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February 20, 1981

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

Subject: LaSalle County Station Units 1 and 2
Resolution of Safety Evaluation Report Issues
NRC Docket Nos. 50-373/374

Dear Mr. Youngblood:

In response to questions from the NRC Staff, information is provided herein to resolve remaining issues in the LaSalle County Safety Evaluation Report. The areas addressed are the following:

1. Reactor Systems Branch - Enclosure 1
   - (a) NUREG-0737 Item II.K.3(46)
   - (b) Post-LOCA ECCS Leakage
   - (c) Flow Control Valve Closure Analysis
2. Power Systems Branch - Enclosure 2
   - (a) Degraded Grid (undervoltage protection design)
   - (b) Electrical Penetrations (medium voltage circuits)
3. Chemical Engineering Branch - Enclosure 3
   - (a) Control Room Carpet (fire rating)
4. Containment Systems Branch - Enclosure 4
   - (a) Appendix J Testing (FSAR Table 6.2-21 Notes 29 & 39)
5. Quality Assurance Branch - Enclosure 5
   - (a) Q-List Requirements
6. Financial Qualification Branch - Enclosure 6
   - (a) Operating Cost Estimate (LSCS 1 1985 & 1986)
   - (b) LSCS 1 Commercial Service date

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These materials are addressed in the referenced enclosures. Changes will be made in a future FSAR amendment as discussed in the enclosures. If there are any further questions in this regard, please direct them to this office.

Very truly yours,

L. O. DelGeorge

L. O. DelGeorge
Nuclear Licensing Administrator

Enclosures 1-6

cc: NRC Resident Inspector - LSCS

0737B

Enclosure 1

Reactor Systems Branch

(a) NUREG-0737 Item II.K.3.(46)

Commonwealth Edison has participated in the BWR Owners Group Review of the concerns reaised by the ACRS consultant (Mr. Michelson). the R. H. Buchholz letter to D. F. Ross dated February 21, 1980 has been reviewed for applicability to the LaSalle County design and is judged to adequately resolve the subject concerns for LaSalle County Station. The NRC request for additional information contained in the P.S. Check letter to T. Kennan dated June 24, 1980, and the BWR Owners Group response in the D. B. Waters letter to D. G. Eisenhut dated January 31, 1981 do not alter this conclusion. In the event future evaluation of the conditions discussed in II.K.3(46) are undertaken by the BWR Owners Group, Commonwealth Edison will participate. This information will be documented in Appendix 1 of the FSAR in a future amendment.

(b) Post LOCA ECCS Leakage

Commonwealth Edison has considered the hypothetical leakage of gate valves on the ECCS suction lines off the containment suppression pool, and concludes that such leakage does not present a safety concern. The bases for this conclusion are discussed in detail in the attachment to this enclosure.

(c) Flow Control Valve Closure Analysis

Based upon conversations between the NRC Staff and General Electric on February 19, 1981, it is concluded that this issue is resolved. The issue presented concerned the effects of power supply failure to the P transmitter and FCV electronic controller on the LOCA analysis. It was verified by GE that the P transmitter and valve electronic controls are on separate 24 V ac power supplies fed from the same 120 V ac bus. Failure of the bus would result in valve failure in the as-is position. Because such a failure would not result in rapid closure, the reported LOCA analysis results are not effected.

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ATTACHMENT - Amendment 50

Additional Insert to Response to Q212.37

In addition to the design provisions that ensure that leakage through the ECCS suction valves will be minimized, the following provides a bounding assessment of the impact of a postulated 50 gpm leakage through the ECCS suction valves. This leakage value is arbitrarily assumed, based on the guidance provided previously by the NRC, and does not represent the much smaller leakage rate that would actually occur if the valve packing were assumed to fail.

Two major areas of concern have been identified through meetings with the NRC. The first area of concern involves whether adequate provisions to mitigate the consequences of flooding resulting from this postulated leakage have been included. The ECCS suction valves are located in the annular region of the reactor building basement, just outside primary containment. As described in FSAR Section 3.4.1, this area is provided with four floor drain sumps (one in each quadrant) which are equipped with duplex-type sump pumps each of 50 gpm capacity. The sumps are also provided with high level alarms in the main control room, which would assist the plant operators in identifying the source of leakage, enabling them to close the valve; thereby isolating the valve packing from the suppression pool. Therefore, the potential for flooding the annular area as a result of packing leakage through the ECCS suction valves does not appear to warrant additional consideration.

However, an additional level of protection exists to ensure that the leakage associated with one division of the ECCS will not adversely effect the other ECCS divisions due to flooding. As described in section 3.4.1, the ECCS pumps are located in separate corner cubicles which are water-tight to an elevation (686'-7") equivalent to that associated with the resultant equilibrium water level from a hypothetical suppression pool rupture. Thus, even if flooding from an ECCS valve packing leak is assumed to drain the pool to a level at which the water outside the primary containment equalizes with that inside, there are no adverse effects on plant safety.

The second area of concern pertains to the ability to make-up the volume of suppression pool water that would be lost from the postulated leakage and the effect that this loss of water level might have on ECCS pump performance due to inadequate NPSH. It must be pointed out that there are a myriad of sources of make-up water to the suppression pool or the primary system that could be utilized to replace the water lost through leakage. Two readily available sources are the CRD pumps, and the HPCS system, either of which has more than sufficient capacity to transfer water from the cycled condensate tank to the primary system to make-up any water lost through leakage. Other sources which require no special access include the feedwater system, condensate/condensate booster system, and HPCS and RCIC water leg pumps. If access to the reactor building is available, there are many manual valved connections between the ECCS lines connected to the pool or RPV and the cycled condensate system. Therefore, adequate make-up is not a problem.

It should also be noted that leakage from the suppression pool into the floor drain sumps would be pumped to the radwaste system. After treatment, the water is then returned to the cycled condensate system where it would be available for leakage make-up. Therefore, a closed inventory of water would be avaiable to replenish any pool leakage.

With regard to the effect of the decreased pool level on ECCS pump performance, please refer to FSAR Figures 6.3.4, 6.3-8 and 6.3-11 and subsection 6.3.2.2.6. As can be seen, the NPSH available to the HPCS pump (governing case) can be decreased by 5 feet, corresponding to a pool level decrease of this same amount, before any adverse effects on ECCS pump operation would occur. At a leakage flowrate of 50 gpm, the operator would have approximately 62 hours to transfer additional make-up water to the pool or isolate the leakage path. Therefore, this postulated leakage should have no adverse impact on the ECCS pump performance.

Although the potential for leakage through the ECCS suction valves has been shown to be unlikely, the preceding assessment demonstrates ~~the~~ that additional levels of protection ~~that~~ are already provided in the existing plant design, and it establishes a justifiable basis to resolve the NRC concerns in this area.

Enclosure 2

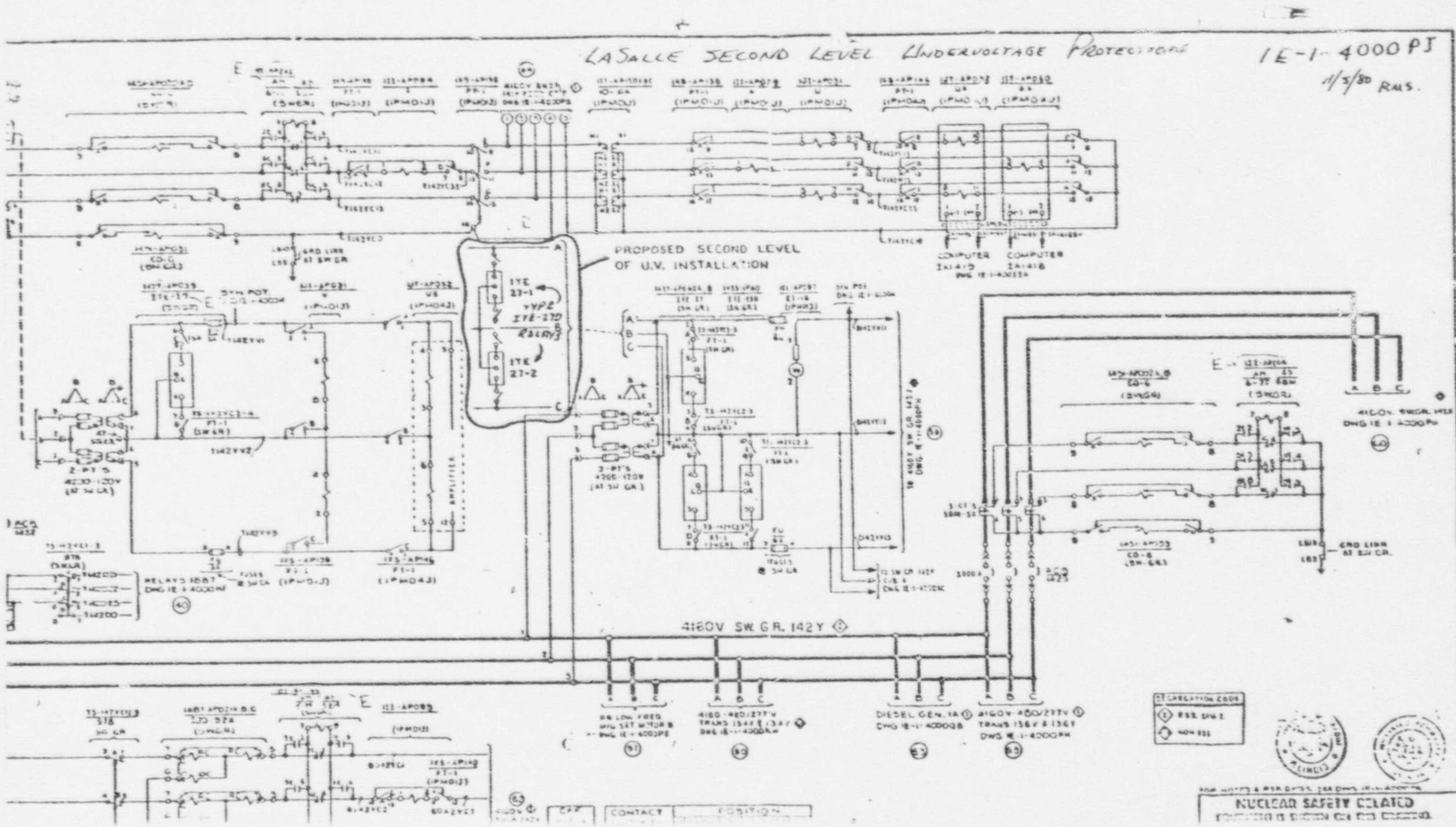
Power Systems Branch

(a) Degraded Grid (undervoltage relay design)

