Dear FOIA Requester:

The FOIA Improvement Act of 2016, which was enacted on June 30, 2016, made several changes to the Freedom of Information Act (FOIA). Federal agencies must revise their FOIA regulations to reflect those changes by December 27, 2016. In addition to revising our regulations, we intend to update the Form 464, which we use to respond to FOIA requests.

In the interim, please see the comment box in Part I.C of the attached Form 464. The comment box includes information related to the recent changes to FOIA that is applicable to your FOIA request, including an updated time period for filing an administrative appeal with the NRC.

Sincerely yours,

Stephanie Blaney /S/

Stephanie Blaney
FOIA Officer (Acting)

NRC FORM 464 Part I
(12-2015)

U.S. NUCLEAR REGULATORY COMMISSION

RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) REQUEST

FOIA	RESPONSE NUMBER
2016-0379	1

RESPONSE TYPE ☐ INTERIM ☑ FINAL

REQUESTER:	DATE:
Michael Ravnitzky	10/20/2016

DESCRIPTION OF REQUESTED RECORDS:

The following SECY Papers; 75-194A, 75-205, 75-383B, 75-535A, 75-690A, 76-008, 76-020, 76-081, 76-097, 76-125, 76-134, 76-147, 76-237, 76-272, 76-286A, 76-346, 76-351, 76-438, 76-524, 77-069, 77-228, 77-268A, 77-268B, 77-282, 77-285, 77-612

PART I. -- INFORMATION RELEASED

- ☐ Agency records subject to the request are already available in public ADAMS or on microfiche in the NRC Public Document Room.
- ☑ 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.
- ☑ None. Minimum fee threshold not met.
- ☐ You will receive a refund for the amount listed.
- ☐ Fees waived.

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

- ☐ We did not locate any agency records responsive to your request. *Note*: Agencies may treat three discrete categories of law enforcement and national security records as not subject to the FOIA ("exclusions"). 5 U.S.C. 552(c). This is a standard notification given to all requesters, it should not be taken to mean that any excluded records do, or do not, exist.
- ☑ We have withheld certain information pursuant to the FOIA exemptions described, and for the reasons stated, in Part II.
- ☐ Because this is an interim response to your request, you may not appeal at this time. We will notify you of your right to appeal any of the responses we have issued in response to your request when we issue our final determination.
- ☑ You may appeal this final determination within 30 calendar days of the date of this response by sending a letter or email to the FOIA Officer, at U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or FOIA.Resource@nrc.gov. Please be sure to include on your letter or email that it is a "FOIA Appeal."

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

In conformance with the FOIA Improvement Act of 2016, the NRC is informing you that: (1) you have the right to seek assistance from the NRC's FOIA Public Liaison; (2) you have the right to seek dispute resolution services from the NRC's FOIA Public Liaison or the Office of Government Information Services; and (3) notwithstanding the language in Parts I.B and II.B of this form, you may appeal this final determination within 90 calendar days of the date of this response by sending a letter or email to the FOIA Officer, at U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or FOIA.Resource@nrc.gov. Please be sure to include on your letter or email that it is a "FOIA Appeal."
[continued on the next page]

SIGNATURE - FREEDOM OF INFORMATION ACT OFFICER

Stephanie A. Blaney

Add Continuation Page

Delete Continuation Page

NRC FORM 464 Part I (12-2015)	U.S. NUCLEAR REGULATORY COMMISSION	FOIA	RESPONSE NUMBER
RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) REQUEST Continued		2016-0379	1
		RESPONSE TYPE ☐ INTERIM ☑ FINAL	

REQUESTER:	DATE:
Michael Ravnitzky	10/20/2016

PART I.C COMMENTS (Continued)

The incoming request will be made available in ADAMS as ML16077A045. Records with an ML accession number are publicly available in the NRC Public Electronic Reading Room at http://www.nrc.gov/reading-rm.html. If you need assistance in obtaining these records, please contact NRC's Public Document Room (PDR) at 301-415-4737, or 1-800-397-4209, or by email to PDR.Resource@nrc.gov

Per your October 18, 2016 email, SECY-75-194A will be answered under a separate request (FOIA/PA-2017-0071).

We did not locate any agency records responsive to SECY-75-205.

NRC FORM 464 Part II
(12-2015)

U.S. NUCLEAR REGULATORY COMMISSION

RESPONSE TO FREEDOM OF INFORMATION ACT (FOIA) REQUEST

FOIA: 2016-0379

DATE: 10/20/2016

PART II.A -- APPLICABLE EXEMPTIONS

Records subject to the request are being withheld in their entirety or in part under the FOIA exemption(s) as indicated below (5 U.S.C. 552(b)).

- [ ] Exemption 1: The withheld information is properly classified pursuant to an Executive Order protecting national security information.
- [ ] Exemption 2: The withheld information relates solely to the internal personnel rules and practices of NRC.
- [ ] Exemption 3: The withheld information is specifically exempted from public disclosure by the statute indicated.
  - [ ] Sections 141-145 of the Atomic Energy Act, which prohibits the disclosure of Restricted Data or Formerly Restricted Data (42 U.S.C. 2161-2165).
  - [ ] Section 147 of the Atomic Energy Act, which prohibits the disclosure of Unclassified Safeguards Information (42 U.S.C. 2167).
  - [ ] 41 U.S.C. 4702(b), which prohibits the disclosure of contractor proposals, except when incorporated into the contract between the agency and the submitter of the proposal.
- [ ] Exemption 4: The withheld information is a trade secret or confidential commercial or financial information that is being withheld for the reason(s) indicated.
  - [ ] The information is considered to be proprietary because it concerns a licensee's or applicant's physical protection or material control and accounting program for special nuclear material pursuant to 10 CFR 2.390(d)(1).
  - [ ] The information is considered to be another type or confidential business (proprietary) information.
  - [ ] The information was submitted by a foreign source and received in confidence pursuant to 10 CFR 2.390(d)(2).
- [x] Exemption 5: The withheld information consists of interagency or intraagency records that are normally privileged in civil litigation.
  - [ ] Deliberative process privilege.
  - [ ] Attorney work product privilege.
  - [x] Attorney-client privilege.
- [ ] Exemption 6: The withheld information from a personnel, medical, or similar file, is exempted from public disclosure because its disclosure would result in a clearly unwarranted invasion of personal privacy.
- [ ] Exemption 7: The withheld information consists of records compiled for law enforcement purposes and is being withheld for the reason(s) indicated.
  - [ ] (A) Disclosure could reasonably be expected to interfere with an open enforcement proceeding.
  - [ ] (C) Disclosure could reasonably be expected to constitute an unwarranted invasion of personal privacy.
  - [ ] (D) The information consists of names and other information the disclosure of which could reasonably be expected to reveal identities of confidential sources.
  - [ ] (E) Disclosure would reveal techniques and procedures for law enforcement investigations or prosecutions, or guidelines that could reasonably be expected to risk circumvention of the law.
  - [ ] (F) Disclosure could reasonably be expected to endanger the life or physical safety of an individual.
  - [ ] Other

PART II.B -- DENYING OFFICIALS

In accordance with 10 CFR 9.25(g) and 9.25(h) of the U.S. Nuclear Regulatory Commission regulations, the official(s) listed below have made the determination to withhold certain information responsive to your request.

DENYING OFFICIAL	TITLE/OFFICE	RECORDS DENIED	APPELLATE OFFICIAL	
			EDO	SECY
Rochelle Bavol	Executive Assistant, Secretary of Commission	Legal discussions	☐	☑
			☐	☐
			☐	☐

Appeals must be made in writing within 30 calendar days of the date of this response by sending a letter or email to the FOIA Officer, at U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or FOIA.Resource@nrc.gov. Please be sure to include on your letter or email that it is a "FOIA Appeal."

~~OFFICIAL USE ONLY~~

Recd

UNITED STATES

December 22, 1975 NUCLEAR REGULATORY COMMISSION SECY-75-383B

~~POLICY SESSION ITEM~~ Commissioner Action

For: The Commissioners

From: Executive Legal Director

Thru: Executive Director for Operations

Subject: PROTECTION OF FOREIGN INFORMATION GIVEN IN CONFIDENCE: LETTER TO FOREIGN GOVERNMENTS AND INTERNAL PROCEDURES

Purpose: To obtain Commission approval of (1) a proposed letter to foreign government agencies stating that NRC will maintain in confidence information which they request be withheld from public disclosure and (2) revised internal procedures for treatment of such information.

Category: This paper concerns a major policy issue.

Discussion and Alternatives:

After consideration of SECY-75-383A, "Follow-up to Protection of Foreign Information Given in Confidence" at Policy Session 75-62, the Commission requested that a letter to foreign governments be drafted to reflect the NRC position that any information received from a foreign government with the request that it be maintained in confidence will be protected by the NRC. A proposed letter to all foreign government agencies with which the NRC exchanges information is enclosed as Enclosure "A". Enclosure "B" describes NRC internal procedures for the protection of foreign information received in confidence. Enclosure "C" analyzes the Freedom of Information Act regulations of other agencies which specifically address the problem of withholding foreign information from public disclosure.

Each of the enclosures is summarized below. This paper does not address the protective treatment of proprietary information received from foreign non-government sources or a proposed rule change to 10 CFR 2.790, "Public Inspections, exemptions, requests for withholding." These matters will be addressed in a revision of SECY-75-588.*

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* SECY NOTE: These two papers, SECY-75-383B and the revision of SECY-75-588, will probably be scheduled together at an early Policy Session.

Contact:
J.W. Maynard, ELD
ext. 27444

~~OFFICIAL USE ONLY~~

a. Notification Letter to Foreign Governments

There are three principal alternative approaches that may be followed in responding to foreign governments which have expressed concern about NRC's ability to protect confidential communications. The first alternative would be to no longer accept foreign information provided in confidence. This alternative would, of course, obviate the burden of determining the legal basis for withholding particular documents and establishing proper administrative controls for safeguarding and accounting for the documents. This alternative, however, would in all likelihood diminish the amount and categories of information furnished to the Commission by foreign governments. Certain governments have made it clear that foreign intelligence information bearing on the safeguarding of special nuclear material, trade secrets, and confidential commercial information, for example, will not be supplied unless the confidential or privileged status of that information can be assured by NRC. The staff has assessed its need for the types of information which would normally be provided in confidence and has determined that its ability to make well-informed decisions could be impaired if such information were no longer furnished by foreign governments.

The second alternative would be to require the foreign governments to mark all information submitted to NRC as either "classified" or "proprietary". Many of our information exchange arrangements provide that the foreign agency should mark the information it is supplying with appropriate legends. The markings are useful to the staff in determining (1) the precise nature of the information in the context of protecting it from disclosure and (2) the control and accounting procedures that must be provided for adequate protection. The advantage of this alternative is that it will result in communications which clearly show that the foreign government expects the information to be maintained in confidence as well as the basis therefor. The disadvantage of such an approach is that a foreign government may be unable or find it difficult to succinctly categorize the information it is supplying.

The third alternative would be to indicate to the foreign governments that NRC will protect all information received in confidence, but only suggest that the reason for protecting the information be marked on the face of the document. This alternative would allow a foreign government to communicate confidential or privileged information to us in situations where it is unable to place a restrictive legend on the material. If the staff receives an unmarked document, it will have to determine whether the material should be protected by classifying the communication as national security information or by exempting it from disclosure because it contains trade secret or other "proprietary" material. The procedures in Enclosure "B" have been revised to require OISP to obtain the written views of the Department of State on the need for NRC to classify particular foreign communications under Executive Order 11652 in the interests of the foreign relations of the United States. This procedure has been followed by other agencies and will allow us to obtain not only the most knowledgable view on the effect disclosure would have on United States foreign relations, but also documentation supporting a decision to classify the information. In the event the information cannot be protected under United States law, the procedures in Enclosure "B" provide that the document will be returned to the foreign government.

The staff recommends the third alternative. Enclosure "A" sets forth a suggested notification to foreign governments.

b. NRC Internal Control and Accounting Procedures for Protection of Foreign Information Provided in Confidence

Enclosure "B" describes NRC internal control and accounting procedures for protection of foreign information provided in confidence. The procedures, formerly furnished to the Commission as Appendix A to SECY-383A, have been simplified by eliminating Section I, "Statement of Principles", and Section II, "Illustrations of Practical Usage".

c. Treatment of Confidential Foreign Information By Other Federal Agencies

Enclosure "C" describes the treatment given to foreign confidential information by other federal agencies under their regulations implementing the Freedom of Information Act (FOIA). Only six agency FOIA regulations, out of sixty-seven surveyed, specifically discuss foreign information. The Food and Drug Administration (FDA) stat that "Communications with foreign government officials shall have the same status as communications with any member of the public," except that foreign trade secret or other "proprietary" information voluntarily disclosed to the FDA will be exempt from public disclosure to the same extent that similar domestic records would be so exempt under exemption (4) of the FOIA.[1/] On the other hand, the Department of State, the Agency for Internation Development, and the Central Intelligence Agency, take the approach that information obtained from foreign agencies are not "records" under the terms of the FOIA and therefore such information is outside the scope of the Act. The Defense Supply Agency (DSA) and the Energy Research and Development Administration (ERDA) address foreign information in that part of their regulations implementing exemption (4) of the FOIA. DSA will withhold foreign information if received by DSA with the understanding that it will be retained on a privileged or confidential basis. ERDA deals directly with the issue by stating that exemption (4) applies to material obtained in confidence from a foreign source.

1/ The fourth exemption allows a federal government agency to exempt from required disclosure "trade secrets and commercial or financial information obtained from a person and privileged or confidential."

Recommendation: The Commission :

1. Approve the proposed letter to foreign regulatory agencies found in Enclosure "A".

2. Approve the proposed internal procedures found in Enclosure "B" for control and accounting of confidential or privileged information received from foreign sources.

3. Note that the proposed letter to foreign government agencies found in Enclosure "A" is in the process of being cleared by appropriate offices within the Departments of State and Justice.

Coordination: The offices of Policy Evaluation, General Counsel and International and State Programs concur in the recommendations of this paper. The Division of Security also concurs in this paper.

Scheduling: Schedule for an early Policy Session.

Howard K. Shapar
Executive Legal Director

Enclosures:
1. Enclosure "A" - Notification ltr to foreign governments
2. Enclosure "B" - NRC Internal Control & Accounting Procedures for the Protection of Foreign Info Provided in Confidence
3. Enclosure "C" - Treatment of Confidential Foreign Info by other Federal Agencies

January 23, 1976

C O R R E C T I O N N O T I C E

to

SECY-75-383B - PROTECTION OF FOREIGN INFORMATION GIVEN IN CONFIDENC
LETTER TO FOREIGN GOVERNMENTS AND INTERNAL PROCEDURE

Please substitute the attached revised pages (Enclosure A) to your copy(ies) of SECY-75-383B, dated December 22, 1975.

January 30, 1976

AMENDED CORRECTION NOTICE TO SECY-75-383B - PROTECTION OF FOREIGN INFORMATION GIVEN IN CONFIDENCE: LETTER TO FOREIGN GOVERNMENTS AND INTERNAL PROCEDURES

On January 23, 1976, revised pages for Enclosure A of SECY-75-383B, dated December 22, 1975, were distributed for substitution in your copies of the subject paper. These pages have been further revised at the request of Mr. Shapar, ELD, as a result of recent discussion with representatives of the Department of State and the Department of Justice. The revised language, which has the concurrence of EDO, OGC, and ISP, is reflected in the attached pages, which should be substituted for those in your copies of the subject paper. OPE concurs, with the exception of the sentence indicated and footnoted on page 2.

Enclosure A

Dear Mr. _____:

Certain foreign regulatory authorities which provide nuclear energy information to the Nuclear Regulatory Commission (NRC) under technical information exchange arrangements have recently expressed concern about the ability of NRC to protect under United States law documentary material containing privileged or confidential communications from a foreign government. These authorities have indicated that such concern may affect their capacity to supply this information in the future. The Commission has asked me to transmit its position that in keeping with established United States Government practice the NRC will maintain in confidence any documentary material which an agency of your Government identifies as confidential or privileged and requests be maintained in confidence. NRC will not make such material publicly available without the permission of the authorities within your Government who have transmitted it to NRC, and it confidently anticipates that these procedures will safeguard the material from compulsory judicial disclosure. We assume, of course, that any privileged or confidential material which NRC provides to your Government will be afforded the same protection.

It would assist us in assigning the proper internal control and accounting procedures if the agency transmitting the material to NRC would indicate why it is to be protected. This could be

ENCLOSURE A (Revised)

Dear Mr._____:

Certain foreign regulatory authorities which provide nuclear energy information to the Nuclear Regulatory Commission (NRC) under technical information exchange arrangements have recently expressed concern about the ability of NRC to protect under United States law documentary material containing privileged or confidential communications from a foreign government. These authorities have indicated that such concern may affect their capacity to supply this information in the future. In keeping with established United States Government practice the NRC will maintain in confidence any documentary material which an agency of your Government identifies as confidential or privileged and requests be maintained in confidence. NRC will not make such material publicly available without the permissic of the authorities within your Government who have transmitted it to NRC, and it confidently anticipates that these procedures will safeguard the material from compulsory judicial disclosure We assume, of course, that any privileged or confidential material which NRC provides to your Government will be afforded the same protection.

It would greatly assist us in ensuring proper internal control if the agency transmitting the material to NRC would indicate the sensitive nature of the information to be protected. This could be accomplished, for example, by the agency marking the document or otherwise indicating that the information contained

ENCLOSURE A (Revised)

Dear Mr. _____:

Certain foreign regulatory authorities which provide nuclear energy information to the Nuclear Regulatory Commission (NRC) under technical information exchange arrangements have recently expressed concern about the ability of NRC to protect under United States law documentary material containing privileged or confidential communications from a foreign government. These authorities have indicated that such concern may affect their capacity to supply this information in the future. In keeping with established United States Government practice the NRC will maintain in confidence any documentary material which an agency of your Government identifies as confidential or privileged and requests be maintained in confidence. NRC will not make such material publicly available without the permission of the authorities within your Government who have transmitted it to NRC. ~~and it confidently anticipates that these procedures will safeguard the material from compulsory judicial disclosure.~~ We assume, of course, that any privileged or confidential material which NRC provides to your Government will be afforded the same protection.

It would greatly assist us in ensuring proper internal control if the agency transmitting the material to NRC would indicate the sensitive nature of the information to be protected. This could be accomplished, for example, by the agency marking the document or otherwise indicating that the information contained

accomplished, for example, by the agency marking the document or otherwise indicating that the information contained in the document is national security information, a trade secret, or commercial or financial information of a privileged or confidential nature.

I sincerely hope that this letter will clarify any questions your authorities may have had in the past regarding this matter, and that our Governments may continue to freely exchange information regarding the health, safety, safeguards, and environmental aspects of nuclear energy so that we may make informed decisions with respect to our responsibilities to protect the public health and safety.

in the document is national security information, a trade secr or commercial or financial information of a privileged or confidential nature. In the event that such advice cannot be, or is not provided, and the NRC is unable to restrict dissemi nation under U.S. law, the information will be returned witho public disclosure.

I sincerely hope that this letter will clarify any questions y authorities may have had in the past regarding this matter, an that our Governments may continue to freely exchange informati regarding the health, safety, safeguards, and environmental as of nuclear energy so that we may make informed decisions with respect to our responsibilities to protect the public health a safety. If any additional clarification is necessary, I would propose future discussions to assure a full understanding of the procedures which will best serve our mutual needs.

in the document is classified in accordance with the laws of your country or ~~/national-security-information~~, a trade secret or commercial or financial information of a privileged or confidential nature. /In the event that such advice cannot be, or is not provided, and the NRC is unable to restrict dissemination under U.S. law, the information will be returned without public disclosure. /*

I sincerely hope that this letter will clarify any questions you authorities may have had in the past regarding this matter, and that our Governments may continue to freely exchange information regarding the health, safety, safeguards, and environmental aspe of nuclear energy so that we may make informed decisions with respect to our responsibilities to protect the public health and safety. If any additional clarification is necessary, I would propose future discussions to assure a full understanding of the procedures which will best serve our mutual needs.

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*NOTE: OPE believes that this sentence should not be included routinely in all letters. In general, it should be included only when the foreign authorities have expressed concern on this point. Otherwise, it may give rise to unnecessary questions.

ENCLOSURE B

NRC INTERNAL CONTROL AND ACCOUNTING PROCEDURES FOR THE PROTECTION OF FOREIGN INFORMATION PROVIDED IN CONFIDENCE

The following procedures shall be followed when NRC receives from a foreign government or other foreign or international source information which the foreign government or source requests be maintained in confidence by NRC:

A. Documents Marked as Containing Classified Information

Executive Order 11652 requires that classified information furnished to the United States by a foreign government or international organization "shall either retain its original classification or be assigned a United States classification. In either case, the classification shall assure a degree of protection equivalent to that required by the government or international organization which furnished the information or material." Exemption 1 of the Freedom of Information Act (5 U.S.C. 552(b)(1)) and 10 CFR 9.5(a)(1) of the Commission's Regulations exempt from disclosure "records (i) which are specifically authorized under criteria established by an Executive Order to be kept secret in the interest of national defense or foreign policy, and (ii) which are in fact properly classified pursuant to such Executive Order."

When a document is received from a foreign government or international organization which is physically marked or identified as containing classified information, it will be transmitted to the Office of International and State Programs (OISP) for appropriate handling. The document shall be safeguarded and controlled according to the procedures set forth in NRC Manual Appendix 3401 and the National Security Council Directive of May 17, 1972 (Annex B to NRC Manual Appendix 3401). The origin of all material bearing foreign classification shall be clearly indicated on or in the body of the material. If the foreign classification is shown in English (TOP SECRET, SECRET, or CONFIDENTIAL), no additional classification marking is required. If the foreign classification is not marked in the United States form (TOP SECRET, SECRET, or CONFIDENTIAL), the equivalent classification shall be entered as prescribed for United States documents.

The classified portion of a document will be disclosed only to a person having an appropriate security clearance who has a need for access to the particular classified information or material sought in connection, for example, with the performance of his official duties or contractual obligations. The determination of the "need-to-know" will be made by NRC official(s) having responsibility for the classified information or material.

Should there be a need for further information or clarification in order to determine the appropriate United States classification, OISP

will request such clarification or information from the foreign government or international organization furnishing the document. In the event that material deemed as classified by a foreign government or international organization does not meet the requirements for classification under Executive Order 11652, the originating government or organization will be so advised and the information will be returned. Such action will not be taken without the approval of the Commission.

B. Documents Marked as Containing Trade Secrets, or Privileged or Confidential Commercial or Financial Information

Exemption 4 of the Freedom of Information Act (5 U.S.C. 552(b)(4)) and 10 CFR 9.5(a)(4) of the Commission's regulations permit the exemption of trade secrets and privileged or confidential commercial or financial information from required public disclosure.

When a document is received from a foreign source which is physically marked or identified as containing trade secrets or other confidential or privileged commercial or financial information, it will be transmitted to OSIP for appropriate handling.

Any foreign originated document exempt in whole or in part from disclosure in accordance with the 4th exemption of the Freedom of

Information Act and the Commission's regulations shall be appropriatel marked and safeguarded and controlled according to the procedures set forth in NRC Manual 2104. Such documents may be inspected in certain situations, by a person properly and directly concerned who is not an NRC employee if the person signs an agreement not to disclose to a third party the proprietary information contained in the document. A determination to permit a person other than an NRC employee to inspect a document containing information protected in accordance with this section shall receive the concurrence of the Office of the Executive Legal Director.

C. Confidential Material Not Marked by the Originating Authority

If a document is received from a foreign government or international organization and is not classified or marked as containing trade secret or confidential or privileged commercial information, or its equivalent, but the foreign authority requests that the information be maintained in confidence, the NRC may originally classify the document pursuant to the authority of Executive Order 11652 if such action is necessary in the interest of the national defense or foreign relations of the United States. In such cases, the document will be reviewed by OISP, the Division of Security, the Office of the Executive Legal Director, and the program office(s) most directly involved. OISP will also obtain a written statement from the Department of State regarding the broader foreign relations aspects of the request for nondisclosure and the need to classify the information furnished by the foreign government or international

organization. OISP, after receiving the concurrences of the other reviewing offices, will be responsible for reporting to the Executive Director for Operations the value of the information to the NRC and making a recommendation whether the information should be classified. In the event that the document cannot be classified under the authority of Executive Order 11652, and does not contain trade secret, confidential or privileged commercial or financial information, or other information which may be withheld from required disclosure under the Freedom of Information Act, the Executive Director for Operations, with the approval of the Commission, will so notify the foreign authority and will return the material if the foreign authority desires.

D. Information Furnished Pursuant to Reporting Requirements of 10 CFR Part 21.

Section 206 of the Energy Reorganization Act of 1974, which will be implemented by 10 CFR Part 21 of the Commission's regulations, requires that the suppliers of basic facility components, among others, report to the NRC certain safety-related information regarding facilities and activities licensed by the NRC. Classified information or other confidential information exempt from required disclosure under the Freedom of Information Act may be maintained in confidence by NRC even though the information is furnished in a report required by 10 CFR Part 21. Should the NRC be informed by a domestic supplier that its report under 10 CFR Part 21 contains information which a

foreign government or other foreign source has requested be maintained in confidence, the matter will be referred to OISP for appropriate action in accordance with the procedures set forth above.

ENCLOSURE C

TREATMENT OF CONFIDENTIAL FOREIGN INFORMATION
BY OTHER FEDERAL AGENCIES

During the consideration of SECY-75-383A, "Follow-up to Protection of Foreign Information Given in Confidence", at Policy Session 75-62 on November 20, 1975, the question arose as to the treatment accorded foreign information by the other agencies of the Government. A review was made of approximately sixty-seven (67) published regualtions, both proposed and final, and what follows is a summary analysis of the fruits of the review.

The Food and Drug Administration (FDA) considered this area intensely.[1/] The comments published at the time of publication of their final regulations included a section entitled "Communications with Foreign Government Officials."[2/] In addressing the general issue of how to treat the situation wherein a counterpart agency in a foreign country offers data or information to the FDA on a confidential basis, the FDA Commissione noted

> "that there is no specific exemption relating to communications with foreign governments under the Freedom of Information Act, except for classified material relating to national defense or foreign policy.[3/]

1/ 39 F.R. 44602 (December 24, 1974).

2/ Id. at 44620.

3/ Id. at 44621.

With regard to the suggestion that the FDA include a special provision in its regulations specifically retaining as confidential (and not subject to public disclosure) any information submitted by a foreign government in confidence or as a trade secret, the Commissioner advised that the FDA had authority to withhold from disclosure only information specifically exempt from disclosure under the Freedom of Information Act. He expressed the belief that Section 4.89 of the final regulations (set forth hereinafter) reflected the current law in this regard and would permit the agency, under the "trade secret" exemption[4/] of the Freedom of Information Act, to retain in confidence and withhold from public disclosure all trade secret information. Further, all information or documents relating to pending regulatory issues would be withheld from public disclosure under the investigatory records exemption[5/] of the Freedom of Information Act.

Section 4.89 of 21 C.F.R. Part 4 reads, in part, as follows:

> "Communications with foreign government officials.
>
> Communications with foreign government officials shall have the same status as communications with any member of the public except that:
>
> (a) Investigatory records compiled for law enforcement purposes by foreign government officials who perform counterpart functions to the Food and Drug Administration in a foreign country, and trade secrets and confidential commercial or financial information obtained by such officials, which are voluntarily disclosed to the Food and Drug

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4/ 5 U.S.C. §552(b)(4): "trade secrets and commercial or financial information obtained from a person and privileged or confidential..."

5/ 5 U.S.C. §552(b)(7): "investigatory records compiled for law enforcement purposes, but only to the extent that the production of such records would (A) interfere with enforcement proceedings..."

> Administration as part of cooperative law enforcement and regulatory efforts, shall be exempt from public disclosure to the same extent to which the records would be so exempt pursuant to [exemption 4] and [exemption 7], as if they had been prepared by or submitted directly to Food and Drug Administration employees....

In contrast to the FDA approach, the regulations of the Department of State[6/] remove foreign information from the scope of the Freedom of Information Act by providing in the definitions section of the regulations, Section 6.1, that

> "The term 'record' ... does not include copies of the records of ... foreign governments, international organizations, or non-governmental entities unless they evidence organization, functions policies, decisions, procedures, operations, or activities of the Department of State."

Similarly, the Agency for International Development (AID) also accords foreign information special treatment by providing in its regulations[7/] that the term "record" does not include copies of the records of foreign governments and international organizations.

The Central Intelligence Agency (CIA) has an approach similar to that of the Department of State and AID. The CIA regulations[8/] provide that the term "record" does not include documents and records furnished by foreign governments or international organizations. However, the CIA regulations have a more restrictive exclusion before a record can be removed from the operation of the Freedom of Information Act. Before

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6/ 40 F.R. 7256 (February 19, 1975).

7/ 40 F.R. 7327 (February 19, 1975).

8/ 40 F.R. 7294 (February 19, 1975).

"documents and records" furnished by foreign governments or international organizations are excepted from the provisions of the Freedom of Information Act as not being "records" of the CIA, the documents and records must have been furnished to and held by the CIA "on the understanding that the information therein or the furnishing thereof be kept in confidence."

Other agencies treat the foreign information issue under that section of their regulations implementing exemption (4) of the Freedom of Information Act. The Defense Supply Agency in its regulations[9/] implementing the "trade secret" exemption provides that the following types of records will be withheld from public disclosure:

> "(iv) Those containing information which DSA receives from anyone including ... a foreign nation ... with the understanding that it will be retained on a privileged or confidential basis...."

Similarly, the Energy Research and Development Administration (ERDA) regulations[10/] address foreign information in the section dealing with exemption (4) material by the following direct statement:

> "This exemption [the 'trade secret' exemption] also applies to material obtained in confidence from a foreign source."

By this language ERDA appears to make it abundantly clear that foreign information received in confidence will be exempt from disclosure under

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9/ 40 F.R. 7282 (February 19, 1975).

10/ 40 F.R. 7320 (February 19, 1975).

the Freedom of Information Act. Inasmuch as ERDA is separately addressing foreign information in the regulations, it must be assumed that such information is being accorded special treatment. What appears obvious from the specific language employed by ERDA is the implication that foreign information obtained in confidence will be protected from public disclosure even if it is not a trade secret or commercial or financial information. It should be pointed out that no other agency regulations have been found which follow the ERDA approach nor has any decided case been found which is in support thereof.

The regulations of the remaining departments and agencies which were reviewed neither singled out nor otherwise addressed foreign information separate and apart from domestic information and therefore these regulations did not in any way accord foreign information special treatment.

May 7, 1976

SECY-75-690A

UNITED STATES
NUCLEAR REGULATORY COMMISSION

CONSENT CALENDAR ITEM

For: The Commissioners

From: Daniel J. Donoghue, Director, Office of Administration

Thru: Executive Director for Operations

Subject: CERTIFICATION OF NUCLEAR REGULATORY COMMISSION (NRC) SENSITIVE POSITIONS

Purpose: To supplement SECY-75-690 by providing the Commission with: a reconsideration of the criteria to be used to determine which positions are designated sensitive; a comparison of the NRC personnel security criteria and procedures with those of some other federal agencies, including regulatory agencies; and information on the costs of various options.*

Discussion: During consideration of SECY-75-690, the Commission requested that the criteria for determining which positions are sensitive be reconsidered by comparing them with the criteria used by some other federal agencies, including regulatory agencies, and by estimating the costs of various options.

A. Comparison of Criteria

A survey of the certification criteria and procedures of some other federal agencies, including regulatory agencies, disclosed that the criteria outlined by the Civil Service Commission (CSC) are generally utilized to determine which positions are "Critical-Sensitive" (The term "Critical-Sensitive" is used by many agencies and corresponds closely to the term "Sensitive" as used by NRC and formerly by the Atomic Energy Commission). Enclosure 1 reflects the CSC criteria for a "Critical-Sensitive" position. The CSC criteria serve as a minimum and agencies are free to add other factors which constitute sensitive positions within their agencies. Two regulatory agencies contacted during this survey were found to certify close to 50% of their positions as being "Critical-Sensitive" and one other agency certifies almost 100% of its positions as "Critical-Sensitive". Enclosure 2 contains additional information on certain other aspects of these agencies' personnel security programs. The NRC Criteria (Enclosure 3) which

Contact:
Raymond J. Brady
42-74472

*Ref. memo from the Secretary to the Executive Director for Operations dated January 26, 1976.

were approved, in principle, during Policy Session 75-20 on April 24, 1975, are consistent with the criteria (categories of functions) approved by the Administrator of the Energy Research and Development Administration-ERDA (Enclosure 4). The ERDA and NRC criteria are similar to those of the CSC. The staff believes that the adoption of the proposed criteria would maximize cost-effectiveness and flexibility in terms of the level of protection provided and would not create any significant administrative problems. These criteria would also assure compliance with all applicable statutes and directives that deal with personnel security matters.

It should be noted that many of the positions identified as sensitive by offices, divisions, boards and panels in SECY-75-690 were so designated due to access (or possible access) to Restricted Data (RD) either at NRC facilities or at selected ERDA facilities. A recent informal survey revealed that NRC offices, divisions, boards and panels have an estimated 2,000 RD documents. These documents deal with safety, safeguards, naval nuclear propulsion and other matters. The RD is utilized by both professional and non-professional personnel to discharge their assigned responsibilities with NRC. While some of the incumbents (e.g. messengers, secretaries, and document custodians) do not normally require access to RD information, all have the ability to obtain such access. In some organizations, work is distributed among the entire staff. Thus, it would create an administrative burden if all such personnel were not cleared for access to RD. Other NRC personnel should also be cleared for access to RD in order to conduct NRC business at certain ERDA facilities (e.g. weapons, production, and naval nuclear facilities).

Based upon the NRC criteria and the additional factors mentioned above, it is felt that the 1,354 positions proposed as sensitive positions in SECY-75-690 continue to meet the criteria for sensitive positions. Since the time of consideration of that paper, two NRC organizations have reported that an additional ten positions have been identified as meeting one or more of the criteria. These additional positions are listed in Enclosure 5. The full field investigations which would be required for individuals who will occupy sensitive positions should provide NRC with additional information as to the reliability and dependability of these personnel.

B. Cost Information

The investigative costs over the next five years will vary greatly, depending upon which alternative presented in SECY-75-115 is finally approved. Assuming a growth figure of 500, by FY-1981 the agency ceiling could reach about 2,800 (currently it is about 2,300) and assuming further that the loss due to attrition during this time will be about 700 employees, then approximately 1,200 people could be hired during the next five years. Since an average of five applicants are investigated for every four that are hired, about 1,500 applicants may be investigated over the period.

To continue with all NRC positions as sensitive over the next five years (Alternative 1), would require approximately 1,700 full field re-investigations and 1,500 full field investigations (FFI's) for applicants. The total cost of these 3,200 FFI's would be $3,200,000, based on an average cost figure of $1,000 for each investigation.

If only 57% (Enclosure 4 of SECY-75-690) of the NRC positions are designated sensitive (Alternative 2), 1,000 full field re-investigations and 900 FFI's for applicants in sensitive positions would be required over the next five years. These 1,900 FFI's would cost $1,900,000. This program would also call for National Agency Checks (NAC's) for 600 applicants at a total cost of $3,600, based on an average cost of $6.00 for each NAC. The total investigative costs, over the next five years, for the sensitive/nonsensitive program would be $1,903,600, thereby resulting in a savings of $1,296,400 over Alternative 1.

C. Control of Certification

The Executive Director for Operations will establish procedures to assure that the number of sensitive positions will continue to be held to an absolute minimum and yet permit NRC to discharge its assigned responsibilities and authorities with maximum efficiency and effectiveness both at NRC and ERDA facilities. These procedures will include re-evaluation of position sensitivity with each occurring vacancy and each time the incumbent is due for re-investigation.

Recommendation: 1. Approve staff recommendations contained in SECY-75-690.

2. Note that the ten positions identified in Enclosure 5 meet the criteria for certification.

Coordination: The Office of the Executive Legal Director has no legal objection to the recommendations contained in this paper.

Scheduling: Request Commissioner consents or comments be provided directly to the Office of the Secretary by close of business Tuesday, May 25, 1976.

Daniel J. Donoghue, Director
Office of Administration

Enclosures:
1. Excerpt from the Federal Personnel Manual, Chapter 732, Subchapter 1, Section 3a.(1), dated September 13, 1973.
2. Some Selected Aspects of Other Federal Agencies' (Including Regulatory Agencies) Personnel Security Programs.
3. NRC Criteria for Sensitive Positions.
4. ERDA Criteria for Sensitive Positions.
5. List of Additional-Proposed NRC Sensitive Positions.

DISTRIBUTION

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Secretariat

ENCLOSURE 1

EXCERPT FROM THE FEDERAL PERSONNEL MANUAL, CHAPTER 732, SUBCHAPTER 1, SECTION 3a.(1), DATED SEPTEMBER 13, 1973.

(1) Critical-sensitive positions. The criteria to be applied by the heads of the agencies in designating a position as critical-sensitive are:

- Access to TOP SECRET defense information;

- Development or approval of war plans, plans or particulars of future or major special operations of war, or critical and extremely important items of war;

- Development or approval of plans, policies or programs which affect the overall operations of an agency; that is, policy-making or policy-determining positions;

- Investigative duties, the issuance of personnel security clearances, or duty on personnel security boards; or

- Fiduciary, public contact, or other duties demanding the highest degree of public trust.

ENCLOSURE 2

SOME SELECTED ASPECTS OF OTHER FEDERAL AGENCIES'
(INCLUDING REGULATORY AGENCIES) PERSONNEL SECURITY PROGRAMS

AGENCY	HIGHEST LEVEL OF CLASSIFIED INFO.	NUMBER OF PERMANENT EMPLOYEES	NUMBER OF CRITICAL/SENSITIVE POSITIONS*	WHO MAKES DETERMINATION OF SENSITIVITY
EQUAL EMPLOYMENT OPPORTUNITY COMMISSION	NONE	2,300	1,075 (47%)	EXECUTIVE DIRECTOR OR PERSONNEL DIRECTOR
ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION (HQ'S)	TOP SECRET	2,300	1,978 (86%)	ADMINISTRATOR
ENVIRONMENTAL PROTECTION AGENCY	TOP SECRET	10,000	300 (3%)	SECURITY DIRECTOR
FAA EASTERN REGIONAL OFFICE	SECRET	6,000	2,400 (40%)	SECURITY OFFICER
FEDERAL AVIATION ADMINISTRATION (HQ'S)	TOP SECRET	3,000	600 (20%)	SECURITY OFFICER
FEDERAL COMMUNICATIONS COMMISSION	SECRET	2,000	300 - 400 (15% - 20%)	BUREAU CHIEFS
FEDERAL ENERGY ADMINISTRATION	TOP SECRET	3,000	100 (3%)	DIVISION DIRECTORS
FEDERAL MARITIME COMMISSION	SECRET	290	75 (26%)	CHM OR MGING DIRECTOR
FEDERAL POWER COMMISSION	TOP SECRET	1,305	100 (8%)	OFC DIRECTOR, PSO & EXECUTIVE DIRECTOR
FEDERAL RESERVE BOARD	TOP SECRET	1,400	19 (1%)	SECURITY DIRECTOR
FEDERAL TRADE COMMISSION	NONE	1,650	26 (2%)	ASST. EXEC. DIRECTOR FOR MGMT.

ENCLOSURE 2 (CONT'D)

AGENCY	HIGHEST LEVEL OF CLASSIFIED INFO.	NUMBER OF PERMANENT EMPLOYEES	NUMBER OF CRITICAL/SENSITIVE POSITIONS*	WHO MAKES DETERMINATION OF SENSITIVITY
IMMIGRATION & NATURALIZATION SERV.	TOP SECRET	8,000	MOST (ALMOST 100%)	DEPARTMENT ORDER
INTERNATIONAL TRADE COMMISSION	TOP SECRET	400	12 (3%)	COMMISSION
INTERSTATE COMMERCE COMMISSION	TOP SECRET	2,000	41 (2%)	PERSONNEL DIRECTOR
NATIONAL AERONAUTICS & SPACE ADMINISTRATION (HQ ONLY)	TOP SECRET	1,500	120 (8%)	SECURITY DIRECTOR AND SUPERVISOR
NATIONAL BUREAU OF STANDARDS	SECRET	3,000	600 (20%)	SECURITY DIRECTOR
NATIONAL LABOR RELATIONS BOARD	TOP SECRET	2,500	1,100 (44%)	SECURITY DIRECTOR
POSTAL RATE COMMISSION	NONE	82	NONE	N/A
SECURITIES & EXCHANGE COMMISSION	TOP SECRET	2,000	50 (3%)	COMMISSION
TENNESSEE VALLEY AUTHORITY	TOP SECRET	16,000	68 (1%)	OPERATING DIVISION

* Require full field investigations - Other positions require National Agency Checks

ENCLOSURE 3

NRC CRITERIA FOR SENSITIVE POSITIONS

A NRC employee will occupy a sensitive position if the position requires one or more of the following:

1. Access to Restricted Data or Top Secret National Security Information.

2. Development or approval of plans, policies or programs which affect the overall operations of the Commission, i.e., policy-making or policy-determining positions.

3. Access to Secret or Confidential National Security Information, other than Restricted Data, and the incumbents' duties are concerned with communications, intelligence, investigations, safeguards or security.

4. Are on the immediate staff of the Commission.

5. Occupy any other position so designated by the Commission.

All other NRC employees will occupy nonsensitive positions and access to National Security Information classified Secret or Confidential may be granted on the basis of a NAC provided the position does not involve the function listed in category 3. above.

ENCLOSURE 4

ERDA CRITERIA FOR SENSITIVE POSITIONS

ERDA positions, including consultants, are sensitive if they require either:

1. Access to Restricted Data or Top Secret National Security Information.

2. Development or approval of plans, policies or programs which affect the overall operations of the Administration, i.e., policy-making or policy-determining positions.

3. Access to Secret or Confidential National Security Information, other than Restricted Data, and the incumbent's duties are concerned with communications, investigations, intelligence, security, and safeguards.

4. Any other position so designated by the Administrator.

NOTE:

Currently 86% of ERDA's 2,300 Headquarters positions are sensitive.

ENCLOSURE 5

LIST OF ADDITIONAL-PROPOSED NRC SENSITIVE POSITIONS

OFFICE OF THE GENERAL COUNSEL

ADD: Administrative Aide (1)
Secretary (2)

OFFICE OF ADMINISTRATION-DIVISION OF DOCUMENT CONTROL-CRESS UNIT

ADD: Operators (6)
Proofreaders (2)

DELETE: Unit Supervisor (1)

Net increase in total number of NRC Sensitive Positions - 10.

January 7, 1976 SECY- 76-8

COMMISSIONER ACTION

For: The Commissioners

From: Daniel J. Donoghue, Director
Office of Administration

Thru: The Executive Director for Operations

Subject: RESPONSE TO DECEMBER 22, 1975, LETTER FROM CHAIRWOMAN BELLA S. ABZUG, SUBCOMMITTEE ON GOVERNMENT INFORMATION AND INDIVIDUAL RIGHTS

Purpose: To obtain Commissioners' approval or comments on draft response.

Category: This paper covers a routine matter requiring Commission consideration.

Discussion: In a letter to Chairman Anders, Chairwoman Abzug requested information on what actions the NRC had taken to implement an OMB memorandum of October 3, 1975, providing additional guidance on responding to Congressional inquiries which involve access to personal information subject to the Privacy Act of 1974, and recommending that agencies amend their systems of records to provide as a routine use for all systems that:

> Disclosure may be made to a Congressional office from the record of an individual in response to an inquiry from the Congressional office made at the request of that individual.

The draft response to Chairwoman Abzug states that the NRC issued an announcement on October 20, 1975, to its principal staff calling attention to the guidance contained in the OMB memorandum. The draft response

Contact: J. M. Felton
ADM:R&R
492-7211

also states that while the NRC has not yet received a Congressional request for personal information subject to the Privacy Act, we would, should we receive such a request, follow the guidance contained in the OMB memorandum. The response further states that the NRC is in the process of amending its systems of records as recommended in the OMB memorandum.

Coordination: The Offices of the Executive Legal Director and Congressional Affairs concur in the proposed letter.

Daniel J. Donoghue, Director
Office of Administration

Enclosures:
1. Draft Letter to Chairwoman Abzug
2. Letter from Chairwoman Abzug

Commissioners' comments should be provided directly to the Office of the Secretary by close of business Wednesday, January 14, 1976.

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

D R A F T

Honorable Bella S. Abzug
Chairwoman, Subcommittee on Government
Information and Individual Rights
U.S. House of Representatives

Dear Chairwoman Abzug:

This is in response to your letter of December 22, 1975, concerning the NRC's actions with respect to the memorandum dated October 3, 1975, from the Office of Management and Budget entitled, "Congressional inquiries which entail access to personal information subject to the Privacy Act."

On October 20, 1975, the NRC sent an announcement to its principal staff calling attention to the guidance contained in the OMB memorandum. A copy of Announcement 153 is enclosed. While the NRC has not yet received a Congressional request for personal information subject to the Privacy Act, we would, should we receive such a request, follow the guidance contained in the OMB memorandum.

As indicated in Announcement No. 153, the NRC is in the process of preparing a rule change implementing the OMB directive, and we expect to forward the amendments to the Office of the Federal Register for publication within the next few weeks.

Sincerely,

William A. Anders
Chairman

Enclosure: NRC Announcement
No. 153

Enclosure 1

NRC 9 (1-75)

NRC

UNITED STATES
NUCLEAR REGULATORY COMMISSION

ANNOUNCEMENT NO. 153

DATE: October 20, 1975

TO: Directors of Offices, Divisions, and Regional Offices
Assistant Directors and Branch Chiefs

SUBJECT: CONGRESSIONAL INQUIRIES WHICH ENTAIL ACCESS TO PERSONAL INFORMATION SUBJECT TO THE PRIVACY ACT

Enclosed is a memorandum dated October 3, 1975 from the Office of Management and Budget which provides guidance to all agencies on the handling of Congressional inquiries which entail access to personal information subject to the Privacy Act.

Should you receive a Congressional inquiry which involves access to personal information and you have any questions as to whether the information may be disclosed, please consult with J. M. Felton, Director, Division of Rules and Records, prior to taking action on the inquiry.

A rule change is in preparation to add the new routine use recommended in the OMB memorandum, but the rule change will not be effective for at least 90 days.

Daniel J. Donoghue

Daniel J. Donoghue, Director
Office of Administration

Enclosure:
OMB Memorandum

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

OCT 3 1975

TO THE HEADS OF EXECUTIVE DEPARTMENTS AND ESTABLISHMENTS

SUBJECT: Congressional inquiries which entail access to personal information subject to the Privacy Act

This memorandum provides additional guidance to Executive Departments and Agencies on responding to congressional inquiries which involve access to personal information subject to the Privacy Act of 1974 (5 U.S.C. 552a). This guidance has been coordinated with the congressional committees with legislative jurisdiction and the principal agencies affected. It is intended to assure that implementation of the Act does not have the unintended effect of denying individuals the benefit of congressional assistance which they request.

It is recommended that each agency establish the following as a routine use for all of its systems, consistent with subsections (a)(7) and (e)(11) of the Act:

> "Disclosure may be made to a congressional office from the record of an individual in response to an inquiry from the congressional office made at the request of that individual."

The operation of this routine use will obviate the need for the written consent of the constituent in every case where the constituent requests assistance of the Member which would entail a disclosure of information pertaining to the constituent.

In those cases where the congressional inquiry indicates that the request is being made on behalf of a person other than the individual whose record is to be disclosed, the agency should advise the congressional office that the written consent of the subject of the record is required. The agency should not contact the subject unless the congressional office requests it to do so.

In addition to the routine use, agencies can, of course, respond to many congressional requests for assistance on behalf of individuals without disclosing personal information which would fall within the Privacy Act, e.g., a

congressional inquiry concerning a missing Social Security check can be answered by the agency by stating the reason for the delay.

Personal information can be disclosed in response to a congressional inquiry without written consent or operation of a routine use-

-- if the information would be required to be disclosed under the Freedom of Information Act (Subsection (b)(2));

-- if the Member requests that the response go directly to the individual to whom the record pertains;

-- in "compelling circumstances affecting the health or safety of an individual..." (Subsection (b)(8)); or

-- to either House of Congress, or to the extent of matter within its jurisdiction, any committee or subcommittee thereof..." (Subsection (b)(9)).

The routine use recommended above and disclosures thereunder are, of course, subject to the 30 day prior notice requirement of the Act (Subsection (e)(11)). In the interim, however, it should be possible to respond to most inquiries by using the provisions cited in the previous paragraph. Furthermore, when the congressional inquiry indicates that the request is being made on the basis of a written request from the individual to whom the record pertains, consent can be inferred even if the constituent letter is not provided to the agency.

It is urged that all agency personnel who are involved in responding to congressional inquiries (including all field offices) be advised of this policy by the most expeditious means available (e.g., telephone or cable).

James T. Lynn
Director

BELLA S. ABZUG, N.Y., CHAIRWOMAN
EDWARD J. MEZVINSKY, CALIF.
JOHN CONYERS, JR., MICH.
TOMMY F. MACHTANAUD, MASS.
JOHN E. MOSS, CALIF.
MICHAEL HARRINGTON, MASS.
ANDREW MAGUIRE, N.J.
ANTHONY MOFFETT, CONN.

SAM STEIGER, ARIZ.
CLARENCE J. BROWN, OHIO
PAUL N. MCCLOSKEY, JR., CALIF.
225-3741

NINETY-FOURTH CONGRESS

Congress of the United States

House of Representatives

GOVERNMENT INFORMATION AND INDIVIDUAL RIGHTS
SUBCOMMITTEE
OF THE
COMMITTEE ON GOVERNMENT OPERATIONS
RAYBURN HOUSE OFFICE BUILDING, ROOM B-349-B-C
WASHINGTON, D.C. 20515

December 22, 1975

Honorable William A. Anders
Chairman
Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Anders:

It has recently come to my attention that many agencies have not yet implemented the Office of Management and Budget guideline for the Privacy Act of 1974 regarding congressional inquiries on behalf of constituents. These agencies are not releasing information in response to telephone calls from congressional offices which affirm that a constituent request has, in fact, been received. In some cases, agencies are refusing to respond to inquiries even when the constituent's letter requesting help, or a form signed by the constituent authorizing the congressman to help, has been forwarded to the appropriate division within the agency.

When the Privacy Act became effective on September 27 of this year, this Subcommittee was overwhelmed with complaints from Members of Congress because executive agencies were refusing to deal with congressional inquiries and were citing the Privacy Act as the reason.

As a result of over a week of meetings between myself, congressional representatives, the OMB, and agency representatives, OMB Director James Lynn issued the following directive on October 3:

> Disclosure may be made to a congressional office from the record of an individual in response to an inquiry from the congressional office made at the request of that individual.

The guideline, a copy of which is enclosed, appeared in the Congressional Record of October 6, 1975, and the Federal Register of December 4, 1975.

Representatives of the Defense Department, the Veterans Administration, and the Department of Health, Education, and Welfare quickly assured me that their departments would amend their regulations to permit release of

Enclosure 2

a constituent's personal data to congressional offices upon telephonic assurance that the request for congressional help had been made by the constituent.

I am writing now to ask whether your agency is complying with the OMB guideline. As you may know, the guideline provides that if a constituent has asked for assistance, the Representative should inform the agency of that fact. The guideline does not require that the request be in writing, or that it be presented to the agency.

Please supply the Subcommittee with a copy of your agency's regulation implementing the OMB guideline. If you have not yet implemented the OMB language, please inform the Subcommittee of your reasons for not having done so.

Thank you for your prompt attention to this important matter.

Sincerely,

Bella S. Abzug

BELLA S. ABZUG
Chairwoman

cc: James Lynn, Director
Office of Management and Budget

Enclosure

be a system of records subject to the Act if the list is maintained separately by the agency, it consists of records (i.e., contains personal information), and information is retrieved by reference to name or some other identifying particular.

"Libraries. Standard bibliographic materials maintained in agency libraries such as library indexes, Who's Who volumes and similar materials are not considered to be systems of records. This is *not* to suggest that all published material is, by virtue of that fact, not subject to the Act. Collections of newspaper clippings or other published matter about an individual maintained other than in a conventional reference library would normally be a system of records."

2. *Routine Uses—Intra-agency disclosures* (5 U.S.C. 552a(a)(7))

On page 28953, first column, after line 17, add:

"Intra-agency transfer need not be considered routine uses. Earlier versions of House privacy bills, from which the routine use concept derives, permitted agencies to disclose records within the agency to personnel who had a need for such access in the course of their official duties thus permitting intra-agency disclosure without the consent of the individual. The concept of routine use was developed to permit other than intra-agency disclosures after it became apparent that a substantial unnecessary workload would result from having to seek the consent of the subject of a record each time a transfer was made for a purpose '. . . compatible with the purpose for which [the record] was collected' (5 U.S.C. 552a(a)(7)). To deter promiscuous use of this concept, a further provision was added requiring that routine uses be subject to public notice. (5 U.S.C. 552a(e)(11).) It is our view that the concept of routine use was devised to cover disclosures other than those to officers or employees who have a need to for the record in the performance of their official duties within the agency.

"It is not necessary, therefore, to include intra-agency transfers in the portion of the system notice covering routine uses (5 U.S.C. 552a(e)(4)(D)) but agencies may, at their option, elect to do so. The portion of the system notice covering storage, retrievability, access controls, retention and disposal (5 U.S.C. 552a(e)(4)(E)) should describe the categories of agency officials who have access to the system."

3. *Consent for access in response to congressional inquiries* (5 U.S.C. 552a(b)(9))

On page 28955, third column, after line 18, add:

To assure that implementation of the Act does not have the unintended effect of denying individuals the benefit of congressional assistance which they request, it is recommended that each agency establish the following as a routine use for all of its systems, consistent with subsections (a)(7) and (e)(11) of the Act:

Disclosure may be made to a congressional office from the record of an individual in response to an inquiry from the congressional office made at the request of that individual.

The operation of this routine use will obviate the need for the written consent of the individual in every case where an individual requests assistance of the Member which would entail a disclosure of information pertaining to the individual.

In those cases where the congressional inquiry indicates that the request is being made on behalf of a person other than the individual whose record is to be disclosed, the agency should advise the congressional office that the written consent of the subject of the record is required. The agency should not contact the subject unless the congressional office requests it to do so.

In addition to the routine use, agencies can, of course, respond to many congressional requests for assistance on behalf of individuals without disclosing personal information which would fall within the Privacy Act, e.g., a congressional inquiry concerning a missing Social Security check can be answered by the agency by stating the reason for the delay.

Personal information can be disclosed in response to a congressional inquiry without written consent or operation of a routine use—

If the information would be required to be disclosed under the Freedom of Information Act (Subsection (b)(2));

If the Member requests that the response go directly to the individual to whom the record pertains;

In "compelling circumstances affecting the health or safety of an individual * * *" (Subsection (b)(8)); or

To either House of Congress, or to the extent of matter within its jurisdiction, any committee or subcommittee thereof * * *" (Subsection (b)(9)).

The routine use recommended above and disclosures thereunder are, of course, subject to the 30 day prior notice requirement of the Act (Subsection (e)(11)). In the interim, however, it should be possible to respond to most inquiries by using the provisions cited in the previous paragraph. Furthermore, when the congressional inquiry indicates that the request is being made on the basis of a written request from the individual to whom the record pertains, consent can be inferred even if the constituent letter is not provided to the agency.

"This standard for implied consent does not apply to other than congressional inquiries."

4. *Describing the purpose in the accounting of disclosures* (Subsection (c)(1))

On page 28956, first column, after line 42, add:

"Agencies which submit inquiries to other agencies in connection with law enforcement or pre-employment investigations (e.g., record checks) are reminded to include the purpose in their record check in order to preclude having record checks returned to them to ascertain the purpose of the check. It is noted that this is necessary whether the inquiry is made pursuant to the subsection (b)(3) or (b)(7) ('routine use' or law enforcement disclosures). At a minimum, the inquiring agency must describe the purpose as either a background or law enforcement check."

5. *Agency procedures for review of appeals of denials of requests to amend a record* (Subsection (d)(3))

On page 28959, second column, after line 39, add:

"This does *not* mean that the officer on appeal must be a justice or judge. Rather, the reviewing official designated by the agency head may be a justice or judge (unlikely in this case) or any other agency official who meets the criteria in 5 U.S.C. 2104a (1), (2), and (3)."

6. *Correcting records released to an individual* (Subsection (e)(6))

On page 28965, second column, after line 6, add:

"While this language requires that agencies make reasonable efforts to assure the accuracy of a record before it is disclosed, when an individual requests access to his or her record, pursuant to subsection (d)(1), above, the record must be disclosed without change or deletion except as permitted by subsections (j) and (k), exemptions. To avoid requiring individuals to file unnecessary requests for amendment, however, the agency should review the record and annotate any material disclosed to indicate that which it intends to amend or delete."

7. *Rights of parents and legal guardians* (Subsection (h))

On page 28970, second column, after line 59, add:

"This is not intended to suggest that minors are precluded from exercising rights on their own behalf. Except as otherwise provided in the Act (e.g., general or specific exemptions) a minor does have the right to access a record pertaining to him or herself. There is no absolute right of a parent to have access to a record about a child absent a court order or consent."

8. *Relationships to the Freedom of Information Act* (Subsection (q))

On page 28973, third column, after the last line, add:

"In some instances under the Privacy Act an agency may (1) exempt a system of records (or a portion thereof) from access by individuals in accordance with the general or specific exemptions (subsection (j) or (k)); or (2) deny a request for access to records compiled in reasonable anticipation of a civil action or proceeding or archival records (subsection (d)(5) or (1)). In a few instances the exemption from disclosure under the Privacy Act may be interpreted to be broader than the Freedom of Information Act (5 U.S.C. 552). In such instances the Privacy Act should not be used to deny access to information about an individual which would otherwise have been *required* to be disclosed to that individual under the Freedom of Information Act.

"Whether a request by an individual for access to his or her record is to be

January 12, 1976

SECY 76-20

COMMISSIONER ACTION

For: The Commissioners

From: Kenneth R. Chapman, Director
Office of Nuclear Material Safety and Safeguards

Thru: Executive Director for Operations

Subject: TASK FORCE FOR THE MATTER OF REVIEW OF REGULATION OF RADIUM AND ACCELERATOR PRODUCED RADIOACTIVE MATERIAL

Purpose: To obtain Commission comments on a proposed internal Task Force to review the regulation of radium and accelerator produced radioactive material, and on a letter to FDA.

Discussion: As requested in the meeting with the Executive Director for Operations on January 6, 1976, enclosed is a memorandum to implement a Task Force to review the matter of regulation of radium and accelerator produced radioactive material (Appendix A).

A copy of the Agreement State recommendations to the staff on this matter is shown in Appendix B.

Copies of the Conference of Radiation Control Program Director's letter of May 20, 1975, regarding the matter, and Chairman Anders' reply dated July 14, 1975, are shown in Appendix C.

A copy of pages 65-67 of a June 1, 1973 GAO report on the Agreement State program expressing similar concerns is shown in Appendix D.

Kenneth R. Chapman, Director
Office of Nuclear Material
Safety and Safeguards

Enclosures: See attached

Contact:
G. Wayne Kerr
J. O. Lubenau
492-7767

NOTE: Commissioners' comments should be provided directly to the Office of the Secretary by c.o.b. Tuesday, January 20, 1976.

Enclosures:
1. Appendix A - memorandum w/background report
2. Appendix B - Ltr fm Texas dtd 10/16/75
3. Appendix C - Ltr fm Charles M. Hardin dtd 5/20/75 & Chairman Anders' reply dtd 7/14/75
4. Appendix D - Excerpt fm GAO rpt dtd 6/11/73
5. Appendix E - Proposed Letter to FDA

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

Howard K. Shapar
Office of the Executive
Legal Director

Joseph D. Lafleur, Jr.
Acting Director
Office of International and
State Programs

John G. Davis, Acting Director
Office of Inspection and
Enforcement

Robert B. Minogue, Director
Office of Standards Development

TASK FORCE FOR THE MATTER OF REVIEW OF REGULATION OF RADIUM AND ACCELERATOR-PRODUCED RADIOACTIVE MATERIAL

NRC has been requested by the Agreement States and by the Conference of Radiation Control Program Directors to look into the matter of the regulation of radium and accelerator-produced radioisotopes. A background report on the problem prepared by the Agreements and Exports Branch, NMSS, is attached.

At the October 1975 meeting of the Agreement States, NRC announced that an internal Task Force will be formed to perform a review of this matter. The Task Force will include representatives from ELD, SD, IE, ISP and NMSS and a representative from an Agreement State and from the Bureau of Radiological Health (FDA) to serve as resource persons. The Task Force will be chaired by Don Nussbaumer, NMSS. Please provide to him the name of your representative by January 30, 1976. The Task Force will begin its work in the near future.

Lee V. Gossick
Executive Director
for Operations

Attachment:
Background Report

Appendix A

Background Report on the Matter of
Regulation of Naturally Occurring
and Accelerator-Produced Radioactive Material
January 7, 1976

Background

The Atomic Energy Act, as amended, requires the NRC to regulate source, by-product and special nuclear material. Naturally occurring radioactive material, principally radium, and accelerator-produced radioactive material is subject to varying degrees of regulatory control by the states. Twenty-seven states license these materials (all Agreement States, plus two non-Agreement States), twenty-two states conduct a registration program and one state has no program. Inspection and enforcement efforts are equally variable in scope. There is no basis at this time for expecting a minimum, uniform regulatory program to develop through individual states' actions. There are also specific areas where national regulatory action and coordination is appropriate, e.g., the development and enforcement of product standards and the control of distribution of consumer-type products.

Since 1912, nearly 2000 grams of radium have been produced in, or imported into, the United States. Early regulatory efforts to control radium hazards began in the 1930's, but significant, though limited, impact was not made until the 1960's. By that time, nearly all the radium in the United States had been produced and distributed in a wide variety of consumer products and medical and industrial devices. According to published state statistics, approximately 3,300 persons are currently known to regulatory agencies to possess radium sources. These are classified as 1900 medical users, 1000 industrial users and 400 other types of users. Approximately 1400 of these 3,300 persons are located in non-Agreement States. These figures do not include owners of consumer-type products presently in the public domain and numerous other sources which are subject to regulation and which are "lost." Reported radium incidents occur at a rate of about four per month.

The production and use of accelerator-produced radioisotopes is a post-WW II phenomenon and is increasing. The scope of state regulatory activities for these materials is similar, and therefore as disparate, as they are for radium.

The GAO report on the Agreement State program, dated June 11, 1973, documented the concern of the states regarding the lack of uniform controls over all radioactive material. In October 1974, the Agreement States strongly recommended the NRC assume regulatory responsibility for naturally occurring and accelerator-produced radioactive materials.

The Conference of Radiation Control Program Directors in letters to the Commissioners dated May 20, 1975, strongly urged the NRC to take such action. (Copies of the report and letters pertaining to these requests are appended to this report.)

Issue

The issue is to decide whether to leave the regulation of these materials under minimal and non-uniform regulation, to recommend regulation by other Federal agencies, or, in accordance with recommendations, take action to include these materials under NRC jurisdiction. The last alternative would require an amendment to the Act, changes to the regulations, and result in added workloads to the materials licensing, inspection and standards development areas. Currently, NRC administers approximately 8300 licenses. Assuming that the regulatory control of radium and accelerator-produced materials by Agreement States will be continued, NRC's inspection and licensing load would be increased by about 17%. The impact on Standards Development is not defined at present.

Current Position

The States look to NRC as the lead agency in the regulation of nuclear energy and radioactive materials. Serious consideration has not been previously given by NRC to obtain this authority. The Agreement States have expressed a strong recommendation that NRC take action. Such action by NRC should also result in clarification of OSHA's role in regulating these sources (by reserving regulatory authority in this area to NRC and to the Agreement States). The Department of Labor has stated they believe regulations governing product design and manufacture are needed. Chairman Anders, in his response to the Conference of Radiation Control Program Directors, stated NRC is in the process of studying this proposal (attached).

Possible Issues, Controversies and Problems

a. Generic technical and policy matters - Basic standards for the evaluation of the hazards and degree of controls to be applied to products containing these materials (watch dials, static eliminators, luminous paints, etc.) need to be developed. Whether or not to even attempt to exercise control over consumer product-type sources already in the public domain is a basic policy matter to be developed.

b. Staff-licensee controversies - Many present radium users will have difficulty in adjusting to tight regulatory control. An indeterminate, but significant, number of persons will probably elect to dispose of sources rather than adapt to the tighter controls. In the medical area, conversion to the use of sealed sources containing byproduct material, and to the use of afterloading techniques, can be expected. Such changes would be consistent with numerous recommendations already issued by Federal, state, and medical groups.

c. Public reaction - Public reaction should be favorable since it would serve to further ensure the public health and safety.

d. Regulations needing revision - Several parts including 10 CFR 19, 20, 30-36, 71, 150 and 170.

e. Issues relating to the other agencies:

(1) Federal - FDA's Bureau of Radiological Health currently conducts a modest voluntary cooperative program in this area with the states. FDA has an extensive reservoir of information on radium hazards but has no regulatory authority in this area. FDA is hopeful of gaining legislative authority to regulate medical devices and such authority would provide product standards to sealed sources used in brachytherapy. As noted previously, the Department of Labor would probably be receptive to the move. EPA currently operates a radium disposal facility. (Operation of this facility has been found to be vital to programs which have been successful in encouraging the discontinuance of radium use.) EPA's role on the environmental issues concerning controls of naturally occurring radioactive materials is indeterminate. (Examples of natural occurrences are high concentrations of radioactive materials in mineral industry mines, in drinking waters, in beach sands, etc.)

(2) State - Current state programs range from none to extensive licensing and inspection efforts. "Grandfathering" existing state programs which provide licensing and inspection will probably be sought by the states. However, Federal assistance, or direct Federal control, may be requested by the states for specified problem areas, e.g., control of mill tailings, and decontamination of contaminated buildings and structures.

Recommendation

It is recommended that an internal NRC Task Force be created to review this matter. Membership should consist of representatives of the Agreements and Exports Branch, Materials Branch, Standards Development, the Office of Inspection and Enforcement, and the Office of the Executive Legal Director. The FDA, having had experience in radium hazards evaluation, and the states, should be asked to provide representatives to serve as resource personnel.

Texas State Department of Health

MILTON P. PLAVY, M.D., M.P.H.
COMMISSIONER OF HEALTH

CLIFF L. DUFF, M.D., D.P.H.
DEPUTY COMMISSIONER

AUSTIN, TEXAS 78756

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October 16, 1974

RECEIVED
U.S. ATOMIC ENERGY COMMISSION
AGREEMENTS AND EXPORTS BRANCH
OCT 22 1974
AM 7,8,9,10,11,12,1,2,3,4,5,6 PM

Mr. G. Wayne Kerr, Chief
Agreements & Export Branch
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Wayne:

At the Annual Meeting of the Agreement States, October 8-11, 1974, the State caucus held on October 9, made the following requests and recommendations of the A.E.C.

1. The States appreciate the Agreement and Export Branch's expressed interest in providing additional training for state regulatory personnel. The States request that the Agreement and Export Branch continue close coordination with the Government Liason Division in establishing priorities for training programs in order that the priorities established by the National Conference of Radiation Control Program Directors receive due consideration.

   The Texas Radiation Control Branch is currently developing an Oil Well Logging Course in cooperation with the Region VI training committee. The States request that the A.E.C. consider funding state attendees to that course and possibly others that may be developed to meet specific regulatory needs.

2. The States request that the A.E.C. reevaluate Generally Licensed Devices used in measuring levels, density and thickness with the intent to determine if the devices currently being distributed continue to meet radiation safety criteria which allow them to be eligible for general licensed distribution. The evaluation should include a determination that the devices continue to meet essential safety criteria throughout their useful life.

The States will provide the A.E.C. a list of observed circumstances which indicate that the requested evaluation may show that these devices may not be eligible for continued distribution for generally licensed use. The list will be sent to you by Aubrey Godwin, 1975 Chairman, in 60 days.

3. The States request that the A.E.C. consider changing 10 CFR 30.204 to allow land burial of small quantities of radioactive material by specific request only. (Similar to the current rule for specific approval of incineration.)

4. The States request the A.E.C. to investigate the possibility of providing the States with uniform soil contamination limits.

5. The States request that the A.E.C. provide descriptive Sealed Source and Device sheets for devices distributed under the terms of General Licensing. The States will provide similar sheets for devices distributed under their licensure.

6. The States request that the A.E.C. consider reestablishing notifications of shipments of large quantities of radioactive materials and quantities of S.N.M. sufficient to form a critical mass thru state jurisdictions.

7. The States recommend strongly that the A.E.C., or it's successor agency, move immediately to bring accelerator produced and naturally occurring radioactive material under it's jurisdiction.

The States also suggested that the A.E.C. should examine the possible impact of the Act creating a new agency upon agreements now in effect with the U. S. A.E.C.

The States expressed appreciation for the positive action of Mr. Brown of the Government Liason Division in committing funds to permit interaction of the States in emergency response planning.

I am enclosing a copy of Dr. Paul Numerof's "shotgun" letter to state program personnel. The States feel that the establishment of an organization such as this may tend to dilute the proper routes for notification of incidents and accidents.

I want to express our appreciation to you and Don Nussbaumer in particular and the rest of the A.E.C. staff in general for a productive meeting with a minimum of controversy. We recognize that your problems and ours are many and varied and we look forward to working with you as we attempt to improve radiation safety practices in mutual areas of concern.

Yours truly,

David K. Lacker

David K. Lacker
Chairman, Agreement States
1974 Meeting

Encl.

CONFERENCE OF RADIATION CONTROL PROGRAM DIRECTORS

May 20, 1975

Richard T. Kennedy
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Commissioner Kennedy:

On behalf of the Conference of Radiation Control Program Directors, I want to thank you for giving members of our Executive Committee the opportunity to meet with you and discuss the activities of our Conference. I feel that the meeting was very fruitful in that we were able to learn of some of your concepts relating to state activities, and we hope we were able to provide you information as to the Conference's relationship with the Nuclear Regulatory Commission.

