

SEP 27 1971

Docket No. 50-231

General Electric Company
ATTN: Dr. Bertram Wolfe
General Manager
310 DeGuigne Drive
Sunnyvale, California 94068

Gentlemen:

By letter dated April 28, 1971, you submitted Proposed Change No. 5 to the Technical Specifications appended to License No. DR-15 for the SEFOR reactor. The proposed change would require additional limiting conditions for operation based on additional analysis of the bolts which attach the head to the reactor vessel.

During our review of the proposed change, we found that certain revisions were necessary to meet our licensing requirements as discussed with your staff. These revisions have been made. Based on our review, we conclude that the proposed change, as modified, does not present significant hazards considerations not described or implicit in the safety analysis report and that there is reasonable assurance that the health and safety of the public will not be endangered.

We have redesignated the proposed change as Change No. 6 and pursuant to 10 CFR 50.59, Change No. 6 is hereby authorized as indicated by margin bars on the enclosed replacement pages 3.4-1.2, 3.4-4, 3.4-5, 4.4-2 and 4.4-6 for the Technical Specifications.

Sincerely,

Original Signed by
Peter A. Morris

Peter A. Morris, Director
Division of Reactor Licensing

Enclosures:
Replacement pages

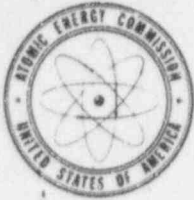
cc: Paul B. Van Buren, Attorney
General Electric Company
175 Curtner Avenue
San Jose, California 95125

R. Woodruff
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UNITED STATES
ATOMIC ENERGY COMMISSION

WASHINGTON, D.C. 20545

September 27, 1971

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310 DeGuigne Drive
Sunnyvale, California 94068

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Change No. 6
License No. DR-15

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cc: Paul B. Van Buren, Attorney
General Electric Company
175 Curtner Avenue
San Jose, California 95125

3.4.L. The sodium temperature at the reactor vessel outlet shall be controlled such that changes in temperature remain within the following limits:

1. The average rate of change of temperature shall be less than 10°F/hr when the net temperature change from an initial steady state condition exceeds 125°F .
2. The temperature change from any initial steady state condition shall not exceed 125°F for a period of 12.5 hr.

3.4.M. The reactor vessel outer head bolts shall be preloaded when the reactor vessel outlet sodium temperature is less than 500°F such that the calculated bolt stress is equal to or less than 4000 psi.

3.4.N. The reactor vessel outer head bolts shall meet the acceptance standards of Paragraphs N-325.1, N-325.2 and N-325.4 of Section III using the provisions of Paragraph IS-300 of Section XI of the ASME Pressure Vessel Code^(8,9).

3.4.O. The cumulative permanent elongation of the reactor vessel outer head bolts, as determined by the annual surveillance measurements, shall not exceed 0.030 inch.

Setting the plugging temperatures at least 25°F lower than the minimum loop operating temperatures provides a means of assuring that oxide precipitation and potential plugging will not occur in the coolant system. The upper plugging temperature value of 425°F represents a limit which will not cause significant corrosion or mass transfer for the SEFOR operating temperatures. This conclusion is based upon results of tests run at GE under the AEC Sodium Mass Transfer Program⁽⁷⁾. Corrosion measurements were made with sodium containing 50 ppm oxygen (corresponding to a plugging temperature of 450°F) which indicate that corrosion rates are small for the SEFOR conditions.

The change in the reactor vessel outlet sodium temperature must be controlled at or below 10°F/hr during heat-up and cool-down of the coolant system, when the temperature change is greater than 125°F , to assure that stress levels in the reactor vessel head bolts remain below the values specified in the ASME Pressure Vessel Code. A rapid change in reactor vessel outlet sodium temperature of up to 125°F , followed by a cool-down such as might occur following a reactor scram, is acceptable provided that the rapid temperature change is followed by a hold in temperature of sufficient duration to give an average rate of 10°F/hr from the initial steady state condition.

The maximum bolt stresses during primary coolant temperature transients are a function of bolt preload. The preload limit established in 3.4.M. provides assurance that the outer head bolt stresses associated with the limits given in Paragraph 3.4.L. remain below the ASME code allowable values.

The acceptance standards of Paragraphs N-325.1, N-325.2 and N-325.4 of Section III of the ASME Pressure Vessel Code⁽⁸⁾ provide assurance that the bolts are capable of performing their intended function over the service life of the reactor. Paragraph IS-300 of Section XI of the ASME Pressure Vessel Code⁽⁹⁾ defines the course of action in the event the surveillance specified in Paragraphs 4.4.R. and 4.4.S. results in indications outside the referenced acceptance standards of Section III.

