PRIORITY 1

(ACCELERATED RIDS PROCESSING)

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9510030241 DOC.DATE: 95/09/21 NOTARIZED: NO DOCKET #
FACIL:50-244 Robert Emmet Ginna Nuclear Plant, Unit 1, Rochester G 05000244
AUTH.NAME AUTHOR AFFILIATION
MECREDY,R.C. Rochester Gas & Electric Corp.
RECIP.NAME RECIPIENT AFFILIATION
JOHNSON,A.R.

SUBJECT: Forwards info re question of whether adequate svc water flow would be provided to safety related pump room coolers during accident conditions if only one SWP operating & info re current degree of verification of KYPIPE model for SWS.

DISTRIBUTION CODE: A001D COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 9
TITLE: OR Submittal: General Distribution

NOTES:License Exp date in accordance with 10CFR2,2.109(9/19/72). 05000244

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
	PD1-1 LA	1	1	PD1-1 PD	1	1
	JOHNSON,A	1	1			
INTERNAL:	FILE CENTER 01	1	1	NRR/DE/EMCB	1	1
	NRR/DRCH/HICB	1	1	NRR/DSSA/SPLB	1	1
	NRR/DSSA/SRXB	1	1	NUDOCS-ABSTRACT	1	1
	OGC/HDS3	1	0			
EXTERNAL:	NOAC	1	1	NRC PDR	1	1

NOTE TO ALL "RIDS" RECIPIENTS:
PLEASE HELP US TO REDUCE WASTE! CONTACT THE DOCUMENT CONTROL DESK, ROOM OWFN 5D8 (415-2083) TO ELIMINATE YOUR NAME FROM DISTRIBUTION LISTS FOR DOCUMENTS YOU DON'T NEED!

TOTAL NUMBER OF COPIES REQUIRED: LTTR 12 ENCL 11

P R I O R I T Y 1 D O C U M E N T

MA4

ROCHESTER GAS AND ELECTRIC CORPORATION • 89 EAST AVENUE, ROCHESTER, N.Y. 14649-0001 AREA CODE 716 546-2700

ROBERT C. MECREDY
Vice President
Nuclear Operations

September 21, 1995

U.S. Nuclear Regulatory Commission
Document Control Desk
Attn: Allen R. Johnson
Project Directorate I-1
Washington, D.C. 20555

Subject: Response to Additional Questions on Service Water System
R.E. Ginna Nuclear Power Plant
Docket No. 50-244

Ref.(a): Letter from R. C. Mecredy (RG&E) to Allen R. Johnson (NRC), Subject: Additional Information - Service Water System, dated July 27, 1993

(b): Letter from R. C. Mecredy (RG&E) to Allen R. Johnson (NRC), Subject: Additional Information - Service Water System, dated March 30, 1994

Dear Mr. Johnson:

On June 23, 1995, during an NRC inspection on the spent fuel pool system, representatives from RG&E met with Mr. Steve Jones of the NRC staff to discuss the remaining open questions regarding the Ginna Station service water system. Resolution of these questions is needed to provide closure to previously conducted inspection 50-244/91-201 dated January 30, 1992. A follow-up telephone call with Mr. Jones on August 11, 1995 provided a discussion of the open questions we believe to be sufficient to provide closure of this subject. The purpose of this letter is to document that discussion and provide the basis for our conclusions.

Attachment A provides information related to the question of whether adequate service water flow would be provided to safety related pump room coolers during accident conditions if only one service water pump were operating. This was a follow-up question associated with Reference (a), Attachment A, Question # 2.

Attachment B provides information related to the current degree of verification of the KYPIPE model for the service water system and correlation to flow tests performed. This was a follow-up question associated with Reference (b), Attachment A, Question #3.

030008

A001
1/1

We trust that the attached information is sufficient to complete your evaluation supporting the adequacy of single service water pump operation during accident conditions.

Very truly yours,

Robert C. Mecredy

GAH\392

xc: Mr. Allen R. Johnson (Mail Stop 14B2)
Project Directorate I-1
Washington, D.C. 20555

U.S. Nuclear Regulatory Commission
Region I
475 Allendale Road
King of Prussia, PA 19406

Ginna Senior Resident Inspector

ATTACHMENT A

During a meeting with Mr. Steve Jones of the NRC staff on June 23, 1995, several remaining questions were discussed as related to the operation of a single service water pump during accident conditions. Specifically, it was requested that the service water flowrate to the safety related pump loads be identified and justified as being adequate during single service water pump operation. Values for service water flow were previously provided in a letter from RG&E to NRC dated July 27, 1993, Attachment A, Question No. 2. However, the flowrate to the safety related pump loads was not shown on the flow figure provided with the Attachment, since these lines and flows are small compared to the other system flows.