As indicated during our visit, the Conference of Radiation Control Program Directors represents the radiation control programs of each of the fifty states, the District of Columbia, certain metropolitan agencies, the Virgin Islands, and Puerto Rico. The Conference, therefore, not only represents those states which have signed agreements with the Nuclear Regulatory Commission but all radiation control programs. On the attached document I have listed the objectives of this Conference and the task forces which have been active during the past year. In addition to these task forces, the Conference also performs its work through workshop activities at its annual meeting. Also attached is a listing of these specific workshops which were conducted at our last annual meeting. Proceedings of this annual meeting will be published, and we will provide you with a copy when the proceedings are available.

I would like to list some of the points which were discussed with you during our meeting.

1. The Agreement States have expressed concern regarding the organizational location of the Agreements and Exports Branch within the NRC. Prior to the reorganization of the AEC in May of 1972, the Agreement States communicated with the Division of State and Licensee Relations. Organizationally, this Division was only two levels below the Commission. It was felt by the Agreement States that this Division was able to express the concerns of the Agreement States to the Commission. It was also felt that the Division of State and Licensee Relations was involved in policy development for the Commission. Currently, the Agreement States communicate with the Agreements and Exports Branch within the Division of Materials and Fuel Cycle Facility Licensing. Several states have expressed concern that after the reorganization of May 3, 1972, of the AEC and the last reorganization of January 19, 1975, the communication point with the NRC is at such a

level in the organization that these concerns may not reach top management.

2. In light of the concern as expressed in item no. 1 above, another point discussed during our meeting was the consideration of the establishment of an advisory group to the Commission representing the states. Such an advisory group could not only express the concerns and interests of the Agreement States but, additionally, could inform the Commission of other state activities and concerns in matters dealing with environmental monitoring of nuclear facilities, emergency response planning and capabilities, and other topics of state concern. If such a group would be appropriate, the Executive Committee of the Conference could serve in this capacity.

3. Another suggestion for consideration regarding improved communications from states to the NRC would be the establishment of a regional position in each of the NRC regional offices whereby direct communication with states and the regional office could occur. Both the FDA and the EPA have such positions and have found these regional contacts with states to be very productive.

4. There is concern on the part of several states regarding the need for Federal control of radioactive material not being regulated by Agreement States or the NRC. Most Agreement States have included naturally occurring and accelerator produced radioactive material under the same regulatory control as materials coming under the Atomic Energy Act when these agreements were signed. However, since there are 25 non-Agreement States, there is a definite gap existing in the proper control of these non-Agreement materials. Therefore, we strongly urge the NRC to consider taking appropriate actions to place this type material under the same control as is now applied to materials falling under the Atomic Energy Act.

Again, let me thank you for giving us the opportunity to meet with you. We hope this is one of several opportunities that we will have to periodically meet with the Commission.

Yours very truly,

Charles M. Hardin

Charles M. Hardin
Past-Chairman

CMH:co

Attachments

JUL 1 1 1975

Mr. Charles M. Hardin
Past-Chairman
Conference of Radiation
Control Program Directors
213 Birchwood
Frankfort, Kentucky 40601

Dear Mr. Hardin:

I am pleased that you and the members of the Executive Committee felt that the April 8 meeting was a fruitful one. I regret that I was not able to join Commissioners Gilinsky, Kennedy and Rowden. I understand that they share the Executive Committee's feeling and appreciated the candid exchange of information and ideas on state-federal interrelationships which ensued. I hope that such discussions can be held with greater frequency in the future.

With regard to the points raised in your letters of May 20, 1975, my comments address them in the order in which they were presented.

1. You expressed concern regarding the location of the Agreements and Exports Branch within the NRC. We are mindful of the need to assure ready access to the Executive Director for Operations and the Commissioners by those concerned with matters affecting the States, and such access is afforded. As examples, recent decisions concerning Commission actions regarding the American Nuclear Corporation in Tennessee and Nuclear Engineering Company in Kentucky were reached after consideration of these matters by the Commissioners. Close liaison is maintained by our Office of International and State Programs with all of the states as well as with the Agreements and Exports Branch and other Commission staff. We believe that this provides a communication net which assures that all state concerns reach the appropriate levels of management. On the other hand, if there are instances where you perceive this not to be the case, please do not hesitate to bring them to my attention.

2. You suggest that the Commission consider establishing an advisory group from the states and, in fact, that the Executive Committee of the Conference could serve in this capacity. The Commission's basic regulatory responsibilities stem from health and safety concerns, and involve related aspects such as balancing the need for new nuclear facilities with their environmental impact.

Realizing that states have similar concerns, the Commission, for example, has been working with the Conference on radiological health and safety matters and with a committee of state representatives to assure that our mutual concerns are understood and satisfied to the extent possible. The Conference and the siting committee are thus acting as special advisory groups to the Commission and I trust that this relationship will continue. Perhaps your suggestion of the establishment of a state advisory group could be implemented to focus the Commission's state-federal interrelationships. We have asked the staff to look into this possibility, and we will be in touch with you on this matter soon.

3. You also suggest that the Commission consider establishing regional positions to foster improved communications between the states and NRC. We agree that "close communication" with the states is highly desirable in such areas as emergency preparedness planning, siting, environmental and transportation surveillance, agreement state program, and other subjects of mutual interest. I appreciate your highlighting this subject as one of the Conference recommendations. Again, we are looking into the possible ways of accomplishing this important objective and will want to discuss this with you. If you have additional suggestions regarding specific advantages or considerations for such regional positions, please be sure to bring them to our attention.

4. You also suggested that the NRC consider taking action to assure that radioactive material in the non-agreement states not presently covered is subject to the same control as in the agreement states. As you know, this recommendation was also made at the last meeting of the Agreement States in Bethesda in October 1974. We are currently in the process of studying this proposal, which has far reaching implications for the NRC, and will keep the Conference and the Agreement States informed of any action we take.

I would like to thank you and the Conference for your recommendations, and I hope that this response will serve to improve our dialogue on these matters of mutual concern.

Sincerely,

/s/

William A. Anders
Chairman

REPORT TO THE JOINT COMMITTEE ON ATOMIC ENERGY CONGRESS OF THE UNITED STATES

Opportunities For Improving AEC's Administration Of Agreements With States Regulating Users Of Radioactive Materials B-155352

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

JUNE 11, 1973

LACK OF UNIFORM CONTROLS OVER RADIOACTIVE MATERIAL

A number of States expressed concern about the lack of comprehensive Federal controls--or uniform and compatible State controls--over naturally occurring radioactive materials (such as radium) and accelerator-produced radioactive materials. No Federal agency has comprehensive jurisdiction over users of such materials, even though their hazards are similar to those of reactor-produced radioactive materials. In fact, according to AEC and HEW, radium is more hazardous than most manmade radioactive materials.

All agreement States have developed comprehensive regulatory programs; they regulate both agreement and nonagreement materials. AEC has regulatory responsibility for the possession and use of agreement materials in nonagreement States. AEC has no responsibility, however, for other radioactive materials (radium and accelerator-produced isotopes) users, and agreement States have been concerned about the extent to which nonagreement States regulate such users. In addition, although the Department of Labor has responsibility under OSHA for regulating radium and accelerator-produced materials as they affect the health and safety of employees, the Department does not have responsibility for regulating other aspects of the manufacture and use of these materials.

Several agreement-State program directors expressed concern to us about the lack of uniform and compatible controls over devices containing radium which are manufactured in nonagreement States and distributed throughout the United States. In addition, these officials stated that competent regulatory authorities need to evaluate and control the design, construction, and testing of such devices to insure that proper radiological safety requirements are met. To illustrate the importance of this problem, in 1971 two-thirds of the companies which sold devices containing radium were located in nonagreement States and accounted for 91 percent of the total devices sold.

The following comments made by radiation control officials of three agreement States in response to our questionnaires illustrate the concerns of the States.

Kansas

"A considerable amount of time has been spent in this state locating, evaluating, and correcting problems caused by the receipt and use of 'non-licensed' radioactive materials. Such devices have in some cases entered the surplus market and been responsible for contamination incidents; some have been sold to persons unfamiliar with radiation safety and used without proper authorization. Some are quite likely being sold in the state at this time and this office is unaware of the nature of the device, its use, and degree of hazard, if any."

Maryland

"* * * density gauges and the * * * fire detectors containing radium have given considerable administrative problems since their home base is in a non agreement state, and we cannot rely on an agency to assure continued regulatory control over the manufacture of the devices. There is a definite need for a single agency having jurisdiction to do an evaluation and provide regulatory control for non agreement state manufacturers. We could then rely on the agency findings in our licensing actions."

North Carolina

"Evaluation and control of devices and device manufacture by competent authorities having regulatory jurisdiction provide needed assurance of initial and continued device safety and quality control. Non-agreement material from non-agreement states is not adequately controlled to provide the same safety assurance as in the case of agreement material and non-agreement material from agreement states.

"Devices of foreign manufacture present similar problems."

Agreement-State officials said they would like to have some assurance that all States are evaluating and controlling manufacturers of such devices adequately.

The Commissioner of FDA has concurred in the States' concern. In a March 13, 1972, letter to the chairman of the Conference of Radiation Control Program Directors, he stated

> "I concur in your evaluation that the control over radium and accelerator-produced material is not uniform and compatible with that exercised by the Atomic Energy Commission over material under their authority. This lack of uniform Federal/State control does pose problems regarding the design and safety of products manufactured without regulatory review and control and sold to individuals in the licensing and nonlicensing States. In addition, there is the problem of uniform qualification and control of users since only 22 Agreement States, New Jersey, and Pennsylvania license radium users."

In December 1972 a BRH official told us that, to assist the States, BRH had initiated an informal program for evaluating, upon request by an agreement State, the radiation safety aspects of manufacturers' products in nonagreement States. He said that BRH and radiological health personnel from the nonagreement State evaluate these products at the manufacturer's plant. He also said that this program is only voluntary because BRH does not have statutory authority to inspect manufacturers of products containing radioactive materials.

In commenting on our draft report, the Department of Labor told us that, although OSHA covers radium and accelerator-produced materials as they affect the health and safety of employees, it believes that further regulation is needed in product design and manufacture.

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

John C. Villforth, Director
Bureau of Radiological Health
Food and Drug Administration
Public Health Service
U. S. Department of Health,
Education and Welfare
5600 Fishers Lane
Rockville, Maryland 20852

Dear Mr. Villforth:

The U.S. Nuclear Regulatory Commission has been requested by the Conference of Radiation Control Program Directors and by the Agreement States to review the regulation of naturally occurring and accelerator-produced radioisotopes.

In response to these requests, we are forming an internal task force to recommend a course of action. We are, of course, very much aware of the extensive reservoir of experience and technical knowledge in this area within the Bureau and in the States. During our recent meeting of the Agreement States, they designated Dave Lacker to serve as a resource person. Accordingly, I wish to extend an invitation to the Bureau to provide a representative to participate as a resource person on the task force.

If this is agreeable, please furnish the name of your designee to Don Nussbaumer, Assistant Director for Materials Safety and Licensing. We anticipate that the task force will begin work early in 1976.

Sincerely,

Lee V. Gossick
Executive Director
for Operations

Appendix E

February 11, 1976 SECY-76-81

COMMISSIONER ACTION

FOR: The Commissioners

FROM: Peter L. Strauss, General Counsel

SUBJECT: FOIA REQUEST FROM CONGRESSWOMAN ABZUG

DISCUSSION: Attached is a proposed letter to Congresswoman Abzug, in response to her recent FOIA request. The request, which arises out of the recent Pollard matter, is granted in full, but with a paragraph explaining the format and tentative character of the Technical Safety Activities Report. EDO, NRR, and ELD have concurred. OPE has no comment at this time. The Technical Safety Activities Reports, which are voluminous, are available in the Office of the Secretary. Our response is due to Congresswoman Abzug by February 19. Please give any comments to the Office of the Secretary at your early convenience.

Peter L. Strauss
General Counsel

Attachments:
1. Proposed Letter
2. Incoming

CONTACT:
Janice Corr, OGC
492-7375

DISTRIBUTION

Commissioners
Commission Staff Offices
Exec Dir for Operations
Secretariat

NOTE: Commissioner comments should b
directly to the Office of th
by c.o.b. February 18, 19

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

OFFICE OF THE
CHAIRMAN

Honorable Bella S. Abzug
U.S. House of Representatives

Dear Mrs. Abzug:

Enclosed please find copies of the documents requested in your letter of January 30, 1976.

Item 6 of your request, the "Technical Safety Activities Report," related to nuclear power plant licensing. Several such reports have been issued to date (Item 6 and Item 7). The activities referred to in these reports are primarily related to the development of improved calculational techniques to be used by the NRC staff in evaluating nuclear power plant performance, or to the development of new technical positions to be incorporated into NRC regulatory guides. These reports were begun as a management technique to organize and schedule technical activities of the licensing staff of approximately 450 engineers and scientists. Although the format and contents of these reports have not yet been developed into the programmatic, scheduling and budgetary control document ultimately intended, copies have been distributed periodically throughout staff in order to provide updated information on the staff's current technical activities, including laboratory research and development programs. The items contained in these reports on staff technical activities have been the subject of numerous public discussions in ACRS meetings, meetings with vendors and utilities, NRC hearings, and other meetings, the minutes of which are available in the NRC Public Document Room. In the future, as issued, these reports will be placed in the NRC Public Document Room.

Sincerely,

William A. Anders
Chairman

Enclosures as stated

Attachment 1

COMMITTEES:
GOVERNMENT OPERATIONS
PUBLIC WORKS

Congress of the United States
House of Representatives
Washington, D.C. 20515

WASHINGTON, D.C. 20515

DISTRICT OFFICES:
225-7TH AVENUE
NEW YORK, N.Y. 10001

723 WEST 181ST STREET
NEW YORK, N.Y. 10033

720 COLUMBUS AVENUE
NEW YORK, N.Y. 10025

January 30, 1976

Mr. William A. Anders
Chairman
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Anders:

Persuant to the Freedom of information Act 5 USC 552, I hereby request the following documents:

The following correspondence between Mr. Anders and Mr. Robert Pollard, Project Manager in the Office of Nuclear Reactor Regulation and the NRC, and Mr. Pollard's attorney, Mr. Gary Simpson.

1. January 15, 1976 letter from Mr. Simpson to Mr. Anders
2. January 16, 1976 letter from Mr. Simpson to Mr. Anders
3. January 16, 1976 memorandum from Mr. Anders to Mr. Pollard
4. January 23, 1976 letter from Mr. Pollard to Mr. Anders
5. January 26, 1976 letter from Mr. Anders to Mr. Pollard
6. In addition, the "Technical Safety Activities Report", December 1976 and the accompanying letter of transmittal dated January 5, 1976, from Mr. Robert Heineman, Director, Division of Systems and Safety.
7. Finally, all previous issues of this periodic report issued since December 1974.

I believe that the release of this material is in the public interest and therefore request that any fees attendant on it be waived.

Under the Act, the Agency has 10 days within which to respond. I look forward to your early reply.

Sincerely,

Bella Abzug

BELLA S. ABZUG
Member of Congress

BSA

Attachment 2

THIS STATIONERY PRINTED ON PAPER MADE WITH RECYCLED FIBERS

February 19, 1976

UNITED STATES
NUCLEAR REGULATORY COMMISSION

SECY-76-97

INFORMATION REPORT

For: The Commissioners

From: T. A. Rehm, Assistant to the Executive Director for Operations

Thru: Executive Director for Operations

Subject: CONFIRMATORY RESEARCH PROGRAMS

Purpose: To provide information to the Commissioners.

Discussion: Attached for your information are implementation procedures to assure the necessary coordination between NRR and RES for confirmatory research programs.

T. A. Rehm
Assistant to the Executive
Director for Operations

Enclosure:
As stated

Contact:
B. Rusche
492-7691
H. Kouts
353-3473

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

FEB 1 1 1976

L. V. Gossick, Executive Director for Operations

CONFIRMATORY RESEARCH PROGRAMS

The Energy Reorganization Act of 1974 placed certain responsibilities relative to confirmatory research on RES and the other major NRC Offices. Section 205 of the Act charges that RES is responsible for recommending, engaging in, and contracting for research activities as are necessary for the effective performance of the Commission's licensing and related regulatory functions. Section 203(b)(3) established the responsibility that NRR recommend research necessary for the discharge of the functions of the Commission.

In order to effectively and efficiently implement these responsibilities, we have recently established interoffice procedures for the identification and scheduling of confirmatory research programs considered necessary by NRR. These procedures include:

1. NRR and RES will undertake a review of NRR technical assistance activities to determine which of those activities more properly should be considered confirmatory research and should be transferred to RES. Likewise, RES and NRR will review the RES programs to see if any should be transferred to NRR.

2. RES and NRR will undertake a thorough review of all NRR-related programs presently funded by RES to re-evaluate NRR needs for such confirmatory research.

3. For all NRR-related activities to be funded by RES during FY 1977, NRR will clearly identify those activities that are important for the regulatory process. To ensure that those programs identified as necessary are consistent with budgetary realities and reflect NRR priorities, we are establishing additional procedures to require all NRR requests to RES for confirmatory research receive Office level approval. Further, once a program need is established RES will provide NRR with an estimate of the funding necessary to meet the desired completion date so that this may be mutually considered in assessing program priority and cost effectiveness.

4. Recognizing the importance of confirmatory research for the functioning of the regulatory process, all programs identified by NRR as important will to the extent permitted by budgetary realities be conducted by RES. To the maximum extent possible, those programs identified as necessary will receive the funding level and management efforts required to meet the requested completion date.

Ben C. Rusche, Director
Office of Nuclear Reactor
Regulation

Herbert J. C. Kouts, Director
Office of Nuclear Regulatory
Research

UNITED STATES
NUCLEAR REGULATORY COMMISSION

INFORMATION REPORT

March 2, 1976 SECY-76-125

For: The Commissioners

From: Herbert J. C. Kouts, Director, Office of Nuclear Regulatory Research

Thru: Executive Director for Operations

Subject: SANDIA INDUSTRIAL SABOTAGE STUDY - UNCLASSIFIED SUMMARY

Purpose: To inform the Commission of plans to release the contractor's combined Part I/Part II unclassified report of the classified (SECRET-NSI) Sandia Study, "Safety and Security of Nuclear Power Reactors to Acts of Sabotage".

Discussion: There have been numerous requests from the public sector as well as from other governmental agencies for information developed in the Sandia Study.

It is intended to respond to future such requests with the enclosed contractor's unclassified report. It is further intended to place copies of it in the NRC Public Document Room on March 11,1976.

Coordination: This paper has been concurred in by NMSS, NRR, I&E, SD, ELD, and ADM.

Herbert J. C. Kouts, Director
Office of Nuclear Regulatory Research

Enclosure:
Sandia Unclassified
Summary Report

Contacts:
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Printed January 1976

SAFETY AND SECURITY OF NUCLEAR POWER REACTORS TO ACTS OF SABOTAGE

(DRAFT)

Prepared for
United States Nuclear Regulatory Commission
Office of Nuclear Regulatory Research

by

Sandia Laboratories
Albuquerque, New Mexico 87115
Livermore, California 94550

ABSTRACT

A study has been made of the vulnerability of U.S. commercial light water reactor power plants to sabotage. The susceptibility of nuclear plants to sabotage and the consequences of a successful attack are compared with respect to other industrial and civil targets. Recommendations are given to further reduce the vulnerability of nuclear power plants to sophisticated sabotage threats.

ENCLOSURE

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SAFETY AND SECURITY OF NUCLEAR POWER REACTORS TO ACTS OF SABOTAGE

1. Background

Commercial nuclear power plants are designed and operated to very high standards to protect against accidents. The plants include a variety of engineered safety features which provide additional protection against a radioactive release. Consequently, the risk to the public due to accidents caused by equipment failure or operator error is very low.[1] There remains the question whether consequences of deliberate sabotage could contribute significantly to the public risk.

In 1968 the U.S. Atomic Energy Commission sponsored an appraisal of the potential hazard of industrial sabotage in nuclear power plants. This appraisal, directed by Dr. C. Rogers McCullough, reviewed the history of industrial sabotage and examined the motivation and extent of knowledge likely to be possessed by various types of saboteurs. An assessment was made of the likelihood and possible consequences of a number of sabotage acts and the level of damage necessary to create a public hazard. It was concluded that, although sabotage with serious consequences to the public is possible in theory, the probability of occurrence was sufficiently low that no undue risk to the health and safety of the public existed.

Recent events indicate that: (1) terrorism has increased in many parts of the world, (2) terrorists are becoming more sophisticated, and (3) a greater variety of more complex targets are being attacked. This situation demands reconsideration of the vulnerability of various civil and industrial facilities to sabotage. Thus early in 1974 the Atomic Energy Commission began at Sandia Laboratories this study on the vulnerability of nuclear power plants to sabotage. This report summarizes the objectives, methodology, results, and recommendations.

2. Study Objectives

The objectives of the study are:

(1) Evaluation of the susceptibility of nuclear plants to sabotage for a broad range of threats,

(2) Determination of the consequences of successful sabotage,

(3) Comparison of the susceptibility and the consequences with sabotage of other industrial targets,

(4) Recommendations of means by which sabotage might be prevented or its consequences mitigated.

The likelihood of sabotage attempts in nuclear power plants was not estimated.

Principal emphasis is on sabotage which could produce levels of radioactivity constituting a hazard to the lives, health, or property of the general public. Sabotage which would cause only loss to the operating utility company was not evaluated.

3. Study Methodology

Two typical U.S. commercial nuclear power plants -- one having a pressurized water reactor (PWR) and the other having a boiling water reactor (BWR) -- were studied in detail. A number of other plants of both reactor types were visited and studied in order to identify plant-to-plant differences and to assure general applicability of the results.

The study methodology (see Figure 1) combines systematic analysis and empirical gaming to identify plant vulnerabilities and to determine countermeasures. Fault trees were developed to systematically inventory all combinations of sabotage actions that could lead to a radioactive release from the plant. Adversary study teams developed detailed sabotage sequences describing how sabotage operations might be accomplished. Differing amounts of information and plant access were afforded to the teams. The teams evaluated the resources required to accomplish sabotage and estimated their chances of achieving success. These results were analyzed to obtain a qualitative measure of the susceptibility of the plants to sabotage.

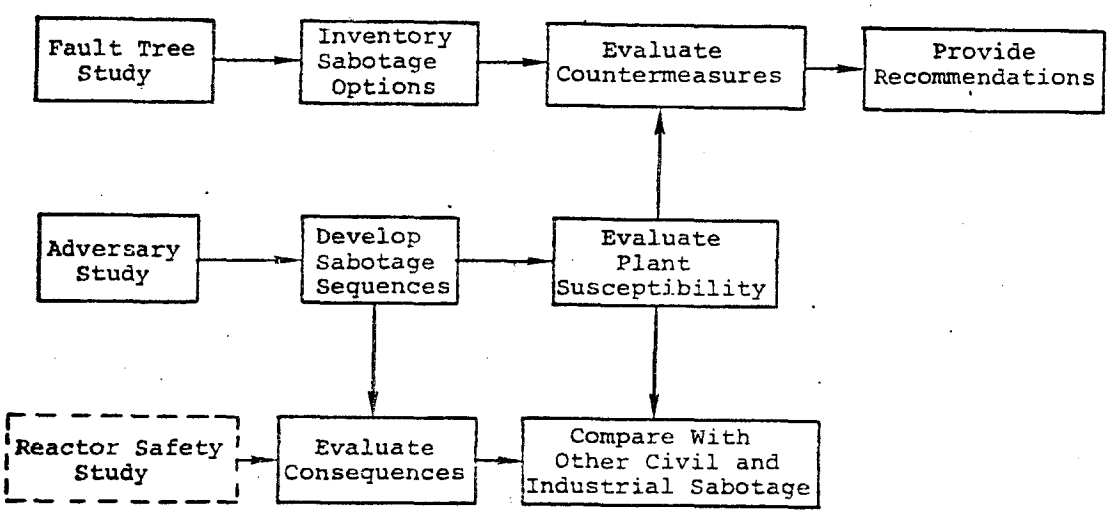

Figure 1. Study Methodology

The same combination of fault tree analysis and empirical gaming was employed to determine countermeasures to reduce the vulnerability of the plants to sabotage. The fault trees were analyzed to define conditions sufficient to prevent a radioactive release and to identify vital plant systems that should be protected. Measures to thwart sabotage were also formulated by members of the adversary teams by drawing upon their experience gained in perceiving how to penetrate the plant defenses.

The consequences of the sabotage sequences were estimated using data developed by the Reactor Safety Study. Adversary team members investigated the susceptibility of other targets to sabotage, and the consequences were estimated, in order to provide a basis for comparison.

4. Study Results

4.1 Inherent Resistance of Nuclear Plants to Sabotage

The following characteristics of commercial nuclear power plants greatly increase the difficulty of releasing radioactivity by sabotage:

(1) The "defense-in-depth" concept of reactor plant design;

(2) The massive structure of the plant, which protects critical components from external attack;

(3) The safety design basis of the plant, which emphasizes system reliability, flexibility, redundancy, and protection against common mode failures; and

(4) Engineered safety features, which are added to the basic system to cope with abnormal operations or accidents.

As an example, in a commercial light water reactor plant, fuel containing the radioactive fission products is enclosed in metallic cladding and is located within a thick steel reactor vessel. The reactor vessel and coolant piping are located within a massive steel and concrete containment structure. Although, in part, the purpose of these multiple containments is to provide successive confinement of radiotoxic fission products, the containments may also serve as effective physical barriers against external threats.

Factors that might decrease the resistance of the plants to sabotage are:

(1) Excessive dependence on external security systems to provide sabotage protection; and

(2) Possible conflicts in plant design and operation requirements for safety and for security, particularly in regard to access to vital plant components.

4.2 Susceptibility of Nuclear Plants to Sabotage

Acts of willful destruction occur in many industries. They may be caused by disgruntled employees during periods of discordant labor relations, by fanatics or extremists during periods of civil unrest, or by mentally deranged individuals. Such acts have rarely occurred at nuclear power plants. The sequences developed by the adversary teams and the systematic presentation of plant failure modes described by the fault trees jointly demonstrate that there is negligible chance that acts of willful destruction would result in release of radioactive materials.

Sabotage which might endanger the public could only be carried out by knowledgeable, capable personnel having a high degree of technical competence. Such an attack would require thorough planning in order to mount an effort coordinated to bypass the plant security system and to disable or destroy elements of several plant systems in the multiple plant defenses against a radioactive release.

4.3 Consequences

The elapsed time between the initiation of a sabotage-induced failure sequence and the actual release of radioactive materials varies considerably. For many credible sequences, such as long-term transient incidents, sufficient time is available after initiation for a plant damage control team to nullify or mitigate the consequences of the attack.

The Reactor Safety Study[1] developed methods to predict the magnitude of the radioactivity released and the public consequences occurring from random equipment failure and human error for various accident sequences. All sabotage options that have been identified lead to plant failure sequences that were included in the Safety Study. Therefore, sabotage cannot create consequences greater than those considered by the Study.

Many factors influence the consequences: the sabotage option chosen, the operating status of the engineered safety features, the containment failure mode, the time and space variation of the wind and meteorological conditions, the site population distribution, and the extent of emergency response by on-site and off-site personnel. Control of all these factors is well beyond the capabilities of a credible sabotage operation. Evaluation of the consequences arising from the sequences developed by the adversary teams yielded values that are a small fraction of the maximum consequences considered by the Reactor Safety Study.

4.4 Comparison with Sabotage to Other Targets

Within the civil, industrial, and military sectors of our society are many potential targets for sabotage, which, if attacked, could result in public harm. To evaluate objectively the risk resulting from sabotage of a given target, the following factors must be known:

(1) The likelihood that sabotage will be attempted,

(2) The susceptibility of the target to sabotage, and

(3) The consequences of successful sabotage.

Reliable methods have not been developed for predicting the likelihood of attack. Thus, judgments of the seriousness of the threat must be based on perception and intuition. The latter two factors, susceptibility and consequences, are amenable to analysis. Qualitative comparisons of the relative susceptibility of various targets to sabotage and estimates of the consequences can be made. Such objective knowledge of the susceptibility of a target and the consequences of a successful attack are useful inputs in making subjective judgments of risk.

Nuclear power reactors appear far less susceptible to sabotage than most other civil or industrial targets. The technical requirements, planning, and necessary manpower and equipment are much greater for a credible sabotage attempt on a nuclear power reactor than are required for an attack on other potential industrial or civil targets. The expected consequences of successful sabotage of a power reactor are comparable to the consequences that could be produced by sabotage of many other targets. The lower susceptibility to sabotage attack of nuclear reactors reduces the likelihood of credible attacks being mounted by unsophisticated elements.

Figure 2 shows a qualitative ranking of the magnitude of susceptibility of various targets to sabotage, along with the magnitude of consequences of successful sabotage. For equal attack likelihood, targets listed near the upper right-hand corner (high susceptibility, high consequences) present the greatest risk.

CONSEQUENCES	LOW	MEDIUM	HIGH
HIGH	NUCLEAR WEAPONS WARFARE CHEMICALS	DAM	WATER SUPPLY FOOD SUPPLY PUBLIC GATHERING
MEDIUM	NUCLEAR POWER REACTOR MUNITIONS DEPOT	PUBLIC BUILDING BRIDGE TUNNEL AIRPORT AND AIRCRAFT EXPLOSIVES	RAILROAD YARD AND TRAINS DOCKS AND SHIPS TOXIC CHEMICALS PETROLEUM AND NATURAL GAS
LOW	MILITARY BASE	BANK FOSSIL FUEL POWER PLANT	COMMUNICATIONS POWER TRANSMISSION

SUSCEPTIBILITY →

Figure 2. Comparison of Various Sabotage Targets

5. Recommendations

Recommendations have been developed to reduce further the susceptibility of nuclear power plants to sabotage. These recommendations fall into three categories: plant design, administrative control, and emergency planning.

5.1 Plant Design

In practice, sabotage protection as well as safety and operability considerations should be an integral part of nuclear power plant design.

Specific recommendations were developed for a PWR and a BWR nuclear power plant for plant design modifications to counter sabotage. The impact of these plant specific recommendations can be summarized by the following generic recommendations:

> Recommendation 1 - Systems* whose disablement, destruction, or misuse could cause a radioactive release, the immediate loss of reactor coolant, or the permanent loss of plant monitoring and control should be adequately protected by physical barriers, intrusion detection systems, and active response.

Examples are the reactor vessel and the control room. Protection of such systems should not be difficult since the safety-based design of the plant has already located these systems deep within the plant behind massive physical barriers.

> Recommendation 2 - Systems* required to provide recovery from short-term transient incidents which could lead to a radioactive release should be adequately protected by physical barriers, intrusion detection systems, and active response.

A flexible combination of physical protection and emergency plant damage control response (see Recommendation 6) is recommended to assure that transient incidents created by sabotage cannot lead to a radioactive release. Physical protection of some systems is required to prevent those transient sequences which might cause a release in times which are too short for plant damage control actions to be effective. Although these systems may be located throughout the vital area of the plants, they are highly redundant and are provided with great flexibility. Adequate protection of a required minimum set of these systems appears to require relatively minor plant modifications.

5.2 Administrative Control

Control of personnel access during shutdown, repair, or operation of nuclear power plants would preclude sabotage actions by unauthorized personnel. The

*Systems used here also denote plant features or areas.

specific recommendations that have been developed follow:

Recommendation 3 - Procedures should be developed to permit access to containment and other vital areas only to authorized personnel during shutdown, repair, or operation. Following every prolonged period of shutdown or repair, a methodical inspection of containment should be made by qualified personnel to assure that no foreign components have been emplaced.

Recommendation 4 - Close supervision, by knowledgeable personnel, should be given to maintenance or repair being performed on equipment of vital systems or in vital areas.

Recommendation 5 - Plant tours for the general public should not be conducted in vital areas.

Recommendation 4 could have spinoff benefit in terms of increased plant availability and safety.

5.3 Emergency Planning

The final recommendation involves planning for emergency damage control actions which would be performed by plant operating personnel. A flexible preplanned response by trained personnel of the plant operating staff would be a very effective countermeasure against sabotage.

Recommendation 6 - Emergency plans should include a damage control team to provide effective response to acts of sabotage. Equipment required by the team should be provided and plant modifications implemented to provide features to expedite the use of the equipment. The team should be capable of restoring long-term emergency cooling to effect safe shutdown following sabotage attack.

6. Summary

Nuclear power plants have inherent resistance to sabotage due to their safety-based design and construction. A highly determined, knowledgeable, planned, and skillful effort would be required in order for saboteurs to circumvent plant security measures, create an initiating incident, and disable the engineered safety features in order to cause a radioactive release from the plant. Countermeasures involving plant design, protective devices, administrative control, and emergency planning have been recommended to provide increased protection against such sophisticated efforts.

7. References

1. Reactor Safety Study - An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants, U.S. Nuclear Regulatory Commission, WASH-1400 (NUREG-75/014), October 1975.

2. C. R. McCullough, S. E. Turner, and R. L. Lyerly, An Appraisal of the Potential Hazard of Industrial Sabotage in Nuclear Power Plants, Southern Nuclear Engineering, Inc., SNE-51 UC-80, July 1968.

3. S. E. Turner, C. R. McCullough, and R. L. Lyerly, Industrial Sabotage in Nuclear Power Plants, Nuclear Safety, Vol. II, No. 2, March-April 1970, p. 107.

March 3, 1976 SECY-76-134

COMMISSIONER ACTION

For: The Commissioners

From: Kenneth R. Chapman, Director
Office of Nuclear Material
Safety and Safeguards

Thru: Executive Director for Operations

Subject: RESPONSE TO GAO RECOMMENDATIONS ON WASTE BURIAL GROUNDS

Purpose: Approval of letters to the President of the Senate, the Speaker of the House of Representatives, and the Comptroller General of the United States.
These letters are in response to the GAO recommendations to the Chairman, NRC, contained in their report to Congress, "Improvements Needed In The Land Disposal of Radioactive Wastes -- A Problem of Centuries," issued January 12, 1976.*

Discussion: The GAO report is a self-initiated document concerned with the disposal by land burial of other than high-level radioactive wastes. It addresses both Federal facilities controlled by ERDA and the commercial disposal sites regulated by NRC and the Agreement States. The report presents ten recommendations on the need for comprehensive studies of waste disposal sites, improvements in certain aspects of site operations and regulatory efforts, and evaluation of long-term care requirements. Enclosure 3 lists each specific recommendation and describes the action NRC plans to take to implement each recommendation. Certain recommendations will involve coordination between ERDA, the NRC and Agreement States. The need for coordination between the various Federal agencies and Agreement States is included in the proposed NRC actions. The proposed letters to Honorable Nelson A. Rockefeller, President

Contact:
P. Lohaus
492-7767

*SECY NOTE: Distributed to the Commissioners and other addressees as indicated in Enclosure 5, McTiernan memo of 1/21/76.

Discussion: (continued) of the Senate, and to Honorable Carl Albert, Speaker of the U.S. House of Representatives, (Enclosure 1), respond to the recommendations of GAO as presented in Enclosure 3. They, in turn, will refer our letter to the appropriate committees. In addition, OCA will take copies of our letter with a cover note to the JCAE and to the appropriate Appropriations and Government Operations subcommittee heads in the House and Senate.

It is pointed out that the NRC may require additional funds and staff to carry out the GAO recommendations. The subject of additional staff and funding will be addressed in a separate paper after the staff has determined the scope and detailed requirements necessary to carry out the recommendations. The proposed letter to Honorable Elmer B. Staats, Comptroller General of the United States, General Accounting Office, indicates that NRC has responded to the GAO recommendations (Enclosure 2).

Recommendation: That the Commission:

Approve the proposed letters, with enclosure, to the Honorable Nelson Rockefeller, the Honorable Carl Albert and Comptroller General Staats.

Coordination: The Office of the Executive Legal Director has no legal objection to the proposed letters. The Offices of the Controller and the Inspector and Auditor concur. OCA comments have been incorporated.

Kenneth R. Chapman, Director
Office of Nuclear Material
Safety and Safeguards

Enclosures:
1. Proposed letters to Nelson Rockefeller and Carl Albert
2. Proposed letter to Compt. Gen. Staats
3. NRC Proposed Actions on the GAO Recommendations on Waste Burial
4. Incoming from Staats
5. McTiernan memo 1/21/76

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SECY NOTE:

1. The GAO report is dated January 12, 1976 and requires response according to law not later than 60 days after the report date. Therefore, concurrent review by the General Counsel and the Office of Policy Evaluation is requested.

2. Commissioner comments should be provided directly to the Office of the Secretary by close of business Thursday, March 11, 1976.

D R A F T

Honorable Nelson A. Rockefeller
President of the Senate

(Identical letter to be sent to:
Honorable Carl Albert
Speaker of the
U.S. House of Representatives

Dear Mr. President:
(Dear Mr. Speaker:)

On January 12, 1976, the Comptroller General of the United States issued a report to Congress entitled, "Improvements Needed in the Land Disposal of Radioactive Wastes--A Problem of Centuries". The report addressed several recommendations to the Administrator, Energy Research and Development Administration (ERDA), and Chairman, Nuclear Regulatory Commission (NRC).

I am pleased to provide you with a statement of the actions NRC has taken or plans to take to implement the report's recommendations which are set out in the enclosure to this letter.

The Commission at the present time is not in a position to determine what additional funds are needed to carry out the recommendations. As the scope and detailed requirements of the NRC actions are established by NRC staff and if it becomes apparent that additional funds and staff are necessary, we will subsequently request them.

A principal GAO recommendation relates to conducting a comprehensive study of existing commercial and ERDA disposal

Enclosure 1

sites to better evaluate their ability to retain radioactive waste. It may be of interest to the Congress that the Commonwealth of Kentucky, an Agreement state, previously established a committee of federal, state, industry and university personnel to design a comprehensive study for the Maxey Flats, Kentucky site. The committee recommended a six-point program of studies which included a deep geology study, a weather zone study and an environmental-biological exposure pathway study. The Committee estimated that the cost for the complete six-point program would be in excess of one million dollars.

Presently, the U.S. Geological Survey plans to conduct studies at three commercial disposal sites including the Maxey Flats, Kentucky site. The NRC plans to work closely with the other federal and Agreement state agencies to achieve maximum cost-effectiveness in carrying out the comprehensive study recommended by GAO as well as the other GAO recommendations.

Sincerely,

William A. Anders
Chairman

Enclosure:
NRC Actions on GAO
Recommendations on
Waste Burial

D R A F T

Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office

Dear Mr. Staats:

This is to acknowledge receipt of your letter of January 12, 1976 transmitting to Congress copies of your report entitled, "Improvements Needed in the Land Disposal of Radioactive Wastes--A Problem of Centuries".

Enclosed is a copy of a statement provided to Congress which sets forth the actions NRC has taken and plans to take to implement the recommendations of the GAO report and explains that additional funding and staff may be needed to carry out the GAO recommendations.

Sincerely,

William A. Anders
Chairman

Enclosures:
Letters to the President
of the Senate and Speaker
of the House w/Enclosed
NRC Actions on GAO
Recommendations on
Waste Burial

Enclosure 2

NRC Actions on GAO Recommendations on Waste Burial

Actions to be taken by NRC to implement the recommendations in GAO report "Improvements Needed in the Land Disposal of Radioactive Wastes - A Problem of Centuries."

1. Recommendation that NRC and ERDA jointly should:
   - Enlist the cooperation of other Federal and State agencies with regulatory or program responsibilities and expertise and sponsor a comprehensive study of existing commercial and ERDA disposal sites to better evaluate their ability to retain radioactive waste; and
   - Use the results of the comprehensive study to develop site selection criteria for determining the long-term suitability of existing disposal sites and for selecting future sites.

2. Recommendation that ERDA and NRC jointly develop radiation detection standards for disposal sites and issue such standards for universal application.

3. Recommendation that ERDA and NRC direct their staffs, as part of the comprehensive study previously recommended, to evaluate the effectiveness of monitoring programs at existing disposal sites and to redesign them as necessary and that redesign work should be done in conjunction with Agreement States for disposal sites regulated by such States.

Enclosure 3

NRC Action:

The NRC generally agrees with the GAO recommendations. As an initial step to implement recommendations 1, 2 and 3, the NRC called a meeting of ERDA, U.S.G.S. and EPA representatives on February 13, 1976. The representatives agreed to establish a working group to coordinate implementation of these GAO recommendations. At this meeting, action was initiated to delineate various agency responsibilities, current agency activities relating to waste disposal, and actions which need to be taken. The NRC is providing initial leadership for the group and will respond to those areas of responsibility and need determined to be NRC's. The NRC will request State participation through the National Conference of Radiation Control Program Directors. In addition, the NRC is cooperating in a U.S.G.S. study and a contracted Brookhaven National Laboratory study. The U.S.G.S. is conducting a study to develop geologic and hydrologic criteria for evaluating waste burial sites and to develop predictive waste transport models. NRC is assisting U.S.G.S. in this program by providing analytical services for samples obtained by U.S.G.S. Under an NRC contract, work is underway at Brookhaven to carefully catalogue the types and characteristics of wastes likely to be found at the various burial grounds. This work will, in large measure, serve as the technical bases for developing improved criteria for the management and disposal of radioactive wastes.

4. Recommendation that NRC direct the staff to monitor the actions being taken by Kentucky and insure that the trench water problem at the Maxey Flats disposal site is corrected.

   NRC Action:

   The NRC has and will continue to review actions taken by Kentucky to improve the Maxey Flats burial ground water management program. The most recent review, conducted December 1-5, 1975, concluded the State is taking appropriate action regarding recommendations made by NRC to improve the water management program and is continuing their efforts to improve site operations. In February 1976, the NRC conducted a survey of the commercial burial grounds which included independent sampling by NRC. The results of analyses of samples taken at Maxey Flats indicate that releases of radioactivity to the site environs are decreasing.

5. Recommendation that NRC direct the staff to take the necessary actions to determine whether disposal site licenses should be renewed.

   NRC Action:

   The NRC only regulates the Nuclear Engineering Company site located near Sheffield, Illinois. The staff has requested Nuclear Engineering Company to submit an up-to-date application for renewal of the license, including an environmental report.

6. Recommendation that NRC direct the staff to arrange for the systematic exchange of monitoring results among the Federal and State agencies regulating or independently monitoring commercial disposal sites.

NRC Action:

The staff is arranging with appropriate Federal and State agencies, for the establishment of a formal program to exchange data regarding burial ground monitoring programs. The results of the February 1976 survey conducted by the NRC will be made available to interested agencies.

7. Recommendation that NRC direct the staff to establish independent monitoring programs for NRC-licensed disposal sites where there are no such programs or where existing monitoring programs are inadequate.

NRC Action:

The monitoring program at the NRC regulated Sheffield, Illinois, site will be carefully reviewed to determine its adequacy. Any deficiencies in the monitoring program proposed by the Nuclear Engineering Company will be corrected prior to renewal of their license. Confirmatory measurements to verify the results of the licensee's environmental monitoring program have been made by NRC in the past. The NRC plans to collect samples on a routine basis for analysis at the NRC's reference laboratory.

8. Recommendation that ERDA and NRC direct their staffs to study ways to improve record-keeping practices at commercial and Government-owned disposal sites.

NRC Action:

The NRC staff will take appropriate steps during review of the application for renewal of the license for the Sheffield site to

assure that records of waste buried will be accurate and quantitative, insofar as practicable.

The Task Force on Waste Management of the Conference of Radiation Control Program Directors has considered the problem of record-keeping at commercial burial grounds. It was agreed that some shipments of waste were not quantitatively identified. The Task Force is continuing to study this problem. We plan to work with the Task Force and provide continuing support.

9. Recommendation that NRC direct the staff to establish, in cooperation with Agreement States, long-term-care requirements for commercial disposal sites and require that adequate funding be established to support such requirements.

NRC Action:

The Conference of Radiation Control Program Directors' Task Force on Bonding is developing requirements relating to bonding and perpetual care funding for commercial radioactive waste burial grounds and guidance is set out in their January 20, 1975 report. However, the Task Force believes changes in the guidance provided may be needed in the future as more detailed requirements for perpetual care and maintenance are developed. The NRC participates in the Task Force and will continue to work with the States to develop better guidance concerning perpetual care and maintenance.

10. Recommendation that NRC and ERDA develop a policy on Federal involvement in correcting migration problems at commercial disposal sites.

NRC Action:

The NRC presently has a policy to assure correction of problems affecting health and safety at NRC and Agreement State licensed facilities. We would require an NRC licensee to take appropriate corrective action and we expect the Agreement States to require their licensees to take similar corrective action. We have and will continue to provide technical assistance to the Agreement States within our budgetary and technical resources. We will work with ERDA and other Federal agencies to establish a position on Federal involvement (both financial and technical) relating to correcting any migration problems at the commercial waste burial grounds.

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-164105

January 12, 1976

The Honorable William A. Anders
Chairman, Nuclear Regulatory Commission

Dear Mr. Anders:

Enclosed is a copy of our report to the Congress on improvements needed in the land disposal of radioactive wastes. This report discusses our findings and the recommendations to the Nuclear Regulatory Commission and the Energy Research and Development Administration concerning the need for a comprehensive study of existing radioactive waste disposal sites, improvements in program management and regulatory efforts, and evaluations of long-term-care requirements.

As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House and Senate Committees on Government Operations not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We appreciate the courtesies and cooperation extended to our representatives during our review.

Sincerely yours,

Comptroller General
of the United States

Enclosure

Enclosure 4

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

January 21, 1976

MEMORANDUM FOR: Chairman Anders
Commissioner Rowden
Commissioner Mason
Commissioner Gilinsky
Commissioner Kennedy

FROM: Thomas J. McTiernan, Director
Office of Inspector and Auditor

SUBJECT: GAO FINAL REPORT ENTITLED "IMPROVEMENTS NEEDED IN THE LAND DISPOSAL OF RADIOACTIVE WASTES--A PROBLEM OF CENTURIES"

In accordance with our August 25, 1976, memorandum concerning coordination of GAO activities within NRC, the subject report is being sent for your information.

It should be noted that this report does make recommendations directed to NRC, and as you know, section 236 of the Legislative Reorganization Act of 1970 requires the Chairman to submit a written statement on actions taken on GAO recommendations to the House and Senate Committees on Government Operations not later than 60 days after the date for the report and to the House and Senate Committees on Appropriations with the NRC's first request for appropriations made more than 60 days after the date of the report. This response on NRC's actions will be coordinated and drafted by EDO.

Should you have any views or comments on subject report, we will be happy to pass these on to GAO.

Enclosure:
Cy subj rpt

cc: L. Gossick, w/5 cys encl.
B. Huberman, w/encl.
P. Strauss, w/encl.
S. Chilk, w/encl.
J. Harris, w/encl.
C. Kammerer, w/encl.

Contact:
O. Gene Abston, OIA
49-27611

Enclosure 5

March 15, 1976 SECY-76-147

COMMISSIONER ACTION

For: The Commissioners

From: Ben C. Rusche, Director
Office of Nuclear Reactor Regulation

Thru: Executive Director for Operations

Subject: RESPONSES TO FEBRUARY 11, 1976 LETTER FROM REPRESENTATIVE BELLA S. ABZUG, FEBRUARY 11, 1976 LETTER FROM REPRESENTATIVE EDWARD I. KOCH, AND FEBRUARY 16, 1976 LETTER FROM SENATOR MIKE MANSFIELD

Purpose: Approval of letters to Representatives Abzug and Koch, and Senator Mansfield

Discussion: In a letter dated February 11, 1976 (Enclosure 4), Representative Abzug urges:

- suspension of licensing procedures for Indian Point Unit No. 3 pending a State investigation

- release of nuclear safety information requested under the Freedom of Information Act of January 20

In a letter dated February 11, 1976 (Enclosure 5), Representative Koch:

- states that he is concerned about the charges of Robert D. Pollard and requested a response to general and specific charges listed

Contact:
D. B. Vassallo
49-27831

Discussion: (continued)

In a letter dated February 16, 1976, (Enclosure 6) Senator Mansfield:

- enclosed correspondence from a constituent, Mr. Darrell J. Kruzen concerning safety of nuclear power plants

- requested information which might be of interest to Mr. Kruzen

The proposed responses transmit to Representative Bella S. Abzug, Representative Edward I. Koch, and Senator Mike Mansfield a copy of Chairman Anders' testimony at the JCAE hearings, with all supporting testimony and documents introducted into the record.*

Coordination:

The Office of the Executive Legal Director and the Office of Congressional Affairs concur in the proposed letters.

Ben C. Rusche, Director
Office of Nuclear Reactor Regulation

Enclosures:
1. Proposed reply to Rep. Abzug from Chairman Anders
2. Proposed reply to Rep. Koch from Chairman Anders
3. Proposed reply to Sen. Mansfield from Chairman Anders
4. Letter to Chairman Anders from Rep. Abzug dated 2/11/76
5. Letter to Chairman Anders from Rep. Koch dated 2/11/76
6. Letter to Chairman Anders from Sen. Mansfield dated 2/16/76

DISTRIBUTION

Commissioners
Commission Staff Offices
Executive Director for Operations
Secretariat

NOTE: Commissioner comments should be provided directly to the Office of the Secretary by c.o.b. Tuesday, March 23, 1976.

*This enclosure is the same package submitted to the JCAE on March 2, a copy of which was provided to each Commissioner's office prior to the NRC appearance at the hearings.

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

CHAIRMAN

Docket Nos. 50-247
and 50-286

Honorable Bella S. Abzug
U. S. House of Representatives

Dear Ms. Abzug:

Thank your for your February 11, 1976 letter regarding Indian Point Nuclear Generating Units 2 and 3 and Robert Pollard's allegations concerning the safety of the plant. Your request under the Freedom of Information Act was handled separately and the material that you requested was provided to your office by my letter of February 19, 1976. I apologize for the time it has taken to reply to the other matters raised in your letter, but that time has been spent by the Nuclear Regulatory Commission staff, my fellow Commissioners, and me looking into the merit of these allegations in great detail. As you are aware, the Joint Committee on Atomic Energy (JCAE) is holding extensive hearings into this matter. Let me assure you that the Nuclear Regulatory Commission would not permit the commencement of operation or continued operation of Indian Point Units 2 or 3 or any other reactor, unless and until we are satisfied that the plants can be operated safely. This is the paramount Commission responsibility. As is evidenced by our denial of further operation at Indian Point Unit 1 until safety improvements are completed, we are not hesitant to prevent operation of any nuclear plant that does not meet our tough safety requirements.

The technical items cited in your letter and enumerated by Mr. Pollard are not new. They are topics that have been reviewed by the NRC staff and the statutory Advisory Committee on Reactor Safeguards (ACRS). Even so, in light of Mr. Pollard's allegations and the seriousness with which we pursue all allegations concerning nuclear safety, I directed the NRC staff to reexamine all of these topics to assure that adequate protection is provided for the health and safety of the public at Indian Point Units 2 and 3. To this end, a special Task Group was formed by Mr. Rusche, Director of the Office of Nuclear Reactor Regulation, to review all technical subjects specified by Mr. Pollard. The work of this task group has in turn been reviewed carefully by senior NRC management. In addition, I have requested that the ACRS make an independent examination of these matters. Mr. Rusche's report is completed and concludes that adequate consideration has been given to each of the technical subjects specified by Mr. Pollard. To provide

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

Enclosure 1

you with the detailed bases for this conclusion and to indicate the depth of our investigation, I am pleased to provide you with a copy of Mr. Rusche's report and a copy of Mr. Rusche's and my testimony presented at the JCAE hearings on March 2, 1976, along with other material presented to the JCAE for inclusion into the hearing record.

Sincerely,

William A. Anders

Enclosures:
1. Statements Before the Joint Committee on Atomic Energy - March 2, 1976
2. NRC Staff Report on Technical Issues Raised by R. D. Pollard
3. NRC Inspector and Auditor Summary Report on Allegations by R. D. Pollard
4. NRC Staff Report on Technical Issues Raised by D. G. Bridenbaugh, R. B. Hubbard, and G. C. Minor
5. NRC Staff Report on Other Issues Raised by R. D. Pollard, D. G. Bridenbaugh, R. B. Hubbard, and G. C. Minor

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

CHAIRMAN

Docket Nos. 50-247
and 50-286

Honorable Edward I. Koch
U. S., House of Representatives

Dear Mr. Koch:

Thank your for your February 11, 1976 letter regarding Indian Point Nuclear Generating Units 2 and 3 and Robert Pollard's allegations concerning the safety of the plant. I apologize for the time it has taken to reply to the matters raised in your letter, but that time has been spent by the Nuclear Regulatory Commission staff, my fellow Commissioners, and me looking into the merit of these allegations in great detail. As you are aware, the Joint Committee on Atomic Energy (JCAE) is holding extensive hearings into this matter. Let me assure you that the Nuclear Regulatory Commission would not permit the commencement of operation or continued operation of Indian Point Units 2 or 3 or any other reactor, unless and until we are satisfied that the plants can be operated safely. This is the paramount Commission responsibility. As is evidenced by our denial of further operation at Indian Point Unit 1 until safety improvements are completed, we are not hesitant to prevent operation of any nuclear plant that does not meet our tough safety requirements.

The technical items cited in your letter and enumerated by Mr. Pollard are not new. They are topics that have been reviewed by the NRC staff and the statutory Advisory Committee on Reactor Safeguards (ACRS). Even so, in light of Mr. Pollard's allegations and the seriousness with which we pursue all allegations concerning nuclear safety, I directed the NRC staff to reexamine all of these topics to assure that adequate protection is provided for the health and safety of the public at Indian Point Units 2 and 3. To this end, a special Task Group was formed by Mr. Rusche, Director of the Office of Nuclear Reactor Regulation, to review all technical subjects specified by Mr. Pollard. The work of this task group has in turn been reviewed carefully by senior NRC management. In addition, I have requested that the ACRS make an independent examination of these matters. Mr. Rusche's report is completed and concludes that adequate consideration has been given to each of the technical subjects specified by Mr. Pollard. To provide

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

Enclosure 2

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William A. Anders

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

CHAIRMAN

Docket Nos. 50-247
and 50-286

Honorable Mike Mansfield
United States Senate

Dear Senator Mansfield:

Thank your for your February 16, 1976 letter regarding the views of your constituent, Mr. Darrell J. Kruzen, concerning the Indian Point Nuclear Generating Units 2 and 3 and Robert Pollard's allegations concerning the safety of the plant. I apologize for the time it has taken to reply to your letter, but that time has been spent by the Nuclear Regulatory Commission (NRC) staff, my fellow Commissioners, and me looking into the merit of these allegations in great detail. As you are aware, the Joint Committee on Atomic Energy (JCAE) is holding extensive hearings into this matter. Let me assure you that the Nuclear Regulatory Commission would not permit the commencement of operation or continued operation of Indian Point Units 2 or 3 or any other reactor, unless and until we are satisfied that the plants can be operated safely. This is the paramount Commission responsibility. As is evidenced by our denial of further operation at Indian Point Unit 1 until safety improvements are completed, we are not hesitant to prevent operation of any nuclear plant that does not meet our tough safety requirements.

The technical items cited in Mr. Kruzen's letter and enumerated by Mr. Pollard are not new. They are topics that have been reviewed by the NRC staff and the statutory Advisory Committee on Reactor Safeguards (ACRS). Even so, in light of Mr. Pollard's allegations and the seriousness with which we pursue all allegations concerning nuclear safety, I directed the NRC staff to reexamine all of these topics to assure that adequate protection is provided for the health and safety of the public at Indian Point Units 2 and 3. To this end, a special Task Group was formed by Mr. Rusche, Director of the Office of Nuclear Reactor Regulation, to review all technical subjects specified by Mr. Pollard. The work of this task group has in turn been reviewed carefully by senior NRC management. In addition, I have requested that the ACRS make an independent examination of these matters. Mr. Rusche's report is completed and concludes that adequate consideration has been given to each of the technical subjects specified by Mr. Pollard. To provide

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

Enclosure 3

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Sincerely,

William A. Anders

Enclosures:

1. Statements Before the Joint Committee on Atomic Energy - March 2, 1976
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5. NRC Staff Report on Other Issues Raised by R. D. Pollard, D. G. Bridenbaugh, R. B. Hubbard, and G. C. Minor

BELLA S. ABZUG
20th District, New York

COMMITTEES:
GOVERNMENT OPERATIONS
PUBLIC WORKS

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Washington, D.C. 20515

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New York, N.Y. 10025

720 Columbus Avenue
New York, N.Y. 10025

February 11, 1976

Mr. William Anders, Chairman
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Anders:

In light of charges made by Robert Pollard, NRC project manager, I urge that you suspend licensing procedures for Indian Point No. 3 pending a state investigation.

In addition, I urge you to immediately release the nuclear safety information that I requested under the Freedom of Information Act on January 20.

I enclose a full statement of my views on the situation regarding Indian Point No. 3, and an explanation of the above requests.

Sincerely,

Bella S. Abzug

Bella S. Abzug
Member of Congress

BSA/cl

Enclosure 4

Statement by Rep. Bella S. Abzug concerning safety dangers at Indian Point atomic power plants

February 10, 1976

The numerous dangers inherent in operating nuclear power plants are so apparent that even the people most committed to nuclear power are risking their reputations and their livelihoods to force long-suppressed information into view.

Now we have a charge by Robert Pollard, project manager for safety evaluations at the Nuclear Regulatory Commission, that the Indian Point nuclear plants threaten the health and safety of millions of people in the Greater New York area. Because of the utmost seriousness of these revelations, Governor Carey and other State officials have an immediate responsibility to protect the people living within the radiation reach of these plants.

I have been in close contact with Robert Pollard since mid-January. After he submitted his resignation at that time, officials at the NRC denied the importance of his charges and immediately limited the scope of his inquiry. Initially, Mr. Pollard had been promised access to all files necessary to substantiate his charges of unexamined safety problems, both at Indian Point No. 2 and No. 3 and at many other nuclear reactors throughout the nation. An attempt was made to restrict the topics of his final report. Mr. Pollard's attorney then consulted with the House Government Operations Subcommittee on Information and Individual Rights, which I chair. After the Subcommittee counsel telephoned Peter L. Strauss (counsel for the NRC), Mr. Pollard was allowed greater access to NRC files for the remainder of his period of employment.

However, Mr. Pollard has charged that crucial evidence of the agency's withholding of information on safety problems exists in the NRC internal files. On January 30, citing the provisions of the Freedom of Information Act, I formally requested the NRC to provide me with the following material:

1) The correspondence between Mr. Pollard, Mr. William A. Anders, chairman of the NRC, and Mr. Gary Simpson (Mr. Pollard's attorney) concerning Mr. Pollard's access to NRC files for the purpose of substantiating his charges.
2) Mr. Pollard's January 23 interim report listing unresolved safety problems at Indian Point.
3) The December 1975 "Technical Safety Activities Report," and previous issues of this report issued since December 1974.

I have been informed by Mr. Pollard that this third item is an updated compendium of continuing unresolved nuclear safety problems, with roughly one problem on each of its several hundred pages. Release of this quarterly publication will finally demonstrate the extent of the NRC's willingness to license plants now and ask questions about safety later.

Since all of this material is either in published form, or is correspondence involving Mr. Pollard, and none could under the most extreme definition be called classified national security information, I see no reason why this information should not be released immediately, rather than within the 30 days provided by the statute.

In addition, Mr. Pollard, whose formal term of employment ends February 13, should be allowed access to files at the NRC headquarters for as long as he requires to produce a substantive and comprehensive documentation of his charges.

As for the specifics of the Indian Point nuclear plants, Mr. Pollard has cited three principal dangers:

1) Lack of separation between electrical and instrument cables which jeopardize emergency backup systems;
2) Problems with backup diesel generating facilities;
3) Danger of overloaded pumps and turbines, leading to the possibility that a loosened flywheel could turn into a high-velocity missile, puncturing the nuclear container and releasing radioactive material into the atmosphere.

Mr. Pollard's focusing on these three areas does not preclude the existence of safety problems in other systems which he did not examine at these plants.

Until these questions have been resolved, Indian Point No. 2 should be shut down, and Indian Point No. 3 should not be licensed for operation.

I have questioned the safety and the economics of these plants since their inception. Beginning in April 1975, I attempted to block the sale of Indian Point No. 3 to the Power Authority of the State of New York (PASNY). In general, the State authorities involved took Con Edison's word about this plant, and they failed to consider my objections, as well as those of many other elected officials and concerned citizens. On January 19, before Mr. Pollard's story became known, I called upon the State Legislative Commission on Energy Systems to investigate the circumstances surrounding the sale of this plant. The need for such an investigationis even greater at this time.

Con Edison is now operating Indian Point No. 3 in its pre-operational phases under PASNY supervision. Con Edison has already applied to the Nuclear Regulatory Commission for a "full-term, full-power license" for Indian Point No. 3. At some time after the plant becomes operative, PASNY will apply for a license to operate the plant. Several problems in this transfer are still unknownto the public, including the reluctance of insurers to write separate insurance policies for three adjacent nuclear plants (Indian Point No. is still shut down as unsafe) operated under different authorities. And this spring, the glossed-over problem of dangers from nearby geological faults will again be examined.

Therefore, I call upon the NRC and PASNY to suspend the application for operating licenses for Indian Point No. 3. And I call upon Con Edison to close down Indian Point No. 2, all pending an investigation of all charges by an independent board of scientists and technicians. I urge the Governor to establish such a board immediately. Mr. Pollard is not the only individual with serious charges. Last week, three General Electric senior engineers resigned, asserting that nuclear power plants could not be built safely. And it is rumored that a number of Con Edison employees at Indian Point have terminated their employment in recent years under similar circumstances, but with no public attention.

Con Edison, which was able to sell the No. 3 plant to the State by pleading financial hardship, is once again as robust as it was before it suspended its dividends. The price of its stock is back at the level where it was before taking this dramatic action for the benefit of the State Legislature and the Public Service Commission. PASNY has paid Con Edison $354 million so far for Indian Point No. 3. The total eventual cost, including financing, to the state agency, may reach $600 million before the plant goes into operation. At this time, it is essential that Con Edison and PASNY renegotiate their purchase agreement, so that, in the event the plant never goes into operation, and it can be demonstrated either that Con Edison neglected important safety considerations or concealed them from State officials, the utility will return a substantial portion of the funds to the State.

I am today writing to Governor Carey, Chairman Fitzpatrick of PASNY, Chairman Anders of the NRC, and Chairman Luce of Con Edison, concerning the matters I have raised in this statement.

# # #

EDWARD I. KOCH
18TH DISTRICT, NEW YORK

COMMITTEE ON APPROPRIATIONS

SUBCOMMITTEES:
FOREIGN OPERATIONS
TRANSPORTATION
DISTRICT OF COLUMBIA

Congress of the United States
House of Representatives
Washington, D.C. 20515

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NEW YORK, NEW YORK 10007
PHONE: 212-264-1066

WASHINGTON OFFICE:
1126 LONGWORTH OFFICE BUILDING
PHONE: 202-225-2436

February 11, 1976

Mr. William A. Anders, Chairman
Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Anders:

I am concerned about the charges of NRC Project Manager, Robert D. Pollard, as reported in the New York Times of February 10, 1976. Therefore, I would appreciate your response to each of his general and specific charges below:

1. "The Indian Point plants have been badly designed and constructed and are susceptible to accidents that could cause large-scale loss of life and other radiation injuries, such as cancers and birth defects."

2. "The magnitude of the hazards associated with these plants has been suppressed by the Government because the release of such information might cause great public opposition to their operation."

3. The No. 2 reactor had a "serious design defect - submerged valves - that could render required safety systems inoperable during an accident."

4. Valves on the No. 3 plant "which are supposed to prevent escape of radioactivity during accidents" were defective.

5. Electrical systems on the No. 2 plant "suffer from the same fundamental weaknesses as those which allowed a fire last year at the Brown's Ferry plant in Alabama to paralyze much of that plant's vital safety apparatus."

I look forward to an early reply. All the best.

Sincerely,

Edward I. Koch

EIK:mjg

Enclosure 5

THIS STATIONERY PRINTED ON PAPER MADE WITH RECYCLED FIBERS

MIKE MANSFIELD
MONTANA

United States Senate
Office of the Majority Leader
Washington, D.C. 20510.

February 16, 1976

William A. Anders
Chairman
Nuclear Regulatory Commission
Washington, D.C.

Dear Mr. Anders:

I have received the enclosed correspondence from Mr. Darrell J. Kruzen of Missoula, Montana, concerning the safety of nuclear energy plants.

I would appreciate receiving whatever information you have which might be of interest to him.

Thank you for your consideration in this matter and with best personal wishes, I am

Sincerely yours,

Mike Mansfield

Enclosure

Enclosure 6

To: Honorable Mike Mansfield
133 OSOB
Washington, D.C.
20515

Darrell J. Kruzen
1522 34th St.
Missoula, Montana
59801
9th February, 1976

My Dear Sir,

I watched the CBS network's program, 60 Minutes, on the 8th February, 1976 and became quite concerned over a portion of its telecast. That portion was entitled, How Safe Is Safe? The report dealt with and in fact challenged the actual design of the safety back-up mechanisms at several of our nuclear power reactor plants with sites presently in the states of New York and Connecticut(either at this moment under construction or at present operational status).

I became even further concerned upon hearing the news today of the resignation of one Mr. Robert Pollard, a safety inspector and or engineer coordinator, for the National Reactor Commission. The above individual was also interviewed on this last Sunday's portion of 60 Minutes.

I do not take Mr. Pollard's professional judgement lightly, in-view of his superior's high rating of him, nor do I for the position he once held.with the NRC. His challenge to the Commission's decision to allow operational status to be granted to a plant by the name of Indian Head II, plus that of one other already in operation now, causes me to reflect and question this whole affair. Why?? I believe Mr. Pollard's motives and convictions to be well founded and fully sincere, so perhaps I should ask the "Why" of people like yourself, my representative in The Congress of these here United States of America. Might you have any comment worth its while??

Personally, Senator Mansfield, I do not believe that we the people of this nation can permit the operation of nuclear power reactor plants with reference to the questionable designs in their safety back-up mechanisms. This seems especially evident with the knowledge of Mr. Pollard's statements and apparent break with the Commission. Something is not right...somewhere!

A general awareness of nuclear physics and its "workings" is

common to most people of my age group, courtesy of our distinguished informal and formal educational institutions. We too, are not strangers to the potential hazards of radioactivity amongst a biological world of which we as human beings are so much a part. The Pacific Nuclear Test Blasts of the late 1940's and early 1950's illustrate this point all too vividly.

We therefore, can simply not afford error(human error...hence poor judgement)when dealing with nuclear material within or near populous regions...nor for that matter...anywhere. Any damage to our environment from an exposure to radioactive materials(especially in high density population areas), would be at this time impossible to repair with our present technological capacity. This is indeed a tragic prospect!

One note further. This "Do-not-rock-the-boat" philosophy which our government agencies seem to acquire, jeopardizes any competency thought to exist within the crucial decision making processes of those agencies. For this to continue to persist is an indictment of irresponsibility with severe consequences against and for GOOD GOVERNMENT. I am familiar with this, at least to a point. I believe it to be despicable and utterly disgusting...bicentennial year or not!!

You have this, my letter of protest and comment. I invite yours.

Thank you Sir for your time, if indeed you read this at all. I am most grateful if only for that. I bid you a good day Sir.

I am most respectfully,

Mr Darrell J. Rouzer

April 22, 1976 SECY-76-237

COMMISSIONER ACTION

For: The Commissioners

From: Kenneth R. Chapman, Director
Office of Nuclear Material
Safety and Safeguards

Thru: Executive Director for Operations

Subject: UNAUTHORIZED USE OF SNM

Purpose: To inform the Commission of plans to conduct a funded study on malevolent use of SNM.

Discussion: For several years, there has been considerable conjecture on whether it is easy or hard to make a fission bomb given an adequate quantity of SNM.

In 1974, Mason Willrich and Theodore B. Taylor authored a book, "Nuclear Theft: Risk and Safeguards", which contains the following statements: "Under conceivable circumstances, a few persons, possibly even one person acting alone, who possessed about ten kilograms of plutonium oxide and a substantial amount of high explosive could, within several weeks, design and build a crude fission bomb...This could be done using materials and equipment that could be purchased at a hardware store and from commercial suppliers of scientific equipment for student laboratories".

Since expert opinions differ widely on this important safeguards issue, we are planning to sponsor an independent assessment to determine the degree of validity that should be afforded the statement quoted above as well as other similar statements regarding the same subject.

Contact:
M. Eisenstein
492-7180

Specifically, we are investigating the possibility of having JASON, an unbiased, highly-qualified study group, comprised primarily of university professors, perform a classified assessment. We hope to get the work underway during the JASON Summer Study and to complete it this year. The JASON working group would probably consist of three or four members. We estimate that the study would cost less than $100,000.

We are also requesting ERDA to cooperate, both institutionally and through their laboratories, with the independent JASON study. A copy of this request is attached.

The Commission is scheduled to be briefed on this subject.

Kenneth R. Chapman, Director
Office of Nuclear Material Safety
and Safeguards

Enclosures:
1. Proposed ltr to
   Mr. Edward B. Giller, ERDA
2. Copy of 3/4/76 ltr from
   H.W. Lewis, SRI/JASON to
   M. Eisenstein

Commissioner comments should be provided directly to the Office of the Secretary by close of business Friday, April 30, 1976.

DISTRIBUTION

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Commission Staff Offices
Executive Director for Operations
Secretariat

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

Mr. Edward B. Giller
Deputy Assistant Administrator
for National Security
Energy Research and Development
Administration
20 Massachusetts Avenue, N. W.
Washington, D. C. 20545

Dear Mr. Giller:

As you know, there has been considerable public debate about how difficult it may be to fabricate a fission bomb using SNM obtained in an unlawful manner. Knowledgeable opinions vary so widely on this issue that we think the time has come for NRC to develop a position which will assure the public that our safeguards are adequate regardless of which "expert" opinion turns out to be correct. The timing is based on the current NRC involvement with new safeguards regulations to cover the use by licensees of plutonium, its compounds, and mixed oxide fuel.

