases of chlorine are not postulated and have been eliminated from the TMI Unit 1 licensing basis. Other chemicals utilized onsite have been evaluated and determined to have no potential adverse impact on control room habitability. Utilization of new chemicals onsite is evaluated in accordance with 10 CFR 50.59 for potential impact on control room habitability.

Offsite hazardous chemical train/truck traffic and industrial installations were evaluated to support the TMI Unit 1 IPEEE probabilistic risk assessment in December 1994. This evaluation identified that the chemical hazard to the plant is dominated by toxic chemical releases caused by the rupture of one tank car transporting chemicals on either of the two rail lines adjacent to the plant. Other sources of hazardous chemicals release, such as rupture of a large ammonia tank located 2.7 miles north of the site would not generate a high enough concentration of toxic gases at the control room intake to cause control room uninhabitability and lead to significant disruption of normal activities of the operators. These scenarios were determined to be negligible contributors to the frequency of accident scenarios initiated by the release of toxic chemicals. This evaluation determined that the probability of exceeding a toxic limit in the control room is 8.1E-6 per year, and the total mean frequency of core damage due to scenarios initiated by rail car accidents releasing toxic chemicals is 1.6E-7 per year. This total core damage frequency is below the screening criterion specified in NUREG-1407.

Smoke Assessment

Reactor control capability is maintained from the control room during a smoke event external to the control room. If smoke were detected in the air intake tunnel supply to the CBVS, then the fire dampers would isolate the supply air to the system, and it would remain on recirculation. Externally generated smoke can potentially enter the Control Building through outside air supply damper AH-D-39. This damper is not relied on to control smoke. The smoke is minimized by the closure of the fire damper AH-D-5 in the air intake tunnel. Ventilation system ducts within the CBE are equipped with smoke detectors, which alarm in the control room. These detectors minimize smoke infiltration by isolating ventilation system smoke dampers. Ventilation systems which would be used for smoke removal have been evaluated against NRC Branch Technical Position (BTP) APCSB 9.5-1, Appendix "A", Position D.4(b), to ensure that inadvertent operation or single failure will not violate the controlled areas of the plant design including maintaining habitability for operations personnel, as described in the TMI Unit 1 Fire Hazards Analysis Report (FHAR). In the control room, ionization smoke detectors are provided inside or above safety related control consoles and panels, which alarm on the control room fire alarm panel. Smoke detectors are also provided in the ceiling of the control room. These detectors provide early indication of any fire condition within the control room. The Relay Room, located directly below the control room, has ionization detectors and provisions for manual smoke venting. A gaseous suppression system is installed in the Relay Room to provide extinguishment. The control room is continuously manned, such that any smoke or odor from a fire would be immediately apparent. Fire brigade response to any fire will significantly limit fire severity and duration. The control room fire loading is low and consists of cable insulation, which is slow burning, and transient materials. Hose stations are provided adjacent to the control room. Portable extinguishers are provided both inside and outside the control room in accessible areas. Temporary ventilation smoke ejectors and flexible round duct are available for portable ventilation use. Portable fans will exhaust any smoke from the Control Building. The Fire Pre-Plans provide the steps to take to accomplish smoke removal from different areas in the CBE.

The TMI Unit 1 control room is provided with two redundant lighting units powered by onsite ES power supplies and one separate DC lighting system. At least one lighting system is available to illuminate the control room for all fire scenarios. Self-contained breathing apparatus (SCBA) using full-face positive pressure masks approved by NIOSH are provided for control room personnel. Each SCBA has a 60-minute air supply with a 60-minute backup. Also, there is an air compressor and cascade system for unlimited air supply. TMI Unit 1 design meets NRC BTP APCSB 9.5-1, Appendix "A", Position

D.4(f) requirement to minimize smoke infiltration to stairwells and access/exit routes, as described in the TMI Unit 1 FHAR. The alternate shutdown panel is located within the Control Building Envelope. The remote shutdown panel provides safe shutdown capability in the event of an Appendix R type fire in any of four different fire areas within the Control Building: Control Room, Relay/Cable Spreading Room, ES Actuation Cabinet Room, or Health Physics and Lab Area. The operators need only trip the reactor prior to leaving the control room. Transfer switches to isolate the control room circuits are located on remote shutdown transfer switch panels located outside the above fire areas. In the event of significant smoke inside the control room, Procedure OP-TM-EOP-020, "Cooldown from Outside the Control Room," is used to direct plant shutdown/cooldown. SCBA equipment is located in the plant to provide a source of air for the operators. The TMI Unit 1 IPEEE analysis results identified no significant core damage sequences caused by in-plant fires.

These design provisions effectively minimize the potential of smoke infiltration into the control room and remote shutdown panel areas, and thus provide adequate assurance that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.*

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

Response

TMI Unit 1 Technical Specification Sections 3.15 and 4.12 provide Emergency Control Room Air Treatment System limiting conditions of operation and surveillance requirements, respectively. The emergency fans, and HEPA and charcoal adsorber banks must be operable and capable of producing design flow and satisfying minimum filter efficiency requirements. The Technical Specifications allow continued reactor operation or irradiated fuel handling operations with one inoperable control room air treatment system to continue for 7 days provided the redundant system is verified to be operable. If both systems are inoperable or the inoperable system cannot be made operable in 7 days, irradiated fuel handling operation shall be terminated and reactor shutdown shall be initiated. Technical Specification surveillance requirements include HEPA filter and charcoal adsorber bank pressure drop/flow and air distribution testing, filter test and sample analysis, emergency fan/filter circuit operation, and Control Building isolation/recirculation damper testing. The TMI Unit 1 Technical Specifications do not include a ΔP surveillance requirement or a requirement to verify control room envelope integrity.

