Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

December 13, 1982

Mr. Paul O'Connor
Project Manager
Operating Reactors Branch No. 5
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Dresden 2
SEP Topic IX-5, Ventilation Systems

<u>NRC Docket 50-237</u>

Dear Mr. O'Connor:

10CFR50 (GDC 4, 60 and 61), as implemented by SRP Sections 9.4.1, 9.4.2, 9.4.4 and 9.4.5, requires that the ventilation systems shall have the capability to provide a safe environment for plant personnel and for engineered safety features. The NRC staff is concerned that the ventilation systems of engineered safety features are not adequate following a loss of off-site power event. The following response addresses these areas of concern:

Item 1: Following a loss-offsite-power event, operator action is required to reinitiate the battery room ventilation system. During that inoperative period, hydrogen is generated because of continued battery charging. It is the staff's position that Commonwealth Edison should define the maximum period the ventilation system could be inoperative and demonstrate that of hydrogen generated during that period, will not exceed the minimum combustion limits or provide for adequate ventilation to preclude the potential for buildup of combustible hydrogen.

Response: The Unit 2 battery room ventilation system is not powered from an onsite source. The staff is concerned because the time of highest hydrogen concentration occurs while the diesel generator is being used to recharge the batteries. An evaluation was made to determine the amount of hydrogen generated during a recharge of the Dresden Unit 2 batteries and in that period will not exceed the minimum combustible limits. Attachment A provides technical information and equipment data. Figures 1, 2 and 3 provide battery recharge curves.

For this study it was assumed that the battery chargers were re-energized when the total nameplate amp-hour rating were removed from the batteries. If the chargers would be energized sooner, lesser amounts of hydrogen would be evolved. The amounts of hydrogen were calculated for an eight hour period following re-energization of the chargers.

A035

Figure 1, 2 and 3 illustrates a typical amp-hour recharge curves for a 250V, 125V and 24/48V battery respectively. For conservatism 5% of all charging is considered hydrogen generation. Based on 5% charging current rate, 2% hydrogen evolution rate, and zero natural ventilation the minimum volume of air space required for ventilation is as follows:

UNIT 2 BATTERY ROOMS

Battery Voltage (volts)	Hydrogen Generation (cu. ft. H_2)	Minimum Volume of Air Space at 2% H_2 (cu. ft.)	Actual Volume of Air Space (cu. ft.)
250	59.27	2964	3752
125 & 24/48	21.15	1058	2147

Any allowance for Material Ventilation, such as openings under the door or louvers in the wall will allow the number of cubic feet of air space to be reduced.

Item 2: Diesel generator 2 and 2/3 are housed in separate rooms served by separate ventilation systems. Cooling is provided by the diesel service water systems, and the ventilation systems both vent the rooms and cool associated switchgear equipment. Both DG rooms are ventilated by a single 30HP fan that is automatically loaded to essential service motor control center (MCC) 29-2 (essential service, DG 2).

Outside air and/or turbine building air is supplied to the fan through a set of temperature-controlled dampers. Should the single ventilation fan fail, the large double doors between the turbine building and DG 2 could be opened to promote natural convection. Access to the DG 2/3 building is through two single inseries doors, both of which would have to be opened to provide natural convection.

However, because of the necessity of maintaining DG availablity for mitigating accident conditions and the susceptibility of the DG ventilation systems to other types of failures (e.g., tornado missiles), the staff has determined that adequate ventilation of the DGs is necessary. Therefore, it is the staff's position that the licensee evaluate the consequences of losing the DG room ventilation system. If it is determined that ventilation is required for system performance, corrective actions and a proposed schedule should be established.

Response: Because of the redundancy provided by separately powered diesel generators 2, 3 and 2/3 along with 30-HP ventilation fans for each diesel, the loss of one ventilation fan would be a single active failure on one of the redundant diesel generators.

Please address any questions you may have concerning this matter to this office.

One (1) signed original and thirty-nine (39) copies of this transmittal have been provided for your use.