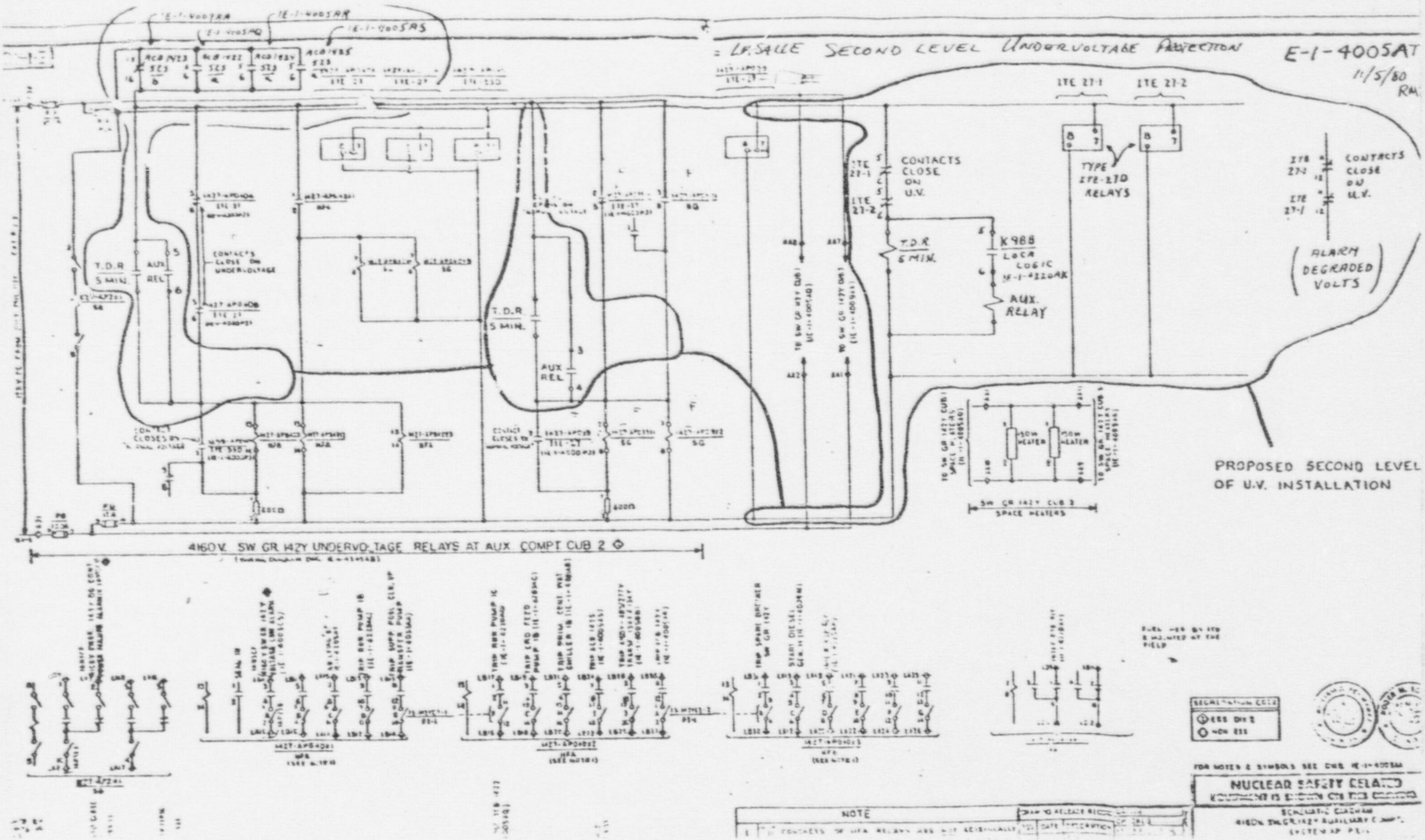
The primary undervoltage protection design for LaSalle County is documented in the FSAR and has been reviewed by the NRC Staff. Attached are schematics of the second level of protection. As was previously indicated in LOD 81-40-14, the ITE-27-1 relays have built in item delay setpoint which will be set at 10 seconds. These drawings will be incorporated into the FSAR Section 1.7 upon verification by the Staff of its acceptance of the design.

(b) Electrical Penetrations (medium voltage circuits)

Attached are proposed revisions to the response to Power Systems Branch Question Q040.106, as well as, the discussion of RG 1.63 in Appendix B of the FSAR. These revisions clarified the discussion with the Staff on the design of backup protection for medium voltage circuits penetrating primary containment. It is made clear that only 480V circuits rely on the conductor self-fusing characteristics to satisfy RG 1.63.



LASALLE SECOND LEVEL UNDERVOLTAGE PROTECTIONS
1E-1-4000PJ
11/5/80 RMS.
PROPOSED SECOND LEVEL OF U.V. INSTALLATION
ITE 27-1
TYPE ITE-27D RELAYS
ITE 27-2
COMPUTER
COMPUTER
4160V SW. G.R. 142Y
DIESEL GEN. 1A
AMPLIFIER
NUCLEAR SAFETY RELATED
CONTACT
POSITION


LaSalle Second Level Undervoltage Protection
E-1-4005AT
11/5/80
LTE 27-1
LTE 27-2
CONTACTS CLOSE ON U.V.
TYPE ITE-27D RELAYS
T.D.R. 5 MIN.
AUX REL
CONTACTS CLOSE ON UNDER-VOLTAGE
T.D.R. 5 MIN.
AUX REL
T.D.R. 5 MIN.
K988 LOCA LOGIC
AUX. RELAY
ALARM DEGRADED VOLTS
150W HEATER
150W HEATER
SW GR 142Y CUB 3 SPACE HEATERS
PROPOSED SECOND LEVEL OF U.V. INSTALLATION
4160V. SW GR 142Y UNDERVOLTAGE RELAYS AT AUX COMPT CUB 2
NOTE
NUCLEAR SAFETY RELATED

(REGULATORY GUIDE 1.63

Initial Issue: Revision 0, October 1973

Current Issue: Revision 0, October 1973

La Salle C.P. Issued: September 10, 1973

ELECTRIC PENETRATION ASSEMBLIES IN CONTAINMENT STRUCTURES FOR WATER-COOLED NUCLEAR POWER PLANTS

This regulatory guide describes a method acceptable to the NRC for compliance with GDC 50 and Appendix B to 10 CFR 50 requirements for the design, construction, and installation of all electrical penetrations through the primary containment barrier.

The La Salle County Station electrical penetrations are designed and applied to withstand, without loss of mechanical integrity, the maximum possible fault current versus time conditions (which could occur because of single random failures of circuit overload protection devices) within the two leads of any one single-phase circuit or the 3 leads of any one three-phase circuit.

(However, for the low voltage penetrations) goal

The LSCS design meets the ~~intent~~ of Position 1 of Regulatory Guide 1.63 ~~[illegible]~~ the self-fusing circuit characteristics are external to the penetrations. The LSCS low voltage penetrations are designed with oversized conductors through the penetration seals such that they can withstand any conceivable fault current versus time condition not interrupted by the primary protective device. Should the backup protective device also fail to clear the fault, the ratio of conductor size within the seals to the conductor size of the external circuit is such that failure of the electrical circuit external to the penetration seals is calculated to occur prior to failure of the penetration conductors. This capability is confirmed by testing (See Subsection 3.8.1). This ~~design~~ (oversizing) of the penetration assembly ~~so that the connecting cables will fail under extended fault conditions before the penetration assembly fails and the addition of a LOCA signal to trip the circuit overload protection devices are two means available to meet the requirements of Section 4 of IEEE 317-1972.~~

Regulatory Guide 1.63 was issued after the LSCS construction permit. However, the LSCS design meets the ~~intent~~ (objective) of Position 1 of Regulatory Guide 1.63 and meets ~~[illegible]~~ Positions 2 and 4. Position 3 makes reference to other regulatory guides.

(conductors so that fault current will not cause overheating of the electrical penetration before fault current is interrupted meets the requirements of Section 4 of IEEE 317-1972.)

(and the response to question Q40.106.)

(By having two breakers for interruption of fault current for the medium voltage penetrations and by having one breaker or self-fusing circuit characteristics to interrupt fault current for the low voltage penetrations.)

QUESTION 040.106

"Concerning the response relating to Regulatory Guide 1.63, address each of the following items.

(1) The response states that the electrical penetrations for the La Salle County Stations are designed with oversized conductors through the penetration seals such that they can withstand any conceivable fault current versus time condition not interrupted by the primary protective device. Provide a quantified meaning for the terms 'any conceivable fault current' for the 6900, 4160 and 480 volt electrical penetrations. Also quantify the maximum time duration for which this conceivable fault current is to be applied to each of the above three types of electrical penetrations.

