



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

June 13, 1991

Docket Nos. 50-237, 50-249
and 50-254, 50-265

LICENSEE: Commonwealth Edison Company

FACILITY: Dresden, Units 2 and 3 and Quad Cities, Units 1 and 2

SUBJECT: SUMMARY OF MEETING WITH COMMONWEALTH EDISON COMPANY TO
DISCUSS COMBUSTIBLE GAS CONTROL FOR DRESDEN AND QUAD CITIES

A meeting was held with Commonwealth Edison Company (CECo) on May 20, 1991, at the NRC's office located in Rockville, Maryland. The objective of the meeting was for CECO to present its proposed plant modifications, at Dresden and Quad Cities, that would result in a purge repressurization system, to control post-accident combustible gas concentrations inside containment, that would comply with the NRC staff's position related to the requirements of 10 CFR 50.44. A list of meeting attendees and handouts are provided as Enclosures 1 and 2, respectively.

J. Able, of CECO, described the existing combustible gas control systems currently installed at Dresden and Quad Cities and the areas of compliance and non-compliance with the applicable General Design Criteria (GDC). These systems are currently used for containment venting during startup and for containment atmosphere control during normal operation. CECO's conclusion was that since these systems do not fully comply with the GDC's in the areas of redundancy of controls and features, it would be easier and more economical to convert the existing air-containment atmosphere dilution (ACAD) system to a nitrogen-containment atmospheric dilution (NCAD) system. The modifications proposed by CECO are very similar to the modifications performed at Cooper Nuclear Station.

This new NCAD system proposed by CECO would utilize the existing two train ACAD system and connect the existing on-site liquid nitrogen system and a new smaller liquid nitrogen system to each of the existing trains. Two atmospheric vaporizers of sufficient capacity to maintain the oxygen concentration below 5 percent using Regulatory Guide 1.7 generation rates would also be installed in each train. CECO has stated that the proposed ACAD system conversion will result in two redundant safety-grade nitrogen addition systems that meet the requirements of the applicable GDC's.

CECo also stated that the proposal presented represents their preliminary engineering evaluation and that detailed design and engineering will not proceed until the Boiling Water Reactor Owners Group (BWROG) emergency procedure guideline (EPG) concern, related to repressurization (EPG's currently do not address containment repressurization) is resolved with the staff. CECO stated it would take about 40 weeks to complete the detailed design and about 2 years to procure and install the system.

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The staff stated that additional design details would be required before the staff could write its Safety Evaluation on the design of the proposed NCAD system. CECo said the additional information could be provided within approximately 90 to 120 days, after the repressurization issue is resolved.

Although sufficient detail was not provided for the staff to approve the design proposed by CECo, enough information was provided for the staff to endorse, in principle, the approach proposed by CECo to resolve this issue.

Original Signed By:

Byron L. Siegel, Project Manager
Project Directorate III-2
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Enclosures:

1. Meeting Attendees
2. Meeting Handouts

cc w/enclosures:

See next page

DISTRIBUTION

Docket File	ACRS(10), P-315
NRC & Local PDRs	GPA/PA, 2G5
PDIII-2 r/f	E. Tana, 12G18
T. Murley/F. Miraglia, 12G18	P. O'Dell, 12E4
J. Partlow, 12G18	L. Plisco, 12G18
B. Boger, 13E4	R. Lobel, 17G21
J. Zwolinski, 13H24	J. Strasma, RIII
B. Siegel	C. Moore
L. Olshan	A. Dromerick, 14C7
A. Chaffee, EAB/11A1	S. Brown, 11B20
OGC, 15B18	
E. Jordan, MNBB 3701	
B. Grimes, 9A2	
J. Kudrick, 8D1	

OFC	:LA:PDIII-2	:PM:PDIII-2	:PM:PDIII-2	:SPLB	:D:PDIII-2	:
NAME	:C Moore:	:B L Siegel	:btv: L Olshan	:J Kudrick	:R J Barrett	:
DATE	:06/16/91	:06/17/91	:06/17/91	:06/17/91	:06/17/91	:

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Document Name: MEETING WITH CECO

