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RECIP.NAME	RECIPIENT AFFILIATION
	Office of Nuclear Reactor Regulation
ZIEMANN,D.L.	Office of Nuclear Reactor Regulation

SUBJECT: Forwards addl info requested by NRC 800328 ltr re environ qualification of electrical equipment.Info provided virtually identical to util 790810 ltr.Requests that analysis make use of previously supplied info.

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LEON D. WHITE, JR.
VICE PRESIDENT

TELEPHONE
AREA CODE 716 546-2700

April 10, 1980

Director of Nuclear Reactor Regulation
Attention: Mr. Dennis L. Ziemann, Chief
Operating Reactors Branch No. 2
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Environmental Qualification of Electrical Equipment
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Ziemann:

Your letter dated March 28, 1980, which was received on April 7, 1980, presented the NRC Staff schedule for review of environmental qualification of electrical equipment. Enclosure 1 to your letter requested that the plant data listed in Enclosure 2 be provided to the NRC Staff by telephone in the near future and that the plant data listed in Enclosure 3 be provided by May 1, 1980.

We have reviewed the enclosures and have found that they are virtually identical to an information request that we received on May 1, 1979 from Mr. R. Snaider of your Staff regarding SEP Topics VI-2.D and VI-3. On August 10, 1979 we provided detailed responses to Mr. Snaider on an informal basis. These responses, in general, referenced previous submittals.

We suggest that your current analysis efforts make use of the previously supplied information and subsequent Staff analysis results. For your information, we have attached our August 10, 1979 information package. Should you have any further questions regarding these data, please contact us.

Very truly yours,

L D White, Jr.

L. D. White, Jr.

A001
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1/1

Att.

8004150434

RESPONSES TO TELECOPY FROM R. SNAIDER TO RG&E
5/1/79 - SEP TOPICS VI-2.D and VI-3,
"MASS AND ENERGY RELEASE INSIDE CONTAINMENT"

GENERAL: As will be apparent in the RG&E responses to this SEP Topic quiz, much of the information requested is available from docketed material.

Question 1. Containment Information

Containment total volume
Containment net free volume

Response:

	LOCA	Containment Integrity Analysis
Containment total volume	1.13×10^6 cu. ft.	1.13×10^6 cu. ft.
Containment net free volume	1.066×10^6 cu. ft.	0.972×10^6 cu. ft.

The LOCA analysis was performed to obtain a conservatively low estimate of peak containment pressure since, for purposes of determining post-LOCA peak clad temperatures, a "minimum backpressure" condition is conservative. This "LOCA" analysis found in Exxon Topical Report XN-NF-77-58 (Ref #1). The "Containment Integrity Analysis", on the other hand, refers to the FSAR analysis found in Section 14.3.4 (Ref #2). This analysis was performed using assumptions which would result in a conservatively high estimate of the mass and energy released to the containment, as well as minimum containment heat removal capability. Such assumptions, of course, result in a conservatively high value for post-accident peak containment pressure.

8/10/79

Question 2. <u>Passive Heat Sinks</u>

Identify structures, components and equipment that act as passive heat sinks within the containment. Provide the following information:

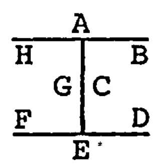
a. total exposed heat transfer surface area with clarification if the exposed area is for one or both sides of the material

b. total equivalent thickness

c. thermo-physical properties (i.e., density, specific heat and thermal conductivity).

Response: The passive heat sinks within containment that were used in the LOCA analysis are listed in Table 2.4 of Reference #1. This reference describes the heat sink, its thickness and material. For structures, the surface areas listed are for one side only. For beams, however, the surface area listed is for the total surface area (i. e., surface area = A+B+C+D+E+F+G+H)

where



This convention is consistent with the inputs to the containment response codes used.

The thermo-physical properties are also listed in Reference #1.

