THE CLEVELAND ELECTRIC ILLUMINATING COMPANY
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December 29, 1982

Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Perry Nuclear Power Plant
Docket Nos. 50-440; 50-441
Fire Protection - Confirmatory
Issue No. 36 and Miscellaneous
FPER Concerns

Dear Mr. Youngblood:

This letter is provided in response to the letter dated November 26, 1982, from A. Schwencer to D. R. Davidson regarding the confirmatory issue (#36) on the documentation or test of the 3-hour fire resistance of gypsum board walls.

As stated in our November 16, 1982 letter, we are pursuing an Underwriter's Laboratory (UL) evaluation of the configuration differences between the Perry wall design and the design tested by UL. This evaluation is expected by January 14, 1983, and will be forwarded to the staff as soon as it is available.

Additionally, this letter and its attachments provides clarification on the staff concerns regarding the hydraulic calculations for standpipe sizing and drainage for the switchgear rooms. Attachment 1 to this letter provides the design criteria and sample calculations to demonstrate the adequacy of the standpipe size to meet the hose station requirements of NFPA Standard 14. The calculation shows that the worst case flow requirements are within the fire pumps capability. Attachment 2 to this letter addresses the staff's concern about water accumulation in the switchgear rooms in the Control Complex Building. The justification that drainage is not needed was previously provided as the response to Question Topic 21 in our letter dated March 12, 1982.

B002

We believe that this information will enable the staff to resolve the hydraulic calculations for standpipes and drainage in the switchgear room in the next Supplement to the Safety Evaluation Report.

Sincerely,

Dalwyn R. Davidson

Dalwyn R. Davidson
Senior Vice President

DRD:kh

cc: Jay Silberg, Esq.
John Stefano
Max Gildner
J. Stang

December 29, 1982

ATTACHMENT 1

PURPOSE:

To demonstrate that the standpipe and hose system is designed to supply an adequate water flow and pressure at each hose station outlet in accordance with the requirements of NFPA Standard 14.

DESIGN CRITERIA:

1. The hydraulic calculation for the standpipe and hose system will be based on the worst case flow situation (greatest friction loss).

2. All interior pipe is assumed to be Schedule 40, C=120, except when utilizing "Automatic" Sprinkler Corporation of America (ASCOA) hydraulic reference points. These points are shown in the calculations and diagrams as "A-X: (X referring to point shown on ASCOA print no. 4549-70A-001-55-2, Equivalent Pipe Lengths). For interior pipe lengths using "A-X" points, C=100, and for exterior "A-X" points, use C=75.

3. All interior hose stations are designed for Class II service and sized for a minimum flow of 100 gallons per minute at 65 psi at the hose station outlet valve.

4. The calculations will be based on a total flow of 500 gpm from both internal (building) and external (yard hydrant system) hose streams.

5. When a hazard area is within reach of several internal hose streams, (utilizing 75' hose length except as noted) the calculations will include simultaneous water flow from multiple hose streams.

6. Water flow from hose streams will be based on hose stations located on the same floor level and within the same building as the area being protected, except as noted (hose will be included from another floor only when the isolated location of the station in question prevents simultaneous flow with at least one other interior hose station, in accord with NRC requirements).

7. The water flow from outside hose streams (yard hydrant system), is the difference between the 500 gpm (required allowance from all hose streams) and the internal (building) hose stream protection. Passage of hose through enclosed exit stairs or between adjacent buildings will not generally be addressed since this would negate the existing stairs or fire walls by allowing smoke, heat and fire to enter the enclosure or adjacent building, and/or create a possible tripping hazard.

8. The water supply for the standpipe and hose system will be based on rated capacity of the fire pumps. The maximum water pressure available will be based on the fire pump relief valve setting. Fire pump discharge outlets are located at El. 587'-10½".

9. In areas of the plant where fixed fire suppression systems are located, the calculations will be based on a simultaneous operation of both the fixed fire suppression system and all fire hose stations whose hose streams will reach the area protected by the fixed fire suppression system.

   a. The demand for the fixed water spray and automatic sprinkler systems will be based on "Automatic" Sprinkler Corporation of America (ASCOA) calculations, when available.

   b. When ASCOA calculations are not available, the demand for sprinkler systems will be based on the density curves of NFPA 13, Table 2-2.1 (B) for the largest fire area within the protected area of the system, but, with an area of sprinkler operation not to exceed 3,000 square feet. These calculations will be shown on the "Conclusions" page for each case requiring them.

   c. If the pressure required for the interior hose stations is less than that required by the ASCOA calculations for a fixed system (at the junction point), then further analysis of the standpipe/hose station is not required because the resultant flow and pressure will always be in excess of the hose requirements, (NFPA 14).