The TMI Unit 1 Technical Specifications will be revised to include a new Section 6.0 administrative program for Control Room Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program will address the following:

- CRE Boundary/Breach Control
- CRE Integrity Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self-Assessment

A license amendment request to revise Technical Specification Section 6.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the test results (performed in accordance with ASTM E741) and available margin between measured inleakage and the licensing basis analytical value, other tests performed since, and ongoing periodic program self-assessment, a TMI Unit 1 Technical Specification requirement for periodic testing other than the current requirements is not warranted. However, if significant problems, issues, repairs, or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

<u>Response</u>

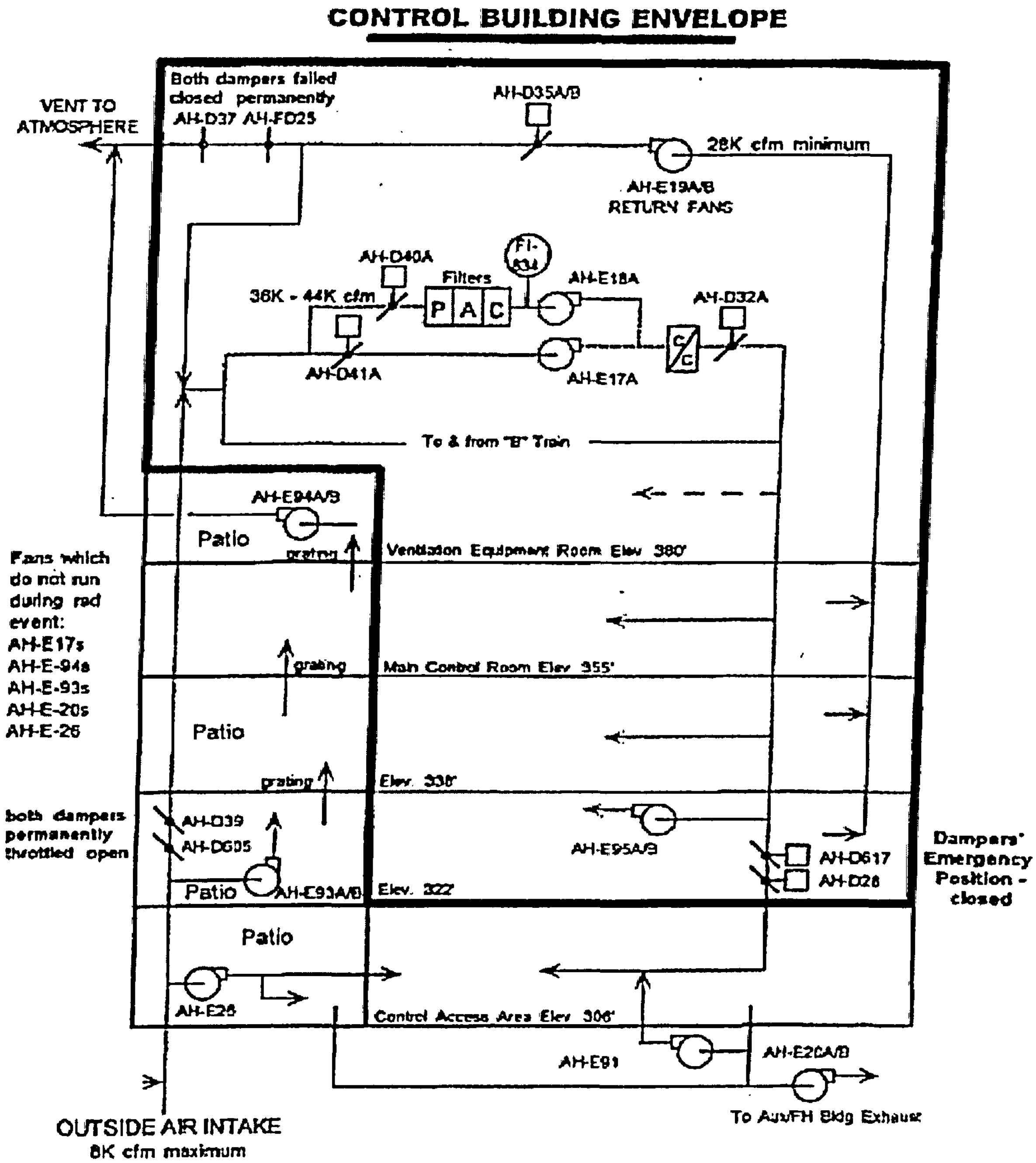
No compensatory measures are required to demonstrate TMI Unit 1 control room habitability for radiological releases or hazardous chemical release consequences. Therefore, there are no corrective actions that needed to retire such measures.

3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

Response

TMI Unit 1 meets the GDC that are applicable to control room habitability. A detailed discussion of the GDC as applicable to TMI Unit 1 is provided in response to Item 1 above.

Figure 9-1



TMI-1 CONTROL BUILDING VENTILATION SYSTEM
(Simplified drawing)

ATTACHMENT 10

180-Day Response to NRC Generic Letter 2003-01

Quad Cities Nuclear Power Station, Units 1 and 2

Exelon Generation Company, LLC

Attachment 10

180-Day Response to NRC Generic Letter 2003-01

Quad Cities Nuclear Power Station, Units 1 and 2

On June 12, 2003, the NRC issued NRC Generic Letter 2003-01, "Control Room Habitability." The Generic Letter requested the following information.

