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

March 7, 1979

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Additional Fire Protection Information
for Dresden Station Units 2 and 3
NRC Docket Nos. 50-237 and 50-249

Reference (a): W. F. Naughton letter to H. R. Denton
dated January 4, 1979

Dear Mr. Denton:

In accordance with Section 3.0 of the Dresden Station Units 2 & 3 Fire Protection Safety Evaluation Report, Reference (a) transmitted design drawings for the sprinkler system in the Dresden Unit 3 cable tunnel.

As a result of discussions with the NRC Staff, the design of this system has been revised. The major revision is the change from a pre-action to a wet-pipe system. The enclosed design drawings and hydraulic calculations reflect this revision.

Please address any additional questions that you might have to this office.

Per an agreement with the NRC Staff, one (1) signed original and two (2) copies of this letter are provided for your use.

Very truly yours

Robert F. Janecek
Nuclear Licensing Administrator
Boiling Water Reactors

enclosures

2 DRWGS ADVANCED TO POWER SYS BR

1 DRWG TO REG FILE

7903140405

ASCOA Form 9-52
(Rev. 12-75)

LE SHEET — HYDRAULIC CALCU TIONS
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

• • • • • **Note: This Sheet to Be Completed for Each Separate System** • • • • •

SYSTEM NO. 132

CONTRACT NO. 26-1750 CALCULATOR EH & RK OFFICE [illegible] #35 DATE [illegible]

NAME OF PROPERTY [illegible]

ADDRESS [illegible] CONTRACT WITH SARGENT & [illegible]

BLDG. AND AREA PROTECTED UNIT 3 CABLE Tunnel

DESIGN MADE IN ACCORDANCE WITH (NFPA) ~~(FM)~~ STANDARD NO. 13

TYPE PROTECTION		ALARM TYPE		DISCHARGE HEADS	HEAD SPACING	DESIGNED COVERAGE
Extinguishment ✓		Alarm	Suprotex	Open Spks.	C to C Lines VARIES	Density GPM/Sq. Ft. .15
Control		Dry Pipe	Suprotex-Deluge	Sealed Spks. 1/4"	C to C Spks. 10' MAX	Minimum GPM/Head 7
Exposure Protection		Pre-Action	Gate Valve 6"	Spray Nozzles	Sq. Ft. Per Head [illegible]	Minimum PSI at Head 25.4
Fire Prevention		Deluge		Foam	Max. Sq. Ft. Per Head 47	No. Heads Discharging 152
TYPE SYSTEM		Flow Switch 6"				No. Systems Operating 1
Automatic	Manual	WET PIPE Sys.		Hose Nozzles		Hose Streams GPM 750
✓						Rack GPM 20

STARTING POINT: Dwg. Sheet No. 21 Story or Level [illegible] Reference Point 1

ABBREVIATIONS

E	90° Ell	AlV	Alarm Valve	DTM	Detector Meter
EE	45° Ell	DelV	Deluge Valve	ST	Strainer
C	Cross — flow turned 90°	DPV	Dry Pipe Valve	GPM	U.S. Gallons/Minute
T	Tee — flow turned 90°	PAV	Pre-Action Valve	PSI	Pounds Sq. Inch.
GV	Gate Valve	CkV	Check Valve		

CALCULATION SEQUENCE

Trunk (or minimum demand) **Calculation** is run directly from Starting Head to Supply Point.

Starting Head is that point in the system which will require the greatest pressure at the supply.

Supply Point is that point at which the water supply is known, such as bottom of a gravity tank, pump discharge, or point of acceptable water supply flow test.

Branch (or balancing) **Calculations** are those made to determine the flow for units or lines picked up in the path of the Trunk Calculation.

IDENTIFICATION

Each Head used in the calculation is **NUMBERED** consecutively on the plan: 1, 2, 3 etc., in the order in which it enters the calculation. (Where lines or units are typical with a previous line or unit, the heads are not numbered.)