10. Assumptions:

   a. Friction loss will be calculated for all flows in pipe less than 4" in diameter.

   b. Friction loss will be calculated for flow greater than 200 GPM in 4" diameter pipe (unless otherwise noted).

   c. Friction loss will be calculated for flow greater than or equal to 500 GPM in pipe larger than 4" in diameter (unless otherwise noted).

11. Conclusions for each hose station calculation are shown at the end of the individual sections (i.e., Intermediate Building or Control Complex).

ABBREVIATIONS/SYMBOLS:

X X-alphanumeric, hydraulic reference point

A-X X-number (1,2,3,...) hydraulic reference point from "Automatic" Sprinkler Corporation of America Drawing No. 4549-70A-001-55-2.

Z Hydraulic Reference Point representing Fire Pump Discharge

"Automatic" Sprinkler Corporation of America - ASCOA

FSD - Fluid System Diagram

FPER - Fire Protection Evaluation Report

AUX. BLDG. - Auxiliary Building

INT. BLDG. - Intermediate Building

RAD. WASTE - Radioactive Waste Building

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CALCULATION

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HOSE STATION PRESSURE CALC PNRP - UNIT 1	01-4549-310	1 OF 7 PAGES

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TURBINE BLDG - UNIT 1

10" (A-17) 590'-9 3/8"

(17) 1 1/2" (11) D645, EL. 582'-3"; 1 1/2"-23', 1T, 4E, 1AV
NOTE: CALCS ON PG# ____ SHOW SIMULTANEOUS FLOW D645 W/ D691, & 300 GAM IN OUTSIDE HOSE.

592'-10 1/4" (A-18) 8" TURB BLDG SPRK SYST 1; (ALV @ 628'-6") (23)

10" (18) 1 1/2" (12) D652, EL. 582'-3"; 1 1/2"-5', 1T, 2E, 1AV
NOTE: CALCS ON PG# ____ SHOW SIMULTANEOUS FLOW OF D652 & D696, W/ 1173 GAM FROM TURB BLDG SPRK SYST #1, & 300 GAM IN OUTSIDE HOSE.

(13A) 1 1/2" (13) (100' HOSE)
D651, EL. 652'-3"; 1 1/2"-2', 1AV; 2"-82', 11E
NOTE: CALCS ON PG# ____ SHOW FLOW FROM D651 & D695, TOGETHER W/ 300 GPM OF OUTSIDE HOSE.

10" 2"

633'-0 (19) 2" (14) 1 1/2" D650, EL. 629'-3"; 1 1/2"-19', 4E, 1AV; 2"-1', 1T
NOTE: CALCS ON PG# 4, 5, 86 SHOW FLOW OF D650, D649, D694, D641 W/ TURB BLDG SPRKS 1A (1040 GAM @ 63.5 PSI) & 93 GPM OUTSIDE HOSE.

(29) 2"

(15) 1 1/2" D649, EL. 625-3"; 1 1/2"-2', 1 AV; 2"-119, 12E, 1T
NOTE: FOR FLOW, SEE D650 (ABOVE)

(15A) 4"

614'6" (21) 1 1/2" (16) D648, EL. 610'-3"; 1 1/2"-17', 1T, 4E, 1AV
NOTE: CALCS, PG# ____, SHOW SIMULTANEOUS FLOW OF D648 & D693, W/ 1313 GPM FROM THE TURB. BLDG. SPRK SYST. #1 & 300 GPM IN OUTSIDE HOSE.

(22) 4"

D645 - ASCOA 19-1, D648, D650 - ASCOA SHT # 4549-70A-001-23-1
D652 - ASCOA 18-3, D649, D651 - ASCOA SHT # 4549-70A-001-22-2

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TURBINE BLDG - UNIT 1

592'-10½" (A-18) — (23) TURB BLDG SPRK, SYST #1 (ALV. @ EL. 628'-6")

10" — (A-17) 590'-9⅜"

10"

590'-9⅜" — (6) 1½" — (1) D D691, EL. 582-3; 1½"-16', 1T, 2E, 1AV

NOTE: CALCS ON PG # ____ SHOW SIMULTANEOUS FLOW OF D691 & D645 WITH 300 GAM OF OUTSIDE HOSE.

(2) (100' HOSE)

10" — (2A) 1½" — D695, EL. 652'-3"; 1½"-2', 1AV ; 2"-87', 2T, 9E

NOTE: CALCS ON PG # ____ SHOW SIMULTANEOUS FLOW OF D695 & D651 W/ 300 GAM IN OUTSIDE HOSE.