The passive heat sinks within containment that were used in the Containment Integrity Analysis are listed in Table 14.3.4-1 of Reference #2. The thermo-physical properties are not referenced but should be the same as those used in the LOCA analysis.

Question 3. **Initial Containment Conditions**

Initial containment atmosphere conditions for:

a. temperature
b. pressure
c. relative humidity

Provide minimum, maximum and nominal values of each for evaluation of conservatism and margin.

Response: **Containment Conditions**

	minimum	nominal	maximum
temperature (°F)	90	100	120
pressure (psig)	-2.0	0	+3.0
humidity (%)	-	50	100

The minimum and maximum values of containment temperature are inputs to the analyses in references 1 and 2, respectively. The minimum and maximum pressures are taken from the Ginna Technical Specifications, paragraph 3.6.2.

Question 4. Containment Spray System

a. Parameters and their setpoints to activate spray system

b. Spray system activation time

The time associated with each of the following is needed (indicate whether or not they are additive):

(1) time elapsed until signal to activate spray system is reached

(2) time elapsed between reaching signal to activate spray and contact closure (total instrumentation lag time)

(3) time required for diesel generator to attain full operating speed

(4) time required for loading of containment spray pump

(5) time required to open isolation valve

(6) time required for containment spray pump to achieve full speed

(7) time required to fill spray system piping and deliver water to spray header

c. Spray flow rate

d. Temperature of water at spray nozzle

e. Spray system heat exchanger

(1) type of heat exchanger, such as tube and shell, U tube, crossflow, counterflow and parallel flow

(2) heat transfer surface area of heat exchanger

(3) overall heat transfer coefficient for heat exchanger

(4) heat exchanger coolant inlet temperature

(5) heat exchanger coolant flow rate

Response: The majority of this information was supplied in Reference #3.

The containment spray system is actuated on:

2 out of 3 Hi-Hi Containment Pressure signals <u>or</u> manually

The Hi-Hi Containment Pressure setpoint is 30 psig

The fastest containment spray actuation time is stated in Reference #3 as 2 sec.

The slowest containment spray actuation time would consist of the following approximations:

delay time for containment pressure instrument	1.0 sec
diesel generator startup time	10.0 sec
time for spray pump to come up to speed	5.0 sec
measured time for spray valves to open	12.0 sec
time to fill the largest unfilled spray piping (inc. ring header)	22.5 sec

Since the spray pumps come up to speed while the valves are opening, only the valve opening time will be used in calculating the overall delay. There is no delay time associated with sequencing the spray system onto the diesel-backed emergency buses, since the spray system is loaded onto the bus as soon as the hi-hi containment pressure signal is generated, and the emergency bus is up to required voltage.

The longest containment spray actuation = 1.0 + 10 + 12 + 22.5 = 45.5 seconds. This is very conservative, since flow would begin prior to the time the spray valves were full open, and spray would occur as the ring header was filling.

The runout flow rate per spray pump is 1800 gpm. This is the flow rate used in the LOCA analysis. The spray flow used in the containment integrity analysis is 1200 gpm per pump.

The spray pump performance curve is presented in Reference #2.

The source of spray water is the Refueling Water Storage Tank (RWST) which is at ambient temperature of the Auxiliary Building. The RWST water is assumed to be at 37°F for spray and at 60°F for Safety Injection in the LOCA analysis (Ref. #1).

There are no spray heat exchangers; however, the Residual Heat Removal (RHR) heat exchanger provides for long-term cooling of water being recirculated from the containment sump. Attachment 1 provides information on the RHR heat exchanger.

Question 5. Fan Cooler

a. Delay time before the fan cooler becomes effective for heat removal (equivalent information to 4.6 above)

b. Heat removal capability of the fan cooler. Provide a curve or table of the energy rate as a function of containment temperatures. The containment temperature should be in the range of 70°F to 500°F.

Response: Reference #3 provides the requested information for minimum delay time (20 seconds). The containment integrity analysis asumes a starting time of 45 seconds (Ref #2).