(2) The response also states that 'should the backup protective device also fail to clear the fault, the ratio of conductor size within the seals to the conductor size of the external circuit is such that failure of the electrical circuit external to the penetration seals is calculated to occur prior to failure of the penetration conductors.' With regard to this item, provide the detail calculations which demonstrate the above.

(3) The response also appears to reference subsection 3.8.1 for test information which verifies that the capability of the electrical penetrations circuits as stated in item 2 above has been confirmed by testing. This subsection does not address the testing of the penetration circuits in this manner. Accordingly, provide a short description of these tests as well as clearly stating the associated test results.

(4) In connection with this regulatory guide, it is also stated that the addition of a LOCA signal to trip the circuit overload protective device is one means of available to meet the requirements of Section 4 of IEEE Standard 317-1972. Identify all cases in the electrical design of the La Salle Stations whereby these requirements are met in this manner."

RESPONSE

(1) The requested information is provided in Table Q40.106-1 and figure Q40.106-2. Note that LSCS has no 4160-volt containment electrical penetration. Also note that for the 6900 volt electrical penetration, the design does not take advantage of the oversized penetration conductor but rather has primary and backup fault current protection for the electrical penetration assembly (EPA) as shown in Figure Q40.106-2. Coordination curves showing the primary and backup fault current protection for the low voltage penetrations are provided in Figures Q40.106-3, Q40.106-4, Q40.106-5, Q40.106-6 and Q40.106-7.

(2) and (3) Tests, which were conducted at the Gould/ITE High Power Testing Laboratory in Chalfont, Penn. on February 28, 1978, demonstrated for the field cable/penetration combinations tested that the La Salle County Station design is valid without exception, provided that the penetration assembly conductors are at least one standard (AWG) size larger than the connected field cable. The failure (fusing) of the field cabling with resulting interruption of the test occurred before any damage occurred to the penetration assembly or pressure seal integrity. This was true for all cases where the relative size of cable followed the qualification combinations used at La Salle. Figure Q40.106-1 and Tables Q40.106-2, Q40.106-3, and Q40.106-4 describe the tests and results. The last column to the right in Table Q40.106-4 shows that for configurations identical to LSCS field/penetration cable interface sizings, the maximum thermal capacity of the penetration conductors is from approximately ~~190%~~ 230% to approximately 440% of the thermal load experienced during testing. Hence sufficient margin exists between the penetration conductor's maximum thermal capacity and the thermal load to field fusion for all the required LSCS field/penetration cable interface sizings.

(4) The LSCS design utilizes the fusing properties of the cables external to the low voltage penetration assemblies to meet the requirements of section 4 of IEEE 317-1971 and therefore, does not make use of a LOCA signal to trip circuit overcurrent protective devices.

Also, Figures Q40.106-3, Q40.106-4, Q40.106-5, Q40.106-6 and Q40.106-7 illustrate that ample margin exists between the backup fault current protection and the conservative thermal limit capability curve of the electrical penetration.

TABLE Q40.106-1

CONTAINMENT ELECTRICAL PENETRATION FAULT CURRENT MAGNITUDE AND TIME DURATION VALUE

PENETRATION TYPE	EXTERNAL (FIELD) CONDUCTOR SIZE	INTERNAL CONDUCTOR SIZE	FAULT CURRENT (amperes)	TIME DURATION (seconds)
Medium Voltage Power (6900-V)	1000/1500 MCM*	1500 MCM	70,000	0.1
Low Voltage Power (480-V)	4/0 AWG	390 MCM	23,500	1.0
Low Voltage Power (480-V)	#2 AWG	250 MCM	17,500	1.0
Low Voltage Power (480-V)	#6 AWG	#2 AWG	8,800	1.0
Low Voltage Power (480-V)	#10 AWG	#2 AWG	3,600	1.0
Low Voltage Power and Control (480-V)	#14 AWG	#10 AWG	1,400	1.0

* The inboard conductor size is 1500 MCM while the outboard conductor size is 1000 MCM.

TABLE Q40.106-2

CONTAINMENT ELECTRIC PENETRATION ASSEMBLY (EPA) CABLE

FUSION QUALIFICATION TESTING

REF TEST NO.	FLD WIRE SIZE**	EPA WIRE SIZE**	CURRENT RMS SYM AMPS	DURATION TO FAIL (SEC)	I^2t	REMARKS
A1	#14AWG	#10AWG	921*	0.620	5.26 (10^5)	Field cable failed near connection to power bus connection. Thermal damage to polyolefin heat shrink tubing near EPA/Fld cable splice on the fld. cable side. EPA feedthrough maintained 48 psig.
A2	#14AWG	#10AWG	1315*	0.250	4.32 (10^5)	Same as A1
A3	#14AWG	#10AWG	1340	0.310	5.57 (10^5)	Fusible link in penetration circuit as shown in Figure Q40.106-1. Link did not fuse. Field cable failure near power bus connection. EPA feedthrough maintained 48 psig.
A4	#14AWG	#10AWG	1340	0.280	5.03 (10^5)	Same as A3.
B1	#14 AWG	#12AWG	1260	0.29	4.69 (10^5)	Fusible link in circuit near connection to power bus. Link did not fuse. Field cable failed on each side of fusible link. EPA feedthrough maintained 48 psig.
B2	#14AWG	#12AWG	1297*	0.29	4.90 (10^5)	Fusible link with electrical insulating tape in circuit near connection to power bus. link did not fuse. Field cable failed at power bus connection. EPA feedthrough maintained 48 psig.

TABLE Q40.106-2 (Cont'd)

REF TEST NO.	FLD WIRE SIZE**	EPA WIRE SIZE**	CURRENT RMS SYM AMPS	DURATION TO FAIL (SEC)	I^2t	REMARKS
C1	#10AWG	#6AWG	1940	0.90	3.39 (10^6)	Fusible link in curciut near power bus connection. Link did not fuse. Field cable failed on each side of link. EPA feedthrough maintained 48 psig.
C2	#10AWG	#6AWG	3280	0.295	3.17 (10^6)	Field cable failed near both power bus connections. Flame emitting from field cable insulation at point of failure for approximately 10 seconds after failure. EPA feedthrough maintained 48 psig.
C3	#10AWG	#6AWG	3300*	0.290	3.16 (10^6)	Same as C2 with no visible flame but much smoke emenating from field cable jacketing. EPA feedthrough maintained 48 psig.
D1	#10AWG	#8AWG	3190	0.305	3.10 (10^6)	Field cable failed at connection to one side of power bus supply. Failure at EPA/Fld cable splice. Flame emitting from each end of field cable for 10 seconds after failure. EPA feedthrough maintained 48 psig.
E1	#6AWG	#2AWG	1790	8.10	2.60 (10^7)	Field cable failed near power bus connection at jacketing/cable juncture. Visible flame and smoke from from field cable. EPA feedthrough pressure increased 5 psig above 48 psig.
E2	#6AWG	#2AWG	4470	1.12	2.24 (10^7)	Same as E1.
E3	#6AWG	#2AWG	7650	0.38	2.22 (10^7)	Same as E1. Electromagnetic forces noticeably bent penetration pigtails
F1	#6AWG	#4AWG	7940	0.38	2.40 (10^7)	Same as E3.

TABLE Q40.106-2 (Cont'd)

REF TEST NO.	FLD WIRE SIZE**	EPA WIRE SIZE**	CURRENT RMS SYM AMPS	DURATION TO FAIL (SEC)	I^2t	REMARKS
G1	#10AWG	#10AWG	1390	1.30	2.51 (10^6)	Penetration conductor failed near connection to field cable. Inboard seals failed with EPA feedthrough pressure to increase to 58 psig and then decreasing to 0 psig rapidly.***
K1	#4/0		24700*	1.86	1.13 (10^9)	Cable fused with smoke and flame which self-extinguished in approximately 10 seconds.
K2	#2AWG		17800	0.30	9.51 (10^7)	Same as K1

* Integrated average RMS Current.

** Reference Figure Q40.106-1 for Test Arrangement

*** Although the feedthru inboard seal failed, containment integrity would have been maintained since the outboard feedthrough seal was undamaged and when tested possessed a leak rate that was less than 1×10^{-10} scc/sec helium at 75 psig.

TABLE Q40.106-3

PREDICTED FINAL TEMPERATURE THAT OCCURRED DURING CONTAINMENT ELECTRICAL PENETRATION ASSEMBLY (EPA) TESTING

REF TEST NO.	FLD WIRE SIZE (AWG)	EPA WIRE SIZE (AWG)	I^2t (AMP^2-SEC)	Tf °C (FIELD)	Tf °C (EPA)
A1*	14	10	5.2591 (10^5)	2586	134
A2*	14	10	4.3231 (10^5)	1601	110
A3*	14	10	5.5664 (10^5)	3013	143
A4*	14	10	5.0277 (10^5)	2302	128
B1	14	12	4.6040 (10^5)	1854	349
B2	14	12	4.8784 (10^5)	2134	379
C1	10	6	3.3872 (10^6)	2653	135
C2	10	6	3.1737 (10^6)	2242	127
C3	10	6	3.1581 (10^6)	2214	126
D1	10	8	3.1037 (10^6)	2120	376
E1*	6	2	2.5953 (10^7)	4455	164
E2*	6	2	2.2379 (10^7)	2902	140
E3*	6	2	2.2239 (10^7)	2853	139
F1	6	4	2.3957 (10^7)	3511	499
G1	10	10	2.5117 (10^6)	1304	1304
K1	4/0	--	1.1348 (10^9)	1566	--
K2	2	--	9.5052 (10^7)	1111	--

*configuration identical to LSCS field/penetration cable interface sizing.