The NRC approach is to sponsor an independent, critical evaluation to determine the degree of validity that we should afford statements to the effect that fabricating a crude fission weapon is not a very difficult task given an adequate quantity of SNM. Specifically, we are planning to contract with JASON to undertake such an evaluation starting this summer and finishing by the end of this year. The JASON working group would consist of about three or four select members who currently are cleared. Their report, of course, would be classified and handled on a strict need-to-know basis.

Undoubtedly, JASON will have to contact ERDA laboratory personnel for information and discussions on bomb design, materials, and fabrication in order to perform its assessment. Presumably, the job will consist primarily of digging out, correlating, and evaluating contributions from the knowledgeable weapons community. If new complex calculations are required, they could probably be done most expeditiously at the laboratories through coordination with your office.

Enclosure 1

Therefore, I request your cooperation with and support of this effort and I would appreciate receiving any suggestions you might have about its conduct or management.

Sincerely,

Kenneth R. Chapman, Director
Office of Nuclear Material Safety
and Safeguards

JASON

STANFORD RESEARCH INSTITUTE
1611 N. KENT STREET
ARLINGTON, VIRGINIA 22209
(703) 524-2053

4 March 1976

Mr. M. Eisenstein
Nuclear Regulatory Commission
7735 Old Georgetown Road
Bethesda, Md. 20014

Dear Maurie:

This is a first cut at the letter I promised you, outlining what JASON might possibly do for NRC in the area of nuclear safeguards. As we both know, this problem is rendered particularly sensitive and difficult because it has technical, political, and public content, an arena in which our country does not excel at problem solving. This means that NRC's posture on the subject, however it is internally derived and constructed, must be publicly defensible, using freely available information. The problem is further exacerbated by quite proper questions about the differing responsibilities of NRC and ERDA, since nuclear weapons issues are necessarily relevant to the safeguarding of nuclear materials. Many members of JASON are broadly knowledgeable about nuclear weapons matters, and some even about nuclear energy, but I would regard it as possible to work in this field only if it were done openly, with the blessings of all relevant parties. Given that, we might be able to bring to bear a fairly substantial breadth of experience and expertise.

As I see it (and I must emphasize that this is entirely my personal view) the main subject to which we could contribute would not be so much mechanisms for the protection of nuclear materials, but rather the implications of loss of materials. Much of the public debate centers around the questions of whether it is as easy to make a bomb as Ted Taylor says is the case, or as hard as is alleged by others. A principal objective would be to provide some perspective and wisdom on this subject, in a quantitative way. One should probably explore, inter alia, such issues as the dependence of nuclear yield on: manufacturing inaccuracies (with some information presumably available from one-point-safety calculations, and test fizzles); materials (mixtures, oxides, nitrates, etc.); design simplifications (e.g., can anyone's grandmother design a bomb?). In all of these areas the information is probably indigenous in the weapons laboratories, and I would see the job as more one of digging out, correlating, and responsibly evaluating contributions from the learned community. If new calculations of any complexity really needed to be done, they could presumably be done most expeditiously at the Laboratories, through coordination with ERDA.

Enclosure 2

As a possible format, I would consider beginning by speaking to Ted Taylor, and reviewing what he has written both for you and others, as well as to solicit his suggestions for the names of those people at the Laboratories who might best be able to contribute wisdom. One would, I think, then go to the directors of the Laboratories (Harold Agnew and Roger Batzel), as well as to such knowledgeable old-timers as Hans Bethe and Edward Teller, to compile a roster of real bomb designers whose experience could be tapped with regard to both the calculations that have been made (even when they didn't turn into weapons) and the wisdom which comes from testing experience.

It may well be that a critical assembly (no pun intended) of the lore would be sufficient, when properly interpreted and organized, but one would have to leave both options open. As an off-hand guess, I would judge that this effort would cost something just under $100,000, but that is truly a guess, and we would have to work out a more detailed program plan and budget before we really got to work. The JASON Summer Study will almost certainly be extended to ten weeks (from the normal seven) this summer, so that if we move quickly there is a fair chance of getting something done. We should, however, think of this as a one year effort and act accordingly.

On the attached sheet I have listed a random collection of JASON members whom I know to be both knowledgeable about, and interested in, some of these questions. The list is neither inclusive nor exclusive, but may give you some flavor of the group. In particular, a couple of our members have other associations with ERDA which we may want to consider when deciding upon the ultimate manning of this putative project. Probably five or six is the right number for the working group.

I hope that this is the sort of thing you wanted, and I know that you will feel free to write or call if there are any ambiguities.

Best Regards,

Hal

Harold W. Lewis

HWL/sp

attachment

Ken Case	(Rockefeller University)
Roger Dashen	(Institute for Advanced Study, Princeton, worked at Sandia as a young man)
Sid Drell	(Associate Director, SLAC, known to everybody)
Freeman Dyson	(Institute for Advanced Study, Princeton)
Ed Frieman	(Plasma Physics Laboratory, Princeton, works on fusion for ERDA)
Dick Garwin	(IBM, consultant to Los Alamos, directed Academy study on Solar Energy Research Institute)
Bob LeLevier	(R&D Associates, a private consulting company, which has contracts with NRC)
Hal Lewis	(you fill this in)
Marshall Rosenbluth	(Institute for Advanced Study, Princeton, formerly Los Alamos and General Atomic, and a fusion expert)
Ken Watson	(Univ. of Calif., Berkeley, with close connections to both the Lawrence Berkeley Laboratory and the Lawrence Livermore Laboratory)
Fred Zachariasen	(Cal Tech, consultant to Los Alamos)

May 17, 1976 SECY-76-272

For: The Commissioners

From: Ben C. Rusche, Director, Office of Nuclear Reactor Regulation

COMMISSIONER ACTION

Thru: Executive Director for Operations

Subject: REQUEST FROM RALPH NADER FOR REASSESSMENT OF CRITERIA ALLOWING NUCLEAR PLANTS TO OPERATE IN HIGH-INTENSITY EARTHQUAKE AREAS

Purpose: To obtain the Commission's approval of the letter to be sent to Ralph Nader

Discussion: In a letter to Chairman Anders, dated April 8, 1976, Ralph Nader expressed concern over the safe siting and continued operation of nuclear power plants in California and other "high-intensity earthquake areas," and has requested that the operation and construction of these plants be halted.

This Commission Action paper is being submitted in response to the enclosed letter by Mr. Ralph Nader which is divided into two parts:

1. a statement of the NRC policy regarding the safe siting of nuclear power plants in California and other seismically active areas; and

2. direct responses to Nader's specific comments.

Recommendation: That the Commission approve the proposed letter to be sent to Ralph Nader.

Coordination: The Office of the Executive Legal Director has no legal objection to the proposed letter.

Ben C. Rusche, Director
Office of Nuclear Reactor Regulation

CONTACT:
S. Wastler
492-7972

Enclosures:
1. Ltr Rusche to Nader
2. Ltr dtd 4/8/76 Nader to Anders

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[illegible] comments should be provided directly to the Office of the S[illegible] [illegible]siness Wednesday, May 26, 1976.

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

Mr. Ralph Nader
2000 P Street, N.W.
Washington, D. C. 20036

Dear Mr. Nader:

I am responding to your letter to Chairman Anders, dated April 8, 1976, in which you expressed concern over the safe siting and continued operation of nuclear power plants in California and other "high intensity earthquake areas."

In our review of nuclear power plant sites, we closely follow the evolution of new geologic and seismic information and incorporate such information in our review as appropriate, particularly in "high intensity earthquake areas" such as California. While there is not a complete understanding of earthquake generating mechanisms, major advances have been made in this field during the last decade. In fact, understanding has improved to the point that earthquake prediction is now considered by the scientific community to be a goal realizable in the near future. Also, comparable advances have been made in the field of earthquake engineering design during this period.

In recognition of the uncertainties in the seismic risk analysis and earthquake engineering design, the Nuclear Regulatory Commission and its predecessor, the Atomic Energy Commission, adopted procedures and criteria which require conservative assessments of each of the parameters which must be considered in (1) defining the levels of ground motion for which the plants must be designed and (2) the design of the plant structures and systems to resist those motions. In addition, the plants must be designed to withstand the forces of multiple loads, such as the forces resulting from a major primary system pipe break (high temperatures and pressures) and, simultaneously, the ground motion forces resulting from the Safe Shutdown Earthquake (SSE - the design basis earthquake). As a consequence of these multiple design requirements, the forces which could be expected to result from the SSE generally have little influence on the design of major systems and structures, such as the primary system and containment.

All of the items referenced above lead to plant seismic designs that are conservative. Further, as outlined to the Joint Committee on Atomic Energy during its hearings on March 2, 1976, concerning the resignation of the General Electric Company employees and one NRC employee, we have a program of reanalysis of the design of the older plants to demonstrate whether these older plants require revisions that would provide substantial additional protection for public health and safety. An urgent aspect of this program is a reanalysis of the earthquake generated

Enclosure 1

ground motion expected at the sites of the older plants and to specify alterations to assure adequate safety margins. This seismic reanalysis is already in progress for the Humboldt Bay Nuclear Power Plant, Unit No. 3, and the San Onofre Nuclear Generating Station Unit No. 1. In view of this ongoing process, we see no basis for and cannot agree to your request that operation and construction of nuclear power plants in earthquake zones be halted.

In response to your specific comments, the following discussions are offered:

1. Mr. Collins has suggested, in his telegram, dated August 25, 1976, that the seismic design of the Humboldt Bay Nuclear Plant is inadequate. It should be recognized that some of the earliest plants were designed and constructed prior to the establishment of seismic design criteria by the NRC (AEC). These plants were generally designed to the California Uniform Building Code (UBC) specifications. One of those plants, the Humboldt Bay Nuclear Power Plant, Unit No. 3, was originally designed to withstand a seismic load of 0.25 times the dead load and equipment load or 0.2 times the dead load plus one-half of the live load, whichever resulted in a more conservative design. A reevaluation of the seismic design of the plant which was initiated in 1968, has led to modifications to upgrade the earthquake resistance design of the reactor in 1970. Additional modifications to substantially increase seismic design margins are to be completed this fall.

   Mr. Collins has also suggested that faulting is widespread in the Humboldt Bay region and cites displacements in sediments at Humboldt Hills, Fields Landing, College Cove, Agate Beach and Table Bluff as indicative of recent movement. We were made aware that displacements of the type cited by Collins exist in the site vicinity by the 1972 report by Earth Sciences Associates (ESA-Consultants to the Pacific Gas & Electric Company). Additional information was provided in an ESA 1975 report, along with a considerable body of other information relating to the geology and seismicity of the site vicinity. Our review of this material has revealed that definitive evidence has not been developed concerning the origin of the displacements cited by Collins and the recency and extent of faulting in the site vicinity. The licensee is being required to resolve these remaining concerns as expeditiously as is practicable.

2. Mr. Mendes apparently criticizes nuclear power plant design based on comparisons with building responses developed in accordance

with the California UBC. He and his associates in the Structural Engineers Association of California have promoted the California UBC for many years. The San Fernando earthquake did, indeed, demonstrate that structures built to California UBC standards could pose a hazard to the public health and safety. As noted earlier, a few older nuclear power plants were generally designed to the California UBC, but in all cases design acceleration values were higher than those proposed by the California UBC. If needed, we will require alterations to these plants to assure adequate safety margins. Humboldt Bay Nuclear Plant, Unit 3, has been under review using contemporary methods of analysis and modifications to the seismic design will be complete this fall. California UBC methods have not been allowed for safety related structures in nuclear power plants for many years. Dynamic analysis considering conservatively postulated earthquake shaking is now required rather than the application of just a pseudo-static horizontal load, as was required by the California UBC.

3. As implied above, nuclear power plants are designed to far more stringent seismic standards than schools and hospitals in California. The independent review of the earthquake safety provisions is conducted through several offices within NRC. The Office of Nuclear Reactor Regulation reviews the seismic design basis, procedures, and criteria. The applicant is required to implement a quality assurance program which involves independent reviews of their design calculations and drawings by qualified personnel. The Office of Inspection and Enforcement inspects and audits the performance of the quality assurance program.

4. The NRC hearing process is conducted in such a manner that an interested citizen, or group of citizens who file a timely petition to intervene may participate as a party to the hearings with full rights to present evidence and cross examine witnesses. As in judicial proceedings, presentation of evidence is restricted to parties to the preceedings. However, persons, not parties, are, at the proper time, allowed to make a statement in the form of a limited appearance. It is our experience that the NRC Atomic Safety and Licensing Board makes a concerted effort to hear all parties fully. With those individuals or groups who do not become formal intervenors, participation in the form of a limited appearance is encouraged. Furthermore, any information held by anyone relative to any proceeding should be conveyed to my staff for consideration in its review.

5. In 1971, rather than subsequent to 1973, Shell Oil Company geologists published a technical paper, based on proprietary seismic data, which indicated that a large, fault-bounded basin existed in the near offshore vicinity of the Diablo Canyon site. The FSAR for Diablo Canyon was submitted to the AEC for review in July, 1973. The AEC staff determined at that time, August, 1973, that the applicant had not adequately addressed the offshore faulting discussed in the Shell Oil Company paper and recommended that the applicant conduct offshore investigations. During December 1973, PG&E performed additional offshore mapping and confirmed the existence of faulting. The U.S. Geological Survey (USGS) was also conducting investigations of faulting in California in November, 1973, and reported offshore faulting in the near vicinity of the Diablo Canyon site. This study was funded by the AEC. The results of the offshore seismic profiling by both PG&E and the USGS, referred to above, and subsequent investigations by PG&E, has confirmed the existence of the fault zone (comprised of a number of separate traces at the surface) described by the Shell Oil Company geologists and evidence of geologically recent movement. The plant had been designed for several possible earthquakes, including a major earthquake on the San Andreas fault. The effect on design of an earthquake which could occur on the nearby offshore fault is still being reviewed by NRC staff.

6. The USGS, acting as advisor to the NRC, has actively participated in the review of the geologic and seismic aspects of nuclear power plant siting in California. It is generally accepted that large earthquakes will continue to be generated along the San Andreas fault. The recurrence interval for such earthquakes appears to be between 60 and 100 years. Consequently, the possibility of a major earthquake on the San Andreas is taken into consideration in the design of nuclear power plants in California.

I trust you will find this information responsive to your concerns. A reply to your request for information in accordance with the Freedom of Information Act has been sent under separate cover. Thank you for the opportunity to comment on these important issues.

Sincerely,

Ben C. Rusche, Director
Office of Nuclear Reactor Regulation

April 8, 1976

William A. Anders, Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Chairman Anders:

There are major uncertainties over the ability of nuclear power plants sited in California and other high intensity earthquake areas to continue operation without a catastrophic accident. These uncertainties require prompt and aggressive action by the Nuclear Regulatory Commission (NRC). Operation and construction of nuclear power plants in earthquake zones should be halted until the NRC has performed a detailed reanalysis of its seismic design and seismology criteria.

Your agency has already received a report from Thomas Collins, a U.S. Forest Service geologist in Trinidad, California; on the serious problems with Pacific Gas and Electric's Humboldt Bay nuclear plant. Mr. Collins reported that the Humboldt Bay plant is located directly above an active fault zone. Mr. Collins also stated that on the basis of the ground motion which the plant is supposed to withstand, the seismic design for Humboldt is inadequate. (Seismic Hazards At The Humboldt Bay Nuclear Plant, Thomas Collins, January 1976, submitted to the Nuclear Regulatory Commission.)

Your attention is also drawn to Mr. Stanley H. Mendes, a structural engineer from Santa Barbara,California who believes there are "substantial questions as to whether adequate earthquake safety provisions have been incorporated in the design of nuclear power facilities constructed in California and elsewhere." (Letter from Stanley H. Mendes, Santa Barbara, California, March 30, 1976) Enclosed are copies of a letter from Mr. Mendes, and his testimony before the California Senate Committee on Public Utilities, Transit, and Energy, March 23, 1976.

In his March 23 statement, Mr. Mendes addresses the following problems:

1. The basic design criteria for the earthquake safety provisions of nuclear facilities are incorrect. The NRC apparently has not adjusted its design criteria to consider information from the 1971 San Fernando (California) earthquake, which "clearly demonstrated to all knowledgeable persons that there is still much to be learned before we can construct totally earthquake-proof facilities." (p. 2)

2. Although public schools and hospitals receive in-depth, independent reviews of their earthquake safety provisions, no such independent review is made by NRC for the earthquake safety of nuclear power plants. (p. 3,11)

Enclosure 2

3. The NRC hearing process is not conducive to candid discussion, which would reveal the deficiencies in the state of the art in earthquake design. (p. 4) "I seriously doubt that the State of the Art is sufficiently advanced to produce the relatively risk-free facilities to which the people of California are entitled." (p. 2)

Mr. Mendes points out as an example that in January 1973, he expressed doubt that sufficiently detailed explorations of fault systems offshore of Pacific Gas and Electric's Diablo Canyon nuclear plants had been made. (p. 8) Since that time, an offshore fault has been discovered and the NRC has been forced to reanalyze the earthquake design criteria for Diablo Canyon.

4. Nuclear power plants designed fifteen years ago may very possibly be found not to provide adequate earthquake protection today. (p. 4) This statement, of course, has been confirmed by Mr. Collins' paper. The Humboldt Bay plant began operation in 1962, 14 years ago.

Also relevant is a briefing given by the U.S. Geological Survey (USGS) to the staff of Governor Brown of California, on the "uplifting" along California earthquake zones. The USGS has stated that another great earthquake along the San Andreas fault is "inevitable, possibly within the next decade." A copy of the USGS briefing summary is enclosed.

An earthquake in and of itself could obviously do serious damage in populated areas. But if the earthquake were also to cause a reactor accident, the catastrophe would be seriously compounded. Persons unaffected by the earthquake could be contaminated by radioactive materials from the reactor. Rescue efforts could similarly be hampered by radioactive contamination of people and land. It is therefore imperative that if the NRC is to license nuclear reactors, they be able to withstand, beyond any reasonable doubt, earthquakes in California and other areas.

It is noteworthy that uncertainties over earthquake design contributed to the recent resignations of four nuclear engineers--three from the General Electric Company and one from the NRC. In its statement before the Joint Committee on Atomic Energy on March 2, 1976, the NRC staff said that it has already started the reevaluation of "older plants located in high seismic risk areas such as Humboldt Bay and San Onofre 1." (NRC Staff Response To The Testimony of Bridenbaugh, Hubbard, and Minor, p. VI-25). It is also recognized that the NRC is reevaluating the earthquake risks to Diablo Canyon, mentioned above, and to Consolidated Edison's Indian Point plant. ("Quake Risks Studied for Nuclear Sites," New York Times, March 30, 1976, p. 41)

It is requested that the NRC not only expedite that reevaluation; but also cease the operation (except in areas where substitute power is not available) and construction of all nuclear plants in areas of high earthquake risk until a reevaluation of those plants' seismology and basic seismic design criteria is completed. I also request, pursuant to the Freedom of Information Act, the following materials:

1. All documents pertaining to seismology and seismic design criteria for all California reactors.
2. All documents related to any reevaluation of seismology or seismic design for reactors, including but not limited to all California reactors being reevaluated. Please provide a list of all reactors being reevaluated.
3. All documents pertaining to the need to retrofit older reactors to provide adequate earthquake protection.
4. All documents pertaining to the San Fernando earthquake of 1971, as it relates to nuclear power plant design. All documents related to any NRC reanalysis of seismic design criteria in light of information from the San Fernando earthquake.
5. All documents on the "uplift" of the San Andreas fault, as it relates to nuclear power plants and nuclear power plant design.
6. All documents pertaining to the independent NRC review, or lack thereof, of seismology and seismic design at nuclear plants.

I request that copies of documents released in response to this request be placed in local public document rooms in California and other applicable locations.

Sincerely,

RNader

Ralph Nader

Enclosures:
1. Letter of Stanley H. Mendes, Santa Barbara, California, to Ralph Nader, March 30, 1976 (without attachments)
2. Statement of Mr. Mendes, March 23, 1976
3. Summary of USGS Briefing to the Staff of Edmund G. Brown, Governor of California, March 17, 1976

STANLEY H. MENDES
STRUCTURAL ENGINEER
1226½ STATE ST. SUITE 7
SANTA BARBARA, CALIF. 93101

PHONE (805) 962-9870

March 30, 1976

Mr. Ralph Nader
Public Citizen, Inc.
P. O. Box 19404
Washington, D. C. 20036

Dear Mr. Nader:

Certain activities on the part of the Nuclear Regulatory Commission (formerly Atomic Energy Commission) raise substantial questions as to whether adequate earthquake safety provisions have been incorporated in the design of nuclear power facilities constructed in California and elsewhere. Can you help to make public this situation so that needed changes in NRC procedures might be forthcoming.

I have personally witnessed "coverup" and "stonewalling" actions which may still be taking place in conjunction with the Diablo Canyon facilities of Pacific Gas & Electric Company now nearing completion at San Luis Obispo, California.

Immediately after the San Fernando earthquake of 1971, all knowledgeable geologists, seismologists, and engineers knew full well that many of the basic design criteria and assumptions commonly made in earthquake resistant design were incorrect.

Only now, five years after the San Fernando earthquake, is the NRC apparently finally questioning the design adequacy of the Diablo Canyon facilities. The questioning may be sincere or it may be just a ploy; time will tell. It comes as a result of the recent discovery of an offshore active earthquake fault capable of generating an earthquake of major proportions.

Beginning in July, 1971, all attempts by me to question the basic design criteria for the Diablo Canyon facilities were brushed aside by the AEC and Pacific Gas & Electric Company. Not once would the AEC permit, as part of the official proceedings, any public discussion regarding adequacy of the earthquake safety provisions for the facilities.

The details of my experiences are clearly set forth in my exchange of correspondence (copies enclosed) in 1974 with Dr. Dixy Lee Ray, then chairman of AEC. Also enclosed is a paper dated March 23, 1976, containing pertinent information which was presented at public hearings on the Nuclear Initiative held by the State Senate Committee on Public Utilities, Transit and Energy in Sacramento, California.

I can furnish all additional necessary documentation of my experiences, including copies of official proceedings, interrogatories and responses, etc. Please let me know if you are interested in this matter.

Very sincerely yours,

Stanley H. Mendes

Stanley H. Mendes

SHM:pm

Enclosures:

Presentation to State Senate Committee of March 23, 1976.
Affidavit of Stanley H. Mendes dated January 23, 1973.
Dr. Dixy Lee Ray correspondence dated January 9 & 29, 1974, and February 19, 1974, and April 15, 1974.
Enclosures 1 through 28 of AEC letter of April 15, 1974.
Portions of Draft Environmental Statement by AEC dated December 1972.
Portions of Safety Evaluation of Diablo Canyon facilities by AEC dated October 16, 1974.
Seismic Evaluation of Diablo Canyon Site dated May 28, 1968, and Recommended Earthquake Design Criteria dated June 24, 1968.
Resume of Stanley H. Mendes.

STANLEY H. MENDES
STRUCTURAL ENGINEER
1226½ STATE ST. SUITE 7
SANTA BARBARA, CALIF. 93101

PHONE (805) 962-9870

March 23, 1976

The Honorable Alfred E. Alquist, Chairman
and Members of
Senate Committee on Public Utilities, Transit and Energy
State Capitol Building
Sacramento, California 95814

Gentlemen:

My purpose in appearing before this committee is, hopefully, to make you concerned enough to investigate and determine, first hand, how the Nuclear Regulatory Commission (formerly the Atomic Energy Commission) really functions to supposedly provide effective earthquake safety regulation of the construction of nuclear power facilities. If you will really dig in and investigate, you will likely open up the biggest can of worms this state has seen in a long time.

I hope to convince this committee that the Nuclear Power Plant Initiative, as written, has true merit, that it is long overdue and much needed, and that you should willingly accept responsibility for determining that adequate safety provisions are incorporated into the design and construction of nuclear power facilities in California.

A proliferation of nuclear power facilities has been and is in process before proven earthquake safety provisions have been developed. The San Fernando earthquake of 1971 clearly

demonstrated to all knowledgeable persons that there is still much to be learned before we can construct totally earthquake-proof facilities. There is still plenty of room for human and technical errors in the various disciplines needed to construct nuclear power facilities. I seriously doubt that the State of the Art is sufficiently advanced to produce the relatively risk-free facilities to which the people of California are entitled. The people should know the truth and be able to influence their destinies with respect to the use of nuclear power. The serious questions which can be raised about the adequacy of existing and proposed new plants should be discussed openly and candidly in public.

As a licensed Civil and Structural Engineer in California, my entire professional career of nearly thirty years has been devoted to the design of buildings and related structures to withstand the effects of damaging earthquakes. I am quite familiar with earthquake resistant design and have personally inspected and studied numerous earthquake-damaged structures. I know most of the strengths and weaknesses of my profession. Experiences during the past few years have given me some insight as to how the Nuclear Regulatory Commission really functions. Frankly speaking, their system scares the hell out of me. Here's how Big Brother really operates!

1. In the language of our times, I have personally witnessed the AEC engage in "coverup" activities and abuse their lawful powers in "stonewalling" attempts to exclude probable adverse testimony about the earthquake safety of nuclear plants. This was done in concert with Pacific Gas and Electric Company at the Diablo Canyon Nuclear Power Facilities near San Luis Obispo.

   The AEC and Pacific Gas and Electric Company have continued to construct the Diablo Nuclear Power Plant facilities for the last five years with full knowledge that the basic design criteria for the earthquake safety provisions of the facilities are incorrect. Why?

2. a) Public school buildings and hospitals receive greater in-depth, independent reviews of their earthquake safety provisions than do nuclear power plants constructed in California. Why?

   b) No in-depth detailed reviews of earthquake safety provisions are made by NRC of design calculations and construction drawings to determine if errors have been made. Why not?

   c) No in-depth detailed reviews were made by qualified staff of PG&E of the basic earthquake design criteria for the Diablo Nuclear Power Plant facilities. Why not?

3. Citizen participation in so-called public hearings is permitted at such times as is convenient for the NRC and the utility company constructing the nuclear facilities. These hearings are charades which exclude meaningful citizen participation.
4. The NRC conducts advocate type proceedings, including "discovery" procedures, in a semi-judicial atmosphere which by its very nature is not really conducive to determining scientific or technical truths. Open and candid discussion conducted in public among informed persons is the best way to determine scientific truth. This method also permits lay persons to better understand the limitations of the State of the Art.
5. The present State of the Art in the fields of geology, soils engineering, seismology and various engineering specialties is such that substantial human and technical errors are possible and not at all unusual. NRC procedures oftentimes belatedly discover substantial errors.
6. Nuclear power plants constructed as little as fifteen years ago, in accordance with knowledge then available, very possibly will not provide the necessary earthquake safety features which are required today. What is being done to review and update existing facilities?

In the interest of public health, safety, and welfare, I ask this committee to seek the truth, to continue to investigate

and determine how the present system of safety regulation of nuclear power plants really works, to determine what inadequacies exist and to attempt to remedy the situation. The Nuclear Initiative is a giant step in the solution to a tremendous problem.

policy that the investment is risk capital and may not be charged to utility customers by way of rate increases.

It is my sincere hope that the present NRC proceedings questioning the earthquake safety features of the Diablo Canyon facilities are honest and forthright so as to ultimately reveal the truth. Not being privileged to sit in on the "informal" discussions between PG&E and NRC, I just don't know.

2.a,b,c) Detailed independent reviews are made by the State Office of Architecture & Construction for all public school buildings and hospitals which are to be constructed in California. These reviews include a check of criteria, method, and procedures. They also make a detailed check of the results of the design, including verifying that plans correctly and completely agree with design assumptions and results. In addition, independent field inspections are made to assure compliance with approved plans and specifications.

The Office of Architecture and Construction procedures contrast greatly with the NRC procedures. The NRC does not make a detailed check of analysis, design calculations and construction plans. They only "--check criteria, method and procedures." On February 18, 1975 at San

Luis Obispo, California, Mr. Larry Shaw, of the Structural Engineering staff of NRC made the following statements when asked by a commission member of the Advisory Commission on Reactor Safeguards about the checking procedures of the Diablo Canyon nuclear power plant design:

> "We don't check detailed results. We only check criteria, method, and procedures. Do you know how long it would take to check a detailed analysis? It would take about four or five years." -- -- "In order to check detailed answers, I would need a staff of a thousand people to do that."

From such a procedure, it is clear and apparent to experienced engineers that human errors and mistakes will have to all be discovered by the designers of nuclear facilities. Let's have a close look at how PG&E designers of the Diablo Canyon facilities made an in house check. The seismological evaluation of the Diablo Canyon site is contained in the Preliminary Safety Analysis Report (PSAR) and set forth in reports dated January 9, 1967, and May 28, 1968. There are no significant differences in the Final SAR (FSAR) published only a couple of years ago. Under date of July 18, 1975, representatives of PG&E responded as follows, under penalty of perjury, to several significant questions contained in Interrogatories by San Luis Obispo Mothers for Peace dated June 19, 1975.

"37. Name the person or persons responsible for the review of the "Seismic Evaluation of the Diablo Canyon Site" prepared by Hugo Benioff and transmitted to Mr. Gordon V. Richards under dates of January 9, 1967, and May 28, 1968.

Response

This document was submitted in connection with PGandE's applications for construction permits for the two Diablo Units. It was reviewed by PGandE personnel, AEC Staff personnel, the Advisory Committee on Reactor Safeguards, the Atomic Safety and Licensing Boards, and various consultants to each. PGandE is unable to name specific individuals responsible for this review."

"38. State the nature and extent of the review which was made, including the number of man hours spent by each person or persons involved in the review referred to in question No. 37.

Response

PGandE does not have records of the time spent by its personnel in reviewing reports of its consultants and obviously does not have that information for members of other organizations."

"39. Name the person or persons responsible for the review of the "Recommended Earthquake Design Criteria for the Nuclear Power Plant -- Unit 2, Diablo Canyon Site" transmitted to Mr. Gordon Richards from John

Blume and Associates, Engineers, under date of June 24, 1968. Said report is dated June 1968.

Response

See response to Interrogatory 37."

The significance of the responses are tremendous. PG&E can't name one single person on their staff who reviewed the basic earthquake design criteria for the Diablo facilities. Certainly the criteria is important enough to have it reviewed by the best qualified persons on PG&E's staff! Yet no one knows who reviewed it nor how much time they spent reviewing it. I honestly question if it was reviewed at all.

One main point I wish to make is that if the basic earthquake design criteria are incorrect, then it logically follows that the earthquake safety provisions of the facilities are likely to be inadequate. One can be reasonably sure that the plant was not materially "overdesigned" -- not with PG&E's money at stake.

3. As previously set forth in the discussion of item No. 1, I have on three separate occasions been excluded from giving testimony at public hearings by specific Order of the AEC. Indications are that I probably will be permitted to testify at the June 1976 licensing hearings. This comes

a bit late! It will be a cold day in hell before I will dignify those hearings by participating.

4. The primary aim of advocate type proceedings is to sway a third party to a particular point of view. In the process, facts detrimental to a point of view are almost never brought to light, except by the opposition. One does not harm one's own case! The name of the game is win --- winning is everything.

   In contrast to advocate type proceedings are those normally followed by scientifically trained persons. Here, a premise is set forth and examined for merit. The pros and cons are discussed by all parties. Facts become facts when they are mutually accepted. The entire purpose is to determine the truth -- not to win. How vastly different are the statements made by "experts" when they are part of a round table discussion among colleagues as compared to "expert testimony" during advocate type proceedings.

5. Practicing professionals in the fields of geology, soils engineering, seismology and various engineering specialties will inform you, if asked, of personal experiences wherein substantial errors have been made. Don't expect many of these persons to volunteer to come before you and furnish

such information. Errors and omissions are usually reserved for discussion in private committees and conferences, but not before a Senate committee -- unless asked, that is.

How adequate are NRC procedures which allowed the Diablo Canyon facilities to become over one-half constructed before discovery of an active offshore fault capable of generating a Magnitude 7.5 earthquake with ground accelerations on the order of 0.70G to 0.80G?

What if the San Fernando earthquake of 1971 hadn't happened? We would be sitting here in ignorant bliss believing that maximum ground accelerations would never likely exceed 0.50G. The Pacoima Dam record produced peak accelerations of 1.25G!

6. I don't believe any knowledgeable person would be so foolish as to say that the professions haven't learned a great deal about earthquake resistant design during the past fifteen years. There has been an explosion of knowledge which is still going on. Most earthquake design concepts are based upon assumptions, many of which have yet to be proven by performance during damaging earthquakes. Only during damaging earthquakes do we get a clearer picture of the adequacy of our design procedures.

It is fair to say that the San Fernando earthquake of 1971 clearly showed there is one hell of a lot to be learned.

While much attention since then has been focused on the well-known hazard of older unreinforced masonry buildings, what has the NRC done to review and update the earthquake safety provisions of older nuclear power facilities? This is a problem that I'm certain the NRC would not wish to have exposed publicly, but it is one which they should face up to as soon as possible. This committee should concern itself with the adequacy of existing nuclear facilities in California.

RECOMMENDATIONS

It is recommended:

1. This committee should investigate the Diablo Canyon nuclear power plant proceedings and fully inform the Legislature of your findings regarding their propriety and the degree of confidence you have as to whether proper earthquake safety provisions have been made.

2. The Legislature should take action to assure that an independent review is made of the earthquake safety provisions of nuclear power facilities which presently exist and those which are to be constructed in California in the future.

3. The Legislature should conduct public conferences and public hearings to solicit open and candid discussion among interested and informed persons to determine the following:

   a) whether the State of the Art is sufficiently advanced in the fields of geology, soils engineering, seismology, and earthquake engineering so as to permit the design and construction of nuclear power facilities without substantial risk to the health, safety, and welfare of the people who live in California.

b) the degree of risk which accompanies design and construction of nuclear power facilities which are subjected to the forces and effects of earthquakes.

c) the consequences of a nuclear disaster which may accompany natural disasters such as earthquakes.

4. The Legislature should inform the electorate of the findings from the foregoing recommended conferences and hearings and allow them to participate in reaching a decision as to whether and/or under what conditions nuclear power facilities are to be constructed and operated in California. A decision should also be made as to whether and under what conditions existing nuclear power facilities should be continued in use.

Respectfully submitted,

Stanley H. Mendes

Stanley H. Mendes

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

SUMMARY OF BRIEFING TO STAFF OF EDMUND G. BROWN, JR., GOVERNOR OF CALIFORNIA

March 17, 1976

1. Over 4500 square miles of southern California rose 5 to 10 inches since 1961.

2. Destructive earthquakes at San Fernando, California, in 1971, and Niigata, Japan, in 1964, were preceded by land uplifts of less than 5 inches. Uplifts, however, have been observed without subsequent earthquakes.

3. The uplift occurs along the section of the San Andreas fault where a major earthquake (M > 8) occurred in 1857 and where another great earthquake is inevitable, possibly within the next decade.

   While some evidence can be interpreted as precursory to a major earthquake in this region, there is no basis now for predicting the time it will take place. The sum of the evidence, however, justifies a warning that a great earthquake will take place in this area and also justifies preparedness actions.

4. If an earthquake similar to that in 1857 occurred today in this region about 30 miles north of Los Angeles, the probable losses in Orange and Los Angeles Counties alone are estimated as follows:

   40,000 buildings would collapse or be seriously damaged,
   3,000 to 12,000 people killed,
   12,000 to 48,000 people hospitalized,
   $15 to 25 billion damage.

   Failure of one of the larger dams could leave 100,000 homeless and tens of thousands dead.

5. It is possible but less certain that one or more damaging earthquakes may take place within this region prior to a great earthquake.

6. Studies of the area are underway by the U.S.G.S., the California Division of Mines and Geology, and several universities. Some additional instruments have been installed and new funds of $2.1M are to be provided in the FY77 budget. Hopefully a predictive capability will be developed in advance of the earthquake, but emergency plans should be developed on the assumption that there will be no advance notice.

7. If data become available supporting a prediction in California, the evidence will be evaluated by the U.S.G.S. and transmitted to the Governor.

July 2, 1976

UNITED STATES
NUCLEAR REGULATORY COMMISSION

SECY-76- 351

INFORMATION REPORT

For: The Commissioners

From: Lee V. Gossick, Executive Director for Operations

Subject: UNEXPECTED EVENTS STUDY

Purpose: To respond to the Chairman's request that a group be formed to assess NRC's responses to non-routine events.

Discussion: A May 26 memorandum from the Chairman to the EDO requested that a Steering Committee be formed to analyze specific non-routine events that have disrupted or had the potential for disrupting NRC's day-to-day operations. Events mentioned in Chairman's memo were the Browns Ferry fire, BWR pipe cracks, and the Pollard/GE engineers' resignations. The Steering Committee has been formed. It is chaired by the EDO and composed of the A/EDO, the General Counsel, and the Director of OPE. The committee has met and identified a general plan for the analysis and a working group to carry out the committee's directions.

The purposes of the study are summarized from the Chairman's memo as (1) to review the nontechnical management aspects of selected events, (2) to conduct a systematic, lessons-learned analysis of NRC's performance in dealing with these events, and (3) where appropriate develop recommendations to assist NRC management in future events of this type.

Basically the study plan, which is attached, proposes to take a pilot approach by analyzing the Browns Ferry fire. Several advantages result from the analysis of a test case. First, the study group members will develop a common view of the objectives, procedures and expected outputs of the study. Second, the results of the Browns Ferry analysis can be given to the Steering Committee for their comments and guidance and thereby influence the subsequent analyses. Finally, when these other events are studied, each analyst will benefit from the experience gained.

Contact:
H. S. Bassett, PLA
492-7575

The schedule and staffing effort are attached to the study plan. Mainly the plan proposes a September 30 delivery date and a study staffing requirement of the equivalent of 5 full-time people.

Conclusion: Per the Chairman's request, the Steering Committee is presenting the general scope and schedule for this study.

Coordination: The attached has been reviewed by the Steering Committee and other appropriate offices. All concur in the proposed plan.

Lee V. Gossick
Executive Director for Operations

Attachments:
1. Study Plan
2. 5/26/76 memo, Chairman to EDO

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UNEXPECTED EVENTS STUDY PLAN

Purpose - The purpose of the study is to:

a. Review recent unanticipated events that either disrupted operations or had the potential for so doing.

b. Identify and evaluate lessons learned from experiences with above events.

c. Develop recommendations, where appropriate, to assist NRC management in dealing with unexpected, disruptive incidents arising in the future.

The study will review the non-technical, management aspects associated with these incidents including the role of the Commissioners as well as the staff. Because the study will consider NRC's response to past events, there could be a tendancy to dwell on how an individual's performance might have been improved in a particular instance. This will be resisted particularly where there is tendancy to single out offices or individuals for specific criticism. Rather the emphasis of the study will be future oriented. It must, however, identify past reactions to specific events to determine if we can inductively derive procedures to assist NRC management to deal with future, unanticipated events.

Events for study - Among events that seem to be candidates for study are:

- Browns Ferry fire
- Pipe cracks in 23 BWR's
- Pollard and GE Engineers' resignations
- Memorial Day alert
- Keith Miller's allegations
- Channel box vibrations

These are a sample of non-routine incidents that resulted in major operational disruptions as well as those that did not, but did have the potential for becoming disruptive. The specific events to be studied may vary after the group begins its work. We intend to include both people and technical type events -- e.g., Keith Miller and pipe cracks -- as well as events that varied in terms of their immediate and potential impact on public health and safety -- e.g., Browns Ferry fire and channel box vibrations.

Attachment 1

Procedure - Initially, the procedure to be followed is to interview the primary management participants in one event -- the Browns Ferry fire -- using a list of operationally stated questions. This approach will assure that all study group members will have a common understanding of the objectives, procedures and expected outputs of the study. Consequently when other events or crises are studied and analyzed, each will be done in a similar manner. After the pilot investigation has been completed the study group will present its analysis to the Steering Committee. This will provide the study group with comments and guidance from the Steering Committee before the remainder of the events are analyzed. Subsequently the study group will analyze each event using the pilot approach as modified by the Steering Committee's remarks. When the study of each event is completed the group will develop conclusions and, where appropriate, recommendations and options for Commissioners' consideration.

People within and, where appropriate, outside of NRC will be interviewed. Significant aspects of the events will be summarized chronologically and key decisions reviewed and dissected. Within NRC the study group will concentrate on interviewing upper-level managers including the Commissioners. Possible sources outside NRC that might offer useful perspectives include Congressional staff, the media, relevant Federal agencies, State or local government officials, licensees, industry groups and intervenors.

The information collected by the study group will help answer questions similar to the following:

1. What was the event?

2. How did the situation develop?

3. How was the event dealt with? Was there time for an explicit action plan?

4. How did a plan evolve; how long did it take; who was involved?

5. Was the plan effective, realistic?

6. Did everyone involved work toward the same solution?

7. To what extent were normal operations disrupted? How? Why?

8. Could any "early warning system" have anticipated the crises?

9. What communications were/should have been made?

10. Was any coordination with other agencies, Congress et al. . required or useful?

11. What data were needed during crises?

12. How was it supplied?

13. Did NRC organization structure help or hinder crisis resolution?

14. What types of resources were needed to cope with crisis?

15. Did NRC easily locate and free resources needed?

16. Was anything done because of lessons learned in past crises?

17. Was it essential to get involved to the extent NRC did? Could other organizations have better responded - State Department, EPA, State/local governments?

18. Do concerned people inside and outside of NRC feel crisis was adequately handled and resolved?

19. What were outputs in dealing with crisis?

20. Was there adequate follow-up action?

These and similar questions will provide the basis to answer questions in the Chairman's memo, such as:

- Whether NRC has the appropriate capabilities for responding to these events and is prepared to respond efficiently with a minimim disruption of operations.

- Whether NRC can plan for these situations to any extent thereby controlling events to a larger degree rather than merely reacting.

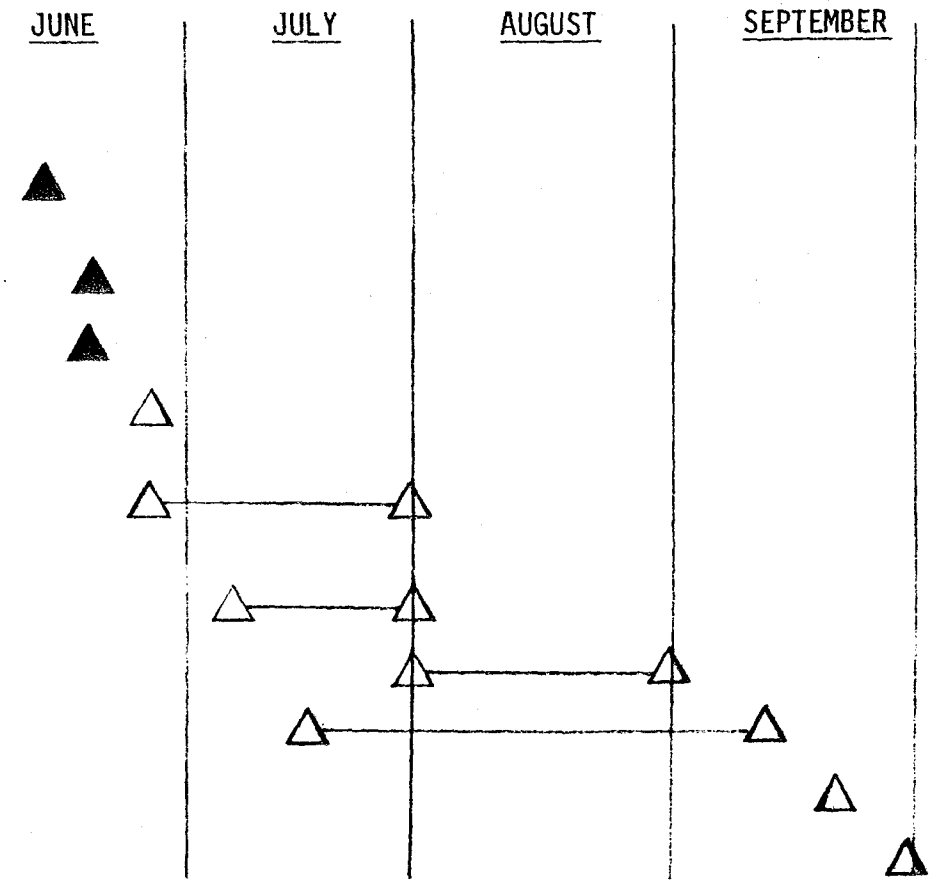
- Whether it is possible to develop an early warning capability that could prevent or mitigate crises or assist management in coping with these unavoidable events.

This analysis will be documented in a report to the Commissioners including findings and where appropriate recommendations and options.

RECOMMENDED SCHEDULE

Event

1. Steering Group formation and initial discussion and guidance
2. Steering Committee agreement on scope content and schedule of study
3. Forward to Directors for their information
4. Forward study plan to Commissioners
5. Analysis of (pilot) event and Steering Committee feedback
6. Re-work questions and procedures and modify study plan if appropriate
7. Analyze other events
8. Draft findings
9. Steering Committee Reactions
10. Final Report to Commissioners



Staffing Requirements for Study Duration

PLA:	1.5	people (full-time equiv.)
OPE:	2.0	"
OGC:	0.5	"
NRR:	1.0	"
	5.0	people

Key: ▲ = Accomplished

△ = Projected

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

OFFICE OF THE CHAIRMAN

May 26, 1976

MEMORANDUM FOR: Lee V. Gossick

FROM: Marcus A. Rowden, Chairman

SUBJECT: MISSION STATEMENT FOR A HIGH LEVEL GROUP ON REGULATORY RESPONSIVENESS

As you know, maintaining and wherever possible improving the effectiveness and efficiency of the regulatory process is a primary NRC objective. This includes not only NRC's ability to meet its routine responsibilities but also its ability to respond to non-routine events which place unexpected and extensive demands on the resources and time of the entire organization. During our first year or so of operation the NRC has confronted and dealt with several major non-routine challenges, including the pipe crack situation, the Browns Ferry fire and the events surrounding the recent resignations. I believe we can be proud of our performance in each case. At the same time, we should be open to whatever lessons experience may teach us concerning ways of further improving NRC's responsiveness to unexpected demands.

Accordingly, the Commission would like you to take the lead in organizing a high-level study group to carry out several tasks. First, the group should conduct a systematic "lessons learned" analysis of overall NRC performance in dealing with major non-routine challenges like those mentioned above. The analysis will focus on the non-technical aspects of NRC responses at all levels of the agency, Commission as well as staff.

Secondly, on the basis of the foregoing analysis and through discussions with management and staff, the group should explore and address such questions as:

— Whether NRC has the appropriate capabilities for responding in an integrated way to non-routine situations, both internally (e.g., by marshalling and coordinating staff resources) and externally (e.g., by suitably broad interaction with the Congress and the media);

— Whether NRC is currently prepared to respond efficiently to non-routine situations with minimal "wheel spinning" and disruption of ongoing responsibilities;

Attachment 2

— Whether NRC can take full advantage of opportunities to exercise reasonable leadership and control over the course of events as opposed to being in a reactive posture;

— Whether NRC is equipped to exercise sound advance and real-time planning for effectively dealing with the demands generated by non-routine challenges;

— Whether NRC is giving adequate consideration to developing "early warning" and deterrence capabilities to assist it in anticipating, responding to and, where possible, preventing non-routine, crisis-like situations.

Thirdly, the review group should produce in close cooperation with the senior staff a report describing its findings and presenting the Commission with alternatives for action. The purpose of the report will be to aid the Commission by summarizing NRC experience in dealing with the non-technical aspects of high-stress, unexpected challenges and, as appropriate, clarifying organizational and procedural options for improvement of capabilities for integrated responses, as well as suggesting steps for their implementation.

To assure that the group brings a broad and balanced perspective to the task, which cuts across all areas of Commission responsibility, it should be composed of individuals from both the EDO and Commission levels. In keeping with the importance and sensitivity of the assignment the group should be headed by senior level persons. The Commission believes a four-member steering committee, composed of the Assistant Executive Director, the Director, OPE, the General Counsel, and chaired by you would be a manageable and effective leadership vehicle. The steering committee would be primarily responsible for providing broad policy guidance to the study, supervising its conduct, and reviewing and approving the report for submission to the Commission. The bulk of the actual day-to-day interviewing and exploration could be performed by the review group's staff (4-6 persons) drawn from such offices as OGC, OPE and PLA.

I would hope that, once begun, the study could be completed expeditiously. I would appreciate receiving your recommendations on the detailed scope of the study and what an appropriate schedule might be.

cc: Commissioner Mason
Commissioner Gilinsky
Commissioner Kennedy
Peter Strauss
Ben Huberman
San Chilk

August 24, 1976

SECY-76-438

COMMISSIONER ACTION

For: The Commissioners

From: Harold S. Bassett, Acting Director, Office of Planning and Analysis

Thru: Executive Director for Operations

Subject: EVALUATION OF THE OMIPC RAINBOW BOOKS

Discussion: At the time of discussion of the FY 1977 budget, Chairman Anders requested several follow-up actions. One of these actions resulted in an assignment directing the Office of Planning and Analysis to perform an evaluation of the OMIPC Rainbow Books.

Recommendation: We recommend continuation and improvement of the Rainbow Books in order to provide management with a tool to assess all NRC actions and activities.

Coordination: By using the interview technique, comments regarding the books were solicited and received both from within and outside the agency. The interviewees were given the opportunity to edit and approve their remarks prior to their being placed in the report appendicies. We have provided you with a copy of the executive summary. The back-up document is quite bulky and is presently being edited, in final, and will be sent to you shortly.

Harold S. Bassett, Acting Director
Office of Planning and Analysis

Attachment:
Executive Summary

Contact:
S. D. Isaacs
492-7721

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Secretariat

[illegible]ioner comments should be provided directly to the Office of the Secretar[illegible] [illegible]f business Wednesday, September 1, 1976.

Executive Summary

I. Purpose:

The purpose for this study is to evaluate the usefulness of the Rainbow Series published by the Office of Management Information and Program Control (OMIPC).

II. Background

The original charter for OMIPC was to develop a scheduling/manpower/control system for the Directorate of Licensing of the Atomic Energy Commission. Today, this charter has significantly expanded, ranging from increased application of ADP techniques to installation of additional information systems (e.g., safeguards, advanced reactor research, fuel cycle research, etc.). OMIPC does not function solely as a data base manager, but instead has a wide-ranging responsibility for the development, implementation and maintenance of management information systems. Ultimately, the goal of these activities is to establish a comprehensive information and control system which will provide executive management with a tool for tracking the performance of all aspects of the NRC regulatory process.

The current Rainbow Series consists of detailed integrated reporting systems in book form. Currently, books are routinely published, mostly on a montly basis. The book themselves, while representing a highly visible form of output, are only a small part of the effort. Maintenance of the Series involves considerable subsidiary effort, including data collection, computer update, publication, analysis and review.

The sheer number and volume of the books, as well as their attendant resources, have in the past frequently raised questions regarding the utility of the system and its cost. These questions have been raised by individual users as well as by groups, such as the Program Review Committee, and the Commission itself.

At the request of Chairman Anders several follow-up actions were undertaken concern the FY 1977 budget. One of these actions resulted in an assignment directing the Office of Planning and Analysis to perform an evaluation of the Rainbow Series reports.

Attachment

III. Scope of the Study:

The study pursues the following objectives: (1) examine the functions of OMIPC to provide the Commission with a broad overview of its activities and interagency interfaces; (2) identify users of the Rainbow Books and the users that are made of them ; (3) evaluate the books' utility from a user's standpoint, considering the impact on decision-making, and availablity of information and assessing costs and (4) identify deficiencies and possible improvements if necessary, such as deletion of books or reduction in content and/or frequency of publication. The approach taken for collecting information to support the findings, conclusions, and recommendations was to interview principal users of these systems at various levels within NRC.

IV. Findings:

1. Rainbow Books satisfy a number of organizational needs, some of which are not immediately apparent and are difficult to identify with any specific office or portion of the agency. Besides their most obvious objective of aiding project management, books perform several other institutional functions of varying importance. They were assessed against the following criteria:

   - Management Control: Do the books assist the various levels of management perform better by providing accurate and timely information and total program overview?

   - Quality of Information: Do the books promote the quality of communication both internally and externally?

   - Discipline of Exposure: By providing widespread exposure to programs and projects, do the books impose a level of management discipline that would otherwise not exist?

   - Establishment of Common Terminology: Is the information recorded and presented in a manner that provides a central point of reference for internal discussion?

   - Evidence of Management Attention: Do the books provide tangible evidence to the Executive Branch, Congress, industry, and the public of attention to the problems of management?

   - Compendium of Information: Do the books provide a useful and comprehensive source of information not available elsewhere, and/or in more readily retrievable form?

2. With regard to utility from a project management standpoint, most of the managers interviewed voiced specific difficulties with the particular books they were familiar with. However, most agreed that these difficulties were amenable to correction, particularly with regard to the accuracy and timeliness of the information used as input to the information system. Significantly, in no case did any individual recommend major changes in or elimination of a book with which he was identified as a primary user.

3. The Rainbow Books are reviewed on a regular basis by OMIPC and user offices regarding content, frequency of publication, quality of information. These reviews have in the past frequently caused revisions in the books and the manner in which they are presented. The fact that such activity does take place is not widely recognized throughout the organization.

4. For the most part, books represents a very inexpensive means to acheive the objectives mentioned in #1 above. The average cost of a book is $35,000 per year, roughly the cost of a single middle-grade employee. Nearly 60 percent of the total represents personnel costs, about 25 percent goes for printing with the remainder assigned to computer expenses.

   From the standpoint of examining adjustments in frequency and content, a very large part of the total cost is fixed. In other words, changing a book from a montly to a quarterly schedule would not reduce its total cost by two-thirds. The cost reduction would probably be more in the order of 10 percent in most cases hardly enough to justify the change.

5. For those books offered to the public on a subscription basis, utility outside of NRC can be measured quite readily. The Gray and Yellow Books each generate nearly enough revenue to cover their costs.

V. Conclusions and Recommendations:

1. In general, Rainbow Books accomplish their purpose well and OMIPC has performed its task effectively. The books serve several important purposes for the NRC. Consequently, when contemplating changes in the system impact should be carefully assessed.

2. The books also provide documentation that is useful in NRC's dealings with Congress, the public and industry. It seems necessary, therefore, to continue to portray the information contained in the books.

3. OMIPC should determine whether additional books, other than the Gray and Yellow, can become more self-supporting on a subscription basis.

4. A more formal periodic review cycle should be established emphasizing the users' participation.

October 20, 1976 ~~OFFICIAL USE ONLY~~ SECY-76-524

UNITED STATES
NUCLEAR REGULATORY COMMISSION

CONSENT CALENDAR ITEM

For: The Commissioners

From: W. G. McDonald, Director, Office of Management Information and Program Control

Through: Executive Director for Operations

Subject: ABNORMAL OCCURRENCE DETERMINATION AND PUBLIC DISSEMINATION PROCESS

Purpose: To obtain Commission approval of an NRC procedure for abnormal occurrence determination and public dissemination of reports concerning abnormal occurrences, in accordance with Section 208 of the Energy Reorganization Act of 1974 (ERA).*

Category: A minor policy matter.

Issues: Section 208 of the Energy Reorganization Act of 1974, as amended, sets forth Congressional and specific public reporting requirements but provides no direction regarding implementation. The Congressional reporting requirement for quarterly reports is currently being met by issuing NUREG reports. The public reporting requirements need similar specific dissemination procedures. The issues are:

Issue 1. Who determines that an event is an abnormal occurrence?

Issue 2. What procedure should the NRC use to fulfill the abnormal occurrence public reporting requirements of Section 208?

Decision Criteria: The abnormal occurrence determination and dissemination process should:

1. Be effective in fully complying with the 15 day public reporting requirement and the handling of subsequent information concerning the abnormal occurrence.

Contact:
W. G. McDonald
(Ext. 27834)

*Two related Commission papers are SECY-76-471, "Abnormal Occurrence Criteria," and SECY-76-384, "Agreement States Events and Abnormal Occurrences Reporting." (See SECY Note on page 8.)

2. Be efficient by providing for timely yet thorough evaluation, coordinated determinations, and widespread dissemination of abnormal occurrence information.

Discussion: Section 208 of the ERA of 1974 reads as follows:

"The Commission shall submit to the Congress each quarter a report listing for that period any abnormal occurrences at or associated with any facility which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended, or pursuant to this Act. For the purposes of this section an abnormal occurrence is an unscheduled incident or event which the Commission determines is significant from the standpoint of public health or safety. Nothing in the preceding sentence shall limit the authority of a court to review the determination of the Commission. Each report shall contain -

(1) the date and place of each occurrence;

(2) the nature and probable consequences of each occurrence;

(3) the cause or causes of each; and

(4) any action taken to prevent reoccurrence;

the Commission shall also provide as wide dissemination to the public of the information specified in clauses (1) and (2) of this section as reasonably possible within fifteen days of its receiving information of each abnormal occurrence and shall provide as wide dissemination to the public as reasonably possible of the information specified in clauses (3) and (4) as soon as such information becomes available to it."

The public dissemination (as opposed to the Congressional reporting aspects) of abnormal occurrence information necessitates that specific procedures be developed. Since the law specifies time requirements for the public dissemination of information on abnormal occurrences, the Commission needs to have a reasoned approach for compliance. Time conflicts exist between meeting reporting requirements and performing evaluative appraisals for significance. For events with major consequences from the standpoint of public health and safety, the significance of the event is readily apparent and information can be disseminated quickly; for events with potential

consequences, the significance may not be readily apparent and a time delay occurs in information dissemination. Thus, the process for determining an event to be an abnormal occurrence could involve a balance between the requirement of initial public notification within fifteen days of receiving information and the need for time required to: (1) allow the licensee to gather information about the event; (2) have the NRC review the information and inspect and report, if necessary; and (3) allow all parties involved to evaluate the significance of the event.

The issues and alternatives* are:

Issue 1. Who determines that an event is an abnormal occurrence?

Alternative 1. Continue the present determination method. The staff screens, evaluates and recommends events through preparation of the quarterly report to Congress. Commission approval of the report is the final determination step.

Pro: (1) Allows time for event evaluation and followup action.

(2) Fully coordinated determinations result.

Con: (1) Would not reflect the intent of Section 208 as to timeliness.

Alternative 2. The Commission determine abnormal occurrences on an incident basis through staff screening, evaluation and recommendation. (This alternative is the staff recommendation.)

Pro: (1) Timely top-level attention results.

(2) The legislative history addresses this intent. (See Enclosure 3.)

Con: (1) Depending on frequency of events, an inordinate amount of Commission time may be required.

*Note - The alternatives assume the Commission approval of Approach B on Tab A in SECY-76-471, "Abnormal Occurrence Criteria," as the abnormal occurrence criteria. If another approach is selected, these alternatives may not be applicable.

Alternative 3. Executive Director for Operations determine abnormal occurrences on an incident basis through staff screening, evaluation, and recommendations.

Pro: (1) Timely.

(2) Staff concurrence.

(3) Responsibility and authority for the abnormal occurrence program would be delegated.

Con: (1) This delegation of authority may not meet the intent of the legislative history of the Energy Reorganization Act of 1974, though it is within the Commission's authority to do so.

Alternative 4. Each major office determine abnormal occurrences within their area of responsibility.

Pro: (1) Determination could be rapid.

Con: (1) May be difficult to coordinate timing, depth of analysis, and quality of final report.

(2) Various interpretations of the criteria could evolve causing different offices to determine abnormal occurrences differently.

The lack of timeliness in Alternative 1 with subsequent potential legal problems and agency criticism makes this alternative least desirable. Alternative 2 has the advantage of Commission attention and meets the intent of the legislative history of the Energy Reorganization Act of 1974; however, it may consume an inordinate amount of Commission time. (Note - The Office of Management Information and Program Control would continue to process event data, to screen the information for potential abnormal occurrences, to coordinate the evaluation with the staff, and to prepare recommendations to the Executive Director for Operations.) Alternative 3 also provides a coordinated decision-making process involving staff efforts; however, delegating the decision-making to the Executive Director for Operations may be inconsistent with the legislative intent of the Energy Reorganization Act of 1974. Alternative 4 lacks coordinated efforts thus providing opportunity for public confusion.

Issue 2. What procedure should the NRC use to fulfill the abnormal occurrence public reporting requirements of Section 208?

Alternative 1. Continue the present policy of public dissemination using the NRC Quarterly Report to Congress as the public dissemination vehicle for abnormal occurrences. A notice is published in the Federal Register (FR) after the report is submitted to Congress. However, this FR notice does not discuss the individual abnormal occurrences. Computerized abstracts of Licensee Event Reports (LER's) are sent to all Public Document Rooms on a biweekly basis.

Pro: (1) Since this is the method presently used, it is one of proven implementation.

Con: (1) It is questionable that this fulfills the intent of public release "as soon as available" specified by Section 208.

Alternative 2. Disseminate all abnormal occurrence information to the public through Federal Register Notices. In addition, continue making the quarterly Congressional reports available to the public.

Pro: (1) Fast and reliable method that would satisfy the requirement for rapid, broad public dissemination.

(2) 10 CFR 140 uses the Federal Register for noticing an extraordinary nuclear incident determination, so a precedent exists.

Con: (1) Time consuming. There could be up to three Federal Register Notices per abnormal occurrence event. (The initial notice contains event, place, date, and probable consequences; additional notices could contain cause and corrective action information.)

(2) Some additional NRC workload would result from this dissemination procedure.

(3) Broader public dissemination is available at low additional cost.

Alternative 3. Each abnormal occurrence determination would be disseminated by a Federal Register Notice with copies distributed to NRC Public Document Rooms. In addition, the quarterly Congressional reports would continue to be available to the public. (This alternative is the staff recommendation.)

Pro: (1) This provides an optimum combination of timely official public notification and detailed description of each event.

(2) Use of the PDR's provides a repository for collection of the fragmented information.

Con: (1) Time consuming. As discussed under Alternative 2, there could be up to three Federal Register Notices per abnormal occurrence event, plus the notice to NRC Public Document Rooms.

(2) Some additional NRC workload would result from this dissemination procedure.

Alternative 1 seems least desirable as it is the least timely and is questionable with respect to meeting the intent of Section 208. Alternative 2 provides for limited public dissemination which may not be as wide dissemination as reasonably possible. Alternative 3 provides that once designated an "abnormal occurrence" by the Commission, the NRC notifies the public by FR notice (minimum information required: date, place, and probable consequences within fifteen days.) Prior to public dissemination, the JCAE will be informed. Additionally, the Federal Register Notice for each recent abnormal occurrence will accompany the biweekly report to each Public Document Room. Finally, at the end of each calendar quarter, the abnormal occurrences of that quarter are compiled and reported to Congress. Thus, the public reporting requirements of Section 208 are satisfied through a combination of abnormal occurrence determination on an individual event basis, prompt public notification through the Federal Register, updating of abnormal occurrence information through the Federal Register and PDR mailings and the quarterly abnormal occurrence report to Congress.

NRC public announcements were discussed with the Office of Public Affairs as an alternative for public dissemination of abnormal occurrence information. Such announcements are issued on items that are significant from the standpoint of public health and safety on a timely basis as soon as possible after they have occurred. Thus, a later public announcement,

containing the same information, but confirming the event as an abnormal occurrence, would not be newsworthy and would not be an effective means of publicly disseminating, after the fact, abnormal occurrence information. These public announcements will, however, serve as an additional source of information, readily available to the public, on events that are determined to be abnormal occurrences.

It should be noted that public dissemination of safeguards events may require handling different from other events, due to the general question of classification or sensitivity of safeguards information.

Three enclosures contain details relevant to the issues and recommended program. Enclosure 1 demonstrates that the present system of licensee reporting, NRC response, and corrective actions is adequate to ensure that all events truly significant with respect to public health or safety are evaluated in the abnormal occurrence program. Also, Enclosure 1 reviews the methods considered for public dissemination of abnormal occurrence events. Enclosure 2 contains the present procedure for abnormal occurrence determination and information dissemination. Enclosure 3 contains pertinent pages of the legislative history of the Energy Reorganization Act of 1974, which supports the staff recommendation for Issue 1.

The detailed process to supply to the Commission the appropriate staff screening, evaluation, and recommendation of events considered to be abnormal occurrences will be developed by the staff; the process will be included in an implementation paper which will be forwarded to the Commission after Commission approval of the issues contained in this paper and the two related papers.

Recommendation:

1. Approve the Commission determination of abnormal occurrences on an incident basis through staff screening, evaluation, and recommendation (Alternative 2 of Issue 1).

2. Approve the public dissemination of information concerning abnormal occurrences through the Federal Register (with a copy of each such recent Federal Register notice issued to accompany the biweekly LER distribution to PDR's), in addition continue making the Quarterly Report to Congress available to the public (Alternative 3 of Issue 2).

Coordination: The Office of Nuclear Reactor Regulation, Nuclear Regulatory Research, Nuclear Materials Safety and Safeguards, Inspection and Enforcement, Standards Development, Public Affairs, and Congressional Affairs concur. The Executive Legal Director has no legal objection.

OGC concurs. OPE recommends that the 'abnormal occurrence criteria' paper (SECY-76-471) and then the Agreement States issue (SECY-76-384) be resolved prior to this issue, a course of action which may require revisions to the paper. MIPC responds at Enclosure 4 and though it agrees with OPE on the order for resolving the issues, MIPC feels this paper provides necessary additional background information for the Commission relevant to the other 2 papers referenced above; later changes will be submitted as appropriate.*

William G. McDonald, Director
Office of Management Information
& Program Control

Enclosures:

1. Consideration for Abnormal Occurrence and Dissemination Procedure
2. Present NRC Abnormal Occurrence Program
3. Excerpts from Transcript of Proceedings of Joint Conference Committee on H. R. 11510 as printed in ERDA Compilation of "Legislative History, Energy Reorganization Act of 1974, P. L. 93-438, 1974 Vol. 3, pp. 1745-1752.
4. Response to OPE Comments

Commissioners' comments or consent should be provided directly to the Office of the Secretary by close-of-business Monday, November 1, 1976.

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Exec. Dir. for Operations
Secretariat

*SECY Note: Per coordination with EDO and MIPC, this paper is intended primarily for information purposes at this time and decision subsequent to Commission action on SECY-76-471 and SECY-76-384, which are scheduled for consideration by the Commission on Wednesday, October 27, 1976.

Enclosure 1

CONSIDERATIONS FOR ABNORMAL OCCURRENCE DETERMINATION AND DISSEMINATION PROCEDURE

Important considerations for the abnormal occurrence program include:

1. Determination

   Does the NRC require licensee reporting of the events to be considered for abnormal occurrence purposes? Do these events actually cause NRC response or action? Is publicity generally involved? How frequently is enforcement action required? Do license modifications result?

2. Dissemination

   What are the possible methods of public dissemination? Which are most cost-effective? What would be the legal minimum dissemination?

To answer these questions, MIPC reviewed the events determined to be abnormal occurrences during calendar year 1975. Table 1 summarizes the determination aspects. This table indicates several important concepts:

1. There is no single source of input data for the abnormal occurrence program. None of the events were identical in the reporting process, the internal handling, the public release of information, or in enforcement or other regulatory action. The listing of resources across the top of Table 1 is, therefore, the minimum required for the abnormal occurrence screening and evaluation.

2. All of the events determined to be abnormal occurrences were reported to the NRC in a timely manner by existing procedures. Therefore, no additional reporting requirements are anticipated for abnormal occurrence program purposes.

3. All of the events received NRC action such as enforcement or licensing action, often substantial in nature. This indicates that the events selected by the abnormal occurrence program are of genuine concern to the NRC and are receiving corrective followup and action.

4. The public was generally informed of each event before it was determined to be an abnormal occurrence. The public release of information, on this basis, appears to be adequate to keep the public informed.

To summarize Table 1, the abnormal occurrence program can initiate from existing NRC response action programs for event screening, evaluation, and abnormal occurrence determination.

The methods of public dissemination considered are summarized in Table 2. The combination of a Federal Register notice for each abnormal occurrence, a copy of the Federal Register notice deposited in the Public Document Rooms (PDR's), and the quarterly report to Congress on abnormal occurrences, should adequately keep the public informed.

Table 1. Summary of NRC Response Actions on events Determined to be Abnormal Occurrences During 1975

Title of Abnormal Occurrence	Licensee	Event Report to NRC: Licensee: Prompt, Immed., or 24 Hour Report	14-Day Report	30-Day Report	Other Report	Other Source: Inspector (IE)	Vendor Report	Other Regulatory Body Report	Other Report	IE (1) Incident Response: Level I	Level II	Level III	PN Issued	Publicity of Event: Int.: OPA/IE HQ	External: IE Region	Licensee	Other	LER Mail to PDR	IE Enforcement Actions: Suspend/Revoke Lic	Cease/Desist Order	Notice of Violation: Violation	Infraction	Deficiency	Suspend Lic.	NRC Licensing Action: Safety Mod Order	License Mod Order
Steam Generator Tube Failure	Point Beach 1	✓	✓		✓	✓					✓		✓			✓		✓								✓
Fire in Electrical Cable Trays	Browns Ferry 1 & 2	✓	✓		✓	✓	✓	✓		✓			✓	✓		✓	✓	✓							✓	✓
Loss of Main Coolant Pump Seals	H. B. Robinson	✓	✓		✓	✓	✓				✓		✓			✓		✓								
Improper Control Rod Withdrawls	Dresden 2	✓	✓			✓	✓					✓	✓	✓	✓			✓			✓	✓				
	Quad Cities 2	✓	✓			✓	✓					✓	✓	✓	✓			✓				✓				
Cracks in Pipes at BWR's	Dresden 2	✓	✓		✓	✓	✓				✓		✓	✓				✓	NRC ACTIONS BY BULLETIN REQUESTING TIMELY INFORMATION						✓	
	Quad Cities 1 & 2	✓	✓		✓	✓	✓				✓		✓	✓				✓							✓	
	Millstone 1	✓	✓		✓	✓	✓				✓		✓	✓				✓							✓	
	Monticello	✓	✓		✓	✓	✓				✓		✓	✓				✓							✓	
	Peach Bottom 3	✓	✓		✓	✓	✓				✓		✓	✓				✓							✓	
Fuel Channel Box Wear at BWR's	Duane Arnold				✓	✓	✓				✓		✓	✓		✓		✓							✓	
	Cooper				✓	✓	✓				✓			✓		✓		✓							✓	
	Peach Bottom 2 & 3				✓	✓	✓				✓			✓		✓									✓	
	Browns Ferry 1 & 2				✓	✓	✓				✓			✓		✓									✓	
	Brunswick 2				✓	✓	✓				✓			✓		✓									✓	
	Hatch 1				✓	✓	✓				✓			✓		✓									✓	
	Fitzpatrick				✓	✓	✓				✓			✓		✓									✓	
	Vermont Yankee				✓	✓	✓				✓			✓		✓									✓	
Steam Generator Feedwater Flow Instability at PWR's	Surry 1	✓	✓		✓		✓									✓										
	Turkey Point 3 & 4	✓	✓		✓		✓				✓					✓										
	Indian Point 2	✓	✓		✓		✓				✓		✓			✓										
	Calvert Cliffs 1	✓	✓		✓		✓				✓		✓			✓		✓								
Nuclear Material Inventory Anomaly	Nuclear Fuel Services			✓	✓	✓			✓		✓		✓	✓		✓			(2)						✓	✓
Overexposure to Radiographer	Value Engineering Lab.	✓			✓	✓			✓		✓		✓	✓					(3)							

(1) This system was not in effect in 1975. The checks indicate the approximate response level.