Two cases were considered; 1)single pump operation during the injection phase, and 2) single pump operation during the recirculation phase. Flow values were established from the KYPIPE model for the service water system. *(Source:RG&E Case SW1PRC02 in Design Analysis DA-ME-92-019 Rev. 0 dated 7/15/92).* As shown on the figure in our July 27, 1993 letter, the net flow to the service water header feeding the safety related pump room coolers, containment penetration cooler, and the safety injection pump thrust bearing housing water jacket during the injection phase and recirculation phase is 201 gpm and 128 gpm, respectively. The flow values to these individual coolers are as follows:

SINGLE SERVICE WATER PUMP OPERATION

COMPONENT	INJECTION PHASE (GPM)	RECIRC PHASE (GPM)	UFSAR VALUE (GPM)
RHR pump room cooler 'A'	16.9	10.7	12.5
RHR pump room cooler 'B'	17.1	10.7	12.5
Charging pump room cooler 'A'	16.5	10.4	9
Charging pump room cooler 'B'	16.5	10.4	9
Safety injection/spray cooler 'A'	35.7	22.6	22
Safety injection/spray cooler 'B'	35.7	22.6	22
Safety injection/spray cooler 'C'	36.7	23.2	22
Containment penetration cooler	26.6	18.9	20
Safety injection pump thrust bearing water jacket	NO VALUE *	NO VALUE *	3

* No value is included , since the KYPIPE model for the service water system did not include the small (1-1/4 -inch and 3/4 -inch) lines when it was modeled. Further information is included below.

Comparison of the values obtained from the KYPIPE model and the UFSAR for the single service water pump case indicates that all flows exceed the UFSAR values (Table 9.2-2) with the exception of the RHR room coolers (10.7 gpm versus 12.5 gpm), and the containment penetration cooler (18.9 gpm versus 20 gpm) for the recirculation case only. All injection phase flows exceed the UFSAR values. The values determined using the KYPIPE model are acceptable as explained below.

RHR PUMP ROOM COOLERS

The values listed in the table above are from the computer model run, not actual test values. Instrumentation is not available in the system to monitor these flows. One of the major benefits of the KYPIPE hydraulic model is to ascertain acceptability of flows to components during various conditions without installing test instrumentation. Therefore, for the purpose of this discussion it is assumed that these computer determined values represent actual values.

The service water flow values presently included in the UFSAR were taken from original plant test data in 1969. (*GILBERT COMMONWEALTH DOCUMENT SS-72266, UCN 7/047 AND 7/041).* The values were not established as pass/fail values, but simply determined from system conditions during testing the two pump configuration. During the early 1980s RG&E performed ventilation analyses to determine the effects on the environment near the safety related pumps to determine the sensitivity to cooling on the resulting environment during various conditions. These analyses were performed initially as part of the electrical environmental qualification work pursuant to 10 CFR 50.49. It was concluded that the areas near safety related pumps in the auxiliary building were a mild environment from a temperature standpoint (less than 104 °F). A refinement of these analyses was performed in the early 1990s to consider other transients and conditions not originally performed.

The function of the room coolers is to provide cooling for the environment surrounding the safety related pump motors in order to maintain the input air temperature circulating through the motors within the limits of their design, particularly the motor windings and insulation. The ambient temperature limit for the original motor designs was 40 °C (104 °F). The RHR motors were rewound as a result of EEQ considerations and are now qualified for temperatures in excess of 150 °F and high humidity conditions. The temperature environment near the safety injection and containment spray motors was due to heat generated from the pumps and motors themselves plus the second order effect of the outside air temperature during the design basis high temperature day for this region (91 °F). The environment in the RHR pump room, however, is more affected by the temperature of the fluid in the piping during design basis LOCA and during the normal cooldown mode approaching cold shutdown when the plant transfers to RHR operation. An analysis was performed using the RHU computer code to determine the resultant RHR room temperature in the event of total failure of the room coolers. It was determined that the temperature stabilized at 149 °F in 13 hours for the normal cooldown mode,,while it would stabilize at the same temperature after 72 hours post accident. The RHR motors are qualified for this environment, however, the failure of both coolers is a beyond design basis condition, since at least one cooler would remain operable in all cases.

Therefore, the amount of service water flow to the coolers for the RHR room can be considered a second order effect, that is, since the motors are qualified for the environment without cooling, slightly less service water flow than the value obtained during original testing is not significant to the operability of the RHR pumps.