1. *Provide confirmation that your facility's control room meets the applicable habitability regulatory requirements (e.g., General Design Criteria (GDC) 1, 3, 4, 5, and 19) and that the Control Room Habitability Systems (CRHSs) are designed, constructed, configured, operated, and maintained in accordance with the facility's design and licensing bases.*

<u>Response</u>

Following is a brief summary of the Control Room HVAC system. Additional details are given in Quad Cities Nuclear Power Station (QCNPS) Unit 1 and Unit 2 Updated Final Safety Analysis Report (UFSAR) Sections 6.4, Habitability Systems, 6.5, Fission Product Removal and Control Systems, and 9.4, Air Conditioning, Heating, Cooling, and Ventilation Systems.

The Control Room is common for QCNPS, Units 1 and 2, and shares the Control Room HVAC System. There are two trains of HVAC that serve the Main Control Room for QCNPS Units 1 and 2. The Train "A" Control Room HVAC system is a non-safety related system that serves the Main Control Room, Cable Spreading Room (CSR), Auxiliary Electric Equipment Room (AEER), and miscellaneous hallway and office spaces adjacent to the Main Control Room. The Train "B" Control Room HVAC system is safety related and seismic, and consists of an air handling unit, refrigeration condensing unit and Air Filtration Unit (AFU). Train "B" serves the entire Control Room Envelope (CRE), which includes the Main Control Room, CSR, AEER, Old Computer Room, and Train "B" HVAC Equipment Room. During normal operation Train "A" operates primarily, while Train "B" operates in the event Train "A" fails or is taken out of service for maintenance. In the event of LOCA, Train "B" is operated and its supply of outside air is filtered by the AFU. Train "B" is operable during a loss of offsite power or instrument air. Figure 10-1 provides a simplified schematic.

The air intake for Train "A" is continuously monitored for ammonia and smoke. The air intake for the Train "B" is continuously monitored for ammonia. In addition, ammonia concentration is also monitored in the Main Control Room. Upon receiving a high ammonia concentration signal from any of the normal air intakes, the CRE intakes are isolated automatically. The AFU cannot operate with outside air intakes isolated, unless manual actions are taken.

The CRHSs are designed so that radiation exposure of control room personnel does not exceed the limits of NUREG-0800, Standard Review Plan (SRP) 6.4, or of GDC 19 of Appendix A to 10 CFR 50. GDC 19 and SRP 6.4 require adequate radiation protection to permit access to and occupancy of the control room under accident conditions without personnel receiving radiation exposure in excess of 5 rem whole body, or its equivalent to any part of the body for the duration of the design basis accident (DBA).

The Train "A" Control Room HVAC Air Handling Unit is located in an equipment room across the hall from the Main Control Room and outside the CRE. The Train "B" Control Room HVAC Air Handling Unit and Refrigeration Condensing Unit are located in "B" Train equipment room located in the Unit 1 Turbine Building. This equipment room is part of the CRE. The AFU is located just outside the "B" Train equipment room. The Train "B" Control Room HVAC system is powered from vital buses in Unit 1. The condensing unit is cooled by non-safety and safety related service water systems.

The AFU is sized to accommodate 2000 scfm and is located near the Train "B" HVAC equipment room. This component consists of a prefilter, electric heating coils, an upstream high efficiency particulate air (HEPA) filter, charcoal filters, and a downstream HEPA filter. Two 100%-capacity fans for this unit are located inside the Train "B" HVAC equipment room.

The control room HVAC system isolates on high drywell pressure, low reactor vessel water level, high main steam line flow, detection of toxic gas, or high radiation levels in the drywell, reactor building, or refueling floor. The control room can also be isolated by operator action or by detection of smoke in the Train"A" outdoor air intake. Transfer of the control room HVAC systems to the emergency (pressurization) mode of operation is not a fully automatic operation, since some control room HVAC system components must be manually started to operate the control room HVAC systems in the emergency (pressurization) mode. The manual actions required when placing the Control Room HVAC system into the pressurization mode following an accident include: (1) starting the refrigeration condensing unit; and (2) starting one AFU fan.

Applicable Habitability Regulatory Requirements

General Conformance with General Design Criteria (GDC)'s

The QCNPS was originally designed and constructed prior to the issuance of GDC' s. Proposed GDC' s were issued in July 1967, during the construction of the plant. These proposed GDC' s were not adopted as regulatory requirements at the time QCNPS was built. However, the proposed GDC' s (issued July 1967) were used by the Atomic Energy Commission (AEC) as guidance in evaluating the original design of QCNPS. This review indicated that based on the applicant's understanding of the intent of the proposed GDC' s, QCNPS fully satisfies the intent of the criteria. The proposed GDC' s contained many aspects that required modification or clarification prior to adoption of the current GDC' s. By Staff Requirements Memorandum (SRM), SECY-92-223, issued on September 18, 1992, the Commission (with all Commissioners agreeing) approved the staff proposal to not apply the GDC to plants with construction permits issued prior to May 21, 1971. At the time of promulgation of Appendix A to 10CFR Part 50, the Commission stressed that the GDC were not new requirements and were promulgated to more clearly articulate the licensing requirements and practices in effect at that time. While compliance with the intent of the GDC is important, each plant licensed before the GDC were formally adopted was evaluated on a plant specific basis, determined to be safe, and licensed by the Commission. Furthermore, current regulatory processes are sufficient to ensure that plants continue to be safe and comply with the intent of the GDC. Backfitting the GDC would provide little or no safety benefit while requiring an extensive commitment of resources. Contained herein is an evaluation of the design basis of the QCNPS relative to the proposed and current GDCs.