Level I - An actual or imminent serious threat.

Level II - A potential threat, or an event which has or could have adverse effects.

Level III - No immediate potential threat, or an event which has or could have relatively insignificant effects.

(2) Plant was shutdown for reinventory. (3) Show cause order.

ITEM		METHOD	FREQUENCY	EXTENT OF DISSEMINATION	PRESENTLY USED (JAN '75-JUNE '76)	RECOMMENDED PUBLIC DISSEMINATION METHODS
LER'S	1.	LER Mailing to PDR's	Biweekly	PDR	X	X
	2.	Gray Book (Commercial Nuclear Reactors Only)	Monthly	NTIS	X	X
ABNORMAL OCCURRENCES	1.	Report to Congress (with FR Notice)	Quarterly	Fed. Register	X	X
	2.	Federal Register Notice				
		a. Each Event	By Event	Fed. Register		X
		b. Periodic Summary	Monthly	Fed. Register		
	3.	PDR Notification				
		a. Copy of Federal Register Notice (non-computerized)	By Event	PDR		X
		b. Condensed (computerized)	Biweekly	PDR		
	4.	Press Release (Special for AO determination)	By Event	Press		"Normal Policy"
	5.	Special AO Publication	Monthly	NTIS		

ALTERNATIVES CONSIDERED FOR THE
PUBLIC DISSEMINATION OF ABNORMAL OCCURRENCE INFORMATION

TABLE 2

Enclosure 2

PRESENT NRC ABNORMAL OCCURRENCE PROGRAM

The present abnormal occurrence determination procedure, in use since mid year of 1975, provides for staff screening, evaluating, and recommending events for the quarterly abnormal occurrence report to Congress. However, it is not until Commission approval of the report to Congress that an event has been "determined" to be an abnormal occurrence. A Federal Register notice accompanies the Report to Congress, which complies with the requirement of public dissemination of the abnormal occurrence information. There presently is no other special public notification that an abnormal occurrence determination has been made.

NRC licensees report events in accordance with the applicable regulations (10 CFR), and the provisions of licenses, technical specifications, and license conditions. Each Licensee Event Report (LER) from a nuclear power plant (this system is being expanded to include all licensees) is screened and evaluated. Proper NRC response action is determined on an individual event basis. An abstract of each LER is computerized and placed in the LER file by the Performance Evaluation Branch of MIPC. Biweekly, these abstracts are mailed to the Washington and 122 Local Public Document Rooms (PDR's). If an LER is subsequently determined to be an abnormal occurrence, the event is not presently identified as an abnormal occurrence in the LER file.

Thus, the present public dissemination concerning abnormal occurrences is by:

- Biweekly dissemination of Licensee Event Report (LER) to the Public Document Room prior to Commission determination that the LER is an abnormal occurrence.
- Quarterly Report to Congress of abnormal occurrences.
- Federal Register Notice of Report to Congress.

The present method is cumbersome because there is no clearly defined procedure by which events are determined to be abnormal occurrences. No one person decides when an event becomes an abnormal occurrence. This method is also untimely with respect to 15 day reporting, since several months may pass between the time the NRC is notified of an event and the time the Quarterly Report to Congress is approved and submitted to Congress.

Enclosure 3

Excerpts from Transcript of Proceedings of Joint Conference Committee on H.R. 11510 as printed in ERDA Compilation of "Legislative History, Energy Reorganization Act of 1974, P.L. 93-438," 1974 Vol. 3, pp. 1745-1752.

1 in no more than ten minutes.

2 (Whereupon, at 11:20 a.m. a ten-minute recess was taken.)

3 Representative Holifield. The Committee will be in

4 order, and staff will please lower the tone of their discussions.

5 We are looking at Subsection 35, to which I propose

6 to offer an amendment, with the agreement of the staff, as I

7 understand.

8 In Section 207, entitled Abnormal Occurrence Reports,

9 which reads as follows: "The Commission shall submit to the

10 Congress each quarter a report listing for that period any

11 abnormal occurrences at or associated with any facility which

12 is licensed or otherwise regulated pursuant to the Atomic

13 Energy Act of 1954 as amended, or pursuant to this Act."

14 And the following is the language which I am offering

15 for consideration, it's a definition of abnormal occurrences,

16 that is a term which could be vague.

17 "An abnormal occurrence is an unscheduled incident or

18 event which the Commission determines to be significant from

19 the standpoint of public health or safety."

20 Senator Percy. Mr. Chairman, I would like to speak to

21 this, inasmuch as this was my amendment in the Subcommittee,

22 I believe.

23 I think the section is vital. We have a deep concern

24 by many people that with the energy crisis we are hell-bent

25 for election and disregard safety. Now, that we know is not

1 true, but it's a concern that exists. I concur with the clari-
2 fication the staff has made in this regard. I would only
3 suggest that rather than putting in a statute, in the opinion
4 of the Commission, that we put that in the report language,
5 and leave the wording exactly as the staff has listed it on the
6 page on Item 35, "An abornmal occurrence is an unscheduled
7 incident or event which is significant from the standpoint
8 of public health and safety." A good addition.
9 But, if we put in the report language that it's our
10 intention that the Commission shall have discretion in this
11 area, and the Court would go to the Commission to determine
12 whether in their judgment it is an abnormal occurrence, it
13 wouldn't be quite as binding as in the statute, but still the
14 intent would be there.
15 I would recommend that we accept this modification,
16 except we delete "in the opinion of the Commission", but we
17 infer that in the report, rather than the statute.
18 Representative Holifield. Well, in response to the
19 Senator's position, and the position has merit, I would say
20 that an abnormal occurrence has to be determined by someone.
21 Senator Percy. Yes.
22 Representative Holifield. And who is the highest
23 authority in ERDA, I mean, the Nuclear Regulator Commission
24 to determine that? That would be the Commission.
25 Why is there any objection to writing it in and speci-

it so that there won't be court cases involved as to an improper determination by a subordinate, or something like that I think it's important that it go right to the Commission if it's an abnormal occurrence, and they make the determination, and we can pinpoint them the responsibility of it, rather than to have some subordinate somewhere down the line make this.

I think it would actually achieve the results that the Senator wishes to achieve, and achieve them clearly and unambiguously.

Senator Percy. I think it's a subtle difference in that the report would make it clear that in our opinion the Commission should be the final arbitor in the matter, and the court would go to the Commission for a definition of what an abnormal occurrence is.

It would not be quite so discouraging to an intervenor if it were in the report language, than if it were in the statute. We would at least give the feeling and the expression and the attitude towards those who believe that occurrences are not being adequately reported, that they have a recourse. And here at least it would not be quite as binding.

I just think psychologically and subtly it would not be quite as much of a discouragement if it were in the report, as it is in the statute itself.

Representative Holifield. But I'm thinking about the delay in the energy program. I think anywhere that we are

1 ambiguous and leave something that looks and is undoubtedly
2 weaker, and more ambiguous, we should eliminate that if possibl
3 Senator. I believe very strongly that we ought to pin down
4 where we can the responsibility, and here we pin it to the
5 highest possible entity, still subject to court challenge.
6 I just believe that it is very important that we pin thi
7 down so that we won't leave a loophole there for people who
8 may be with good motive but are acting with less than expert
9 opinion, on what is an abnormal occurrence.
10 For instance, it's abnormal that a water supply hose
11 breaks, that's abnormal; the normal thing is for it to function
12 This encompasses so many trivia, abnormal occurrences that what
13 you do, unless you pin it down, you are laying the ground work
14 for all kinds of actions, all kinds of ambiguities; and it
15 seems to me we should pin it down.
16 Senator Percy. What I'm looking for is, here you have
17 a case, you are setting up a Commission to be judge and jury,
18 or we are assuming the Commission is infallible, that it can m
19 no mistake. You are directing the Commission to make a report,
20 but you are giving to the Commission absolute authority to
21 determine what in their judgment is an abnormal occurrence.
22 Now, they are fallible, they are human beings.
23 Representative Holifield. So are the people that are
24 complaining, that have not been confirmed by the Senate. The
25 Senate has confirmed this Commission; they are deemed very

1 capable in their respective fields.

2 Senator Percy. I didn't confirm them based on the fact

3 that they are infallible. I assume that they are human beings

4 of flesh and blood, and they have judgments.

5 I think we should try to see that they recognize that

6 they must somehow justify and look very carefully at an

7 occurrence to see whether or not it is to be reported or not;

8 and if there is someone, an intervenor, if they feel they have

9 due cause, could then go to court and the court in the report

10 language would look back to the Commission to determine whether

11 in their judgment it's an abnormal occurrence; but not to

12 make it total, absolute and binding and not totally discouraging

13 to an intervenor if they felt that there was cause. They are

14 not going to the expense if they don't feel there is cause.

15 Representative Holifield. Will the gentleman yield?

16 Representative Horton. I certainly understand Senator

17 Percy's position, but it would seem to me that even with your

18 concern, there still would have to be a judicial interpretation

19 as to whether or not the Commission actually was proper, or

20 appropriate in what they decided, or whether they acted

21 reasonably.

22 In other words, as I see the procedure, if someone, let's

23 say an intervenor, was concerned with whether or not it was

24 an abnormal occurrence, and the Commission had made a determina-

25 tion that it was, or was not, they would have the alternative

1 of going to court anyway. What you are saying is that the
2 intervenor can make the determination that it's abnormal, and go
3 to the court for a decision.
4 I think it would be better to have it in the language,
5 in the Act because it is a responsibility which we are going
6 to place on the Commission, and require them to make that
7 finding. And then, if their finding is made, the court will
8 have an opportunity to determine whether or not they are
9 reasonable, or whether or not their finding is accurate.
10 Senator Percy. As I interpret the language suggested
11 by Chairman Hollifield, if it's in the statute, the court
12 simply goes to the Commission. They say, by our definition it
13 was not an abnormal occurrence, and that's it.
14 Representative Horton. Well, why don't we put it in
15 the language that we don't intend to take away the right of
16 the court to determine whether or not the Commission was
17 reasonable, and whether or not it acted properly?
18 Senator Percy. I think you have brought forth an
19 acceptable solution.. That's all we want, the feeling that the
20 Commission can't arbitrarily just simply say in our judgment --
21 Senator Ribicof. All in favor of the Horton-Percy --
22 Representative Holifield. Please hold it for Mr.Wydler.
23 Representative Wydler. Well, I'm a little confused, in
24 reading this section, exactly what we are even talking about.
25 This is called "Abnormal Occurrence Report", but it doesn't

1750

1 describe in any way, shape or form what an abnormal occurrence
2 is. It just strikes me, for instance, if there were a strike
3 by the workers in an atomic plant, during the period of the
4 report, would that be listed, in all this information, as an
5 abnormal occurrence in the plant? Wouldn't this language
6 cover anything --
7 Representative Horton. The definition on the side
8 is referring to the public health and safety, Mr.Wydler, that's
9 what we are talking about.
10 Representative Wydler. I didn't have this report.
11 Representative Holifield. Will you put the question?
12 Senator Ribicof. All those in favor of the Percy-
13 Horton compromise --
14 Representative Brown. Could you state the Percy-
15 Horton compromise?
16 Representative Horton. Well, the idea is to state in
17 addition to the language that the Chairman has just read,
18 which says an unscheduled or abnormal incident or event which
19 the Commission determines is significant from the standpoint of
20 public health and safety, and then we would write into the
21 language of the Conference that it is intended -- it is not
22 intended that the court would be foreclosed, or that any right
23 would be taken away from an intervenor to have the court review
24 the action of the Commission.
25 Representative Brown. The action in the Commission in

1 what regard?

2 Representative Horton. To make that determination.

3 Representative Brown. To determine what "abnormal" is?

4 Okay.

5 Representative Holifield. A show of hands on this side?

6 It is agreed.

7 Senator Ribicof. On this side? Senator Percy, Senator

8 Jackson?

9 Senator Percy. Could I get together with Congressman

10 Horton just a second when we break and see if we can't agree

11 on the language today.

12 Senator Ribicof. All right.

13 While Senator Jackson is here, Mr. Chairman, we have

14 three Conferences going, and I wonder if we could go back --

15 Senator Jackson. Stripmining, solar energy, they are

16 all meeting at the same time.

17 Senator Ribicof. -- to some of the items we deferred.

18 Senator Jackson. They finished solar energy.

19 Senator Ribicof. The helium item, 22.

20 Senator Jackson. Yes.

21 Senator Ribicof. A question was raised by Senator Percy

22 about that.

23 Senator Jackson. As Senator Percy will recall, it was

24 Senator McClure who made the request, he is a member of the

25 Interior Committee, and asked me to present a proposal. And

Enclosure 4

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

T. Rehm
Assistant to the EDO

RESPONSE TO OPE COMMENTS ON AO DETERMINATION AND PUBLIC DISSEMINATION PROCESS PAPERS

Per telecon with OPE (Joan Aron) on October 13, OPE has no problem with forwarding this paper to the Commission as a 'Action Paper' subject to changes which may be necessary as a result of Commission action on SECY-76-384.

The OPE comments (attached) are appropriate. We have recognized the interrelationship of the abnormal occurrence issues during development of the paper. We have noted in this paper that the recommendations are contingent on the Commission approving the staff recommendation of Approach B of Tab A in SECY-76-471, "Abnormal Occurrence Criteria." We have been coordinating with you and the Secretariat to have the 'criteria' issue resolved first; the agreement states issue second, and this paper third. This corresponds to what OPE is suggesting also.

We, therefore, believe it appropriate to send the paper now. It will give the Commission the advantage of knowing the complete broad picture on the three interrelated issues prior to making any decisions. This should assist in the decision making process.

W. G. McDonald, Director
Office of Management Information
& Program Control

cc: L. V. Gossick
B. Huberman
P. Strauss
H. Shapar
R. A. Hartfield
J. L. Crooks

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

Enclosure 4

October 7, 1976

MEMORANDUM FOR: Tom Rehm

FROM: Ben Huberman

SUBEJCT: PUBLIC DISSEMINATION PROCESS FOR ABNORMAL OCCURRENCES

I think the alternatives are adequate but recommend that the choice of a process for public dissemination await the prior determination of the criteria to be used in the definition of "abnormal occurrence." Since the choice of criteria is likely to be a determining factor in affecting the frequency of events, we should know more about the number of abnormal occurrences at issue before we decide on the alternative to be followed in public dissemination. For example, if the definition of "abnormal occurrences" results in a large number of incidents for the Commission to review, it might be wise for the Commission to delegate responsibility for determining abnormal occurrences on an incident basis to EDO (Alternative 3). Conversely, if the criteria are defined in such a manner as to require infrequent Commission review, it may not burden the Commission to serve as the final arbiter (Alternative 2). For this reason, I suggest that the choice of criteria be undertaken before public dissemination procedures are set.

For the same reason, I also believe that it is premature to establish a public dissemination process until we have arrived at a determination concerning "comparable events" in the agreement states.

cc: Peter Strauss
Howard Shapar
Bill McDonald

CONTACT:
Joan Aron (OPE)
634-1541

UNITED STATES
February 10, 1977 NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SECY-77-69

INFORMATION REPORT

For: The Commissioners

From: Kenneth R. Chapman, Director
Office of Nuclear Material Safety and Safeguards

Thru: Executive Director for Operations

Subject: ANALYSIS OF THE EFFECTS OF NATURAL PHENOMENA ON EXISTING PLUTONIUM PROCESSING AND FABRICATION PLANTS

Purpose: To inform the Commission of staff action to examine the capability of existing licensed plutonium processing and fabrication facilities to withstand the effects of natural phenomena.

Discussion: The following is a summary statement of the problem and the staff approach to its solution. More detailed discussion is provided in the several enclosures.

Statement of Problem: On September 2, 1971 changes were made to 10 CFR 70, §70.22 and §70.23, that conditioned approval of construction of new plutonium processing and fabrication plants upon reasonable assurance of protection against natural phenomena such as severe storms, earthquakes, tornadoes and floods. The changed regulation is mute with respect to like protection for the existing ten plutonium processing and fabrication facilities. However, the Statement of Considerations that accompanied the rule change does state that existing plants will be examined with the objective of improving to the extent practicable their ability to withstand adverse natural phenomena. In July 1976 the staff together with a panel of expert consultants began this review and it is now well underway. Other aspects of public health and safety have been reviewed previously when the facilities were licensed and will be reviewed regularly during the normal five-year renewal cycle.

Contact:
James E. Ayer
427-4205

Approach to Problem: The approach being taken by the staff is to review each facility by the same team of interdisciplinary experts. This will result in a sequential review of each facility starting with the facility with the largest plutonium inventory. Since each facility is practically unique with regard to local weather conditions, demography, construction details and earthquake probabilities, a generic approach is not considered feasible. Instead the staff concluded that a consistent approach could best be taken by having the same review team examine each facility. The review team consists of staff members and the best recognized experts in their field in this country.

Of the ten facilities now classed as plutonium processing and fabrication facilities, the seven with possession limits over 5 Kg were selected for review. If during the review it appears that the facilities with limits below this could present substantial risk, they will be included.

The subject review will consider flood, earthquake, and severe weather forces upon plant structures on the basis of historic recurrence intervals for each event considered. Consequence to the public by way of structural response and releases, if any, will be estimated. This will allow the staff to use risk assessment methods if the study shows that radioactive releases of a problem nature are possible. The results will be used to determine if any upgrading of the facilities is necessary.

A detailed discussion of the technical approach to the review is given in Attachment A. A list of the facilities being reviewed is given in Attachment B.

Status of Analysis: As of 31 December 1976 all members of the team concerned with severe weather aspects have been identified, committed to the project, and funding has been made available. The several members of the team have met and agreed on the information input/output to succeeding reviewers. Work

has started on the severe weather characterization for the locale occupied by the first plant to be reviewed. The structural reviewers for the complete natural phenomena effects analysis have been identified, committed to the project, and have made the first site visit at two of the seven plants to be analyzed.

Coordination: Periodic meetings have been held with the staff of Nuclear Regulatory Research, Nuclear Reactor Regulation, and Energy Research and Development Administration to provide for information exchange and notification of project status. Similar meeting will be held in the future as the project continues and significant findings evolve. Technical guidance for risk assessment is being provided by the Office of Regulatory Research. Arrangements are being made to obtain review and comment by the Advisory Committee on Reactor Safeguards of the basic approach for this analysis, and subsequently of staff findings.

Kenneth R. Chapman, Director
Office of Nuclear Material
Safety and Safeguards

Enclosure :
"Analysis of the Effects of Natural Phenomena upon Existing Plutonium Fabrication Facilities"

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ACRS
Secretariat

October 12, 1976

ANALYSIS OF THE EFFECTS OF NATURAL PHENOMENA UPON EXISTING PLUTONIUM FABRICATION FACILITIES

I. STATEMENT OF PROBLEM

The regulations that establish procedures and criteria for the issuance of licenses to possess and use (and, thereby, fabricate) special nuclear materials are contained in 10 CFR 70. On September 2, 1971 changes were made to Sections 70.22 and 70.23 that spelled out additional requirements applicable to plutonium processing and fuel fabrication plants. Those changes required that applications for licenses "... shall contain ... a description and safety assessment of the design bases of the principal structure, systems, and components of the plant, including provisions for protection against natural phenomena, ...".

The Statement of Considerations for the September 2, 1971 rule making (Attachment A) states that "Existing licensed plutonium processing and fabrication plants will be examined with the objectives of improving to the extent practicable their ability to withstand adverse natural phenomena without loss of capability to protect the public and their capability for coping with inplant accidents." It further states that "The Commission is developing appropriate siting and general design criteria for plutonium processing and fabrication plants which will include consideration of protection against adverse natural phenomena as well as inplant accidents."

Since the subject rule making became effective four licensees of plutonium fabrication plants have applied for authorization of full-term license or license renewal. One of the four has been issued a full-term license supported by a final environmental statement. The remaining three applications are in various stages of review. Attached is a table (Attachment B) that identifies all facilities with license limits of over 5 kg. of unencapsulated plutonium that are or may become a candidate for "... a safety assessment of the design bases of the principal structure, systems, and components ....., including provisions for protection against natural phenomena ....".

Enclosure

Experience with safety and environmental reviews relative to plutonium fuel fabrication plant operation has revealed certain major problems. These problems relate to inconsistency in the assumptions and methodology used to quantify site characteristics, to analyze for structural weakness leading to failure of confinement systems, to assign values to the dispersion characteristics of severe weather, and to quantify other pertinent features of site and plant. Uniformity of treatment becomes especially important if credence is given to the previously quoted source, which states that ".... existing .... plants will be examined with the objectives of improving to the extent practicable their ability to withstand adverse natural phenomena without loss of capability to protect the public ....".

II. PROPOSED SOLUTION

In the past, problems of the type mentioned above have been dealt with on a "generic" basis. That is, a model plant or site was characterized, the phenomena of interest were applied to plant or site, and the effects were analyzed. Such a procedure is used to advantage when licensing actions that require the results are not imminent or can be delayed. However, in the case of plutonium processing and fabrication plant license renewals the review actions are immediate and/or ongoing. Therefore, the "generic" approach to analysis of the effects of natural phenomena upon such facilities would constitute delaying some renewal actions. The "generic" approach to the problem also suffers from inadequacies because the subject plants are distributed across the continent in diverse geologic, meteorologic, ecologic, and demographic settings that are not likely to yield to analysis as an average or model locale.

For the above reasons it is proposed that all existing plutonium fuel fabrication facilities that are licensed to possess and process more than 5 kg. of unencapsulated plutonium be examined and evaluated to determine the effects of natural phenomena upon the public health and safety. The evaluations would address a particular plant at its specific site. It is further proposed that the licensees provide basic data relative to the plant and any site related information in their possession to fulfill the requirement of §70.22f. The licensees would be advised of this program and contacted for suggestions to expedite it. In order to provide maximum credibility and confidence in the results obtained, the proposed examinations and analyses would be performed by an NRC-funded team of nationally recognized experts with NRC staff

providing management direction, guidance and interface control. The results of this effort would be used in the license renewal reviews for each application as appropriate and as a source of information to be used in the development of plant design and siting criteria for future plants.

III. SUMMARY PLAN OF ACTION

A survey of the facilities identified in Attachment B will be conducted to determine their licensing status. The results of this survey will provide the basis for selection of the facilities to be evaluated.

Experts in the fields of seismology/geology, normal and severe weather, structural analysis, source term characterization, meteorological dispersion, demography, and radiological impact will be contacted to determine their interest in the problem and their availability to participate in the program. The detailed review plan, included in this writeup gives a further breakdown of program detail and identifies experts to be initially considered.

It is our intent that the team will review the selected facilities on a site specific basis and provide a safety assessment for each. To the extent possible we will use team generated information as the input data for the independent assessment. The safety assessment will provide a basis for determining the extent of backfitting, if any, necessary for adequate protection of each facility from the effects of natural phenomena. It is recognized that protection of facility is tantamount to protection of the public health and safety.

The technical assessment will take the following path. For the seismic event, ground motion at the plant foundation will be provided as input for the structural and component analysis. This will require the participation of seismologists, geologists, and soil mechanics. The NRC staff will specify a level of ground motion or recurrence interval to be used in the estimate of effects on structure, and radiological impact. The selection may require iterative calculation based upon resultant radiological impact assessment. In the final analysis the staff, with the assistance of a part of the team of experts, will agree upon a source term generated by the selected seismic event.

The source term and mode of structural failure will be provided to an expert on aspiration and levitation of heavy metal compounds who will supply the meteorologist with his estimate of the rate of release and quantity of material available for dispersion. The meteorologist will estimate deposition and airborne concentrations which, when coupled with demographic and land and water use data, will permit an assessment of the radiological impact on man and his environment.

In the case of threat to a facility by severe weather, a similar approach is proposed. In this case transient and steady state forces will be provided as input for structural analysis. The assistance of an aerodynamicist may be required to perform this part of the analysis. In any event, severe weather characterization will not be limited to credible tornadoes but will also include recurrent high winds, which may be the more serious in the event of breach of confinement. Again, source terms and estimates of rate of release and quantity of material available for dispersion will be estimated. Analysis of dispersion, airborne concentration, and deposition by and from severe weather requires the attention of a meteorologist with specialized training and/or experience in this field. Given such an analysis, coupled with the demographic and land/water use data provided above, the radiological impact of releases will be assessed.

Each facility will be analyzed to determine its capability to resist impairment by floods. Credible sources of flooding will be identified and flood levels and stream/river flow rates versus recurrence intervals will be estimated. The data considered will include, where appropriate, the Probable Maximum Flood and the Standard Project Flood as defined by the Corps of Engineers as well as an estimate of warning time as a function of flood intensity. Data from other authoritative sources will be used to further describe the hydrologic characteristics of each site. Forces against flooded structures will be estimated by a hydrodynamicist and provided as input for structural and component analysis. Source term and mode of structural failure, if any, will be provided to the hydrodynamicist who will estimate the concentration and deposition rates of released materials in the flowing stream. When this information is coupled with demographic and land and water use data, an assessment will be made of the radiological impact on man and his environment.

IV. APPLICABILITY OF RESULTS

The results of the proposed plan of action would be applicable to the solution of several current and potential problems. The completed work would provide a description and safety assessment of the design of the principal structure, systems, and components of each plant with regard to their ability to withstand the effects of natural phenomena. The subject results would include the consequences to the public and the environment of exposure of each plant to potentially damaging natural phenomena. Such an analysis is a part of both the safety assessment and the environmental review that normally precedes a licensing action. This is consistent with both Part 51 and Sections 10 CFR 70.22 and 10 CFR 70.23 of the regulations that establish procedures and criteria for the issuance of licenses to possess and use special nuclear materials. Each plant analyzed is licensed and has either applied, or is a potential applicant, for license renewal. Therefore, the analyses to be performed are either needed now or in the near future.

The Statement of Considerations for the September 2, 1971 rule making discussed earlier stated that "Existing licensed plutonium ..... fabrication plants will be examined with the objective of improving to the extent practicable their ability to withstand adverse natural phenomena ....." The results of the proposed plan of action would be derived from an examination of licensed plutonium fabrication plants as stated above. The analysis and results would then provide a basis for determining the modifications, if any, necessary to improve a plant's ability to withstand adverse natural phenomena and in this way contribute to the Commission's stated intention.

The abovementioned Statement of Considerations also stated that "The Commission is developing appropriate siting and general design criteria for plutonium .... fabrication plants which will include consideration of protection against adverse natural phenomena ...." It is expected that the results of the proposed program would provide data applicable to a determination of the defenses needed to adequately protect plants, and thereby the public health, from the effects of natural phenomena.

I SEVERE WEATHER EVENT

A. Wind Speed Characterization

Characterize site specific severe weather (tornado and strong wind) with respect to frequency (probability) including peak velocity, pressure gradients and transient characteristics.

B. Wind Loading

From above data determine forces that will be presented to the structure, and ventilation system by the severe weather.

C. Structural and Component Analysis

Analyze structure and ventilation system(s) to determine resistance to the forces and failure mode, if failure occurs. Analyze effect of structural failure on appropriate plant components. The plant components to be analyzed will be provided by NRC.

D. Source Term

Using NRC supplied quantities of radioactive material at risk and from consideration of failure mode of the structure and confinement components (I-C above), estimate quantities and size distribution released from confinement to the environment ambient to the building.

E. Dispersion to the Environment

Using the source term(s) developed above (I-D) and the severe weather characteristics (I-A), determine the ground level concentration of the radioactive aerosol as a function of downwind time and distance from the plant. Where applicable, describe the dispersal pattern and estimate quantities of pellets, fuel rods, storage containers containing radioactive material, etc. distributed by the severe weather phenomena.

F. Normal Meteorology - Resuspension - Dispersion

Determine the normal meteorology on a site specific basis. Utilizing this data evaluate the probability of resuspension of the radioactive material deposited as a result of severe weather dispersion. For cases of resuspension determine the time and distance ground level concentration(s) of radioactive material that results.

G. Demography

Determine the distribution of population from plant site to a 50-mile radius of the plant. Additionally, determine all locations of water usage within 50 miles of the plant site and estimate minimum dilution between points of contamination and points of use.

H. Radiological Impact

Using the dispersion information (I-E, I-F) and demography data (I-G), calculate and discuss the environmental effect of the releases, both airborne and deposited. Estimate the radiological impact on man and the environment and compare with applicable standards.

II SEISMIC EVENT

A. Geology/Seismic Characterization

Characterize site related geology and seismology including the

1. Earthquake source.

2. "g" value to recurrence interval relationship.

3. Effect of the seismic travel path from source to the base of the site.

4. Effect of travel path through the site.

Develop and present the data for use in the structural and component analysis below.

B. Structural and Component Analysis

Analyze the structure and critical components to determine their resistance to the ground motion developed above. Determine failure mode, if failure occurs, and the effect of the failure on the components. The components to be analyzed will be provided by NRC.

C. Source Term

Using NRC supplied quantities of radioactive material at risk and from consideration of failure mode of the structure and confinement components (II-B above), estimate quantities and size distribution released from confinement to the environment ambient to the building.

D. Dispersion to the Environment

Using the sources term(s) developed above (II-C) and the weather characteristics (II-E), determine the ground level concentration of the radioactive aerosol as a function of downwind time and distance from the plant.

E. Normal Meteorology - Resuspension - Dispersion

Determine the normal meteorology on a site specific basis. Utilizing this data evaluate the probability of resuspension of the radioactive material deposited as a result of dispersion. For cases of resuspension determine the time and distance ground level concentration(s) of radioactive material that results.

F. Demography

Determine the distribution of population from plant site to a 50-mile radius of the plant. Additionally, determine all locations of water usage within 50 miles of the plant site and estimate minimum dilution between points of contamination and points of use.

G. Radiological Impact

Using the dispersion information (II-D, II-E) and demography data (II-F), calculate and discuss the environmental effect of the releases, both airborne and deposited. Estimate the radiological impact on man and the environment and compare with applicable standards.

III FLOOD

A. Hydrology Characterization

Provide data on hydrologic characteristics, historical flooding and types of flood- producing phenomena for each site. From this data prepare charts for water level vs. water flow and water level vs. recurrence interval. Provide an estimate of warning time each site would have when threatened by the flood(s).

B. Hydrologic Loading

From the above data determine forces that will be exerted against the structure.

C. Structural Analysis

Determine resistance of the plant structure to loading from flood forces, including failure mode and extent. For the structure failure determine effect upon confinement systems.

D. Source

Using the information from III-C and NRC developed inventory at risk estimate the quantities and size distribution of radioactive materials released from confinement and available for dispersion by the flood.

E. Hydrodynamic Dispersion

Develop or select a model for dispersion of the radioactive material in the flood waters. Using the data developed in III-D estimate the concentration of radioactive material deposited as a function of stream flow and deposition rate for the affected land area.

F. Radiological Impact

Utilizing the demographic information developed for the severe weather event (I-G), estimate the impact of the amounts of radioactive material released on man and the environment.

rial nuclear material that was obtained under lease from the Commission.

All interested persons were invited to submit written comments and suggestions for consideration in connection with the proposed amendments within 60 days after publication of the notice of proposed rule making in the FEDERAL REGISTER. After careful consideration of the comments received, and other factors involved, the Commission has adopted the amendments set forth below.

The only difference from the amendments published for comment is the dates for submitting Material Status Reports. The Commission has decided to retain the dates of June 30 and December 31 for filing these reports, rather than changing the dates to March 31 and September 30.

At the request of persons commenting on Form AEC-741, the form has been changed to accommodate the reporting of additional data on transactions involving privately owned material. Some changes have also been made in the instructions for completing this form. Form AEC-742 has been changed to require separate line entries for material procured from and sold to the Commission. The instructions for completing the form have been changed in some respects, including a provision that Form AEC-742 shall be signed by the licensee if an individual, by a partner if the licensee is a partnership, or by an officer if the licensee is a corporation.

Pursuant to the Atomic Energy Act of 1954, as amended, and sections 552 and 553 of title 5 of the United States Code, the following amendments to 10 CFR Parts 70 and 150 are published as a document subject to codification, to be effective 30 days after publication in the FEDERAL REGISTER.

36 FR 145
Published 1/6/71
Effective 2/5/71

Fees for Facilities and Materials Licenses

See Part 170 Statements of Consideration.

36 FR 12731
Published 7/7/71
Effective 7/7/71

Miscellaneous Amendments

See Part 50 Statements of Consideration.

36 FR 16894
Published 8/26/71
Effective 9/25/71

Civil Penalties

See Part 2 Statements of Consideration.

36 FR 17573
Published 9/2/71
Effective 9/2/71

On May 28, 1971, the Atomic Energy Commission published in the FEDERAL REGISTER (36 F.R. 9786) proposed amendments of its regulations in 10 CFR Part 70, "Special Nuclear Material," which would provide for Commission review, prior to construction of the site and design bases for plutonium processing and fuel fabrication plants for which a license is sought.

All interested persons were invited to submit written comments and suggestions for consideration in connection with the proposed amendments within 60 days after publication of the notice of proposed rule making in the FEDERAL REGISTER. Upon consideration of the comments received and other factors involved, the Commission has adopted the amendments set out below. These amendments are identical to those published for comment except for minor changes reflecting amendments to Part 70 which were published in the FEDERAL REGISTER subsequent to May 28, 1971.

The requirements of the amendments will apply to plants for the manufacture of plutonium reactor fuel and plants for the conduct of plutonium fuel research and development activities. These plants typically process kilogram quantities of plutonium.

Under the amendments, an application for a license to possess and use special nuclear material in a plutonium processing and fuel fabrication plant must be filed at least 6 months before the beginning of plant construction. Such an application is required to contain, in addition to other required information, a description of the plantsite, a description and safety assessment of the design bases of the principal plant structures, systems and components, and a description of the quality assurance program to be applied to the design, fabrication, construction, testing and operation of structures, systems and components of the plant. Applicants for such licenses should select sites which are at reasonable distances from densely populated areas.

The purpose of the Commission's preconstruction review will be to determine whether the applicant's design bases for the principal structures, systems and components, and its quality assurance program provide reasonable assurance of protection against natural phenomena and the consequences of potential accidents. The Commission will approve construction of the principal structures, systems and components of a plutonium processing and fuel fabrication plant when it has made a favorable safety determination. Failure to obtain Commission approval prior to beginning of construction may be grounds for denial of a license to possess and use special nuclear material in a plutonium processing and fuel fabrication plant.

The Commission is developing appropriate siting and general design criteria for plutonium processing and fabrication plants which will include consideration of protection against adverse natural phenomena as well as inplant accidents. In the interim, the siting principles of 10 CFR Part 100, the General Design Criteria for nuclear power reactors in 10 CFR Part 50 and the criteria used by the Commission to evaluate the adequacy of the design of irradiated fuel reprocessing plants will be used to the extent pertinent. The criteria set forth in appendix B of 10 CFR Part 50, "Quality Assurance Criteria for Nuclear Powerplants," will be used in determining the adequacy of the quality assurance programs.

Existing licensed plutonium processing and fabrication plants will be examined with the objective of improving to the extent practicable their ability to withstand adverse natural phenomena without loss of capability to protect the public and their capability for coping with inplant accidents.

The Commission has found that, because of the importance of the amendments in regard to the public health and safety, good cause exists for making the amendments effective without the customary 30-day notice. Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and sections 552 and 553 of title 5 of the United States Code, the following amendments to Title 10, Chapter I, Code of Federal Regulations, Part 70, are published as a document subject to codification to be effective upon publication in the FEDERAL REGISTER (9-2-71).

37 FR 3985
Published 2/25/72
Effective 3/26/72

Miscellaneous Amendments to Chapter

See Part 20 Statements of Consideration.

37 FR 5745
Published 3/21/72
Effective 3/21/72

Prohibition of Site Preparation and Related Activities

See Part 50 Statements of Consideration.

38 FR 1271
Published 1/11/73
Effective 1/11/73

Miscellaneous Amendments to Chapter

See Part 30 Statements of Consideration.

38 FR 2330
Published 1/24/73
Effective 1/24/73

Miscellaneous Amendment

See Part 2 Statements of Consideration.

ATTACHMENT B

PLUTONIUM FUEL PROCESSING & FABRICATION PLANTS

DOCKET NO. LICENSE NO.	NAME AND LOCATION	POSSESSION LIMIT, Pu, kg	LICENSE STATUS
70-364 SNM-414	Babcock & Wilcox Leechburg, Pa.	2000	Timely renewal
70-1257 SNM-1227	Exxon Nuclear Richland, Wa.	10 90 encapsulated	Renewed 7/18/74
70-754 SNM-960	General Electric Vallecitos, Ca.	150	Timely renewal
70-1193 SNM-1174	Kerr-McGee Crescent, Ok.	360	Timely renewal
70-1143 SNM-1120	Westinghouse Electric Cheswick, Pa.	120	Timely renewal
70-8 SNM-7	Battelle Memorial Institute Columbus, Ohio	16	Timely renewal
70-143 SNM-124	Nuclear Fuel Services Erwin, Tenn.	100	Timely renewal
70-25 SNM-21	Atomics International Chatsworth, Ca.	4	Timely renewal

May 4, 1977 SECY-77-228

COMMISSIONER ACTION

For: The Commissioners

From: Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety and Safeguards

Thru: for Executive Director for Operations

Subject: LETTER TO LICENSEES RE HOSTAGE EVENTS

Purpose: To obtain Commission approval for sending subject letter.

Category: This paper covers a minor policy question.

Issue: Whether licensees and/or NRC can accede to adversary demands for special nuclear material.

Discussion: In the Commission briefing on safeguards contingency planning held on April 11, 1977, Chairman Rowden inquired as to the method that would be used to inform licensees of NRC policy with respect to hostage events.*

We propose to send the letter (Enclosure 1) to the attached list of major fuel-cycle licensees (Enclosure 2).

Hostage events at nuclear reactors could involve considerations other than demands for special nuclear material. A legal basis for NRC policy for these events is under development by ELD and will be reported to the Commission later.

Recommendation: That the Commission approve the attached letter to appropriate fuel-cycle licensees.

*See SECY-77-141A

Contact:
T. F. Carter, Jr., NMSS
42-74191

Coordination: Content of the proposed letter has been coordinated with ERDA. The Office of the Executive Legal Director has no legal objection. The FBI has provided input. OGC concurs. OPE recommends that the first sentence of the last paragraph be changed to read ". . .holding hostages under circumstances involving the illegal transfer of SNM." The FBI has suggested this change not be made since it is somewhat narrower than the existing sentence.

Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety
and Safeguards

Enclosures:
1. Proposed letter to licensees
2. List of major fuel-cycle licensees

NOTE: Commissioners' comments should be provided directly to the Office of the Secretary by c.o.b. Tuesday, May 17, 1977.

Commission staff office comments, if any, should be submitted to the Commissioners NLT May 12, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional time for analytical review and comments, the Commissioners and the Secretariat should be apprised of when comments may be expected.

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Enclosure 1

Proposed letter to fuel-cycle licensees:

Gentlemen:

Occasionally licensees query the Nuclear Regulatory Commission regarding the options that may be available to them in response to illegal demands for special nuclear material based on kidnapping or the taking of hostages. Section 57 of the Atomic Energy Act of 1954, as amended, directly prohibits the delivery of special nuclear material to any other than a licensed person or persons (or certain exempted persons). Under Section 222 of the Act, any violation of Section 57 is a felony.

The criminal penalty in Section 222 would cover individuals employed by the Nuclear Regulatory Commission as well as by any other Government agency. Therefore, the Commission could not legally authorize the delivery of special nuclear material to an extortionist.

At the Federal level the responsibility for negotiating with individuals or groups holding hostages lies with the Federal Bureau of Investigation (FBI), when the violation that has occurred is clearly within the FBI investigative jurisdiction. It is the policy of the Nuclear Regulatory Commission to cooperate in every way possible with the FBI in situations of this kind.

Sincerely,

Ralph G. Page, Acting Director
Division of Safeguards

Enclosure 2

FUEL-CYCLE LICENSEES TO RECEIVE "EXTORTION" LETTER

Babcock & Wilcox/Lynchburg Research Center
Lynchburg, Virginia

Babcock & Wilcox/Naval Nuclear Fuel Division
Lynchburg, Virginia

Babcock & Wilcox/Nuclear Materials Division
Apollo, Pennsylvania

Exxon Nuclear Company, Inc.
Richland, Washington

General Atomic Company
San Diego, California

General Electric Company/Vallecitos Nuclear Center
Pleasanton, California

Kerr-McGee Nuclear Corporation
Oklahoma City, Oklahoma

Nuclear Fuel Services, Inc.
Erwin, Tennessee

Rockwell International Corporation/Atomics International Division
Canoga Park, California

Texas Instruments, Inc.
Attleboro, Massachusetts

United Nuclear Corporation
Uncasville, Connecticut

United Nuclear Corporation/Recovery Operations
Wood River Junction, Rhode Island

Westinghouse Electric Corporation
Cheswick, Pennsylvania

Westinghouse Electric Corporation
Columbia, South Carolina

Battelle Columbus Laboratories
Columbus, Ohio

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

June 16, 1977 SECY-77-268A

INFORMATION REPORT

For: The Commissioners

From: Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety
and Safeguards

Thru: Executive Director for Operations

Subject: PUBLIC RELEASE OF INVENTORY DISCREPANCY (MUF) DATA

Purpose: To inform the Commission of changes in the inventory discrepancy (MUF) release program.

Background: On June 10, 1977, R. Page and F. Crane of the Division of Safeguards, and L. Ong of the Office of Policy Evaluation met with J. Marcum, B. Huberman, and J. Tuckman of the National Security Council (NSC), J. Kearny of the Office of Management and Budget (OMB), and J. Schechter of the White House press office. The purpose of the meeting was to discuss NRC's program for release of inventory discrepancy (MUF) data, with special emphasis on the differences between the NRC and ERDA release programs. L. Brenner and T. Isaacs of ERDA were also in attendance. The purpose of this paper is to inform the Commission of the results of the meeting.

Discussion: Classification of Navy Inventory Discrepancy Data

At the outset of the meeting, the ERDA representatives stated that Admiral Rickover is forwarding a letter to ERDA concerning the release of data from those licensed nuclear processing facilities supporting the Navy Propulsion Program. They understand that the letter will ask that all inventory discrepancy figures for these facilities remain classified as Confidential Restricted Data and that they not be released. Should ERDA agree, ERDA management will rescind their commitment stated in a letter to NRC on March 21, 1977, to declassify these data at the same time that ERDA releases their data to the public. Continued classification of data for these licensed facilities will have a

Contact:
Fred Crane, SG/NMSS
427-4010

major impact on NRC's release program. It will prevent release of high enriched uranium (HEU) inventory discrepancies for six facilities: B&W, Apollo; B&W, Leechburg; B&W, Lynchburg; UNC, Montville; UNC, Wood River Junction; and NFS, Erwin. The inventory discrepancies for these six facilities comprise 70% of the total industry figure for HEU isotope, and 75% for HEU element. Plutonium figures are not affected.

Changes in Release Format

The representatives of the NSC, the OMB, and the Press Secretary expressed serious concern that any differences exist in the ERDA and NRC release formats. They feel that the public interest demands that the releases be as similar as possible. The NRC noted that there are basic differences in the definitions used by NRC and ERDA. The ERDA representatives did not agree. The NRC and ERDA staffs agreed to strive to reach a compatible definition for MUF and use the same term.

As a result of the discussions, the NSC has requested that the following steps be taken:

1. That the term "inventory difference" instead of "inventory discrepancy" be used by both NRC and ERDA.

2. That ERDA release isotope instead of element data for HEU.

3. That the NRC drop the plan to release both element and isotope data for HEU, and release only isotope figures.

4. That the NRC release yearly inventory difference data.

The attendees from NRC and ERDA agreed to meet these requests if at all possible. The NRC representatives pointed out that using a yearly format could delay release until the end of August. The staff had informed the licensees in April that we intended to release cumulative figures and that they had an opportunity to make a proprietary claim on these figures. Five have done so. NRC should follow the same procedure for the yearly figures; an action that can take as long as two months. The NSC representatives said that the delay was acceptable, in the interest of achieving compatible ERDA and NRC formats.

The staff has begun the process of informing the licensees and will work in close coordination with ERDA in the coming weeks to develop a format that is compatible and that serves the best interests of both agencies and the public.

Coordination: The Office of the Executive Legal Director has no legal objections.

Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety
and Safeguards

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UNITED STATES
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INFORMATION REPORT

July 7, 1977

SECY-77-268B

For: The Commissioners

From: Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety and Safeguards

Thru: Executive Director for Operations

Subject: STATUS OF NRC'S PROGRAM FOR RELEASE OF INVENTORY DIFFERENCE (MUF) DATA TO THE PUBLIC

Purpose: To inform the Commission of the status of the inventory difference release program.

Background: On June 3, 1977, the staff briefed the Commission on the status of the NRC's program for the release of inventory difference (MUF) data to the public (SECY 77-268). During that briefing, the Commission raised several issues regarding the program. These issues were detailed in Mr. Chilk's memorandum to L. V. Gossick on June 14, 1977. It is the purpose of this paper to inform the Commission on the status of those issues and the program in general.

Discussion: Mr. Chilk's memorandum addressed seven specific issues. The first two dealt with the Commission's desire that the staff brief the National Security Council on the NRC release program. That was done on June 10, 1977, and the staff reported the results to the Commissioners in SECY 77-268A. Of the five remaining issues raised by the Commission, three require action of this office. The first deals with modification in the release package to expand on (1) upgrading of safeguards, past and future, (2) the concept that even small MUFs may require investigation and (3) the reasons that some figures include inventory differences from years prior to 1968.

The safeguards upgrades discussion in the report addresess physical security and material control and the significant strides made and planned in these areas. It also describes how material accounting has evolved from an accounting tool in the 1960's into an important component of the safeguards program. However, the direction of

Contact:
Fredrick Crane, SG/NMSS
427-4010

future upgrades in the material accounting area is still in the formative stage. As a result, the package contains no specific discussions regarding future upgrades in this area.

The staff recognizes the importance of describing inventory differences in a straightforward way. The fact that small inventory differences are not sufficient proof of adequate safeguards, i.e., no theft or diversion, is specifically stated in the version of the release package now under development.

Some of the inventory difference figures span periods beginning prior to 1968. This occurs because the figures are based on inspection reports and, in some cases, the initial inspection periods began well before January, 1968. Furthermore, because of the changes requested by the National Security Council (NSC), the data are now in a fiscal year format. The ending date of each inventory period was used to determine under which fiscal year each inventory difference appears. As a result, even though all of the inventory differences in the earlier draft will also be incorporated in the final version, the earliest date listed in the report will be January, 1968.

Another issue raised by the Commission concerns British plans for release of inventory difference data. The British have assured ERDA that they will inform them before their release occurs. Their ongoing investigation of the Windscale facility is now under way. If there is a request for inventory difference data during the investigation, the British Government will probably release the figures to the public. If that happens, their release could take place before NRC's.

Finally, the Commision directed that the NMSS staff resolve the differences between NRC and ERDA presentation of the inventory differences. In order to satisfy the NSC's desire that ERDA and NRC formats be as similar as possible, the NRC has made several changes to the release package as it was presented in SECY 77-268. These changes are:

1. NRC is changing to ERDA's "Inventory Difference" term.

2. NRC is changing to ERDA's format giving inventory difference data cumulated by fiscal year.

3. NRC is following ERDA's plan of including only FY 76 data in the body of the report, and earlier years in an appendix.

4. NRC is following ERDA's plan to provide descriptions of facility operations.

5. NRC is following ERDA's plan to provide explanations for all of the FY 76 data.

With these changes on NRC's part, there remains only one substantial difference in the presentation of the data; it concerns the inclusion of cumulative figures. The staff is convinced of the importance of including cumulative inventory difference data for the entire period of a facility's operations, in addition to separate cumulative figures for each fiscal year. The fiscal year format developed by ERDA is designed to make it difficult and time consuming to compute such totals.

ERDA feels that cumulative figures can appear to be too large and that the yearly figures should not be added. The NRC staff has pointed out to ERDA that total cumulative figures, like yearly cumulative figures, are valid numbers having analytial significance to one reviewing material accounting procedures and data. Furthermore, our recent experience with Congress, the press, and the public shows that the greatest interest is not in the industry situation in any particular fiscal year, but in the historical cumulative inventory difference situation at specific facilities. The press and Congress have shown special interest in such figures. The staff believes that Congressman Dingell's staff will want a report that includes the cumulative figures. Such figures are the only means for his staff to correlate the numbers in the public report with the figures he received from the Chairman in April of this year. The fiscal year figures, which have recently become the basis of the public report, are not the figures Dingell received.

Therefore, to make our report as open, responsive, and clear as possible, and to lessen the chance that forcing each reader to add the figures may cause errors and misinterpretations, the staff intends to include, as an appendix, cumulative inventory difference figures for the regulatory life of each facility.

Because of the NSC's desire that ERDA and NRC use the same format, the staff has urged ERDA to include similar cumulative figures in their report.

The staff expects to have a new draft of the release package ready within ten days. The release date is still contingent upon completion of the proprietary procedures described in SECY 77-268 and SECY 77-268A. The staff will be prepared to release the report sometime between July 22, and August 19.

The classification issue (SECY 77-268A) for facilities involving the U. S. Navy Propulsion Program has been resolved. ERDA will declassify inventory differences for these facilities when they release the ERDA report.

Coordination: The Offices of Inspection and Enforcement and Public Affairs have concurred in this action. However, in light of recent events, the Office of Public Affairs feels that a release date between July 22 and August 19 is not realistic, and release may be necessitated sooner. The Office of the Executive Legal Director has no legal objections.

Clifford K. Smith, Jr., Director
Office of Nuclear Material Safety and Safeguards

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June 2, 1977

SECY-77-282

COMMISSIONER ACTION

For: The Commissioners

From: Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety and Safeguards

Thru: Executive Director for Operations

Subject: SHIPMENT OF PLUTONIUM BY AIR SINCE JANUARY 1, 1976

Purpose: Approval of a letter to Congressman Melvin Price.

Discussion: On May 13, 1977, Congressman F. H. Stark, Jr., of California, expressed concern to Congressman Price about shipment of plutonium by air, particularly into the airport at Livermore, California, in his district. On May 17, 1977, Congressman Price relayed the letter to the NRC (Enclosure 2), requesting comments on those portions involving the NRC. The identified remarks pertaining to the NRC are the allegations that shipments of plutonium have been illegally made by air by NRC licensees, the statement that an NRC-commissioned study, which could not be identified, showed that a plutonium release in a metropolitan area could necessitate the evacuation of the entire city and result in thousands of deaths, and the statement that a plutonium container capable of withstanding the impact of a high-speed aircraft accident is not now available.

The proposed response (Enclosure 1) states that the NRC has prohibited air shipments of plutonium since August 15, 1975, as have the Agreement States, that the NRC is aware of one inadvertent air shipment made by one of its licensees, that the most recent NRC study (NUREG-0034) concludes that the health effects of a plutonium release in a high density urban area are much less severe than indicated in the letter, and that a program to certify a plutonium package for air shipment is in progress.

Contact:
C. V. Hodge, NMSS
427-4122

Coordination: The Office of the Executive Legal Director and the Office of Inspection and Enforcement concur with this response. OCA also concurs.

Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety
and Safeguards

Enclosures:
1. Proposed Response
2. Ltr w/encl. fm Congressman Price

NOTE: Commissioners' comments should be provided directly to the Office of the Secretary by c.o.b. Tuesday, June 14, 1977.

Commission staff office comments, if any, should be submitted to the Commissioners NLT June 10, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional time for analytical review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

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The Honorable Melvin Price, Chairman
Committee on Armed Services
United States House of Representatives
Washington, D. C. 20515

Dear Mr. Chairman:

Thank you for your letter of May 17, 1977, requesting our comments on a letter from Congressman F. H. Stark, Jr. to you, dated May 13, 1977, which discusses air shipments of plutonium. As you know, on August 9, 1975, Public Law 94-79 was enacted, requiring that:

> "The Nuclear Regulatory Commission shall not license any shipments by air transport of plutonium in any form, whether exports, imports or domestic shipments; provided, however, that any plutonium in any form contained in a medical device designed for individual human application is not subject to this restriction. This restriction shall be in force until the Nuclear Regulatory Commission has certified to the Joint Committee on Atomic Energy of the Congress that a safe container has been developed and tested which will not rupture under crash and blast-testing equivalent to the crash and explosion of a high-flying aircraft."

Enclosure 1

On August 15, 1975, the NRC imposed on its licensees a cease and desist order prohibiting air shipments of plutonium in accordance with the law. The Agreement States, who license small quantities of plutonium, took similar action to prohibit air shipment of plutonium by their licensees. Congressman Stark's letter mentions that since January 1, 1976, more than 88 shipments of plutonium have been made by air. We are aware of only one air shipment of plutonium (which was inadvertent) made in violation of NRC's cease and desist order implementing this law. It consisted of a sealed plutonium neutron source. The NRC continues to inspect its licensees and enforce its rules and regulations. We understand that Congressman Stark has contacted the Energy Research and Development Administration in connection with any shipments they may have made.

Prior to the enactment of PL 94-79, the NRC announced on June 2, 1975, its intention to review its regulations on transportation of radioactive materials, including packaging, and initiated an environmental impact statement on transportation of radioactive materials by air and other modes. A draft (NUREG-0034) of that statement was released in March 1976 (Enclosure 1). Public comments on that draft statement and other pertinent information have been incorporated into the preparation of the final version of the statement, which should be released in the near future. The health effects of a plutonium release from a severe aircraft crash in a high density population environment are described in this statement. The current NRC understanding of these effects is that they are much less severe than as described in Congressman Stark's letter.

Since the NRC has not yet certified any plutonium containers pursuant to the foregoing statute, it is foreclosed from permitting shipment of plutonium by air at the present time, other than in a medical device designed for individual human application. The NRC has, however, initiated a program to develop qualification and acceptance criteria for a certifiable air shipment package and a program to develop and test such a package. The qualification criteria, the package design, the test results, and the supporting documentation are to be reviewed by the Advisory Committee on Reactor Safeguards (ACRS) and the National Academy of Sciences (NAS) prior to NRC's certifying the design to the Joint Committee on Atomic Energy. In the Fall of 1976, the ACRS endorsed the criteria developed by the NRC staff as being properly responsive to Public Law 94-79. The NAS is currently reviewing the qualification criteria. The certification program is scheduled to be completed in the Fall of 1977.

If I can be of additional assistance, please let me know.

Sincerely,

Marcus A. Rowden
Chairman

Enclosure:
NUREG-0034

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U.S. House of Representatives

COMMITTEE ON ARMED SERVICES

Washington, D.C. 20515

NINETY-FIFTH CONGRESS

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JOHN J. FORD, STAFF DIRECTOR

May 17, 1977

The Honorable Marcus A. Rowden
Chairman
Nuclear Regulatory Commission
1717 H Street, N.W.
Washington, D.C. 20555

Dear Mr. Chairman:

The attached letter from Congressman Stark expresses concern over alleged shipments of plutonium involving the Livermore (California) Municipal Airport. I would appreciate your comments on those aspects of his letter which involve your agency.

Sincerely,

Melvin Price

Melvin Price
Chairman

MP:ssj
Attachment

Enclosure 2

CONGRESS OF THE UNITED STATES
HOUSE OF REPRESENTATIVES
WASHINGTON, D.C. 20515

May 13, 1977

The Honorable Melvin Price
Chairman, House Armed Services Committee
2120 RHOB
Washington, D.C. 20515

Dear Mr. Chairman:

It has recently come to my attention that the packaging used in the air transportation of plutonium is not capable of withstanding an air crash. I am especially concerned about this problem due to the recent disclosure that this most toxic material is being flown in and out of the Livermore Municipal Airport, located in the district I represent, by a private firm which has experienced at least 4 crashes since 1970.

The current standards and regulations set by DOT, NRC, and ERDA in regard to the air transportation of plutonium are grossly inadequate. Currently these agencies only require that containers carrying plutonium withstand such tests as a 30 foot drop onto a steel plate with a terminal velocity of 45 feet per second; a 40 inch drop onto a steel spike; a 30 minute exposure to 1475 fahrenheit heat; and immersion in 3 feet of water. As an example of these agencies' lack of concern for public health and safety in approving these standards, the terminal velocity of a crashing aircraft would be at least 160 miles per hour or 235 feet per second, not the 45 feet per second used in the test. In other words, packaging need only withstand an impact one-fifth as severe as the one which would occur in an actual crash.

I now know that there have been more than 88 air shipments of plutonium since January 1, 1976. 10 percent of these have been on commercial passenger flights. What would happen if there was an accident involving leakage of plutonium? The Union of Concerned Scientists state that as little as one-millionth of a gram if inhaled could cause cancer in humans. Indeed, according to a NRC-commissioned study, if plutonium was leaked in a metropolitan area it could necessitate the evacuation of the entire city and result in thousands of deaths.

At this time we do not have a plutonium container capable of withstanding the impact of a high-speed aircraft accident.

THIS STATIONERY PRINTED ON PAPER MADE WITH RECYCLED FIBERS

Federal agencies have been insensitive to the public health and safety implications, if not actually negligent, in permitting the air transportation of plutonium under such weak safeguards. For this reason, I am requesting that your committee conduct a comprehensive study as to whether the current safeguards are adequate. Until this is done, it is my belief that there should be a moratorium placed on all air shipment of plutonium.

Sincerely,

Pete

Fortney H. Stark, Jr.
Member of Congress

FHS/nas

June 6, 1977 SECY-77-285

COMMISSIONER ACTION

For: The Commissioners

From: Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation

Thru: Executive Director for Operations

Subject: HEALTH EFFECTS OF THE COAL AND NUCLEAR FUEL CYCLES

Purpose: To respond to Commission request

Discussion: This paper is in response to the Commission's request of April 27, 1977 pertaining to the Staff presentation of the comparative health effects attributable to the coal and nuclear fuel cycle alternatives at the April 25, 1977 Commission briefing. Specifically, the Commission requested (1) an action plan for generic rulemaking to remove this matter from plant-by-plant consideration and (2) expanded distribution and formal requests for comments on the staff assessment of the comparative health effects.

As discussed in the enclosure, there is much greater uncertainty associated with generic health effects evaluations for the coal fuel cycle than for the nuclear fuel cycle. This is due to the relatively sparce and equivocal data regarding cause-effect relationships for most of the principal pollutants in the coal fuel cycle, and the effect of recent Federal laws on future performance of coal-fired power plants, mine safety, and coal waste bank stabilization. Accordingly, it will be some years before this uncertainty will be reduced sufficiently to be comparable to that associated with the nuclear fuel cycle. Nevertheless, recent activity at Brookhaven and Argonne

Contact:
Harold Denton, NRR
492-7207

National Laboratories, the Electric Power Research Institute and several universities promises some forthcoming improvements in such health effects assessments largely through development of better predictive models which will permit more realistic evaluations of interactions between the various pollutants, meteorology, demography, epidemiology, and geochemistry.

Indeed, a comprehensive assessment of the coal and nuclear fuel cycles, and other alternatives is currently being prepared by the National Research Council Committee on Nuclear and Alternative Energy Systems and is now expected in August 1977, having slipped from its June 1977 target date. The NRC itself is contemplating a contract with Argonne National Laboratory for the development over several years of better models to estimate risks of mortality, disease, and consequent life-shortening. The first phase of this study is scheduled for completion in October 1977, with additional modules due in FY 78 and 79. The Staff recommends the following schedule and procedure for dealing with this matter:

1. Revise present assessment set forth in Supplemental Testimony Regarding Health Effects Attributable to Coal and Nuclear Fuel Cycle Alternatives (Enclosure 1) to reflect areas of interest raised in proceedings at which the testimony has been presented and redesignate the document as a draft NUREG (July 1977).

2. Distribute the draft NUREG with a formal request for comments under the signature of the Director, NRR to the Council on Environmental Quality, Environmental Protection Agency, Energy Research & Development Administration, National Academy of Sciences, HEW (Public Health Service), National Institutes of Health, Federal Energy Administration, Dept. of Interior (Bureau of Mines), Federal Power Commission, Dept. of Labor, Electric Power Research Institute, Edison Electric Institute, National Coal Association, United Mine Workers, Sierra Club, Natural Resources Defense Council, Public Interest Research Group, Friends of the Earth, Environmental Defense Fund, and others as appropriate. (August 1977)

3. Review the report of the National Research Council Committee on Nuclear and Alternative Energy Systems (September 1977).

4. Evaluate comments received on draft NUREG and report of National Research Council and prepare final NUREG (October 1977).

5. Determine advisability of proceeding with rulemaking and inform the Commission (November 1977).

In the event a rulemaking proceeding is found to be desirable an additional period of about six to eight months is believed to be necessary following a favorable determination (November 1977). This period would permit development of a proposed rule and publication of a notice of rulemaking in the Federal Register in December 1977 and the conduct of a legislative-type rulemaking proceeding. On this basis a final rule could be in place in about May-July 1978.

Coordination: This paper was concurred in by the Office of Nuclear Material Safety and Safeguards. The Office of the Executive Legal Director has no legal objection.

Edson G. Case, Acting Director
Office of Nuclear Reactor Regulation

Enclosure:
Supplemental Testimony Regarding
Health Effects Attributable to Coal
and Nuclear Fuel Cycle Alternatives,
by Dr. R. L. Gotchy

Commissioners' comments should be provided directly to the Office of the Secretary by close of business Friday, June 17, 1977.

Commission staff office comments, if any, should be submitted to the Commissioners NLT June 14, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional time for analytical review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

DISTRIBUTION:
Commissioners
Commission Staff Offices
Exec. Dir. for Opers.
Secretariat

SUPPLEMENTAL TESTIMONY
REGARDING HEALTH EFFECTS ATTRIBUTABLE
TO COAL AND NUCLEAR FUEL CYCLE ALTERNATIVES

DR. R. L. GOTCHY

In addition to the environmental costs attributable to coal and nuclear fuels discussed in the Final Environmental Statement, the differing health effects from using coal and nuclear fuels have been considered in the environmental assessment of each alternative. In making these assessments the entire fuel cycle rather than just the power-generation phase was considered in order to compare the total impacts of each cycle. For coal, the cycle consists of mining, processing, fuel transportation, power generation, and waste disposal. The nuclear fuel cycle includes mining, milling, uranium enrichment, fuel preparation, fuel transportation, power generation, irradiated fuel transportation and reprocessing, and waste disposal.

In preparing this assessment it has been recognized that there are large uncertainties due to the lack of an adequate data base in certain areas of each fuel cycle alternative. The overall uncertainty in the nuclear fuel cycle is probably about an order of magnitude, while there is about a two order of magnitude uncertainty in the assessment of the coal fuel cycle. The much greater uncertainty associated with the coal fuel cycle results from the relatively sparse and equivocal data regarding cause-effect relationships for most of the principal pollutants in the coal fuel cycle, and the effect of Federal laws on future performance of coal fired power plants, mine safety, and culm bank stabilization.

Health effects, as it is used here, is intended to mean excess* mortality, morbidity (disease and illness) and injury among occupational workers and the general public. The most recent and detailed assessments of health effects of the coal fuel cycle have been prepared by the Brookhaven (Refs. 1,2,3,4) and Argonne (Refs. 5,6) National Laboratories. The most complete and recent assessment of the radiological health effects of the uranium fuel cycle for normal operations was prepared for the "Final Generic Environmental Statement on the Use of Recycle Plutonium in Mixed Oxide Fuel in Light Water Cooled Reactors (GESMO I) (Ref. 7)."

However, in accordance with 10 CFR Part 51.20(e), the current impact of the uranium fuel cycle (excluding reactors and mines) is defined by the March 14, 1977 revision of Table S-3, 10 CFR Part 51.** Using the Table S-3 effluents and the models developed for GESMO I, it was possible to

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* "Excess" is used here to mean effects occuring at a higher than normal rate. In the case of death it is used synonymously with premature mortality.

** Consistent with the Commission's announced intention to reexamine the rule from time to time to accomodate new information, (39 F.R. 14188, April 22, 1974, and 42 F.R. 13803, March 14, 1977), staff studies are underway to determine what areas, in addition to waste management and reprocessing, may require updating in Table S-3 (Notice of Proposed Rulemaking, Docket No. RM 50-3, Environmental Effects of the Uranium Fuel Cycle, 41 F.R. 45849, October 18, 1976).

estimate the impact of the uranium fuel cycle on the general public for routine operations. These values are shown in Tables 1 and 2, and some critical assumptions related to estimates are shown in Appendix A.

Since Table S-3 excludes radon releases from uranium mines, the health effects of such releases on the general public are not included in Tables 1 and 2. The effects of such releases would result in some small increases in the total risks of mortality and morbidity as discussed below under "Other Considerations."

In addition, Table S-3 does not generically address releases for light water cooled power reactors. The estimated total body population dose commitments for both occupational workers and the general public were taken from GESMO I (U recycle only option). In addition, the occupational dose commitments to workers in uranium mines, mills, uranium hexaflouride plants, uranium fuel plants and uranium enrichment plants were taken from GESMO I, since they are not considered in Table S-3. However, these dose commitments are comparable to those which would result from the radiological releases in NUREG-0216, which provides background support for Table S-3.

The dose commitments to the public and occupational workers in the March 1977 Table S-3 were used for estimating health effects from the reprocessing and waste management aspects of the uranium fuel cycle. The risk estimators used to estimate health effects from radiation dose commitments were taken from GESMO I and WASH-1400 (Ref. 8).

The impact of accidents in fuel cycle facilities (Ref. 9) and reactors (Ref. 8) generally does not markedly increase the impact of normal operations for the uranium fuel cycle, but has been included in this assessment for completeness. No comparable analysis of health effects resulting from accidents in coal-fired plants is available at this time.

Estimates of death, disease and injury from non-radiological causes for the uranium fuel cycle are from the Brookhaven (Refs. 1, 2, 3) evaluations, with the exception of transportation accident related deaths and injuries, which were taken from Table S-4, 10 CFR Part 51. The results of these assessments are shown in Tables 1 and 2. It should be noted that there are two lines under the nuclear fuel cycle: the first assumes all of the electricity used within the uranium fuel cycle is generated by nuclear power (i.e., all nuclear economy); the second line assumes, as shown in Table S-3, (10 CFR Part 51), that 100% of the electricity used within the nuclear fuel cycle comes from coal power. This is equivalent to a 45 MWe coal-fired plant, or 4.5% of the power produced.

The Uranium Fuel Cycle

Currently the NRC estimates that the excess deaths per 0.8 gigawatt-year electric (GWy(e)) will be about 0.48 for an all nuclear economy. This is probably somewhat high due to the conservatism* required in evaluations of generic plants and sites. However, it is not greatly different from estimates by others such as Comar and Sagan (Ref. 10) (0.11 to 1.0), Hamilton (Ref. 1) (0.7 to 1.6), and Rose et al (Ref. 11) (0.50). The uncertainty in the estimate is about an order of magnitude.** If, as shown in Table S-3, 100% of the electrical power used by the uranium fuel cycle comes from coal-fired power plants, the NRC would estimate there would be about 1.1 to 5.4 excess deaths per 0.8 GWy(e). Of this total, about 0.62 to 4.9 excess deaths per 0.8 GWy(e) would be attributable to coal power. The uncertainty in the estimate is about one to two orders of magnitude.

The total number of injuries and diseases which might occur among workers and the entire U.S. population as a result of normal operations and accidents in the uranium fuel cycle was estimated to be about 14 per 0.8 GWy(e) for an all nuclear economy. Injuries among uranium miners from accidents such as falls, cave-ins and explosions account for 10 of the 14 cases (see Table 2). If 100% of the electrical power used by the uranium fuel cycle comes from coal-fired power plants, the NRC would estimate there would be about 17-24 injuries and diseases per 0.8 GWy(e). Of this total, about 3 to 10 excess effects per 0.8 GWy(e) would be attributable to coal power (See Table 2a). The uncertainty in the estimate is also about one to two orders of magnitude.

Although anticipated somatic*** effects associated with normal releases of radioactive effluents from the nuclear fuel cycle are limited to potential cancers and leukemias, for the higher doses associated with serious nuclear accidents there is some small risk of various non-fatal somatic effects (see footnote c, Table 2). At this time only light water cooled power reactors (Ref. 8) have been thoroughly evaluated. However, it should be noted that power reactors probably account for most of the potential health effects associated with nuclear accidents in the uranium fuel cycle.

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* Conservative is used here to mean that assumptions regarding atmospheric dispersion, deposition of particulates, bioaccumulation, and so forth generally result in estimates of impact that are typically "upper bound" estimates, and in most cases, the estimates would be lower for real plants.