The maximum heat removal capability of the fan coolers is presented in Reference #3. The heat removal capability used in the Containment Integrity Analysis is presented in Reference #2.

Question 6. <u>Other Containment Heat Removal Systems</u>

Identify any other containment heat removal system that affects the containment temperature response. Provide the same type of information as in Item 4 above.

Response: There are no other heat removal systems.

Question 7. <u>Mass and Energy Release Data</u>

Provide the mass and energy release rate data for a spectrum of MSLBs and LOCAs. Reference to existing data previously submitted to the staff is acceptable. Reference or describe methods used to calculate mass and energy releases. Enclosure II describes information needed by the staff.

Response: For LOCA mass and energy release data see Reference 4.

Mass and energy release data for a MSLB is generally discussed in FSAR Section 14.2.5 and steam flow curves are presented in the accompanying figures.

LOCA mass energy release has been presented in Section 14.3 of the FSAR for the containment integrity analyses and in References 1 and 4 for the most recent Appendix K analyses. Methodology for each of these analyses is presented or referenced in each of these documents.

Question: ENCLOSURE II

Additional Information Required Describing the Plant's Mass and Energy Inventories (PWR)

1. Reactor Rated Power.

Response: 1520 MW_t

2. Steam flow rate per steam generator at full power

Response: 3.13×10^6 lb/hr per generator

3. Fluid mass in each steam generator at full power and hot shutdown.

Response: 1681 cu. ft. at HFP
2821 cu. ft. at HZP

4. Fluid energy in each steam generator at full power and hot shutdown.

Response: The energy can be calculated from the following:

513.8°F at 770 psia at HFP
saturation at 547°F at HZP

5. Steam line flow area.

Response: The area varies as illustrated below:

Steam Generator outlet	28.250 in. I.D.	
Reducer	31 in. x 30 in.	
Steam Piping	30-MS-600-1	Ref. #2 Fig. 10.2-1
	36-MS-600-1	Ref. #2 Fig. 10.2-1
	24-MS-600-1	Ref. #2 Fig. 10.2-1
Flow limiter	16 in. I.D.	

where: 36-MS-600-1 is 36" OD nominal wall = 1.656 in.
30-MS-600-1 is 30" OD nominal wall = 1.406 in.
24-MS-600-1 is 24" OD nominal wall = ~~1.405~~ 1.156 in.

6. Time when steam isolation valves will close on a main steam line break.

Response: The time delay from when the required parameters reach the trip setpoint until the main steam isolation valves close is assumed to be 5 sec.

7. Mass of unisolated steam between a steam generator and the isolation valve following closure of main steam isolation valves.

Response: Mass of unisolated steam from "A" steam generator to isolation valve equals 1176 #.
Mass of steam from "B" steam generator to isolation valve equals 2412 #.

8. Additional mass of unisolated steam if the main steam isolation valve nearest the break fails to close.

Response: Additional mass of unisolated steam in the event of isolation valve failure equals
"A" loop 50 #
"B" loop 50 #

9. Main feedwater line flow area.

Response: The area varies as illustrated below:

14-FW-900-1 Ref. #2 Figure 10.2-2
20-FW-900-1 Ref. #2 Figure 10.2-2
14-FW-900-1 Ref. #2 Figure 10.2-2
20-FW-900-1 Ref. #2 Figure 10.2-2
14-FW-900-1 Ref. #2 Figure 10.2-2

where 14-FW-900-1 is 14.00 in O.D., 12.124 in. ID.
20-FW-900-1 is 20.00 in O.D., 17.438 in. ID.

10. Main feedwater enthalpy.

Response: The enthalpy can be calculated from:

steam generator pressure = 774 psig
feedwater temperature = 432°F

11. Time when main feedwater isolation valves will close following a main steam line break.

Response:

% Open	Inches	FCV-466 Time In Seconds	FCV-476 Time In Seconds
50	1 1/4	4.46	4.66
75	1 7/8	6.45	6.23
100	2 1/2	9.51	10.38

At full power these valves run at 50% open.