Very truly yours,

Thomas J. Rausch

Thomas J. Rausch
Nuclear Licensing Administrator
Boiling Water Reactors

SPP/ji
2580D/3
Attachment
cc: RIII Resident Inspector, Dresden
Gregg Cwalina, SEP Integrated Assessment Project Manager (w/att)

ATTACHMENT A

Technical Information, Field Data,& Equipment Nameplate Information Used In H_2 Evaluation

1. IEEE Standard 484-1981 Par. 5.1.4. Ventilation. The battery area shall be ventilated, either by a natural or induced ventilation system, to prevent accumulation of hydrogen to maintain design temperature. The ventilation system shall limit hydrogen accumulation to less than 2% of the total volume of the battery area. Maximum hydrogen evolution rate is 0.000269 cubic feet per minute per charging ampere per cell at 77°F, one atmosphere. The worst expected condition exists when forcing maximum current into a fully charged battery.

2. For this evaluation the recharge cycle is assumed to start with a fully discharged battery. For conservatism 5% of all charging current is considered to be hydrogen forming even during the early charge high currents when the battery is utilizing all the amperes for recharging the plates. (Hydrogen is basically formed when current is forced into a fully charged battery.)

3. To force any measurable amount of current into a fully charged battery the charger must be set to provide at least 2.25 volts per cell, i.e. equalize mode of charging.

4. Chargers are of the constant voltage design (with 110% current limit) and are in the float voltage mode, i.e. 2.17 volts per cell.

5. 250V Battery - Gould FPS-25, 996 ampere hour
   250V Charger - 100 ampere, constant voltage

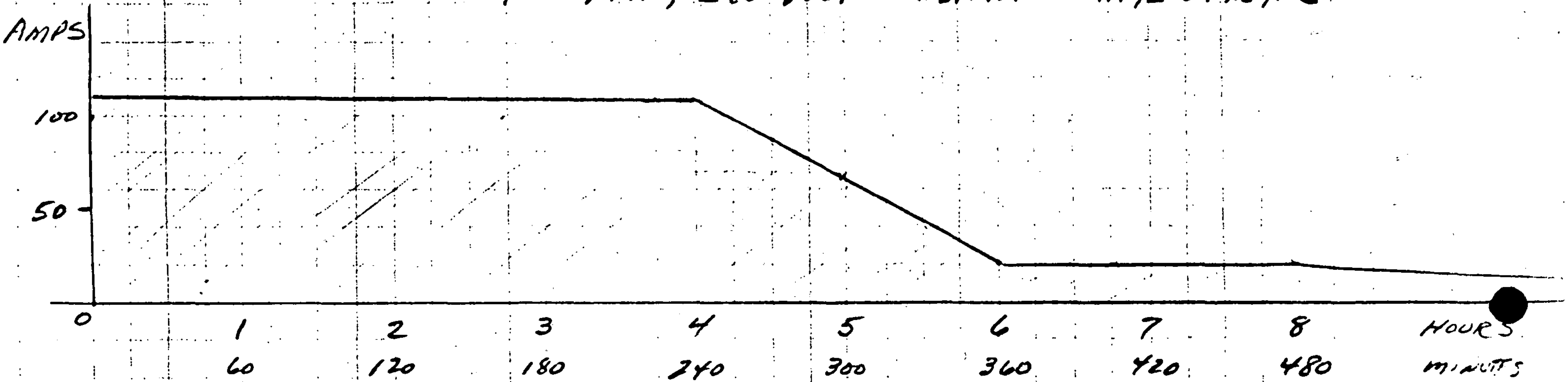
6. 125V Battery - Gould FPS-13, 498 ampere-hour
   125V Charger - 200 ampere, constant voltage

7. 24/48V Battery - Gould DPR-9, 80 ampere-hour
   24V Charger - 25 ampere, constant voltage

8. Charger leaves current limit mode when battery is approximately 40% recharged.

FIG. 1

TYPICAL AMP-HOUR RECHARGE CURVE
250 VOLT BATTERY (FPS-25, 996 A-HR, 120 CELLS)
100 AMP, 260 VOLT CONSTANT VOLTAGE CHARGER



