NRC FORM 464 Part I (6-1998)

U.S. NUCLEAR REGULATORY COMMISSION

RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) / PRIVACY ACT (PA) REQUEST

FOIA/PA	RESPONSE NUMBER
2000-0224	1

RESPONSE TYPE ☑ FINAL ☐ PARTIAL

REQUESTER: **Ms. Ophelia Williams**

DATE: JUN 0 2 2000

PART I. -- INFORMATION RELEASED

☐ No additional agency records subject to the request have been located.

☐ Requested records are available through another public distribution program. See Comments section.

☐ APPENDICES ____ Agency records subject to the request that are identified in the listed appendices are already available for public inspection and copying at the NRC Public Document Room.

☑ APPENDICES A Agency records subject to the request that are identified in the listed appendices are being made available for public inspection and copying at the NRC Public Document Room.

☐ Enclosed is information on how you may obtain access to and the charges for copying records located at the NRC Public Document Room, 2120 L Street, NW, Washington, DC.

☑ APPENDICES A Agency records subject to the request are enclosed.

☐ Records subject to the request that contain information originated by or of interest to another Federal agency have been referred to that agency (see comments section) for a disclosure determination and direct response to you.

☐ We are continuing to process your request.

☐ See Comments.

PART I.A -- FEES

AMOUNT * $

* See comments for details

☐ You will be billed by NRC for the amount listed.

☐ You will receive a refund for the amount listed.

☑ None. Minimum fee threshold not met.

☐ Fees waived.

PART I.B -- INFORMATION NOT LOCATED OR WITHHELD FROM DISCLOSURE

☐ No agency records subject to the request have been located.

☐ Certain information in the requested records is being withheld from disclosure pursuant to the exemptions described in and for the reasons stated in Part II.

☐ This determination may be appealed within 30 days by writing to the FOIA/PA Officer, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Clearly state on the envelope and in the letter that it is a "FOIA/PA Appeal."

PART I.C COMMENTS (Use attached Comments continuation page if required)

SIGNATURE - FREEDOM OF INFORMATION ACT AND PRIVACY ACT OFFICER

Carol Ann Reed Carol Ann Reed

Re: FOIA/PA 2000-224

APPENDIX A
RECORDS BEING RELEASED IN THEIR ENTIRETY
(If copyrighted identify with *)

NO.	DATE	DESCRIPTtION
1.	3/3/83	Memorandum from Gary R. Burdick to Gunter Arndt, Subject: Review Of Seismic Scram Report, UCRL-53037 (4 pages)
2.	1/20/83	Memorandum from W. F. Anderson to Z. R. Rosztoczy, E. L. Jordan, G. R. Burdick and E. Wenzinger, Subject: Seismic Scram (5 pages)

R C Emrit

March 3, 1983

Reference (487)

MEMORANDUM FOR: Gunter Arndt
Mechanical/Structural Engineering Branch
Division of Engineering Technology
Office of Nuclear Regulatory Research

FROM: Gary R. Burdick, Chief
Reactor Risk Branch
Division of Risk Analysis
Office of Nuclear Regulatory Research

SUBJECT: REVIEW OF SEISMIC SCRAM REPORT, UCRL-53037

As requested by you at the 2/17/83 meeting on Seismic Scram, K. Murphy of this office has reviewed the subject report. Detailed comments are attached. The report appears to be in error and should not be issued until the major defects are cleaned up. Lawrence Livermore should be able to correct the errors without a substantial effort.

The report has two serious flaws: (1) the cut sets that could be influenced by seismic scram were not properly identified and isolated from those that would not be affected by seismic scram, and (2) the quantitative reduction factors applied (factor of four reduction in LOCA and transient probabilities) were gross estimates having no technical basis and appear incorrect. As a consequence, the overall factor of three reduction in seismic risk as a result of a seismic scram system appears much too high.

The report should use the Zion SSMRP as a basis. A rough parametric analyses should be made in which the ratio of structural versus system related seismic risk is varied from a high (such as the case of Zion) to some hypothetical low level to determine the influence this ratio makes on the degree of risk reduction from a seismic scram.