*Note - These times include instrument delay time but not response time to accident parameters.

12. Mass and temperature of feedwater between a steam generator and the feedwater isolation valve.

Response: The mass of feedwater between the "A" steam generator and its first isolation valve is 9346 #. The mass of water between the "B" steam generator and its first isolation valve is 18,300 #.

The temperature of the feedwater between the generators and their respective isolation valves is 432°F.

13. Mass and temperature of feedwater above 240°F between a steam generator and any redundant feedwater isolation valve.

Response: The mass of the feedwater between "A" steam generator and the redundant isolation valve (feedwater pump discharge valve) is 76,895#. The temperature between the steam generator and number 5 heater is 432°F. The temperature between number 5 heater and the feedwater pump discharge valve is 354°F.

The mass of the feedwater between "B" steam generator and the "B" feedwater pump discharge valve is 85,849#. The temperatures are the same as described for the "A" steam generator.

14. Mass and temperature of all feedwater above 240°F.

Response: The mass and temperature of all feedwater above 240°F has yet to be determined. The requirements to perform this task represent more than a fair amount of effort. Since the mass has been determined to the redundant isolation valve for both a feedwater and main steam line break in containment, the valve of performing this exercise is not clear.

15. Time when auxiliary feedwater injection will begin following a main steam line break.

Response: A main steam line break will cause an SI which will in turn start the motor-driven auxiliary feedwater pumps (MDAFP). The turbine-driven auxiliary feedwater pump (TDAFP) will start only on loss of buses 11A <u>and</u> 11B (which are non-IE buses not powered from the diesel generators, and would thus be lost during a loss of offsite power) or on low-low steam generator level in <u>both</u> steam generators.

The minimum time for auxiliary feedwater injection can be conservatively determined by assuming full auxiliary feedwater flow when the pump breaker is closed.

With offsite power available; the breaker for "A" MDAFP will close 30 sec. after the generation of an SI signal. The breaker for "B" MDAFP will close 32 sec. after the generation of an SI signal. The TDAFP will not start unless a low-low steam generator level is reached in both steam generators, since buses 11A and 11B should still be available.

With no offsite power; 10 sec. must be added to the above times for the MDAFP to allow for starting the diesel generators and 5 seconds for the pumps to attain fuel flow. The TDAFP would start a minimum of 3 sec. following loss of offsite power.

16. Auxiliary feedwater flow rate and enthalpy.

Response: MDAFP design assumption 200 gpm
TDAFP design assumption 400 gpm

With offsite power available; a MSLB would result in 2 MDAFP operating with a total flow of 400 gpm. The TDAFP would not start until a low-low steam generator level is reached on both steam generators.

With no offsite power available; a MSLB would result in 2 MDAFP and 1 TDAFP operating with a total flow of 800 gpm.

The enthalpy can be calculated from the following:

auxiliary feedwater temperature 32 to 80°F
Auxiliary feedwater pressure is slightly greater than steam generator pressure

17. Time when core flooding system will begin injection following a LOCA.

Response: The first high-head SI pump reaches full flow at 15 sec. The first low-head SI pump reaches full flow at 25 sec.

The accumulators start injecting when system pressure decreases below 700 psig. This will naturally vary depending on the size of the break. See Figures 2.7 and 2.8 of Ref. #1.

18. Fluid mass in the reactor system at full power and hot shutdown.

Response: Fluid mass can be calculated from the following:

	HFP		HZP
RCS volume (cu. ft.)	6245		6245
pressurizer steam space (cu. ft.)	-320		-600
RCS fluid volume	5925		5645
system pressure (psia)	2250		2250
temperature (°F)	573.5	Tave	547
	544.5	T_C	
	602.5	T_H	
	650	Przr.	650

This information was obtained from Reference #7.