Each Junction Point is **LETTERED** consecutively on the plan, A, B, C in the order in which it enters the calculation. (No two heads or two junction points are given the same letter or number in the same system.) Where a letter can refer to two junction points in the plan view, such as the tee at top of riser nipple and the tee at bottom of riser nipple, sub letters t and b are used to represent top and bottom junctions.

Branch Lines or Units are identified by the letter of the junction point at which they are brought into the main calculation, as Line C, or Unit C.

In Branch Calculations, starting head and first junction point take the next head number and junction letter after the last one used so far in the Trunk Calculation.

SHEET NUMBERING

Trunk Calculations from Starting Point to Supply Point, if requiring more than one sheet, are numbered 1, 1-A, 1-B, 1-C, as required, to keep sheets of primary importance in direct sequence. If there is more than one system, sheets for EACH NEW SYSTEM start with 1, 1-A, etc., again. For this reason, calculation sheets must show both system number and sheet number.

Branch Calculation Sheets and the graphs used to pick off flow to be added to Trunk Calculation are numbered 2, 3, 4, and so on in the **order** in which the lines and units are calculated.

EXPLANATION OF COLUMN HEADINGS

Plan Reference Point identifies starting point and succeeding head numbers and junction letters, on plan.

Total Heads mean accumulated number of heads discharging.

Type "S" followed by orifice diameter means standard sprinkler of that diameter. Other discharge outlets are indicated by their listed symbol number.

Added GPM (q) means the flow for single head, line or unit picked up. TOTAL GPM (Q) is the accumulated flow.

Friction Loss. Loss per Ft. (first column under this heading) times total feet for pipe and fittings gives Total Loss (second column).

Static. Added to or deducted from accumulated pressure demand. (If a deduction, minus mark "___" is used.)

Required Pressure. Accumulated net total.

Calculation Reference. (Sheet No. and Point No.) These columns show calculation sheet numbers and identifying numbers or letters for starting points of junction points in related calculations.

FORM 9-53 (REV. 4-68) 26-17[illegible]

CONTRACT NO. PRELIMINARY

System No. 132 Sheet 2-2

HYDRAULIC CALCULATION SHEET

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

NAME, ADDRESS OF PROPERTY [illegible]

NOTES [illegible]

DATE [illegible]

Calculated by [illegible]

SPRINKLERS NOZZLES: Plan Ref. Pt.	Total Heads	Type	(q) Added Gpm	(Q) Total Gpm	Pipe Size In.	Pipe and Equivalent Length Fittings - Devices Feet	FRICTION LOSS: Psi/Ft. C = [illegible]	Total Psi	(Elevation) Static Plus or Minus Psi	Required Pressure Psi	CALCULATN. REFERENCE: Sheet No.	Point No.
1	1	1/2	7			PRESSURE AT HEAD →				25.[illegible]		
1	1	1.39		7	1	Br. 2	.018	0		25.[illegible]		A
A	1	1.39		7	1 1/4	R 1.25	.0049	0	.541	25.[illegible]		[illegible]
B	2	1.39	7.1	14.1	1 1/4	R 1.25	.0177	0	.541	26.[illegible]		[illegible]
C	3	1.39	7.1	21.2	1 1/4	R 1.25	.0375	0	.541	[illegible]		C
D	4	1.39	7.2	28.4	[illegible]	[illegible]	.0638	.1	.541	27.5		E
E	5	1.39	7.3	35.7	1 1/4	R 1.25	.103	.1	.541	28.[illegible]		F
F	6	1.39	7.4	43.1	1 1/4	R 1.25	.141	.2	.541	28.[illegible]		G
G	7	1.31	7.5	50.6	[illegible]	R [illegible]	[illegible]	.2	[illegible]	[illegible]		[illegible]
H	8	1.39	7.5	58.1	[illegible]	R [illegible]						
I						[illegible] 1(T)						
		(K=10.[illegible])				[illegible]	.205	[illegible]	[illegible]	32.[illegible]		I
1	1	1.39		7		[illegible]	.018	0		25.4		A
A	[illegible]	1.39		7	1	R 1.25			.541	[illegible]		[illegible]
B	2	1.39	7	14	1	R 1.25	.[illegible]	0	.541	[illegible]		[illegible]
C	3	1.39	7.1	21.1	1	R [illegible]	.142	.2	.541	26.6		D
D	4	1.39	7.2	28.3	1	[illegible]	.243	.3	.541	27.4		E
E	5	1.39	7.3	35.6	1	R [illegible]	.386	.5	.541	28.[illegible]		[illegible]
F	6	1.39	7.4	43.0	1	R [illegible]	.536	.7	.541	[illegible]		[illegible]
G	[illegible]	1.39	7.6	50.6	1	R 1.25	.735	.9	.541	31.0		H
H	8	1.39	7.7	58.3	1	R 2.0						I
						6 [illegible] 1(T)	.923	1.4	[illegible]	33.[illegible]		
						8.0						
		(K=10.04)										

