

July 16, 1982

SECY-82-157A

For: The Commissioners

From: William J. Dircks
Executive Director for Operations

Subject: Status Report on the NRR Investigation of the Effects
of Electromagnetic Pulse (EMP) on Nuclear Power Plants

Purpose: To provide information to the Commission

Discussion: The following status report on the subject investigation is
submitted for your information; also included are staff
comments on the related memoranda written by Mr. D.
Basdekas, Commissioner Ahearne, and Dr. J. C. Mark.

- Sandia National Laboratory (SNL) and its subcontractors have completed the last phase of the EMP investigation which addresses extension of the results of the Watts Bar study to nuclear plants in general. This involved site visits and design reviews of the Catawba (W), Clinton (GE) and Palo Verde (CE) plants and discussions with Combustion Engineering on design details of the System 80 and NUPLEX 80 designs. The CE designs include more digital signal processing than other designs.
- A March 1982 draft interim report prepared by SNL on the EMP investigation has been reviewed by the staff (NRR, AEOD, and RES) and by the EMP Review Panel. Reviewer comments (except for one panel member) have been received and forwarded to SNL for evaluation and disposition. All staff and review panel comments will be included in an appendix to the final report; and all comments will be addressed in the appendix, either directly or by

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F. Rosa, ICSB
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Discussion:
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reference to specific sections of the report. Additionally, the staff has concluded that an Executive Summary of the report is needed and will be provided. The preparation of the draft final report by SNL including the above cited additions is underway.

- We have revised our program schedule and now project submittal of the staff report to the Commission by October 15, 1982 instead of August 31, 1982 as previously reported in SECY-82-157. This change is due to the additional tasking of SNL to provide the Executive Summary and the Appendix containing detailed responses to reviewer comments with the Final Report. It is also due to delays in obtaining review panel comments on the draft interim report. The remaining EMP program milestones and present completion schedule are as follows:

<u>Milestone</u>	<u>Scheduled Completion</u>
Draft Final Report To Reviewers	7/15/82
Staff and Review Panel Comments Received By SNL	8/30/82
Final SNL Report to NRR	9/30/82
Staff Report to the Commission	10/15/82

- The staff has reviewed a May 24, 1982 memorandum to the Commissioners from Demetrios L. Basdekas on the EMP program. It contains allegations of (1) technical incompetence and bias on the part of NRR staff and (2) deficiencies in the EMP program. We know of no reason for the staff to be biased in this study. The study was requested by the Commission.

Technical competence has been a concern since the first development of the study plan. The staff is not experienced with nuclear weapon induced EMP effects. That was the reason that expert contractors, experienced in such activities

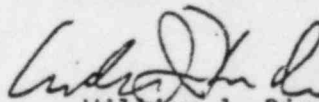
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with DOD, and an expert review panel were built into the plan for the study.

The staff has limited the scope of its study to the determination of the vulnerability of the systems and equipment required for safe shutdown. It was decided to start with a limited assessment and let the Commission decide later whether to expand the scope to include more equipment, upset conditions, and other phenomena (e.g., magnetohydrodynamics).

The comments in the Basdekas memorandum do not directly address the draft interim report. He was not assigned to review it. However, Mr. Basdekas will be requested to review the draft final report and to provide his personal comments, technical or otherwise. These comments and the corresponding responses will be included in the appendix to the final report. Additionally, we will transmit the Basdekas memorandum to the NRC staff reviewers and to the review panel members with a request that his comments be considered in their review of the final report. This will assure that Mr. Basdekas' review and comments will encompass the complete program as described in the draft final report, and that his views will be addressed directly in the appendix to the final report and indirectly through the peer review process. Some preliminary reaction to the Basdekas memo by our contractor (Sandia) are attached.

- A May 26, 1982 memorandum from Commissioner Ahearne to Dr. J. C. Mark suggested that the EMP review panel (Dr. Mark is a member) address Mr. Basdekas' comments. After discussions with Commissioner Ahearne we decided to involve the review panel in considering the Basdekas comments in the manner described above. In addition, Dr. Mark responded directly to Commissioner Ahearne. His response is attached for the Commission's information.



William J. Dircks
Executive Director for Operations

Attachments:
As stated

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Commissioners
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June 22, 1982

Commissioner John F. Ahearne
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear John:

This is in partial reply to your inquiry of May 26 concerning Mr. Basdekas' belief that the EMP study is inadequate. My comments are necessarily provisional, since the final version of the EMP report is still under consideration.

I have read the draft version of the report on this study. It advances the tentative conclusion that the (selected) systems required for safe shutdown would not be put out of action by EMP. Several members of the Review Panel have raised questions about various points and assumptions in the study. These are in the course of being reviewed to determine whether or not they would affect the present conclusion. The results of this review will be incorporated in the final report.

The questions raised include Basdekas' complaint #7; and, similarly, Basdekas' #6 is recognized in §2.3 of the draft report as a matter which may require further attention. In his items #1-5, Basdekas raises a different important question, which is that as to whether components or systems outside the selected set could be affected in such a way as to interfere with achieving shutdown. This may well require further examination or, at least, further specific comment in the report.