Proposed GDC 1 – Quality Standards (associated with current GDC 1)

The reactor facility's essential components and systems were designed, fabricated, erected and perform in accordance with the specified quality standards which are, as a minimum, in accordance with applicable codes and regulations. These systems and associated components important to safety are appropriately tested, maintained, and operated in accordance with the Exelon Quality Assurance Topical Report (QATR). The Exelon QATR satisfies the requirements of 10 CFR 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," and has been reviewed and approved by the NRC. The Exelon QATR is designed and implemented to ensure that the QCNPS structures, systems, and components important to safety are tested and operated in conformance with the regulatory requirements and design bases of the plant.

Proposed GDC 3 – Fire Protection (associated with current GDC 3)

Design allowances are provided to minimize the occurrence of fire and explosions and their effects by the use of noncombustible and fire resistant materials throughout the plant.

The Control Room, CSR, and AEER are all contained in a single fire area (Fire Area SB-1). Three-hour fire barriers separate SB-1 from the adjacent fire areas. This limits the potential for fire spread from adjacent fire areas into SB-1.

Smoke detectors are located in all three rooms that alarm in the Control Room. Smoke detectors are also located in return duct and supply duct for the Control Room ventilation. Activation of the detectors in the return duct will cause the ventilation system to place the Control Room into a smoke purge mode, causing dampers to reposition to bring in 100% outside air. Activation of the detectors in the supply duct will isolate the control room ventilation and put it into 100% recirculation. Additionally there is a wet-pipe sprinkler system located in the CSR. Activation of the sprinkler system is alarmed in the Control Room.

Combustible loading in the CSR and AEER is medium with the majority of the combustible consisting of electrical cables. The combustible loading in the Control Room is due primarily to transient loading in the form of paper products. In all three fire zones, detection of the fire will be quick due to the smoke detectors in the rooms and ventilation ducts. Fire brigade response will then limit the damage caused by any fire.

Analyses have been performed to verify that the plant could be safely shut down with a fire in the Control Room, CSR, and AEER. This analysis assumes that all equipment in SB-1 is damaged. The plant safe shutdown analysis confirms that a train of equipment that can allow the plant to achieve and maintain a hot shutdown condition remains free of fire damage. This includes a source of reactor water makeup, containment cooling, and the electrical equipment required to support their functions.

Proposed GDC 43 – Accident Aggravation Prevention (associated with current GDC 4)

Components of the engineered safety features (ESF) which are required to function after design basis accidents or incidents are designed to withstand the most severe forces and environmental effects, including missiles from plant equipment failures anticipated from the events, without impairment of performance capability and without accentuating adverse aftereffects of the accident.

Proposed GDC 4 – Sharing of Systems (associated with current GDC 5)

QCNPS Units 1 and 2 share some systems and components as specified in UFSAR Sections 1.2.4, 6.2.3, 6.5, and 9.2.2. This sharing does not result in undue risk to the health and safety of the public.

The reactor facility consists of two boiling water reactor generating units located on a common site. The design criteria and performance objectives for systems and components located on a single unit site are equally applicable to the systems and components shared between two units on a common site. Additional design criteria have been used in the design of Units 1 and 2. These stipulate that:

A. Equipment and facilities are shared only when it can be done without compromising or interfering with the independent operation of Units 1 and 2;
B. For unshared equipment, the equipment and its controls will be physically separated and identified;
C. Operation or safe shutdown of either Unit 1 or 2 will not be precluded as a result of reactor operator error or equipment malfunction in the other unit; and
D. Operation or safe shutdown of either Unit 1 or 2 after a postulated design basis accident in the other unit will not be precluded because of the shared equipment or facilities.

Proposed GDC 11 – Control Room (associated with current GDC 19)

In response to NUREG 0737 Task Action Plan Item III.D.3.4, "Control Room Habitability," QCNPS committed to install a redundant Control Room HVAC system (Train "B").

The plant is provided with a centralized control room having adequate shielding, fire protection, air conditioning, and facilities to permit access and continuous occupancy under 10 CFR 20 limits during all design basis accident situations. The plant design does not contemplate the necessity for evacuation of the Control Room. However, if it is necessary to evacuate the Control Room, the design does not preclude the capability to bring the plant to a safe, cold shutdown from outside the Control Room. The necessary plant controls, instrumentation, and alarms for safe and orderly operation are located in the Control Room. These include such controls as the control rod position indication, the reactor core heat removal system, and reactor coolant system leakage detection system.

Current GDC 19 – Control Room

In response to NUREG 0737 Task Action Plan Item III.D.3.4, "Control Room Habitability," QCNPS committed to install a redundant Control Room HVAC system (Train "B").