TABLE Q40.106-4

THERMAL LOADING COMPARISON BETWEEN TEST VALUES AND MAXIMUM CAPACITY VALUES FOR CONTAINMENT ELECTRICAL PENETRATION ASSEMBLY (EPA)

REF. TEST NO.	ACTUAL (I^2t) ACT. FROM TEST	FLD CABLE SIZE	EPA CABLE SIZE	MAXIMUM EPA (I^2t) EPA CAPABILITY**	Ratio $\frac{(I^2t)\ \text{EPA}}{(I^2t)\ \text{ACT.}}$
A1*	5.26 (10^5)	14 AWG	10 AWG	1.48×10^6	2.81
A2*	4.32 (10^5)	14 AWG	10 AWG	1.48×10^6	3.43
A3*	5.57 (10^5)	14 AWG	10 AWG	1.48×10^6	2.66
A4*	5.03 (10^5)	14 AWG	10 AWG	1.48×10^6	2.94
B1	4.60 (10^5)	14 AWG	12 AWG	5.87×10^5	1.28
B2	4.88 (10^5)	14 AWG	12 AWG	5.87×10^5	1.20
C1	3.39 (10^6)	10 AWG	6 AWG	9.47×10^6	2.79
C2	3.17 (10^6)	10 AWG	6 AWG	9.47×10^6	2.99
C3	3.16 (10^6)	10 AWG	6 AWG	9.47×10^6	3.00
D1	3.10 (10^6)	10 AWG	8 AWG	3.75×10^6	1.21
E1*	2.60 (10^7)	6 AWG	2 AWG	6.06×10^7	2.33
E2*	2.24 (10^7)	6 AWG	2 AWG	6.06×10^7	2.71
E3*	2.22 (10^7)	6 AWG	2 AWG	6.06×10^7	2.73
F1***	2.40 (10^7)	6 AWG	4 AWG	2.40×10^7	1.00
G1****	2.51 (10^6)	10 AWG	10 AWG	1.48×10^6	.59
K1*	1.13 (10^9)	4/0 AWG	~~390~~ 600 MCM	~~2.10~~ 4.95 $\times 10^9$	~~1.86~~ 4.38
K2*	9.51 (10^7)	2 AWG	250 MCM	8.60×10^8	9.04

*Configuration identical to LSCS field/penetration cable interface sizing.

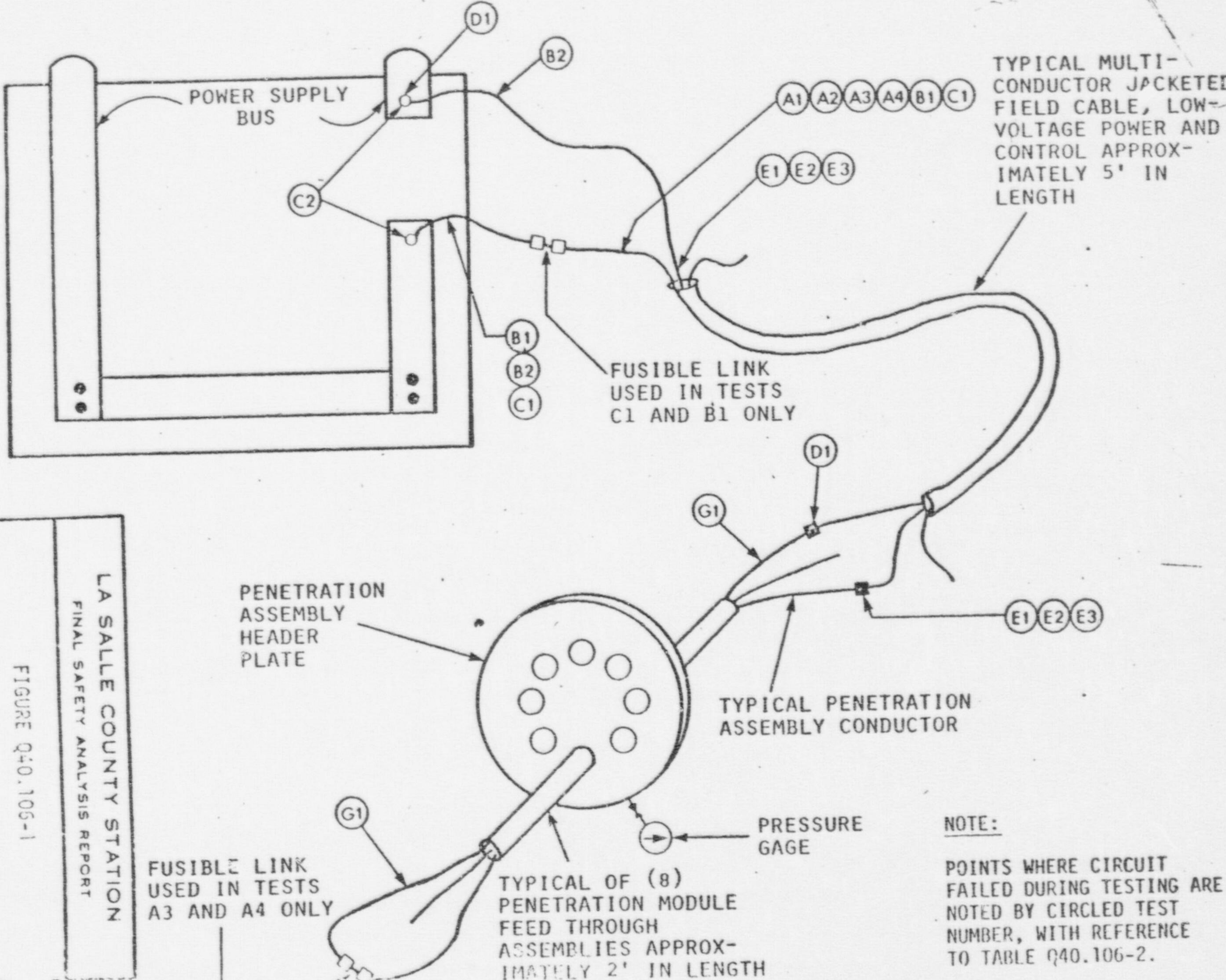
**Based on maximum limiting conductor temperature of 499° C which manufacturer feels that the insulation system can withstand under fault condition. Thus

$$\frac{I^2t}{A^2} = 0.0297 \, \text{Log} \left(\frac{T_f + 234}{T_i + 234} \right) \qquad T_i = 18.33° \text{ C } (65° \text{ F}), \quad T_f = 499° \text{ C } (930° \text{ F}).$$

already rewrit in rev 54

***Case F1 is the baseline case for this analysis and is not a field/penetration cable interface that is used at LSCS.

****Case G1 was a planned configuration to demonstrate the damage potential of equal field/penetration cable sizing. The inboard seal was lost during this test, however, the outboard seal did not fail and would have maintained containment integrity.



