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WHITE,L.D. Rochester Gas & Electric Corp.
RECIP.NAME RECIPIENT AFFILIATION
ZIEMANN,D.L. Operating Reactors Branch 2

SUBJECT: Submits deferred response to NRC 791022 ltr re long-term requirement X.4.3.3 2 for auxiliary feedwater sys.Water source capabilities will provide required flow by gravity feed to pump suction.

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LEON D. WHITE, JR.
VICE PRESIDENT

TELEPHONE
AREA CODE 716 546-2700

March 28, 1980

Director of Nuclear Reactor Regulation
Attn: Mr. Dennis L. Ziemann, Chief
Operating Reactors Branch #2
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: NRC Requirements for Auxiliary Feedwater Systems
R. E. Ginna Nuclear Power Plant
Docket No. 50-244

Dear Mr. Ziemann:

A letter from Darrel Eisenhut dated October 22, 1979 requested that we evaluate our auxiliary feedwater system against the applicable requirements contained in Enclosure 1 to that letter. Our letter to you dated November 28, 1979 responded to Mr. Eisenhut's letter and provided all the information requested in Enclosure 1 except for response to long-term recommendation X.4.3.3 2, which was deferred until April 1, 1980. The purpose of this letter is to provide the deferred response.

Long-term recommendation X.4.3.3 2 requested that we evaluate the water source capabilities available to the turbine driven auxiliary feedwater pump suction to assure that there is a water source sufficient to supply the required auxiliary feedwater flow for two hours independent of any AC power source. We have examined our water source capabilities and determined that 22,500 gallons total inventory in the condensate storage tanks will provide the required flow by gravity feed to the pump suction. The basis for our determination is contained in Attachment A.

Other water sources, including the condenser hotwell and service water, are normally available to supply the auxiliary feedwater system. The service water pumps can be powered by the emergency diesel generators and the service water system, including the power supply, meets the single failure criterion. Nevertheless, these design features have been ignored in establishing the minimum required condensate storage tank quantity.

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Our present technical specifications require that at least 15,000 gallons of water be maintained in the condensate storage tanks even though our practice is to maintain much more. An application to amend our technical specifications will be filed in the near future. In the interim an administrative order will be issued to maintain at least 22,500 gallons of water in the tanks.

Sincerely yours,

L. D. White, Jr.

L. D. White, Jr.

ATTACHMENT A

The quantity of water necessary to supply the required auxiliary feedwater flow for two hours has been determined by comparing decay heat generated during the two hour period with the heat which can be released by relieving steam through the steam generator power operated relief valves.

The amount of decay heat generated following shutdown is given in the basis for Technical Specification 3.3 and is as follows:

Time After Shutdown	Decay Heat, % of Rated Power
1 min.	4.5
30 min.	2.0
1 hr.	1.62
8 hrs.	0.96

It will be assumed that immediately following reactor trip decay heat is 9% of full power.

Decay heat is plotted as a piece-wise linear curve on Figure 1. The integral of this curve from 0 to 120 minutes is 250% power minutes. The 2 hour integrated decay heat is:

$$(1520 \times 10^{6} \text{ watts/100\% power})(250\% \text{ power min})(5.69 \times 10^{-2} \text{ Btu/min/watt})$$

$$= 2.16 \times 10^{8} \text{ Btu}$$

Following reactor trip saturated steam wil be released from the steam generator power operated relief valves at a pressure of 1050 psig. It is asumed that the condensate storage tank temperature is 70°F. From steam tables the change in enthalpy of the auxiliary feedwater as it is converted to saturated steam is:

1190 Btu/lbm - 41 Btu/lbm = 1149 Btu/lbm

The mass of water required to remove the first two hours of decay heat as saturated steam is:

$$2.16 \times 10^{8} \text{ Btu/(1149 Btu/lbm)} = 1.88 \times 10^{5} \text{ lbm}$$

Converting this mass of water to gallons yields:

$$(1.88 \times 10^{5} \text{ lbm})(0.016 \text{ ft}^{3}\text{/lbm})(7.48 \text{ gal/ft}^{3}) \approx 22{,}500 \text{ gallons}$$

Thus, the quantity of water necessary to supply the required auxiliary feedwater flow for two hours following reactor trip is 22,500 gallons.