ASCOA Form 9-52
(Rev. 12-75)

TITLE SHEET – HYDRAULIC CALCULATIONS
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

• • • • • Note: This Sheet to Be Completed for Each Separate System • • • • •

SYSTEM NO. 334

CONTRACT NO. 26-1750SH CALCULATOR EH&RK OFFICE Region 35 DATE 2-22-[illegible]

NAME OF PROPERTY Dresden Nuclear Power Station – Morris Ill.

ADDRESS Morris Ill CONTRACT WITH [illegible] & Lundy Spec # [illegible]

BLDG. AND AREA PROTECTED Unit 3 Cable Tunnel

DESIGN MADE IN ACCORDANCE WITH (NFPA) ~~(FM)~~ STANDARD NO. 13

TYPE PROTECTION	ALARM TYPE	DISCHARGE HEADS	HEAD SPACING	DESIGNED COVERAGE
Extinguishment ✓	Alarm · Suprotex	Open Spks.	C to C Lines VARIES	Density GPM/Sq. Ft. .15
Control	Dry Pipe · Suprotex-Deluge	Sealed Spks. 1/4"	C to C Spks. 10' MAX.	Minimum GPM/Head [illegible]
Exposure Protection	Pre-Action · Gate Valve 6"	Spray Nozzles	Sq. Ft. Per Head 3'X10'	Minimum PSI at Head 25.4
Fire Prevention	Deluge	Foam	Max. Sq. Ft. Per Head [illegible]	No. Heads Discharging 42
TYPE SYSTEM	Flow Switch 6"			No. Systems Operating 1
Automatic ✓ · Manual	WET PIPE SYS. ✓	Hose Nozzles		Hose Streams GPM 750
				Rack GPM ~~0~~

STARTING POINT: Dwg. Sheet No. P1 Story or Level TRAY Nozzle Reference Point A

ABBREVIATIONS

E	90° Ell	AlV	Alarm Valve	DTM	Detector Meter
EE	45° Ell	DelV	Deluge Valve	ST	Strainer
C	Cross — flow turned 90°	DPV	Dry Pipe Valve	GPM	U.S. Gallons/Minute
T	Tee — flow turned 90°	PAV	Pre-Action Valve	PSI	Pounds Sq. Inch.
GV	Gate Valve	CkV	Check Valve		

CALCULATION SEQUENCE

Trunk (or minimum demand) **Calculation** is run directly from Starting Head to Supply Point.

Starting Head is that point in the system which will require the greatest pressure at the supply.

Supply Point is that point at which the water supply is known, such as bottom of a gravity tank, pump discharge, or point of acceptable water supply flow test.

Branch (or balancing) **Calculations** are those made to determine the flow for units or lines picked up in the path of the Trunk Calculation.