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COMBUSTIBLE GAS CONTROL MEETING
WITH COMMONWEALTH EDISON COMPANY

<u>Name</u>	<u>Affiliation</u>
Ed Rowley	CECo/BWR Systems Engineering
J. S. Abel	CECo/Engineering and Construction
Kathleen Brennan	CECo/Engineering and Construction
Rita Stols	CECo/Nuclear Licensing
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J. Knubel	GPUN
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Darius Depa	IDNS/RxSS
A. Dromerick	NRC/NRR/PDI-4
R. Barrett	NRC/NRR/PDIII-2
Rob Elliott	NRC/NRR/PDIII-2
L. N. Olshan	NRC/NRR/PDIII-2
B. Siegel	NRC/NRR/PDIII-2
John Hannon	NRC/NRR/PDIII-3
S. Brown	NRC/NRR/PDNP
A. Drozo	NRC/NRR/SPLB
J. Kudrick	NRC/NRR/SPLB
Conrad McCracken	NRC/NRR/SPLB

COMBUSTIBLE GAS CONTROL

COMMONWEALTH EDISON COMPANY
DRESDEN & QUAD CITIES STATIONS

MAY 20, 1991

MEETING OBJECTIVES

- DESCRIBE OUR EXISTING CAPABILITY FOR COMBUSTIBLE GAS CONTROL.
- DESCRIBE PROPOSED MODIFICATIONS TO ENHANCE OUR ABILITY TO CONTROL CONTAINMENT GAS CONCENTRATIONS.
- OBTAIN NRC CONCURRENCE ON THE PLANNED MODIFICATIONS.

AGENDA

- REVIEW THE REGULATION AND LICENSING HISTORY.
- DESCRIBE THE STATUS AT DRESDEN AND QUAD.
- DESCRIBE THE EXISTING NITROGEN INJECTION SYSTEMS.
- DISCUSS THE EXISTING SYSTEMS COMPLIANCE WITH THE GENERAL DESIGN CRITERIA.
- DESCRIBE THE PROPOSED NCAD SYSTEM.
- DISCUSS THE NCAD SYSTEMS COMPLIANCE WITH THE GENERAL DESIGN CRITERIA.

10 CFR 50.44 (g)

- PURGE SYSTEM IS ACCEPTABLE IF RADIATION DOSE LIMITS ARE MET AND DESIGNED IN CONFORMANCE WITH GDC 41, 42, AND 43.
- OTHERWISE, ANOTHER TYPE OF COMBUSTIBLE GAS CONTROL SYSTEM IN CONFORMANCE WITH GDC 41, 42, AND 43 SHALL BE PROVIDED.

GENERAL DESIGN CRITERIA

GDC-41 CONTAINMENT ATMOSPHERE CLEANUP

- CONTROL OF HYDROGEN AND OXYGEN CONCENTRATIONS
- REDUNDANCY IN COMPONENTS AND FEATURES
- LEAK DETECTION
- ISOLATION AND CONTAINMENT CAPABILITIES
- ACCOMPLISH SAFETY FUNCTION WITH LOSS OF ONSITE OR OFFSITE POWER ASSUMING A SINGLE FAILURE

GDC-42 INSPECTION OF CONTAINMENT ATMOSPHERIC CLEANUP SYSTEM

- DESIGNED TO PERMIT INSPECTION

GDC-43 TESTING OF CONTAINMENT ATMOSPHERIC CLEANUP SYSTEMS

- DESIGNED TO PERMIT PERIODIC TESTING

LICENSING HISTORY

1978 10CFR50.44(g) WAS ISSUED.

1981 10CFR50.44(c)(3)(ii) WAS ISSUED.

REQUIRED RECOMBINER CAPABILITY FOR UNITS WHICH RELY ON PURGE AND/OR REPRESSURIZATION SYSTEMS AS THE PRIMARY MEANS FOR COMBUSTIBLE GAS CONTROL.

1982 NEDO-22155 "GENERATION AND MITIGATION OF COMBUSTIBLE GAS MIXTURES IN INERTED BWR MARK I CONTAINMENTS" WAS PREPARED.

CONCLUSIONS

PEAK OXYGEN CONCENTRATIONS ARE LOWER THAN PREDICTED IN REGULATORY GUIDE 1.7.

THE INERTED MARK I CONTAINMENT DESIGN IS SUFFICIENT TO MAINTAIN COMBUSTIBLE GAS CONCENTRATIONS BELOW THE LIMITS.