19. Fluid energy in the reactor system at full power and hot shutdown.

Response: This can be calculated using the values in question 18.

20. Hot and cold leg line flow areas.

Response:

Reactor Vessel to MCP	= 27½ in ID
MCP to S.G.	= 31 in ID
S.G. to Reactor Vessel	= 29 in ID

21. Core flooding system flow rate and temperature.

Response: Minimum SI system flow rate is presented in Reference #5

Maximum SI system flow rate is presented in Reference #6

Accumulator flow rate shown in Figures 2.7 and 2.8 Reference #1

SI water is taken from the RWST. See the response to question 4.

22. Sensible heat in the core and reactor system metal that is above 240°F at full power operation.

Response: The information is presented in Reference #2 Table 14.3.4-2.

23. Initial hot and cold leg temperatures.

Response: See the response to question II-18.

References

1. ECCS Analysis for the R. E. Ginna Reactor with ENC WREM-2 PWR Evaluation Model, XN-NF-77-58, December 1977.

2. Final Facility Description and Safety Analysis Report (FSAR) for R. E. Ginna

3. Letter from K. W. Amish of RG&E to E. G. Case of the USAEC, dated November 25, 1974.

4. Letter from L. D. White of RG&E to D. L. Ziemann of USNRC, dated February 2, 1979.

5. Application for Amendment to Operating License dated March 7, 1975.

6. Letter from L. D. White of RG&E to A. Schwencer of USNRC, dated July 29, 1977.

7. RG&E Interoffice memo, R.C. Mecredy to B.A. Snow, G.J. Wrobel, 5/1/79.

Attachment 1