SAFETY INJECTION/CONTAINMENT SPRAY PUMP AREA COOLERS

It is noted that the service water flows to these coolers is greater than the value in the UFSAR, however, the lines providing service water to the coolers was isolated in 1991 based on the environmental analyses that showed that additional ventilation cooling was not essential for their operation during all modes of operation.. The environment was determined to stabilize at 94 °F after 20 hours of operation post accident, with a peak of 108 ° F , 30 minutes following the LOCA, without cooling being provided to the pump area. This information is currently reflected in the UFSAR in section 9.4.9.1 and Table 3.11.1. Data examined during the EEQ reviews showed that these motors are capable of operation for a minimum of 44,000 hours at 130 °F (TER-C5257-178 dated 3/20/81 submitted with NRC letter dated 6/1/81, RG&E Document No. RG009768). These motors have never been operated in such an environment. Therefore, there is margin between the calculated post accident ambient conditions and the motor qualification. Closure of the service water lines to these room coolers has resulted in a slightly greater flow available to the RHR room coolers, charging room coolers, and penetration cooler. Our assessment concludes that the safety injection and containment spray pumps are capable of performing their function independent of the service water flow to the area coolers.

PENETRATION COOLER

Based on the table on page 1, the recirculation phase service water flow to the containment penetration cooler is 18.9 gpm from the model run versus 20 gpm as listed in the UFSAR. As previously discussed, the value of 20 gpm was based on the initial test and is not a pass/fail value. More significant is the fact that service water flow through the penetration cooler is not categorized as an essential service water load in the Ginna design basis, (although the flow is not automatically isolated during a safety injection signal combined with an undervoltage condition).

There are 15 penetrations which receive cooling air to cool the hot mechanical process piping, which include main steam, main feedwater, steam generator sample, steam generator blowdown, containment steam heating supply, residual heat removal, and reactor coolant pump seal water. The penetrations contain fluids which range in temperature from 200° F for the reactor coolant pump seal water to less than 650° F for the steam generator sample lines. The purpose of the penetration cooling system is to provide cooling air to these penetrations such that the bulk concrete temperature is maintained below 150° F *(UFSAR section 9.4.1.2.10 and 3.8.1.5.3 - 6)*, an original code requirement for Ginna Station. This requirement has since been relaxed to 200° F, in accordance with ASME Code Section III, CC-3440. Short term and accident conditions allow a 350° F temperature with local areas allowed to reach 650 ° F.

Penetrations are cooled with the passage of air, drawn from the outside, around the penetrations supplied by redundant fans, with service water coils as the heat sink. One fan alone provides 100% of the design requirement. The original plant prototype testing demonstrated that with no service water flow, the penetrations would not exceed 150 °F for 80 minutes. The system function applies primarily during normal power operation, as opposed to accident conditions, when process piping is at the higher temperatures. During accident scenarios the process piping is significantly less. In 1988 RG&E performed a test during normal plant operation with service water flow but with the airflow isolated. The penetration temperatures remained below 200° F throughout the testing. Hence there is a large margin in the original design, such that the slight difference between 20 gpm (representing 2 pump operation) and 18.9 gpm service water flow (representing single pump operation) is insignificant.

COMPARISON WITH TWO AND THREE PUMP OPERATION

As a means of comparison with the single service water pump operation, the following table presents flows determined from KYPIPE runs simulating the normal plant operating mode for two pump and three pump operation. In both cases the component cooling water heat exchangers are receiving service water flow. These are substantial demand loads on the service water system, and have the effect of increasing service water pump flow. However, the flows to the safety related pump room coolers is relatively unchanged as compared to the single service water pump cases without the component cooling water loads imposed. This shows that these pump room cooler flows are not significantly sensitive to the number of service water pumps in operation.

NORMAL OPERATION FLOWS (GPM)

(FROM DA-ME-93-044 REV. 1 10/15/93)

COMPONENT	TWO PUMP OPERATION	THREE PUMP OPERATION
RHR pump room cooler A	15.1	17.0
RHR pump room cooler B	18.2	20.5
Charging pump room cooler A	16.6	18.7
Charging pump room cooler B	16.5	18.6
Safety injection/spray area coolers A, B, and C	No flow:these have been isolated	No flow:these have been isolated
Containment penetration cooler	34.0	38.4
Component cooling water heat exchanger A	1316	2095
Component cooling water heat exchanger B	1326	2069

SAFETY INJECTION PUMP BEARING WATER JACKET

Currently, the KYPIPE model does not include the small 1-1/4 inch and 3/4 inch piping providing service water to the safety injection pump thrust bearing water jacket. The pump technical manual specifies a value of 3 gpm nominally, which agrees with the UFSAR value. A test performed during this past refueling outage confirmed that a service water flow of 3 gpm did exist. The test simulated single service water pump operation. RG&E plans to include the modeling of these lines in the KYPIPE computer program.