2" — (7) 634'-0"

1½" — (3) D694, EL. 629'-3"; 1½"-11', 1T, 2E, 1AV; 2"-26', 1T

NOTE: CALCS, PG # 4, 5, 6 SHOW FLOW OF D694, D641, D649, D650, W/ 193 GAM IN OUTSIDE HOSE, AND TURB BLDG SPRK (1040 GPM @ 63.5 PSI)

585'-6" — (9) 2" — 4" — (8) 615'-0"

(4)

1½" — D693, EL. 610'-3"; 1½"-20', 1T, 4E, 1AV

10"

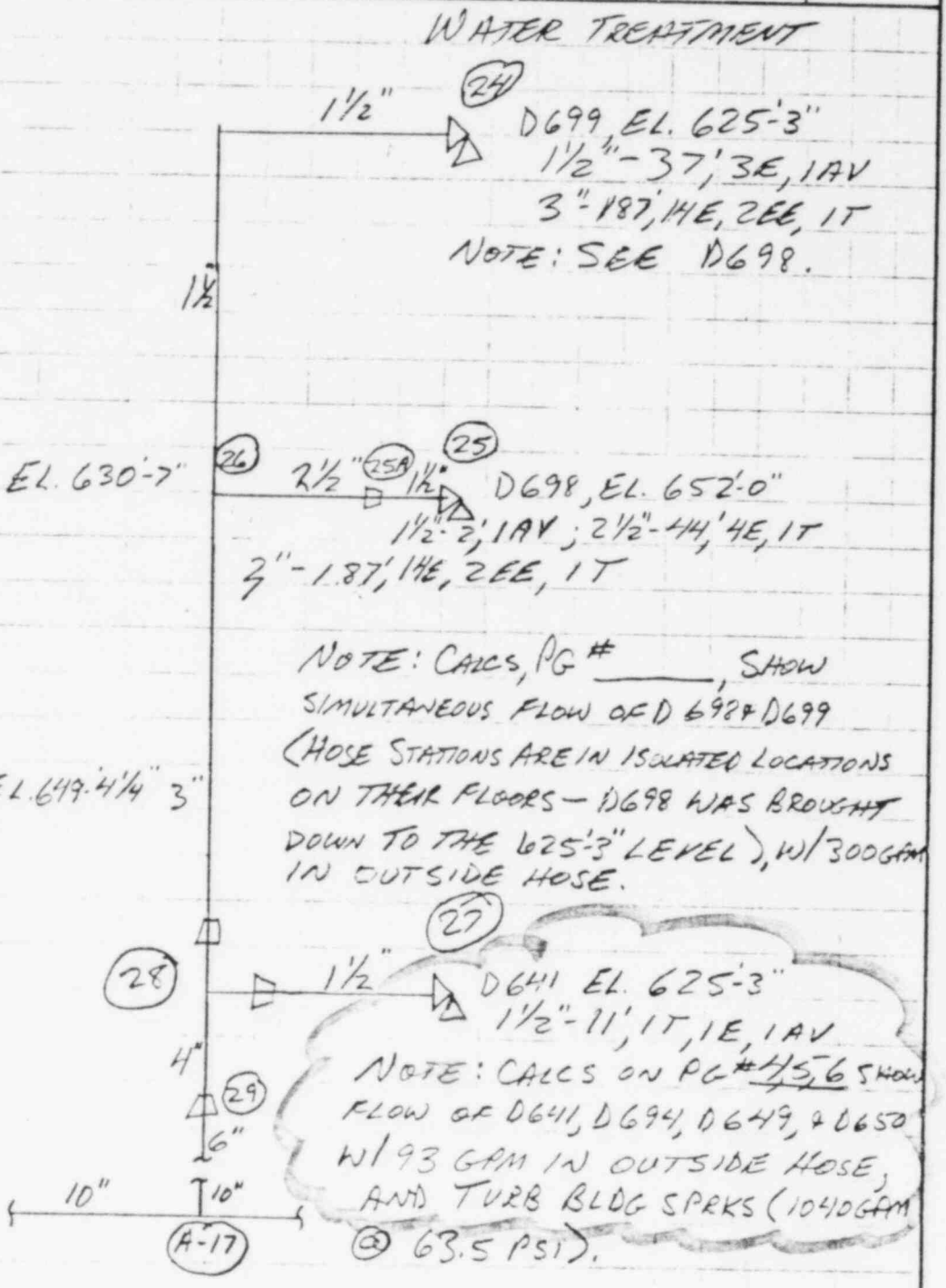
NOTE: CALCS, PG # ____, SHOW SIMULTANEOUS FLOW OF D693 & D648, W/ 1313 GAM FROM THE TURBINE BLDG SPRINKLER SYST. #1 & 300 GPM IN OUTSIDE HOSE.