WESTINGHOUSE ELECTRIC CORPORATION
ATOMIC POWER DIVISION

PRELIMINARY OUTLINE SKETCH

DUTY REQUIREMENTS

UA = 7.48 10^5 BTU/HR·°F

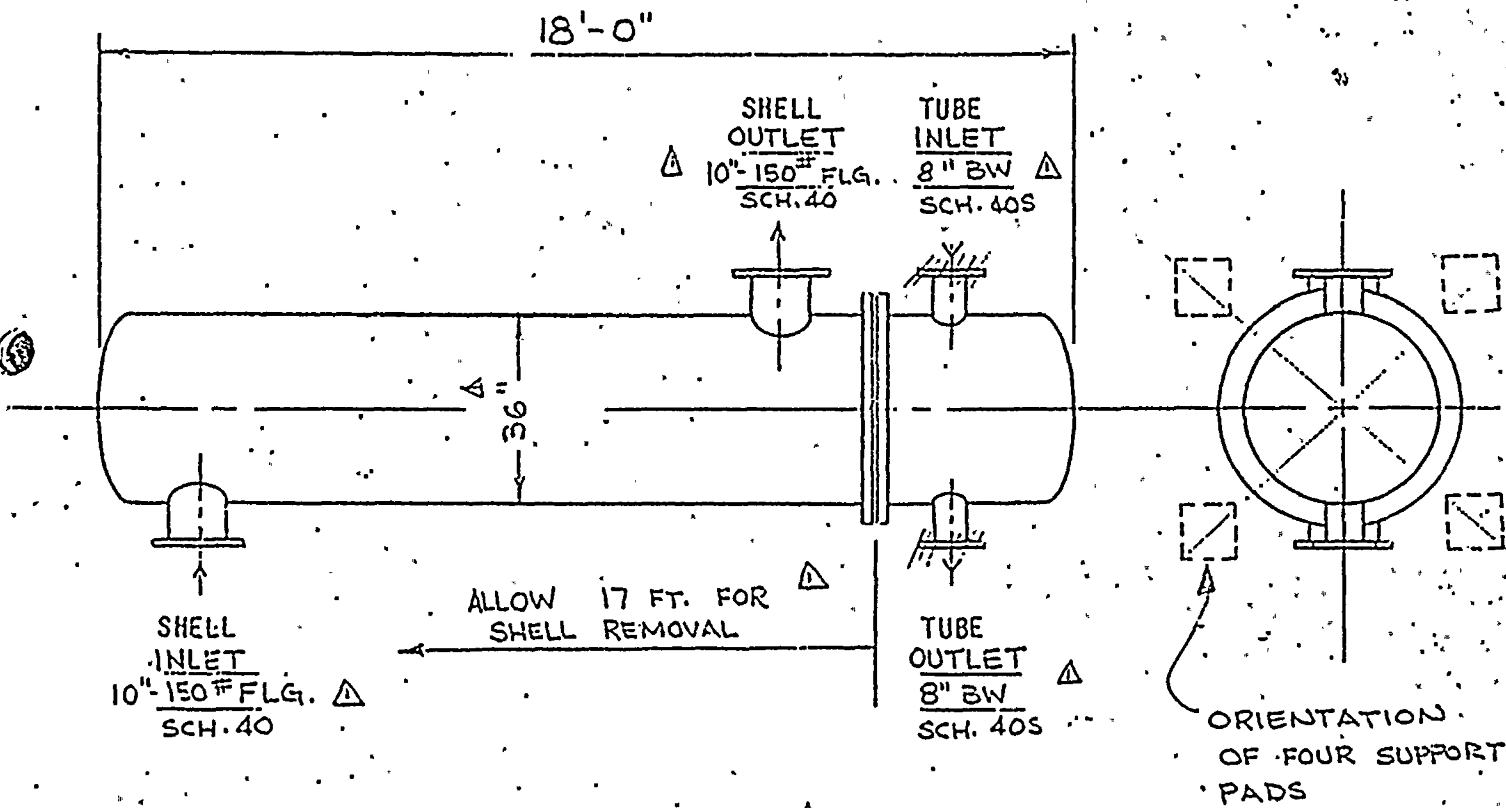
EQUIPMENT Residual Heat Exchanger

SYSTEM Auxiliary Coolant

PROJECT Ginna △

ITEM NO.

SPECIAL REQUIREMENTS, & FEATURES



~~MAY BE~~ INSTALLED VERTICALLY ~~OR HORIZONTALLY~~ △
ON FOUR FEET

APPROX. DRY WT. 9000 LBS. (FLOODED: 13,800 LBS) △

NOTE: DIMENSIONS SHOWN ARE APPROXIMATE AND ARE GIVEN FOR REFERENCE ONLY. SKETCH IS NOT TO SCALE

SKETCH NO. MC-1261

DATE 3-24-66 / REV. △ 6-29-66

ENGINEER JRB.

SKETCH REFERENCE CASF

WESTINGHOUSE FORM 54316

EXCHANGER SPECIFICATION SHEET - B

ROBERT EMMETT GINNA NUCLEAR POWER PLANT

SERVICE OF UNIT	RESIDUAL HEAT EXCHANGER			ITEM NO.	
TWO REQUIRED		TYPE	SHELL & U-TUBE	CONNECTED IN	
SURFACE PER UNIT		SHELLS PER UNIT		SURFACE PER SHELL	

PERFORMANCE OF ONE UNIT

	SHELL SIDE	TUBE SIDE
FLUID CIRCULATED	WATER	WATER
TOTAL FLUID ENTERING	1,375,000 LB/HR	763,000 LB/HR
VAPOR		
LIQUID	1,375,000 LB/HR	763,000 LB/HR
STEAM		
NON-CONDENSABLES		
FLUID VAPORIZED OR CONDENSED		
STEAM CONDENSED		
GRAVITY—LIQUID		
VISCOSITY—LIQUID		
MOLECULAR WEIGHT—VAPORS		
SPECIFIC HEAT—LIQUIDS	B.T.U./#	B.T.U./#
LATENT HEAT—VAPORS	B.T.U./#	B.T.U./#
TEMPERATURE IN	100.0 °F	160.0 °F
TEMPERATURE OUT	117.5 °F	128.4 °F
OPERATING PRESSURE	75 #/SQ. IN.G	400 #/SQ. IN.G
NUMBER OF PASSES		
VELOCITY	FT./SEC.	FT./SEC.
PRESSURE DROP - MAX. ALLOWABLE	15 #/SQ. IN.	15 #/SQ. IN.
FOULING FACTOR - HR. FT.² °F/BTU	0.0005	0.0005