IDENTIFICATION

Each **Head** used in the calculation is **NUMBERED** consecutively on the plan: 1, 2, 3 etc., in the order in which it enters the calculation. (Where lines or units are typical with a previous line or unit, the heads are not numbered.)

Each **Junction Point** is **LETTERED** consecutively on the plan, A, B, C in the order in which it enters the calculation. (No two heads or two junction points are given the same letter or number in the same system.) Where a letter can refer to two junction points in the plan view, such as the tee at top of riser nipple and the tee at bottom of riser nipple, sub letters t and b are used to represent top and bottom junctions.

Branch Lines or Units are identified by the letter of the junction point at which they are brought into the main calculation, as Line C, or Unit C.

In Branch Calculations, starting head and first junction point take the next head number and junction letter after the last one used so far in the Trunk Calculation.

SHEET NUMBERING

Trunk Calculations from Starting Point to Supply Point, if requiring more than one sheet, are numbered 1, 1-A, 1-B, 1-C, as required, to keep sheets of primary importance in direct sequence. If there is more than one system, sheets for EACH NEW SYSTEM start with 1, 1-A, etc., again. For this reason, calculation sheets must show both system number and sheet number.

Branch Calculation Sheets and the graphs used to pick off flow to be added to Trunk Calculation are numbered 2, 3, 4, and so on in the **order** in which the lines and units are calculated.

EXPLANATION OF COLUMN HEADINGS

Plan Reference Point identifies starting point and succeeding head numbers and junction letters, on plan.

Total Heads mean accumulated number of heads discharging.

Type "S" followed by orifice diameter means standard sprinkler of that diameter. Other discharge outlets are indicated by their listed symbol number.

Added GPM (q) means the flow for single head, line or unit picked up. TOTAL GPM (Q) is the accumulated flow.

Friction Loss. Loss per Ft. (first column under this heading) times total feet for pipe and fittings gives Total Loss (second column).

Static. Added to or deducted from accumulated pressure demand. (If a deduction, minus mark. "___" is used.)

Required Pressure. Accumulated net total.

Calculation Reference. (Sheet No. and Point No.) These columns show calculation sheet numbers and identifying numbers or letters for starting points of junction points in related calculations.

REVISED [illegible]

FORM [illegible] REV. 4-68

CONTRACT NO. [illegible]

System No. 3C4 Sheet 1-2

HYDRAULIC CALCULATION SHEET

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

NAME, ADDRESS OF PROPERTY [illegible]

NOTES [illegible]

DATE [illegible]

Calculated by [illegible]

SPRINKLERS NOZZLES			(q) Added Gpm	(Q) Total Gpm	Pipe Size In.	Pipe and Equivalent Length Fittings - Devices Feet	FRICTION LOSS		(Elevation) Static Plus or Minus Psi	Required Pressure Psi	CALCULATN. REFERENCE	
Plan Ref. Pt.	Total Heads	Type					Psi/Ft. C = [illegible]	Total Psi			Sheet No.	Point No.
							PRESSURE AT HEAD →			33.[illegible]		
[illegible]	8	10.04		58.3	2½	CM [illegible]	.0[illegible]	.1		33.3		
[illegible]	16	[illegible]	58.4	116.7	2½	CM [illegible]						
						12 [illegible]						
						[illegible]	.0[illegible]	[illegible]		[illegible]		
[illegible]	24	10.04	[illegible]	176.1	[illegible]	CM – [illegible]						
						12 [illegible]						
						22	.117	2.6		3[illegible]		
[illegible]	3[illegible]	10.04	61.6	237.7	2½	CM [illegible]	[illegible]	2		[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	300.[illegible]	[illegible]	[illegible]	.303	3		[illegible]		
[illegible]	[illegible]	[illegible]	[illegible]	366.1	2½	CM [illegible]	[illegible]	4.5		[illegible]		
[illegible]	56	10.04	[illegible]	43[illegible]	[illegible]	[illegible]	[illegible]	6.[illegible]		[illegible]		
[illegible]	64	[illegible]	[illegible]	508.5	2½	[illegible] - 8	[illegible]					
						[illegible] 12						
	PICK UP [illegible]					20.0		16.1		64.3		
3[illegible]	(126)	K_{62} = 62.25	517.8	1026.3	4	PIPE 24	.268				2	K62
						(2EE) 12						
						2(E) 20						
						1 GV 2						
						58.0	.273	15.8	-6.5	78.6		
	PICK UP APPROX 16 HDS @ 8.0 GPM 128 GPM @ 26.0 PSI											
				1026.3						78.6		
	(142)		222.6	1250.0	6	STRAINER		1.5		80.1		