LA SALLE COUNTY STATION
FINAL SAFETY ANALYSIS REPORT

FIGURE Q40.106-1

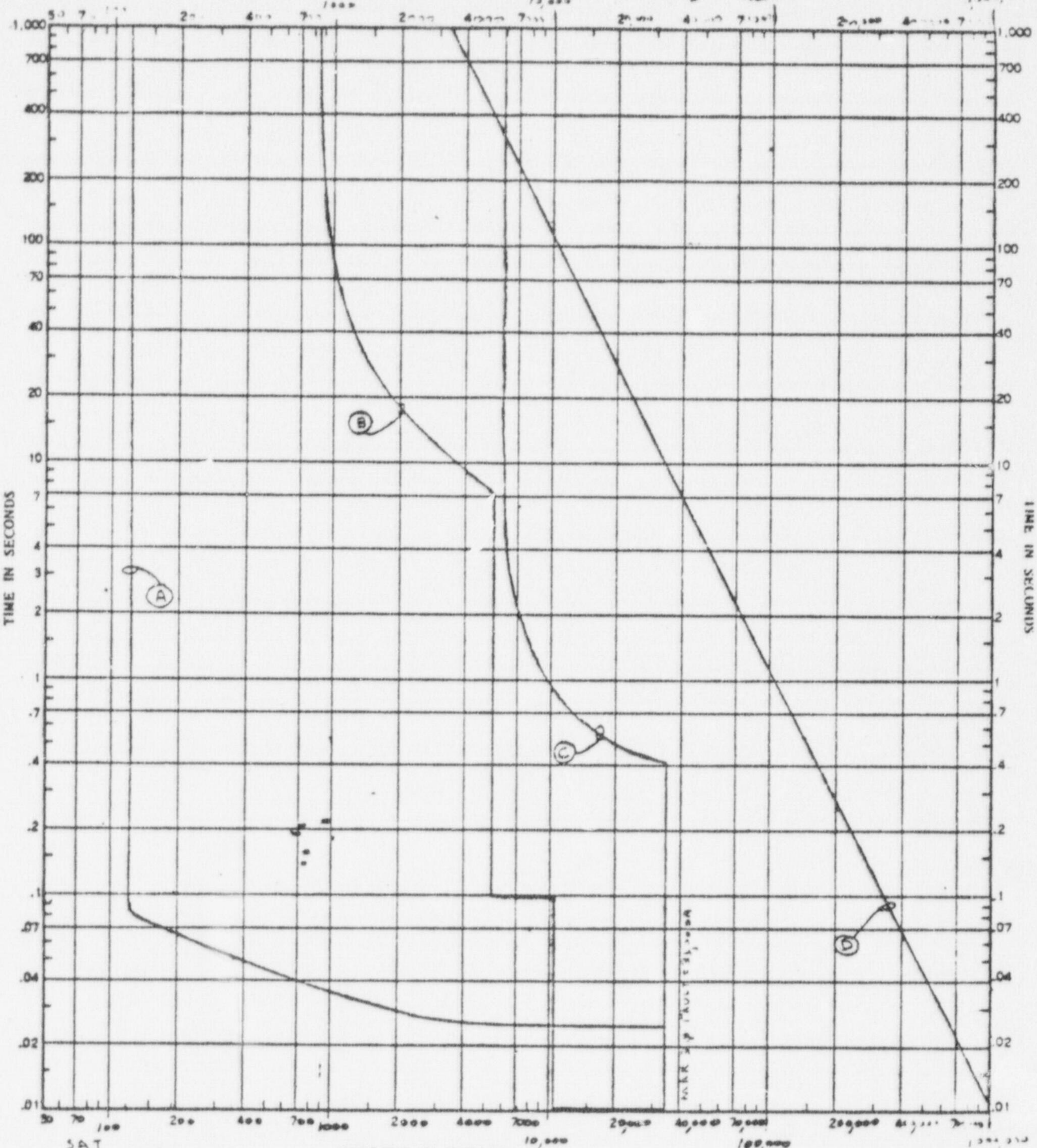
TEST CELL ARRANGEMENT

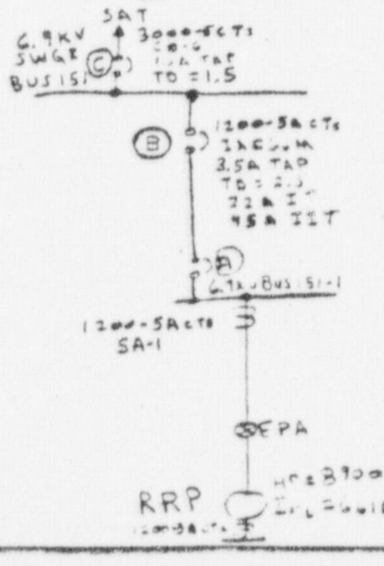
REVISED

OCTOBER 1979

6.9KV SWGR LOAD

(THIS FIGURE IS REPRESENTATIVE FOR BOTH OF THE 6700V SWGR LOADS)





Ⓓ IS THE EPA'S THERMAL LIMIT CURVE BASED ON THE FOLLOWING 1500MCM FEEDTHRU INITIAL AND FINAL TEMPERATURES (T_i & T_f):

$$T_i = 90°C$$
$$T_f = 250°C$$

THE PRIMARY PROTECTION FOR THE EPA IS REPRESENTED BY Ⓐ. NOTE THAT Ⓐ IS FOR HIGHLY SENSITIVE DIFFERENTIAL RELAYING WHICH TRIPS BREAKER Ⓐ AT BUS 151-1 FOR THE INDICATED DIFFERENTIAL CURRENT VALUES BETWEEN THE RR PUMP MOTOR NEUTRAL CONNECTION LOCATED AT THE MOTOR AND BUS 151-1.

SARGENT & LUNDY ENGINEERS

6-15-79

ESA-198

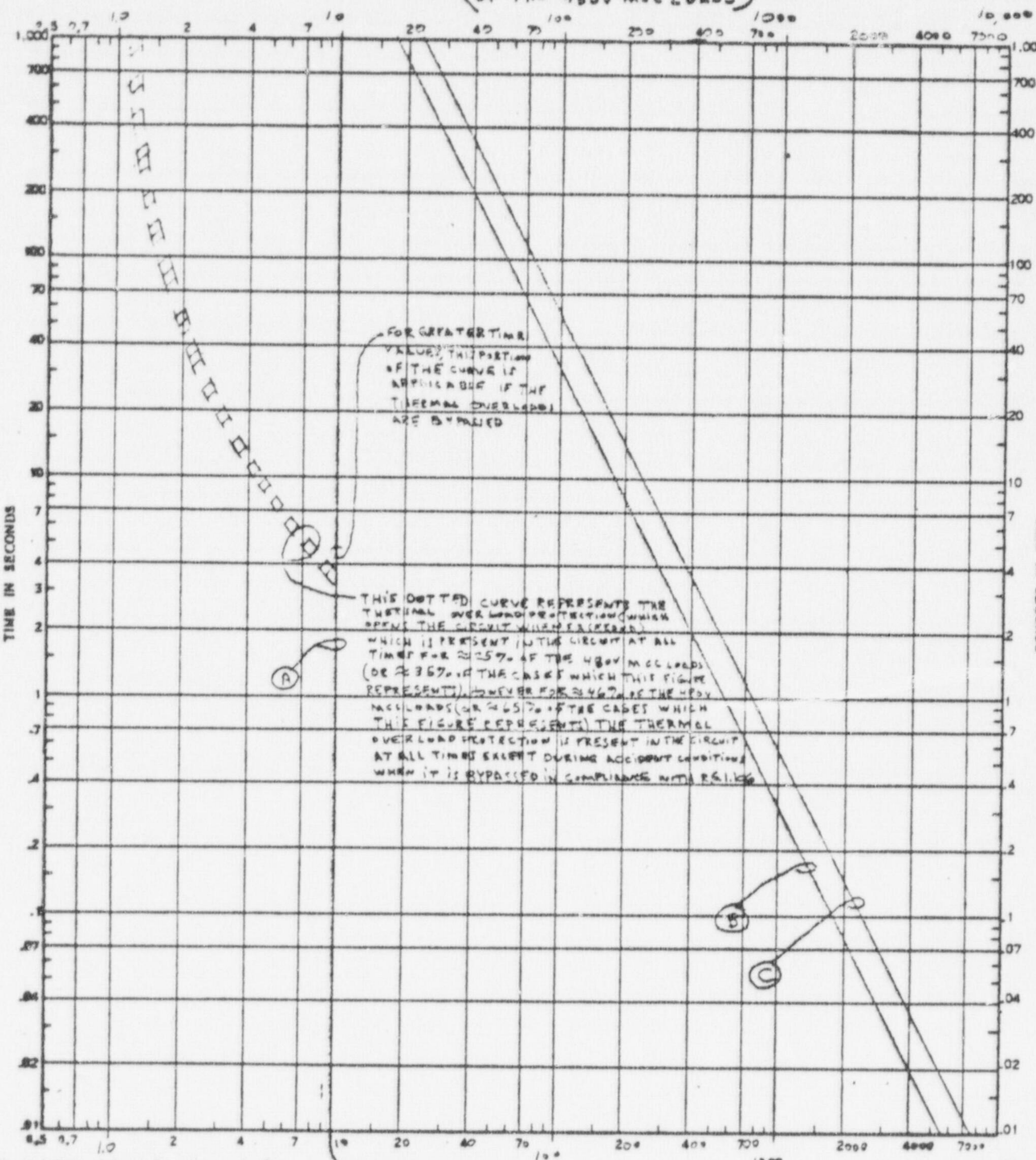
THE BACKUP PROTECTION FOR THE EPA IS REPRESENTED BY Ⓑ. NOTE THAT Ⓑ IS FOR OVERCURRENT RELAYING WHICH TRIPS BREAKER Ⓑ AT BUS 151. ALSO NOTE THAT SIGNIFICANT BACKUP PROTECTION IS ALSO PROVIDED BY Ⓒ. Ⓒ IS FOR OVER-CURRENT RELAYING WHICH TRIPS BREAKER Ⓒ AT BUS 151.

Q40.106-10

FIGURE 210.106-2

FAULT CURRENT PROTECTION

TYPICAL MCC LOADS
(REPRESENTATIVE OF ≈ 71% OF THE 480V MCC LOADS)



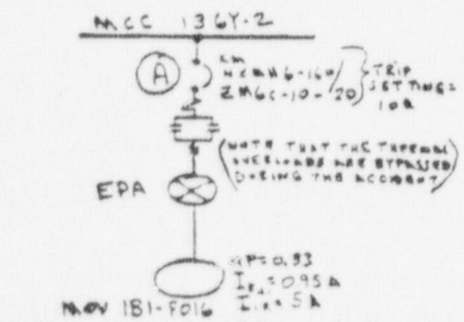
PRIMARY PROTECTION FOR EPA IS REPRESENTED BY (A)

BACKUP PROTECTION FOR EPA IS REPRESENTED BY (B)

(C) IS THE EPA'S THERMAL LIMIT CURVE BASED ON THE FOLLOWING #10 AWG FEEDTHRU INITIAL AND FINAL TEMPERATURES (T_i & T_F):

$T_i = 90°C$

$T_F = 250°C$



MAIN STEAM LINE DRAIN ISOLATION VALVE

EACH POINT ON (B) REPRESENTS THE TIME NECESSARY FOR THE CORRESPONDING CURRENT VALUE TO RAISE THE FIELD CONDUCTOR (#14 AWG) TO THE MELTING TEMP OF COPPER (1083°C)