1984 GENERIC LETTER 84-09 WAS ISSUED.

ESTABLISHED CRITERIA FOR ACCEPTANCE OF AN INERTED CONTAINMENT STRUCTURE AS THE PRIMARY METHOD OF COMBUSTIBLE GAS CONTROL.

LICENSING HISTORY

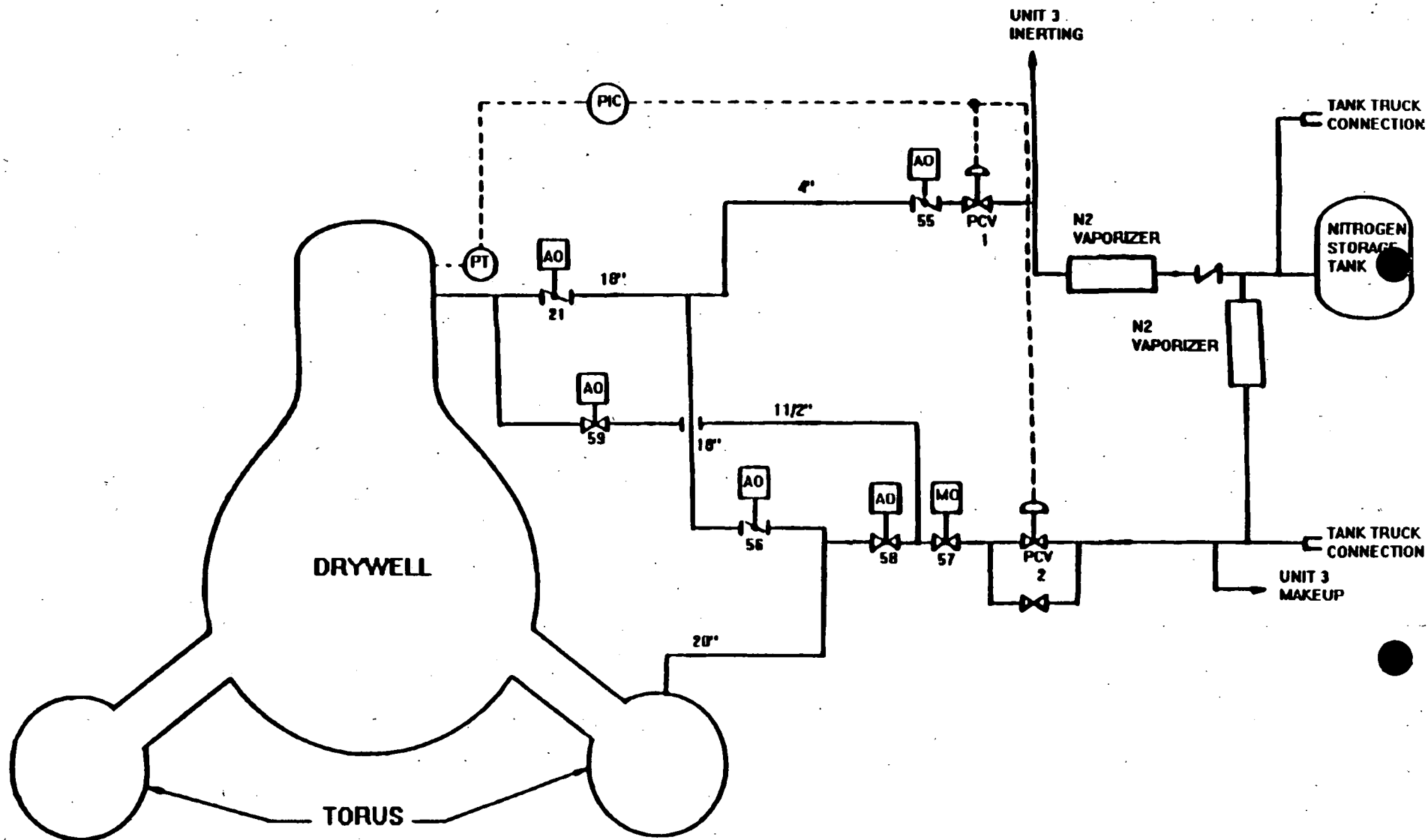
- 1984 CECO RESPONDED TO GENERIC LETTER 84-09, INDICATING THAT DRESDEN AND QUAD MET THE CRITERIA ESTABLISHED FOR ACCEPTANCE OF AN INERTED CONTAINMENT AS THE PRIMARY METHOD OF COMBUSTIBLE GAS CONTROL.
- 1989 THE NRC ISSUED A SAFETY EVALUATION OF GE'S METHODOLOGY FOR DETERMINING RATES OF GENERATION OF OXYGEN BY RADIOLYTIC DECOMPOSITION (NEDO-22155).
- 1990 THE NRC REQUESTED A MEETING WITH CECO TO DISCUSS THE EXISTING CAPABILITY FOR COMBUSTIBLE GAS CONTROL AT DRESDEN AND QUAD CITIES STATIONS.