(A1) CUT-IN →

FORM 3-53 (REV. 4-68)

CONTRACT NO. [illegible]

HYDRAULIC CALCULATION SHEET

System No. 384 Sheet 1-2

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

NAME, ADDRESS OF PROPERTY [illegible]

NOTES [illegible] DATE [illegible]

Calculated by [illegible]

SPRINKLERS NOZZLES			(q) Added Gpm	(Q) Total Gpm	Pipe Size In.	Pipe and Equivalent Length Fittings - Devices Feet	FRICTION LOSS		(Elevation) Static Plus or Minus Psi	Required Pressure Psi	CALCULATN. REFERENCE	
Plan Ref. Pt.	Total Heads	Type					Psi/Ft. C = 120	Total Psi			Sheet No.	Point No.
				35.6			PRESSURE AT HEAD →			27.4		
	5	K=5.9		35.6	1	[illegible]	.386			27.4		
						5 FT						
								3.4	.9	30.4		
		K=6.35										
	5			35.6	1½	[illegible]						
							.0060	.0		31.4		
	10		35.6	71.2	2	(CM) 10	.0210	.2		31.6		
	15		35.7	106.9	2½	[illegible]	.0472	.5		32.1		
	20		35.9	142.8	2½	[illegible]	.0854	.8		32.9		
	25		36.1	179.2	2½	[illegible]	.117	1.2		34.1		
	30		37.1	216.3	2½	[illegible]	.177	1.7		35.8		
	38	K=10.4	60.1	276.4	3	[illegible]	.0666	2.7		38.5		
	46		62.3	338.7	3	[illegible]	.0380	2.8		41.3		
	54		65.3	404	3	[illegible]	.0380	3.8		[illegible]		
	62		69.3	473.3	2½	CM-2						
						1H 12						
						14.0	.720	10.1		57.8		
			K_{62} = 473.3 / √57.8 − 62.25									

ASCOA Form 9-52
(Rev. 12-75)

TITLE SHEET – HYDRAULIC CALCULATIONS
"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

• • • • • Note: This Sheet to Be Completed for Each Separate System • • • • •

SYSTEM NO. 556

CONTRACT NO. 26-1750 CALCULATOR EH/RK OFFICE Region #35 DATE 2/22/79

NAME OF PROPERTY Dresden Nuclear Power Station

ADDRESS Morris Ill. CONTRACT WITH Sargent & Lundy

BLDG. AND AREA PROTECTED Unit 3 Cable Tunnel Prot. # 5069 Spr [illegible] 239

DESIGN MADE IN ACCORDANCE WITH (NFPA) ~~(FM)~~ STANDARD NO. 13

TYPE PROTECTION		ALARM TYPE		DISCHARGE HEADS	HEAD SPACING	DESIGNED COVERAGE
Extinguishment ✓		Alarm	Suprotex	Open Spks.	C to C Lines [illegible]	Density GPM/Sq. Ft. .15
Control		Dry Pipe	Suprotex-Deluge	Sealed Spks. 1/4"	C to C Spks. 10' max.	Minimum GPM/Head 7
Exposure Protection		Pre-Action	Gate Valve 6"	Spray Nozzles	Sq. Ft. Per Head 3' X 10'	Minimum PSI at Head 25.4
Fire Prevention		Deluge		Foam	Max. Sq. Ft. Per Head 47	No. Heads Discharging [illegible]
TYPE SYSTEM		Flow Switch 6"				No. Systems Operating 1
Automatic	Manual	WeT Pipe Sys. ✓		Hose Nozzles		Hose Streams GPM 250
✓						Rack GPM 0