Supplemental cooling is supplied to the thrust bearing water jacket surrounding the bearing housing in order to maintain the oil bath temperature in the range of approximately 140 - 180 °F. This allows for a 76 °F rise above an ambient temperature of 104 °F, the original mild environment temperature. Based on ventilation analyses performed using the RHU computer code, it was determined that the area around these pumps would stabilize at 94 °F during the recirculation phase, without the benefit of the room coolers supplying air cooling around the safety injection pumps.[1] Thus, an additional margin of 10 ° F exists as compared to the original design basis of 104 ° F. During the injection phase bearing temperatures are not a concern, since the pumped fluid is obtained from the relatively cool refueling water storage tank, as compared to the recirculation phase when water is pumped from the containment sump via the RHR pumps and heat exchangers (water temperature in the 150-160 °F range downstream of the RHR heat exchangers). Therefore, based on the tests performed and the additional margin, we are confident that a service water flow with the magnitude of 3 gpm is adequate for all operating conditions for these pumps and satisfies the design basis.

---

[1] The RHU computer code has been utilized for other analyses and verified as providing reasonable correlation to other calculation methods performed on the Standby Auxiliary Feedwater system and for the Control Building analyses. The analyses performed for the Auxiliary Building was conservative in the assumptions applied. Although the specific modeling techniques used in the RHU code cannot be explicitly quantified due to personnel changes at the code developer, other alternative calculations demonstrate that the RHU code results are similar.

ATTACHMENT B

As discussed in our letter of 3/30/94 (reference b), the development of the hydraulic model for the Service Water System using the KYPIPE Computer Code was a multi-step project involving the following major activities:

- Establish an initial model based upon review of engineering design documents associated with the Service Water System
- Adjust model parameters based upon actual operating data for the major hydraulic components within the Service Water System
- Compare hydraulic model flow results to actual plant data for various mode of operation

The initial model development was performed by an RG&E contractor, NUS Corp., based upon a review of engineering design documents (eg P&IDs, pipe lay-out drawings, piping isometrics, pump curves, heat exchanger data sheets, etc). RG&E performed a detailed review and verification of the NUS data for all of the safety related components and sections of the service water system. This detailed review and verification was documented in RG&E Design Analysis DA-ME-93-044, Rev. 0.

Subsequent to the engineering review, actual plant periodic test data for the service water pump performance was reviewed and compared to the original manufacturer's pump curve. The hydraulic model pump curve was adjusted as needed to be consistent with the in-plant measured pump data. Additionally, actual measured pressure drop data was obtained for major safety related components in the service water system (eg. containment air coolers and diesel-generator coolers). The hydraulic resistance for these major components was calculated and compared to the engineering data. If the measured hydraulic resistance exceeded the design data, the model hydraulic resistance was adjusted based upon the plant data.

Finally, after adjusting the model hydraulic resistance based upon actual plant data, the model was used to simulate various two pump and three pump normal operating plant conditions. The model prediction for flows to major components was compared to actual flow values measured in the plant. A comparison of a normal three pump operating condition was documented in RG&E Design Analysis DA-ME-93-044, Rev. 1 and showed agreement in flows to within 2% for the major safety related components. These results indicated good agreement between the model prediction and measured plant data for normal operation.

Additionally, subsequent to the containment air cooler replacement during the 1993 refueling outage, post modification flow testing was performed on the service water system. As part of this testing a one service water pump test was performed with all non-safety related loads isolated. This test simulated the design basis one service water pump configuration during the injection phase of a Design Basis Accident. Flows to the four containment air coolers and the diesel-generator coolers were measured during this test as well as the total flow to the miscellaneous room coolers. A comparison of tested flows to hydraulic model flows for this test is shown below for the major safety related components. These results show good agreement between the tested flows and the predicted flows. This comparison is documented in RG&E Design Analysis DA-ME-95-127, Rev. 0.

Comparison of One Pump Test Flow Results

Component	TEST (GPM)	MODEL (GPM)	DIFF. (%)
Containment Air Cooler A	1266	1310	+ 3.5%
Containment Air Cooler B	1202	1227	+ 2.1%
Containment Air Cooler C	1087	1091	+ 0.4%
Containment Air Cooler D	1307	1372	+ 5.0
Diesel-Generator Cooler A	424	403	- 4.9%
Misc Coolers (Total)*	112	100	- 10.7%

Since the hydraulic model has been developed using the original engineering design data of the service water system, and, since it has been modified to take into account actual performance characteristics of the major service water system components, the hydraulic model realistically simulates the present hydraulic characteristics of the service water system. This conclusion is supported by the comparisons made for major components of model predictions to actual plant data for various modes of plant operation.

* No contribution from the safety injection/containment spray pump area coolers, since lines are closed