DRESDEN & QUAD CITIES STATUS COMBUSTIBLE GAS CONTROL SYSTEM

- COMPLIANCE WITH 10CFR50.44g IS BASED ON AN INERTED CONTAINMENT AND THE GE REPORT (NEDO-22155).
- IN ADDITION, OUR EXISTING NITROGEN INJECTION SYSTEMS CAN BE USED FOR BEYOND DESIGN BASIS ACCIDENTS, WHICH REQUIRE REPRESSURIZATION.
- ★ HOWEVER THESE SYSTEMS ARE NOT FULLY REDUNDANT AND THEREFORE DO NOT COMPLY WITH THE REDUNDANCY REQUIREMENT IN GDC 41.

EXISTING NITROGEN INJECTION SYSTEMS

- THE INERTING SYSTEM IS USED FOR INITIAL DRYWELL INERTING FOLLOWING EACH OUTAGE.
- THE MAKEUP SYSTEM IS USED TO PROVIDE NITROGEN MAKEUP DUE TO LEAKAGE. THIS SYSTEM IS USED THROUGHOUT THE OPERATING CYCLE.
- TOGETHER THESE SYSTEMS PROVIDE TWO SEPARATE NITROGEN INJECTION PATHS.



EXISTING COMBUSTIBLE GAS CONTROL SYSTEMS

EXISTING INERTING AND MAKEUP SYSTEMS

COMPLIANCE WITH THE GENERAL DESIGN CRITERIA

GENERAL DESIGN CRITERIA 41	STATUS
CONTROL OF HYDROGEN AND OXYGEN CONCENTRATIONS	YES
REDUNDANCY IN COMPONENTS AND FEATURES	NO
LEAK DETECTION CAPABILITY	N/A
ISOLATION AND CONTAINMENT CAPABILITY	YES
ACCOMPLISH SAFETY FUNCTION WITH LOSS OF ONSITE OR OFFSITE POWER	YES*
GENERAL DESIGN CRITERIA 42	
DESIGNED TO PERMIT INSPECTION	YES
GENERAL DESIGN CRITERIA 43	
DESIGNED TO PERMIT PERIODIC TESTING	YES

* POWER IS AVAILABLE FROM EITHER ONSITE OR OFFSITE SOURCES, HOWEVER, THESE SYSTEMS ARE VULNERABLE TO SINGLE ELECTRICAL COMPONENT FAILURES

EXISTING NITROGEN INJECTION SYSTEMS DESIGN INFORMATION

PIPING
DESIGN
TEMPERATURE

>281 F

COMPONENT
DESIGN
PRESSURE

125 LBS

SEISMIC

NO, BUT THE SYSTEM WAS
BUILT TO PIPING CODE B31.1.
WE BELIEVE THE SYSTEM
COULD BE SEISMICALLY
QUALIFIED AS- BUILT.

QUALITY
GROUP

THE CONTAINMENT ISOLATION
VALVES AND PRESSURE
SENSOR ARE SAFETY-RELATED
THE OTHER COMPONENTS ARE
NON-SAFETY RELATED. THE
SYSTEMS ARE ROUTINELY
OPERATED AND HAVE FEW
ACTIVE COMPONENTS.

EXISTING NITROGEN INJECTION SYSTEMS

NITROGEN SUPPLY

- A NITROGEN FLOW OF 25 SCFM IS REQUIRED TO MAINTAIN THE OXYGEN CONCENTRATION BELOW 5% USING REG. GUIDE 1.7 GENERATION RATES.