STARTING POINT: Dwg. Sheet No. P1 Story or Level Tray [illegible] Reference Point A

ABBREVIATIONS

E	90° Ell	AlV	Alarm Valve	DTM	Detector Meter
EE	45° Ell	DelV	Deluge Valve	ST	Strainer
C	Cross – flow turned 90°	DPV	Dry Pipe Valve	GPM	U.S. Gallons/Minute
T	Tee – flow turned 90°	PAV	Pre-Action Valve	PSI	Pounds Sq. Inch.
GV	Gate Valve	CkV	Check Valve		

CALCULATION SEQUENCE

Trunk (or minimum demand) **Calculation** is run directly from Starting Head to Supply Point.

Starting Head is that point in the system which will require the greatest pressure at the supply.

Supply Point is that point at which the water supply is known; such as bottom of a gravity tank, pump discharge, or point of acceptable water supply flow test.

Branch (or balancing) **Calculations** are those made to determine the flow for units or lines picked up in the path of the Trunk Calculation.

IDENTIFICATION

Each Head used in the calculation is **NUMBERED** consecutively on the plan: 1, 2, 3 etc., in the order in which it enters the calculation. (Where lines or units are typical with a previous line or unit, the heads are not numbered.)

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Branch Lines or Units are identified by the letter of the junction point at which they are brought into the main calculation, as Line C, or Unit C.

In Branch Calculations, starting head and first junction point take the next head number and junction letter after the last one used so far in the Trunk Calculation.

SHEET NUMBERING

Trunk Calculations from Starting Point to Supply Point, if requiring more than one sheet, are numbered 1, 1-A, 1-B, 1-C, as required, to keep sheets of primary importance in direct sequence. If there is more than one system, sheets for EACH NEW SYSTEM start with 1, 1-A, etc., again. For this reason, calculation sheets must show both system number and sheet number.

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EXPLANATION OF COLUMN HEADINGS

Plan Reference Point identifies starting point and succeeding head numbers and junction letters, on plan.

Total Heads mean accumulated number of heads discharging.

Type "S" followed by orifice diameter means standard sprinkler of that diameter. Other discharge outlets are indicated by their listed symbol number.

Added GPM (q) means the flow for single head, line or unit picked up. TOTAL GPM (Q) is the accumulated flow.

Friction Loss. Loss per Ft. (first column under this heading) times total feet for pipe and fittings gives Total Loss (second column).

Static. Added to or deducted from accumulated pressure demand. (If a deduction, minus mark. "___" is used.)

Required Pressure. Accumulated net total.

Calculation Reference. (Sheet No. and Point No.) These columns show calculation sheet numbers and identifying numbers or letters for starting points of junction points in related calculations.

REVISED

FORM 9-53 (REV. 4-68)

CONTRACT NO. Preliminary

HYDRAULIC CALCULATION SHEET

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

System No. 5E 6 Sheet 12

NAME, ADDRESS OF PROPERTY [illegible]

NOTES P = [illegible] Q = [illegible]

DATE 2/22/79

Calculated by [illegible]