585'-6" — (10) 1½" — (5) D696, EL. 582'-3"; 1½"-5', 1T, 2E, 1AV

NOTE: CALCS ON PG # ____ SHOW SIMULTANEOUS FLOW OF D696 & D652, W/ 1173 GPM FROM THE TURBINE BUILDING SPRINKLER SYST. #1 AND 300 GAM IN OUTSIDE HOSE.

10"

FOR D691 — SEE ASCOA 4549-70A-001-19-1
FOR D696 — SEE " " -18-3
FOR D693, D694 — SEE " 22-2; FOR D695 — SEE ASCOA SHT 23-1



FOR D 641 - SEE ASCOA 70A-001-23-1
FOR D698, 699 - SEE " " 42-0

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NOZZLE TYPE & LOCATION	FLOW IN G.P.M.	PIPE SIZE	FITTING & DEVICES	PIPE EQUIV. LENGTH	FRICTION LOSS P.S.I./FT.	REQUIRED P.S.I.	HYD. REF. PT.	ELEV.	NOTES
	Q			TOT.		PE			
	Q	1 1/2"	1T-8	LGTH. 11	.318	PT 65.0	3	629'-3"	TURB BLDG H.S.
D694	Q 100		2E-8	FTG. 39		PF 15.9			
			1AV-23	TOT. 50		PE			
	Q	2"	1T-10	LGTH. 26	.093	PT 80.9	7		
	Q 100			FTG. 10		PF 3.3			
				TOT. 36		PE			
	Q	4"		LGTH.		PT 84.2	8		
	Q 100			FTG.		PF NIL			
				TOT.		PE 18.9			
	Q			LGTH.		PT 103.1	9	585'-6"	
	Q			FTG.		PF			
				TOT.		PE			
D641	Q	1 1/2"	1T-8	LGTH. 11	.318	PT 65.0	27	625'-3"	TURB BLDG H.S.
	Q 100		1E-4	FTG. 35		PF 14.6			
			1AV-23	TOT. 46		PE			
	Q	4"/6"/10"		LGTH.		PT 79.6	28		
	Q 100			FTG.		PF NIL			
				TOT.		PE 17.2			
ADJ TO HIGHER ↓				LGTH.		PT 96.8	9	585'-6"	$\sqrt{\frac{103.1}{100}}(100) = 98$
PT. NO CHANGE ≅ 100				FTG.		PF ↓			
				TOT.		PE ↓			
D694+	Q 100	10"		LGTH.		PT 103.1	9		
D641	Q 200			FTG.		PF NIL			
				TOT.		PE (-) 2.3			
ADJ FLOW TO	Q ↓			LGTH.		PT 100.8	A-17	590'-9"	$\sqrt{\frac{108}{100.8}}(200) \cong 207$
HIGHER PRESSURE PT	Q 207			FTG.		PF ↓			
				TOT.		PT 108.0	A-17		

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NOZZLE TYPE & LOCATION	FLOW IN G.P.M.	PIPE SIZE	FITTING & DEVICES	PIPE EQUIV. LENGTH	FRICTION LOSS P.S.I./FT.	REQUIRED P.S.I.	HYD. REF. PT.	ELEV.	NOTES
TURB BLDG	Q	8"		LGTH.		PT 63.5	23	628'-6"	ASCOA CALC
SPRK SYST #2A	Q 1040			FTG.	.0094	PF 1.7			4549-71A-044-1
				TOT. 184		PE 15.4			
ADJ Q TO	Q ↓			LGTH.		PT 80.6	A-18	592-10¼	$\sqrt{\frac{104.6}{80.6}}(1040)$
HIGHER PT	Q 1185			FTG.		PF ↓			= 1185
				TOT.		PE			
(FROM PG #6)	Q			LGTH.		PT 104.6	A-18		
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			
	Q			LGTH.		PT			
	Q			FTG.		PF			
				TOT.		PE			