<u>SYSTEM</u>	<u>NOMINAL</u>	<u>CAPACITY</u>
MAKEUP	1 SCFM	> 25 SCFM
INERTING	2500 SCFM	2500 SCFM

- THE INERTING SYSTEM CAN PROVIDE OVER 400 SCFM FLOW AGAINST A 60 PSIG CONTAINMENT PRESSURE.
- ADMINISTRATIVE PROCEDURES REQUIRE A MINIMUM TANK VOLUME ABOVE THE 2 DAY SUPPLY VOLUME.
- OFFSITE SUPPLY AVAILABLE WITHIN 8 HOURS.
- THERE ARE TANK TRUCK CONNECTIONS AVAILABLE IN THE EVENT OF STORAGE TANK TANK FAILURES.

EXISTING NITROGEN INJECTION SYSTEM POST LOCA SYSTEM OPERATION

- CONTAINMENT INTEGRITY IS MONITORED BY PRESSURE AND VALVE POSITION INDICATION.
 - NO OPERATOR ACTION IS REQUIRED
 - SAFETY-RELATED POWER SUPPLY
- CONTAINMENT ATMOSPHERE IS MONITORED BY THE SAFETY RELATED MONITORING SYSTEM (CAM).
 - MONITORS HYDROGEN, OXYGEN, AND RADIOACTIVITY
 - NO OPERATOR ACTION IS REQUIRED
 - SAFETY-RELATED POWER SUPPLY
- THE NITROGEN INERTING SYSTEM IS AVAILABLE AND MONITORED USING THE CAM SENSORS AND PRESSURE INDICATION.
 - THE OPERATOR INITIATES THE SYSTEM FROM THE CONTROL ROOM
 - OPERABLE WITH ONSITE OR OFFSITE POWER, EXCEPT THE HEATING BOILERS WHICH REQUIRE ONSITE POWER.
- NITROGEN MAKEUP IS AVAILABLE AND MONITORED USING THE CAM SENSORS AND PRESSURE INDICATION.
 - THE OPERATOR INITIATES THE SYSTEM FROM THE CONTROL ROOM.
 - OPERABLE USING ONSITE OR OFFSITE POWER, EXCEPT THE VAPORIZERS AT QUAD CITIES.

EXISTING NITROGEN INJECTION SYSTEMS SUMMARY

- THE EXISTING NITROGEN INJECTION SYSTEMS PROVIDE A METHOD FOR COMBUSTIBLE GAS CONTROL BY NITROGEN INJECTION.
- ALTHOUGH THE SYSTEMS DO NOT FULLY COMPLY WITH THE DESIGN CRITERIA, THEY PROVIDE REASONABLE ASSURANCE THAT NITROGEN CAN BE ADDED POST LOCA.

PROPOSED NCAD SYSTEM PROPOSED MODIFICATION

- **THE PROPOSED NCAD SYSTEM WILL FULLY COMPLY WITH GDC 41, 42, AND 43.**
- **WE PROPOSE TO CONVERT THE EXISTING AIR-CAD(NOT IN SERVICE) SYSTEM TO A NITROGEN- CAD SYSTEM BY:**
 - **CONNECTING IT TO OUR EXISTING NITROGEN SUPPLY SYSTEM**
 - **INSTALLING A REDUNDANT NITROGEN SUPPLY SYSTEM**
 - **INSTALLING ACCUMULATORS ON THE AIR OPERATED CONTAINMENT ISOLATION VALVES TO ENSURE VALVE OPERATION IN THE EVENT OF A LOSS OF INSTRUMENT IAR.**
 - **CONVERTING THE FLOW CONTROL VALVES TO ISOLATION VALVES.**
 - **ELIMINATING THE ACAD COMPRESSORS, AIR RECEIVERS, WITH THE ASSOCIATED PIPING AND INSTRUMENTATION.**
- **THIS IS EQUIVALENT TO THE MODIFICATION PERFORMED AT COOPER STATION.**

