

August 24, 1978

8/24/78

Robert M. Lazo, Esq., Chairman
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Richard F. Cole
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Walter H. Jordan
881 West Outer Drive
Oak Ridge, Tennessee 37830

In the Matter of
Northern States Power Company
(Monticello Nuclear Generating Plant, Unit 1)
Docket No. 50-263

Gentlemen:

This letter will bring to your attention a letter from General Electric (the vendor of the Monticello NSSS) to the Staff, dated October 25, 1977, regarding a GE proposal for a change in the licensing basis transient model. Briefly, GE has been employing the REDY transient model, but results of tests conducted have indicated that the REDY model underpredicts heatup rates in critical power ratio (CPR) limit evaluations. GE has discussed with the Staff the test results and reasons why these results differed from those predicted by REDY. The Staff has independently reviewed this matter and has determined that, based upon (1) the explanation provided for the differing results and (2) the conservatism in the licensing basis as demonstrated by actual plant operations, the REDY model remains acceptable for use as a licensing basis.

On these bases, we believe that it is not necessary for the Monticello record to remain open pending acceptance by the Staff of the new transient model (ODYN) which the Staff currently has under review.

Sincerely,

SL

Stephen H. Lewis
Counsel for NRC Staff

Enclosure:

Ltr. fm. E. D. Fuller (GE) to Denwood F. Ross (Staff), dtd. Oct. 25, 1977, Subject: General Electric Proposal for Change in Licensing Basis Transient Model.

cc: See page 2.

OFFICE >

SURNAME >

DATE >

cc w/enclosure:

Edward Luton, Esq.
 Mr. Russell J. Hatling
 Gerald Charnoff, Esq.
 Arthur Renquist, Esq.
 Mr. Steve J. Gadler
 Jocelyn F. Olson, Esq.
 Mr. Ken Dzugan
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DATE >	8/24/78	8/24/78			



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

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GENERAL ELECTRIC

NUCLEAR ENERGY

SYSTEMS DIVISION

GENERAL ELECTRIC COMPANY, 175 CURTNER AVE., SAN JOSE, CALIFORNIA 95125

MC 682, (408) 925-3141

NUCLEAR ENERGY
PROJECTS DIVISION

HFH 405-77

October 25, 1977

U. S. Nuclear Regulatory Commission
Division of Systems Safety
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Attention: Mr. Denwood F. Ross
Assistant Director for Reactor Safety

Gentlemen:

SUBJECT: GENERAL ELECTRIC PROPOSAL FOR CHANGE IN LICENSING BASIS
TRANSIENT MODEL

This letter is to provide the NRC staff with the program details for the development of a new transient model based upon recent reactor tests, the results of which are under review by the NRC. The test results have been discussed with the staff on June 15 and September 15, 1977. The transient model was discussed with the staff on July 15, 1977. Further explanation of the tests and the program details is provided below.

TURBINE TRIP TESTS

Several turbine trip tests have been conducted at a domestic operating BWR and a foreign operating BWR for the purpose of transient model verification. The plant configuration for these tests included installation of a temporary bypass of the scram signal from the turbine stop valve position. This results in scram on a high neutron flux signal. This departure from the licensing basis transient, which include the direct scram, was necessary to achieve a significant core response for comparison with the calculated response.

Based upon the comparisons of the test results and the licensing basis model (REDY), two conclusions were reached. We confirmed the existence of a steam line pressure wave phenomenon (steam line dynamics) and time varying axial core power distribution and determined that the REDY model under-predicts the reactor vessel pressurization rate and its resulting void reactivity effects. In addition, it was determined that the core response to pressurization effects is overpredicted by the REDY model.

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For this test under purposely degraded plant conditions, the REDY model underpredicts the results. This does not indicate, however, a non-conservatism in the licensing basis transient evaluation. Rather, it suggests that careful evaluation of the model is appropriate. Comparisons between the turbine trip tests and licensing basis events are not easily made and are not entirely valid because the events are significantly different. The bypassing of the direct trip scram, as discussed previously, results in a time displacement between the pressurization effects and the scram reactivity insertion. Steam line pressurization effects have a significantly stronger effect due to this time delay in the scram. It is for this reason that the plant was purposely modified for the test. Since this delay does not exist for the licensing basis transients, the absence of steam line dynamics in the transient model is less important than in the turbine trip tests. As a result of the differences in the transients, comparisons of REDY/tes results do not provide a measure of the margin available in current licensing basis FSAR calculations. A detailed discussion of the comparison of the turbine trip tests and the licensing basis events with technical bases for the conclusions reached is being prepared and will be submitted shortly.