A11

...thout the benefit of having the detailed Zion SSMRP report in hand and solely on recent LLL presentations, it would appear that for a plant such as Zion, with its dominant seismic risk coming from structural failures resulting in the loss of long term heat removal, that a seismic scram system would have little benefit. It is expected that a proper sensitivity analysis using Zion SSMRP would support this view.

Gary R. Burdick

Gary R. Burdick, Chief
Reactor Risk Branch
Division of Risk Analysis
Office of Nuclear Regulatory Research

Attachment: Review of Draft Report
Entitled "On the Advisability of
an Automatic Seismic Scram"

cc: Z. Rosztoczy
E. Jordan
E. Wenzinger
W. F. Anderson
A. Thadani
D. Guzy

Review of Draft Report Entitled

"On the Advisability of an Automatic Seismic Scram"

p. iv - 50 percent reduction of "heat generation rate" is more correct than the use of the term "stored heat."

p. 2 - Conclusion regarding factor of three reduction of earthquake-induced core melt is in error since defective decision tree methodology has been applied.

pp. 9, 10 - A PRA approach must assume that the main turbine vibration trip sensor operates as designed (even though it is a non-safety component). Therefore, we need to know its expected response in an earthquake. At what G level will it trip and what is its delay time versus seismic intensity characteristic? See also p. 21, item 1 and bottom of p. 23.

p. 26 - Advantages of Seismic Scram - On the surface the listed advantages (except for turbine pump unavailable - see next comment) appear reasonable, but they must be compared with the dominant seismic risk cut sets to ensure that they, in fact, can contribute measurably to seismic safety.

pp. 26, 44 - Auxiliary steam turbine feedwater pump - how does the fact of a lower secondary pressure transient in any way affect the turbine pump's availability? This appears to be a bad assumption.

p. 32 - Benefits of Seismic Scram for LOCA Sequences - reduced severity of the transients may not result in lower probabilities of core melt for many LOCAs. For instance the success criteria for small and medium LOCAs involves one successful HPI train. This success criteria will not change with a seismic scram system. For large LOCAs there may, in fact, be a beneficial effect as stated.

p. 34 - (top of page) - The additional 11-14 minutes added to the core uncovery time will only have a small affect on recovery (e.g., the human error factors will only slightly change when you add this time onto the 45-100 minute period for no seismic scram).

p. 34 - (middle of page) - Here is major defect in report. You cannot look at "dominant scenarios" when doing a sensitivity study such as attempted in the report, you must look at the cut sets. The dominant risk contribution for SSMRP involves structured failures that will result in core melt regardless of whether you have a seismic scram or not. Therefore, the reported factor of three reduction in seismic risk must be wrong.

; Add to list of disadvantages: spurious scram.

p. 33 - Between Level Four and Level Five must be added another fork involving: (1) cut sets sensitive to seismic scram, and (2) cut sets insensitive to seismic scram.

p. 42 - Seismic trip first - this parameter should vary with earthquake interval and may be substantially different than 0.9 at high and low earthquake levels.

p. 42 - The factor of 4 reduction in probabilities used for the LOCA, T1, and T2 is not supported by referenced documents or by the use of engineering judgment.

Though any reduction factor may be hard to support, a better estimate can surely be obtained if each dominant cut set is studied and engineering judgment used. The factor of four may be correct for those few cut sets involving relief value stuck open and large LOCAs. These are not dominant cut sets.

R. C. Emrit

Reference 486

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

JAN 20 1983

MEMORANDUM FOR: Z. R. Rosztoczy, Chief, RSCB, NRR
E. L. Jordan, Director, DEQA, IE
G. R. Burdick, Chief, RRB, DRA, RES
E. Wenzinger, Chief, ICB, DRO, RES

FROM: W. F. Anderson, MSEB, DET, RES

SUBJECT: SEISMIC SCRAM

Enclosed is an LLNL report, "On the Advisability of an Automatic Seismic Scram," received September 1982. Before presenting this report to the ACRS (D. Okrent), at whose request it was performed, it would be advisable to review the NRC staff's position on requiring such systems.