Plan Ref. Pt.	Total Heads	Type	(q) Added Gpm	(Q) Total Gpm	Pipe Size In.	Pipe and Equivalent Length Fittings - Devices Feet	Friction Loss Psi/Ft. C=120	Friction Loss Total Psi	Elevation Static Plus or Minus Psi	Required Pressure Psi	Sheet No.	Point No.
							PRESSURE AT HEAD →			25.4		
1	1	1.07		7	1	[illegible]	.08	0		25.4		A
A	1			7	1	R 1.5	.08	0	.649	26.1		B
B	2		7.1	14.1	1	[illegible]	.0673	.1	[illegible]	26.7		C
C	3		7.2	21.3	1	[illegible]	.155	.2	.649	27.5		D
D	4		7.3	28.6	1	[illegible]	.259	.4	[illegible]	28.5		
		K=5.36										
		5.36										
[illegible]	4	5.36		28.6	2½	CM 9	.0040	0		28.5		
[illegible]	8		28.6	57.2	2½	[illegible]	[illegible]			[illegible]		
[illegible]	12		28.7	85.9	2½	CM 8 / 6 2(E) / 14	.0243	.4		30.0		
[illegible]	16		29.4	115.3	2½	CM 10	.0559	.6		30.6		
[illegible]	21	6.35	35.1	150.4	2½	CM 10	[illegible]	.8		31.4		
[illegible]	26		35.6	186.0	3	CM 10	.0450	.5		31.9		
[illegible]	31		35.9	221.9	3	CM 10	[illegible]	.6		32.5		
[illegible]	36		36.2	258.1	3	CM 6 / 6 2(E) / 12	.0804	.9		33.4		
[illegible]	41		36.7	294.8	3	CM 10	.105	1.1		34.5		
[illegible]	46		37.3	332.1	3	CM 10	.132	1.3		35.8		
[illegible]	51		37.9	370.0	3	CM 10	.154	1.5		37.3		
[illegible]	56		38.8	408.8	3	CM 10	.187	1.9		39.2		
[illegible]	61		38.8	447.6	3	CM 10	.222	2.2		41.4		
[illegible]	66		40.0	487.5	4	CM 7	.0691	.5		41.9		
[illegible]	70	5.36	34.7	522.2	4	CM 7 / 4 (R) / 30 3(E) / 41	.0800	3.3	1.7	46.9		
[illegible]	74		36.7	560.9	4	CM 10	.0865	.9		47.8		
[illegible]	78		37.1	598.0	4	CM 10	.101	1.0		48.8		
[illegible]	82		37.4	635.4	4	CM 10	.113	1.1		[illegible]		
[illegible]	86		37.9	673.3	4	CM 10	.127	1.3		[illegible]		
[illegible]	90		38.4	711.7	4	CM 10	.141	1.4		52.6		
[illegible]	94		38.9	750.6	4	CM 10	.152	1.5		[illegible]		
[illegible]	98		39.4	790.0	4	CM 10	.167	1.7		[illegible]		
[illegible]	102		40.0	850.0	4	2' 2(E) = 22	.192	4.2		60.0		
Pick up other side →	134	K=37.68	291.8	1141.8	6	FTG 60 & Pipe 23 = 93	.05	4.7	-7.8	56.9		TR
		PICK UP	APPROX 11	HEADS @ 8.0 GPM			W/26.0 PSI @ 88 GPM					
	145	FLOWING	105.0	1250	6	560' PE FTG	.05	29.8	3.5	90.2		

SYSTEM # 6 REQUIREMENTS

FORM 9-53 (REV. 4-68)

CONTRACT NO. 26-1750SH

HYDRAULIC CALCULATION SHEET

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

System No. 5th 6 Sheet 2 of 2

NAME, ADDRESS OF PROPERTY [illegible]

NOTES

DATE 2-22-79

Calculated by [illegible]