In order to evaluate the degree of conservatism within the current licensing basis calculations, General Electric performed a normalized transient calculation by matching plant parameters in the first series of turbine trip tests. This procedure included the steam line dynamics phenomenon. This model, when applied to a licensing basis calculation and compared to a typical BWR licensing basis transient calculation using REDY with typical licensing input parameters, showed a large margin exists in the current license limits. This comparison provides a much better measure of the current licensing basis margins than the turbine trip tests transient comparisons.

MODEL DEVELOPMENT

Following the turbine trip tests, General Electric accelerated its model development program to include steam line dynamics and transient core spatial representation to prepare an alternative calculational model for design evaluations. It has become clear that, despite the margins existing in current evaluations, the models under development should be established as future licensing basis calculational models. The model which provides for both of the effects discussed is the ODYH code. General Electric proposes to establish the ODYH computer model as the licensing basis calculational model for evaluation of those pressurization transients which result in Critical Power Ratio (CPR) limits. For the remainder of the licensing basis events, the current REDY model provides a conservative evaluation and a steam line dynamics correlation is not required. Therefore, General Electric proposes usage of two calculational models, ODYH for CPR limiting pressurization transients and REDY for all others. Part of the forthcoming discussions of the ODYH model will address the specific transients to be analyzed.

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A preliminary version of the ODYN model has been compared to the first series of turbine trip tests and provides an accurate prediction of the test results. When this model was used to evaluate the limiting licensing basis transients for the reactor on which the tests were run, the results indicate the licensing basis provides conservative Δ CPR. General Electric has demonstrated that margin exists in the present licensing basis model and therefore intends to continue to utilize this model while the development and review of the new, more rigorous model is completed. The rapid schedule included in this letter and the margin provided by the REDY model are deemed to be sufficient justification for continued use of the present code for the present. The NRC is requested to accept the generic demonstration of the margin in the REDY code for all license applicants during this interim period. A plant-by-plant justification is unwarranted from a safety view because of the generic effort undertaken. Further, additional plant-by-plant effort would only further delay the ultimate implementation of the ODYN model.

However, in spite of the fact that the current licensing basis evaluations provide significant margins and assures the protection of the public health and safety, a more technically sound technical representation is proposed to replace the current correlation for specific transient evaluations. Documentation of the development of this analytical representation will be provided to the staff on an accelerated basis and an appropriately accelerated review is requested.

PROGRAM SCHEDULE

As stated previously, General Electric has accelerated the ODYN model development program. The program which we are recommending to the NRC is:

- o Draft version of ODYN computer model description submitted to NRC for information - November 4, 1977
- o Letter report on ODYN computer model description to NRC - December 2, 1977
- o Letter report on ODYN model qualification - December 30, 1977
- o Identification of criteria for licensing basis production calculations - February 7, 1978
- o Production version of ODYN available for production use (NRC approval required) - March 31, 1978.

This program is intended to develop an NRC approved production version of the ODYN model in early 1978. This schedule will require a priority effort by both General Electric and the NRC staff in order to avoid a

GENERAL ELECTRIC

USNRC

Mr. Denwood F. Ross

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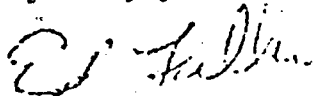
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delay in implementation of the new model. The initiation of usage of the ODYH model on this accelerated schedule is being reviewed to determine the date the staff should expect to receive the first calculation with ODYH and the date for the last submittal with the REDY model as the basis for CPR limiting transients. This information will be provided upon completion of the review. The schedule proposed is based upon no interim model development effort, interim model analysis or justification effort on a plant by plant basis. These dilutions of the ODYH effort would result in significant delays in the program.

In summary, General Electric recommends that the NRC accept the program described above for including the observed effects of steam line dynamic in our licensing basis models. We recommend that no modification be made to the REDY models in the interim. This is admittedly an ambitious program, but it will provide a state-of-the-art transient model which includes steam line dynamic and core transient spatial effects.

Your assistance in providing for an expeditious review of this proposal will be appreciated.

Very truly yours,



E. D. Fuller, Manager
BWR Licensing
Safety and Licensing

EDF:rm/2R

cc: L. S. Gifford