The permanent elongation specified in 3.4.O. results in an average bolt strain of about 0.002 in/in. Strains of this magnitude have been conservatively evaluated⁽¹⁰⁾ to estimate the significance of this amount of permanent deformation. Based on the results presented in Reference⁽¹⁰⁾, a cumulative bolt strain of 0.002 in/in determined by the annual surveillance measurements specified in Paragraph 4.4.R. would not significantly reduce the capability of the bolts to perform their intended function.

References

- (1) SEFOR FDSAR, Supplement 19, p. 52.
- (2) SEFOR FDSAR, Volume I, Paragraph 5.2.2.2.1, p. 5-5.
- (3) SEFOR FDSAR, Supplement 17, Answer J-2, p. J-1.
- (4) SEFOR FDSAR, Supplement 21, pp. 31 & 32.
- (5) SEFOR FDSAR, Volume I, Table V-1, p. 5-2.
- (6) SEFOR FDSAR, Supplement 23 pp. 2-5.
- (7) GEAP-4831, p. 11. Sodium Mass Transfer XV, March 1965, "Behavior of Selected Steel Exposed in Flowing Sodium Test Loops", by M. C. Rowland, D. E. Plumlee, R. S. Young.
- (8) ASME Pressure Vessel Code, Section III, 1968 Edition as amended by the Winter 1968 Addenda.
- (9) ASME Pressure Vessel Code, Section XI, 1970.
- (10) Letter, Karl Cohen to Dr. Peter A. Morris, March 17, 1971.

- L. The plugging temperatures of the main secondary and auxiliary secondary sodium systems shall be measured daily when plugging temperature exceeds 400°F, weekly when the plugging temperature is between 300°F and 400°F, and monthly when the plugging temperature is below 300°F.
- M. When the irradiated fuel storage tank is in service and contains sodium, the plugging temperature of the sodium shall be measured weekly when the plugging temperature exceeds 400°F, and monthly when the plugging temperature is below 400°F.
- N. The argon cover gas system and the argon vent vacuum pump shall be operationally tested at least monthly.
- O. It shall be demonstrated at least once prior to 10 MWt operation and yearly thereafter, that the remote refilling of the primary auxiliary coolant loop can be accomplished within 30 minutes by the minimum operating staff using the emergency procedures.
- P. During initial ascent to full power operation, cover gas samples for spectral analysis shall be taken to the extent necessary to establish baseline data on cover gas activity levels as a function of reactor power. Dependence on temperature and flow will also be determined. Thereafter, spectral analysis shall be performed at least monthly, before and after each series of FRED transients below 90¢, before and after each transient above 90¢, and at any time the gross-gamma monitor indicates an unexpected increase in cover gas activity.

- Q. Samples of the primary coolant shall be taken for analysis, at intervals not to exceed three months and following each prompt-critical FRED transient.
- R. Three reactor vessel outer head bolts shall be removed annually for visual inspection, dimensional checks and dye penetrant testing.
- S. Five reactor vessel outer head bolts shall be inspected annually using ultrasonic testing with straight beam longitudinal scan from the top of the bolt. This inspection may be made with the bolts in place or removed from the reactor. Bolts to be examined shall be selected so that all of the outer head bolts are examined within a 10-year period.

Sodium samples will be taken periodically and analyzed and the results compared with data obtained from the analysis of reactor cover gas samples.

The interval of three months between samples is adequate to establish background information and to identify long term trends in fission product activity in the primary coolant. The frequency of sodium sampling will be increased during the planned prompt transient testing when samples of the primary coolant can be readily obtained without significantly affecting the reactor operating schedules.

Each sample obtained for analysis will be examined for evidence of fission products by means of a multi-channel analyzer (gamma scan). Samples will be analyzed for evidence of carbon and metallic impurities quarterly and whenever such analyses are expected to help explain anomalous reactor behavior.

Excessive rate of change of primary coolant temperature may cause permanent deformation of the reactor vessel outer head bolts. The limits given in Paragraphs 3.4.L. and 3.4.M. are intended to avoid such damage. These surveillance items are intended to provide additional assurance that these limits are adequate.

References

- (1) SEFOR FDSAR, Supplement 23, pp. 3, 4, & 5.
- (2) SEFOR FDSAR, Supplement 16, Section VII, pp. 7-1 ff.
- (3) SEFOR FDSAR, Supplement 19, Answer to Question 9, pp. 67 ff.
- (4) SEFOR FDSAR, Supplement 18, p. 7.

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