SPRINKLERS NOZZLES			(q) Added Gpm	(Q) Total Gpm	Pipe Size In.	Pipe and Equivalent Length Fittings - Devices Feet	FRICTION LOSS		(Elevation) Static Plus or Minus Psi	Required Pressure Psi	CALCULATN. REFERENCE	
Plan Ref. Pt.	Total Heads	Type					Psi/Ft. C = 120	Total Psi			Sheet No.	Point No.
							PRESSURE AT HEAD →			[illegible]		
5M	1	1.39		7	1	CM-6	.0[illegible]	1		[illegible]		
	2	|	7.0	14	1	CM 10	.0[illegible]	.7		[illegible]		
	3	|	7.1	21.1	1	CM 10	.[illegible]	1.6		27.8		
	4	|	7.3	28.4	1	CM-5	.[illegible]	1.3		[illegible]		
	5	|	7.5	[illegible]	1	CM-5	.[illegible]	1.7		[illegible]		
	6	|	7.7	43.6	1	CM 10	.147	1.5		[illegible]		
	7	|	7.9	51.5	1	[illegible]	.762	3.8		[illegible]		
5M	8	|	8.3	59.8	[illegible]	[illegible]	.993	5.0		[illegible]		
5M	9	|	8.7	68.5	1¼	CM 10	.232	[illegible]		[illegible]		
	10	|	9.2	77.9	[illegible]	[illegible]	.424	[illegible]		[illegible]		
	11	|	9.5	[illegible]	[illegible]	[illegible]	.531	[illegible]		[illegible]		
5M	12	|	9.8	97.2	1¼	CM 2						
		|				17 6						
		|				23.0	.647	5.1		54.6		
		BALANCE FLOW:										
J	(12)	K_{60} = 7089	523.5	620.6	4	20'-PIPE						
						100 FTGS						
						60.0	.107	8.6	-3.5	59.7		(TR)
[illegible]		[illegible]			6	STRAINER						
		PICK UP 600 GPM FLOW				SYSTEM # 6						
				1250	6	560 PIPE&FTG	.105	29.8		89.5		
									AT CUT-IN			

FORM 9-53 (REV. 4-68)

CONTRACT NO. 26-1750 SA

System No. 58 6 Sheet 1-1

HYDRAULIC CALCULATION SHEET

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA

NAME, ADDRESS OF PROPERTY DRESDEN Nuclear Power Station – Morris Ill.

NOTES Cable Tunnel Unit 3

DATE [illegible]

Calculated by [illegible]

Plan Ref. Pt.	Sprinklers Nozzles: Total Heads	Sprinklers Nozzles: Type	(q) Added Gpm	(Q) Total Gpm	Pipe Size In.	Pipe and Equivalent Length Fittings - Devices Feet	Friction Loss: Psi/Ft. C = 120	Friction Loss: Total Psi	(Elevation) Static Plus or Minus Psi	Required Pressure Psi	Calculatn. Reference: Sheet No.	Calculatn. Reference: Point No.
							PRESSURE AT HEAD →					
[illegible]	20	5.39		[illegible]	2½	CM 10	.0[illegible]	.8		32.9		
[illegible]	24	5.39	30.9	[illegible]	2½	CM 10	.117	1.2		34.1		
[illegible]	28	5.39	31.5	205.2	2½	CM 10	.156	1.6		35.7		
[illegible]	32	5.39	32.2	[illegible]	2½	CM 8	.200	4.0		39.7		
[illegible]	32					1T-12						
						20						
		K=37.68										
	30	K 36.83		[illegible]	[illegible]	[illegible]	[illegible]	.4		[illegible]		
				45.0		[illegible]				[illegible]		
		K: [illegible]				6	.536	2.2	.433	[illegible]		
[illegible]	6			43.[illegible]	2	CM 10	.097	.2	-	29.3		
[illegible]	12		43.1	86.2	2	CM 10	.0711	.7	-	30.0		
[illegible]	18		43.7	129.9	2½	CM 10	.0642	.6		[illegible]		
[illegible]	24		44.1	174	2½	CM 12						
						12 2E						
						12 1T						
						36						
[illegible]	54	K 36.83	222.5	396	3	CM 3	.117	4.2	1.7	36.5		
SEE	60	7.97	48.1	445.2	3	CM-2	.172	.9		37.4		
						12 R						
						14	.222	3.1	5.2	39.5		
		K60 445.2/√59.5 = 70.84										
	(4)			28.3		[illegible]				26.6		
		K=5.39				[illegible]	.243	1.8	.9	27.5		