HEAT EXCHANGED—B.T.U./HR.	24.15 × 10⁶ BTU/HR.	M.T.D. (Corrected)	
TRANSFER RATE—SERVICE		CLEAN	

CONSTRUCTION

	SHELL SIDE	TUBE SIDE
DESIGN PRESSURE	150 #/SQ. IN.G	500 #/SQ. IN.G
TEST PRESSURE	#/SQ. IN.	#/SQ. IN.
DESIGN TEMPERATURE	350 °F	400 °F

TUBES	SA-213 TP 304 or 316	NO.	O.D.	BWG.	LENGTH	PITCH	
SHELL	SA-106 C.S.	I.D.	O.D.		THICKNESS		
SHELL COVER	SA-234 C.S.				FLOATING HEAD COVER		
CHANNEL	SA-240 TYPE 304 OR 316				CHANNEL COVER	SA-240 TYPE 304 OR 316	
TUBE SHEETS—STATIONARY	SA-240 TYPE 304 OR 316				FLOATING		
BAFFLES—CROSS	SA-285 C.S.	TYPE			THICKNESS		
BAFFLE—LONG		TYPE			THICKNESS		
TUBE SUPPORTS					THICKNESS		
GASKETS	SHELL: SS JACKETED ASBESTOS; TUBE: FLEXITALLIC OR EQUAL						
CONNECTIONS—SHELL—IN	10" SCH. 40	OUT	10" SCH. 40		SERIES	150 LB. RF FLANGE	
CHANNEL—IN	8" SCH. 40S	OUT	8" SCH. 40S		SERIES	BUTT-WELD	
CORROSION ALLOWANCE—SHELL SIDE					TUBE SIDE		
CODE REQUIREMENTS	SEE SB.1 PAGE 11				TEMA CLASS	R	
WEIGHTS—EACH SHELL		BUNDLE			FULL OF WATER		

NOTE: INDICATE AFTER EACH PART WHETHER STRESS RELIEVED (S. R.) AND WHETHER RADIOGRAPHED (X-R)

REMARKS:

FOR ADDITIONAL REQUIREMENTS SEE PAGE 11 : "SUPPLEMENT TO EXCHANGER SPECIFICATION SHEET - B"

8-29-66

WAPD #314

REVISION NO. 0
TO

Rochester Gas and Electric Corporation

Inter-Office Correspondence

May 1, 1979

SUBJECT: SEP Information

TO: B.A. Snow
G.J. Wrobel

Jim Shea asked that I check some plant data that Herb Fonticella, an SEP reviewer, was going to use. The following are the values I supplied:

RCS volume - 6245 ft^3 (Uprating report, T1.2-1)
RCS temp. - avg. in vessel 573.5°F (T1.2-1)
Letdown flow - 40 gpm
Steam generator pressure - 770 psia (T4.1-4)
(measured in June 1978 as 774 psia)
Steam generator water volume - 1681 ft^3 at 100% power (T4.1-4)
Steam generator steam volume - 2898 ft^3 at 100% power (T4.1-4)
Emergency feedwater flow - 200 gpm for the motor driven pumps
- 400 gpm for the steam driven pump
Steam flow - 3.13×10^6 lb/hr per generator
Blowdown - 40 to 70 gpm per generator

RC Mecredy

R.C. Mecredy

RCM/sh

[illegible]