** "Order of magnitude" uncertainty means the estimate could be as much as ten times higher or ten times lower.

*** Health effects of a non-reproductive nature (i.e.; non-genetic).

This results from the fact that they represent 80 percent of all the fuel cycle facilities expected to be operating for the balance of this century (Ref. 7) and the majority of occupationally exposed individuals. In addition, although the probability of serious accidents is extremely small, if one were to occur, the health effects would be larger than for any other type of fuel cycle facility. Serious nuclear accidents in power reactors might also contribute about 0.04 excess deaths per 0.8GWy(e), while transportation related accidents are estimated to contribute about 0.01 excess deaths per 0.8 GWY(e) (see Table 1, footnote c).

Early and latent non-fatal somatic effects which might be expected after high radiation dose effects include a variety of effects (see footnote c, Table 2). It is possible that non-fatal somatic effects could be an order of magnitude greater than excess deaths resulting from accidents (Ref. 8), thus, the total number per 0.8 GWy(e) would be about 0.4. This accounts for about one-third of the morbidity shown for the general public and an all nuclear economy in Table 2. The number of non-fatal thyroid cancers (5-10% mortality rate) and benign thyroid nodules would be about 0.6 per 0.8 GWy(e) from routine releases to the public and occupational exposures (primarily external irradiation), while other non-fatal cancers would be less than or equal in number to fatal cancers (about 0.2 per 0.8 GWy(e)) (see footnote c, Table 2 and footnotes ** and ***, Table 2a).

It is believed (Refs. 6,12) that genetically related diseases* and abnormalities in the descendants of workers and the general public from both normal operations and accidents would be perhaps twice the number of excess deaths due to cancer from total body irradiation; this could add another 0.3 health effects per 0.8 GWy(e) among workers and 0.2 health effects per 0.8 GWy(e) among the general public (see footnote c, Table 2).

In assessing the impact of coal power used in the uranium fuel cycle, Table S-3 was the basis for the assumption that 100% of the electricity used in the uranium fuel cycle, primarily for uranium enrichment and reactor operation, came from coal fired plants. Adding 4.5% of the health effects from the coal fuel cycle per 0.8GWy(e) significantly increases the health effects for the uranium fuel cycle per 0.8 GWy(e), as shown on the second lines of Tables 1 and 2.

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* Includes diseases such as cystic fibrosis, hemophelia, certain anemias, and congenital abnormalities such as mental retardation, short-limbed dwarfism and extra digits. (See footnote c, Table 2)

The Coal Fuel Cycle

Current estimates of mortality and morbidity resulting from the coal fuel cycle are quite uncertain; this is the principal reason for the wide range of values reported in the literature. These uncertainties, as discussed in more detail below, result from the limited number of epidemiological studies and differences in interpretation of the results of such studies. There is additional uncertainty regarding the effects of new Federal laws on coal cycle facilities in the next decade. Current estimates of excess deaths for the entire coal cycle range from 15 to 120 per 0.8 GWy(e), while disease and injury estimates range from 57 to 210 per 0.8 GWy(e).

In the case of occupational effects, there is considerable uncertainty because of anticipated reductions in health effects resulting from the implementation of the Federal Coal Mine Health and Safety Act of 1969 (PL 91-173). The provisions of this act should result in significant improvement of the underground work environment, particularly regarding coal dust. Coal dust is both a cause of underground explosions and fires, and a cause of coal workers pneumoconiosis (CWP), commonly called black lung disease, and subsequent progressive massive fibrosis (PMF) (Refs.1,5). In addition, more coal in the years ahead is expected to be produced by strip mining which results in lower mortality rates (Ref. 1). As a result, the frequencies of both types of events is anticipated to decline in the years ahead, on a per GWy(e) basis. On the other hand, statistics show new coal miners experience higher mortality and injury rates than experienced miners (Ref. 5). As a result of expected increases in coal production, an influx of inexperienced miners will tend to increase the mortality and injury rates for miners as a group.

In the case of the general public*, there is also considerable uncertainty in the estimation of health effects. For example, although there are estimates of health effects related to burning culm banks (waste banks from coal screening), recent efforts by mine operators have greatly reduced such fires, and future processing activities are expected to avoid fires as a result of new methods of stabilizing such banks to prevent slides. (Ref. 13). Current estimates of excess deaths in the public from sulfates from such fires range from 1 to 10 per 0.8 GWy(e) (see footnote g, Table 1). Power generation is estimated to result in 3 to 100 excess deaths per 0.8 GWy(e) (see footnote g, Table 1), while excess morbidity ranges from about 10-100 per 0.8 GWy(e) (see footnote g, Table 2).

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* In the case of coal plant effluents, considerations of health effects was limited to the population within 80 km of such plants.

The uncertainties are even greater in the power generation phase of the coal cycle, where estimates of health effects range over several orders of magnitude. (Ref. 10) This is largely due to the lack of a reliable data base for predicting health effects from the various pollutants emitted from coal plants, and the effect of the EPA New Source Performance Standards for coal plants regarding particulate and sulfur emissions in future years on a long-term basis. There is some uncertainty as to whether these standards can be met in large coal-fired power plants over the life of the plant. The major pollutants emitted include:

1. Particulates: Contain large amounts of toxic trace metals in respirable particle size (Ref. 14) such as arsenic, antimony, cadmium, lead, selenium, manganese, and thallium, (Ref. 5) significant quantities of berylium, chromium, nickel, titanium, zinc, molybdenum, and cobalt (Ref. 15), and traces of radium-226, 228 and thorium-228, 232. (Ref. 16).

2. Hydrocarbons: Includes very potent carcinogens (cancer causing substances) such as benzo(a)pyrene.

3. Sulfur oxides

4. Nitrogen oxides

5. Other gases: Includes ozone ,carbon monoxide, carbon dioxide, mercury vapor, and radon-222.

Of the preceeding list of pollutants, there are no well established epidemiologic cause-effect relationships which can be used to accurately estimate total health effects either from acute exposures during air pollution episodes or from chronic long-term exposures.

Although definitive cause-effect relationships are lacking, tentative cause-effect relationships for sulfur emissions have been used by numerous groups to estimate health effects from sulfur emissions from coal plants. They are described by the National Academy of Sciences in a recent report to the U.S. Senate. (Ref. 17) The most widely quoted studies are those by Lave and Seskin (Ref. 18), Winkelstein et al (Ref. 19), and an unpublished study by EPA which was used in the NAS/NRC study for the U.S. Senate (1975). (Ref. 17)

In general, the effects range from excess deaths from cardiovascular failure and increases in asthma attacks during severe air pollution to excess respiratory disease from long-term chronic exposures. Most of the acute deaths are among the elderly and the severely ill, while morbidity from long-term exposure also includes children. Although widely accepted cause-effect relationships were not derived from acute air pollution episodes in London (1952) (Ref. 20), Donora, Pennsylvania (1948), (Ref. 21), and New York (Ref. 22), these studies definitely support the conclusions regarding excess death and disease associated with emissions from combustion of coal.

There are no estimates of possible long-term carcinogenic effects by sulfur oxides or associated pollutants. In addition, the recently completed (1976)* large scale EPA Community Health and Environmental Surveillance System (CHESS) study has failed to provide any new or definitive cause-effect relationships for any of the pollutants from coal-fired plants which can be used to provide better estimates of health effects than are currently available (see for example Ref. 23).

Assuming that new coal-fired plants in the 1980's can meet EPA New Source Performance Standards (which could require on the order of 99% particulate removal, and 90% sulfur removal for high sulfur coal), and other Federal laws regarding mine safety and culm bank stabilization, the number of deaths should be reduced. Thus, current estimates of 15 to 120 per 0.8 GWy(e), due largely to sulfates from combustion coal may be reduced by about half to 8 to 60 per 0.8 GWy(e).

Recently, Argonne National Laboratory has developed a predictive model for total deaths from emission of benzo(a)pyrene, which indicates about 1 to 4 deaths per 0.8 GWy(e) depending on use of conventional combustion or fluidized bed combustion. (Ref. 6) Such effects, while greater than the expected deaths from the entire uranium fuel cycle (all nuclear economy), do not significantly change the total impact of the coal fuel cycle and were not included in the effects listed in Table 1.

Probably the most reliable estimates of deaths associated with the coal fuel cycle are those associated with transporation accidents. Since a 1000 MWe coal-fired plant consumes about 3 million tons of coal per year,

* This $22 million study attempted to correlate air pollution data collected from six U.S. cities with a variety of health problems.

there are literally thousands of carloads of coal being transported by rail from mines to plants. It has been estimated that about one out of every 10 trains in the U.S. is a coal train going to a coal-fired power plant. (Ref. 24) These trains are estimated to travel an average distance of about 300 miles from the mines to the plants. (Ref. 13) As a result, there are about 1.2 deaths per 0.8 GWy(e)among workers and the general public Further, since most of these deaths occur at railroad crossings, the numbers can be expected to increase as more automobiles are operated and driven greater distances, and as rail transportation distances increase when hauling low sulfur western coals to eastern markets.

Sickness among coal miners and the general public accounts for most of the non-fatal occurrences in the coal fuel cycle, with most of the remainder due to injuries among coal miners. As a result of implementation of Federal laws, it is probable that future rates among underground miners will be substantially reduced. It is not unreasonable to assume that the current estimates of about 57 to 210 cases of sickness and injury among workers and the general public could be reduced in the years ahead, since occupational sickness and injury currently account for about half of the total non-fatal health effects.

The overall uncertainty in the estimates of health effects for the coal fuel cycle is probably about two orders of magnitude.

Other Considerations

Although the Reactor Safety Study (Ref. 8) has helped to provide a perspective of the risk of mortality or morbidity from potential power reactor accidents (the current experience for serious accidents is zero), there is the additional problem associated with individual perception of risk. Thus, while the Reactor Safety Study concluded that "All non-nuclear accidents examined in this study, including fires, explosions, toxic chemical releases, dam failures, airplane crashes, earthquakes, hurricanes and tornadoes, are much more likely to occur and can have consequences comparable to, or larger than, those of nuclear accidents," there will continue to be uncertainty associated with such evaluations. Furthermore, there may be a problem of public acceptance of potential accidents, since the consequences can be severe. In fact, it appears that some people (Ref. 25) more readily accept, for example, having 55,000 people actually killed each year in violent highway accidents, one or two at a time, than would consider acceptable the unlikely occurrence of perhaps several thousand possible deaths from a single catastrophic accident during their lifetime.

As noted in footnote 5 to the March 1977 revision of Table S-3 (10 CFR Part 51), the GESMO I radon-222 release increases from 74.5 Ci to about 4,800 Ci when releases from mines are included. This increase would result in a small increase in the total number of excess deaths shown in Table 1, although the mortality per 0.8 GWy(e) for the general public would increase by about 30%.

With regard to the coal fuel cycle, it is a well established fact that the use of coal results in numerous other costs to society which have not yet been adequately quantified. These include:

1. The short and long-term impacts of sulfur and nitrogen oxides on biota and materials. Acid rain, for example, is known to be severely damaging to terrestrial and aquatic habitats. Reference 5 provides a detailed discussion of these and other effects of sulfur and nitrogen oxide emissions. However, as more coal plants come on line, these effects can be expected to expand to surrounding areas.

2. Damage of materials, such as paints, building surfaces, statuary, and metals, from sulfur oxides, ozone and nitrogen oxide emissions. A 1976 review of such effects indicates that the costs could range into billions of dollars per year in the U.S. alone. (Ref. 26)

3. Contamination of soil and vegetation to toxic levels by such mechanisms as deposition and bioaccumulation of trace elements present in gaseous emissions.

4. Destruction of entire ecosystems in streams and rivers by acid mine drainage, and the potential for public health effects from downstream use of such water for domestic or agricultural purposes.

5. In addition to the occurrence of excess mortalities, injuries, and morbidities, the costs to society in terms of medical costs, lost productivity, and other social losses represent a significant consideration which has not been completely evaluated at this time. Some recent studies have attempted to deal with these extremely complex issues, (Refs. 27,28) and concluded social costs from one coal fired plant may currently be about $50 million per year, not considering the rest of the costs for the coal fuel cycle.

6. The possibility of the so-called "Greenhouse Effect;" this phenomenon is expected by some (Ref. 29) to result sometime early in the next century at the present and future anticipated production rates of carbon dioxide from the combustion of fossil fuels. Since each 1000 MWe coal plant produces about 7.5 to 10.5 million tons of carbon dioxide per year (Ref. 1) it is believed these emissions from hundreds of fossil fuel fired power plants may result in greater releases of carbon dioxide than the atmosphere and oceans can cycle. As a result, the carbon dioxide concentrations would be expected to increase in the atmosphere. Since carbon dioxide strongly absorbs infrared, it is postulated that the mean atmospheric temperature will rise several degrees. This may cause all or part of the polar ice caps to melt resulting in inundation of many inhabited areas of the world. At the same time drought would be expected to prevail in many of the agricultural areas of the temperate zones resulting in huge crop losses. It is possible that the particulates emitted by fossil plants will counteract some of the Greenhouse Effect by reducing the amount of sunlight reaching the surface of the earth.

   However, another effect from carbon dioxide released by coal combustion occurs since coal has essentially no carbon-14. The stable carbon in effect dilutes the carbon-14 in the biosphere, resulting in a reduction in the radiological impact of both naturally occuring and man-made carbon-14.

7. An additional consideration which has not been evaluated for the coal cycle is the radiological impact of mining and burning coal. Of interest is the release of radon-222 from the decay of radium-226 in coal. Not only is the radon released during mining and combustion, but it will continue to emanate from flyash for millions of years after the coal has been burned. While Pohl (Ref. 30) has shown that this is not a problem with most eastern coal (generally of high sulfur content but with 1 ppm uranium content), the average uranium and radium content of large reserves of low sulfur western coal is about 50 times higher than most eastern coal (Refs. 31,32). Combustion of the coal and disposal of the remaining ash leads to approximately the same health effects from radon-222 emissions as uranium mill tailings piles per GWy(e). These releases would account for only about 0.02 excess deaths per 0.8 GWy(e) from fuel cycle activities during the rest of this century. As a result, such releases do not significantly affect the conclusions reached with regard to a comparison of the two alternative fuel cycles.

In addition, some believe (Ref. 33) that when the physical and biological properties of the radium released from conventional coal powered plants burning coal (with 1-2 ppm uranium-238 and Th-232) are considered, such plants discharge relatively greater quantities of radioactive materials into the atmosphere than nuclear powered plants of comparable size. EPA has estimated radiation doses from coal and nuclear powered plants of early designs and reached similar conclusions (Ref. 16).

Summary and Conclusions

For the reasons discussed above, it is extremely difficult to provide precise quantitative values for excess mortality and morbidity, particularly for the coal fuel cycle. Nevertheless, a number of estimates of mortality and morbidity have been prepared based on present day knowledge of health effects, and present day plant design and emission rates, occupational experience and other data. These are summarized in Tables 1 and 2, with some important assumptions inherent in the calculations of health effects listed in Appendix A.

While future technological improvements in both fuel cycles may result in significant reductions in health effects, based on current estimates for present day systems, it must be concluded that the nuclear fuel cycle is considerably less harmful to man than the coal fuel cycle. (Refs. 1,2,3, 4,5,10,11,27,28,33,34,35,36) As shown in Tables 1 and 2, the coal fuel cycle alternative may be more harmful to man by factors of 4 to 250 depending on the effect being considered, for an all nuclear economy, or factors of 3 to 22 with the assumption that all of the electricity used by the uranium fuel cycle comes from coal powered plants.

It should be noted that although there are large uncertainties in the estimates of most of the potential health effects of the coal cycle, the impact of transportation of coal is based on firm statistics; this impact alone is greater than the conservative estimates of health effects for the entire uranium fuel cycle (all nuclear economy), and can reasonably be expected to worsen as more coal is shipped over greater distances. In the case where coal generated electricity is used in the nuclear fuel cycle, primarily for uranium enrichment and auxiliary reactor systems, the impact of the coal power accounts for essentially all of the impact of the uranium fuel cycle.

However, lest the results of this analysis be misunderstood, it should be emphasized that the increased risk of health effects for either fuel cycle represents a very small incremental risk to the average individual in the public. For example, Comar and Sagan (Ref. 10) have shown that such increases in risk of health effects represent minute increases in the normal expectation of mortality from other causes.

A more comprehensive assessment of these two alternatives and others is anticipated from the National Research Council Committee on Nuclear and Alternative Energy Systems by June, 1977* (Ref. 37). This study may assist substantially in reducing much of the uncertainty in the analysis presented.

*The most recent information from Committee members indicates August, 1977 is a more probable date (Refs. 38,39).

APPENDIX A

Some Important Assumptions Affecting the Fuel Cycle Health Effects Evaluations:

1. The Uranium Fuel Cycle (Ref. 7)

   a. For mine and mill emissions it was assumed there was a population density from 7.5 persons/sq.mi. in the west, to 160 persons/sq.mi. in the east, all uniformly distributed. For all other facilities, assumed 160 persons/sq.mi. density.*

   b. Used "box" atmospheric dispersion model with vertical dispersion limited to 1,000 m, 2 m/sec windspeed, and 1 cm/sec deposition velocity for particulates.

   c. Calculated a 50 year dose commitment for one year of operation of each type of fuel cycle facility. The 50 year commitment considered biological uptake of long-lived radionuclides for 40 years following the year of release. The total impact of the fuel cycle to the U.S. population for the years 1975-2000 was calculated using the needs for all types of facilities in order to meet current projections of power plants.

   d. Radioactive materials were not considered to be removed from food chains except by radioactive decay. Only in the case of carbon-14 was an environmental sink assumed to be acting upon biological availability.

   e. Krypton-85 and carbon-14 not removed from the plume in the U.S. was assumed to mix uniformly in the world's atmosphere. Tritium is assumed to be mixed uniformly in the world's circulating water volume after depletion of the plume on its first pass over the U.S.

   f. Resuspension of deposited particulates was considered.

   g. Bioaccumulation of radioactivity in food chains was considered (generally upper bound estimates).

   h.. Assumed an 80% capacity factor.

2. The Coal Fuel Cycle (Refs. 1,2,3)

   Since the major impact of the coal fuel cycle results from power plant emissions, only those critical assumptions will be discussed:

---

* It should be noted that most of the calculated health effects would occur outside the 80 km radius of the plant. The mortality rate for the U.S. population is about 2,000,000 per year from all causes.

APPENDIX A (continued)

a. Used actual population distributions within 80 km of several nuclear plant sites; the average population was 3.8 million people.*

b. Used actual meteorology data from the same plants to calculate inhalation exposures to sulfates out to 80 km.

c. Assumed a 1,000 foot stack for emissions.

d. Assumed use of 3% sulfur coal with 12% ash and 12 thousand BTU per lb (eastern coal) for an upper bound estimate of health effects; assumed 0.4% sulfur coal with 3% ash and 12 thousand BTU per lb (eastern coal) for a lower bound estimate (approximately the same sulfur emission as would result from use of high sulfur coal with flue gas desulfurization).

e. Assumed 99% particulate removal from plant emissions.

f. Assumed a 10% per hour oxidation rate for conversion of sulfur oxides to sulfates.

g. The dose-response relationships of Lave and Seskin (Ref. 18), Winklestein et al (Ref. 19) and others(as discussed in Refs. 1,2,3) were used to calculate excess mortality and morbidity; adjustments were made for fractions of sulfates in the total suspended particulates.

h. Resuspension of deposited particulates was not directly considered, although deposition was.

i. Assumed a 75% capacity factor.

* Experiences about 36,000 per year mortality rate from all causes.

Table 1. Current Energy Source Excess Mortality Summary per Year per 0.8 GWy(e)

	Occupational		General Public		Totals
	Accident	Disease	Accident	Disease	
Nuclear Fuel Cycle (all nuclear)	0.22 (a)	0.14 (b)	0.05 (c)	0.07 (b)	0.48
(with 100% of electricity used in the fuel cycle produced by coal power (U.S. population for nuclear effects; regional population for coal effects)	0.24-0.25 (a,d)	0.14-0.46 (b,e)	0.10 (c,f)	0.65-4.6 (g)	1.1-5.4
Coal Fuel Cycle (Regional Population)	0.35-0.65 (d)	0-7 (e)	1.2 (f)	13-110 (g)	15-120

Ratio of Coal to Nuclear: 31-250 (all nuclear)

14-22 (with coal power) (h)

(a) Primarily fatal non-radiological accidents such as falls, explosions, etc.
(b) Primarily fatal radiogenic cancers and leukemias from normal operations at mines, mills, power plants and reprocessing plants.
(c) Primarily fatal transportation accidents (Table S-4, 10 CFR 51) and serious nuclear accidents.
(d) Primarily fatal mining accidents such as cave-ins, fires, explosions, etc.
(e) Primarily coal workers pneumoconiosis (CWP) and related respiratory diseases leading to respiratory failure..
(f) Primarily members of the general public killed at rail crossings by coal trains.
(g) Primarily respiratory failure among the sick and elderly from combustion products from power plants, but includes deaths from waste coal bank fires.
(h) 100% of all electricity consumed by the nuclear fuel cycle produced by coal power; amounts to 45 MWe per 0.8 GWy(e).

Table 1a
(Breakdown of Table 1)

NUCLEAR

EXCESS MORTALITY per 0.8 GWy(e)

FUEL CYCLE COMPONENT	OCCUPATIONAL		GENERAL PUBLIC		TOTAL
	ACCIDENT (a)	DISEASE (b,c,d,)	ACCIDENT (d,e,)	DISEASE (b)	
RESOURCE RECOVERY (Mining, Drilling, etc.)	0.2	0.038	~0	+	
PROCESSING (f)	0.005**	0.04	*	*	
POWER GENERATION	0.01	0.061	0.04	0.008	
FUEL STORAGE	*	~0	*	~0	
TRANSPORTATION	~0	~0	0.01	~0	
REPROCESSING	*	0.003	*	0.064	
WASTE MANAGEMENT	*	~0	*	0.001	
TOTAL	0.22	0.14	0.05	0.073	0.48

+These effects are not included in Table S-3, 10 CFR 51. Ref. 7 would indicate about 0.023 excess deaths per 0.8 GWy(e) due to radon-222 emission.

*The effects associated with these activities are not known at this time. While such effects are generally believed to be small, they would increase the totals in this column.

**Corrected for factor of 10 error based on referenced value (WASH-1250)

(a) Ref. 1
(b) Ref. 7
(c) 10 CFR 51, Tabe S-3
(d) 10 CFR 51, Table S-4
(e) Ref. 8
(f) Includes milling, uranium hexaflouride production, uranium enrichment, and fuel fabrication.

Table 1b
(Breakdown of Table 1)

COAL

EXCESS MORTALITY per 0.8 GWy(e)

FUEL CYCLE COMPONENT	OCCUPATIONAL		GENERAL PUBLIC		TOTAL
	ACCIDENT	DISEASE	ACCIDENT	DISEASE	
RESOURCE RECOVERY (Mining, Drilling, etc.)	0.3-0.6	0-7	*	*	
PROCESSING	0.04	*	*	10	
POWER GENERATION	0.01	*	*	3-100	
FUEL STORAGE	*	*	*	*	
TRANSPORTATION	*	*	1.2	*	
WASTE MANAGEMENT	*	*	*	*	
TOTAL	0.35-0.65	0-7	1.2	13-110	15-120

Ref. 1

*The effects associated with these activities are not known at this time. While such effects are generally believed to be small, they would increase the totals in this column.

Table 2. Current Energy Source Summary of Excess Morbidity and Injury per 0.8 GWy(e) Power Plant

	Occupational		General Public		Totals
	Morbidity	Injury	Morbidity	Injury	
Nuclear Fuel Cycle (all nuclear)	0.84 (a)	12 (b)	0.84 (c)	0.1 (d)	14
(with 100% of electricity used by the fuel cycle produced by coal power) (U.S. population for nuclear effects; regional population for coal effects)	1.7-4.1 (e)	13-14 (b)	1.3-5.3 (g)	0.55 (h)	17-24
Coal Fuel Cycle (Regional population)	20-70 (e)	17-34 (f)	10-100 (g)	10 (h)	57-210

Ratio of Coal to Nuclear: 4.1-15 (all nuclear)

3.4-8.8 (with coal power) (i)

(a) Primarily non-fatal cancers and thyroid nodules.
(b) Primarily non-fatal injuries associated with accidents in uranium mines such as rock falls, explosions, etc
(c) Primarily non-fatal cancers, thyroid nodules, genetically related diseases, and non-fatal illnesses following high radiation doses such as radiation thyroiditis, prodromal vomiting, and temporary sterility.
(d) Transportation related injuries from Table S-4, 10 CFR Part 51.
(e) Primarily non-fatal diseases associated with coal mining such as CWP, bronchitis, emphysema,etc.
(f) Primarily injuries to coal miners from cave-ins, fires, explosions, etc.
(g) Primarily respiratory diseases among adults and children from sulfur emissions from coal-fired power plants, but includes waste coal bank fires.
(h) Primarily non-fatal injuries among members of the general public from collisions with coal trains at railroad crossings.
(i) 100% of all electricity consumed by the nuclear fuel cycle produced by coal power; amounts to 45 MWe per 0.8 GWy(e).

Table 2a
(Breakdown of Table 2)

NUCLEAR FUEL CYCLE COMPONENT	MORBIDITY AND INJURY per 0.8 GWy(e)				
	OCCUPATIONAL		GENERAL PUBLIC		TOTAL
	MORBIDITY	INJURY (a)	MORBIDITY	INJURY (b)	
RESOURCE RECOVERY (Mining, Drilling, etc.)	**	10	***	~0	
PROCESSING (c)	**	0.6	***	~0	
POWER GENERATION	**	1.3	***	~0	
FUEL STORAGE	**	*	***	~0	
TRANSPORTATION	**	<1	***	0.1	
REPROCESSING	**	*	***	*	
WASTE MANAGEMENT	**	*	***	~0	
TOTAL	0.84	12	0.84	0.1	14

(a) Ref. 1
(b) Table S-4, 10 CFR 51
(c) Includes milling, uranium hexaflouride production, uranium enrichment, and fuel fabication.

*The effects associated with these activities are not known at this time. While such effects are generally believed to be small, they would increase the totals in this column.

**Non-fatal cancers ≤ fatal cancers (excluding thyroid) = 0.14
Non-fatal thyroid cancers and benign nodules = 3X fatal cancers = 0.42
Genetic defects 2X fatal cancers = 0.28

***Reactor accidents 10X fatalities = 0.40 non-fatal cases
Normal operations: Non-fatal cancers ≤ fatal cancers = 0.07
Non-fatal thyroid cancers and nodules = 3X fatal cancers = 0.22
Genetic effects = 2X fatal cancers = 0.15

Table 2b
(Breakdown of Table 2)

COAL	MORBIDITY per 0.8 GWy(e)				
FUEL CYCLE COMPONENT	OCCUPATIONAL		GENERAL PUBLIC		TOTAL
	MORBIDITY	INJURY	MORBIDITY	INJURY	
RESOURCE RECOVERY (Mining, Drilling, etc.)	20-70	13-30	*	*	
PROCESSING	*	3	*	*	
POWER GENERATION	*	1.2	10-100	*	
FUEL STORAGE	*	*	*	*	
TRANSPORTATION	*	*	*	10	
WASTE MANAGEMENT	*	*	*	*	
TOTAL	20-70	17-34	10-100	10	57-210

Ref. 1

*The effects associated with these activities are not known at this time. While such effects are generally believed to be small, they would increase the totals in this column.

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

INFORMATION REPORT

December 9, 1977 SECY-77-612

For: The Commissioners

From: Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety and Safeguards

Thru: Executive Director for Operations

Subject: JACK ANDERSON AND LES WHITTEN NOVEMBER 26, 1977 NEWSPAPER ARTICLE ENTITLED "U. S. FINDS LACUNAS IN NUCLEAR BOOKS"

Purpose: To inform the Commission of facts and actions related to the November 26, 1977 newspaper article by Jack Anderson and Les Whitten.

Discussion: Newspaper Article by Jack Anderson and Les Whitten

On November 26, 1977, the Washington Post carried an article by Jack Anderson and Les Whitten which discussed "700 discrepancies in the nuclear bookkeeping of 30 private companies." The article alleged that an NRC spokesman said, "more than 1000 tons of H-bomb ingredients cannot be accounted for." It mentions "muddled" bookkeeping and "discrepancies" in nuclear inventories of NRC licensees. The article then mentions an NRC "contract bid" to eliminate inconsistencies between a data file in Washington and one in Oak Ridge, Tennessee. In a footnote, the article states that "the National Resources Defense Council is drafting a massive freedom of information suit against the government in an effort to learn the exact amount of missing nuclear material." (Enclosure I is a copy of the newspaper article.)

FOIA Request From NRDC

On November 15, 1977, Thomas B. Cochran of the Natural Resources Defense Council, Inc. (NRDC), wrote to the Director of Nuclear Material Safety and Safeguards, pursuant to the Freedom of Information Act, citing a request for proposals (RFP-RS-78-4) issued by NRC on

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August 31, 1977. NRDC requested "a list of the approximately seven hundred inventory discrepancies in the two computerized systems used by the NRC to receive, store, analyze, and report information on nuclear material possessed by each licensee". (Enclosure 2 contains a copy of the NRDC letter.)

Telephone Inquiry From Les Whitten About the RFP

On November 16, 1977, Columnist, Les Whitten, telephoned NRC to discuss RFP-RS-78-4, entitled "Enhancement of Nuclear Reporting and Analysis System." Members of the staff explained it to him. (Enclosure 3 is a copy of a note to the Commissioners on this subject.)

Background to the RFP

Early in 1977, while assembling inventory difference data for public release in August, 1977, the staff detected differences between the computerized data stored in the Nuclear Materials Management and Safeguards System (NMMSS) and data in a manual system maintained by the Office of Inspection and Enforcement. To increase the reliability and utility of the computerized data base to NRC, the Division of Contracts issued request for proposal RFP Number RS-78-4, on August 31, 1977, Title, "Enhancement of Nuclear Reporting and Analysis System."

Contents of RFP

RFP-RS-78-4 stated that because data in the computerized NMMSS system were not consistent with data reported through the regional offices to NRC's Office of Inspection and Enforcement, NRC was seeking proposals to "interface NMMSS data with NRC's regional reporting network". The RFP contained the following task statement:

> "TASK 1 - ELIMINATION OF INCONSISTENCIES IN TWO NRC DATA BASES
>
> The Contractor shall, through examination and evaluation of the two (2) data bases, identify, determine the reasons for, and provide the logic and procedures for eliminating any inconsistencies existing between the two (2) data bases. This includes providing corrected data from either or both data bases for direct input into the NRC NMMSS.

The NRC shall approve the corrected data before it is input into the NMMSS. The Contractor shall put the results of this effort into the proper form for keypunching. The NRC shall be responsible for having the cards keypunched and the data thereon input into NMMSS.

The NRC shall be responsible for providing the Contractor with the current NMMSS and OIE data on licensee inventory discrepancies. The OIE data shall include, but not be limited to, approximately seven hundred inventory discrepancy figures, and corresponding inventory data for approximately fifty separate licensees from the NMMSS."

Response to the FOIA Request From NRDC

The information requested by the NRDC is not yet available. In fact, one of the purposes of RFP-RS-78-4 is to determine the information. Accordingly, it was considered appropriate to advise the NRDC of this and clarify the nature and intent of RFP-RS-78-4. Enclosure 4 is the response to the NRDC which was mailed on December 6, 1977.

Coordination: This information paper has been concurred in by the Office of Inspection and Enforcement, the Division of Contracts and the Office of Public Affairs.

Clifford V. Smith, Jr., Director
Office of Nuclear Material Safety and Safeguards

Enclosures:
1. Newspaper article by J. Anderson and L. Whitten, 11/26/77
2. Letter from T. B. Cochran, NRDC, 11/15/77
3. Note to Commissioners on "Enhancement of Nuclear Reporting and Analysis System"
4. 12-6-77 Response to the NRDC

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ENCLOSURE 1

Jack Anderson and Les Whitten

U.S. Finds Lacunas in Nuclear Books

The federal government has discovered 700 discrepancies in the nuclear bookkeeping of 30 private companies. Hundreds of pounds of nuclear materials, suitable for producing H-bombs, are unaccounted for and therefore, may be missing.

This news comes at a time of chilling reports that nuclear materials have been stolen from U.S. plants and smuggled to foreign powers seeking to manufacture nuclear weapons.

The Nuclear Regulatory Commission, which has been charged with keeping track of the deadly materials since 1975, prefers to say the 700 cases are merely "accounting differences." But a spokesman conceded that more than 1,000 tons of H-bomb ingredients cannot be accounted for.

In addition, the status of thousands of pounds of less dangerous uranium is in question. The bookkeeping is so muddled that some companies may actually have more material on hand than the records show.

The discrepancies have been found in the nuclear inventories of such major companies as Westinghouse, General Electric, General Atomics, Babcock and Wilcox, Nuclear Fuel Services and Atomics International.

The nuclear regulators, despairing of solving the problem on their own, are calling in outside contractors for help. The contract bid calls for "eliminating any inconsistencies existing between the two data banks." One data file is located in Washington, the other in Oak Ridge, Tenn.

The commission acknowledges the companies may have provided good data to the government. In at least some cases, the information was cranked faithfully into the computer banks. In other cases, one set of factors was fed to one federal computer and another set to the other computer. To make it even more confusing, there were instances where no data was delivered to one of the two federal bookkeeping systems.

Footnote: The Natural Resources Defense Council is drafting a massive freedom of information suit against the government in an effort to learn the exact amount of missing nuclear material.

ENCLOSURE 2

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November 15, 1977

Clifford V. Smith, Jr., Director
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Washington, D.C. 20555

Dear Cliff,

Pursuant to the Freedom Of Information Act (FOIA), please send me a list of the approximately seven hundred inventory discrepancies in the two computerized systems used by the NRC to receive, store, analyze, and report information on nuclear material possessed by each licensee. These discrepancies are discussed more fully in RFP No. RS-78-4 (formerly 77-72), "Enhancement of Nuclear Reporting and Analysis Systems," August 31, 1977. In this regard, where there are discrepancies, pursuant to FOIA, please identify each as fully as possible, i.e. provide a complete description of the reported data from the two data sources. Identify the licensee, type of material, reporting date, each inventory quantity, etc. I am particularly interested in those cases where the discrepancies involve special nuclear material, and even more so those involving strategic quantities of SNM.

Thank you kindly for your assistance in this matter.

Sincerely,

Thomas B. Cochran

cc: J.M. Felton

ENCLOSURE 3

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

November 16, 1977

NOTE FOR THE COMMISSIONERS

Les Whitten of the Jack Anderson column has inquired about a request for proposals issued by NRC in August entitled "Enhancement of Nuclear Reporting and Analysis System." Basically, this RFP is aimed at eliminating inconsistencies in the nuclear material inventory systems. One of these is the computerized system at Oak Ridge and the other is the Office of Inspection and Enforcement system, which is a manual operation based upon NRC inspections of licensees.

Whitten said the RFP seemed to suggest that there is "bewilderment" in the nuclear materials accounting program. Mr. Page, Deputy Director of Safeguards, is planning to talk with Whitten and tell him that because of errors which have crept into the automated system at Oak Ridge, NRC relies on the I&E manual reporting system. We are hoping to eliminate the errors in the Oak Ridge automated system, and that is the purpose of the work being proposed under the RFP.

Whitten also noted that the RFP mentioned 700 inventory discrepancies. We have told him these involve both high and low enriched uranium and plutonium, and noted that in August we released figures for the period 1968 to September 1976 on nuclear material inventory differences at licensed facilities.

Joseph J. Fouchard
Acting Director
Office of Public Affairs

cc: L. Gossick, EDO
✓ C. Smith, NMSS
E. Volgenau, IE
C. Kammerer, CA

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

DEC 0 6 1977

Mr. Thomas B. Cochran
Natural Resources Defense
Council, Inc.
917 15th Street, N.W.
Washington, D.C. 20005

IN RESPONSE REFER
TO FOIA-77-294

Dear Mr. Cochran:

This responds to your letter dated November 15, 1977, in which you request, pursuant to the Freedom of Information Act, a list of the approximately seven hundred inventory discrepancies in the computerized systems used by the NRC referred to in RFP No. RS-78-4. Your request was received by the Office of Administration on November 16, 1977.

The information you requested is not yet available. One of the purposes of the contract solicited under Request for Proposal (RFP) No. RS-78-4 is to compile the information. Perhaps you have misinterpreted the phrase in the RFP that reads "approximately seven hundred inventory discrepancy figures". The intent was to describe to potential offerors that there are a total of about seven hundred records, overall, in one data base and some of these are known to differ from corresponding records in another data base. The following discussion of the origin of RFP-78-4 should help clarify the situation and better explain what NRC seeks through this contract.

While assembling the inventory difference data publicly released by the Commission in August, 1977, the NRC staff examined data in two independent information systems. The first system operates through NRC's regional inspection network. It is a manual reporting system that funnels selected nuclear material accounting data to NRC Headquarters through NRC's Regional Offices. The data are generated by licensees, checked by the appropriate NRC regional office and reviewed again by NRC headquarters. Data from the manual inspection system were published in August, 1977, in NUREG-0350, Vol. 1, entitled, "Report on Strategic Special Nuclear Material Inventory Differences" (copy enclosed).

The second system, the Nuclear Materials Management and Safeguards System (NMMSS), stores licensee material accounting data in a computer. In the course of carefully examining the information available from the NMMSS, NRC determined that the automated system lacked capability to furnish data in required detail. It also contained some erroneous data. To increase the utility of the automated data, NRC issued a request for proposal to correct data errors and determine the reasons for erroneous data in the automated system. As stated in the RFP, the contractor will have access to data in both the manual and automated systems.

ENCLOSURE 4

DEC 0 6 1977

One of the direct products of the contract work will be a list of actual discrepancies in the automated data system and an explanation of why these discrepancies exist. This is the information which you requested in your letter of November 15, 1977. We expect the study to take approximately seven months and, when completed, the contractor's report will be placed in the NRC Public Document Room located at 1717 H Street, N.W., Washington, D.C.

Sincerely,

J. M. Felton, Director
Division of Rules & Records
Office of Administration

Enclosure:
NUREG-0350

July 1, 1976

SECY-76- 346

COMMISSIONER ACTION

For: The Commissioners

From: Kenneth R. Chapman, Director
Office of Nuclear Material Safety
and Safeguards

Thru: Executive Director for Operations

Subject: PLUTONIUM PACKAGE CERTIFICATION FOR AIR TRANSPORT

Purpose: To inform the Commission of the status of this program and to obtain approval of the actions being taken by the staff and the schedule for plutonium package certification pursuant to P.L. 94-79 (Scheuer Amendment).

Discussion: In accordance with plans discussed at Commission briefings on December 15, 1975, and March 4, 1976,* the staff has developed preliminary qualification criteria for plutonium package certification and has tested present package de-designs to determine if they are certifiable. Based upon the results of the tests, it appears that present designs are not certifiable and that additional time will be required to develop and test a higher integrity package that can be certified. An assessment of present package designs with respect to their potential for certification under P.L. 94-79 is included as Enclosure D.

The proposed qualification criteria (Enclosure C) have been discussed extensively with the ACRS working group on plutonium packages and the staff is continuing its evaluation of the underlying information and data. In conjunction with the development of a certifiable package design, the criteria will be revised to incorporate various refinements suggested by the ACRS working group and other minor changes that may be appropriate. The certification program, including the criteria, will be submitted to the full ACRS for their review. As requested by the Commission, the staff is also arranging for an evaluation to be made by the Assembly of Engineering of the National Academy of Sciences.

*See SECY Staff Requirements Memoranda to EDO, dated January 8, 1976.

ontact:
Nussbaumer
7

Discussion:
(Cont'd)

Comments on the proposed criteria have been received from DOT and ERDA staff (Enclosure E). DOT staff comments were that the criteria seemed to be sufficient. ERDA staff commented that the proposed criteria should be revised to allow the release of 50-100 times more plutonium and to afford protection only against typical approach/ departure type accidents. NRC staff opinion is that criteria of the type suggested by the ERDA staff would not meet the intent of the law that containers not rupture as a result of testing equivalent to the crash and explosion of a high-flying aircraft.

The staff has planned a two-phase effort to develop and test a certifiable package design for plutonium oxide powder. The first phase, scheduled for completion in August, 1976, consists of developing a certifiable package design and establishing, through preliminary tests, that the design is likely to meet the qualification criteria. Sandia has been authorized to proceed with the first phase. The second phase, scheduled for completion in February, 1977, consists of comprehensive testing and documentation of a number of prototypes to qualify the design for certification. Sandia has not yet been authorized to proceed with the second phase. Upon completion of the first two phases, an optional third phase, involving the crash of a large jet aircraft, may be practicable. In a separate paper to the Commission, the staff plans to make a recommendation concerning the optional third phase.

An expanded discussion of the Certification Program status, plans, and costs is included as Enclosure A. A diagram showing the milestones and target dates of the planned program is included as Enclosure B. The schedule for the program will permit certification of a package in April, 1977. This represents about an eight-month delay over the previous estimate. The principal reason for this delay is that present package designs do not appear to be certifiable and more time is needed to develop and test a design of higher integrity. The staff believes that the end result of

Discussion: (Cont'd)

the planned program will have high public credibility. Also, the staff is not aware of any significant U.S. need in the commercial sector to ship plutonium by air prior to April, 1977.

Because of the increased time required to complete this program, the staff considered the possibility of: (1) certifying qualification criteria alone; or (2) certifying qualification criteria at the conclusion of phase I of the planned program when the engineering feasibility of meeting the criteria will have been conclusively demonstrated. While these alternatives would cost less and would enable a response to the Scheuer Amendment to be made in late 1976, they would not result in the resumption of air transport of plutonium until work of the type planned for phase II was accomplished - by licensees or by ERDA. It does not appear that certification of criteria rather than a package design would be regarded as acceptable for meeting the Scheuer Amendment. For these reasons, and subject to Commission approval, the staff is pursuing a program to develop and test a package for certification.

Upon successful completion of phase II of the planned program, the staff believes the Commission will be in a position to certify a package design. The package will be capable of withstanding test conditions more severe than the conditions produced in virtually all aircraft accidents without releasing a quantity of material in excess of that permitted under present international Rules. The ability of the design to meet the qualification criteria will have been extensively documented through a comprehensive test program.

Recommendation: That the Commission approve the staff proceeding with the approach, objectives, and schedule for plutonium package certification as described in Enclosure A and the Press Release at Enclosure F.

Coordination: The Offices of Standards Development and Nuclear Regulatory Research concur in the actions described in this paper. The Office of the Executive Legal Director has no legal objections. The Press Release (Enclosure F) was prepared by OPA.

Kenneth R. Chapman, Director
Office of Nuclear Material Safety
and Safeguards

Enclosures:
A. Expanded Discussion of Status and Plans
B. Certification Program Plan (Diagram)
C. Working Paper on Qualification Criteria
D. Assessment of Present Packages
E. DOT and ERDA Staff Comments
F. Press Release

Note: Commissioner comments should be provided directed to the Office of the Secretary by c.o.b. Tuesday, July 13, 1976.

DISTRIBUTION

Commissioners
Commission Staff Offices
Executive Director for Operations
ACRS
Secretariat

Expanded Discussion of Certification
Program Status and Plans

Background

At briefings by the staff on December 15, 1975, and March 4, 1976, the Commission was informed of the staff's plans and schedule for a program leading to certification of a plutonium oxide package for air transport in accordance with P.L. 94-79 (Scheuer Amendment). Basically, these plans were for the staff to develop qualification criteria for package certification based upon an assessment of the conditions that could be produced in severe aircraft accidents. The criteria would specify a series of physical tests simulating aircraft accident conditions and also prescribe appropriate standards for post-test acceptability. In parallel with the development of qualification criteria by the staff, a test program would be conducted to investigate the capabilities of present package designs and modified versions of those designs to determine if they were certifiable. It had been anticipated that the program could be completed in August, 1976.

Schedule Delay

As discussed in Enclosure D, it appears that present package designs are not certifiable and therefore, additional time is required to develop and test a higher integrity package that can be certified. The staff, through Sandia Laboratories, is pursuing a development and test program which is expected to lead to a certifiable package design in August, 1976. Comprehensive qualification testing of several prototypes of this design and thorough documentation is to be completed in February, 1977, permitting certification in April, 1977. This represents about an eight-month delay over the previous estimate. The staff is not aware of any significant U.S. need in the commercial sector to ship plutonium by air prior to April, 1977. Also, the staff believes the program being pursued will have high public credibility.

Status of Criteria Development

The staff has drafted qualification criteria for plutonium package certification. Because of the nature and wording of the law, the proposed criteria are very stringent and are intended to provide a high degree of assurance that plutonium containers can withstand virtually all aircraft accidents. The criteria address the requirement of P.L. 94-79 that testing be equivalent to the crash and explosion of a high-flying aircraft by prescribing physical tests which simulate the conditions produced in severe aircraft accidents. The requirement for the container not to rupture is addressed by specifying post-test acceptance standards, equivalent to those in the present IAEA Rules.

The IAEA Rules impose conservative limitations on the release of radioactive material. The proposed qualification criteria, along with a detailed discussion of their rationale, is provided as Enclosure C.

By placing minimal reliance upon factors which could mitigate damage done to cargo, the proposed criteria are adequate to assure that package survival of aircraft accidents occurring during take-off, landing, or ground operations will approach certainty. These types of accidents represent the majority of all accidents and are the type most likely to occur in an urban area. Considering the conservatism inherent in the criteria for protecting against take-off and landing accidents, and the numerous factors which can be present in an accident situation to mitigate container damage, the criteria also afford a high degree of protection against accidents which occur in other phases of flight. This includes accidents of extreme severity, such as mid-air collisions and high-speed crashes.

The proposed qualification criteria have been discussed extensively with the ACRS working group on plutonium shipping packages and the staff is continuing its evaluation of the underlying information and data. In conjunction with the development of a certifiable package design, the criteria will be revised to incorporate various refinements suggested by the ACRS working group and other minor changes that may be appropriate. The certification program, including the criteria, will be submitted to the full ACRS for their review. As requested by the Commission, arrangements are being made for evaluation of the NRC certification program by the Assembly of Engineering of the National Academy of Sciences.

Comments on the proposed criteria have been received from DOT and ERDA staff (Enclosure E). The DOT comments expressed an opinion that whether or not the proposed criteria will be considered adequate depends upon the interpretation applied to P.L. 94-79. DOT states that if the interpretation used to develop the criteria is accepted, the proposed tests and standards seem sufficiently conservative to assure a virtually crash-resistant package.

The ERDA comments state that the proposed criteria are too severe and recommend less stringent test conditions and less stringent acceptance standards. Principally, their recommendations would involve: (1) revising the proposed test sequence to afford protection only against typical approach/departure type aircraft accidents instead of protecting against virtually all accidents, and (2) revising the acceptance standards to allow the release of 50-100 times more plutonium than present acceptance standards permit.

NRC staff opinion is that criteria of the type suggested by the ERDA staff would not meet the intent of the law that containers not rupture as a result of testing equivalent to the crash and explosion of a high-flying aircraft.

Status of Package Testing

Sandia Laboratories has conducted several tests of present plutonium oxide package designs. Based upon the results of these tests, it appears that present designs do not possess a sufficient level of integrity to permit certifying that they will not rupture when subjected to testing that can reasonably be considered to be "equivalent to the crash and explosion of a high-flying aircraft."

A limited number of tests have also been conducted with modified package designs of higher integrity than present designs. These modified designs have all utilized the screwed plug type closure that is used in present packages. Various modified designs have exhibited a substantially improved performance over that of present packages. However, the scope of the tests to date has been too limited to determine whether a package with a screwed plug type closure could meet the qualification criteria. The technical opinion of Sandia is that it would be more effective to test a modified design, utilizing a bolted closure rather than to proceed with testing to determine whether a package with a screwed plug type closure could be certified.

The staff has planned a two-phase effort to achieve a certifiable package design. In the first phase, Sandia is to develop a higher integrity package design for plutonium oxide powder and establish, through preliminary testing, that the design is capable of meeting the qualification criteria. Concurrently, the staff may make some minor changes to the criteria. The first phase is expected to be completed in August, 1976.

In the second phase, several prototypes of the design will be subjected to a comprehensive series of tests for actual qualification. Sufficient tests will be performed to establish a statistical basis for certifying that the design meets the criteria. This phase will be thoroughly documented by technical reports, photographs, and motion pictures. The testing and documentation included in the second phase is expected to be completed by February, 1977.

Status of Full Scale Demonstration Test

Upon completion of the first two phases, an optional third phase, involving the crash of a large multi-engine jet aircraft, may be practicable. Sandia Laboratories, in conjunction with Ultra-Systems, Company of Phoenix, Arizona, is studying the cost and feasibility of conducting a full-scale crash test. Among other things, the report that results from this study will discuss alternative methods of crashing the airplane, including accelerating the plane along a runway into a prepared barrier, and un-manned take-off as a drone for flight into a target. Following receipt and evaluation of the Sandia feasibility report, the staff will recommend a course of action to the Commission for approval in a separate paper.

The Air Force has two aircraft that are military versions of the 707 which may be available for donation to the NRC. The aircraft are currently at Kirtland AFB, adjacent to Sandia.

Actions Being Taken By The Staff

A diagram showing the remaining milestones and target dates of the certification program is provided as Enclosure B. The staff will refine the qualification criteria for submission to the ACRS and to the Assembly of Engineering of the National Academy of Sciences. This will be done in August, 1976, following development of a candidate design for certification.

Following evaluation of the criteria by the full ACRS and the National Academy of Sciences, the staff will seek to obtain formal concurrence on the criteria from ERDA and DOT. The staff will also recommend a plan for implementing the criteria through revisions to NRC Regulations following certification of a package design to the JCAE. At some appropriate time, it may also be desireable to hold preliminary discussions with the JCAE staff and the staff of Congressman Scheuer about certification procedures.

Cost

Sandia has submitted an estimate of the time and costs required to complete the package development and testing portions of the program. The first phase, scheduled for completion in August, 1976, consists of developing a candidate package design (utilizing a bolted closure) that will meet the qualification criteria. Sandia has been authorized to proceed with this phase at a cost of $230K.

The second phase, scheduled for completion in February, 1977, includes comprehensive testing of a number of prototype packages of the candidate design, and thorough documentation to demonstrate that the candidate design meets the qualification criteria. The preliminary cost estimate for this second phase is $570K. The second phase is not yet authorized.

The estimated cost for the evaluation by the Assembly of Engineering of the National Academy of Sciences is $75K.

Certification

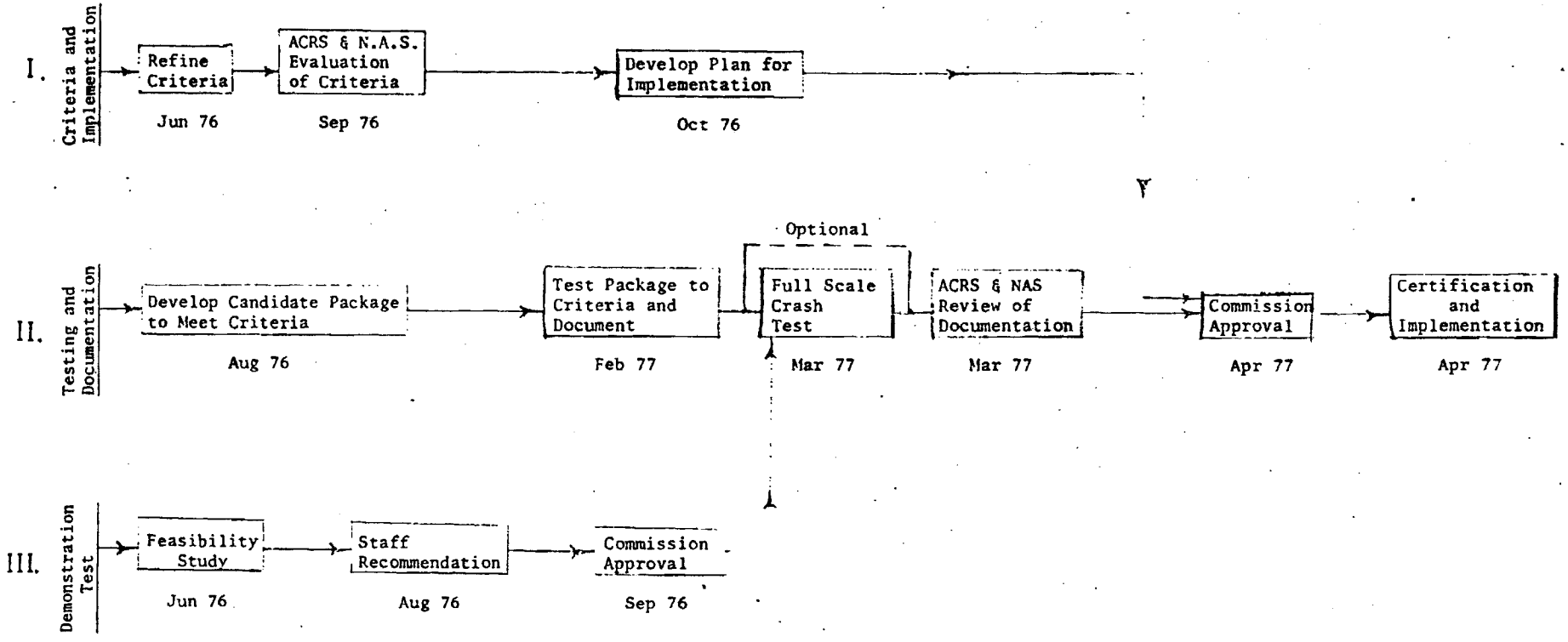
Upon successful completion of this program, the staff believes the Commission will be in a position to certify that "a safe container has been developed and tested which will not rupture under crash and blast-testing equivalent to the crash and explosion of a high-flying aircraft," and that this certification will have high public credibility.

A plutonium oxide package will have been designed to sustain test conditions more severe than the conditions produced in virtually all aircraft accidents without releasing a quantity of material in excess of that permitted under present international rules. Although there is insufficient information to permit a precise determination, the criteria is believed to encompass more than 99% of all aircraft accidents. In addition, the criteria are more severe than the qualification tests for flight recorders. These devices have performed their intended function without damage to the record media, in more than 95% of all accidents and incidents.

The capability of the package design to meet the criteria will have been extensively documented through a comprehensive test program. Assuming ten packages are tested successfully, a 65 percent confidence coefficient can be assigned to a 90 percent probability that all packages produced to the same specifications would meet the criteria. Depending upon the distribution of the results of the qualification tests, other statistical techniques could possibly be employed to show greater reliability figures.

The entire program, including qualification criteria, design specifications, test results, and documentation, will have been evaluated by the ACRS and the Assembly of Engineering of the National Academy of Sciences. Finally, it may be feasible to conclude the program with a full-scale demonstration test involving a large multi-engine jet aircraft.

PLUTONIUM PACKAGE CERTIFICATION PLAN



ENCLOSURE B

April 10, 1976

Working Paper
Qualification Criteria For Plutonium Package Certification

Introduction

Public Law 94-79, enacted on August 9, 1975, places the following restriction on the Nuclear Regulatory Commission (NRC):

> "The Nuclear Regulatory Commission shall not license any shipments by air transport of plutonium in any form, whether exports, imports, or domestic shipments; provided, however, that any plutonium in any form contained in a medical device designed for individual human application is not subject to this restriction. This restriction shall be in force until the Nuclear Regulatory Commission has certified to the Joint Committee on Atomic Energy of the Congress that a safe container has been developed and tested which will not rupture under crash and blast-testing equivalent to the crash and explosion of a high-flying aircraft."

Standards for the integrity of containers used to ship plutonium and other radioactive materials are set forth in 10 CFR Part 71 (Ref. 1) of NRC Regulations and 49 CFR Parts 170-178 (Ref. 2) of Department of Transportation (DOT) Regulations. These standards have undergone continual evaluation and improvement by cognizant United States and international agencies since first established in 1948 and are consistent with those followed by over seventy foreign countries and the International Atomic Energy Agency. The standards are based on two main considerations: (1) protection of the public from external radiation; and (2) assurance that the contents are unlikely to be released during either normal or accident conditions of transport or, if the container is not designed to withstand accidents, that its contents are so limited in quantity as to preclude a significant radiation safety problem if released.

The safety of air transportation of plutonium and other radioactive materials was under active study by the NRC when Public Law 94-79 was enacted. As part of its review of the regulations and procedures originally promulgated by the Atomic Energy Commission, the NRC initiated a re-evaluation of rules concerning the transportation of all radioactive materials by air. This was announced in the Federal Register on June 2, 1975. The announcement included notice that a

rule making proceeding and a companion environmental impact statement would be made to consider standards for containers used to transport all radioactive materials and safeguards against diversion and sabotage. Both the rule making proceeding and the environmental impact statement will be coordinated with DOT and the Federal Aviation Administration (FAA), which have overlapping jurisdiction with NRC for safety aspects of packaging and transportation of radioactive materials.

On February 9, 1976, the NRC announced its decision in the Federal Register that the air transportation of special nuclear material, other than plutonium, under currently effective regulations need not, and should not, be suspended or otherwise limited during the period the rule making proceeding is being conducted. For plutonium, other than in medical devices, continued air shipment is foreclosed by Public Law 94-79 until such time that a shipping container is certified by the NRC.

As a result of Public Law 94-79, the Nuclear Regulatory Commission has banned air shipment of plutonium by its licensees and has established a certification program consisting of: (1) evaluation of the conditions which could be produced in severe aircraft accidents; (2) development of qualification criteria prescribing appropriate performance requirements and acceptance standards for shipping containers used to transport plutonium by air; and (3) a series of physical tests and engineering studies of plutonium shipping containers to demonstrate their ability to meet the qualification criteria.

The purpose of this paper is to describe the specific tests, assessments, acceptance standards, and operational controls that are included in the proposed qualification criteria for plutonium container certification and to discuss their adequacy with regard to severe aircraft crashes. Other elements of the certification program, such as package design features and details, test results, methodology, and documentation, and requirements for container fabrication, inspection, and operation, will be addressed in subsequent papers and reports.

Safety Considerations

A complete assessment of the overall risk to the public and the environment as a result of transporting plutonium by air would relate possible adverse consequences to the probability of this occurrence. One important factor in this type of assessment is the expected accident frequency. For air shipment of plutonium, the

probability of accident involvement is very low. This is based upon the excellent safety record of commercial aviation and the small number of plutonium shipments that will be made. In the event that a plutonium package were to be involved in an accident, the safety of the container would not necessarily be jeopardized, since many aircraft accidents are relatively minor in nature and would not produce damaging environments which are a serious threat to cargo. Severe aircraft accidents which may have a potential to exceed the capabilities of high integrity cargo (e.g. radioactive material shipping containers) occur less frequently. Overall risk is somewhat dependent upon the relationship between package crashworthiness and the distribution of aircraft accident severities. However, the degree of package crashworthiness is not a factor which predominates overall risk since the probability of involvement in a severe aircraft accident is extremely low and any adverse consequences that may result would depend upon several circumstances, such as the nature and location of the accident, the quantity and particle size of material released, the existing meteorological conditions, and the effectiveness of remedial actions.

Although it is only one facet of transport safety, the wording of Public Law 94-79 is focused entirely upon package crashworthiness. The explicit requirement for certification that containers will not rupture as a result of testing equivalent to the crash and explosion of a high-flying aircraft precludes the development of criteria based entirely upon an assessment of overall risk in terms of probabilities and consequences. Also, the criteria cannot be based upon a philosophy of zero risk since it is not possible to unconditionally guarantee that a container could never be ruptured under any set of conceivable aircraft accident circumstances. The approach taken in this paper to satisfy Public Law 94-74 is to provide a high degree of assurance that plutonium containers can withstand virtually all aircraft accidents. Packages are to possess sufficient integrity to insure adequate safety even in the unlikely event of aircraft crash involvement. The possibility that a container could rupture if involved in an accident, while not zero, is to be exceedingly remote.

The qualification criteria proposed in this paper assure that package survival of aircraft accidents occurring during take-off, landing, or ground operations will approach certainty. These types of accidents represent the majority of all aircraft accidents and are the type most likely to occur in an urban area. The intention was to clearly and conservatively envelop a reasonable upper bound of severity for accidents of this type with minimal reliance being placed upon factors which could mitigate damage done to cargo. Considering the conservatisms inherent to the qualification criteria for protecting against take-off and landing accidents and the numerous factors present in

an accident situation which could mitigate container damage, the criteria also affords a high degree of protection against accidents which occur in other phases of flight. This includes accidents of extreme severity, such as mid-air collisions and high speed crashes.

Development of Criteria

The physical tests that are included in the qualification criteria are intended to simulate the accident environments that could be produced in severe aircraft accidents. Initial consideration was given to the environments that could occur at various stages of an accident (Figure 1). Each environment was examined separately and a qualification test or operational control was devised to provide suitable protection against that environment. The objective was for the resulting test or control to be as simple as possible and to provide clear and definite assurance that a high degree of protection was being provided. Sequential qualification test criteria were then obtained by series combination of the individual tests in a logical order corresponding to the order expected for the environments simulated.

Because of the large number of variables, the limited availability of data concerning accidents of the severity being considered, and the need for the qualification criteria to afford a high degree of safety, a reasonable degree of conservatism was used in simulating the accident environments. Although not precisely quantifiable, the qualification tests are conservative for two additional reasons:

1. A fundamental characteristic of a sequential test series is that the total damaging effect that is produced is an accumulation of the effects produced by each individual test. This means that the article being tested must be somewhat overdesigned for any single test in order to meet the other tests prescribed in the sequence. In general, a plutonium package that can meet the proposed test sequence could be expected to withstand testing to a more severe magnitude if the environment simulated by that test were to be considered alone and not as part of a sequence. To be comprehensive, without requiring an inordinate number of different test sequences, the qualification criteria must necessarily prescribe a severe magnitude of test for all environments. However, few, if any, actual accidents would produce all environments at commensurate severity levels.

AIRCRAFT CARGO ENVIRONMENTS

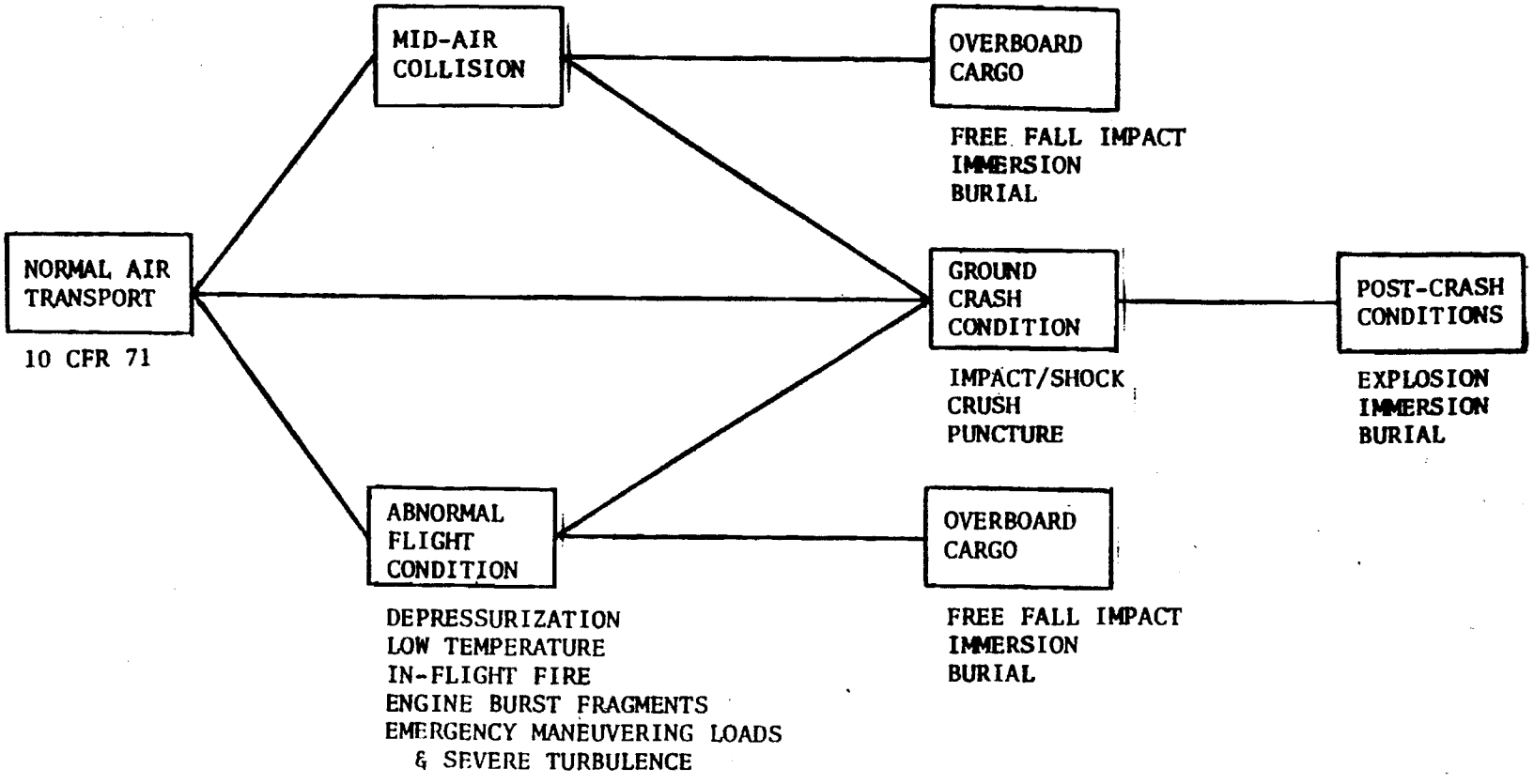


FIGURE 1

2. The qualification criteria represents a minimum level of required container performance. However, a container will have some degree of reserve margin since it is not practicable (or economical) to specify materials, dimensions, thicknesses, and weights that will result in a design capable of withstanding the minimum requirements and no more.

The qualification criteria also prescribe standards for determining the acceptability of plutonium containers following the physical tests. These acceptance standards are related to the three safety functions of a shipping container for fissile material: (1) containment of the contents, (2) acceptable external radiation levels, and (3) maintenance of a sub-critical condition. The proposed acceptance standards are conservative with respect to each of these three safety functions and are consistent with those prescribed by the International Atomic Energy Agency (IAEA) Transport Regulations (Refs. 29, 30).

PROPOSED QUALIFICATION CRITERIA TO CERTIFY PACKAGES FOR AIR TRANSPORT OF PLUTONIUM

A. NORMAL AND ACCIDENT CONDITIONS FOR SURFACE TRANSPORT MODES AND NORMAL CONDITIONS OF TRANSPORT BY AIR

Method of Demonstration: Physical Test or Engineering Analysis

Conditions: Prescribed by 10 CFR 71

Acceptance Standards: Specified in 10 CFR 71

B. AIRCRAFT ACCIDENT CONDITIONS

Sequential Tests

Method of Demonstration: A package shall be physically tested to the following conditions in the order indicated to determine their cumulative effect.

Conditions:

1. Impact at a velocity of 422 ft/sec at a right angle onto an essentially unyielding surface. The container to be tested in the orientation (side, end, corner) which produces the most damage.

2. A static crush load of 70,000 pounds applied in succession along the longitudinal and one orthogonal lateral axis of the container. The force on the container to be developed between a flat steel surface and a two-inch wide, straight, solid, mild steel bar with the longitudinal axis of the bar parallel to the plane of the flat surface. The length of the bar to be at least as long as the diameter of the package and the depth of the bar

to be sufficient so that the package is not contacted by any members or devices supporting the bar. The two-inch width of the bar to contact the center of the top end of the container for the longitudinal loading; and for the lateral loading, to contact the container at mid-length with the longitudinal axis of the bar perpendicular to the longitudinal axis of the container.

3. Packages weighing less than 500 pounds to be placed upon a flat, essentially unyielding, horizontal surface and subjected to a weight of 500 pounds falling from a height of 10 feet in succession onto the top, bottom, and side of the container. The end of the weight contacting the package to be a solid probe made of mild steel; 12 inches long, 8 inches in diameter at the base, transitioning to 1-inch in diameter at the end. The axis of the probe shall be perpendicular to the horizontal surface. For packages weighing 500 pounds or more, the probe to be placed on a flat, essentially unyielding surface and the container dropped from a height of 10 feet onto the probe, the container striking in succession on its top, bottom and side.

4. Exposure to a thermal test in which the heat input to the package is not less than that which would result from exposure of the whole package to a radiation environment of 1,850° F for 55 minutes with an emissivity coefficient of 1.0, assuming the surfaces of the package have an absorption coefficient of 1.0.

5. Immersion under at least 3 feet of water for a period of 36 hours.

Acceptance Standards:

1. Containment - The containment vessel must not be ruptured in its post-tested condition and the package must provide a degree of leaktightness adequate to assure that no more than one millicurie of radioactivity would be released within a period of one week.

2. Shielding - Demonstration that the external radiation level would not exceed one Rem per hour at a distance

of 3 feet from the surface of the package in its post-tested condition.

3. Sub-Criticality - Air transport of plutonium in quantities greater than 15 grams per package shall be classified as either Fissile Class I, II, or III in accordance with 10 CFR Part 71. The package and an array of packages must be demonstrated to be sub-critical if each package were damaged to the extent indicated by the qualification tests, with close reflection by water on all sides and with the packages in the most reactive arrangement and with the most active degree of interspersed hydrogeneous moderation which would be credible.

Individual Test I

(Impact)

Method of Demonstration: Physical test of an undamaged package to the following conditions. This test is not required if the calculated terminal free-fall velocity of the package is less than 422 ft/sec or if its terminal free-fall velocity exceeding 422 ft/sec is used in item No. 1 of the sequential tests, above.

Conditions: Impact at the calculated terminal free-fall velocity at mean sea level at a right angle onto a flat essentially unyielding surface. The container to be tested in the orientation (side, end, corner) which produces the most damage.

Acceptance Standards: Same as for the sequential tests, above.

Individual Test II

(Immersion)

Method of Demonstration: Physical test or engineering analysis of a package to the following conditions.

Conditions: External pressure of 600 psi

Acceptance Standards: Same as for the sequential tests, above.