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NOZZLE TYPE & LOCATION	FLOW IN G.P.M.	PIPE SIZE	FITTING & DEVICES	PIPE EQUIV. LENGTH	FRICTION LOSS P.S.I./FT.	REQUIRED P.S.I.	HYD. REF. PT.	ELEV.	NOTES
D650	Q	1½"	4E-16	LGTH. 19		PT 65.0	14	629'-3"	TURBINE BLDG. H.S.
	Q		1AV-23	FTG. 39	.318	PF 18.4			
	Q 100			TOT. 58		PE (-) 1.7			
	Q	2"	1T-10	LGTH. 1		PT 81.7	19	633-0	
	Q			FTG. 10	.093	PF 1.0			
	Q 100			TOT. 11		PE			
ADJ Q TO	Q ↓			LGTH.		PT 82.7	20		$\sqrt{\frac{87.2}{82.7}}(100)$
				FTG.		PF ↓			
P_T	Q 100			TOT.		PE			≠100
	Q			LGTH.		PT 87.2	20		
				FTG.		PF			
	Q			TOT.		PE			
D649	Q	1½"	1AV-23	LGTH. 2		PT 65.0	15	625'-3"	T.B. H.S.
				FTG. 23	.318	PF 8.0			
	Q 100			TOT. 25		PE			
	Q	2"	12E-60	LGTH. 119		PT 73.0	15A		
			1T-10	FTG. 70	.093	PF 17.6			
	Q 100			TOT. 189		PE (-) 8.4			
ADD D650	Q 100	4"/10"		LGTH.	/	PT 87.2	20	633'-0"	
				FTG.		PF NIL			
	Q 200			TOT.		PE 17.4			
COMBINE TURB	Q 1185	10"		LGTH.		PT 104.6	A-18	592-10¼	C = 100 CARRY FROM PG. 5
SPRK SYST				FTG.	.0071	PF 2.5			
W/ H.S.	Q 1385			TOT. 353		PE .9			
ADD D694 +	Q 207	10"		LGTH.		PT 108.0	A-17	590'-9⅜"	C = 100
D641, PG #4				FTG.	.0092	PF 2.9			
	Q 1592			TOT. 316		PE			
	Q	10"		LGTH.		PT 110.9	A-27		C = 75
				FTG.	.0157	PF 3.0			
	Q 1592			TOT. 193		PE			
OUTSIDE	Q 93	12"		LGTH.		PT 113.9	A-3		C = 75
HOSE				FTG.	.0073	PF 3.8			
	Q 1685			TOT. 518		PE 1.3			
P_T, FIRE	Q			LGTH.		PT 119.0	Z	587'-10½"	
PUMP				FTG.		PF			
	Q 1685			TOT.		PE			
	Q			LGTH.		PT			
				FTG.		PF			
	Q			TOT.		PE			
	Q			LGTH.		PT			
				FTG.		PF			
	Q			TOT.		PE			
	Q			LGTH.		PT			
				FTG.		PF			
	Q			TOT.		PE			
	Q			LGTH.		PT			
				FTG.		PF			
	Q			TOT.		PE			
	Q			LGTH.		PT			
				FTG.		PF			
	Q			TOT.		PE			
	Q			LGTH.		PT			
				FTG.		PF			
	Q			TOT.		PE			

CONCLUSIONS:

D695 D651 - WORST CASE FLOW CONDITION SHOWN ON PG# _____, D695 & D651 W/ 300 GPM IN OUTSIDE HOSE ON A COMMON HAZARD. CALCS SHOW COMPLIANCE W/ NFPA 14.

(REF: FSD GAI DWG D-914-002, LAYOUT DWG. E-001-038)

D694, D641, D649, D650 - WORST CASE FLOW CONDITION SHOWN ON PG# 4,5,6, SIMULTANEOUS FLOW OF H.S. W/ TURBINE BLDG SPRK SYST (1A) AND OUTSIDE HOSE ON A COMMON HAZARD. COMPLIANCE SHOWN W/ NFPA 14.
(REF: FSD GAI DWG D-914-002, LAYOUT DWG E-001-029)

D698, D699 - WORST CASE FLOW CONDITION SHOWN ON PG# _____, D698 & D699 W/ 300 GPM OF OUTSIDE HOSE. CALCS SHOW COMPLIANCE W/ NFPA 14.
(REF.: FSD GAI DWG D-914-002, LAYOUT DWG E-001-038).

Attachment 2
December 29, 1982

Drainage for Switchgear Rooms.

RESPONSE

An evaluation of the equipment located in the switchgear rooms has determined that a maximum water level of 4 inches could be tolerated in the switchgear rooms without endangering the switchgear operation. It is anticipated that hose streams located outside the rooms would be used on fire in these areas only as the second line of defense. If two hose streams were used simultaneously a water flow of approximately 200 GPM could be predicted. Drainage in or adjacent to switchgear areas is such that the predicted water flow would not create any appreciable accumulation on the floor of these areas. In addition, water accumulation from fighting a fire or from a pipe break in any of the switchgear areas can not accumulate to a level which could endanger the redundant equipment which is located in another area.