TIME	AMP-HR	AVE. AMP.	5% of AVE. AMP.	CU. FT. H_2
0-60	110	110	5.5	10.65
60-120	110	110	5.5	10.65
120-180	110	110	5.5	10.65
180-240	110	110	5.5	10.65
240-300	90	90	4.5	8.72
300-360	42	42	2.1	4.07
360-420	20	20	1.0	1.94
420-480	20	20	1.0	1.94
	612			59.27 cu. ft. H_2

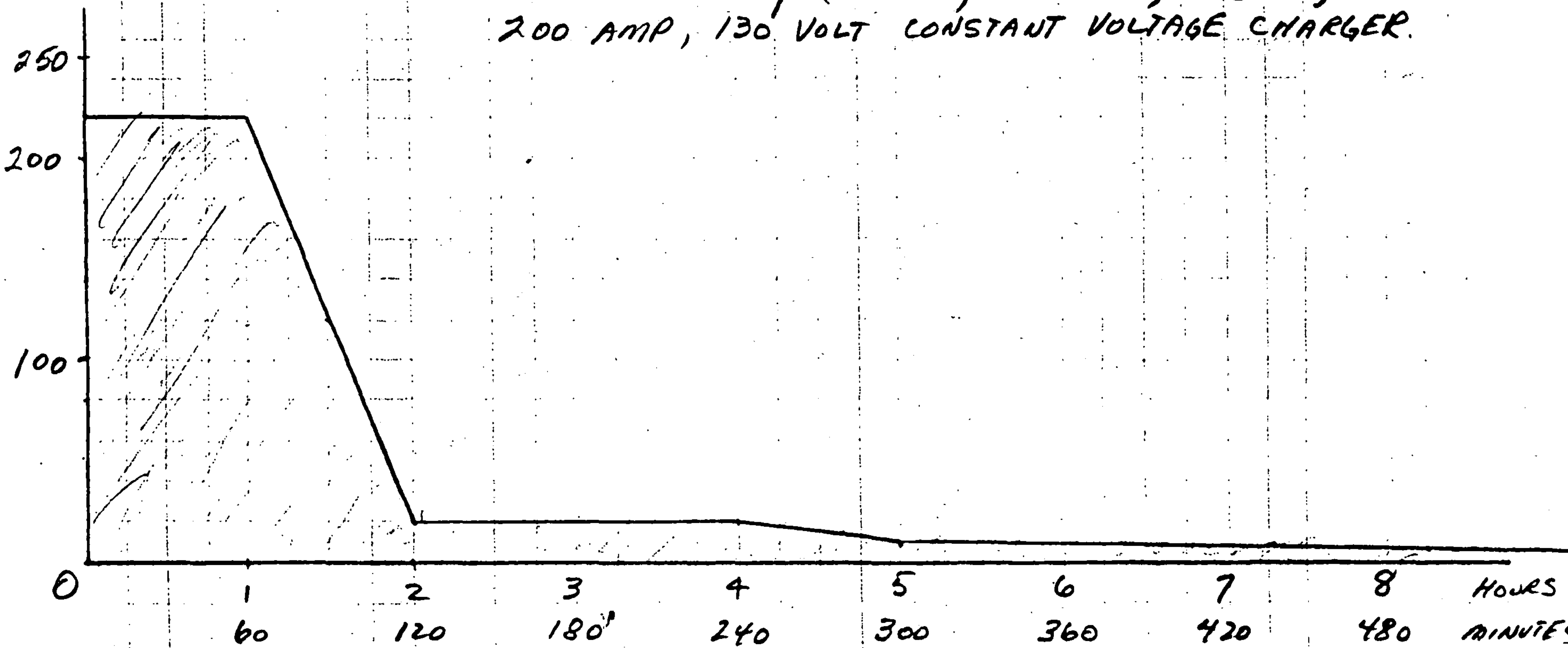
$ft^3\ H_2 = 0.000269$ /min./amp/cell

or $ft^3\ H_2 = 1.937$ /hr./amp./120 CELLS

W.J.S.