C. OTHER REQUIREMENTS

1. Demonstration or analytical assessment showing that the results of the physical testing for package qualification are not significantly affected by:

   a. The package contents used in the tests to simulate the actual contents that will be transported, and

   b. Ambient temperatures ranging from -40° F to +130° F.

2. Demonstration or analytical assessment showing that the ability of the package to meet the acceptance standards prescribed for the accident condition sequential tests would not be affected if one or more tests in the sequence were deleted.

D. OPERATIONAL CONTROLS

Plutonium packages must be located in the aftmost portion of the aircraft that is practicable for cargo of its physical size and dimensions.

DISCUSSION OF PROPOSED QUALIFICATION CRITERIA FOR PLUTONIUM PACKAGE CERTIFICATION

Surface Transport and Normal Air Transport

Containers used for air shipment of plutonium must be adequate for the normal rigors of handling and air transport as well as having the capability to withstand accidents. Containers used in air service must also have intermodal capability to allow surface transport for delivery and receipt at an air terminal.

Experience gained from the hundreds of thousands of shipments of radioactive materials that have been made over a period of several years indicates that present regulations assure adequate safety in surface transport modes and for normal conditions of air transport. The qualification criteria specify that the requirements of 10 CFR Part 71 be used for this purpose.

Abnormal Flight Environments

Various abnormal or accident conditions could occur in flight that may potentially damage cargo or affect its ability to withstand a succeeding surface crash. These environments are discussed below:

A. Depressurization - It is possible that a container could be subjected to a reduced atmospheric pressure during transport as a result of compartment depressurization. This would slightly increase the pressure differential between the internal cavity and the atmosphere and could possibly have a minor effect upon the heat transfer characteristics of the package. As a Normal Condition of Transport, 10 CFR Part 71 prescribes an ambient pressure test of one-half standard atmosphere. Assuming that a package could be exposed to an ambient pressure as low as one-tenth standard atmosphere, corresponding to an altitude of approximately 52,800 feet MSL on a standard day (Ref. 3), the increase in pressure differential beyond that required by the 10 CFR Part 71 test is only about 6 psi. Because pressure differences of this magnitude are negligible in comparison to the internal pressures that can be built up in a post-crash

thermal environment and are insignificant with respect to the capabilities of the types of pressure vessels used in plutonium shipping containers, the qualification criteria does not propose any additional depressurization requirements beyond the one-half atmosphere test specified in 10 CFR Part 71.

B. Low Temperatures - A reduction of ambient temperature could accompany the loss of compartment pressurization. Cold temperatures could possibly have an adverse effect upon the mechanical properties of some materials and cause stresses due to differential thermal expansion. Although the atmospheric temperature corresponding to an altitude of 52,800 feet on a standard day is -69.7° F, temperature inside a cargo compartment is not likely to approach this degree of coldness. Cargo compartments on jet aircraft are equipped with a temperature control system that would continue to supply heat. Also, corrective measures taken by pilots in the event of compartment depressurization (i.e., lowering altitude as much as possible) would not allow sufficient time for a significant reduction of compartment temperature to occur. The qualification criteria does not propose any additional temperature requirements for air transport beyond the -40° F requirement specified in 10 CFR Part 71 as a Normal Condition of Transport. An atmospheric temperature of -40° F corresponds to an altitude of approximately 28,000 feet on a standard day (Ref. 3).

C. Engine Burst Fragments - Operating experience indicates that burst type failures can occur to the blades and rotors used on commercial jet aircraft engines. When this occurs, fragments are generally contained within the nacelle or the engine case. However, in some instances, the fragments are not contained and due to their kinetic energy could potentially become missiles which may damage a package on board the aircraft.

An assessment of the degree of this possible threat (Ref. 4) has been made by a consultant to the NRC staff. A plutonium package on board an aircraft would not be damaged by an uncontained rotor failure unless its location was in the path of a missile. Depending upon the size of the package and the fragment and the distance of the package from the engine, the container occupies only a small portion of the 360° arc through which the engine components rotate. Longitudinal location of the package is also a factor. An FAA document (Ref. 5) reports the probable impact area of fragments to be within 15° fore and aft of the plane of rotation of the major rotor assemblies in

the engine. Other FAA data indicates that uncontained rotor failures occur approximately once per 909,000 jet engine operating hours.

For several types of jet aircraft, these considerations were used to calculate the probability that a typical plutonium package containment vessel would be struck by a major fragment in the event of a rotor burst failure. The package was assumed to be located within the probable impact area (i.e., within 15° fore and aft of the plane of rotation of the assemblies). The average flight duration was conservatively assumed to be 5 hours. The results varied, depending upon the type of plane. The calculated probability that a container would be struck ranged from approximately 3.2% to 0.5%. The expected fragment strike rates for various types of aircraft were extremely low, ranging from once per 5.3 million flights to once per 37.2 million flights.

With regard to the transport of plutonium by air, the above assessment does not consider other factors which reduce this small threat of container damage still further:

1. All air shipments of plutonium will not be made on aircraft which are powered by turbo-jet engines.

2. An operational control discussed later in this paper requires plutonium packages to be located in the aft portion of the aircraft. This control excludes packages from being located within the probable impact area of fragments from wing mounted engines.

3. A containment vessel struck by a rotor burst fragment will not necessarily be penetrated or ruptured. The translational and rotational kinetic energy of a fragment would, in part, be dissipated by the effort required to penetrate various portions of the aircraft structure and enter the fuselage. After entering the cargo area, additional kinetic energy would be expended if the fragment strikes other cargo before striking the container. Upon striking the package, the angle and direction of impingment may not be sufficient to preclude non-penetrating deflection and the integrity of the various package shells and energy absorbing materials may be adequate to resist penetration.

Based upon the qualitative considerations above as well as the conservative demonstration of an extremely small probability of being struck, the threat to a container from this source is considered to be negligible. The qualification criteria do not propose any test conditions to simulate an engine rotor burst fragment.

D. Emergency Maneuvering and Severe Turbulence - Emergency aircraft maneuvering or severe turbulence conditions can be expected to produce cargo acceleration loads of only a few g's magnitude. Adequate protection against this occurrence is afforded by present regulations which require, as a Normal Condition of Transport, that packages withstand a free-drop from heights up to 4 feet onto an essentially unyielding surface without experiencing any damage that significantly reduces the effectiveness of the package. The requirement assures that an environment of this type will not produce any damage which would degrade the ability of a container to survive a subsequent accident. Additional assurance in this regard is provided by the inherently rugged nature and high degree of integrity required for packages to withstand the tests that simulate crash conditions. The qualification criteria do not propose any additional requirements for this purpose beyond the free-drop requirement specified as a Normal Condition of Transport by 10 CFR Part 71.

E. In-Flight Fire - It is possible for fire to occur aboard aircraft while in flight. However, aircraft are equipped with detection and extinguishing systems to confine and limit the duration of fire. Should these provisions not be sufficient, it is likely that either an expeditious landing attempt or a crash condition would ensue. Assuming a container to be in the localized vicinity of an in-flight fire, it appears reasonable to expect that the intensity and duration of the fire would not produce sufficient heat input to the container to significantly detract from its ability to withstand possible succeeding accident conditions, and that the overall damaging potential of in-flight fires is considerably less than for fires which could be produced on the ground. The qualification criteria do not propose any test conditions to simulate an in-flight fire environment.

Ground Crash Conditions

The damaging conditions produced in an airplane crash can be extremely severe. With the exception of minor accidents where the flight recorder accelerometer capabilities were not exceeded (+6g's, -3g's), there

is essentially no information concerning these conditions that has been obtained by instrumented measurement at the time of occurrence. However, a limited amount of data is available concerning various aircraft flight parameters at the time of crash (e.g. speed, pitch, impact angle, etc.). This data, together with other information, such as the design characteristics of the aircraft and its ancillary equipment, has been extensively studied for accident severities where human tolerance is marginal (Refs. 31, 32, 33). The more severe accidents of interest to this paper have been studied to various degrees in connection with the nuclear airplane program, the pacemaker and artificial heart programs, and the program to develop an accident resistant container (ARC) for nuclear weapons. Information developed from the ARC study was used as the basis for a probabilistic study by DOT/ERDA of the severity of cargo aircraft accidents. In addition, aircraft flight recorders are designed to specific criteria to assure accident survivability. There is a large data base of information concerning the performance and accident survival rate experienced by these devices in hundreds of accidents (Ref. 6).

Both the ERDA/DOT study of cargo aircraft accident severity and the flight recorder qualification criteria distinguish aircraft crash conditions as three separate types of environments - impact, crush, and puncture. Aircraft crash conditions are similarly designated in this paper. The specific tests and controls that are proposed to protect against these crash environments are outlined below. Other conditions, such as fire and immersion, which could occur shortly following a ground crash, are included later under Post-Crash Conditions. In-flight accidents, such as mid-air collision and overboard cargo, are also discussed later as a separate subject.

A. Impact/Shock - The primary factors affecting aircraft impact severity are velocity, impact angle, and characteristics of the impact surface. Other factors which can affect crash severity include the angular orientation of the aircraft (roll, yaw, pitch), the magnitude of force needed to collapse the airframe, and the energy absorbing capacity of the airframe structure.

The expected crash speed for a given type of aircraft is somewhat dependent upon its characteristics and capabilities as well as the stage of flight in which the accident occurs. While crashes can happen while the aircraft is cruising at high speed, most accidents occur during landing and take-off operations where aircraft speeds are much less than when cruising at

altitude. Maximum flight speed of aircraft in the United States is governed by the following Federal Regulation (Ref. 7):

1. The maximum airspeed permitted at altitudes lower than 10,000 ft (MSL) is 250 knots (288 mph) (14CFR 91.702).

2. Within an airport traffic control area, the maximum air speed permitted for reciprocating engine aircraft is 156 knots. The maximum air speed permitted for turbine powered aircraft is 200 knots (14 CFR 91.706). An airport traffic control area is defined as extending within a radius of 5 miles from the airport and extending up to 3,000 feet above the airport elevation.

3. Within a terminal control area, the maximum air speed permitted is 200 knots (14 CFR 91.706). A terminal control area is designated for 22 major airports in the U. S. which have a high density of aircraft traffic (Ref. 8). Although the precise boundary varies for individual airports, the terminal control areas are defined in terms of altitude and radial distance from the runway, ranging out to distances of 20 to 30 miles and altitudes up to 12,500 ft.

To protect against the impact environment produced by aircraft crashes, the qualification criteria specify that containers be impact tested at a velocity of 422 ft/sec (250 knots, 288 mph), at a right angle onto an essentially unyielding surface. The container to be impact tested in the orientation (side, end, corner) which produces the most damage.

The velocity of this proposed test is based upon the FAA speed limitation of 250 knots at altitudes less than 10,000 ft. This test velocity, together with the right angle impact requirement, provides a reasonable upper bound for aircraft speed, impact angle, and orientation, for crashes which occur during approach, landing, take-off, and climb-out.

The essentially unyielding surface is specified because accidents can occur onto airport runways, concrete highways, and against rock surfaces which have relatively little potential for mitigating impact severity. This type of test target requires the package itself to dissipate essentially all of its own kinetic energy. Without placing any reliance upon other mechanisms which could dissipate energy and mitigate damage to cargo, the proposed test

virtually precludes the possibility that the type of aircraft crashes which occur in the vicinity of airports (and surrounding urban areas) could produce an impact environment which exceeds the minimum capabilities of a package.

The proposed test also provides a high degree of protection against crashes which occur in a phase of operation other than approach, landing, take-off, and climb-out. Only a small number of cargo type aircraft crashes have occurred at speeds in excess of 250 knots. Crashes at speeds less than 250 knots are enveloped by the proposed test regardless of phase of operation. The adequacy of the proposed test to protect against crashes at higher speeds is considerably enhanced by the following factors, which can substantially lessen the crash severity:

1. The component of crash velocity tangential to the impact surface may be arrested at low force levels over large distances as the aircraft comes to rest.

2. Portions of the kinetic energy may be dissipated through deformation or disintegration of the aircraft structure. Other cargo located forward may deform to dissipate energy and cushion the impact environment for an aft located container.

3. Displacement and deformation of a relatively soft impact surface, such as soil, may cushion the impact and reduce decelerations in the normal direction.

4. The package orientation with respect to the surfaces that are contacted may change as the crash progresses, allowing more than one impact event in which to dissipate its total kinetic energy and allowing deformation of its surrounding impact absorbing materials to occur over a larger surface area than in the qualification test.

The general progression of damage in aircraft accidents is discussed in a U. S. Army Mobility Research and Development Laboratory document (Ref. 9). As described in this document, "The structure which first contacts the impact surface usually is the first to begin to deform. This localized deformation continues either until the kinetic energy of the aircraft is absorbed at low speeds over relatively large distances or

until there is enough structure involved in the deformation to produce a significantly high decelerative force on the aircraft mass. If the quantity of kinetic energy to be absorbed is small, structural damage may be minor, and the aircraft may simply come to rest without endangering occupants" (or cargo). "When the initial kinetic energy is high, there is more likelihood that forces will build up until total aircraft decelerative forces become large. Once these high decelerative forces are reached, then buckling throughout the aircraft may occur."

The velocity of an aircraft at the instant of crash can be resolved into components of velocity normal and tangential to the impact surface (Figure 2).

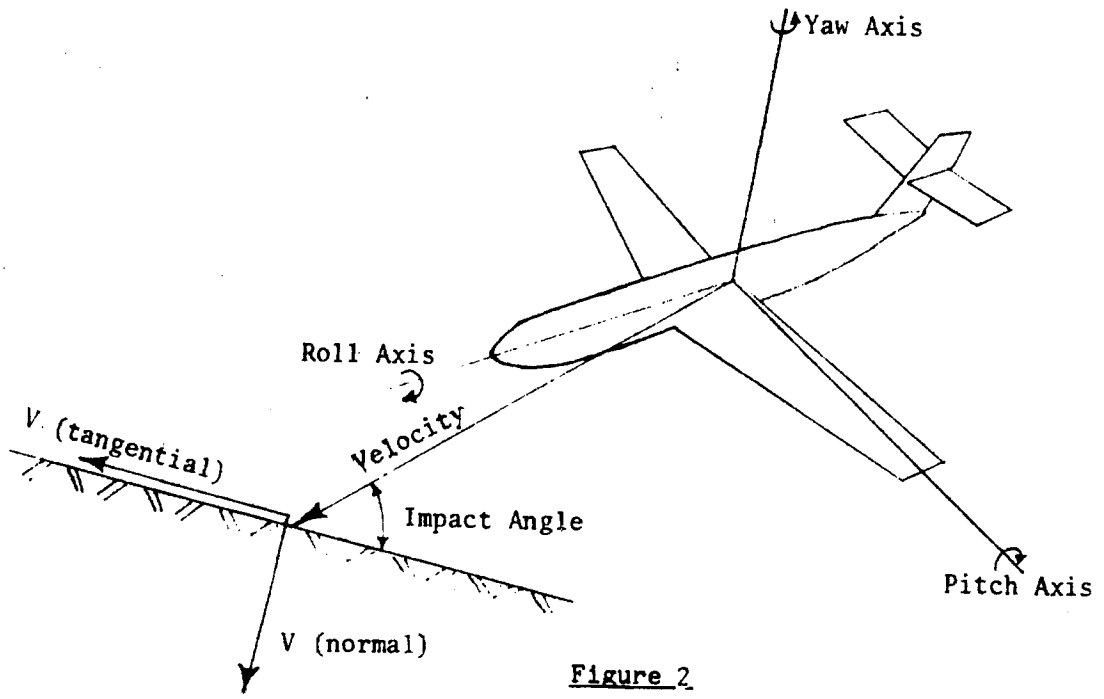


Figure 2

Energy absorption in these two directions can differ significantly. Most aircraft crashes occurring at impact angles up to 30° are accompanied by a rapid change in pitch angle to align the aircraft fuselage with the impact surface. Without

substantial intervening obstacles, aircraft translation in the tangential direction is opposed primarily by frictional forces exerted on the aircraft surface by the impact surface and by airframe "plowing" type interaction with terrain irregularities. Although the acceleration pulses transmitted through the airframe under these circumstances are of irregular frequency, magnitude, and duration, the distance traveled by the aircraft before tangential motion is arrested can be quite large, corresponding to an average deceleration of relatively low magnitude. If the compressive forces resulting from aircraft interaction with the surface become sufficiently high or if the skidding aircraft were to encounter a substantial obstacle, kinetic energy would be dissipated through buckling and longitudinal collapse of the airframe. Until the energy absorption capability of the airframe was exceeded and collapse had essentially "bottomed-out", this energy absorption process would occur at modest levels of force and acceleration.

In most cases, the normal velocity component is substantially lower than the tangential component because most crashes occur at small impact angles. However, in comparison to the tangential direction, velocity changes in the normal direction occur within only a short distance. Bearing pressures acting over the surface contact area produce large forces which rapidly decelerate the aircraft in this direction. The vertical dimensions of the lower hull and floor system afford little distance for kinetic energy to be dissipated by structural collapse. For this reason, the normal component of velocity is considered to be the parameter of primary significance with respect to impact severity. Although there is essentially no possibility that motion can be arrested over protracted lengths of time or distance, the impact surface for cargo can be considerably less damaging than the essentially unyielding surface prescribed in the qualification test. Deformation of the impact surface, collapse of the underside structure of the aircraft, and compression or crushing of debris between the package and the impact surface may provide several inches of stopping distance which are not available in the qualification test. This would lower the average deceleration forces experienced by a container and mitigate the severity of impact.

A report published by the FAA (Ref. 10) contains a general evaluation of the crash and destruction of a twin engine piston propelled aircraft and a four engine jet propelled transport aircraft. The assumed crash speeds were 100 mph for the 45,000 lb. piston aircraft and 150 mph for the 150,000 lb. jet aircraft.

TABLE 1

Energy Absorption Capability of Typical Airframes (Ref.10)

	Twin Engine Piston Transport Aircraft (1)		Four Engine Jet Transport Aircraft (2)	
	Fraction of Kinetic Energy Dissipated*	Maximum Deceleration	Fraction of Kinetic Energy Dissipated*	Maximum Deceleration
Longitudinal Crushing of Fuselage Forward of Wings	20%	7g	8%	4g
Loss of Both Wings by Chordwise Shear or Bending	4%	19g	8%	11g
Vertical Crushing of Lower Fuselage	1.3%	11g	1.3%	14g

(1) 45,000 pounds
(2) 150,000 pounds

* Fraction based on impact speed of 150 ft/sec for the piston aircraft and 220 ft/sec for the jet aircraft.

The results of this report, summarized in Table 1, indicate that the g-loads which accompany deformation and collapse of the aircraft are not sufficiently large to be a major threat to containers. However, structural collapse of the airframe will not dissipate a large percentage of the kinetic energy possessed by aircraft at flight speeds. The kinetic energy of a crash must essentially be dissipated by aircraft interaction with the surface (displacement, deformation, and friction). If the normal component of velocity at impact is not excessive, the energy absorbing capacity of the lower fuselage will not be exceeded and decelerations produced in this direction will be modest. Crashes involving higher rates of descent may produce fuselage damage leading to aircraft disintegration by subsequent longitudinal decelerations. If forces in the tangential direction, due to friction and "plowing" type interaction with the surface, do not become excessive (i.e., 5 to 10 g's for the jet aircraft), longitudinal collapse of the airframe will not occur and the aircraft will come to rest over a relatively large distance. But if the skidding aircraft strikes a substantial obstacle, longitudinal collapse can occur at low force levels without dissipation of substantial kinetic energy.

This type of airframe energy absorption performance was also observed in a series of tests done for the U. S. Air Force by the Flight Safety Foundation (Ref. 11). In these tests, three C-119C cargo aircraft were loaded with a 13,000 lb. container and crashed at a speed of 207 ft/sec. Two of the aircraft were impacted at 90° into a 30-inch thick concrete wall backed by an earthen embankment; the third was impacted at an angle of 20° into an earthen mound. For the two tests into the wall, the container experienced low acceleration as structure forward of the container progressively collapsed longitudinally. After collapse had proceeded sufficiently, the container struck the crushed portion of the forward fuselage intervening between the container and the wall at a velocity of 190 ft/sec (17 ft/sec less than the impact velocity of the aircraft). The wall was displaced 6 inches and energy absorbing materials provided on the container were crushed 14 inches. The report estimates that the 17 inches of debris between the container and the wall were crushed 50%, providing total stopping distance for the inner container of 28.5 inches, resulting in an average deceleration of 236 g's, with a peak of approximately 708 g's. In the third test at 20° onto an earthen mound, the container remained attached to the fuselage floor as the forward section collapsed. When the forward edge of its shipping pallet struck the crushed aircraft structure, the container was released

and thrown free from the disintegrating aircraft. The aircraft wreckage continued to move for several hundred feet while the container impacted into the front face of the slope and tumbled over the crest, coming to rest at the base of the mound. In each of these three tests, the velocity component normal to the impact surface was sufficient to cause collapse or disintegration of the fuselage with minimal protection being afforded to cargo by the aircraft. In the first two instances, cargo impact was mitigated by a small reduction in container velocity before impact, cratering and displacement of the wall, and compression of aircraft debris between the wall and the container. In the third case, the total kinetic energy of the container was not dissipated in a single impact event. The container orientation changed with respect to the surfaces that were contacted and permitted more effective utilization of the surrounding impact absorbing materials. Container impact was also mitigated by cratering and depression of the soil surface.

In other crash circumstances, the aircraft structure can provide considerable additional protection to cargo. This is illustrated in two reports published by the FAA (Refs. 12, 13) concerning full scale crash testing of a DC-7 and a Lockheed Constellation aircraft. Although both of these tests were conducted at speeds (235 and 189 ft/sec) similar to those used for the Air Force tests, the degree of aircraft damage was much less. The crashes occurred at smaller impact angles and had lower velocity components normal to the impact surface. The main portion of both fuselages remained essentially intact and the impact environment experienced by cargo in these crashes was not sufficient to cause failure of the restraining systems.

There is considerable variation in the velocities at which aircraft crashes have occurred. For commercial aviation accidents, very little tabulated or quantified data concerning velocity and other flight parameters at the time of crash could be located by the NRC staff or its consultants. However, extensive records of this sort are maintained for military aviation accidents at Norton Air Force Base, California. At least three statistical studies have been made of this data. In May of 1971, NASA published preliminary impact speed and angle criteria for the nuclear airplane (Ref. 14). This report was based upon analysis of 96 major military accidents occurring between 1960 and 1965 involving multi-engine jet cargo and bombardment aircraft. In November of 1971, the Advanced Concepts Department of Lockheed Georgia Company published a report concerning large military

aircraft accident statistics (Refs. 15, 34). The data used in this study combined the 96 jet aircraft accidents used in the NASA study with the records of 218 accidents between 1964 and 1970 involving large, multi-engine transport, bombardment, and special mission aircraft operated by the Air Force. The resultant sample comprised 311 accident digests. All accidents except those involving ground contact following a controlled flight-airborne phase were eliminated. Also, all accidents involving aircraft with a sonic, or higher, speed capability were rejected as were those accidents which failed to provide numerical estimates of impact speed. The final data set consisted of 128 accidents involving eleven different types of aircraft. The results of the study are probabilistic in nature and are normalized in terms of velocity at impact to maximum low altitude (30,000 feet) speed capability as well as in terms of normal velocity at impact to maximum low altitude speed capability.

The results of both the NASA study and the Lockheed Georgia study are based upon the combined accident data for heavy bombardment aircraft (B-47, B-52) and military cargo aircraft. Because bombardment aircraft data was included in the study sample, the results may not be applicable to commercial aviation. The mission of bomber aircraft sometimes involves high speed flight to target at relatively low altitudes above terrain. Some results of the Lockheed study are shown below; speed characteristics of typical cargo aircraft are listed in Table 2.

1. The ratio of average crash speed to maximum aircraft speed capability at low altitudes for the sample was approximately 0.34. For a 707 aircraft (maximum speed 920 ft/sec), this would correspond to a speed of 312 ft/sec. For crashes which occur during landing and take-off, the average ratio was approximately 0.29, corresponding to a speed of 267 ft/sec for a 707 aircraft.

2. The ninety percent value for ratio of crash speed to maximum low altitude speed capability is 0.67. For normal velocity component, the ratio is 0.325. The ratio of crash speed corresponding to 95% is reported to be 0.77.

3. Ninety percent of aircraft accidents are reported to involve impact angles less than 60°; 76% to involve impact angles less than 15°.

TABLE 2

Approximate Speed Data For Typical Cargo Aircraft (References 27 and 37)

Aircraft Designation	Take-Off (1) (ft/sec)	Aircraft Stall in Take-Off Configuration (2) (ft/sec)	Landing (3) (ft/sec)	Aircraft Stall in Landing Configuration (ft/sec)	Cruise (ft/sec)	Maximum (ft/sec)
Turbo-Jet Aircraft						
B-707-320C	290	250	230	175	800	920
B-727-100QC	255	225	205	160	800	910
B-737-200QC	245	215	195	150	845	860
B-747F	320	280	255	195	850	940
DC-8F	300	265	240	185	800	880
DC-9-30F	275	240	220	170	815	880
DC-10-10CF	285	245	235	180	820	895
Turbo-Prop Engine Aircraft						
FH-227D	-	-	175	135	425	440
L-100-20	-	-	215	165	515	565
Reciprocating Engine Aircraft						
DC-7F	-	-	200	155	365	525
1049H	-	-	-	-	415	-
1649A	-	-	195	150	345	440

(1) Assumed relationship: Take-off velocity ÷ landing velocity = 1.25

(2) Estimated using relationship, take-off speed = 1.15 times stall speed (14 CFR 25.107)

(3) Estimated using relationship, landing speed = 1.3 times stall speed (14 CFR 25.75 and 25.125)

In August of 1975, Sandia Laboratories published a report concerning the accident environments expected for C-5, C-141, and C-130 aircraft accidents (Ref. 16). This report was, in part, derived from information collected for an earlier study of the severities of transportation accident environments (TAC Study) performed for ERDA and DOT (Ref. 17). The aircraft portion of the TAC study is based upon analysis of 305 accident records documented at Norton Air Force Base. These accidents represent all Air Force aircraft flight accidents resulting in aircraft damage for a selected group of cargo aircraft within the period from 1962 through 1972. As defined by the Air Force, aircraft flight accidents resulting in aircraft damage require more than 150 man-hours for repair and occur within the period from which the engines are started for the purpose of authorized flight until the engines are stopped and the brakes are set. Of the 305 accidents, 149 were classified in the report as impact accidents. In cases where a necessary flight parameter was not included in the accident record, the missing data was either assigned a value appropriate to the accident category or estimated through a statistical distribution treatment. The results are in the form of a probabilistic relationship for the normal velocity component at impact. Through use of U. S. Air Carrier accident rates, the study also includes a probabilistic estimate relating the normal component of velocity in accidents to miles of travel for expected occurrence in commercial aviation.

The data sample (Ref. 16) used in the TAC study indicates that only a small number of military cargo aircraft crashes have occurred at speeds greater than 250 knots. Of the 149 military cargo aircraft accidents that involved impact, only eight were estimated to have occurred at a speed in excess of 422 ft/sec (Table 3). Of these eight, only one is known to have had a normal velocity component greater than 422 ft/sec. However, normal velocity estimates are not available for four of the eight cases.

The National Transportation Safety Board (NTSB) maintains accident data records for U. S. air carriers. In the 14-year period from 1962 to 1975, there were 243 U.S. air carrier accidents involving collision of aircraft over 12,500 pounds with ground, water, or other objects (does not include collision between aircraft in flight). Estimates of speed at impact are available for 12 of these 243 collision impacts (Ref. 18). For these 12 accidents (Table 4), the highest estimated speed is 235 knots (397 ft/sec).

TABLE 3

Military Cargo Aircraft Accidents* 1962 through 1972
Estimated to Involve Impact Speeds of 400 FPS or More (Ref. 16)

Aircraft Type	Impact Speed (fps)	Impact Angle With Surface
KC-135	High	35°
KC-135	High	-
-	507	-
KC-135	500	-
-	500	55°
-	490	70°
C-135	461	18°
KC-135	440	3°
-	422	3°
-	422	75°
-	410	40°
-	405	70°
KC-135	401	50°

* Total accident cases 305. Of these, 149 are categorized as impact accidents.

TABLE 4

U.S. Air Carrier Accidents 1962 Through 1974 for Which NTSB Has Numerical Estimates of Speed (Ref. 18)

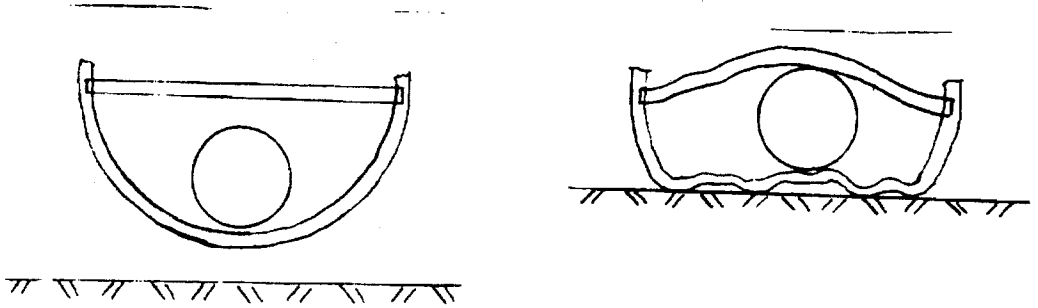
Aircraft Type	Impact Speed (Knots)	Impact Angle with Surface	Flight Phase
727	235	-	Approach
707	187	-	Take-off
580	170	-	Approach
DC-6	155	60°	Climb to Cruise
707	150	-	Approach
DC-9	145	4°	Approach
440	134	-	Approach
707	130	45°	Approach
FH 227	120	8°	Descent from Cruise
580	106	90°	Approach
DC-3	95	-	Approach
DC-9	80	-	Take-off Abort

* Accidents/Incidents involving collision with ground/water or other objects (not including collisions with other aircraft in flight). Aircraft over 12,500 pounds. Total cases in this category 243.

B. Crush - As used in this working paper, crush refers to static or dynamic compression of a shipping container by the weight or inertia force of an impinging object. Essentially no data could be located concerning either the mechanisms that have produced crush in aircraft crashes or its severity. Therefore, the qualification criteria proposed to protect against that environment is necessarily based upon judgemental estimates.

The two most probable causes of crush in an aircraft crash are cargo to cargo interaction and cargo interaction with the aircraft. In the longitudinal direction, deceleration forces may exceed the capabilities of the cargo restraint system, allowing cargo to move forward relative to the aircraft. Under these circumstances, an intermeddled container could be compressed between bulkheads or cargo located forward and other cargo located aft. An assessment of this environment (Ref. 21) made by a consultant to the NRC staff shows that the resulting crush load on the container could be considerable, depending upon the weight and relative velocity of the impinging objects and the deceleration rate of the aircraft. Because of the variety of circumstances affecting the potential severity of this load, no satisfactory means was found to simulate or bound this environment by a specific test. Instead, the qualification criteria in this paper are predicated upon an operational control requiring that plutonium packages be located in the aftmost portion of the aircraft that is practicable for cargo of its size and dimensions. This assures that there will be no large mass of cargo located aft of the container to produce a high crushing force. In addition to providing protection against longitudinal crush, this location affords maximum advantage of the airframe to mitigate impact severity. The FAA requires that flight recorders be located as far aft as practicable for this specific purpose (Ref. 20).

In the vertical direction, the primary potential for producing a crush environment is through collapse of the lower fuselage. A container located in a cargo compartment below the main deck could be compressed between the hull and the floor structure (see sketch).



To protect against this environment, the qualification criteria specifies the following physical test:

> A static crush load of 70,000 pounds applied in succession along the longitudinal and one orthogonal lateral axis of the container. The force on the container to be developed between a flat steel surface and a two-inch wide, straight, solid, mild steel bar with the longitudinal axis of the bar parallel to the plane of the flat surface. The length of the bar to be at least as long as the diameter of the package and the depth of the bar to be sufficient so that the package is not contacted by any members or devices supporting the bar. The two-inch width of the bar to contact the center of the top end of the container for the longitudinal loading; and for the lateral loading, to contact the container at mid-length with the longitudinal axis of the bar perpendicular to the longitudinal axis of the container.

The 70,000 pound load corresponds to the force required to cause upward bending, buckling, or shear failure of the floor system above lower cargo compartments (Ref. 2;) and represents a limiting condition for this type of crush load. The two-inch dimension is a typical value for width of floor beams in cargo aircraft.

A third possible mechanism for producing a crush environment is container interaction with major pieces of the aircraft. For this type of crush, one or more breaks in the cargo compartment must have occurred during the accident. The probability that a portion of a disintegrated aircraft would overlap the area occupied by a container is estimated in the Sandia study of accident severities (Ref. 17). Based upon the extent to which major debris has been scattered in several crashes, the report estimates the probability of a crash producing this type of crush to be in the range of 0.01 to 0.06.

If such a crush environment is produced, there is no suitable method to estimate its severity. However, a container which can withstand the other physical tests included in the qualification criteria inherently has a high resistance to damage from this cause. In addition, the 70,000 pound crush requirement is based upon the deformation capability of the load bearing floor

structure of the aircraft. If a large piece of the aircraft fuselage should land upon a container, it is possible that the fuselage would deform around the container or that part of the container would be pressed below a soil surface without damage. Based upon these considerations, the qualification criteria in this paper do not propose any additional tests to protect against this type of crush environment.

C. Puncture - As used in this paper, puncture refers to a container striking or being struck by an object which by virtue of its small size or pointed nature could cause a localized penetration. In an aircraft accident, a container could be struck by small pieces of free flying debris, such as bolts, cable clamps, bits of splintered wreckage, etc., which may have some potential to penetrate. A puncture environment could also be produced by the container striking a pointed object such as a protruding airframe member, tree limb, or jutting rock. As in the case of the crush environment, essentially data concerning puncture is available and qualification criteria must necessarily be based upon judgemental estimates.

The puncture test proposed in this paper envelopes both the puncture test prescribed for radioactive material containers (10 CFR § 71.36) and the test prescribed for flight recorders (14 CFR § 37.150). These two tests are conducted in a similar manner with the exception of the method used to apply the force. In the case of radioactive material packages, the container is dropped 40 inches onto a probe. In the case of flight recorders, a 500 pound weight is dropped 10 feet onto the device. One factor affecting the relative severity of these two tests is whether the weight of the object being tested exceeds 500 pounds. This is also relevant to an accident since either a heavy container could strike a stationery pointed object or a light container at rest could be struck by a heavier pointed object

To assure that plutonium containers have a high resistance to penetration from contact with pointed objects, the qualification criteria specify the following test:

> Packages weighing less than 500 pounds to be placed upon a flat, essentially unyielding, horizontal face and subjected to a weight of 500 pounds falling from a height of 10 feet in succession onto the top, bottom, and side of the container. The end of the weight contacting the package to be a solid probe made of mild steel 12 inches long, 8 inches in

diameter at the base, transitioning to 1-inch in diameter at the end. The axis of the probe shall be perpendicular to the horizontal surface. For packages weighing 500 pounds or more, the probe to be placed on a flat, essentially unyielding surface and the container dropped from a height of 10 feet onto the probe, the container striking in succession on its top, bottom and side.

The proposed test assures that a plutonium shipping container will have a high degree of resistance to penetration or puncture. The test is substantially more severe than that prescribed for flight recorders where the device rests on a sand surface which is relatively easy to deform and where the probe attached to the falling weight is a length of 1/4 inch diameter bolt which is free to buckle, bend, or shear when in contact with a hard surface. Although weights and velocities (25 ft/sec) greater than those in the proposed test may be envisioned in an aircraft crash, several requirements are necessary for container penetration.

1. The probe must be of sufficient length to extend through the energy absorbing and thermal insulating materials surrounding the inner containment vessel.

2. The probe must be of sufficient rigidity to provide a penetrating force without itself being crushed or collapsed.

3. The probe must be sufficiently aligned with the center of gravity of the container in the direction of travel to preclude non-penetrating deflection.

4. Sufficient kinetic energy must be present in the system to produce containment vessel penetration.

Post Crash Conditions

Following an aircraft crash, cargo could be subjected to various potentially damaging environments, including thermal explosion, immersion, and burial. A potentially damaging thermal environment may also occur during the course of ground operations and not be preceded by aircraft crash conditions. The Sandia study of transportation accidents (Ref. 17) indicates that only 34% of the aircraft incidents which meet the civilian definition of an accident (Ref. 22) could be expected to

produce fire, and only 22% of those incidents could be expected to produce both impact and fire. Post crash burial of a package may occur if the container is thrown free of an aircraft in flight (or during a crash) onto a soft surface. Heat transfer characteristics could be different for this situation, possibly resulting in higher internal temperatures and pressures. Package immersion is associated with accidents that occur over, or into, a body of water. Under these conditions, a package could be subjected to increased external pressure. The specific qualification tests that are proposed to protect against these environments are outlined below.

A. Thermal Explosion - A thermal explosion could occur following an aircraft crash or during the course of various aircraft operations on the ground. The severity of this environment depends upon the nature of the explosion, its intensity, and its duration. A physical test is prescribed in the qualification criteria to assure that plutonium shipping containers can withstand the thermal environment of an aircraft accident.

In considering an aircraft thermal explosion environment, a distinction is made between an explosion characterized by a combustion wave and the explosion characterized by detonation wave. A combustion wave propagates by the processes of heat transfer and diffusion, whereas a detonation wave is a shock wave which is sustained by the energy of the chemical reaction initiated by the temperature and pressure of the wave. Combustion waves are subsonic while detonation waves travel above the sonic velocity of the medium. An explosive medium may support either type of wave, depending on the various conditions of the explosive mixture, such as confinement and mixture composition (Ref. 23).

A thermal explosion, whether it exhibits a combustion wave or detonation wave, will impose a thermal energy load which the package must be capable of withstanding. In addition to the thermal energy of the explosion, there may also be a significant pressure load in the case of the detonation wave, while the combustion wave travels at subsonic speeds with constant pressure equal to the ambient on either side of the wave.

The general discussion above is valid for either gases or liquids in air in that liquid fuels vaporize and behave similar to gases prior to the combustion reaction. This imposes an additional dependency of the combustion rate on the fuel vaporization rate, and increasing the liquid vaporization will increase the rate of fuel consumption and heat production. One method to achieve this,

when increasing the rate of combustion is desired, is to disperse droplets of fuel. This increases the fuel surface area and consequently, the vaporization rate. Once started, the heat or other energy from the reaction accelerates the wave to a stable sustained reaction which proceeds as a combustion or detonation wave. Of interest to this discussion are the liquid fuels used in jet aircraft. From the standpoint of jet engine design, these fuels are ideally developed to burn very rapidly or deflagrate, with a subsonic combustion type wave. A very fast combustion wave is desirable, to ensure complete combustion of the fuel. The detonation wave, however, is not desirable since it would tend to damage the engine. Typical jet fuels, therefore, have very high burn rates, but do not tend to detonate under the conditions found in the jet engine combustion chamber. To extend this to the case of fire accidents, J. H. Meidl (Ref. 24) in discussing fire-fighting techniques for gasoline and jet fuel fires, considers these fuels to present a deflagration rather than a detonation hazard to firemen and others in close proximity to such an accident.

Two possibilities are considered for the post crash thermal explosion. First is the case in which the fuel tanks are ruptured, spilling fuel, followed by ignition. Since ignition occurs without confinement of the explosive mixture, a deflagration is assumed to occur. Second is the case in which ignition somehow occurs in the partially empty intact fuel tank after the crash. The vapor/air mixture over the liquid fuel in the tank will burn rapidly but without detonation. This could result in a rapid increase in temperature and internal pressure in the tank, causing it to rupture and disperse the fuel in fine atomized droplets, leading to a very rapid combustion rate. Rupture of the tank, and sudden release of hot gases, possibly as a pressure wave, represents the greatest hazard for detonation of the dispersed fuel in air. However, once the tank rupture occurs, there is no longer confinement of the explosive mixture, and the weak pressure wave rapidly decreases in strength as the flow diverges. Based on these considerations, protection against thermal explosion in an aircraft accident can be limited to the deflagration process which is characterized by a very rapid subsonic combustion wave.

Factors affecting the intensity or average temperature of aircraft fires include: the type of fuel, the ventilation or air available to the fire, the location of the fire, and the contribution of cargo and aircraft structural materials. The

Sandia study of aircraft accident severities (Ref. 17) concludes that the fuel flame temperature is the most significant parameter affecting the fire intensity. The results of tests performed by B. E. Bader (Ref. 25) and L. H. Russel and J. A. Confield (Ref. 26) for JP-4 and JP-5 aviation fuel indicate temperature variations from 1400° F to 2400° F for JP-4 fuel and from 1400° F to 1975° F for JP-5 fuel. The height over the fuel pool was found to have a strong influence on fire intensity in both investigations. The peak temperatures (Ref. 26) for the JP-5 fuel tests occurred at the central location in the pool several feet above the liquid surface. The variations due to position in the fire can be expected since height and location differences affect the ventilation of the fire. A single temperature to represent intensity is justified when the effect of the fire on the package is considered. The heat transfer to the package is by radiation and convection, and the predominant mode of heat transfer for high flame temperatures is radiation. For a relatively massive structure, such as a plutonium shipping container, the thermal response in such an environment will be affected primarily by the incident heat flux. The effects of the gas temperatures contacting the package will have less significance. Due to the predominant contributions from radiant heating, an average fire ambient flame temperature may be used. B. E. Bader (Ref. 25) states that a black body radiation source of 1850° F is appropriate to simulate an aircraft fuel fire. This conclusion is based on comparison of the thermal performance of test items exposed to actual JP-4 aviation fuel fire tests and computer simulation using a uniform radiant heat source.

In addition to intensity, a duration is needed to specify the total energy incident to a package from a fire environment. The primary factors which affect fire duration are the extent of fuel dispersion, the quantity of fuel on board the aircraft, and the thermochemical properties of the fuel. The extent of dispersion and the quantity of fuel are factors which may vary considerably depending upon the nature of the accident, the phase of flight at which the accident occurs (e.g. landing or take-off) and the characteristics of the aircraft. The thermochemical properties of various aviation fuels are, however, fairly uniform.

The fuel dispersion problem was considered in some detail in the Sandia study of cargo aircraft accident severities (Ref. 17).

In that report, a correlation could not be found between fuel dispersion and impact accident parameters. To explain this unexpected result, the investigators concluded that for low impact angle crashes, the fuel tanks remain nearly intact and are carried along with the aircraft. For high velocity, high impact angle, the fuel tanks are destroyed but the resulting spill remains close to the aircraft. The assumption that the fuel remains in the proximity of the aircraft is conservative for both crash and non-crash induced fire accidents.

The model used in the Sandia study to estimate fire duration assumes duration is proportional to fuel quantity and inversely proportional to dispersion area and burn rate. The relationship is given by the equation

$$t = \frac{W}{\rho A R} \qquad (1)$$

where:

t = fire duration (minutes)
W = weight of fuel (lb)
ρ = fuel density (48.7 lb/ft^3, for JP-4 fuel)
A = dispersion area (ft^2)
R = surface recession rate (1.33×10^{-2} ft/min, for JP-4 fuel)

This equation was used to estimate the maximum fire duration for several typical jet cargo aircraft. A full fuel tank at the time of the accident was conservatively assumed. The dispersion area was estimated to be the projected area of the wings and fuselage, which will be defined as the crash imprint area. In a crash, the aircraft was assumed to form a shallow crater (crash imprint area) which could confine the fuel into a pool. If such an imprint is not formed, say in a non-crash induced fire with ruptured fuel tanks, the fuel would not pool but disperse by flowing over a much larger area, resulting in a large fire with a shorter burn time. The fire duration expression given in equation (1) is shown in Figure 3 as a function of the ratio of fuel weight to crash imprint area. The fuel capacities (Table 5) and estimated crash imprint areas have been calculated for various commercial cargo aircraft presently in service (Ref. 27) These values are presented on Figure 3, which shows a maximum expected fire duration of 54 minutes for the DC-8.

Based on this analysis, it is concluded that exposure to a jet fuel fire of average representative flame temperature for

55 minutes exceeds the most severe fire environment that a package would encounter in an aircraft accident environment. The average flame temperature is represented as an 1850° F black body radiation source.

In considering observations of actual aircraft fire accidents, apparent exceptions to the proposed thermal test environment are immediately evident. The exceptions include fires of higher intensity and fires of longer duration. Higher intensity observations are most likely due to the burning of other cargo or of the aircraft structure itself. Fire from either of these possible sources would be of short duration and also very localized. For the fire environment in which thermal radiation is the dominant mode of heat transfer, the energy contribution from these short duration localized sources is insignificant when compared to the energy from combustion of the fuel. The long duration exceptions are considered to have two possible causes. The first is smoldering of materials present in the accident. Smoldering would not contribute significantly to the accident thermal environment since its characteristically very low intensity results in an insignificant total energy. A final consideration is the possibility of a high intensity long duration fuel fire. This could result from a small breach in a fuel tank which would limit the fuel consumption rate to the fuel release rate. The result is a longer duration fire at the average fuel flame temperature. For such an occurrence, the dispersion area would have to be small since fire duration is inversely proportional to dispersion area; the thermal source area and the extent of fire is therefore small. The average flame intensity will be the maximum estimate (1850°), but its effectiveness on the package will be reduced due to the reduced visibility of the package to the fire, and the increased visibility of the package to the colder ambient environment.

The qualification criteria prescribes the following physical test to assure that plutonium containers can withstand an aircraft accident thermal environment:

> Exposure to a thermal test in which the heat input to the package is not less than that which would result from exposure of the whole package to a radiation environment of 1850° F for 55 minutes with an emissivity coefficient of 1.0, assuming the surfaces of the package have an absorption coefficient of 1.0.

A physical test is to be performed on an actual package; computer simulation or engineering analysis is not acceptable as a means to assess the effects of the specified thermal environment. If the physical test is conducted in an actual hydrocarbon fuel fire, no correction to the test conditions is required to account for the actual package absorption coefficient or the extent to which it may differ from a value of 1.0. However, a correction must be made if the physical test is conducted in a furnace or with some other clean heat source. This is to account for the actual absorption coefficient of a package in a hydrocarbon fire where soot may be deposited on the surfaces. The specified value of 1.0 is a limiting value that is slightly conservative; the corresponding value for lampblack (soot) is approximately 0.97.

B. Immersion - An immersion environment is produced by submerging a package in a liquid medium. Of primary concern is possible hydrostatic crush of the package in inland waters or near the coastline. The Sandia study (Ref. 17) considers the probable depth of immersion following an aircraft crash into these waters. The report estimates that 98% of all immersion accidents will not result in submersion to a depth greater than 400 feet. Few inland waters exceed 1000 feet in depth; Lake Superior is the only large body of water with a depth greater than 1000 feet although some small inland lakes are of exceptional depths (e.g. Crater and Chelan Lakes). The depth of Lake Superior is 1333 feet at its deepest point (Ref. 28).

To protect against the external pressure of an immersion environment, the qualification criteria requires an assessment to be made for an external pressure loading of 600 psi. This pressure corresponds to a depth of water in excess of 1,350 feet.

C. Burial - A third post crash environment is burial of the package. Packages impacted at high velocity onto soil surfaces may be buried under the soil or covered by debris in a crash. Heat dissipation under these circumstances could be impeded, resulting in increased package temperatures. The thermal effects of this environment on package containment have been considered by means of a model which conservatively estimates the effects of the limiting case of infinite burial. The significant parameters were varied to include those characteristics to both present and future packaging designs and

practices. The results of this assessment lead to the general conclusion that deep burial does not pose a safety problem.

Steady state heat conduction through a spherical shell with a constant heat flux at the inner sphere surface was chosen to model the burial problem. The solution is given by

$$\Delta T = \frac{\dot{Q}}{4\pi k r_p} (1 - r_p/r_o) \qquad (1)$$

and

$$\Delta T = T_s - T_\infty \qquad (2)$$

where:

ΔT = temperature differential across the shell, ^oF.
T_s = inner shell, or package surface temperature, ^oF.
T_∞ = outer shell, or earth's surface temperature, ^oF.
$\dot{Q}$ = package internal heat generation, Btu/hr
k = shell, or soil thermal conductivity, Btu/ft-hr ^oF.
r_p = inner shell, or package effective sphere radius, ft.
r_o = outer shell, or effective earth cover radius, ft.

Since the buried package is expected to reach its maximum temperature very quickly, a steady state model was chosen The choice of a spherical shell to represent the soil surrounding a buried package is justified for deep burial. As the outer radius increases the effect of the thermal disturbance at the center of the sphere on the radius (r_o) is diminished. It will be shown that for large (r_o), corresponding to deep burial, the solution converges to a finite value that is independent of (r_o) and depth (H).

The upper bound for such a model is to assume an infinite burial depth (H) and find the limiting value of Equation (1). The burial depth (H) is measured from the package center to the earth's surface. Since the outer sphere radius (r_o) is proportional the the depth (H), the corresponding limiting relationship of (H and r_o) is:

$$\text{as } H \to \infty,\ r_o \to \infty \qquad (3)$$

The above is used to obtain the limiting value of Equation (1).

$$\lim_{H\to\infty} \Delta T = \lim_{r_o\to\infty} \frac{\dot{Q}}{4\pi k r_p} (1 - r_p/r_o) = \frac{\dot{Q}}{4\pi k r_p} \qquad (4)$$

The conservatism resulting from the suggested model is evaluated by examining the bounds of the solution for the surface temperature of a buried package. The upper bound is already identified by Equation (4). The lower bound is estimated by letting (r_o) in equation (1) equal the burial depth (H). This assumption results in underestimating the thermal resistance offered by the soil which surrounds the package. The range of (ΔT), in which the actual solution exists, is expressed by the inequality:

$$\frac{\dot{Q}}{4\pi k r_p}(1 - r_p/H) < \Delta T < \frac{\dot{Q}}{4\pi k r_p} \qquad (5)$$

The above is rearranged to explicitly show the effect of the ratio of (r_p/H) on the accuracy of the solution.

$$(1 - r_p/H) < \frac{\Delta T}{\dot{Q}/(4\pi k r_p)} < 1 \qquad (6)$$

Figure 4 shows how the range which bounds the actual solution of ΔT rapidly diminishes as the depth of burial to package radius (H/r_p) increases. Specifically, at $H/r_p = 10$ the range is about 10% of the limiting prediction; at $H/r_p = 25$ the range is reduced to about 4%. The limiting, infinite burial assumption is a good approximation for deep burial, and it is conservative for shallow burial.

The model assumes the package to be spherical with radius (r_p). The typical package will be cylindrical in shape with characteristic dimensions of length (l) and diameter (d). A reasonable choice for an effective package spherical radius is found by equating the surface areas of the sphere and actual cylindrical package (A_s,A_c), which is satisfied by:

$$r_p = \frac{d}{2}\sqrt{1/2(1 + 2xl/d)} \qquad (7)$$

or alternately, the conservative approach using the inequality

$$A_s \leq A_c \qquad (8)$$

is satisfied by

$$r_p = \begin{cases} d/2, & l/d \geq 1/2 \\ l/2, & l/d < 1/2 \end{cases} \qquad (9)$$

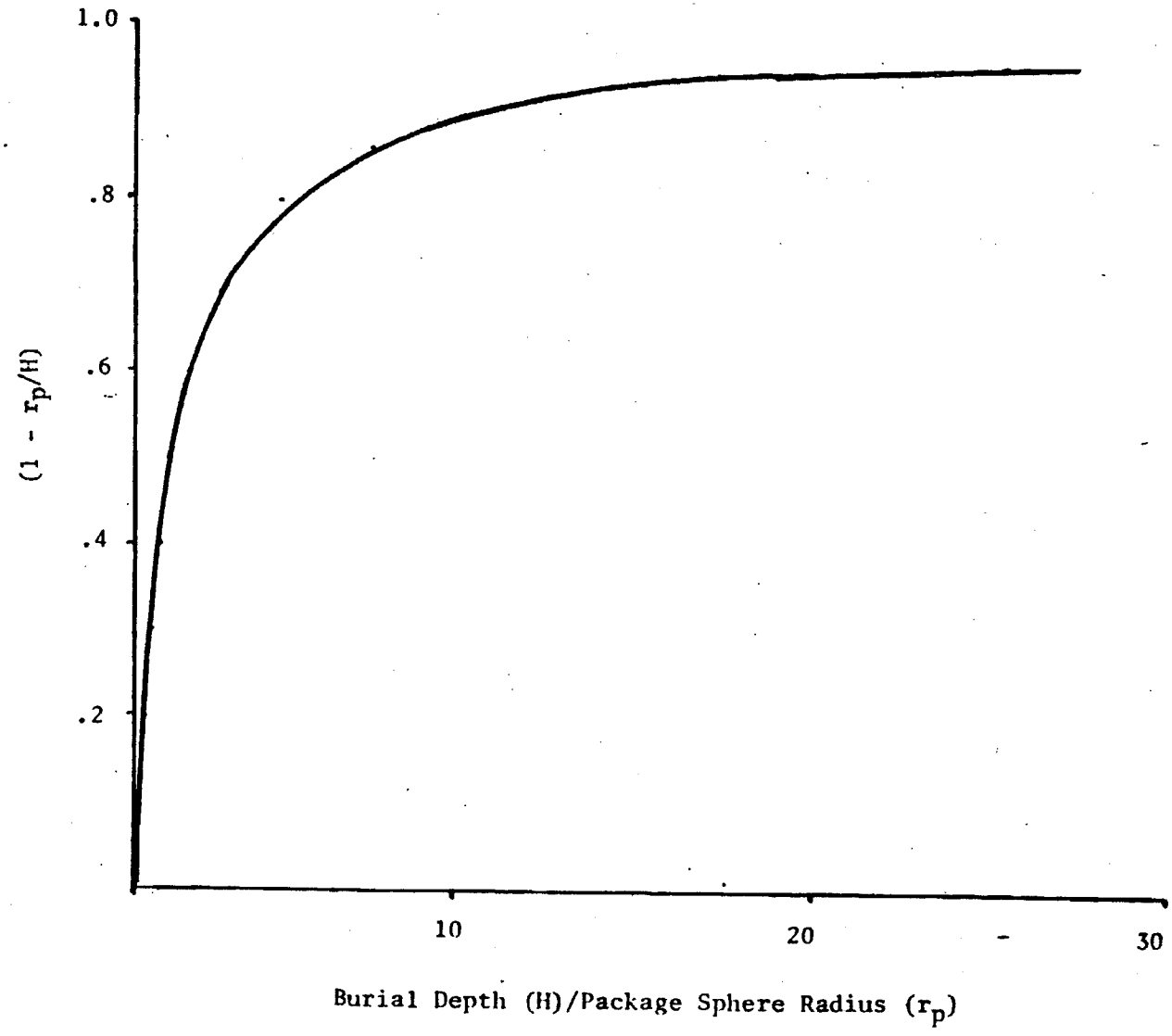


FIGURE 4. EFFECT OF BURIAL DEPTH ON SOLUTION RANGE FOR SPHERICAL SHELL MODEL

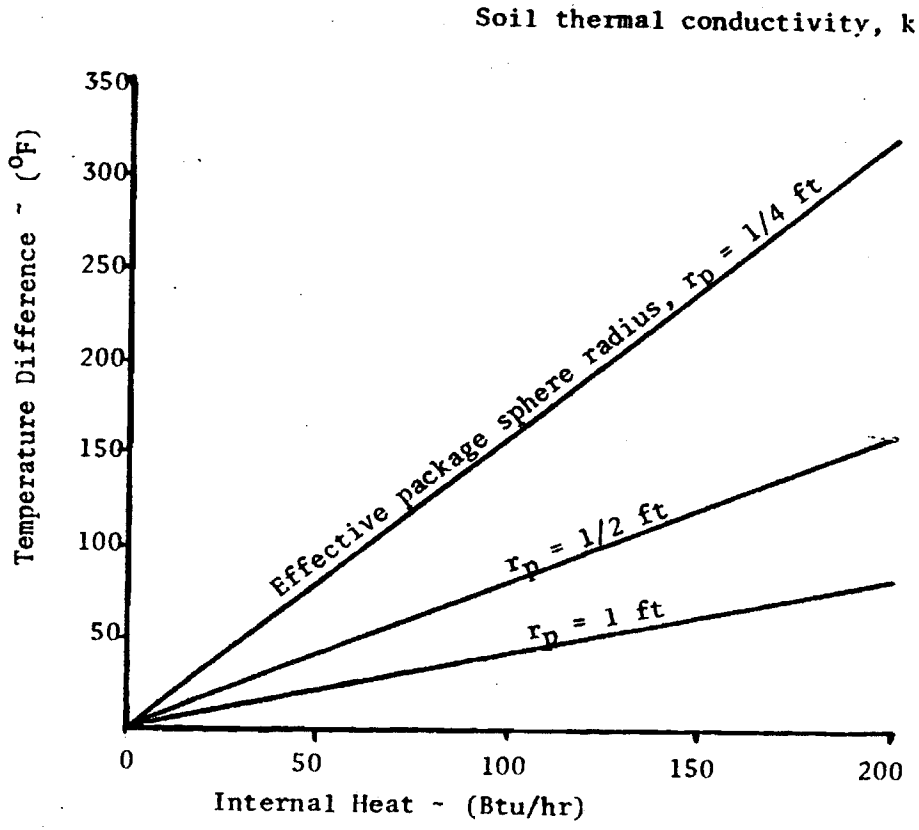


FIGURE 5. MAXIMUM TEMPERATURE DIFFERENCE (PACKAGE SURFACE TO AMBIENT) FOR INFINITE BURIAL DEPTH IN SOIL

A parametric solution is obtained for the limiting infinite burial depth model, given by equation (4), in terms of ($\dot{Q}$) and (r_p). A constant value of 0.2 Btu/ft-hr-^{o}F is assured for the thermal conductivity (k) of soil. This value corresponds to dry soil or sand which could be expected to result in the highest thermal resistance. Consideration has been given to present package designs, and designs which are anticipated in the future. The maximum internal heat generation and minimum effective sphere radius that could be expected to satisfy the normal conditions of transport of 10 CFR Part 71 are: 200 Btu/hr and 3 inches, respectively. Lower internal heat generation and larger radii results in lower package surface temperatures.

Figure 5 shows the temperature difference for infinite burial depth limit for a package in dry soil or sand over the range of internal heat generation of 0 to 200 Btu/hr, and for radii of 3-inches, 6-inches and 12-inches. The maximum temperature difference over this range is estimated at 320° F which, for a 70° F ambient, results in a maximum package surface temperature of 390°F. This limiting result is not considered to be of sufficient severity to cause any real concern. Many of the elastomer seals will function for extended service under this maximum thermal environment, and no significant structural damage to a package can be foreseen.

Based on consideration of the results of this study, it is concluded that the thermal effects of package burial do not produce a significant threat to the safe containment of radioactive material. Since the study considers the range of parameters which include present as well as estimated future plutonium package limitations, a general conclusion is reached to omit further consideration of burial as being a potential problem.

Mid-Air Collision/Overboard Cargo

Failure of the aircraft frame or hull can lead to cargo being ejected overboard while in flight. Objects as large as a casket have been lost overboard as a result of rapid depressurization of cargo compartments. Another mechanism for cargo ejection is through in-flight disintegration of the aircraft. This could be produced by mid-air collision or by major in-flight structural failure of the aircraft.

If a package is ejected overboard because of cargo compartment depressurization, the only environment of concern is clearly free-fall

impact onto the surface of the earth. In a situation involving free-fall from a high altitude, it is not reasonable to expect that the container would be subsequently exposed to a crush, puncture, or fire environment. If either burial or water immersion to a significant depth should occur, the effects of impact would be substantially mitigated because of the nature of the impact surface. The possibility of burial or water immersion has been addressed previously in this paper. To protect against a free-fall environment, the proposed qualification criteria specifies the following physical test:

> Impact at the calculated terminal free-fall velocity at mean sea level at a right angle onto a flat essentially unyielding surface. The container to be tested in the orientation (side, end, corner) which produces the most damage.

Impact at the calculated terminal velocity is proposed because actual free-fall testing of a container may not be practicable, considering required alignment precision for release, wind effects, drop height required to reach terminal velocity, and area of available targets. A more practical test method is to propel (e.g. rocket sled) the container into the prescribed surface. Impact in the most damaging orientation is proposed because shipping containers are not specifically designed to be aerodynamically stable in free-fall. Since the terminal velocity of many containers is less than 422 ft/sec, the test is not required if the calculated terminal velocity of the container is less than the 422 ft/sec velocity proposed for the ground crash test sequence or if its terminal velocity exceeding 422 ft/sec is used in the ground crash test sequence.

If a mid-air collision or in-flight structural failure does not result in aircraft disintegration, the aircraft may subsequently land safely or experience a ground crash accident as previously discussed. In the event of in-flight disintegration, it appears reasonable to expect that the cargo restraint systems would not be adequate to prevent separation of the container from the aircraft wreckage. If the container should not be separated from a major section of the disintegrated aircraft, the terminal free-fall velocity of the combination is impossible to predict. However, the fuselage of aircraft are of relatively lightweight construction and have a large surface area. It is reasonable to expect the density of a major aircraft fuselage section to be relatively low, especially in comparison to a relatively massive and compact shipping container. Because of the larger surface area and the lower overall density expected for the aircraft fuselage and container combination than for the container alone, the effects of drag can be anticipated to be much more pronounced, resulting in a smaller

terminal velocity for the combination than for the container alone.

For mid-air collision, it is possible for the relative closing velocity between aircraft to be greater than the velocity of either aircraft alone. However, mid-air collision does not necessarily involve fuselage-to-fuselage contact between aircraft. Collision which damages a wing or control surface could cause the aircraft to become unstable in flight, increasing drag and producing aerodynamic forces which result in aircraft tumbling and disintegration (a situation discussed above). In the event of fuselage-to-fuselage collision, the effects upon the container are expected to be similar to those of aircraft disintegration, assuming that the container is not located in a vicinity to be struck directly by the other aircraft. If the container is in a position to be struck directly, the severity of the resulting impact environment is difficult to predict. Although the impact speed could exceed 422 ft/sec or the terminal velocity of the container, the impact surface would not be essentially unyielding as prescribed in the qualification criteria. As noted in the previous discussion, aircraft fuselages are readily susceptible to deformation. This could mitigate the severity of impact considerably. Deformation of cargo located between the container and the other aircraft could provide additional mitigation of impact. Also, the container will be capable of resisting a crush load sufficient to deform the load bearing cargo deck structure of an aircraft. Considering this capability, together with the general structural weakening and failure that would be expected in the localized vicinity of contact, it is possible that the container could penetrate the aircraft shell and be expelled overboard.

Another consideration is the relative size of the aircraft involved. While a mid-air collision between a large aircraft and a small aircraft may result in the disintegration of both, the impact severity for cargo aboard the larger airplane may be relatively moderate at the time of contact. Because of the relative mass of the two aircraft, collision with a small light plane may not produce a large or sudden change in the momentum of a large airplane. Under these circumstances, it is also reasonable to expect that the small plane would be more frangible and would disintegrate more readily than the larger plane; enabling cargo aboard the larger airplane to benefit from its structure and larger size. Although mid-air collision between two large aircraft can occur, a more typical incident involves collision between a large commercial airplane and a small plane of the type used in general aviation. The NTSB data for U. S. air carrier accidents in the years 1962 through 1974 (Ref. 18) indicates 14 mid-air collision events. Of these 14 events, 12 involved collision of the commercial airplane with a general aviation type aircraft and 1 with a military aircraft.

Based upon these considerations, the qualification criteria do not propose any additional tests to simulate the environments experienced by a container in a mid-air collision other than the sequential tests and the terminal velocity free-fall test previously discussed.

Standards for Acceptance

To assure that a package will adequately perform its intended safety function, the qualification criteria prescribe specfic standards for acceptance relative to containment, radiation shielding effectiveness, and assurance of nuclear sub-criticality. The standards for acceptance specified by the qualification criteria are consistent with those prescribed by 10 CFR Part 71 and the IAEA Transport Regulations.

For Normal Conditions of Transport, the requirements of 10 CFR Part 71 may be summarized as follows:

a. No release of contents.

b. No reduction in the effectiveness of the packaging.

c. The package will be sub-critical.

d. An array of packages will be sub-critical.

The qualification criteria specifies that these standards of acceptance be used for the tests and assessments which assure protection for normal conditions of transport.

For the individual and sequential physical tests which assure protection against aircraft accident conditions, the qualification criteria specify the following standards for acceptance.

1. Containment - The containment vessel must not be ruptured in its post-tested condition and the package must provide a degree of leaktightness adequate to assure that no more than one millicurie of radioactivity would be released within a period of one week.

2. Shielding - Demonstration that the external radiation level would not exceed one Rem per hour at a distance of 3 feet from the surface of the package in its post-tested condition.

3. Sub-Criticality - Air transport of plutonium in quantities greater than 15 grams per package shall be classified as either Fissile Class I, II, or III in accordance with 10 CFR Part 71. The package and an array of packages must be demonstrated to be sub-critical if each package were damaged to the extent indicated by the qualification tests, with close reflection by water on all sides and with the packages in the most reactive arrangement and with the most active degree of interspersed hydrogeneous moderation which would be credible.

The above acceptance standards for shielding and sub-criticality are consistent with those specified in 10 CFR Part 71 for hypothetical accident conditions. The post-test containment requirement of 10 CFR Part 71 is that no radioactive material will be released from the package except for limited amounts of gases and contaminated coolant; the quantity depending upon the particular radionuclide being transported. For plutonium, this quantity is 10 millicuries or 0.1 percent of the total package contents, whichever is less. The acceptance standard for containment specified in the qualification criteria (no more than 1 millicurie within a period of one week) conforms to the IAEA requirements for multilateral approved plutonium packages (Refs. 29, 30).

Regulatory Guide 7.4, "Leakage Tests on Packages for Shipment of Radioactive Materials," dated June 1975 (Ref. 35), describes a method acceptable to the NRC staff for determining the degree of leaktightness required for a package to meet the acceptance standards for containment and also an acceptable method for measuring leaktightness. Regulatory Guide 7.4 is based upon ANSI Standard N14.5, dated November 1974, of the same title (Ref. 36). With regard to the leakage of material, the ANSI Standard recognizes that the methods prescribed for determining leakage rates of gases and liquids may be overly conservative for materials in the form of a slurry or powder and permits the actual leakage rate to be used when this can be substantiated. The actual leakage rate for plutonium oxide powder will be substantiated by the NRC staff and its consultants. Since the actual leakage rate is somewhat package dependent, this work will be included in subsequent reports or documents which address the adequacy of particular package designs.

It is generally understood that when physical tests are conducted to demonstrate accident survivability of a package, the package actually being tested will not contain the radioactive material (plutonium)

which it is intended to transport. Also, it is not practicable to conduct the prescribed tests at high or low ambient temperatures which may be envisioned at the time or site of an aircraft accident. The qualification criteria therefore requires an assessment to be made demonstrating that the results of the physical tests are not significantly affected by ambient temperatures ranging from -40° F to +130° F or by properties of the material used to simulate the contents (e.g. weight, decay heat, physical or chemical characteristics, moisture content, etc.).

The qualification criteria also specify a test or assessment to protect against immersion. Demonstration of adequacy through either analysis or test for this condition is specified because of the practical difficulty of subjecting a package of reasonably large physical size to an external pressure of 600 psi. The standards for acceptance proposed for this test are the same as outlined above for the other accident condition environments, except that demonstration of compliance may be in the form of an engineering assessment rather than measured observation.

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Assessment of Present Package Designs for Certification

Packages Selected for Testing

Initially, the staff reviewed the various package designs that were approved for transporting plutonium in oxide or nitrate form. Two packages used for transporting plutonium oxide, the Models 6M and LLD-1, were judged to have the greatest integrity and were selected for testing to establish their capabilities under severe accident environments.

Post-Test Acceptance Standards

P.L. 94-79 specifies that a container "will not rupture under crash and blast testing equivalent to the crash and explosion of a high-flying aircraft." In judging the suitability of a package for certification, one consideration is what constitutes an acceptable condition of the container after being subjected to tests that are equivalent to an aircraft crash. The no-rupture requirement of the law could possibly be regarded to have a meaning that ranges from gross violation of integrity to perfect containment with zero release. The present IAEA acceptance standards are believed to be an appropriate translation of the no-rupture wording into engineering type specifications. Under post-accident conditions, the IAEA Rules permit the release of 2 to 100 millicuries of plutonium within a period of one week. The exact amount depends upon the isotopic mixture of plutonium being transported. For a typical plutonium oxide mixture, the quantity is approximately 40 millicuries. This assessment uses the IAEA Rules as the measure of post-test acceptability for certification.

Impact Test Results

Impact tests were conducted with 11 specimens of the Model 6M and 14 specimens of the Model LLD-1. Best results were observed with the Model 6M. Six specimens of the Model 6M were impacted onto a rigid test pad at velocities ranging from approximately 250 fps to 400 fps. Following the tests, none of the six containers met the IAEA Rules and five of the six had visual structural damage or gross failure. Two Model 6M packages were impacted onto a concrete slab at velocities of approximately 375 and 525 fps. Neither package met the IAEA post-test acceptance standards and one was observed to have a gross failure. Three other Model 6M packages were impact tested onto a soil surface. One of these tests (at 420 fps) was successful and another (at 760 fps) was marginal. However, it would be difficult to justify an earth target for certification since aircraft accidents can and have occurred onto more substantial surfaces, such as runways, highways, and rock. Also, in many accidents, the container would not be thrown free of the aircraft. In such cases, the impact surface is likely to be other

cargo or the crumbled wreckage of the metal airframe. While correlation of these possible surfaces with a soil surface is not possible, it is not difficult to visualize situations in which more damage could be produced by impact onto airframe wreckage or other cargo.

With regard to velocity, the lowest values used in the tests ranged from approximately 250 to 300 fps. Velocities this low would be difficult to justify for certification since:

1. NTSB has impact velocity data for only 13 accidents. Of these 13, five occurred at a speed higher than 250 fps.

2. Only about 65% of the accidents would be enveloped by a speed of 300 fps as indicated by a Lockheed study of cargo and bombardment aircraft crashes.