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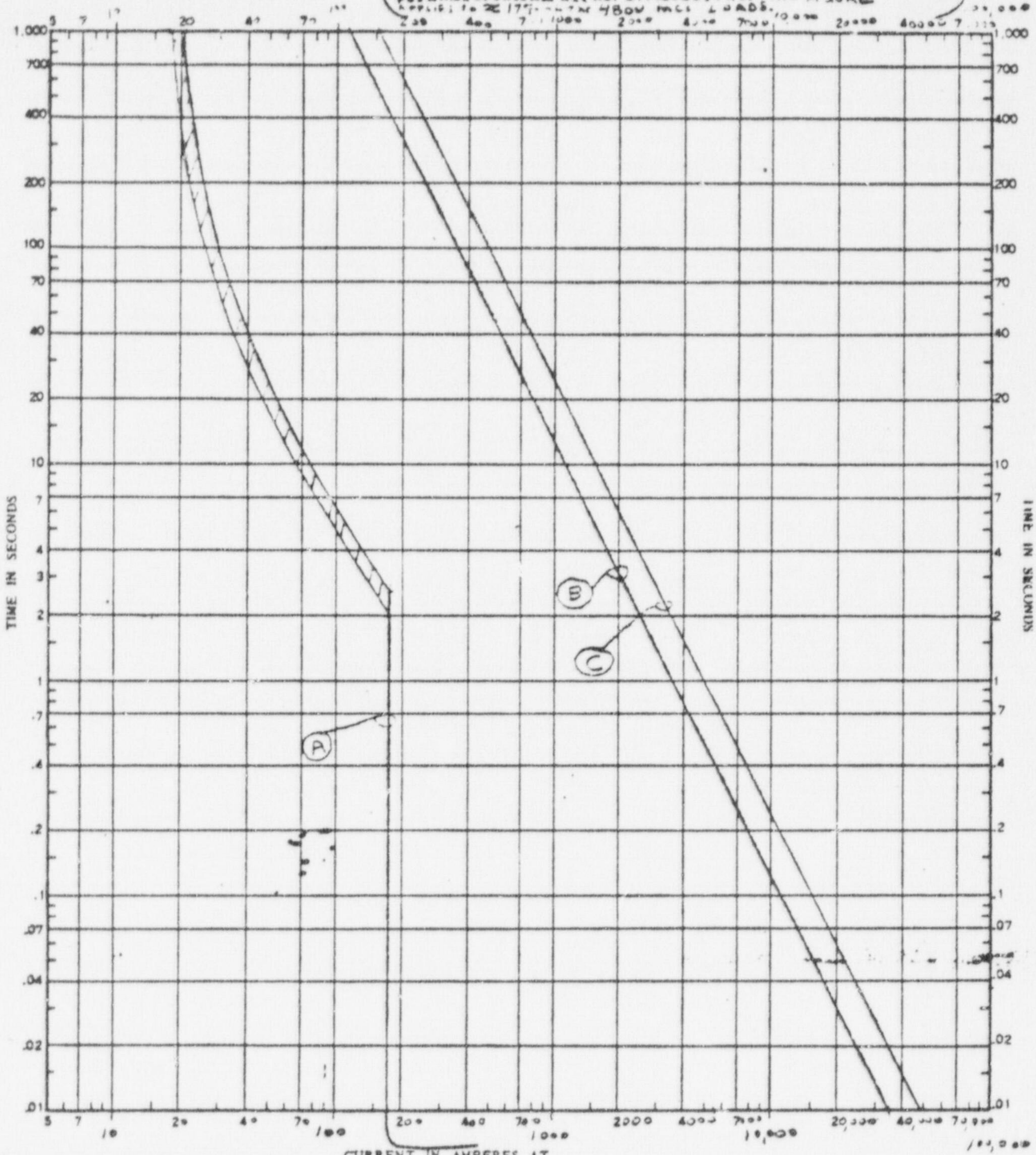
FIGURE Q40.106-3
FAULT CURRENT PROTECTION FOR LOW VOLTAGE PENETRATIONS

LARGEST MCC C.B SETTING

(REPRESENTATIVE OF C.B. SETTINGS OF ?? AMPS (AS WELL AS THE 177 AMP SETTING SHOWN) FOR WHICH OVERLOADS ARE NOT BYPASSED, THUS THIS FIGURE APPLIES TO ≈ 17?% OF THE 480V MCC LOADS.)



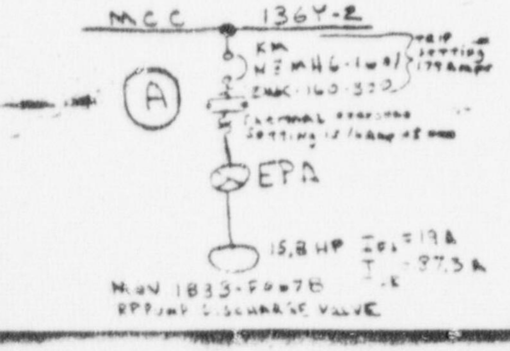
PRIMARY PROTECTION FOR EPA IS REPRESENTED BY (A)

BACKUP PROTECTION FOR EPA IS REPRESENTED BY (B)

(C) IS THE EPA'S THERMAL LIMIT CURVE BASED ON THE FOLLOWING #2 AWG FEEDTHRU INITIAL AND FINAL TEMPERATURES (T_i & T_f):

$T_i = 90°C$

$T_f = 250°C$



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6-15-79

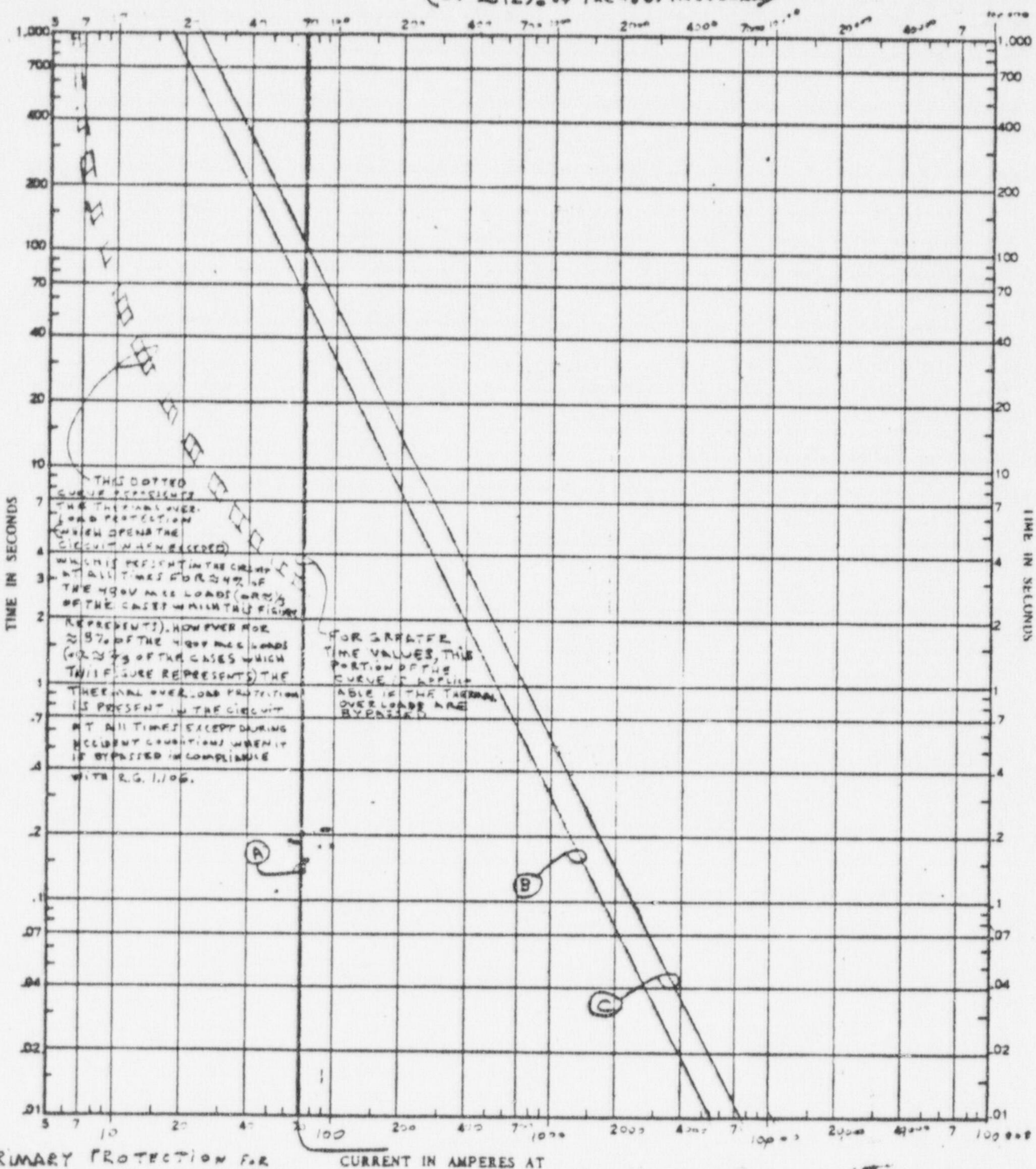
EACH POINT ON (B) REPRESENTS THE TIME NECESSARY FOR THE CORRESPONDING CURRENT VALUE TO RAISE CONDUCTOR (#6) TO THE MELTING TEMPERATURE OF COPPER (1083°C)

FIGURE Q40.106-4

FAULT CURRENT PROTECTION FOR LOW VOLTAGE PENETRATIONS

Q40.106-15

MCC LOAD
(THIS FIGURE IS REPRESENTATIVE OF ≈12% OF THE 480V MCC LOADS)

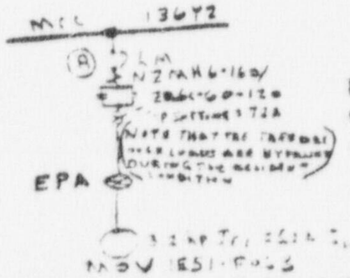


PRIMARY PROTECTION FOR EPA IS REPRESENTED BY (A)

BACKUP PROTECTION FOR EPA IS REPRESENTED BY (B)

(C) IS THE EPA'S THERMAL LIMIT CURVE BASED ON THE FOLLOWING #10AWG FEEDTHRU INITIAL AND FINAL TEMPERATURES (T_i & T_f):