As a result, it is requested that this report be reviewed and recommendations received by four weeks from the date of this memo on what would represent an appropriate position on seismic scram systems with automatic 0.6-0.7 SSE trip levels. Forward comments to Gunter Arndt (x35860), Mail Stop 5650NL. To facilitate coordination, please inform him who the reviewers are once they are assigned. A meeting will be scheduled for 9:00 a.m. on February 16, 1983, to review the comments.

In addition, please indicate whether a research information letter (RIL) is desired for this study. A RIL widely reports completion of a substantial, coherent, and reasonably complete body of experimental or analytical research work. A draft RIL is enclosed for review and comment, if you feel an RIL is warranted.

At the conclusion of the review of this report, "errors and omissions" comments will be forwarded to LLNL, the report finalized and issued as a NUREG, and the RIL, if needed, finalized and distributed.

It is presumed that prior to presenting this study and the staff's plans for its application (or non-application) to the ACRS, a presentation will have to be made to the CRGR by NRR. Following CRGR and ACRS reviews, a brief position paper to inform the Commission may be jointly prepared by RES and NRR.

W. F. Anderson, Chief
Mechanical/Structural Engineering Branch
Division of Engineering Technology
Office of Nuclear Regulatory Research

Enclosures: See next page

3 A/2

JAN 20 1983

Enclosures:
1. Draft RIL
2. LLNL Report

cc: w/enclosures
W. Minners
K. Kniel
D. Sullivan

w/o enclosures
O. Bassett
M. Vagins
J. Watt

Draft
Arndt:cr

DRAFT RESEARCH INFORMATION LETTER ON ADVISABILITY OF AUTOMATIC SEISMIC SCRAM

INTRODUCTION

The question of whether or not to require automatic seismic scrams on U.S. nuclear power plants has long been of interest to the ACRS as indicated by a December 18, 1972 Comittee letter.

While taking a position that it would not require such systems, the NRC staff has conducted several studies on the subject. The first study (URCL-51619, "Evaluation of the Use of Seismic Scram Systems for Power Reactors," July 1974) concluded that automatic seismic scram systems are technically feasible. Anticipatory seismic scram systems that sensed strong seismic motion prior to its arrival at the plant site were also addressed in the first report and considered to be of marginal value. The second study (URCL-52156, "Advisability of Seismic Scram," June 1976) addressed the advisability of seismic trip systems with low or high trip set points.

In September 1982, another LLNL study (NUREG/CR-2513 or UCRL-53037, "On the Advisability of Seismic Scram," December 1981), requested by the ACRS, was completed and the report delivered to the NRC. This study examined in more detail the advisability of requiring seismic scram systems set at high trip levels, such as 0.6×SSE.

RESULTS

The major advantage to an automatic seismic scram is that, with a 3-second scram and a 50% reduction in stored heat in the fuel rods in 5 to 10 seconds, a subsequent seismically-induced transient or LOCA would involve lower pressure and temperature loads. The accident would proceed more slowly and there would be more time to respond to it. The 5-20 seconds lead time before other trip initiations that an automatic scram will provide, will gain an additional 11-18 minutes for later recovery efforts.

The major technical disadvantages would be the imposition of scram-induced loads coincident with seismically-induced loads, and the added complexity of another automatic control system being imposed on the reactor system. The major non-technical disadvantage would be the impact of loss of power generation on the power network and the affected communities.

The advantages and disadvantages will vary from plant to plant depending on how each plant design would respond to an earthquake and how the assumed earthquake characteristics would vary from site to site.

EVALUATION

The report does not state whether or not automatic seismic scrams should be required. It does provide an evaluation technique that includes a limited risk comparison and a general evaluation of the advantages and disadvantages of such systems. In conjunction with

properly weighted site-specific and design-specific information and need-for-power policy considerations, an approach similar to the one used in this study should help to develop and support a conclusion whether or not an automatic seismic scram system should be installed at a specific plant.

An automatic scram system should only be required where a clear benefit would result from adding another control system to an already complex piece of machinery. A review of the study leads one to conclude that such a benefit does not exist generically. On a case-by-case basis, the risk comparison approach used in the study could justify its installation in some plants. Weighting the major disadvantages noted above will, however, still be subjective rather than objective, and individual perceptions can make the risk comparison impotent.