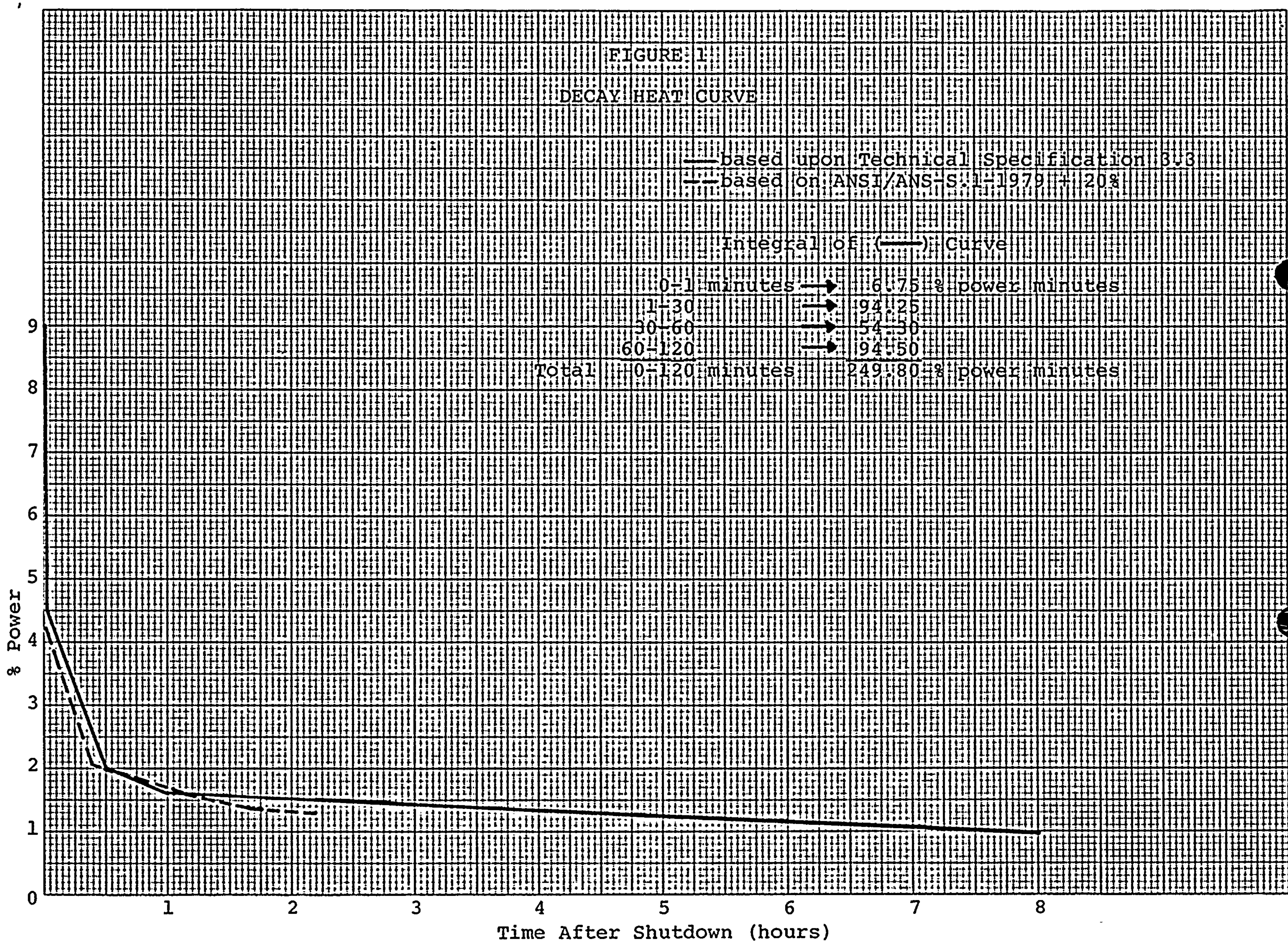
FIGURE 1
DECAY HEAT CURVE
——based upon Technical Specification 3.3
– –based on ANSI/ANS-5.1-1979 + 20%
Integral of (——) Curve
0-1 minutes → 6.75 % power minutes
1-30 → 94.25
30-60 → 54.30
60-120 → 94.50
Total 0-120 minutes 249.80 % power minutes
% Power
0
1
2
3
4
5
6
7
8
9
1
2
3
4
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7
8
Time After Shutdown (hours)