$T_i = 90°C$
$T_f = 250°C$



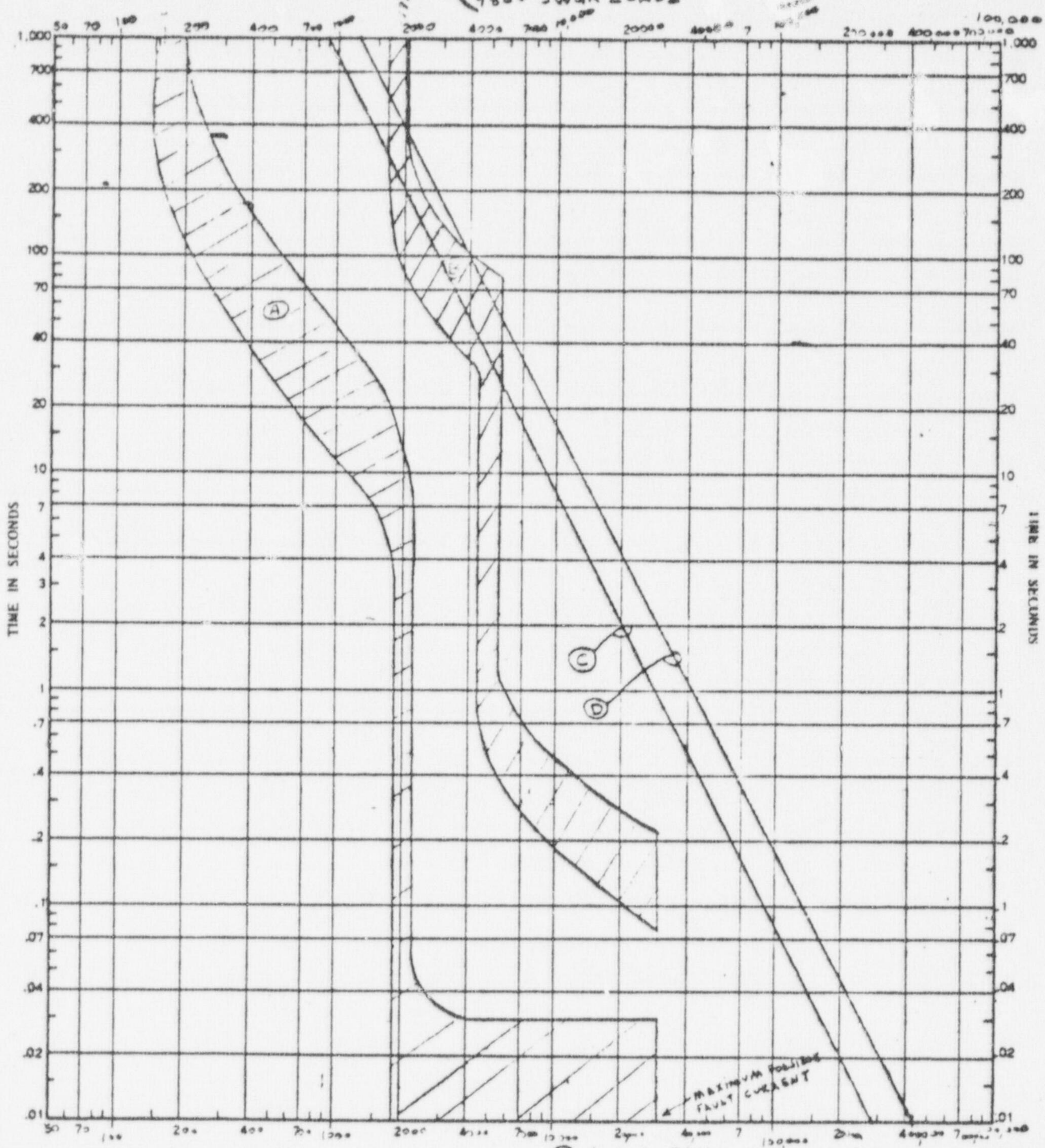
EACH POINT ON (C) REPRESENTS THE TIME NECESSARY FOR THE CORRESPONDING CURRENT VALUE TO RAISE THE FIELD CONDUCTOR (#10AWG) TO THE MELTING TEMPERATURE OF COPPER (1083°C)

FIGURE Q40.106-5

FAULT CURRENT PROTECTION FOR LOW VOLTAGE PENETRATIONS

Q40.106-3

480V SWGR LOAD
(REPRESENTATIVE FOR BOTH OF THE 480V SWGR LOADS)



PRIMARY PROTECTION FOR EPA IS REPRESENTED BY (A)

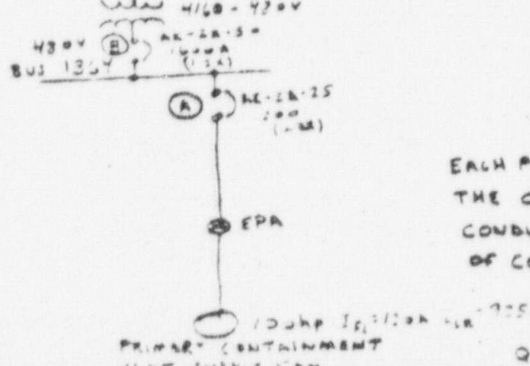
BACKUP PROTECTION FOR EPA IS REPRESENTED BY (C)

NOTE THAT SIGNIFICANT BACKUP PROTECTION IS ALSO PROVIDED BY (B)

(D) IS THE EPA'S THERMAL LIMIT CURVES BASED ON THE FOLLOWING 600 MCM FEED THRU INITIAL AND FINAL TEMPERATURES (T_i & T_f):

$T_i = 90°C$

$T_f = 250°C$



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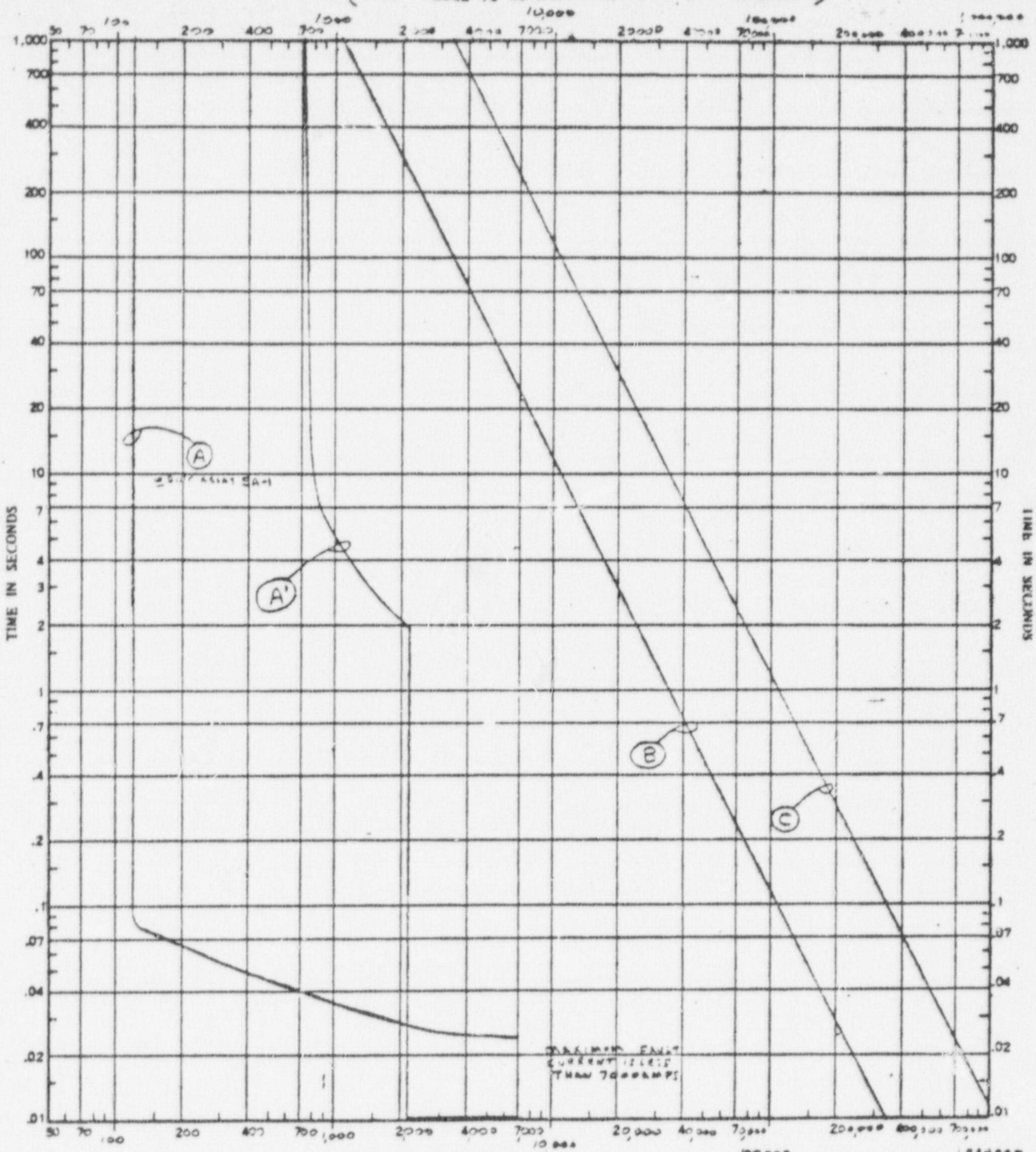
EACH POINT ON (C) REPRESENTS THE TIME NECESSARY FOR THE CORRESPONDING CURRENT VALUE TO RAISE THE FIELD CONDUCTOR (#4/0 AWG) TO THE MELTING TEMPERATURE OF COPPER (1083°C)

FIGURE Q40.106-6
FAULT CURRENT PROTECTION FOR LOW VOLTAGE PENETRATIONS

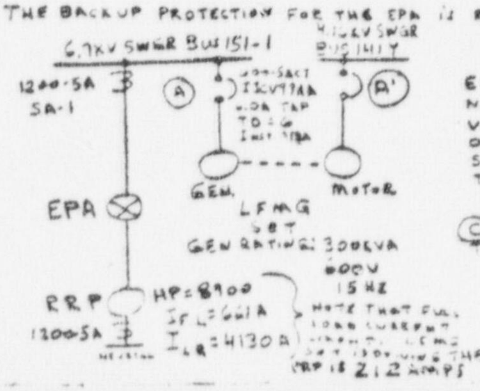
Q40.1[illegible]-14

(THIS FIGURE IS REPRESENTATIVE FOR BOTH LFMGSETS)



THE PRIMARY PROTECTION FOR THE EPA IS REPRESENTED BY CURVE (A). NOTE THAT CURVE (A) IS FOR HIGHLY SENSITIVE DIFFERENTIAL RELAYS WHICH TRIP BREAKER (15) AT BUS 151-1 FOR THE INDICATED DIFFERENTIAL CURRENT VALUES BETWEEN THE RR PUMP MOTOR NEUTRAL CONNECTION (LOCATED AT THE RR PUMP MOTOR) AND BUS 151-1. NOTE THAT BOTH BREAKERS (A) AND (A') ARE TRIPPED BY AN OVERCURRENT VOLTAGE RESTRAINED IJCV RELAY REPRESENTED BY CURVE (A'). CURVE (A') IS DRAWN FOR THE MOST CONSERVATIVE CASE I.E. FOR FULL VOLTAGE BEING PRESENT AT THE GENERATOR OUTPUT. UNDER FAULT CONDITIONS THE GENERATOR OUTPUT VOLTAGE WILL BE REDUCED AND TRIP TIMES WILL BE SHORTER.