The CRHSs are designed so that radiation exposure of control room personnel does not exceed the limits of NUREG-0800, SRP 6.4, or of GDC 19 of Appendix A to 10 CFR 50. GDC 19 and SRP 6.4 require adequate radiation protection to permit access to and occupancy of the Control Room under accident conditions without personnel receiving radiation exposures in excess of 5 rem whole body, or its equivalent to any part of the body for the duration of the DBA. Satisfactory radiation protection is based on pressurizing the Control Room emergency zone with filtered outdoor air no later than 110 minutes after radiation has been detected in the reactor building ventilation manifolds. In addition, both the intake and the dampers which isolate the non-habitable areas from the emergency zone are isolated automatically by the following signals: (1) high drywell pressure (2) low reactor vessel water level (3) high main steam line flow (4) detection of toxic gas (5) high radiation levels in the drywell, reactor building or refueling floor.

1(a) *That the most limiting unfiltered inleakage into your CRE (and the filtered inleakage if applicable) is no more than the value assumed in your design basis radiological analyses for control room habitability. Describe how and when you performed the analyses, tests, and measurements for this confirmation.*

<u>Response</u>

Radiological analyses performed for QCNPS demonstrate that the postulated loss-of-coolant accident (LOCA) is the most restrictive accident for radiological dose consideration to the Control Room. The LOCA radiological analysis assumes that there is 260 cfm of unfiltered inleakage into the CRE in the pressurized radiation mode of operation. For all other accidents, the normal (unfiltered) mode of HVAC operation is assumed. Radiological dose to Control Room operators is analyzed for both modes of operation and have been determined to be acceptable per GDC 19.

In April 1997, two (2) Unfiltered Air Inleakage tracer gas tests were performed on the QCNPS CRE, in accordance with ASTM Standard E741. The CRE consisted of the Main Control Room, the CSR, the AEER, and the B HVAC Equipment Room. The first test was in the Train "A" isolation/pressurization mode. This test yielded the results of 222 cfm +/- 75 cfm of unfiltered air inleakage into CRE. The second test was in the Train "B" isolation/pressurization mode. This test yielded the results of 88 cfm +/- 74 cfm of unfiltered air inleakage into CRE. During a LOCA, Train "B" is the HVAC system that will operate.

Therefore, the most limiting measured unfiltered inleakage is bounded by the value assumed in the QCNPS design basis radiological analyses for control room habitability.

In addition to the above testing, QCNPS also performs differential pressure testing of the CRE once per cycle, using the Train "B" HVAC system. This verifies the differential pressure at many different areas of the CRE with respect to the adjacent spaces. This testing is done in accordance with Technical Specification requirements. QCNPS also periodically performs visual inspections of the ductwork, dampers, air handling units, AFUs, etc. to ensure that the equipment is in good working order and there has been no degradation of the penetrations, doors, and equipment seals. These inspections are performed in accordance with existing procedures and ensure that all components are inspected at least once per three years.

1(b) *That the most limiting unfiltered inleakage into your CRE is incorporated into your hazardous chemical assessments. This inleakage may differ from the value assumed in your design basis radiological analyses. Also, confirm that the reactor control capability is maintained from either the control room or the alternate shutdown panel in the event of smoke.*

<u>Response</u>

The CRE is designed to be isolated automatically or manually in case of a hazardous chemical release. Toxic gas monitors are provided at the outside air intakes for ammonia to isolate the CRE automatically. Operator action is required to isolate the CRE for other chemicals whose control room concentrations do not exceed toxicity limits within two minutes after detection of odor. Two minutes is considered to be adequate time for the operators to take appropriate protective actions to isolate the CRE and don self-contained breathing apparatus (SCBAs) per Regulatory Guide 1.78.

In the ammonia isolation mode for the control room, 260 cfm of unfiltered in-leakage is assumed. For all other hazardous chemical accidents, the normal (unfiltered) mode of the HVAC is assumed.

SCBAs are available in the Control Room in sufficient quantities for operator use in the event of a release of hazardous materials that could affect plant operation. Use of SCBA gear by the operators is reviewed in annual qualification training courses.

The toxic gas analyzer is set to isolate the CRE automatically if ammonia is detected in any of the air intake ducts at a concentration of 25 ppm. In addition, a toxic gas analyzer is provided in the Main Control Room, which warns operators if the ammonia concentration in the Main Control Room exceeds 20 ppm. The threshold of ammonia concentration for isolating the CRE is far below the toxicity limit of 300 ppm (reference Regulatory Guide 1.78, Revision 1), which should allow the 2 minutes needed by Regulatory Guide 1.78 for the operators to don SCBAs before toxicity levels are reached in the Control Room.

Unfiltered air in-leakage testing of the toxic gas isolation mode has not been performed. However, all the ductwork and dampers affected by the toxic gas isolation mode of operation have been bounded by the two previously performed unfiltered air in-leakage tracer gas tests performed on Train "A" and Train "B" pressurization modes. During the toxic gas isolation mode the CRE is at a neutral pressure. Testing of the toxic gas isolation mode is not required based on previously performed in-leakage tests and credit for use of SCBAs.

Onsite hazardous chemical usage and storage is controlled by approved station procedures, which address control room habitability considerations. An assessment of offsite hazardous chemicals in stationary facilities within a 5-mile radius of the plant was performed in 2003 and is re-performed every 3 years in accordance with existing NRC commitments associated with License Amendment Nos. 140 and 135, for Units 1 and 2 respectively. Results of the offsite hazardous chemical assessments performed in 2003 show that the only hazardous chemical available for offsite release is ammonia. Installed ammonia detectors continue to provide adequate protection to CR operators.