3. A Sandia study indicates that the component of velocity perpendicular to the impact surface would exceed 300 fps in approximately 15% of the cases.

4. The terminal free-fall velocity of present packages exceeds 300 fps.

Crush and Puncture Test Results

The Model 6M design was breeched individually by both the crush test and the puncture test that are included in the proposed qualification criteria. Although there is insufficient data to estimate the frequency and severity of these two environments in actual accidents, there is no doubt that they can occur.

In the absence of data, the severity of the proposed puncture test must necessarily be somewhat arbitrary. It may be possible to justify lowering the severity of the puncture test environment in the proposed criteria to be within the range of capabilities of the present Model 6M packages.

There is also an absence of data concerning crush. However, this environment is more amenable to estimation of severity. The proposed crush test of 70,000 pounds is a best estimate of the force required to deform the floor structure of cargo aircraft. Higher crush loadings than this could be envisioned but are essentially precluded by a proposed operational control. Under these circumstances, the proposed 70,000 pound crush loading is believed to be a reasonable and credible situation which could occur in an actual accident. Pertinent to this discussion is the fact that it is relatively easy to adequately design the thickness of the vessel walls to withstand both the proposed crush and puncture conditions. In tests of a modified design using thicker walls and a better grade steel, the inner container alone sustained both of these tests and exhibited only slight and superficial marks and imprints.

Fire Environment

No present Model 6M packages were subjected to the fire test. However, the effective seal in this design is by means of a plumbing type paste compound which can be decomposed by heat. It is judged that a 60-minute fire test of this package would be sufficient to destroy this effective seal, leaving only the engagement of the threads in the closure as a possible sealing mechanism. The likelihood of the paste being destroyed in a fire would be enhanced by any damage done to the outer drum and celotex insulation by a preceding impact, crush, or puncture environment. The threads alone are judged to be inadequate to provide a degree of leaktightness that would conform to the IAEA Rules.

Other Considerations

Presently, the specifications for the Model 6M package are prescribed in DOT regulations. These specifications are general in nature and permit a wide variety of materials and design features to be utilized. Also, the specification prescribes essentially no requirements for welding, fabrication, QA/QC, or operating procedures. Accordingly, the accident resistance of individual containers constructed to these specifications could vary considerably. For certification, it would be difficult to adequately identify or assure the minimum capability of present 6M packages.

UNITED STATES
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
WASHINGTON, D.C. 20545

MAY 12 1976

Kenneth R. Chapman, Director
Office of Nuclear Material
Supply and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Chapman:

We have reviewed the April 10, 1976, draft criteria for plutonium air shipments. Our comments are enclosed. These comments reflect input by both Sandia Laboratories and Battelle-Northwest.

We hope that we can resolve our differences within the next month so that we can still meet our scheduled June submittal of the criteria to the JCAE.

Sincerely,

Hal Hollister

Hal Hollister, Acting Director
Division of Environmental
Control Technology

Enclosure:
As stated

AMERICAN REVOLUTION BICENTENNIAL 1776-1976

ENCLOSURE E

ERDA COMMENTS ON NRS "WORKING PAPER - QUALIFICATION CRITERIA FOR PLUTONIUM PACKAGE CERTIFICATION"

A. GENERAL COMMENTS

1. Realism and Reasonableness

ERDA remains concerned that the test sequences and detail proposed by NRC are not realistic or reasonable, and are not supported by the accident data. NRC seems to be insistent on its "test on test" approach, cascading one maximum condition test on another, and another, and so on. We have discussed this problem with our Sandia Laboratories staff who did the accident data analysis and the testing, and they too feel that NRC staff has misinterpreted the data and have generated a test sequence which is invalid and probably impossibly conservative.

It may be the judgment of the NRC staff that a risk or probabilistic approach is precluded, but the Congressional Record does not support that judgment, nor does the nature of the various discussions with Congressional staff prior to the passage of the statute. The Atomic Energy Act of 1954 makes it very clear that Congress intended that we use a risk approach, and that risks are acceptable if they are reasonable. There was no indication in the passage of PL 94-79 that Congress had changed its mind. We believe strongly that risk, not merely package crash worthiness, should be the deciding criterion in determining whether a package is acceptable for air transport. The ACRS seems to agree with us. We must recognize that whatever standards we come up with for plutonium air shipments are likely to be eventually required for Type B quantities of other isotopes as well.

2. Rule-making

The imposition of the proposed testing requirements on licensees appears to be a rule-making action. However, we understand from NRC staff that NRC does not intend to publish these requirements as a rule-making action in 10 CFR Part 71. It appears to us that the Administrative Procedures Act requires public review.

3. International Implications

Because of the international implication of the proposed requirements, and the resultant significant departure from the IAEA regulations (which the U.S. has officially supported), we believe that it is necessary for the U.S. to propose the same change to the IAEA. This will require close coordination with and participation by the DOT.

4. Metrication

Because of the Government's policy on metrication, and because of the international aspects of this matter, all measurements should be specified in S.I. units. We suggest the following format: "1 meter (approx. 3 feet)" or "1000° C (approx. 1850° F).

5. Terminology

We notice that the words "container," "package," and "packaging" are used in the draft in a context different from 49 CFR 173.189, 10 CFR 71, and industry terminology. We suggest that the term "container" not be used at all, except when quoting PL 94-79. The term "inner containment vessel" should be used to describe the Spec. 2R type inner receptacle.

6. Oxide vs. Other Forms of Plutonium

NRC staff tells us that the draft criteria are being written with only plutonium oxide in mind. We believe this is too limiting, and the criteria should provide for all forms of plutonium--oxide, metal, nitrate (solid or liquid), or encapsulated (special form).

7. Minor Leakage vs. Rupture

We believe that it is necessary to make a clear distinction between minor leakage and rupture. Congress was very clear in its intent, as stated in the Congressional Record, to preclude catastrophic nuclear results from an air crash, but did not indicate any concern over minor leakages which would not produce those catastrophes. A discussion of this aspect in the introduction is necessary to lay the groundwork for selection of release acceptance criteria and leakage rates.

8. Double Containment

Beginning in 1978, NRC regulations require that all plutonium packages provide for double containment. This requirement should be factored into the criteria throughout in order to avoid changes in the criteria a short time later. The double containment principle should also be incorporated into NRC's prototype package design development program.

B. SPECIFIC COMMENTS

1. Pages 2-3, Safety Considerations

The text of the last half of the first paragraph of this section implies that there will be a release of plutonium in all cases of severe air accidents. This implication is incorrect and should be clarified.

2. Page 3, Safety Considerations

In the first full paragraph, we disagree with the second sentence. A risk approach is not precluded by the statute.

3. Page 5, Figure 1

The fire risk should be shown under both "Ground Crash Condition" and "Post Crash Condition."

4. Pages 7-8, Test Conditions

a. A 422 ft/sec (300 mph) impact onto an unyielding surface is not only unrealistic, but is an unjustifiably severe over-test. According to Sandia, it is equivalent to an impact of about 1000 ft/sec (almost 700 mph) into hard soil. There are no credible air crash conditons for commercial aircraft which could produce impact damage this severe. At the very most, this should be related to the airport accident with a maximum aircraft speed of 200 knots (approx 330 ft/sec). Actually, there are other mitigating factors in the impact, such as shock absorption by aircraft structure and the test requirement for an unyielding impact surface rather than "real" hard surfaces, plus the angle of impact factor (aircraft don't plunge directly into the ground around airports at a 90° attitude). A more realistic figure would probably be around 100-150 ft/sec test impact (when applied in the sequenced tests). We believe that a figure of from 200-250 ft/sec is absolutely the highest figure that can be logically supported by either the data or the discussion in the working paper.

As a related minor problem, the figure of 422 ft/sec implies three-figure accuracy which is not correct. These test figures should be rounded off to the nearest 50 ft/sec (or 15 meters/sec) lest anyone mistakenly infer that such precision is real.

b. A double crush test with a 70,000 pound 2" bar is also an unrealistic and unjustifiably severe overtest. Real crush forces will have dynamic shear effects which are conservatively ignored in the proposed test sequence in that the crushing item would be either an aluminum beam or deck, not a 2" wide steel bar. The aluminum beam would deform under real stress conditions much earlier than the 70,000 pound limit due to the longitudinal shearing force. Further, two such crush forces are impossible in a single accident. We would not object to a single 70,000 pound crush force applied statically as a flat load, imposed in the most damaging orientation onto the package already impacted (at less than 422 ft/sec).

c. The proposed puncture tests are conditions which might represent the damage incurred by packages in high speed rail accidents, but not air accidents, particularly with the aft loading requirement. In any event, the puncture force should only be applied once--not three times in succession.

   Further, we cannot postulate a credible accident which could impose these types of puncture forces onto a package caught in the crushed condition represented by the crush test. There would be too much wreckage in the way. The package should be able to meet either impact + crush or impact + puncture, but not impact + crush + puncture.

   The weight of the puncture tool should be reduced to 200-300 pounds to represent actual package sizes more realistically. As an alternate, we could use the 500 pound weight provided for in Standard 7.8.3 of 14 CFR 37.150.

d. The fire test of 55 minutes (1 hour?) is too severe for the high speed crash purported to be simulated by this crash test sequence. A 30 minute 1000°C fire test is realistic and still extremely conservative since the package would receive as much thermal energy input in that test as it would in a real fire of perhaps an hour or two with mitigation due to the wreckage. This 30 minute test is also more consistent with FAA's requirements for fire testing of flight recorders (Standard 7.8.5 of 14 CFR 37.150). The one hour test is more indicative of a takeoff accident where impact and crush/puncture forces would be much less in the proposed test sequence.

e. How can a 36 hour water immersion possibly follow the severe fire exposure? Certainly a package can be severely wetted in firefighting actions, or can sit in a pool of water for some short time after the fire is put out. But we cannot realistically visualize it sitting there for 36 hours with no recovery! The existing 10 CFR 71 test is quite adequate.

5. Pages 8-9, Acceptance Standards

a. Containment: What is meant by "ruptured"? This needs to be clarified, in conjunction with the introductory discussion referred to earlier.

The quantity should be at least 0.1 curies of plutonium in normal form or 2 curies in special form. Actually, based on data generated by NRC's reactor safety research staff, those figures could be increased by a factor of 50 and still not cause any early deaths and an almost insignificant number (less than 1) of latent deaths.

b. Sub-Criticality: The array required to be considered should be limited to the number of packages allowed on an aircraft, and not an infinite array.

6. Page 9, Individual Test I

This should be limited to the free-fall conditions and should be correlated more clearly with the revised impact damage in the sequential tests. Suggest: "This test is not required if the calculated terminal free-fall velocity of the package is less than 90 meters/second (250 feet/second)."

7. Page 9, Individual Test II

We question whether this test is necessary at all. 10 CFR 71 already requires an immersion test equivalent to a 50 ft depth (external pressure of 25 psig). On a risk basis, a depth greater than 500 ft hardly seems supportable (see page 39 of the working paper).

In any case, the acceptance standards for shielding and sub-criticality do not really apply. At most, the containment standard should be based on freedom from gross rupture or geometric changes in the containment vessel. Minor leakage is just not a problem at all in the case of deep immersion.

8. Pages 7-9, General Test Schedule

We have some specific recommendations to make on both the sequential and individual tests.

First of all, the sequential tests need to be recast to represent a typical, very severe approach/departure accident. This does not mean the cascading of individual maximum test conditions, but instead means taking a more realistic and technically supportable approach. We believe that there should be two test sequences as follows:

a. Test Sequence 1:

(1) Impact: 90 meters/sec. (approx. 250 ft/sec.) in most damaging orientation;

(2) Static crush: 32,000 kilograms (approx. 70,000 pounds) flat load in most damaging orientation;

(3) Thermal test: 30 minutes at 1000°C (approx. 1850° F); and,

(4) Immersion: 0.9 meters (3 feet) of water for 8 hours

b. Test Sequence 2:

(1) Impact: 90 meters/sec. (as above);

(2) Puncture: 125 kilogram (275 pound) weight from a height of 3 meters (approx. 10 feet), 30 cm long probe, 20 cm x 2.5 cm, in most damaging orientation;

(3) Thermal test: 30 minutes at 1000° C; and

(4) Immersion: 0.9 meters of water for 8 hours

c. Note: It is assumed that these packages will all qualify first as Type B packages, including meeting the present 10 CFR 71 leakage criteria after the Type B tests.

Next, there should be three individual tests: a free-fall test, representing high altitude ejection; a prolonged fire without significant prior physical damage, representing a runway fire; and (optionally) a deep immersion test as follows:

(1) Individual Test I: Terminal free-fall velocity onto reinforced concrete surface, in most damaging orientation.

(2) Individual Test II: Thermal test, 1 hour at 1000° C.

(3) Individual Test III: Immersion to depth of 150 meters (approx. 500 feet), or 15 kg/cm^2 (approx 220 psig).

9. Page 10, Operational Controls

The word "portion" could be interpreted as the aft-most part of the after cargo compartment. This might unnecessarily interfere with loading operations. Anywhere in the rear of the aircraft or in the after cargo compartment should be completely adequate.

10. Page 11, Surface Transport and Air Transport

The second paragraph clearly implies that air shipments in the past have not assured adequate safety for Type B shipments for air accidents. We believe that statement is not true, and both ERDA and NRC have said many times that the Part 71 standards provided adequate safety. The various environmental impact statements on air transport have demonstrated adequate safety.

11. Pages 11-14, Abnormal Flight Environments

We agree with the rationale, perspective, and conclusions of this section.

12. Page 16, Ground Crash Conditions

The conclusions stated in the last three paragraphs on this page do not follow logically from the preceding two pages of analysis. Commercial cargo aircraft do not impact at right angles to armorplated surfaces at speeds of 288 mph.

The working paper claims that such an impact is "a reasonable upper bound for aircraft speed, impact angle, and orientation, for crashes which occur during approach, landing, takeoff, and climb-out." A reasonable upper bound exists at a much lower level. First of all, the maximum aircraft speed around airports (within at least 5 miles) is 230 mph, not 288 mph. But the accident data shows glancing impacts, not head-on right angle impacts. So the conclusions drawn are a non-sequiter to the analysis.

On page 17, there are four good reasons stated why NRC's proposed impact test velocity is unreasonable and unwarranted. Pages 18-22 contain more very good reasons why the proposed right-angle package impact speed of 288 mph is invalid for an aircraft crash sequence. Further, the military high speed low level accident data do not apply; indeed, the analysis itself states (on page 23) "The results may not be applicable to commercial aviation." We quite agree. Table 4 on page 27 seems much more pertinent, and supports our opinion that a package impact velocity of 250 ft/sec is in itself probably beyond a credible upper bound for representative damage. The highest vertical aircraft speed component shown on that table is about 110 mph (160 ft/sec). As a minor note, on page 16, the references in numbered paragraphs 1, 2, and 3 should be 91.70(a), 91.70(b), and 91.70(c).

13. Pages 28-30, Crush

Our comments are reflected in our earlier discussion on the crush test. We agree that a crush test is appropriate, but we need one that is more likely to represent the real dynamic crushing forces in an accident.

14. Page 31, Puncture

No justification is given for selecting a puncture test that is so significantly more severe than FAA's puncture test for flight records. Without such justification, we should not invent a new puncture test. Either the FAA test should be used, or the puncture probe weight should be reduced to something more comparable--like 200-300 pounds.

15. Pages 34-38, Thermal Explosion

It is our understanding that JP-4 is used only by the military, and JP-5 (less potential hazard) is used in commercial jets. Therefore, only the JP-5 data appears applicable here.

At the top of page 35, it should be pointed out that the only fire of concern is that fire within a few feet of the package, and the fuel burning some distance away is of no consequence.

At the bottom of page 35, it should be pointed out that the 54 minute fire does not occur in conjunction with a high speed impact. This is the basis for our earlier recommendation to reduce the sequential fire test to 30 minutes (itself very conservative) and leave individual fire test at 60 minutes (comparable to the 54 minute figure shown here), and is supported by the discussion in the long paragraph on page 38. As a related issue, we agree with that discussion, but fail to see the connection between it and the following paragraph where NRC staff proposed a much more severe fire test.

16. Pages 39-44, Burial

We agree with the analysis, but question the need for such a lengthy treatise. A few paragraphs should suffice.

17. Pages 44-47, Overboard Cargo

We agree with the analysis.

18. Pages 47-49, Standards for Acceptance

See our earlier comments. It should be explained here that it is assumed that all plutonium packages must meet both Type A and Type B test criteria and acceptance standards, in addition to the new ones. In other words:

Type A tests: No leakage ($A_2 \times 10^6$/hr)

Type B tests: Almost no leakage ($A_2 \times 10^3$/week)

Additional tests: Minor leakage (50-100 A_2/week)

Some representative value for A_2 needs to be set (arbitrarily) for the mixtures of plutonium most likely to be shipped over the next 3-5 years.

DEPARTMENT OF TRANSPORTATION
MATERIALS TRANSPORTATION BUREAU
WASHINGTON, D.C. 20590

DIRECTOR

MAY 4 1976

Mr. Richard E. Cunningham
Acting Director, Division of
Fuel Cycle and Material Safety
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Cunningham:

This refers to your April 13, 1976 request for comments on the revised working paper on Qualification Criteria for Plutonium Package Certification for air transport. Unfortunately, since your letter was received on April 20, 1976 we were unable, due to this late notice, to have a representative attend the April 20 meeting of your staff with the Advisory Committee on Reactor Safeguards (ACRS) Working Group on Plutonium Packages.

The document appears to be an excellent in-depth consideration of the problems posed by Public Law 94-79. Whether or not this response will be considered adequate depends upon the interpretation of those requirements. If the validity of the assumptions is accepted, the standards and test method seem to be sufficiently conservative to meet the intent of developing a virtually crash-resistant containment system for shipment of plutonium by air.

With regard to the operational controls mentioned, this could probably be best accomplished by a requirement in the NRC Certificate of Compliance for mandatory arrangements between the shipper and air carrier regarding stowage conditions.

You inquired about the possibility of having this report reviewed by the Federal Aviation Administration or one of its contractors. The contractor which had earlier reviewed the Sandia Study of Accident Severities was the MITRE Corporation. The Hazardous Materials staff of the FAA has been furnished with copies of this report and they have indicated that the MITRE Corporation has been requested to review the report. The results of that review, however, will probably not be available until June 1, 1976, at the earliest. As soon as it is received we will be sure a copy is forwarded to you.

ENCLOSURE E

Thank you for the opportunity to review this report. We appreciate your efforts to keep us informed of the status of this very important project.

Sincerely,

James T. Curtis, Jr.

NRC CONTINUES WORK ON CONTAINERS FOR SHIPPING PLUTONIUM BY AIR

The Nuclear Regulatory Commission staff expects to certify in April 1977 a container for transporting plutonium by air that "will not rupture under crash and blast testing equivalent to the crash and explosion of a high-flying aircraft."

Until such a container is certified to the Congressional Joint Committee on Atomic Energy, air shipment of plutonium--except that contained in a medical device designed for individual application--is prohibited by a 1975 law.

The NRC staff has drafted qualification criteria for certifying plutonium packages to provide a high degree of assurance that containers will withstand virtually all aircraft accidents, without releasing a quantity of the material in excess of that permitted under international rules. With the assistance of Sandia Laboratories of Albuquerque, New Mexico, NRC is conducting a development and test program on plutonium containers to assure that they meet both the staff's qualification criteria and the criteria of the International Atomic Energy Agency.

Test results indicate that the existing packages probably would not meet the NRC's draft criteria and the IAEA rules; thus, the NRC staff has concluded that a new container with greater structural integrity should be designed, built and tested.

In addition, the NRC staff will continue to work closly with the Commission's Advisory Committee on Reactor Safeguards on the certification program. The certification program will be evaluated by the Assembly of Engineering of the National Academy of Science. Certification to the Joint Committee in April 1977 will represent an eight-month slip in the original schedule. However, the staff has determined there is no significant need to ship plutonium by air during this period.

#

March 25, 1976

UNITED STATES
NUCLEAR REGULATORY COMMISSION

SECY-75-535A

POLICY SESSION ITEM

For: The Commissioners

From: Robert B. Minogue, Director, Office of Standards Development

Thru: Executive Director for Operations

Subject: ADDENDUM TO SECY-75-535, "IMPLEMENTATION OF NCRP RECOMMENDATIONS FOR LOWER RADIATION EXPOSURE LEVELS FOR FERTILE WOMEN"

Purpose: To provide information supplementing SECY-75-535 as requested in Policy Session 75-60 (November 13, 1975) i.e., (1) Consideration of additional alternatives; (2) Relationship of this action to NRDC petition (PRM-20-6); and (3) Informally obtain data on exposure of various occupational categories. (Ref. memo Chilk to Gossick November 14, 1975)

Category: This paper relates to a minor but controversial policy question.

Issue: The same as stated in SECY-75-535, whether the NRC should adopt amendments to 10 CFR Parts 19 and 20, published as proposed rules by AEC, on January 3, 1975, to implement a recommendation of the National Council on Radiation Protection and Measurements (NCRP). NCRP recommended that "During the entire gestation period, the maximum permissible dose equivalent to the fetus from occupational exposure of the expectant mother should not exceed 0.5 rem."

Decision Criteria:

1. The need to protect the embryo or fetus.*
2. AEC's general practice of adopting the principal recommendations of NCRP.
3. The potentially small reduction of exposure to embryos or fetuses in view of:
   (a) The small number of workers who actually receive exposures in excess of the NCRP's recommendation for fertile women.

*New criterion not presented in SECY-75-535

Contact:
W. S. Cool, SD
443-6920

(b) The small fraction (unquantified) of those workers who are pregnant women.

(c) The Commission's policy to maintain occupational radiation exposures as-low-as is reasonably achievable.

4. The likelihood that employers, in view of the practical difficulties involved in implementation of the NCRP recommendation, may not hire women for jobs where radiation exposure is a possibility, resulting in sex discrimination in employment.

5. Comments of the Office of General Counsel of the U.S. Equal Employment Opportunity Commission (Enclosure "H" to SECY-R-75-162) that a regulation requiring adherence to the NCRP recommendation probably would be held to be inconsistent with Title VII of the Civil Rights Act of 1964. (Title VII applies to employers of 15 or more employees.) The views of the Office of Legal Counsel, Department of Justice (Enclosure "F" to SECY-R-75-162) are in concurrence with the position of the EEOC.

6. The need to recognize the inherent responsibility of the individual woman with respect to her offspring.

7. Twenty-three comments filed in response to the notice of proposed rule making published January 3, 1975 (40 FR 799). (See Enclosures "C" and "D" to SECY-75-535).

Alternatives: At Policy Session 75-60 on November 13, 1975, the Commission considered the four alternatives set forth in SECY-75-535 and requested the staff to consider further alternative courses of action. Seven alternative courses of action are identified below. The pro's and con's are set forth in Enclosure "B".

1. Decide not to implement the NCRP recommendation.*

2. Impose a lower limit on women, without a waiver.**

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*Alternative 1 SECY-75-535

**Alternative 2 SECY-75-535

(a) Set limit at 0.17 rem per quarter.

(b) Set limit at 0.5 rem per quarter, with follow-up action when a licensee is informed of a pregnancy.

3. Impose a lower limit on women, with a waiver to go to present limits.

(a) Set limit at 0.17 rem per quarter.

(b) Set limit at 0.5 rem per quarter, with follow-up action when a licensee is informed of a pregnancy.

4. No lower limit, but require that, upon being informed of a pregnancy, a licensee would be required to take action to limit further exposure during the gestation period such that the embryo or fetus is unlikely to receive a dose equivalent in excess of 0.5 rem during the entire pregnancy.

5. Lower the limit for all workers.*** [NRDC petition]

6. Lower the limit for all workers, with a waiver for all workers to go to present limits.

7. Advise women of the NCRP recommendation and the reasons therefor, in conjunction with a Regulatory Guide that sets forth the biological risks associated with radiation exposure of an embryo or fetus, leaving the choice to the woman.****

Discussion: During Policy Session 75-60 the Office of the General Counsel was requested to consider further the practical and legal implications of the various alternative courses of action and to review the basis for the positions taken by the Department of Justice and the Equal Employment Opportunity Commission. A report prepared by OGC is enclosed.

Also, the staff was requested to provide information relating this consideration of lower radiation exposure levels for fertile women to the pending petition for rule making from the Natural Resources Defense Council, Inc. (NRDC). That petition requests reduction of the Commission's limits on occupational exposure of

***Alternative 3 SECY-75-535

****Alternative 4 SECY-75-535

all workers to reduce the genetic risk associated with occupational exposure by a factor of 10 and to reduce the somatic risk by a factor of 6. Notice of receipt of the petition was published by the Commission on October 29, 1975 (40 FR 50327), inviting interested persons to submit written comments or suggestions on or before December 29, 1975. At the request of Paul Ziemer, President, Health Physics Society, the period for comment was extended until February 12, 1976, in order to allow more opportunity for submission of comments by the Society and its members.

A staff recommendation on the petition has not been developed pending evaluation of all comments and other factors involved. However, consideration to date tends to favor postponement of action on the petition or denial.

The petitioner, NRDC, has made assumptions, such as the assumption that all workers receive 5 rems of whole-body exposure every year from age 18 to 65, that greatly exceed the existing conditions and experience. While the regulation would permit such exposures, the efforts being made to maintain occupational exposures to levels that are as low as reasonably achievable are expected to reduce exposures below those currently being experienced. Exposures reported by the four categories of licensees subject to § 20.407, 10 CFR Part 20, for calendar year 1974 averaged 0.24 rem. The urgency indicated by NRDC is not warranted.

There is considerable question regarding the impact of the change requested by NRDC. While it may be expected that a lower dose limit will result in lower individual doses, the staff is convinced, and several of the comments received in response to the notice have stated, that a lower dose limit will be counterproductive in terms of total man-rems. Exposure is received by a worker during entrance to the work area, during orientation to the work to be performed, and while exiting the restricted area, as well as during actual performance of the work. If a lower dose limit is imposed, many more workers would have to be used to achieve necessary work in existing facilities, and the total dose could be significantly increased. Commonwealth Edison evaluated the impact of the NRDC petition on the Dresden power reactor station. Their study indicates that a ten-fold reduction in dose limits would result in only a three-fold reduction in dose per individual (0.3 rem/year vs. 0.9 rem/year), but would result in an increase in the number of workers (including contractor personnel) exposed to radiation from the present 3,200 to 55,400, with an associated 450% increase in total dose from 2,760 to 15,100 man-rem per year.

Reduction of the dose to all workers, including females, would reduce the dose to a specific fetus or embryo, thus reducing the probability of leukemia and other cancers that may be calculated to result from in-utero exposure to that fetus or embryo. However, the increase in total man-rems may increase the number of leukemias and other cancers that may be calculated to result (using the linear hypothesis). Additionally, the lower dose limit would aggravate the existing shortage of available workers in certain key occupations, e.g., in nuclear power plant maintenance and in radiography.

Prescription in the regulations of the occupational exposure levels that are as low as reasonably achievable, as requested by NRDC, is an issue not related to the regulatory limit on exposures. Further, such determinations must be made on a case-by-case basis, or at a minimum, for each of a number of limited types of operations. Standards Development work on these determinations is in progress, and will continue in an orderly manner over a period of several years.

NRDC filed a comparable petition with the Environmental Protection Agency. We are informed that EPA is considering denial of that petition, and expects to take action on the matter within the next few weeks.

The Commission may wish the staff to solicit comments from the National Council on Radiation Protection and Measurements and from the International Council on Radiological Protection regarding this petition to provide information regarding their plans for revisions to their recommendations on occupational dose limits.

In view of these considerations, the staff does not recommend that the Commission defer action on the recommendation of the NCRP regarding lower dose levels for fertile women pending final determination of the NRDC petition.

The staff was also requested to attempt informally to obtain data on exposure experience of various occupational categories. Reports of annual personnel monitoring data are required from only four categories of NRC licensees that are considered to represent the greatest potential for significant occupational radiation doses. These reports do not differentiate between women and men. Data are not available on the number and exposure experience of individuals employed by the remaining NRC licensees.

However, data voluntarily submitted to the NRC radiation records repository by the State of Illinois provide a basis for making estimates of the number and exposure experience of all types of licensees, including estimates by sex and age. These data are presented, discussed, and summarized in Enclosure "A", along with the staff evaluation of the impact on women.

On December 15, 1975, the Department of Health, Education, and Welfare, Food and Drug Administration, Bureau of Radiological Health, published (40 FR 58151) advanced notice of proposed guidelines on medical radiation exposure of women of childbearing age. The notice solicited detailed scientific and technical data as well as comments on nine specific questions. (See Enclosure "C".)

It is the intent of the Bureau of Radiological Health to study X-ray and nuclear medicine practices to determine those actions that may be taken to minimize unnecessary ionizing radiation exposure to an embryo or fetus of a female patient. Effort is being made to collect sufficient information to provide a basis for appropriate radiation protection guidelines for use by the clinician. After the comment period expires on February 13, 1975, BRH will develop a technical overview report that will analyze current recommendations regarding medical radiation exposure of women, summarize information on the benefits and limitations of the current recommendations, review the most recent scientific data relating to this question, and suggest a possible alternative approach. We understand that when completed, perhaps by early summer, the technical overview will be published and will serve as the basis for further discussion leading to development of appropriate guidelines for general clinical use.

The purpose of the BRH action is the same as the NRC action, that is, to minimize radiation dose to an embryo or fetus. However, the considerations apply to the use of radiation in medical diagnosis and therapy and involve balancing factors of benefit and risk that are different from those involved in the consideration of occupational exposure of women and the employability of women in radiation work. Thus, while the BRH action is related, and of great interest to the Commission, the staff does not recommend delay in consideration of the NCRP recommended lower dose level for women pending the completion of the action proposed by BRH.

By letter dated March 5, 1976, Dr. Sidney Wolfe, of the Public Citizen Health Research Group, resubmitted comments on the notice of proposed rule making published by AEC January 3, 1975. The comment, dated January 20, 1975, was not received by the Secretariat or the staff, and was not considered in the development of SECY-75-535. Because it was not considered, and it does raise some points of substantial interest, it is enclosed to this Addendum so that this input will be considered in conjunction with other public comments summarized in the staff paper. Consideration of this comment does not change the staff's recommendation.

Recommendation: See SECY-75-535.

Coordination: The Office of the Executive Legal Director concurs in this Addendum and Enclosures "A", "B", and "D". An Analysis of Constitutional and Other Legal Limitations on NRC's Ability to Amend Its Regulations to Set Lower Radiation Standards for Fertile Women," prepared by the Office of the General Counsel, is set forth as Enclosure "E" to this Addendum. Enclosure "D" responds to a technical note on page 4 of Enclosure "E".

The Office of Policy Evaluation has also reviewed the paper. Its comments are attached as Enclosure "G". We agree with OPE's conclusions, but not entirely with its analysis; therefore we have not modified the staff paper.

Robert B. Minogue

Robert B. Minogue, Director
Office of Standards Development

Enclosures:
"A" - Impact Assessment
"B" - Pro's & Con's of Alternatives
"C" - BRH Federal Register Notice
"D" - "Effects of Ionizing Radiation on Growth and Development"
"E" - "OGC Analysis of Constitutional and Other Legal Limitations..."
"F" - Public Citizen Comment
"G" - OPE Memorandum dated March 12, 1976

POSSIBLE IMPACT OF IMPLEMENTING THE NCRP RECOMMENDATION FOR A LOWER RADIATION DOSE LIMIT FOR WOMEN IN ORDER TO PROTECT THE EMBRYO OR FETUS

Annual reports to the NRC of personnel monitoring results are required by § 20.407, 10 CFR Part 20, from only the four categories of licensees (approximately 450 of 8600) considered to involve the greatest potential for significant occupational radiation doses.* In these reports, differentiation between men and women is not required. These personnel monitoring data indicate that 85% of the individuals monitored by nuclear power plants, fuel processing and reprocessing plants, and byproduct manufacturing and distributing firms receive less than 0.5 rem per year, and 95% receive less than 2 rems per year. Individuals involved in industrial radiography receive slightly higher exposures, 81.5% receive less than 0.5 rem per year, and the average exposure per individual was 0.41 rem in 1973 and 0.33 rem in 1974. The average exposure for all four categories of licensees was 0.31 in 1973 and 0.24 in 1974. The staff believes that women constitute a small part of the work force in these categories of licensees, perhaps only 10-15% of the total number of workers. Data from these four categories of licensees from 1971 to 1974 are presented in Tables 1 and 2 and in Figures 1 - 6. The figures are log-probability plots that permit easy

*A notice of proposed extension of this reporting requirement to all NRC specific licensees was published May 30, 1975 (40 FR 23478). A working paper recommending publication in effective form has been delayed in that it did not receive complete staff concurrence.

visual comparison of exposure distributions. Note that on the log-probability plots, shifts upward or to the left indicate lower exposure.

By memorandum dated November 15, 1974 (Enclosure "G" to AEC staff paper SECY-R-75-162 dated November 25, 1974, attached to NRC staff paper SECY-75-535), the Divisions of Operational Safety and Naval Reactors opposed the position recommended by the rest of the AEC staff. Attached to that memorandum were two tables (Tables 3 and 4 of this document) and a two paragraph summary of "Possible Impact of Implementing NCRP Recommendation For A Radiation Limit To The Fetus And Reducing The Radiation Limit For All Employees To 0.5 Rem/Quarter," copy enclosed. At that time, contractors were employing 3,583 women and 43,551 men in radiation work. Only 24 (0.67%) of the women received more than 0.5 rem in any quarter during 1973. About 10% of all contractor radiation workers, male and female, were expected to receive 0.5 rem or more in any quarter.

Illinois, while not an Agreement State, is a licensing State. Illinois is unique, not only that it is the only State that has been submitting exposure data to the Commission's radiation records repository (voluntarily), but that the data permit evaluation by sex and age. Data from Illinois is presented and compared with AEC-licensee data in Figures 7 - 9 and Tables 5 and 6. The higher average exposures shown for AEC licensees (Figure 8, most of the log-probability plot lies below or to the right of the plot for all

Illinois registrants) reflect the fact that only the four categories of licensees considered to involve the greatest potential for significant occupational radiation doses are required to report pursuant to § 20.407. If exposures experienced by the other categories of NRC licensees are lower, as has been assumed by the staff and as indicated by Illinois data, the distribution of NRC-licensee exposures would be closer to that of Illinois registrants.

Approximately 80% of the women monitored in Illinois in 1973 were employed in "Clinics and Hospitals." A large percentage of these are employed in X-ray departments, not subject to NRC regulations. Use of the Illinois data to calculate the number of women employed in NRC-licensed activities will result in significant, but unquantified, overestimation.

If, in the absence of better data, we assume that data on Illinois registrants (includes Commonwealth Edison's nuclear power stations) are representative of all NRC licensees in exposure experience, age, and sex ratio, we may make the following upper-limit estimates:

	Illinois 1973		Estimated NRC
Number of Licensees	401		8600
Individuals Monitored	5625	5625/401=14.03 14.03 x 8600 = 120,658	120,658
Females Monitored	2280	2280/5625 = 40.53% 40.53% x 120658 = 48,903	48,903

Enclosure "A"

Females With Exposures:			
Less than 0.5 rem	1994	1994/2280 = 87.46% 87.46% x 48903 = 42771	42,771
Greater than 0.5 rem	286	286/2280=12.54% 12.54% x 48903 = 6132	6,132
Less than 2 rems	2236	2236/2280 = 98.07% 98.07% x 48903 = 47959	47,959
Greater than 2 rems	44	44/2280 = 1.93% 1.93% x 48903 = 944	944
Average Exposure of Females	0.224 rem		
Females in "Clinics and Hospitals"	1826	1826/2280 = 80.09% 80.09% x 48903 = 39166	39,166
Females in "Industry"	206	206/2280 = 9.04% 9.04% x 48903 = 4421	4,421
Monitored Females Under 45 Years of Age	1933	1933/2280 = 84.78% 84.78% x 48903 = 41460	41,460

Females monitored in Illinois receive lower exposures than males (most of the log-probability plot for females in Figure 7 is above or to the left of the plot for males). Approximately 85% of all individuals monitored by Illinois registrants and NRC licensees subject to § 20.47 receive less than 0.5 rem per year.

NCRP Report No. 39 suggests, as a speculative method of application of the NCRP recommended fetal dose limit, that fertile women be employed only in situations where the annual dose accumulation is unlikely to exceed 2 or 3 rems and is acquired at a more or less steady rate, with review and follow-up action once a pregnancy is known. Less than 5% of all monitored workers, Illinois or NRC

licensees subject to § 20.407, receive more than 2 rems per year, but the distribution of those exposures within the year is not known.

The extrapolated monitoring data indicate that imposition of a 0.5 rem per quarter (2 rems per year) limit on all women could involve about 950 women employed by NRC licensees, a 0.17 rem per quarter (0.5 rem per 9-month pregnancy or 0.68 rem per year; 9% read from Figure 7) limit could involve 4,400 women and a 0.5 rem per year limit could involve 6,130 women. However, it must be realized that promulgation of any lower limit for women carries the potential for impact on employment of all women. Licensees may be expected to employ individuals who offer the greatest degree of flexibility to the employer in accomplishing work. A lower dose limit could reduce the availability of a woman to do work involving radiation exposure. Employers may reason that if the woman becomes pregnant, she may request assignment to work involving less exposure and constitute an increased liability in the event of the birth of a malformed child or the development of a childhood leukemia or other cancer. Further, adoption of a lower dose limit for all women would be an injustice to women who can not, or who do not intend to become pregnant.

The number of extra leukemia and cancer deaths that may be calculated to result from occupational exposure of women in NRC-licensed activities at current rates is small.

If we assume that the number of live births among women involved in radiation work follows the national average (85.7 live births per 1,000 women in 1968), it may be calculated that 4,191 babies per year may be born among 48,903 women estimated, by questionable (conservative) extrapolation from Illinois data, to be monitored by NRC licensees.

Data in BEIR Report* indicate a natural incidence of leukemia and other cancer deaths, 1,485 and 1,494, respectively, among 40.1 million children under 10 years of age in the United States in 1967. Thus, the natural incidence of cancer for a population of 4,191 children through the first ten years of life can be calculated to be 3.11.**

The BEIR Report assigns a relative risk of 1.5 (50% increase over the natural incidence) per rem of exposure "in utero" for these cancer deaths. IF we assume that the 0.224 rem annual average from personnel dosimeter readings for women in Illinois applies as dose to the fetus (an estimate that is high by a significant, but unquantified, factor depending upon the type and energy of radiation to which the expectant mother may be exposed, and because of the use of protective lead aprons while the dosimeter is worn unshielded to evaluate dose to the head), and IF we assume that the woman maintains work through 9 months of pregnancy (unlikely), we could

*"The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," Report of the Advisory Committee on the Biological Effects of Ionizing Radiations, Division of Medical Sciences, NAS-NRC, November 1972.

**$1,485 + 1,494/40.1 \times 10^6 = 7.429 \times 10^{-5}$ or 1 in 13460 per year and 1 in 1346 over a 10-year period. 4,191/1,346 = 3.11 expected leukemia and cancer deaths.

calculate a fetal dose of 0.168 rem. Using the conservative assumptions presented in the BEIR Report, such as linearity of dose and effects, and that all cancers result in deaths, 3.37 leukemia and cancer deaths,*** as compared to the natural incidence of 3.11, by age 10 in the 4,191 children can be calculated. That is, 1 calculated added death in 3.85 years among the children of all NRC licensee-employed women in radiation work. The BEIR Report cautions that the expression of risk estimates in absolute terms might be misinterpreted as implying considerably greater accuracy than the facts justify. They suggest that the risks be expressed in terms of "order of risk", such as 1 to 10 cases/10^6/year/rad is a 6th order risk. It may be shown that a fetal dose in excess of 4 rems would be required to change the order of risk of leukemia and other cancer deaths.

Note that, in the continued absence of specific guidance from the Environmental Protection Agency (under their assumption of the Federal Radiation Council function) regarding exposure limits for fertile women, embryos, or fetuses, the action taken by the NRC may be expected to influence the course followed by Agreement States, ERDA, Department of Labor, Department of Defense, and others. The staff believes that the number of women involved in work with sources of radiation not subject to NRC control exceed the number of women employed by NRC licensees, perhaps by a factor of 3 to 5.

*** Relative risk of 1 rem is 1.5 (50% increase per rem over the natural incidence. By linear extrapolation, the risk associated with 0.168 rem is 1.084 (8.4%). Thus, 3.11 x 1.084 = 3.37 expected leukemia and cancer deaths by age 10 in 4,191 exposed children.

SUMMARY

Quantitative data are not available on the number and exposure experience of women involved in work for all NRC licensees. However, the data submitted voluntarily by Illinois provide a basis for making estimates of the number and exposure experience of women involved in work for NRC licensees. The staff believes that these are upper-limit estimates. The staff also believes that continued implementation of the ALARA concept will result in further reduction in doses. It appears that there would be a small benefit to individual women and their fetuses from implementation of the NCRP recommended lower dose limit, but population exposures would likely increase. That is, 85% of monitored women already receive less than 0.5 rem per year, and the average exposure would be expected to result in only a very small increase in the number of leukemia and other cancer deaths. Finally, the impact of such a reduced dose limit on the employability of a large number of women could be severe.

Table 1

Distribution of Annual Whole Body Exposures
for Covered Licensees
1974

Covered Categories of NRC Licensees	Total No. Monitored	Exposure Ranges (Rems)																	
		Less Than Measurable	Less Than 0.10	0.10 0.25	0.25 0.50	0.50 0.75	0.75 1.00	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	>12
Power Reactors	62,044	40,140	9,471	3,317	2,230	1,238	929	2,522	1,378	471	226	86	30	6	0	0	0	0	0
Industrial Radiography	8,792	3,849	1,740	939	635	424	323	547	209	74	22	17	5	2	3	0	1	2	0
Fuel Processing & Fabrication	10,921	6,304	1,801	959	772	316	146	275	126	83	60	23	12	16	12	16	0	0	0
Manufacturing & Distribution	3,340	1,513	748	504	144	84	69	125	59	46	17	21	7	1	2	0	0	0	0
TOTALS	85,097	51,806	13,760	5,719	3,781	2,062	1,467	3,469	1,772	674	325	147	54	25	17	16	1	2	0

Enclosure "A"

Table 2

Man-rems Per Category
of
Covered Licensees

Covered Categories of NRC Licensees	Calendar Year	No. of Licensees Per Category	Total No. Individuals Monitored	No. Individuals With Measurable Exposure	Total No. Man-Rems	Average Exposure (Rem) per Individual (Based on All Exposures)	Average Exposure (Rem) Per Individual (Based on Measurable Exposures)
Power Reactors	1974	53	62,044	21,904	14,083	0.23	0.64
	1973	41	44,795	16,558	14,337	0.32	0.87
Industrial Radiography	1974	319	8,792	4,943	2,938	0.33	0.59
	1973	341	8,206	5,328	3,354	0.41	0.63
Fuel Reprocessing and Fabrication	1974	25	10,921	4,617	2,739	0.25	0.59
	1973	27	10,610	5,056	2,400	0.23	0.47
Processing & Distribution of By-Product Material	1974	24	3,340	1,827	1,050	0.31	0.57
	1973	34	4,251	1,925	1,177	0.28	0.61
Totals & Averages	1974	421	85,097	33,291	20,810	0.24	0.63
	1973	443	67,862	28,867	21,268	0.31	0.74

Enclosure "A"

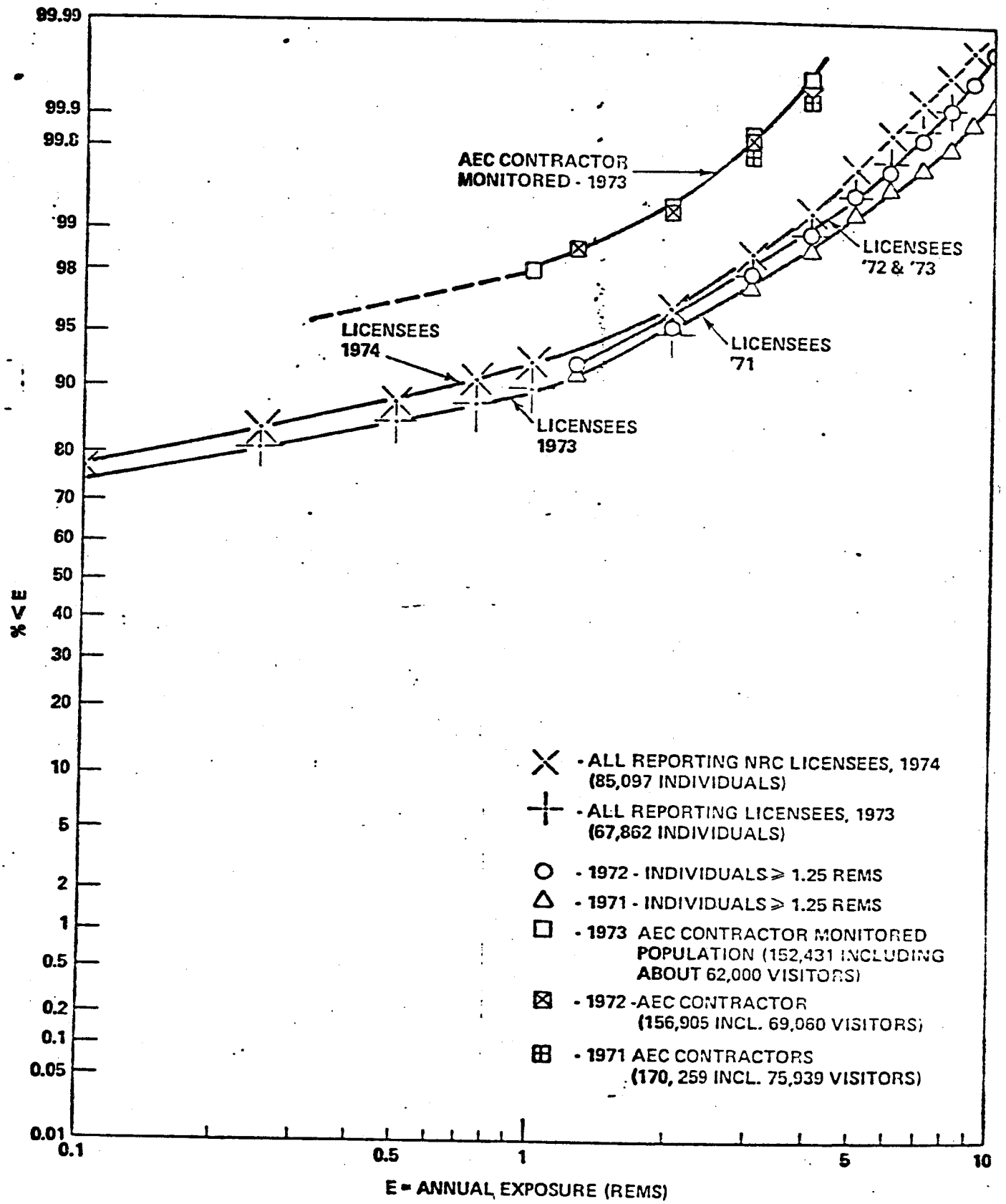


FIGURE 1– ALL REPORTING LICENSEES (NRC) AND AEC CONTRACTOR EMPLOYEES

Enclosure "A"

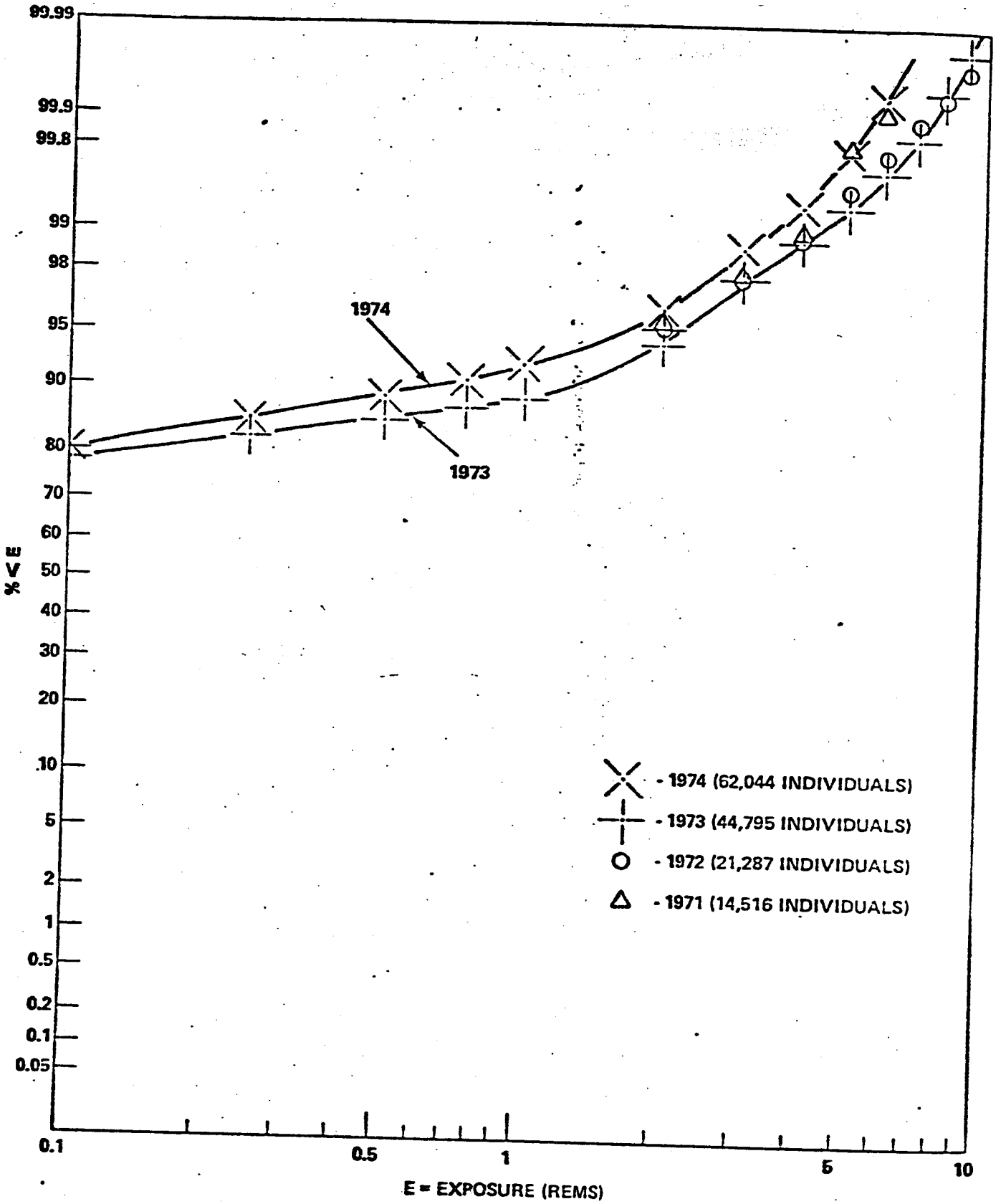


FIGURE 2 — POWER REACTOR LICENSEES

Enclosure "A"

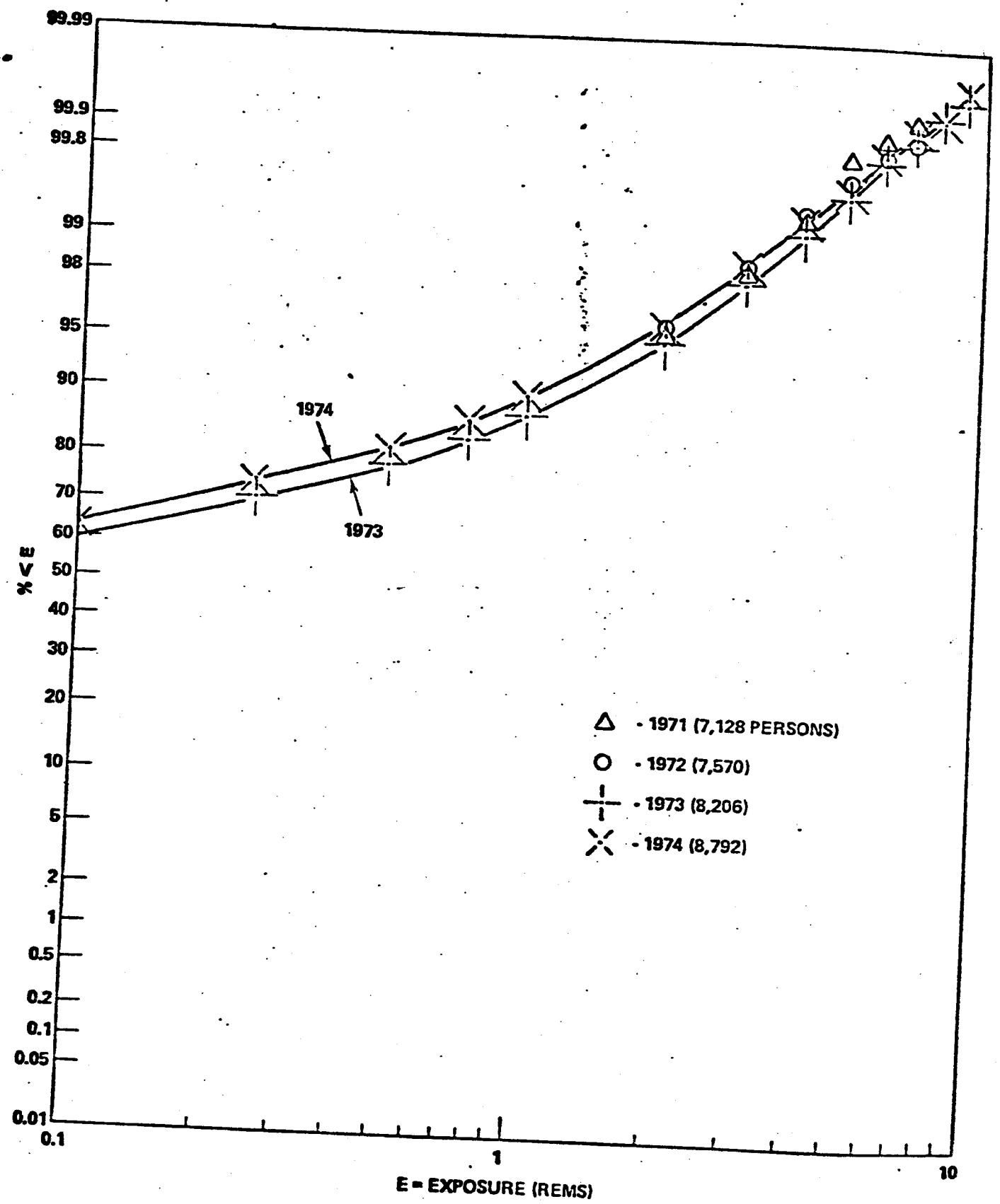
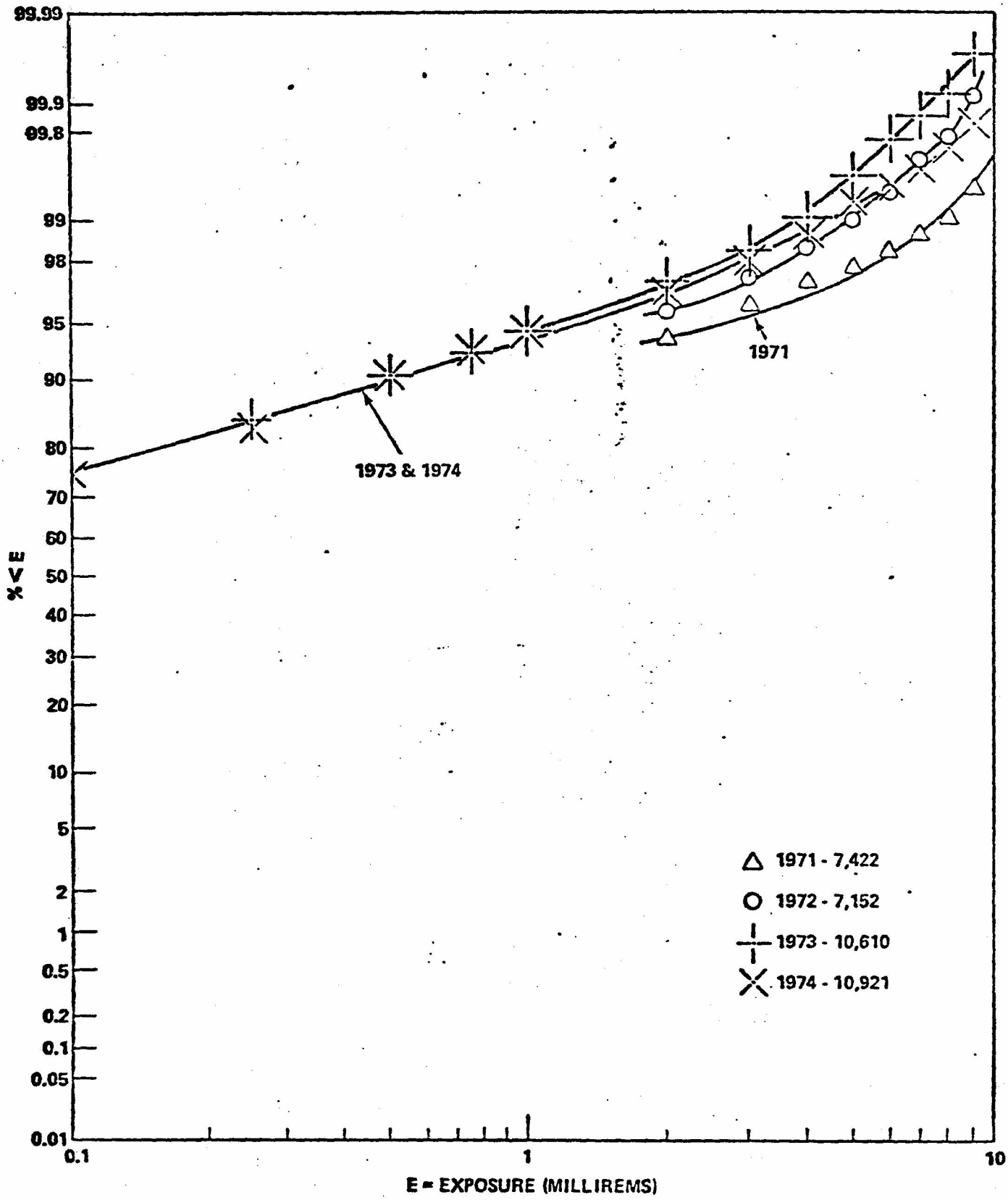


FIGURE 3 – INDUSTRIAL RADIOGRAPHERS

Enclosure "A"



Enclosure "A"

FIGURE 4— FUEL PROCESSING & REPROCESSING

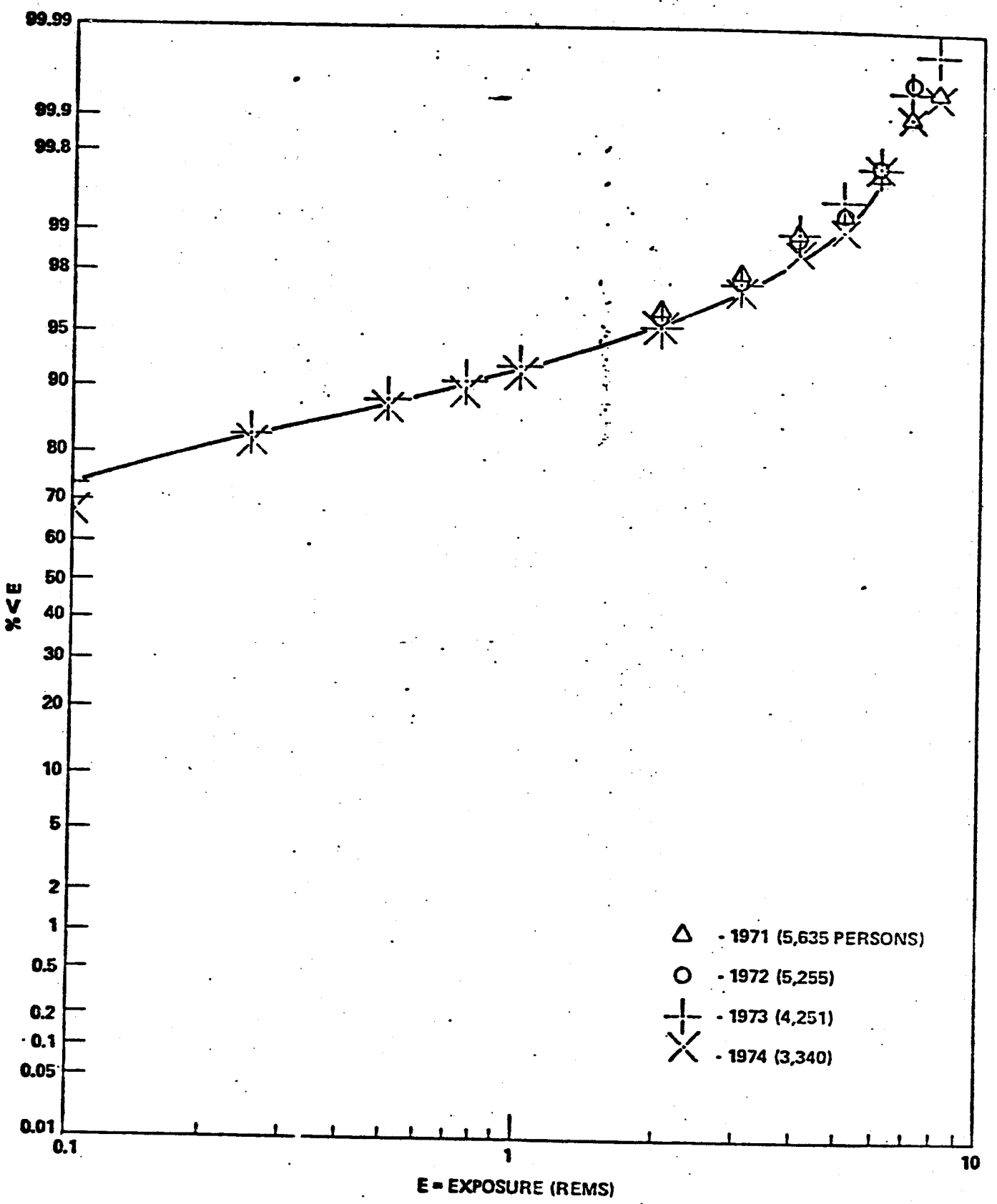
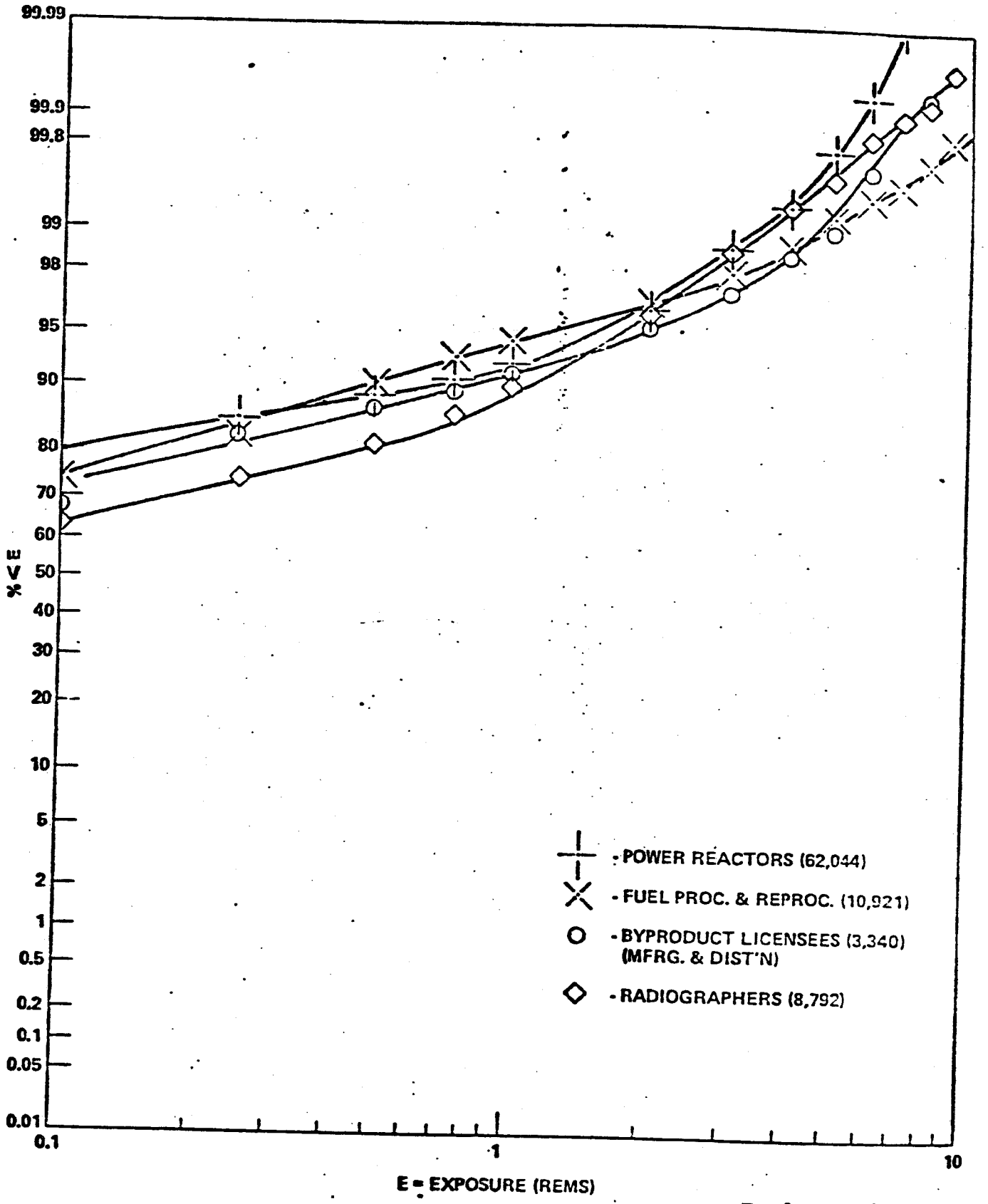


FIGURE 5 – BYPRODUCT MATERIAL LICENSEES IN MANUFACTURING OR DISTRIBUTION

Enclosure "A"



Enclosure "A"

FIGURE 6 – COMPARISON OF TYPES OF LICENSEES FOR 1974

TABLE I

FEMALE RADIATION WORKERS RECEIVING >0.5 REM IN ANY QUARTER

Field Office	No. of female radiation workers currently employed	No. of female radiation workers receiving > 0.5 rem in any quarter during 1973	Ave. yearly No. of female radiation workers receiving >0.5 rem in any quarter (1969-1973)
AL	259	8	5
CH	700	7 (est.)	8
GJ	1	0	0
ID	33	0	< 1
NV	253	0	0
OR	1,515	0	0
PNR	34	0	0
RL	126	5	13
SAN	451	0	< 1
SR	193	4	13
SNR	18	0	0
TOTALS	3,583	24	41

Enclosure "A"

TABLE II

NUMBER OF CONTRACTOR RADIATION WORKERS EXPECTED TO RECEIVE AN EXPOSURE >0.5 REM IN ANY QUARTER

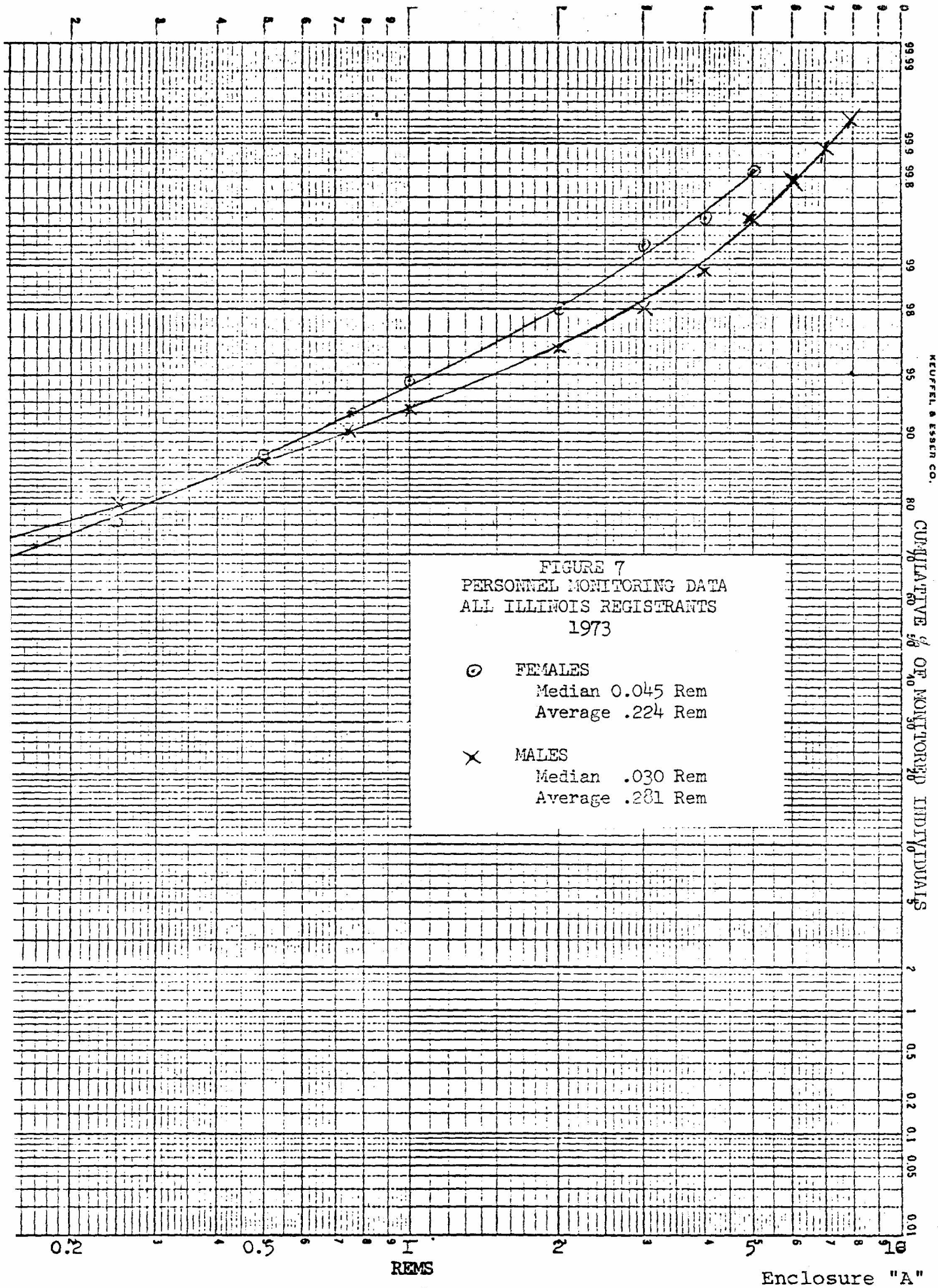
Field Office	No. of female radiation workers	No. of male radiation workers	No. of workers expected to receive > 0.5 rem in any quarter
AL	259	6,142	318
CH	700	7,556	2,522
CJ	1	37	0
ID	33	1,373	27
NV	253	3,819	11
OR	1,515	10,348	93
PNR	34	2,441	---
RL	126	2,382	1,178
SAN	451	3,022	132
SR	193	4,924	108
SNR	18	1,507	87
TOTALS	3,583	43,551	4,476

Enclosure "A"

POSSIBLE IMPACT OF IMPLEMENTING NCRP RECOMMENDATION FOR A RADIATION LIMIT TO THE FETUS AND REDUCING THE RADIATION LIMIT FOR ALL EMPLOYEES TO 0.5 REM/QUARTER

Should the NCRP fertile woman recommendation be fully implemented, 86 percent of AEC contractors estimate that the impact on operations would be negligible. Approximately 10 percent of AEC contractors estimate that the recommendation would have some slight impact on operations. These contractors cite additional costs, closer controls, and possible labor relations problems as estimated impacts. Each of these items is predicted by about 4 percent of AEC contractors.