There is, of course, the more general question of the intended and necessary purpose of the study. As I have pictured it, this was to check for essential items having undue sensitivity and to consider remedial action if necessary. In that context, the fact -- mentioned by Basdekas -- that a malfunction might be induced in some hydrogen detection instruments by a one-volt/m local field (or presumably, by a 50,000 volt/m outside field, even with 40 or 50 dB attenuation) would not necessarily rise to the surface of concern.

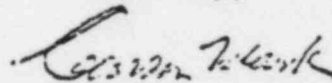
At least some of Basdekas' objections would appear to be pertinent to a much more extended purpose than that suggested above. In his items #1 and 2, he refers to "several such events" or "one or more EMPs." In #3 and 5, he refers to "hardening measures (as) used by the military" and to the need of assuring that "there will be no damage induced by EMP." This would suggest that he feels the approach is deficient if it should not come up to the level applied to Minuteman for possible combat situations.

June 22, 1982

Now, I would not suppose that even a single EMP (as from a megaton at an altitude > 100 km.) could reasonably be associated with what we refer to as "sabotage" or "terrorism," nor that more than one could reasonably be associated with the idea of "accident" (as that word is used in the expression "nuclear war precipitated by accident"). Thus, I would conclude that Basdekas must have in mind the conditions necessary to ensure the operability of plants in the face of the full gamut of possible EMP effects in the event of actual nuclear war. [Of course, none of the plants are prepared to sustain the effects of a nuclear weapon exploding nearby.]

The question remains, then, concerning the Commission's intentions. Will those be met by the more modest objective first described above? In that case, I expect that the present study will cover the needs -- at least by the time the various questions already identified have been resolved. This is what I think the Commission ought to be trying to do. Or, is it the Commission's intention to have the plants prepared to operate during some (not so far stipulated) level of nuclear attack? The present study may not come close to what might be required to meet that sort of objective.

Sincerely,



Carson Mark

JCM:md


Cy: Faust Rose, Chief, ICSB
Dave Ericson, SNL

Sandia National Laboratories

Albuquerque, New Mexico 87185

date: June 30, 1982

to: F. Rosa, Division of Systems Integration, NRR

from: 
G. B. Varnado/D. M. Ericson Jr.,
Facility Analysis Division, SNLA

subject: Treatment of the D. Basdekas Memo to Commissioners in Relation
to Draft Interim Report

At your request we have reviewed the May 24, 1982, memo from D. L. Basdekas to the NRC Commissioners. At this time we do not believe it is appropriate to include this memo with the appendix dealing with other reviewers comments. Our position is based upon the following considerations.

1. The subjects covered in this memo go considerably beyond the scope and content of the study documented in the Interim Report. That is, it is not a review of the report, but a critique on the NRC approach to the EMP question. The first two pages deal extensively with events which occurred either prior to, or independent of the study conducted by Sandia and its subcontractors.
2. In several instances, the memo challenges actions, positions, and/or activities undertaken by the NRR staff which the study team is certainly not in a position to comment upon. For example, on page 3 assertions are made as to the staff's intent, on page 4 (paragraphs 3 and 4) the memo addresses the structure of the NRR program in EMP and related areas, on page 4 (paragraph 5) the memo takes issue with the staff decision not to consider upset in this scoping study, and finally on page 5 the memo makes recommendations for future actions which are clearly beyond the scope of the study team's involvement.

We are of the opinion that the foregoing arguments provide sufficient reason not to include this memo in the Reviewers Appendix now being prepared. In addition, we offer the following thoughts for your consideration in dealing with this issue.

1. In several instances the author makes or implies very large and, to us, unsupported extrapolations. For instance on page 3, paragraph 1, the implication is that because hand-held radio transmitters have caused individual instruments to trigger or go off scale, such transmitters can cause wider system failures. However, there is no support offered for this opinion. XOC

2. On page 3, paragraph 2, the memo refers to one or more EMP events. This suggests to us that Mr. Basdekas is looking at reactors much the same way the military must examine weapon systems. That is, design and build a system which can take everything an adversary has to offer and then still perform a complete mission. Certainly, the question posed to us for the plants is much different, "Given an EMP event, can the plants be secured so that no public harm results?" These are two distinctly different questions or presumptions which profoundly affect the way one proceeds.
3. Mr. Basdekas objects to treating the problem in discrete parts or in his words, "an arbitrarily fragmented manner." In any system as large and complex as a nuclear power plant it seems only prudent to break the problem down into discrete and reasonably handled sections. Obviously, we do not believe there are "innumerable ports of entry and paths of propagation," but rather a discreet number of reasonably defined ports and paths which we have addressed.
4. The author refers to "considerable reservations" (page 5, paragraph 7) on the analytical methods. As we have indicated on several occasions, there are some fundamental differences of opinion within the EMP research community on the best approach to EMP assessment and hardening. This "controversy" predates this program and no doubt will persist long after it is concluded. We do submit however, that when assessments have been done using the Boeing approach and, where necessary, protection added, subsequent pulse testing has not produced failures in those systems which Boeing said were safe. It is certainly an engineering approach, but it does work.
5. We also note that many of Mr. Basdekas' comments are non-technical in nature and in many instances rather broad assertions which don't appear to us to be supported by an analysis or specific data. Therefore, they are difficult to discuss. If he were to provide some of the details which have prompted his thinking, perhaps we would be in a better position to address his concerns.

We trust that these few comments will be of assistance to you and your staff in dealing with this matter.

DME:9414:je

Copy to:

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