The capability for prompt hot shutdown of the reactor and the capability for subsequent cold shutdown through suitable procedures from locations outside the Control Room are provided by the remote shutdown system, if the Control Room becomes inaccessible. Remote shutdown details of the plant is addressed in the QCNPS Safe Shutdown Report (Fire Protection Report Volume 2).

In the event that smoke is generated from within the Control Room, the HVAC system can quickly purge the area of smoke. For an event in which smoke is generated from sources external to the Control Room, the CRE can be isolated, thereby minimizing intrusion of smoke from outside. SCBAs are available for use by Control Room operators.

1(c) *That your technical specifications verify the integrity of the CRE, and the assumed inleakage rates of potentially contaminated air. If you currently have a differential pressure (ΔP) surveillance requirement to demonstrate CRE integrity, provide the basis for your conclusion that it remains adequate to demonstrate CRE integrity in light of the ASTM E741 testing results. If you conclude that your ΔP surveillance requirement is no longer adequate, provide a schedule for: 1) revising the surveillance requirement in your technical specification to reference an acceptable surveillance methodology (e.g., ASTM E741), and 2) making any necessary modifications to your CRE so that compliance with your new surveillance requirement can be demonstrated.*

If your facility does not currently have a technical specification surveillance requirement for your CRE integrity, explain how and at what frequency you confirm your CRE integrity and why this is adequate to demonstrate CRE integrity.

<u>Response</u>

It is recognized that ΔP surveillance alone cannot verify or quantify CRE unfiltered inleakage. Therefore, in April 1997 two Unfiltered Air Inleakage tests were performed on the QCNPS CRE, in accordance with ASTM Standard E741. The scope of this testing and the test results are described in response to Item 1(a) above.

QCNPS has implemented differential pressure testing of the CRE relative to adjacent areas every 24 months in accordance with Technical Specification Surveillance Requirement 3.7.4.4. Trending is performed of observed differential pressure values during the performance of periodic surveillances and measured filter velocities and airflows through the AFU. The installations of CRE penetrations and barrier impairments have been observed since 1997. Potential degradation due to CRE pressure boundary breaches is appropriately controlled. QCNPS performs visual inspections, in accordance with existing procedures, of the ductwork, dampers, air handling units, AFUs, etc. to ensure that the equipment is in good working order and there has been no degradation of the walls, ceiling, floor, penetrations, doors, or equipment seals. This inspection is periodically performed every 3 years. QCNPS has implemented a Plant Barrier Control Program that controls the impairment of plant barriers during maintenance activities. The program evaluates wall and ceiling penetrations, opening doors, duct access, and equipment access. This program ensures that seals, penetrations, equipment and duct barriers are controlled to ensure plant barriers are maintained in their as designed condition.

The QCNPS Technical Specifications will be revised to include a new Section 5.0 administrative program for Control Room Habitability. This program will ensure that existing procedures and processes in place are such that the plant continues to be operated and maintained in accordance with the licensing and design bases. Elements of the program will address the following:

- CRE Boundary/Breach Control
- CRE Integrity Procedure Control
- Control Room Habitability Hazardous Chemical Control
- CRE Integrity Design Change Control
- CRE Integrity Testing Methods
- Control Room Habitability Safety Analyses Control
- CRE Maintenance Control
- Periodic Control Room Habitability Self Assessment

A license amendment request to revise Technical Specification Section 5.0 to incorporate the CRE Integrity Program requirement will be submitted by September 30, 2004.

Based on the 1997 test results performed in accordance with ASTM E741, other tests performed, and ongoing periodic program self-assessment, a QCNPS Technical Specification requirement for periodic testing other than the current ΔP test is not warranted. However, if significant problems, issues, repairs or modifications arise such that another test is needed in order to verify sufficient margin with the assumed value in the design basis analyses, a new test will be performed in accordance with the program.

2. *If you currently use compensatory measures to demonstrate control room habitability, describe the compensatory measures at your facility and the corrective actions needed to retire these compensatory measures.*

Response

No compensatory measures are credited to demonstrate control room habitability in any design basis radiological accident. Therefore, no corrective actions are needed to retire such measures.

3. *If you believe that your facility is not required to meet either the GDC, the draft GDC, or the "Principal Design Criteria" regarding control room habitability, in addition to responding to 1 and 2 above, provide documentation (e.g., Preliminary Safety Analysis Report, Final Safety Analysis Report sections, or correspondence) of the basis for this conclusion and identify your actual requirements.*

Response

As noted in response to item 1, the proposed GDC (issued July 1967) were used by the AEC as guidance in evaluating the original design of QCNPS. That review showed that based on the applicant's understanding of the intent of the proposed GDC, it was felt that the QCNPS fully satisfies the intent of the criteria. A detailed discussion of the GDC' s as applicable to QCNPS is provided in response to Item 1 above.