FIG. 2

TYPICAL AMP-HOUR RECHARGE CURVE
125 VOLT BATTERY (FPS-13, 498 A-HR, 60 CELLS)
200 AMP, 130 VOLT CONSTANT VOLTAGE CHARGER



TIME	AMP-HR	AVE. AMP	5% of AVE. AMP	CU. FT. H_2
0-60	220	220	11.0	10.65
60-120	120	120	6.0	5.81
120-180	20	20	1.0	0.97
180-240	20	20	1.0	0.97
240-300	15	15	0.75	0.73
300-360	10	10	0.5	0.48
360-420	10	10	0.5	0.48
420-480	10	10	0.5	0.48
	425			20.57 cu. ft. H_2

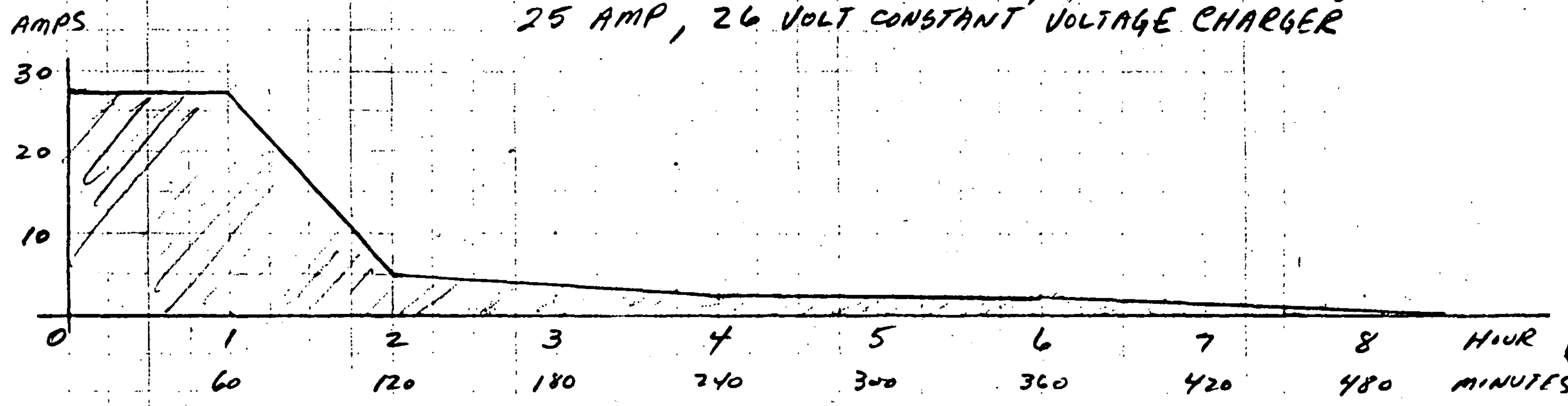
$ft^3\ H_2 = 0.000269$/min./amp/cell

or $ft^3\ H_2 = 0.968$ /hr/amp./60 cells

W.J.S

FIG. 3

TYPICAL AMP-HOUR RECHARGE CURVE
24/48 VOLT BATTERY (DPE-9, 80 A-HR, 12 CELLS)
25 AMP, 26 VOLT CONSTANT VOLTAGE CHARGER



TIME	AMP-HR	AVE. AMP	5% of AVE. AMP	CU.FT H_2
0 - 60	27.5	27.5	1.375	0.27
60-120	16.25	17.0	0.85	0.17
120-180	4.38	4.0	0.2	0.04
180-240	3.33	3.0	0.15	0.03
240 - 300	2.5	2.5	0.125	0.02
300 - 360	2.5	2.5	0.125	0.02
360 - 420	2.5	2.0	0.10	0.02
420 - 480	1.25	1.0	0.05	0.01
	60.2			0.58 cu. ft. H_2

$ft^3 H_2 = 0.000269$/min./amp/cell

or $ft^3 H_2 = 0.1941$ hr/amp/12 cells

W.J.S.