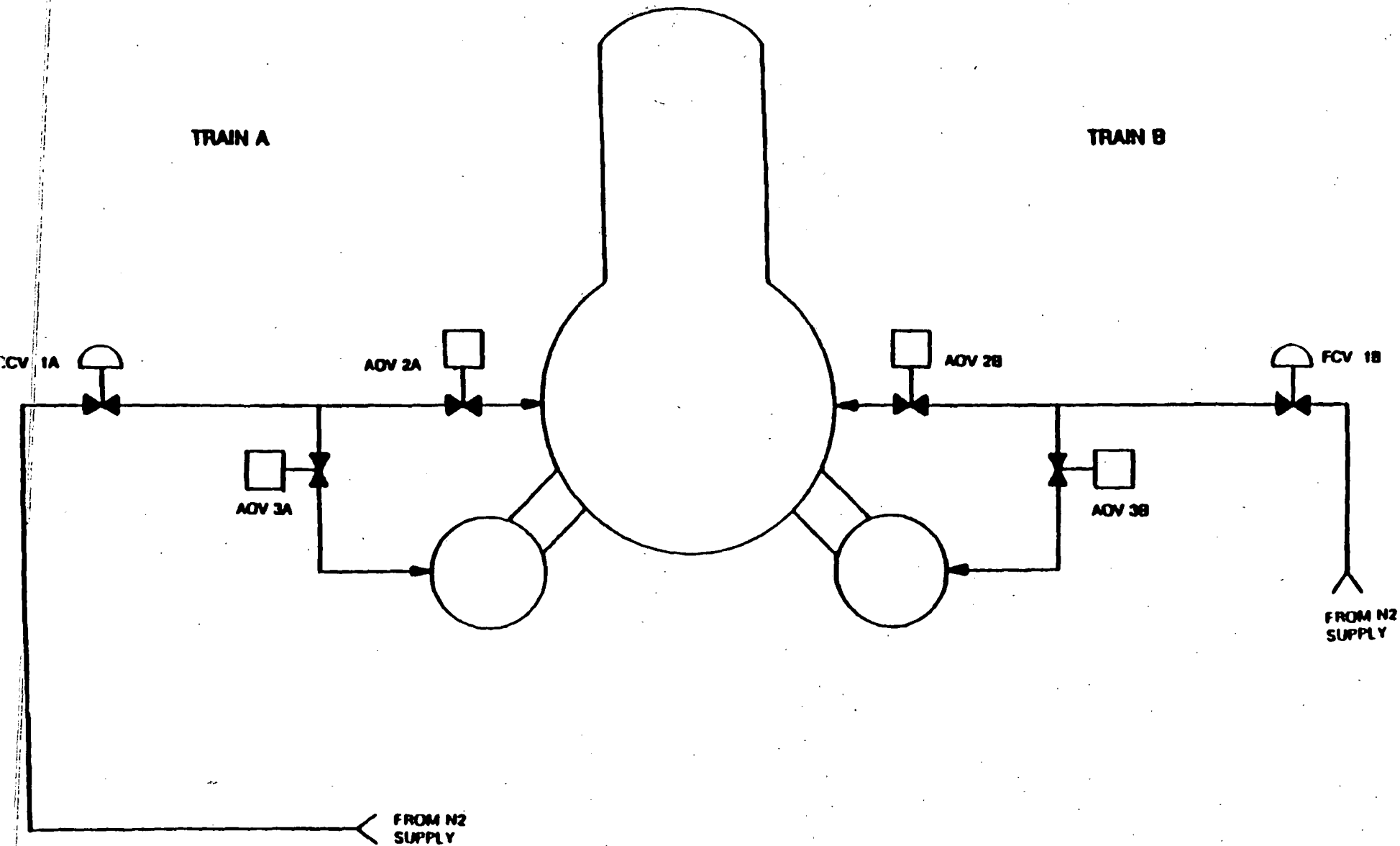
PROPOSED NCAD SYSTEM

COMPLIANCE WITH THE GENERAL DESIGN CRITERIA

GENERAL DESIGN CRITERIA 41	STATUS
CONTROL OF HYDROGEN AND OXYGEN CONCENTRATIONS	YES
REDUNDANCY IN COMPONENTS AND FEATURES	YES
LEAK DETECTION CAPABILITY	N/A
ISOLATION AND CONTAINMENT CAPABILITY	YES
ACCOMPLISH SAFETY FUNCTION WITH LOSS OF ONSITE OR OFFSITE POWER	YES
GENERAL DESIGN CRITERIA 42	
DESIGNED TO PERMIT INSPECTION	YES
GENERAL DESIGN CRITERIA 43	
DESIGNED TO PERMIT PERIODIC TESTING	YES