Figure 10-1

CONTROL ROOM TRAIN A HVAC SYSTEM
NORMAL OPERATION

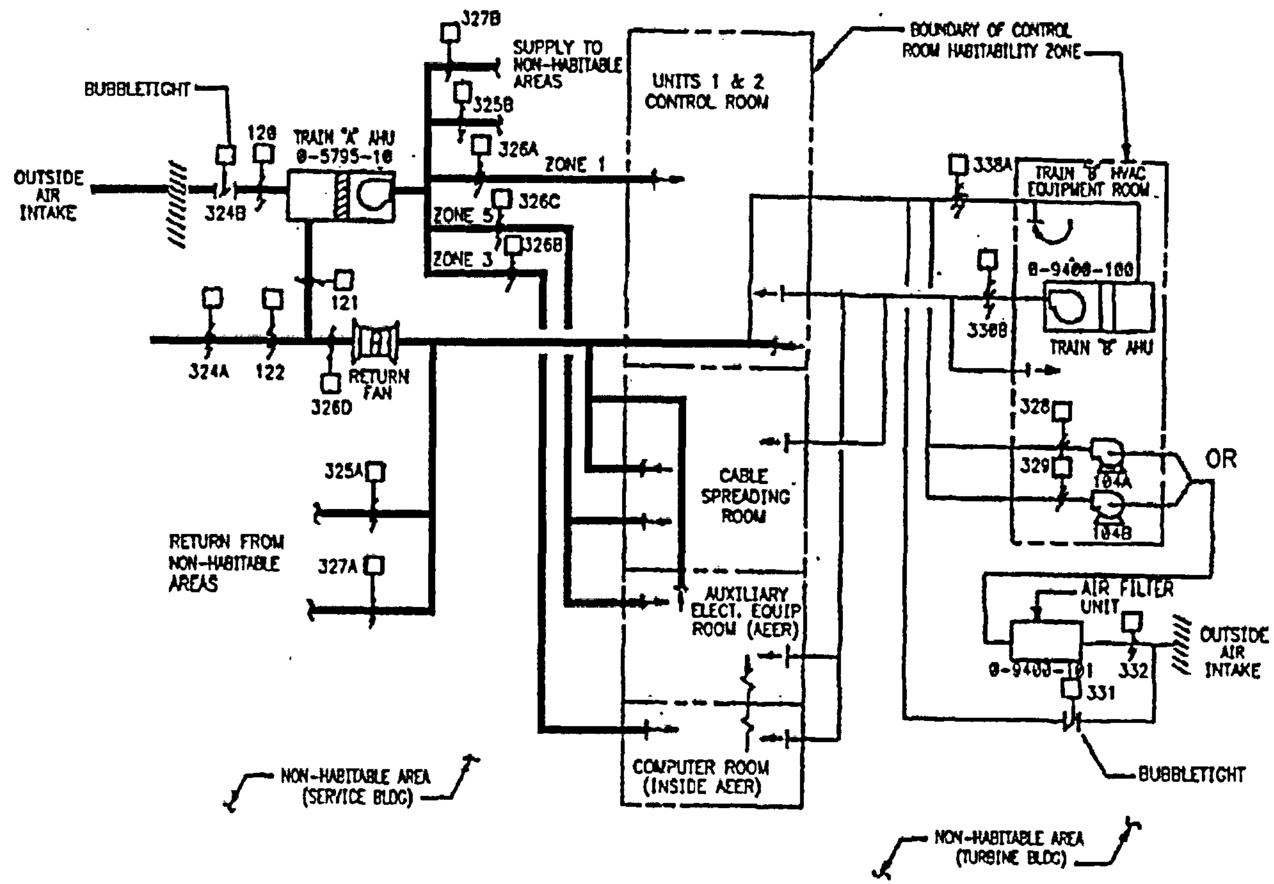


Figure 10-2

CONTROL ROOM TRAIN A HVAC SYSTEM TOXIC GAS ISOLATION MODE

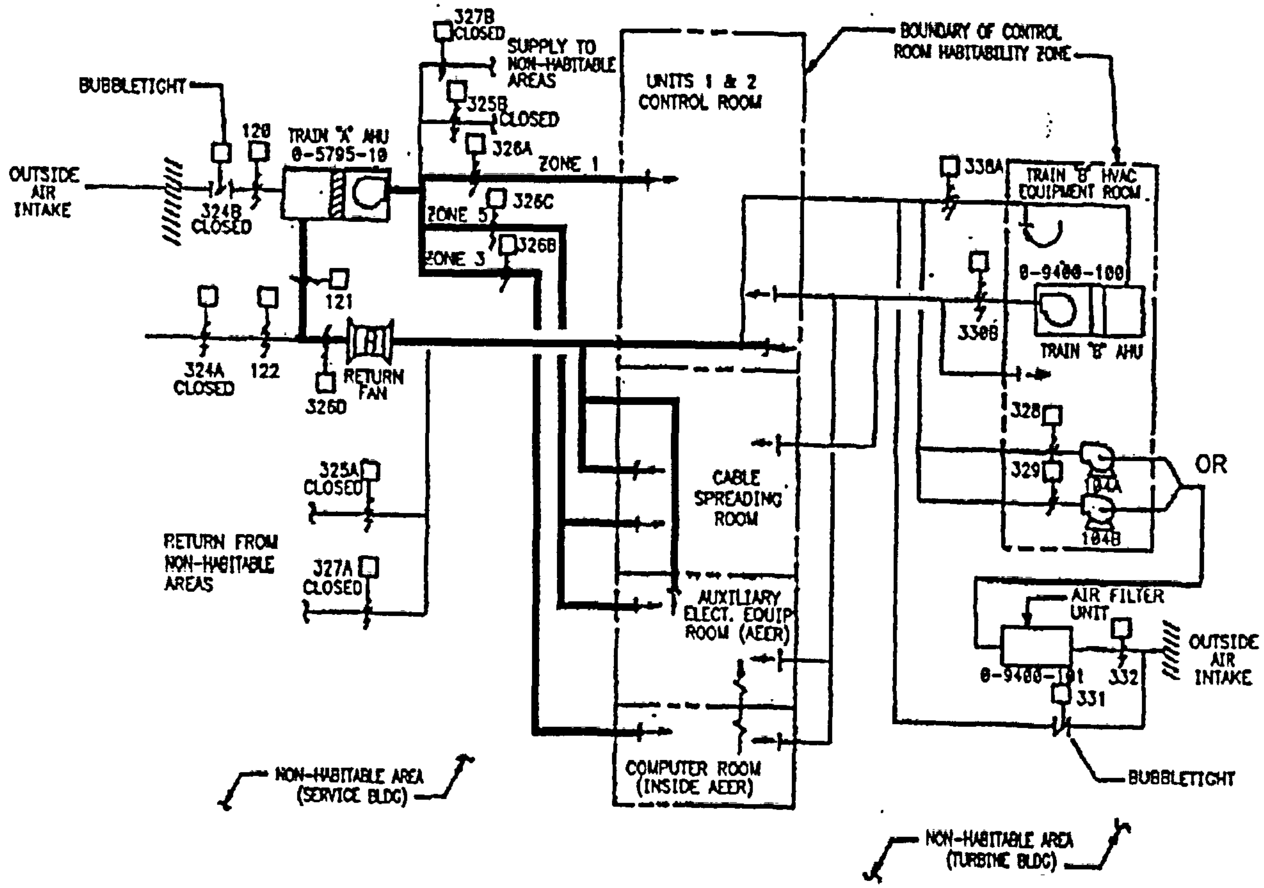


Figure 10-3