THE BACKUP PROTECTION FOR THE EPA IS REPRESENTED BY (B).



EACH POINT ON (B) REPRESENTS THE TIME NECESSARY FOR THE CORRESPONDING CURRENT VALUE TO RAISE THE CONDUCTORS (250MCM) OF THE FIELD CABLE CONNECTING THE LFMG SET TO THE SWGR BUS 151-1 TO THE MELTING TEMPERATURE OF COPPER (1083°C).

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6-25-70

(C) IS THE EPA'S THERMAL LIMIT CURVE BASED ON THE FOLLOWING 1500 MCM FEED THRU INITIAL AND FINAL TEMPERATURES (T_i & T_f):

T_i = 90°C

T_f = 250°C

Q40.106-15

FIGURE Q40.106-7
FAULT CURRENT PROTECTION FOR 6900V EPA WHEN 600V LOW FREQ MOTOR GENERATOR SET IS DRIVING RR PUMP MOTOR

Enclosure 3

Chemical Engineering Branch

Based on discussions between Commonwealth Edison (C. Reed) and the NRC Staff (V. Benaroya) on February 19, 1981, the following summary of qualifications of the LaSalle County Control Room carpeting is provided:

Manufacturer: Bigelow - Sanford Incorporated

Type: Bigelow Growgrain 2, LF200r-F

Qualification Tests

1.(a) 1973 UL Tested

UL Fire Propogation Index of $0.83 = \frac{10 \text{ inches}}{12 \text{ min.}}$ derived from the 12 gas jet test UL used.

Result: carpet self extinguished upon removal of flame jets. Index (0.83) is excellent indicator of non-propogation characteristics.

1.(b) Bigelow Tests

Flame propagation via Steiner Tunnel Test (ASTM E84) 79(A) and by Radient Panel Test (NFPA 253, ASTM E648) which tests ability for self-extinguishing.

Result: Does not ignite in Tunnel Test.
Self-extinguishes in Radient Panel Test.

2. Ignition Test: Pill Test (Dept. of Commerce FF1-70) which is the ignition of explosive charge in contact with carpet.

   Result: Non Flammable

3. National Bureau of Standards Smoke Test (NFPA-258)

   Optical Standard of 450 or less acceptable

   Result: While flamming - 239
   non-flamming - 255

Enclosure 4

Containment Systems Branch

In response to an NRC Staff request for clarification of the Table 6.2-21 notes 29 and 39 related to special leakage tests performed on certain ECCS suction lines to satisfy the requirements of 10 CFR 50 Appendix J, the attached proposed revision to those notes are provided. These revisions will be incorporated into a future amendment to the FSAR.

Specifically, the revision establishes a cumulative limit of 1 gpm per valve for system leakage tests; i.e. for systems having 30 valves, total system leakage should nct exceed 30 gpm.

TABLE 6.2-21 (Cont'd)

These valves are under continuous leakage test because they are always subjected to a differential pressure acting across the seat. Leakage through these valves is continuously monitored by the pressure switches in the pump discharge lines, which have a low alarm setpoint in the main control room.

Even though a special leakage test is not merited on these valves for the reasons discussed above, a system leakage test to meet the requirements of Type C testing and as hereinafter described will be performed to ensure the leak-tightness of the ECCS and RCIC systems. The systems will be pressurized with water to a minimum pressure of 32.5 psig (peak drywell accident pressure) with the system totally isolated from primary containment. A leakage rate for the entire system will then be determined and compared to an acceptance limit based on site boundary dose considerations (10 CFR 100); total sub-system leakage not to exceed 1 gpm x No. of valves in the sub-system tested.

30. The leakages through the Main Steamline valves will not be included in establishing the acceptance limits for the combined leakage in accordance with the 10 CFR 50, Appendix J, Type B and C tests. Because the Main Steamlines are provided with a leakage control system, the leakage through these valves will not be added into the combined leakage rate. This exclusion is in accordance with Article III.C.3 of 10 CFR 50, Appendix J.

31. Although only one isolation valve signal is indicated for these valves, the valves also receive automatic signals from various system operational parameters. For example, the ECCS pump minimum flow valves close automatically when adequate flow is achieved in the system; the ECCS test lines close automatically on receipt of an accident signal. Although these signals are not considered isolation signals; and are therefore, excluded from this table, there are other system operation signals that control these valves to ensure their proper position for safe shutdown. Reference to the logic diagrams for these valves indicates which other signals close these valves.

32. To satisfy the requirements of General Design Criterion 56 and to perform their function, these instrument lines have been designed to meet the requirements of Regulatory Guide 1.11 (Safety Guide 11).

These lines are Seismic Category I and terminate in instruments that are Seismic Category I. They are provided with manual isolation valves and excess flow check valves.

Enclosure 5

Quality Assurance Branch

At a meeting between Commonwealth Edison and the NRC Staff on February 19, 1981, the LaSalle County response to Q421.6 and 421.7 were discussed. Commonwealth Edison agreed to revise Table 3.2-1 to include the following additional items:

1. Item XXXVIII - add reference to HVAC filter
2. Item V.9 - add data and modules term
3. Item XLV - add containment monitoring system
4. Item XLII - add PC and vacuum breaker valves. Indicate sample line included in Section III(Recirc System).

In addition, for those items not included in the table based on previous agreements with the Staff on the safety-classification of certain systems, structures and components supplemental documentation will be submitted to allow the QA Branch to verify these agreements. This documentation can be provided by March 6, 1981. Internal discussion between the QA Branch and the other Technical branches could close this issue more quickly.

Enclosure 6

Financial Qualification Branch

(a) Operating Cost Estimates - LaSalle 1 (1985, 1986)

Attached are the subject estimates requested by the NRC Staff on February 13, 1981. This information was telecopied to Mr. A. Bournia on February 19, 1981.

(b) LaSalle County Unit 1 - Commercial Service Date

The LaSalle County Unit 1 commercial service date is scheduled for April 1, 1982. This information was communicated to Mr. A. Bournia on February 17, 1981.

0737B

ATTACHMENT FOR ITEM NO. 1.a.

ESTIMATED ANNUAL COST OF OPERATING NUCLEAR GENERATING
UNIT: LaSalle, Unit No. 1
FOR THE CALENDAR YEAR 1986

(thousands of dollars)

Operation and maintenance expenses	
Nuclear power generation	
Nuclear fuel expense (plant factor 65 %)	$ 61,159,000
Other operating expenses	556,000
Maintenance expenses	841,000
Total nuclear power generation	62,556,000
Transmission expenses	92,000
Administrative and general expenses	
Property and liability insurance	1,842,000
Other A.&G. expenses	5,442,000
Total A.&G. expenses	7,284,000
TOTAL O&M EXPENSES	69,932,000
Depreciation expense	20,561,000
Taxes other than income taxes	
Property taxes	4,916,000
Other	-
Total taxes other than income taxes	4,916,000
Income taxes - Federal	21,829,000
Income taxes - other	1,977,000
Deferred income taxes - net	5,960,000
Investment tax credit adjustments - net	-(7,482,000)
Return (rate of return: 12.25%)	64,132,000
TOTAL ANNUAL COST OF OPERATION	$181,825,000

ATTACHMENT FOR ITEM NO. 1.a.

ESTIMATED ANNUAL COST OF OPERATING NUCLEAR GENERATING
UNIT: LaSalle Unit No. 1
FOR THE CALENDAR YEAR 1985

(thousands of dollars)

Operation and maintenance expenses	
Nuclear power generation	
Nuclear fuel expense (plant factor 65 %)	$ 58,379,000
Other operating expenses	519,000
Maintenance expenses	786,000
Total nuclear power generation	59,684,000
Transmission expenses	86,000
Administrative and general expenses	
Property and liability insurance	1,842,000
Other A.&G. expenses	5,193,000
Total A.&G. expenses	7,035,000
TOTAL O&M EXPENSES	66,805,000
Depreciation expense	20,561,000
Taxes other than income taxes	
Property taxes	4,772,000
Other	-
Total taxes other than income taxes	4,772,000
Income taxes - Federal	21,602,000
Income taxes - other	1,957,000
Deferred income taxes - net	8,360,000
Investment tax credit adjustments - net	-(7,609,000)
Return (rate of return: 12.25%)	67,464,000
TOTAL ANNUAL COST OF OPERATION	$183,912,000