PROPOSED NCAD SYSTEM NITROGEN SUPPLY

- **A NITROGEN FLOW OF 25 SCFM IS REQUIRED TO MAINTAIN THE OXYGEN CONCENTRATION BELOW 5% USING REG. GUIDE 1.7 GENERATION RATES.**
- **THE SYSTEM WILL BE CAPABLE OF PROVIDING A MINIMUM OF 25 SCFM OF NITROGEN AT A PRESSURE OF 60 PSIG.**
- **A 48 HOUR SUPPLY WILL BE MAINTAINED IN THE EXISTING NITROGEN TANK.**
- **A 24 HOUR REDUNDANT SUPPLY WILL BE MAINTAINED ONSITE.**
- **OFFSITE SUPPLY IS AVAILABLE WITHIN 8 HOURS.**
- **THE SYSTEM WILL BE OPERABLE FROM OUTSIDE THE REACTOR BUILDING**



PROPOSED NCAD SYSTEM

PROPOSED NCAD SYSTEM POST LOCA SYSTEM OPERATION

- **CONTAINMENT INTEGRITY IS MONITORED BY PRESSURE AND VALVE POSITION INDICATION.**
 - **NO OPERATOR ACTION IS REQUIRED**
 - **SAFETY-RELATED POWER SUPPLY**
- **CONTAINMENT ATMOSPHERE IS MONITORED BY THE SAFETY RELATED MONITORING SYSTEM (CAM).**
 - **MONITORS HYDROGEN, OXYGEN, AND RADIOACTIVITY**
 - **NO OPERATOR ACTION IS REQUIRED**
 - **SAFETY-RELATED POWER SUPPLY**
- **THE NCAD SYSTEM IS AVAILABLE AND MONITORED USING THE CAM SENSORS AND PRESSURE INDICATION.**
 - **THE OPERATOR INITIATES THE SYSTEM FROM THE CONTROL ROOM**
 - **THE INJECTION RATE IS CONTROLLED AT THE NCAD CONTROL STATION**
 - **SAFETY-RELATED POWER SUPPLY**

CONCLUSIONS

- WE BELIEVE THAT THE INERTED CONTAINMENT SATISFIES THE REQUIREMENTS OF 10CFR50.44g AS DOCUMENTED BY THE GE REPORT (NEDO- 22155).
- ADDITIONAL CAPABILITY FOR COMBUSTIBLE GAS CONTROL CAN BE PROVIDED BY THE NITROGEN INJECTION SYSTEMS.
- WHEN THE CURRENT ISSUES ON REPRESSURIZATION ARE RESOLVED, AND THE NRC HAS APPROVED OUR DESIGN, CECO WILL CONVERT THE EXISTING ACAD SYSTEM TO AN NCAD SYSTEM.

UNRESOLVED ISSUE

- THE CURRENT BWROG EMERGENCY PROCEDURE GUIDELINES ARE NOT WRITTEN TO ADDRESS CONTAINMENT REPRESSURIZATION.
- THE BWROG IS CONCERNED THAT PRESSURIZING CONTAINMENT MAY INCREASE THE SEVERITY OF OF AN ACCIDENT.
- THE BWROG IS WORKING WITH THE STAFF TO RESOLVE THIS ISSUE.
- IN OUR JUDGEMENT, IT IS PRUDENT TO DEFER DETAILED DESIGN UNTIL THIS ISSUE IS RESOLVED.

NCAD SUMMARY

- THE PROPOSED ACAD SYSTEM CONVERSION WILL RESULT IN A SAFETY-GRADE NITROGEN ADDITION SYSTEM MEETING GENERAL DESIGN CRITERIA 41, 42, AND 43.
- WE HAVE COMPLETED PRELIMINARY ENGINEERING TO DETERMINE THE SCOPE OF THE MODIFICATION.
- DETAILED DESIGN AND ENGINEERING WILL PROCEED AFTER RESOLUTION OF BWROG EPG CONCERN WITH REPRESSURIZATION AND NRC CONCURRENCE ON THE SYSTEM DESIGN.

COMBUSTIBLE GAS CONTROL

PROPOSED NCAD COOPER STATION

N2 SUPPLY	2 TANKS	TANK/BOTTLES
PIPING	SEISMIC	SEISMIC
VAPORIZER	ATMOSPHERIC	ELECTRIC W/WATER BATH
VALVES	AO (WITH ACCUMULATORS)	MOVS
POWER SUPPLY	SAFETY RELATED	SAFETY RELATED