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Docket No. 50-244

MAR 2 6 1980

Mr. Leon D. White, Jr.
Vice President
Electric and Steam Production
Rochester Gas & Electric Corporation
89 East Avenue
Rochester, New York 14649

Dear Mr. White:

SUBJECT: TENDON INSPECTION AND LIFT-OFF VERIFICATION FOR GINNA NUCLEAR POWER STATION.

We are continuing our review of the report attached to your letter dated December 12, 1979 relating to tendon inspection and lift-off verification for Ginna and have found that the following information is needed within 30 days of your receipt of this letter.

1. <u>Concrete Shrinkage</u> (p.3)

   The shrinkage of concrete is an important factor which contributes to the loss of prestress. The magnitude of the shrinkage must be calculated with reasonable accuracy. The best method of estimating the amount of concrete shrinkage for the use of any structural design is through the use of shrinkage tests. Only in the case where no test has been performed, can the suggested shrinkage strain presnnted in Regulatory Guidd 1.35.1 be used to establish a tolerance band. At Ginna, shrinkage tests in accordance with ASTM C-494 weee performed by Pittsburgh Testing Laboratory in 1967 with results greater than 100 x 10^{-6} in/in. Explain why this has not been taken into the consideration. Also provide the mix design of the in-placed concrete and discuss the significance of the water quantity and humidity environment.

2. <u>Time when shrinkage starts</u> (p.4)

   It is usually assumed that no shrinkage would take place during curing if concrete is kept wet. This may be impossible for large placements. Regulatory GGide 1.35.1 suggests that shrinkage starts 10 days after pouring the concrete. Provide the basis for assuming that shrinkage starts one hour after concrete placement. Also, discuss the construction time effect on the shrinkage.

3. <u>Creep curves</u> (p.6)

   Some specific creep curves were used in the calaulation of prestress loss due to creep. Provide these curves, the associated concrete mix design used for the Ginna containment and the test resules.

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4. Tendon stress relaxation (p.8)

As presented in the report, the steel relaxation seems to be the major contributor to the prestress loss. Therefore, the accuracy of the back-up data for the estimate is crucial. Section CC-2424 of ACI-359 requires a minimum of three 1000-hour relaxation tests for the wire used. Provide this data or appropriate back-up data for Figure 8A/

5. Minimum design requirements (p.9)

Provide the minimum design requirements of the prestress tendons in the original design and the associated weld combination.

6. Possible causes (p.16)

Many possible causes were listed to explain the reduction in tendon prestress. However, the most important factors, losses due to rock and elastomeric pad deformation at the base of the containment wall, were not evaluated. Based upon the results of the previous inspection: 1000 hours, 6 months, 1 year, 3 years and 8 years, unusual prestress lossed have been observed in many tendons. A suitable explanation should be provided since the 10-year inspection program recently completed did not address any of the potential causes.

7. Lift-off procedures (p.17, I-1 & I-A1)

The lift-off procedure using 1/32 inch shims is stated to be more "accurate" than the accoustic method. Provide the bases and all the supporting information including information about the instrumentation and the results of monitoring the initial and final tendon positions and discussion of the detensioning effects on shims.

8. Visual inspection

Provide the results and photographs documenting all the visual inspections on the surrounding conceete of the tendon anchorages and rock anchors.

9. Rock anchor design (5.1.2-20)

Provide the design bases for the rock anchors, the required rock anchor capacity and the factor of safety in the original design, the records of the installed depths of the rock anchors, the results of anchor tests, drawings of the rock anchor coupling and the records of the legths that the anchor heads thread into the couplings. Also discuss the effects of group actions, the maximum jack force, the over-stressing on the rock anchor capacity, and the type of the instrument and the observed data.

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Please contact us if any clarification of this request is required.

Sincerely,

Original signed by

Dennis L. Ziemann, Chief
Operating Reactors Branch #2
Division of Operating Reactors

cc: See next page

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