CONTROL ROOM TRAIN A HVAC SYSTEM PRESSURIZATION MODE UNFILTERED INLEAKAGE 222CFM +/- 75CFM

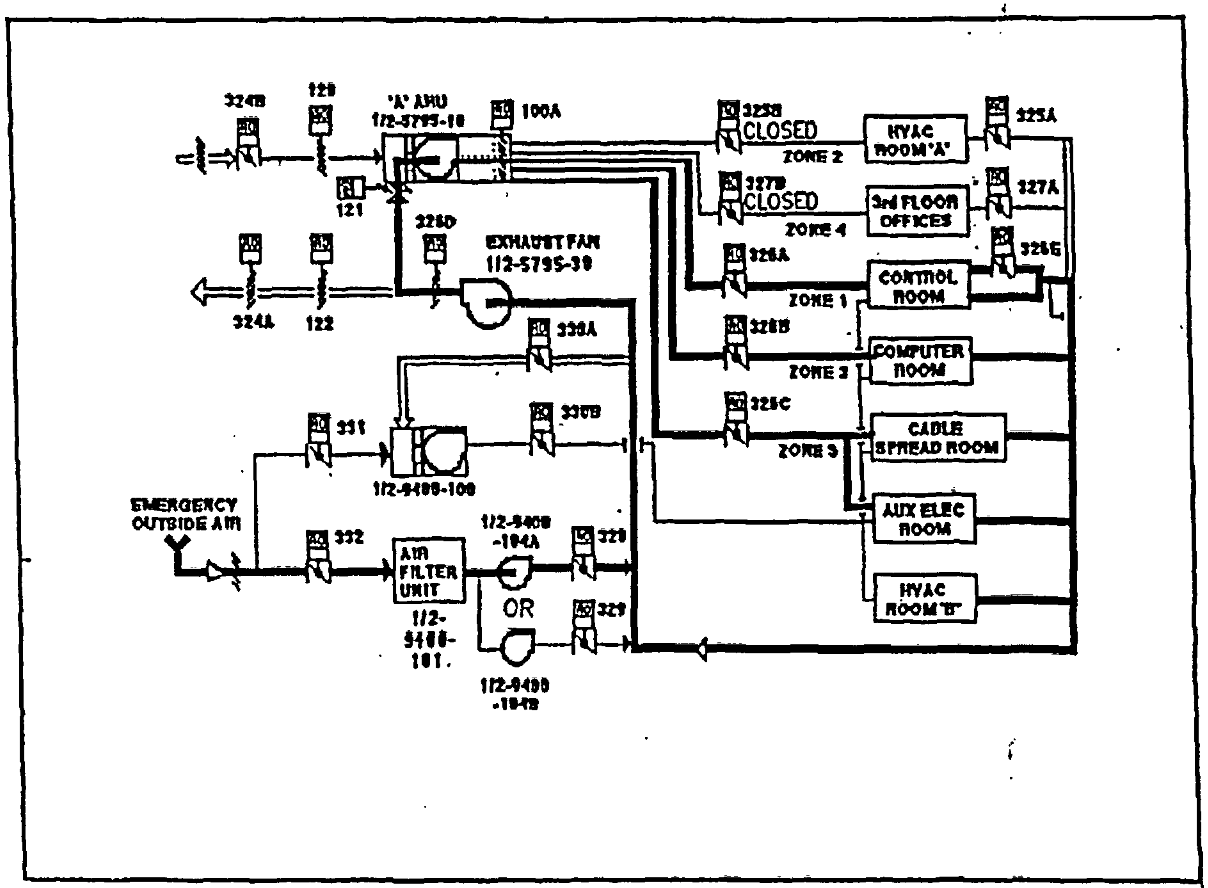


Figure 10-4

CONTROL ROOM TRAIN B HVAC SYSTEM
PRESSURIZATION MODE
UNFILTERED INLEAKAGE 88CFM +/- 74CFM