Should all employees be regulated to no more than one-half rem in any quarter, estimates of the impact on operations vary widely. Several of the university facilities estimate little or no impact. Many facilities foresee a serious impact, but are unable to provide an estimate of additional equipment and operating expenses. Those facilities that are able to provide cost estimates foresee additional costs of $150,000 to $7,500,000 for capital equipment, operating expenses, facility upgrading, and additional personnel. Several facilities also estimate disruption of operations due to loss in efficiency.


PROBABILITY
X 2 LOG CYCLES
KEUFFEL & ESSER CO.
4G 8040
MADE IN U.S.A.
CUMULATIVE % OF MONITORED INDIVIDUALS
99.9
99.8
99
98
95
90
80
50
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
0.2
0.5
1
2
5
10
REMS
FIGURE 7
PERSONNEL MONITORING DATA
ALL ILLINOIS REGISTRANTS
1973
FEMALES
Median 0.045 Rem
Average .224 Rem
MALES
Median .030 Rem
Average .281 Rem

Enclosure "A"

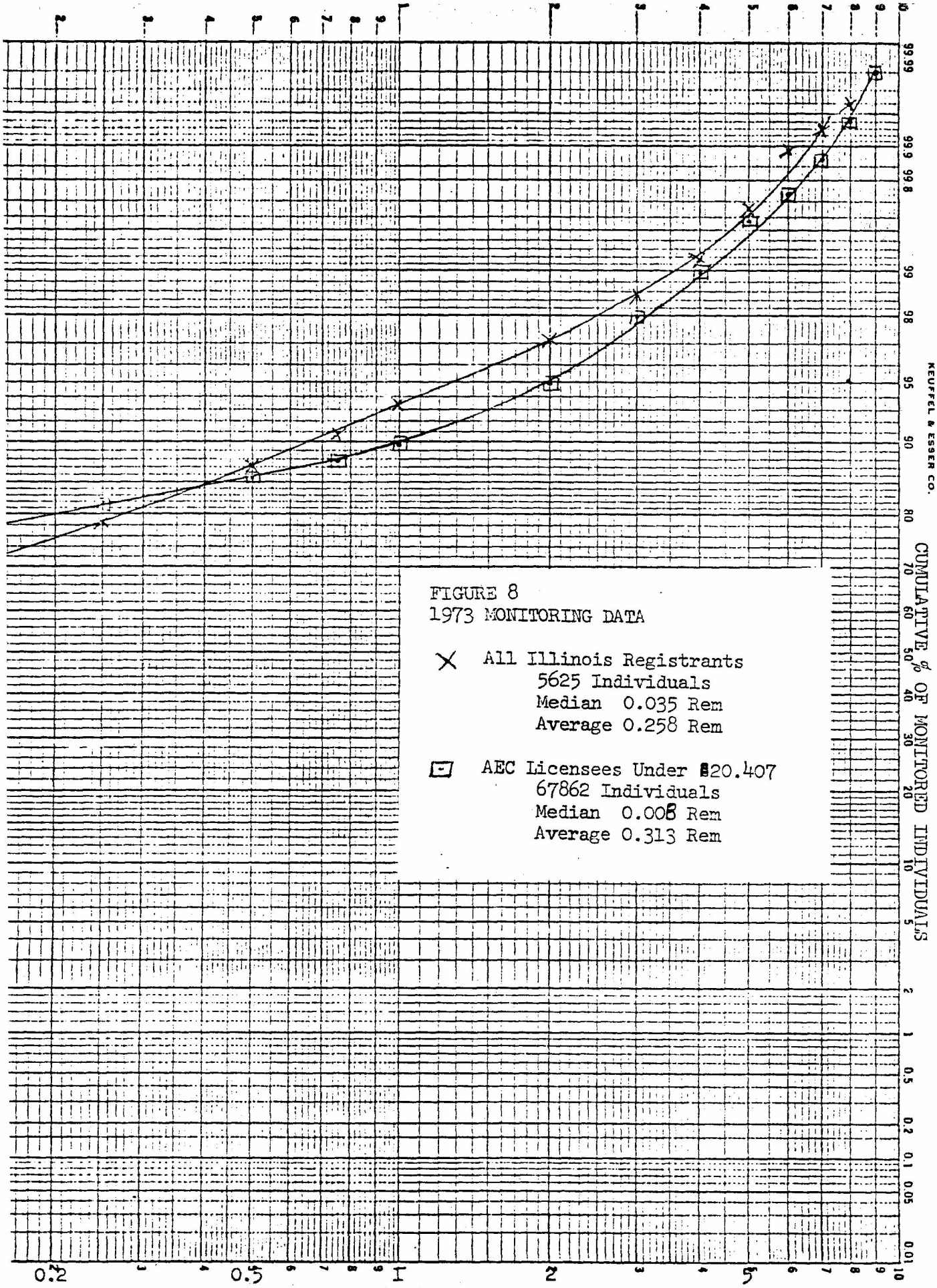


FIGURE 8
1973 MONITORING DATA
All Illinois Registrants
5625 Individuals
Median 0.035 Rem
Average 0.258 Rem
AEC Licensees Under §20.407
67862 Individuals
Median 0.008 Rem
Average 0.313 Rem
CUMULATIVE % OF MONITORED INDIVIDUALS
REMS
0.2
0.5
1
2
5
10
99.99
99.9
99.8
99
98
95
90
80
70
60
50
40
30
20
10
5
2
1
0.5
0.2
0.1
0.05
0.01
K&E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO.
46 8040
MADE IN U.S.A.

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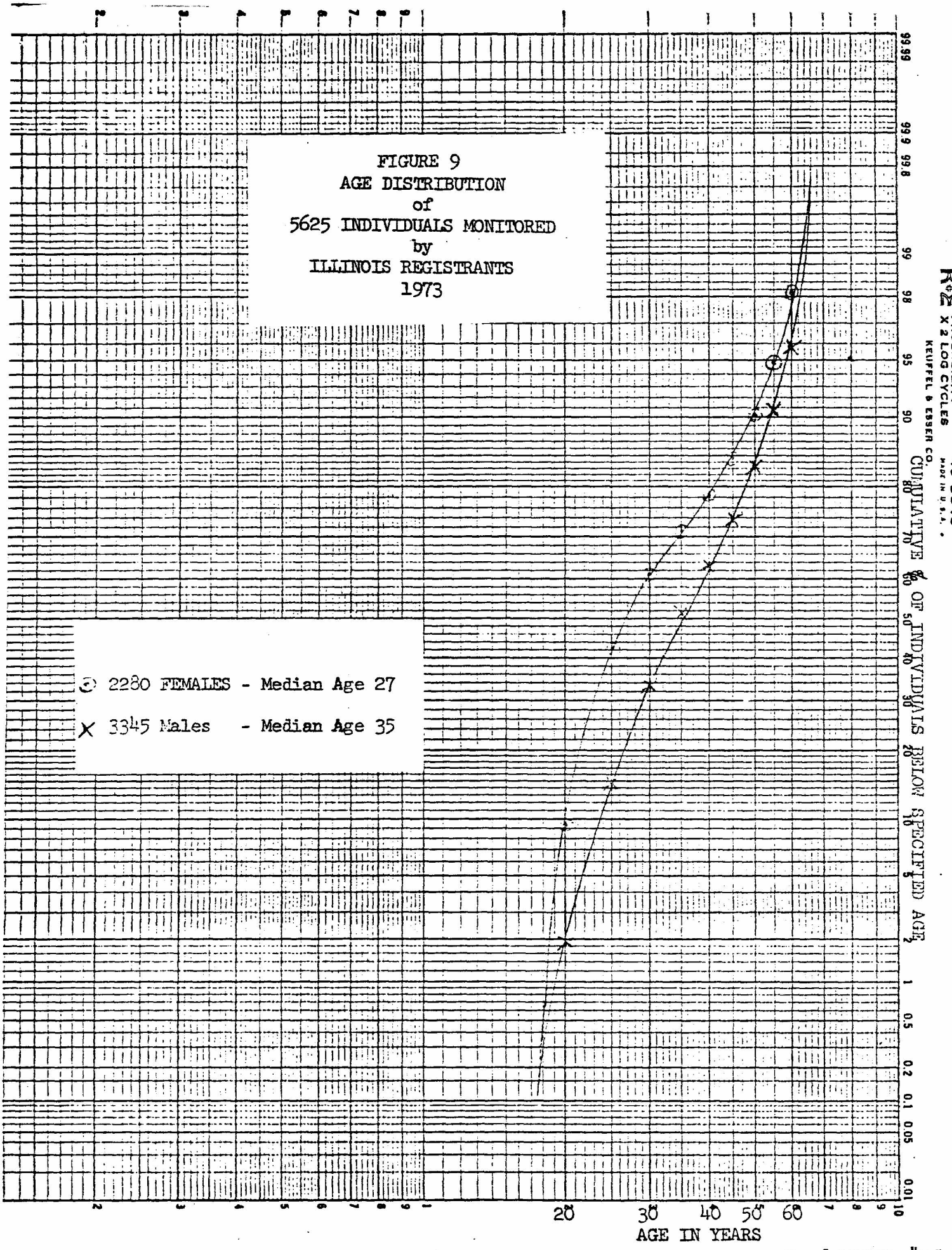
FIGURE 9
AGE DISTRIBUTION
of
5625 INDIVIDUALS MONITORED
by
ILLINOIS REGISTRANTS
1973
2280 FEMALES - Median Age 27
3345 Males - Median Age 35
CUMULATIVE % OF INDIVIDUALS BELOW SPECIFIED AGE
AGE IN YEARS
20
30
40
50
60
K+E PROBABILITY X 2 LOG CYCLES
KEUFFEL & ESSER CO.
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Enclosure "A"

TABLE 6

ILLINOIS REGISTRANTS

		1968	1969	1970	1971	1972	1973	AEC Licensees Subject to §20.407 1973	1974
Number Monitored	Total	4438	5381	5215	6385	6742	5625	67862	85097
	Females	1833	2205	2305	2698	2780	2280	-	-
	Males	2605	3176	2910	3687	3962	3345	-	-
#(%).With No Measurable Exposure	Total	1333(30.0)	1908(35.46)	1566(30.03)	2373(37.17)	2502(37.11)	2326(41.35)	38995(57.5)	51805(60.9)
	Females	487	672	658	880	857	816	-	-
	Males	846	1236	908	1493	1645	1510	-	-
#(%) With Measurable Exposure	Total	3105(70.0)	3473(64.54)	3649(69.97)	4012(62.83)	4240(62.89)	3299(58.65)	28867(42.5)	33292(39.1)
	Females	1346	1533	1647	1818	1923	1464	-	-
	Males	1759	1940	2002	2194	2317	1835	-	-
#(%) Exceeding 0.5 Rem	Total	826(18.61)	819(15.22)	629(12.06)	729(11.42)	831(12.33)	730(12.98)	9812(14.5)	10031(11.8)
	Females	292	272	233	211	306	286	-	-
	Males	534	547	396	518	525	444	-	-
#(%) Exceeding 2.0 Rems	Total	162(3.65)	144(2.68)	111(2.13)	147(2.30)	166(2.46)	162(2.88)	3421(5.0)	3003(3.6)
	Females	32	40	37	42	37	44	-	-
	Males	130	104	74	105	129	118	-	-
Rems	Total	1958.47	1638.75	1811.26	1516.52	1657.73	1450.58	21268	20810
	Females	496.50	578.19	674.27	528.26	555.72	510.51	-	-
	Males	1461.97	1060.56	1136.99	988.26	1102.01	940.07	-	-
Average Rems/Individual	Total	0.441	0.305	0.347	0.238	0.246	0.258	0.313	0.245
	Female	0.271	0.262	0.293	0.196	0.200	0.224	-	-
	Male	0.561	0.334	0.391	0.268	0.278	0.281	-	-
Average Rems/Individual With Measurable Exposure	Total	0.631	0.472	0.496	0.378	0.391	0.440	0.737	0.625
	Female	0.369	0.377	0.409	0.291	0.289	0.349	-	-
	Male	0.831	0.547	0.568	0.450	0.476	0.512	-	-

Enclosure "A"

PRO'S AND CON'S OF ALTERNATIVES

Alternative 1: Decide not to implement the NCRP recommendation.

Pro: (a) The practical implications of implementing the NCRP recommendation for fertile women are not accurately known at this time.

(b) This alternative would avoid discrimination by sex likely to result from establishing lower limits that apply only to women.

(c) This alternative would be in accord with the informal views of the EEOC and the Department of Justice regarding the legality of regulations implementing the NCRP recommendations under Title VII of 1964 Civil Rights Act.

Con: (a) This alternative would be inconsistent with AEC's general practice of adopting the principal recommendations of the NCRP, ICRP, and FRC.

(b) The exposure limits in NRC regulations continue to be in excess of NCRP recommendations for limiting exposure to embryos or fetuses.

Alternative 2.a: Impose a lower limit on women of 0.17 rem/calendar quarter, without a waiver.

Pro: (a) This alternative would be consistent with AEC's general practice of adopting the principal recommendations of NCRP.

(b) There would be some small reduction in the risk to embryos or fetuses of those women who become pregnant while employed in work involving radiation exposure.

Enclosure "B"

(c) A limit of 0.17 rem/calendar quarter, or 0.5 rem/nine month pregnancy would not require any follow-up action when a licensee is informed of a pregnancy.

Con: (a) Lower dose limits for women could lead to discrimination against the employment of women.

(b) Direct implementation of a rule applicable to all women would make no provision for the woman who cannot or does not wish to become pregnant to be employed under dose limits otherwise applicable to adults.

(c) According to the views of EEOC and the Department of Justice this alternative probably would be held to be inconsistent with Title VII of the Civil Rights Act of 1964.

(d) This alternative could be used by licensees who are also government contractors as a reason for not making "good faith efforts" towards affirmative action on equal employment of women under Executive Order 11246.

Alternative 2.b: Impose a lower limit on women of 0.5 rem/calendar quarter, without a waiver.

Pro: (a) This alternative would be inconsistent with AEC's general practice of adopting the principal recommendations of NCRP.

(b) There would be some small reduction in the risk to embryos or fetuses of those women who become pregnant while employed in work involving radiation exposure.

(c) A limit of 0.5 rem/quarter would permit a greater degree of flexibility to a licensee in utilization of workers to accomplish necessary work.

Con: (a) - (d) As in Alternative 2.a.

(e) This alternative would permit a woman to receive a large portion of the NCRP recommended dose limit to an embryo or fetus before pregnancy might be recognized.

(f) This alternative would require a licensee to take certain further action upon being informed of a pregnancy. These actions may involve questions concerning invasion of privacy, depending upon how the regulation was implemented, and the additional action and controls would introduce further potential for discrimination in employment.

Alternative 3.a: Impose a lower limit on women of 0.17 rem/calendar quarter, with a waiver to go to present limits.

Pro: (a) This alternative would be consistent with AEC's general practice of adopting the principal recommendations of NCRP.

(b) There would be some small reduction in the risk to embryos or fetuses of those women who become pregnant while employed in work involving radiation exposure.

(c) A limit of 0.17 rem/calendar quarter, or 0.5 rem/nine month pregnancy, would not require any follow-up action when a licensee is informed of a pregnancy.

(d) Provision of a waiver would allow a woman who cannot or does not wish to become pregnant to be employed under dose limits otherwise applicable to adults.

Con: (a) Lower dose limits for women could lead to discrimination against the employment of women.

(b) This alternative could be used by licensees who are also government contractors as a reason for not making "good faith efforts" towards affirmative action on equal employment of women under Executive Order 11246.

(c) Requires that a woman be provided a basis upon which to make an informed decision regarding informing her employer of her pregnancy. Such action involves questions concerning invasion of privacy and further potential for loss of employment.

(d) This alternative would encourage requests for exception to current exposure limits. Such exceptions have never been granted.

(e) Presents legal questions regarding the status of a fetus as a person, and the right of a mother to waive a protective regulation in its favor.

Alternative 3.b: Impose a lower limit on women of 0.5 rem/calendar quarter, with a waiver to go to present limits.

Pro: (a) This alternative would be consistent with AEC's general practice of adopting the principal recommendations of NCRP.

(b) There would be some small reduction in the risk to embryos or fetuses of those women who become pregnant while employed in work involving radiation exposure.

(c) A limit of 0.5 rem/calendar quarter would permit a greater degree of flexibility to a licensee in utilization of workers to accomplish necessary work.

(d) Provision of a waiver would allow a woman who cannot or does not wish to become pregnant to be employed under dose limits otherwise applicable to adults.

Con: (a) Lower dose limits for women could lead to discrimination against the employment of women.

(b) This alternative could be used by licensees who are also government contractors as a reason for not making "good faith efforts" towards affirmative action on equal employment of women under Executive Order 11246.

(c) This alternative requires that a woman be provided a basis upon which to make an informed decision regarding informing her employer of her pregnancy. Such action involves questions concerning invasion of privacy and further potential for loss of employment.

(d) This alternative would encourage requests for exception to current exposure limits. Such exceptions have never been granted.

(e) Presents legal questions regarding the status of a fetus as a person, and the right of a mother to waive a protective regulation in its favor.

Alternative 4: No general lower limit, but require that a licensee, upon being informed of a pregnancy, take action to limit further exposure during the gestation period such that the embryo or fetus is unlikely to receive a dose equivalent in excess of 0.5 rem.

Pro: (a) This alternative would implement the NCRP recommendation, but not adopt a lower dose limit for all women with the disadvantages inherent thereto.

(b) There would be some small reduction in the risk to embryos or fetuses of those women who become pregnant while employed in work involving radiation exposure.

(c) This alternative minimizes the impact of additional controls on the employability of women by its application only to pregnant women.

Con: (a) Any action differentiating between females and males involves potential for impact on the employability of women.

(b) This alternative would permit a woman to exceed the NCRP recommended dose limit to an embryo or fetus before pregnancy might be recognized.

(c) This alternative requires that a woman be provided a basis upon which to make an informed decision regarding informing her employer of her pregnancy. Such action involves questions regarding invasion of privacy and further potential for loss of employment.

Alternative 5: Lower the limit for all workers.

Pro: (a) Implementation would avoid possibility of discrimination by sex.

(b) There would be some reduction in risk to individual workers for whom radiation exposure would be reduced, as well as the

small reduction in the risk to embryos or fetuses of those women who become pregnant while employed in work involving radiation exposure.

(c) Would constitute affirmative action with respect to the petition filed by the Natural Resources Defense Council.

Con: (a) Would go beyond any NCRP, ICRP, or FRC recommendation.

(b) Some maintenance tasks at LWR's might be virtually impossible. For example, in a 20 R/hour field, a worker would have only 1.5 minutes less approach and withdrawal time.

(c) Implementation would cost the nuclear industry substantial sums of money (unquantified) in that it would be necessary either to apply design and engineering efforts or employ additional workers in order to accomplish essential work within reduced individual dose limits. The latter could result in a net increase in total man-rems of exposure.

(d) Implementation would greatly aggravate (unquantified) the existing critical shortage of available workers in certain key occupations, e.g., in nuclear power plants and industrial radiography.

(e) Bases limits for all workers on a comparatively minor problem.

Alternative 6: Lower the limit to 0.17 rem/calendar quarter for all workers, with a waiver for all workers to go to present limits.

Pro: (a) Implementation would avoid possibility of discrimination by sex.

(b) There would be a reduction in risk to individual workers for whom radiation exposures would be reduced, as well as the small reduction in the risk to embryos or fetuses of those women who become pregnant while employed in work involving radiation exposures.

(c) This alternative would constitute affirmative action with respect to the NRDC petition.

(d) Would permit the individual to make an informed decision regarding employment in work involving potential for exposure above the limit.

(e) Would permit a degree of flexibility to a licensee in accomplishing essential work involving radiation exposure with limited available trained workers, probably with a net savings in total man-rems.

Con: (a) This alternative would go beyond any NCRP, ICRP, or FRC recommendation.

(b) Would emphasize the issue of hazard pay in labor-management negotiations.

(c) Bases limits for all workers on a comparatively minor problem.

(d) This alternative would encourage requests for exception to current exposure limits. Such exceptions have never been granted.

Alternative 7: Advise women of the NCRP recommendation and the reasons therefor, in conjunction with issuance of a Regulatory Guide that sets forth the biological risks associated

with radiation exposure to an embryo or fetus, leaving the choice to the woman regarding continuing employment in work involving radiation exposure within current limits.

Pro: (a) This alternative would implement the principal recommendation of the NCRP although the NRC would not adopt the recommended dose limit.

(b) It would avoid much of the potential for discrimination by sex and the potential impact on employability of women, and would accord with the views of EEOC and the Department of Justice regarding the legality of regulations implementing the NCRP recommendation under Title VII of the Civil Rights Act of 1964.

(c) It would avoid much of the potential for invasion of privacy.

(d) This alternative could not be used by licensees who are also government contractors as a reason for not making additional "good faith efforts" toward affirmative action on equal opportunity for employment of women under Executive Order 11246.

(e) A woman would have the opportunity to make an informed personal decision regarding the application of the NCRP recommendation to her employment and to her offspring.

Con: (a) Would not provide specific numerical limits applicable to women, as desired by some licensees. The absence of limits is

considered by licensees to increase the risk of legal action in the event of the birth of a malformed child or the development of a childhood leukemia or other cancer.

'ashington, D.C., during regular bus' ess hours.

LEONARD LEHMAN,
Acting Commissioner of Customs.

Approved: December 8, 1975.

DAVID R. MACDONALD,
Assistant Secretary of the Treasury.

[FR Doc.75-33716 Filed 12-12-75;8:45 am]

DEPARTMENT OF AGRICULTURE

Farmers Home Administration

[7 CFR Part 1822]

[FmHA Instruction 444.4]

ARM LABOR HOUSING LOAN POLICIES

Procedures and Authorizations

Notice is hereby given that the Farm-s Home Administration has under con-deration revisions to Sections 1822.72 nd 1822.73 of Subpart C of Part 1822, itle 7, Code of Federal Regulations (31 R 14143) to eliminate requirements that ounty Committees certify eligibility of abor Housing loan applicants.

Interested persons are invited to sub-it written comments, suggestions, data, arguments to the Office of the Chief, irectives Management Branch, Farm-s Home Administration, U.S. Depart-ent of Agriculture, Room 6316, South uilding, Washington, D.C. 20250, on before January 14, 1976. Written com-ents received on or before January 14, 976 will be considered before final ac-on is taken on this proposal. Copies of l written comments received will be vailable for examination by interested ersons at the Office of the Chief, Di-ectives Management Branch during reg-ar business hours (8:15 a.m.-4:45 p.m.).

As proposed, § 1822.72(c) is revised as ollows:

1822.72 Final preparation and processing of loan docket.

* * * * *

(c) *County Committee certification.* ounty Committees will not be used to eview Labor Housing loan applications.

* * * * *

Section 1822.73(b)(1) is removed as ollows:

1822.73 Loan approval.

* * * * *

(b) *Loan approval official's responsi-ility.*

* * * * *

(1) [Removed]

* * * * *

42 U.S.C. 1480; delegation of authority by he Secretary of Agriculture, 7 CFR 2.23; eleation of authority by the Assistant Sec-etary for Rural Development, 7 CFR 2.70)

Date: December 8, 1975.

FRANK B. ELLIOTT,
Administrator, Farmers Home Administration.

[FR Doc.75-33727 Filed 12-12-75;8:45 am]

[7 CFR Part 1822]

[FmHA Instruction 444.6]

FARM LABOR HOUSING GRANT POLICIES

Procedures and Authorizations

Notice is hereby given that the Farmers Home Administration has under consideration revisions to Section 1822.218 of Subpart E of Part 1822, Title 7, Code of Federal Regulations (35 FR 14437) to eliminate the requirement that County Committees certify eligibility of labor housing grant applicants.

Interested parties are invited to submit written comments, suggestions, data, or arguments to the Office of the Chief, Directives Management Branch, Farmers Home Administration, U.S. Department of Agriculture, Room 6316, South Building, Washington, D.C. 20250, on or before January 14, 1976. Written comments received on or before January 14, 1976 will be considered before final action is taken on this proposal. Copies of all written comments received will be available for examination by interested persons at the Office of the Chief, Directives Management Branch during regular business hours (8:15 a.m. to 4:45 p.m.)

As proposed, § 1822.218(b) is revised as follows:

§ 1822.218 Actions prior to grant approval.

* * * * *

(b) *County Committee certification.* County Committees will not be used to review labor housing grant applications.

* * * * *

(42 U.S.C. 1480; delegation of authority by the Secretary of Agriculture, 7 CFR 2.23; delegation of authority by the Assistant Secretary for Rural Development 7 CFR 270.)

Date December 8, 1975.

FRANK B. ELLIOTT,
Administrator, Farmers Home Administration.

[FR Doc.75-33728 Filed 12-12-75;8:45 am]

[7 CFR Part 1822]

(FmHA Instruction 444.8)

RURAL HOUSING SITE LOAN POLICIES

Procedures and Authorizations

Notice is hereby given that the Farmers Home Administration has under consideration revisions to Section 1822.271 of Subpart G of Part 1822, Title 7, Code of Federal Regulations (35 FR 10667) to eliminate the requirement that County Committees certify eligibility of Rural Housing Site loan applications.

Interested parties may submit written comments, suggestions, data, or arguments to the Office of the Chief, Directives Management Branch, Farmers Home Administration, U.S. Department of Agriculture, Room 6316, South Building, Washington, D.C. 20250, on or before January 14, 1976. Written comments received on or before January 14, 1976 will be considered before final action is ta' on this proposal. Copies of all wi n comments received will be available for examination by interested persons at the Office of the Chief, Directives, Management Branch during regular business hours (8:15 a.m. to 4:45 p.m.).

As proposed § 1822.271(d)(2) is revised as follows:

§ 1822.271. Processing applications.

* * * * *

(d) *Preparation of docket forms.*

* * * * *

(2) *County Committee certification.* County Committees will not be used to review RHS loan applications.

* * * * *

(42 U.S.C. 1480; delegation of authority by the Secretary of Agriculture, 7 CFR 2.23; delegation of authority by the Assistant Secretary for Rural Development, 7 CFR 270.)

Dated: December 8, 1975.

FRANK B. ELLIOTT,
Administrator, Farmers Home Administration.

[FR Doc.75-33729 Filed 12-12-75;8:45 am]

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Food and Drug Administration

[21 CFR Part 1000]

[Docket No. 75N-0340]

MEDICAL RADIATION EXPOSURE OF WOMEN OF CHILDBEARING AGE

Advance Notice of Proposed Guideline Publication

The Commissioner of Food and Drugs announces that proposed guidelines are to be developed for medical radiation exposure of women of childbearing age. Comments and data are to be submitted before February 13, 1976, to: Division of Compliance, Bureau of Radiological Health (HFX-440), 5600 Fishers Lane, Rockville, MD 20852.

The Bureau of Radiological Health of the Food and Drug Administration (FDA) announces that studies of certain diagnostic x-ray and nuclear medicine practices are to be undertaken to determine those actions that may be taken to minimize unnecessary ionizing radiation exposure of the developing human embryo and fetus. In these studies, efforts will be made to collect sufficient information to provide a basis for appropriate radiation protection guidelines for use by the clinician. Comments are invited on this subject and possible guidelines that may be developed.

The FDA, through the Bureau of Radiological Health and under authority of the Radiation Control for Health and Safety Act of 1968 (Pub. L. 90-602, 42 U.S.C. 263b et seq.) conducts and supports research, training, and operational activities to minimize unnecessary exposure of the public to electronic product radiation. In carrying out the purposes of the act, the Commissioner is authorized to make such recommendations relating to the control of electronic product

Enclosure "C"

radiation as he considers appropriate (section 356(b)(1)(A)). In this capacity and under the authority of section 301 of the Radiation Control for Health and Commissioner is considering the development of guidelines that would provide recommendations to health practitioners and others concerning the exposure of women of childbearing age to ionizing radiation for diagnostic purposes. These recommendations are intended to minimize unnecessary exposure of developing human embryos and fetuses to ionizing radiation that results from radiological examinations. As used in this advance notice of proposed rule making, the term "radiological" includes both x-ray and nuclear medicine procedures used in medicine for diagnosis of disease or injury.

These guidelines would be among several which will be proposed by the Commissioner concerning the hazards and control of electronic product radiation or radiation from other sources. Some of these guidelines may be established for areas or activities inappropriate for mandatory control. However, they will be developed in cooperation with national scientific and technical authorities and representatives of professional, public, and private groups that have an interest and knowledge in the field. The guidelines will therefore represent a consensus of expert opinion upon which individual practitioners and allied health personnel can rely. These guidelines, which will provide guidance on techniques for reducing unnecessary exposure to electronic product or other sources of radiation such as nuclear medicine procedures, would be implemented through educational programs and cooperative activities with professional organizations and State health agencies. This advance notice is being issued pursuant to the FDA's policy of early public participation in guideline development activities.

It presently appears that general guidance can be provided which is appropriate for all types of diagnostic procedures. Thus, as presently contemplated, the proposed guidelines would provide recommendations regarding ionizing radiation exposure from both x-ray examinations and diagnostic procedures employing radiopharmaceuticals or other sources of ionizing radiation. However, should the information developed during this study or from comments received as a result of this advance notice indicate that nuclear medicine or other non-x-ray procedures require different recommendations, appropriate guidelines may be developed for each type of procedure, and they may be published separately.

Interested persons are invited to participate in developing the proposed guidelines by submitting written comments or data on the subject. Communications on the proposed guidelines should be sent to the address noted above. Comments received on or before February 13, 1976 will be considered by the Commissioner before the proposed guidelines are written. When a determination is made on their content, the guidelines will be published in the FEDERAL REGISTER as proposals and public comment will be invited. Comments received after February 13, 1976, will be considered with the public comment on the proposed guidelines and will be used in revising the proposed guidelines.

To assist the Commissioner in this study and the development of useful guidelines, detailed scientific and technical data, as well as comments or suggestions, supported by detailed rationale and justification are solicited on the following questions:

1. Is it advisable to schedule nonemergency radiological examinations of the abdomen of women of childbearing age only during the early part of the menstrual cycle? If such scheduling is appropriate, should this be done only when the examination could be deferred until term if a pregnancy is observed or suspected at the time the examination is scheduled to occur?

2. Is it feasible to modify radiological examinations of known or possibly pregnant women, e.g., fewer views, different technique factors, to reduce exposure of the embryo or fetus? If so, under what circumstances? To what extent does this result in an unacceptable loss of diagnostic information?

3. Is it advisable to recommend to institutions that the physician ordering the examination indicate on the referral slip whether or not the patient is or could be pregnant?

4. Is it advisable to recommend to institutions that the physician ordering the examination indicate on the referral slip whether he would be satisfied with a limited study, i.e., modified from the routine manner of performance, on a patient known or suspected to be pregnant?

5. For which abdominal x-ray examinations could fetal shielding be employed without compromising the diagnostic value of the radiograph?

6. To what extent do pelvimetry examinations affect decisionmaking in the management of delivery?

7. How much radiation exposure is received by the embryo or fetus from various diagnostic nuclear medicine procedures?

8. With what frequency are nuclear medicine diagnostic procedures performed on women of childbearing age?

9. How useful is nuclear medicine placental scanning in the medical management of pregnant women?

Individuals or organizations wishing to provide information on these questions or other relevant topics for use in the development of the guidelines, or wishing to receive information made public on the development of these guidelines, should send their comments or addresses to the address noted above.

As part of this program, the Bureau of Radiological Health will prepare a technical overview report which will include an analysis of the current recommendations regarding medical radiation exposure of women. This report will summarize information on the benefits and limitations of the current recommendations, review the most recent scientific data relating to this question, and suggest a possible alternative approach. When completed, this technical overview report will be published and made available to interested parties, and it will serve as the basis for further discussion leading to appropriate guidelines for general clinical use.

When developed, the guidelines will be codified as voluntary recommendations in a new Subart C of Part 1000 of Chapter I of Title 21 of the Code of Federal Regulations. Subpart C, "Guidelines and Recommendations," is being established (see the FEDERAL REGISTER of September 16, 1975 (40 FR 42749)) to provide wide dissemination and a permanent record of these radiation protection recommendations.

This advance notice of proposed guideline publication is issued under the authority of the provisions of the Public Health Service Act as amended by the Radiation Control for Health and Safety Act of 1968 (sec. 356, 82 Stat. 1174–1176 (42 U.S.C. 263d)) and under authority delegated to the Commissioner (21 CFR 2.120).

Dated: December 8, 1975.

SAM D. FINE,
Associate Commissioner for Compliance.

[FR Doc.75-33649 Filed 12-12-75;8:45 am]

DEPARTMENT OF TRANSPORTATION

National Highway Traffic Safety Administration

[49 CFR Part 571]

[Docket No. 75-32; Notice 1]

FEDERAL MOTOR VEHICLE SAFETY STANDARDS

Definition of "Gross Axle Weight Rating"

This notice proposes to amend the definition of "Gross axle weight rating" and "GAWR" to require that the rating be established for 60-mph speeds or the vehicle's maximum operational speed, whichever is lower.

"Gross axle weight rating" is defined in 49 CFR § 571.3 as "the value specified by the vehicle manufacturer as the load-carrying capacity of a single axle system, as measured at the tire-ground interfaces." The GAWR value on the vehicle's certification label indicates the strength of the axle systems, as a measure of the loads that the vehicle may safely carry. Some of the safety standards depend on specific GAWR values for their application. For example, Standard No. 121, *Air Brake Systems* (49 CFR 571.121), has immediate application to trucks, buses, and trailers with GAWR values under 24,000 pounds, but does not apply to vehicles with GAWR values in excess of 24,000 pounds until September 1, 1976. Some manufacturers have been attempting to qualify for the later effective date of Standard No. 121 by certifying a vehicle at a speed less

Enclosure "C"

ENCLOSURE "D"

EFFECTS OF IONIZING RADIATION ON GROWTH AND DEVELOPMENT

Exposure of an embryo or fetus to ionizing radiation results in biological effects other than increased incidence of leukemia and other cancers. These effects on growth and development were not evaluated in Enclosure "A" to this Addendum because they are of concern at dose levels that are higher by at least an order of magnitude than doses at which there is concern regarding increased incidence of leukemia and other cancers.

Ionizing radiation has three major effects on human development: impairment of growth, microcephaly, and mental retardation. Knowledge about the dose levels at which these effects occur comes principally from data relating to: (1) patients irradiated for medical reasons; (2) the Hiroshima-Nagasaki survivors of the atomic bombs; and (3) the people of the Marshall Islands who were exposed to nuclear fallout in 1954.

In general, investigators have been unable to find changes in various behavioral and functional parameters from exposures below 25 rads. It has been found that certain reflexes and locomotor functions were altered in rats exposed in utero to 50 rads, and more complex motor performances, such as traversing a narrow path, were affected by as little as 25 rads. Certain behavioral responses in the open field and some forms of conditioning have been altered by 25 rads.

In assessing the behavioral effects of in-utero exposure of Japanese children to radiation from the atomic bombs, we have no simple, single-measure tests comparable to those which indicated a significant though small diminution in body growth and head size among those closest to the hypocenter. Owing to

the lack of appropriate and sensitive tests of brain function, mental retardation has had to be severe to be recognized, even using a number of measures; it was rare below 100 rads and not observed to excess below 25 rads.

The effects of ionizing radiation on growth and development are discussed in some detail and extensive bibliographic references provided in Chapter VI of the BEIR Report*/. That chapter has the following summary:

> "VIII. Summary
>
> It has long been recognized that fetal and juvenile mammals are especially sensitive to harm by exposure to ionizing radiation. The mechanisms by which radiation alters the development of structure, behavior, and other functions are extremely complex.
>
> With single brief exposures, the lowest doses observed to bring about these various effects at certain stages in experimental mammals range from a few rads to 50 rads: Occasional germ cells, at certain stages in early life, are killed by a few rads, with no detectable functional effects. Subtle but permanent alterations in nerve cells, at some stages, occur after 10 to 20 rads, but no alterations in behavior are recognized until about 25 rads are given at some stages in prenatal life. The threshold for morphologic alterations in man following irradiation in prenatal life are less precisely known, but observations of the Japanese exposed to atomic bomb radiation place it between 50 and 25 rads to the mother.
>
> There is little information about the effects of chronic low levels of radiation, but experiments have demonstrated that about 1 rad per day, extended over a large part of gestation, is the lowest dose that alters development. Radionuclides tend to be concentrated in certain tissues and act over long periods, but where they can be compared with exposures to atomic bombs and therapeutic X-rays, their effects are similar.
>
> Thus, existing dose-effects data suggest that no effects on growth and development are likely to occur at dose levels compatible with present radiation protection standards."

---

*/"The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," Report of the Advisory Committee on the Biological Effects of Ionizing Radiations, National Academy of Sciences - National Research Council, November 1972.

Enclosure "D"

TO: The Commissioners

FROM: Peter L. Strauss, General Counsel

SUBJECT: Analysis of constitutional and other legal limitations on NRC's ability to amend its regulations to set lower radiation standards for fertile women

(b)(5)

Contact:
James A. Glasgow
X-27375

Enclosure "E"

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Enclosure "E"

Public Citizen

DOCKET NUMBER PROPOSED RULE PR-19,20 (40 FR 799) (25)
Exposure Levels for Fertile Women

March 5, 1976

DOCKETED USNRC MAR 10 1976 Office of the Secretary Docketing & Service Section

Mr. Samuel J. Chilk, Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Secretary Chilk:

On January 20, 1975, Andrea Hricko of the Public Citizen Health Research Group submitted comments on proposed Atomic Energy Commission regulations for the radiation exposure to fertile women. A review of the applicable file in the Nuclear Regulatory Commission's Public Document Room reveals that these comments are not included, although we are certain they were mailed for filing. In any event, we request that Ms. Hricko's comments be included in the file, for purposes of making the record complete. A copy of Ms. Hricko's comments are enclosed. I request that they be included with the comments on 40 FR 799, January 3, 1975.

Thank you for your time.

Yours truly,

Sidney M. Wolfe, M.D.

cc (w/enclosure): U.S. Nuclear Regulatory Commission Document Room

Acknowledged by card 3-10-76, ere

HEALTH RESEARCH GROUP • 2000 P STREET, N.W., WASHINGTON, D.C. 20036 • (202) 872-0320

Enclosure "F"

DOCKET NUMBER PROPOSED RULE PR-19,20 (40 FR 799) (25)
Exposure Levels for Fertile Women

Public Citizen

DOCKETED USNRC
MAR 10 1976
Office of the Secretary Docketing & Service Section

Health Research Group Statement on Proposed AEC Regulations
for the Radiation Exposure of Fertile Women
(Federal Register, 1/3/75, pages 799-800)

For further information:
Andrea Hricko 872-0320

January 20, 1975

The AEC's proposed regulations on radiation exposure for fertile women claim to implement the National Council on Radiation Protection and Measurements (NCRP) recommendations in Report No. 39, issued January 15, 1971. Those recommendations state that fertile "women should be employed only in situations where the annual dose accumulation is unlikely to exceed 2 or 3 rems..." According to the NCRP, with such a dose limit, exposure to the fetus would probably not exceed .5 rems before a woman recognized that she was pregnant. The NCRP states that such a limit is necessary because there is a positive relationship between fetal irradiation and childhood cancer.

According to the AEC's own data, however, 11.8% of all monitored workers in 1973 were exposed to levels of radiation in excess of 2 rems. The AEC does not state how many of these 3,435 individuals were women workers. Thus, a significant number of women may be currently exposed to levels of radiation that the AEC concedes may be harmful to their embryos or fetuses.

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Enclosure "F"

Will the AEC proposed regulations correct this situation? We suggest that the regulations are mere window-dressing to make it appear that the AEC is taking affirmative though belated action to protect women employees. In fact, the proposed regulations are actually meaningless statements of philosophy that are virtually unenforceable because of the AEC's primary concern for the costs to the nuclear industry and secondary concern for the safety of workers under its jurisdiction.

The AEC has proposed two amendments to the current regulations. First, it has added one provision to its worker instruction regulations that would require employers to tell employees about the biological risks of radiation exposure to the fetus or embryo. The woman worker is thus placed with the burden of deciding whether or not to work at a potentially dangerous job. Clearly, a woman who is exposed to an annual dose of radiation exceeding 2 rems will have difficulty evaluating the risks she is taking, in that the AEC admits that such exposure is potentially hazardous, yet does not require that such exposure be forbidden (see paragraph below). The burden of <u>insuring</u> a safe workplace should be placed on the AEC.

Second, the AEC has added one other provision to its current regulations. The current regulations already ask that licensees "make every reasonable effort to maintain radiation exposures...as far below the limits specified in this part as possible." (The current annual maximum dose level is 5 rems.) The AEC proposed regulation would add the following: "[AEC licensees] should make particular efforts to keep the radiation exposure of an embryo or fetus to the very lowest practicable

level during the entire gestation period...." The state of technology, as well as the costs of lowering the dose levels, are allowable considerations in determining the "lowest practicable levels," in both the current and amended regulations.

Two observations must be made. First, neither of the new provisions for women workers are mandatory requirements. Second, both the present regulations and their amendments hinge on the nuclear industry's own assessment of its financial capability to lower the radiation exposure to a safe level. The AEC's statement of reasons accompanying the proposed regulations already alleges, without any substantiation, that it is impracticable for the nuclear industry to lower the dose limits for all workers because it would cost "large sums of money." Thus, it is clear at the outset that the AEC never genuinely expects that the nuclear industry will guarantee that the radiation exposure for all fertile women is kept below the 2-3 rem hazard level.

How does the AEC currently enforce the provisions requiring that the levels of exposure be kept to the "lowest practicable level?" Since costs are such a prime factor in the AEC's proposal, it is necessary to review the AEC's Regulatory Guide 8.10, "Operating Philosophy for Maintaining Occupational Radiation Exposures as Low as Practicable," to determine how the validity of economic claims made by industry are evaluated by the AEC.

The Regulatory Guide states that licensee management "should be committed to maintaining exposures as low as practicable." One aspect to this "commitment" is that

> modifications to operating and maintenance procedures and to plant equipment and facilities should be made where they will substantially reduce exposures at a reasonable cost. [emphasis added.]

Management must merely demonstrate that it has sought changes and implemented improvements "where practicable." During the past year the U.S. has witnessed what results when workers rely on management "commitments" to a safe workplace -- rather than strict regulations -- as evidence has accumulated showing workers dying from cancer after exposure to such chemicals as bis-chloromethyl ether, vinyl chloride, and arsenic.

Thus, we have a situation where the AEC admits that (1) levels above 2-3 rems of radiation exposure are potentially hazardous to women of child-bearing age; (2) a special standard limiting the employment of women workers in AEC facilities would be discriminatory; but that (3) over 10% of workers are currently exposed to annual levels over 2 rems, even though current regulations require AEC licensees to keep the levels to the "lowest practicable level." Obviously, then the voluntary requirement that AEC licensees "make every reasonable effort" to minimize exposure has not to date resulted in creating a safe workplace for all [i.e., male and female] employees. Only a mandatory requirement that AEC facilities reduce exposure levels to an enforceable numerical limit for ALL employees will result in guarantee of a safe workplace, without discriminating against women employees.

At a time when health and safety requirements are already being compromised by threats of economic depression and job lay-offs, it seems improper for a government regulatory agency

to publicly state, without full disclosure or substantiation, that the nuclear industry cannot practicably afford to protect its workers from the dangers of radiation exposure. These economic claims emerge as a weak excuse for the fact that neither the AEC nor the nuclear industry is truly committed to protecting the health of all workers who are exposed to radiation. Those women workers who are employed in AEC facilities should not be fooled by the AEC's empty assurances that women will be protected by the new regulations. These women should demand that the AEC require the nuclear industry to publicly testify with full disclosure of the actual costs of implementing meaningful safety regulations to protect all workers. As the regulations stand now, they protect the profits of the nuclear industry while providing no additional health assurances for fertile women workers.

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

March 12, 1976

MEMORANDUM FOR: Tom Rehm

FROM: Ben Huberman

SUBJECT: FERTILE WOMEN PAPER - ADDENDUM TO SECY-76-535 (REHM MEMO, 2-17-76)

I believe that the paper provides the additional information requested by the Commission, and adequately scopes the alternatives available to the Commission.

Nevertheless, I think the paper does not do justice to the real strengths of the alternative which the paper recommends. These strengths include:

- First, while the paper adequately discusses the capability of the recommended alternative to minimize the possibility of sex discrimination in employment, the paper fails to give due emphasis to the primary motivation for that alternative, as for all the others; namely, NRC's concern for and responsibility to provide adequate protection for the fetus, in accord with the NRCP recommendation. Thus, the paper should make clearer that the aim of the alternative is primarily to provide radiological protection, and only secondarily to provide that protection with a minimum social impact.

- Second, it avoids the potential, which several of the other alternatives have, of shrinking the pool of skilled labor, which may cause an increase in total population exposure with a concomitant increase in all biological effects, including effects on fetuses. (In this connection we should not ignore the real impact of NRC's decision -- whatever it may be -- on the approach of other agencies responsible for radiation protection).

- Third -- and most important -- the recommended alternative is an effective step in further protection of the individual fetus. While it cannot, perhaps, be said to be the most effective alternative of those presented, it cannot be said to be ineffective nor should it be seen in that light. A sizeable fraction of women,

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634-1541

Enclosure "G"

having been made aware of the somewhat greater risk assumed for the fetus, would likely avail themselves, in the event of pregnancy, of the option for alternative work situations that would avoid further increments in that risk. Even if only 50% of the affected women did so, and even if another alternative were 100% effective, the difference in effectiveness in protection of the fetus would be at most a factor of two -- hardly a basis to consider the recommended approach to be ineffective.

- Fourth, while the degree of effectiveness is dependent on the woman, nevertheless the basic responsibility for the effectiveness of radiation protection measures in this instance, as in all other instances, is placed on the licensee. Specifically, the licensee is responsible for

    - maintaining ALARA exposures

    - providing training to persons exposed occupationally, including, in particular, specific instructions to female workers concerning risks in pregnancy, and

    - providing alternative working conditions once the fact of pregnancy becomes known. (For example, a pregnant radiographer might be assigned to monitoring and film evaluation.) While firing an individual in those rare circumstances -- doses above 0.5 rem followed by pregnancy -- may sometimes occur, that should not be accepted as a foregone conclusion. The period over which a lower exposure alternative would have to be provided is not so long -- a few months at most -- that an employer will be quick to unload a skilled worker whose full productive potential will become available again within a matter of months.

In sum, with relatively little effort, I believe the recommended alternative can be presented in a way that more fully substantiates its effectiveness -- both radiologically and sociologically.

cc: Peter Strauss
Bob Minogue
Roger Mattson
Bob Alexander
Walt Cool

UNITED STATES
NUCLEAR REGULATORY COMMISSION

December 14, 1976

SECY-76-286A

POLICY SESSION ITEM

For: The Commissioners

From: Robert B. Minogue, Director, Office of Standards Development

Thru: Executive Director for Operations

Subject: DEVELOPMENT PLAN FOR NUCLEAR FACILITY SITING POLICY AND PRACTICE REVISION

Purpose: To obtain Commission approval of a plan for the development of a more cohesive and explicit siting policy in general philosophy and on specific key issues.

Category: This paper concerns one step in a long term staff effort in a major policy area.

Issue: Whether the stepwise plan proposed herein will result in the cohesive and explicit siting policy needed.

Background: At Policy Session 76-37, August 19, 1976, the staff briefed the Commission on the results of a staff review on reactor site evaluation policy and practice (SECY-76-286). A memorandum of August 31, 1976, from the Secretary of the Commission to the Executive Director for Operations (Enclosure "F"), directed the preparation of a paper in which the staff should consider four main things. On this memorandum, EDO requested the Director, Office of Standards Development, to comment. In a September 24, 1976 memorandum (Enclosure "G"), SD outlined its plans for coordinating the preparation of this paper with input from NRR, RES and ELD. From a joint effort, we have developed in this paper a program plan for consolidation of siting policy and practice.

Decision Criteria: As reflected in part by the Secretary's memorandum of August 31, 1976, a revision of siting policy and practice should provide:

1. Systematization and simplification of the decision process.

2. Improved efficiency of applicants' analysis and NRC's staff review.

3. Reduction in staff review time.

4. Improved predictability of the site review conclusions and recommendations.

Contact:
Roger Mattson, SD
443-6953

5. Enhanced soundness, consistency and equity in the balancing of site evaluation factors.

6. Improved public understanding of siting policy and practice for protecting the health and safety of the public and the environment.

7. Balanced assessments of the available alternatives for supplying a demonstrated need for power in terms of impact on the environment and risk to the health and safety of the public.

Alternatives: As a result of a) discussion of SECY-76-286 in Commission policy session, b) discussions with the Commission concerning the 1976 Five Year Plan and the FY 78 budget request, and c) the Secretary's memorandum of August 31, 1976, the staff believes that the Commission prefers a stepwise approach, over the next two to five years, for the consolidation and clarification of the present siting policy and practice. The present siting policy and practice is basically sound in its assurance of protection of public health and safety. It is, however, difficult to administer, and awkward in its application. Thus, the remaining alternatives fall into two basic categories:

(1) alternatives for ordering priorities in the evaluation of specific program elements - these are addressed in the program plan described in this paper.

(2) alternative methods for solving specific problems -- these will be addressed issue by issue for the specific program elements as they are brought to the Commission for action in the future.

Further discussion of the presentation of alternatives is included in Enclosure "E".

Discussion: Priorities of Issues

The Secretary's memorandum of August 31, 1976, directed that this paper should identify the most important issues on the basis of value/impact analyses of all issues previously identified as requiring attention. The analysis which has been performed is of a subjective judgmental nature. It was performed as a cooperative joint effort through a series of meetings among the technical staff of NRR, RES, and SD. The resulting judgments were reviewed, modified if appropriate, and concurred in by the line management of these program Offices. As a result of this process, the important siting issues have been evaluated and classified below into three categories. These categorizations were also analyzed and cross-checked on the basis of value/impact criteria specified in the Secretary's memorandum. This evaluation is summarized in Enclosure "A".

Having addressed all of the identified issues in this manner, the affected Offices were asked to concur in the judgment that the relative priorities of the various issues could be adequately described as immediate, near term, or long term issues as listed in Categories A, B, and C below. Implied in such judgment is the understanding of those most familiar with siting issues of not only what needs to be accomplished but also what can reasonably be accomplished. Summary descriptions of the three categories are contained in the following outline.

A. The issues most important to the immediate revision of siting policy and practice and the actions required are:

1. Geologic and seismic site evaluation criteria - revise to remove ambiguities and clarify statements subject to misinterpretation and prepare regulatory guides for proper implementation.

2. Pending and future petitions for rulemaking regarding specific siting issues - coordinate the review, resolve the issues and prepare regulations as needed.

3. Early site review - revise 10 CFR Part 50 to provide for early site suitability considerations and prepare an appropriate regulatory guide for applicants and staff stating the information needed for given findings during such an early site review.

4. State/federal interaction - proceed with program to coordinate and reach environmental decisions on sites for utilization or production facilities (the so-called Section 102 study) and complete WINB and SINB study contracts.

5. Emergency plan updating - revise 10 CFR Part 50 and prepare additional regulatory guides to implement emergency planning and preparedness for research reactors and other nuclear facilities and define radiological accidents for which State/local governments should develop preparedness programs (EPA/NRC Task Force established).

6. Accident evaluation practices

   a. Site suitability - review existing practices, based on case reviews and consequence models in WASH-1400, and reconcile differences in accident analysis performed for safety review and for environmental review.

b. Risk assessment - revise the existing practice on accident risk assessments in environmental reviews and develop better and more quantitative bench marks for evaluating accident risks (normalize to Appendix I expected effluent releases).

B. The issues most important to the near future revision of siting policy and practice and actions to be taken are:

1. Siting regulations and policy - revise 10 CFR Part 100 to remove ambiguities and statements subject to misinterpretation, broaden the general siting criteria and remove specific guideline values. Provide supplementary guidance through regulatory guides to implement the revisions.

2. Alternative sites - establish a meaningful alternative site selection practice that considers the health and safety concerns along with the environmental concerns, develops more explicit guidance on ranking environmental and safety factors with emphasis on criteria for concluding that alternative sites should be pursued, and assures a viable site selection procedure by the applicant to which the NRC staff can agree.

3. Emergency planning - using a consistent set of analytical models, estimate the consequences of a spectrum of credible accidents and the capabilities for emergency action in reducing risks.

4. Decommissioning of nuclear facilities - incorporate decommissioning aspects of site suitability into siting practice to provide guidance on decommissioning considerations relative to site evaluation.

C. Issues requiring long term projects for resolution and the actions that would be required for partial answers are:

1. Overall probability values - ideally, determines absolute probability of occurrence values for postulated accidents and for delivery of impact (consequences) such as radiation doses, health effects due to doses, and environmental damage. Achievable is the continuation of the WASH-1400 program to develop a more complete spectrum of analysis which should permit an examination of value/impact relationships of various safety features and siting factors.

2. Acceptable risk - ideally, establish an acceptable risk value which is deemed reasonable by the majority of the general public for protection of health and safety and impacts on the environment. Achievable is the development of improved risk assessments of non-nuclear power generation systems to develop a better characterization of relative risks.

3. Overall risk assessment - ideally, establish a risk evaluation model and methodology capable of assessing the overall impact of siting a nuclear facility on health and safety and the environment in such a way that an absolute risk value could be determined and assessed. Achievable is the establishment of a standard for risk evaluation models and methodology for a comparative risk assessment.

A plan has been developed to address the important issues (Categories A & B, above) for revising the siting policy and practice. It includes only those issues described as immediate issues which can be resolved within two years and the near term issues which may require up to five years or more for resolution. Enclosure "B" describes in more detail the programs required to resolve the immediate issues (Section I) and the near term issues (Section II). Enclosure "C" provides a chart of the major milestones for these programs during the next five years. Plans for resolving issues requiring long term projects of greater than five years have not been discussed.

Other tasks associated with siting policy and practice such as the Environmental and Safety Standard Review Plans have not been included in the enclosed program. Such tasks fall into a general housekeeping category where policy is stated and implemented, not developed or interpreted. These housekeeping tasks will need to be coordinated with the program for consolidation and clarification of siting policy. One mechanism for coordinating this diverse and long range program is by use of a group composed of members from NRR, SD, ELD, NMSS and RES to review the results of the various studies and tasks, recommend additional and further studies, and assure implementation of appropriate revisions of siting policy and practice. This group would be established at the technical staff level and would function outside but in support of normal line functions for the affected Offices, such as case, standards or research project management or budget development.

General Policy Framework

The Secretary's memorandum of August 31, 1976, also directed that this paper should identify alternative general "policy frameworks" for evaluation of the adequacy of proposed sites and for consideration of alternative sites. We believe that such a "policy framework" could be a general statement of safety and environmental

goals or objectives which would tie together for both philosophical and technical consistency, the solutions to the many and diverse siting issues described above. In other words, this general policy framework would be the common thread which guides the long term program plan described above so that the end product is a cohesive and explicit siting policy.

The general policy framework or philosophy for our siting policies and practices can be stated in terms of the basic elements for nuclear facility siting evaluations. These basic elements comprise the foundation upon which a policy framework for siting nuclear power plants has been built. They are included today in the regulations governing the siting and licensing of such nuclear facilities (10 CFR Parts 50, 51, and 100). These elements are:

1. Physical characteristics which affect the design of the facility or the selection of the sites, e.g., natural phenomena which may exist or can occur that could affect safe operation of the facility (seismology, meteorology, geology and hydrology).

2. Facility characteristics which should be considered in conjunction with site characteristics, e.g., engineered safety features, engineering standards, facility use including maximum power level and inventory of radioactive material and unique or unusual design features bearing on probability or consequences of an accident.

3. Regional characteristics which could influence the magnitude of the consequences of an accident or could be cause of an an accident, e.g., population factors, land and water uses, and offsite facilities and activities that might endanger the safe operation of the facility.

4. Facility accidents which should be evaluated for assessing radiological consequences (impact) on the region surrounding the site, i.e., determine the consequences of accidents considering the physical, facility and regional characteristics previously investigated.

5. Potential radiation exposures that should be employed as guidelines in evaluting adequacy of site suitability as determined from the established characteristics of the site, facility, region and associated postulated accidents.

6. Unusual or unique protective features of: the facility that should be investigated such as additional safety features or minimal accident potential; the region such as emergency actions that can be taken or low population in the region of the site; and the site such as exceptional dispersion characteristics in air or water.

7. Facility effects on the environment that should be evaluated such as construction and operation impacts on biota and ecosystems and socioeconomic factors and land use.

The last factor was added as a result of the implementation of the National Environmental Policy Act of 1969. All of the other factors have been part of our siting policy for licensing nuclear facilities since the 1950s and prior to the publication of 10 CFR Part 100 in 1962.

Recommendations: The Commission approve the proposed plan for continued work on the nuclear facility siting policy and practice and direct the staff to proceed with the programs necessary to resolve the important issues outlined herein.

Coordination: The Directors of the Offices of State Programs, Nuclear Reactor Regulation and Nuclear Regulatory Research concur in the recommendations of this paper. The Director of the Office of the Executive Legal Director has no legal objections to the recommendations of this paper. The Director of the Office of Nuclear Material Safety and Safeguards has requested that the proposed program for revising the siting policy and practice be modified to expressly include siting considerations for both reprocessing facilities and plutonium processing and fuel fabrication plants. The coordinating group will provide a mechanism for factoring these fuel cycle interests into the long term program. The fuel cycle standards program is presently undergoing broad review in the context of interoffice MBO coordination and siting standards are included in those considerations.

The Offices of the General Counsel and Policy Evaluation have reviewed this paper. Their comments and our response are attached as Enclosures "D" and "E", respectively.

The Advisory Committee on Reactor Safeguards will be consulted in the further refinement and detailing of the program plan following discussion of this paper by the staff and Commission in Policy Session.

Scheduling: For an early Policy Session.

DISTRIBUTION
Commissioners
Commission Staff Offices
Exec Dir for Operations
ACRS
Secretariat

Roger J. Mattson for
Robert B. Minogue, Director
Office of Standards Development

Enclosures:
See page 8

Enclosures:
"A" - Evaluation of Important Siting Policy Issues
"B" - Detailed Discussion of Development Plan For Revising Siting Policy and Practice
"C" - Five Year Plan for Resolving Important Siting Policy Issues
"D" - Memorandum, "Development Plant For Nuclear Facility Siting Policy and Practice," T. A. Rehm to R. Minogue, November 23, 1976 (OGC and OPE Comments Attached)
"E" - SD Response to OGC and OPE Comments
"F" - Memorandum, "Reactor Site Evaluation Policy Study," Samuel J. Chilk to Lee V. Gossick, August 31, 1976
"G" - Memorandum, "Reactor Site Evaluation Policy Study," Robert B. Minogue to Lee V. Gossick, September 24, 1976

ENCLOSURE A

Evaluation of Important Siting Policy Issues

Siting Issues	Relevant to Siting		Effect on Site Selection		Effect on Site Quality		Review Process Effect		Effect on Applicant		Effect on Legal Concerns		Comment
	Often	Seldom	Likely	Not Likely	Significant	Little	Improve	Impair	Helpful	Adverse	Reduce	Increase	
Immediate													
a. Geologic and Seismic	X		X		X		X		X		X		
b. Petitions Resolution	X		X			X	X			X	X		(Needs to be Timely)
c. Early Site Review	X		X		X		X		X			X	
d. State/Federal Interaction	X		X			X	X		X		X		
e. Emergency Planning	X			X		X	X		X		X		
f. Accident Evaluation Practice	X		X			X	X		X		X		
Near Term													
a. Siting Regulation Revision	X		X		X		X		X		X		
b. Decommission Review	X			X	X		X			X	X		
c. Alternative Siting Process	X		X		X			X	X		X		
d. Emergency Plan Effectiveness	X			X		X	X		X		X		
Long Term													
Idealistic													
a. Accident Probability - Absolute	X			X		X		X		X		X	(Controversial)
b. Acceptable Risk Value		X		X		X	X		X			X	(Variable and Uncertain)
c. Overall Risk Assessment - Absolute		X		X	X			X		X		X	(Not likely to be Accepted)
Achievable													
a. Accident Probability - Relative	X			X	X		X		X		X		
b. Comparative Risk Level		X	X			X	X		X		X		
c. Risk Assessment - Comparative	X		X		X		X			X	X		

Definitions of Terms Used In Table

1. Relevant to Siting - frequency that the specific topic could be relevant to the determination of site suitability. Often would mean more than half of the site reviews would address the issues while Seldom would mean less than 10 percent of the site reviews. On many topics the frequency could be between 10 and 50 percent of the cases but accuracy was sacrificed for simplicity.

2. Effect on Site Selection - assuming the specific topic could be relevant (even seldom), the likelihood that the topic could affect the suitability of the site was determined. Likely would mean that adverse results from the site review for that topic could determine site acceptability. Not Likely would mean that adverse results for that topic alone probably would not determine the site unacceptable.

3. Effect on Site Quality - magnitude of effect on quality of site that could occur due to the specific topic whether determined to be positive or negative during the site review. Significant would mean the conclusion from a site review evaluation of the topic could determine the acceptability of the site. Little would mean the specific topic was not very important to site suitability evaluation.

4. Review Process Effect - how the resolution of the specific topic could change the efficiency or timeliness of a site review. Improve means the site review would benefit from the resolution of the specific

topic by changing current procedures. Impair means the site review could be complicated from the resolution of the specific topic by changing current procedures.

5. Effect on Applicant - as viewed by the applicant, resolution of the specific topic, unless no change was recommended, would be beneficial to obtaining a favorable site suitability finding for a facility license. Helpful means the applicant would find the resolution of the specific topic to be beneficial. Adverse means the applicant could find the resolution to be a detriment to his efforts to obtain a facility license.

6. Effect on Legal Concerns - as viewed by the NRC staff, resolution of the specific topic could result in public controversy or litigation with a greater frequency than currently experienced. Reduce means the frequency of public controversy or litigation could be decreased by resolution of the specific topic by rulemaking action or equivalent action. Increase means the frequency of public controversy or litigation could be increased for the specific topic.

topic by changing current procedures. Impair means the site review could be complicated from the resolution of the specific topic by changing current procedures.

5. Effect on Applicant - as viewed by the applicant, resolution of the specific topic, unless no change was recommended, would be beneficial to obtaining a favorable site suitability finding for a facility license. Helpful means the applicant would find the resolution of the specific topic to be beneficial. Adverse means the applicant could find the resolution to be a detriment to his efforts to obtain a facility license.

6. Effect on Legal Concerns - as viewed by the NRC staff, resolution of the specific topic could result in public controversy or litigation with a greater frequency than currently experienced. Reduce means the frequency of public controversy or litigation could be decreased by resolution of the specific topic by rulemaking action or equivalent action. Increase means the frequency of public controversy or litigation could be increased for the specific topic.

Enclosure B

Detailed Discussion of Development Plan
For
Revising Siting Policy and Practice

I. Immediate Short Term Programs (Less Than Two Years)

A. Revision of Appendix A, 10 CFR Part 100 and initial drafts of regulatory guides to implement the seismic and geologic siting policy have been initiated by the SD staff. The specific topic areas in the regulation being considered for investigation are:

1. Definitions of terms such as capable fault, macro seismicity, tectonic province, and tectonic structure.

2. Purpose and scope revision for clarification and extent of consideration.

3. Modification of Section 100.10(c)(1) to clarify introductory statement on Appendix A.

4. Vibratory ground motion requirements.

5. Surface faulting requirements.

6. Correlation of seismicity with tectonic structure.

Regulatory guides are being considered for implementation of the regulations in the following areas:

1. Guidelines for defining and classifying capable fault.

2. Guidelines for determining and identifying tectonic provinces and structures and for correlating provinces and structures with earthquake activity.

3. Guidelines on volcanic hazards.

4. Guidelines on liquefaction and soil engineering analysis.

5. Guidelines on statistical determination of OBE.

6. Guidelines for age dating faults.

7. Guidelines for evaluating seismic design ground motion.

The NRC staff has under consideration suggested changes for almost every section of Appendix A, 10 CFR Part 100. None of these suggested changes would modify existing procedures or requirements but are intended to increase the clarity of the regulations for seismic and geologic considerations. A sifting process is now underway in considering these suggested changes.

B. Coordination of the review and resolution of pending petitions for rulemaking regarding siting policy issues is being performed by the SD staff. These petitions include the following topics and can be expected to continue to be docketed at the current rate.

1. State of New Jersey - Class 9 Accident Considerations For Novel and Unique Nuclear Facilities - Amendment to 10 CFR

Part 50. (Relates to Liquid Pathway Generic Study - NUREG-0140.)

2. Public Interest Research Groups - Evacuation Drills and Emergency Planning - Amendment to 10 CFR Part 50.

3. Public Interest Research Group - Numerical Limits on Population Density and Minimum Siting Distances - Amendment to 10 CFR Part 100.

4. Township of Lower Alloways Creek, New Jersey - Notification of Authorities Concerning Consideration of Alternative Sites - Amendment to 10 CFR Parts 2 and 51.

5. Detroit Edison Company, Inc., and Public Service Company of Indiana - Regulatory Authority Over Transmission Lines and Related Equipment - Amendment to 10 CFR Part 50.

6. Business and Professional People for the Public Interest - Restriction on Operation Due To Construction Work Affecting Integrity of Operating Unit Safety - Amendment to 10 CFR Part 50.

7. Public Interest Research Group - Physical Security Requirement For Common Areas at Multi-unit Station Sites for Operating and Under Construction Units - Amendment to 10 CFR Part 50.

8. Boston Edison, Florida Power and Light and Iowa Electric Light and Power Companies - Define Bases for Determination of Significant Hazards Consideration - Amendment to 10 CFR Part 50.

9. New England Coalition on Nuclear Pollution - Amend Table S-3 - Summary of Environmental Considerations for Uranium Fuel Cycle - Amendment to 10 CFR Part 51.

10. New England Coalition on Nuclear Pollution -Clarification of Determination for Safe Shutdown Earthquake - Amendment to Appendix A, 10 CFR Part 100.

11. Central Maine Power Co. - Further Definition of Capable Fault Term - Amendment to Appendix A, 10 CFR Part 100.

C. Revision of 10 CFR Parts 2 and 50 to provide for early review of site suitability issues and preparation of further regulatory guidance are underway by the NRC staff. Completion of this revision to the regulation should be accomplished by late 1976 with the final issuance of the guidance on limited early site suitability findings occurring in mid-1977.

D. The study program to improve the state/federal interaction for coordinating and reaching environmental decisions on sites for utilization or production facilities is underway. Other ongoing programs related to similar state/federal programs are the

regional problem solving study with the Western Interstate Nuclear Board and the regional demonstration project with the Southern Interstate Nuclear Board being conducted by SD.

E. Revision of 10 CFR Part 50 to require periodic updating of the emergency plans for licensed utilization and production facilities is under review by the NRC staff. A draft regulatory guide has been prepared on emergency planning for research reactors and has been released for an interoffice technical review. The draft regulatory guide on emergency planning for nuclear power reactors has been issued for public comment, and Revision 1 of the guide is in preparation.

F. A new program to be initiated will be an accident evaluation study of radiological impact for siting of light water power reactors. The study will investigate the use of present knowledge and information as given in WASH-1400 in the assessment of radiological impact on the area surrounding the site of an LWR facility.

The initial information collation for this study will be performed by NRR and RES. A summary of the past practice accident results for licensed facilities and a comparison of actual practice with the guidelines in Regulatory Guide 1.70 will be completed by NRR within 2 months after program initiation. A collation of all

pathway dose models and parameters to be used for assessing the radiological impact will be necessary and must be consistent with current models and parameters being used by the NRC staff. A collation of Man-Rem as a function of variation in site and plant characteristics for both accident and expected releases will be needed as an input into the studies performed by the technical assistance contractors. The NRR and RES staff will determine the typical design basis accidents and core melt accidents as well as base data on expected fuel behavior and release terms to be used in the study by the technical assistance contractors. RES & SD will coordinate their programs. Input data from other related studies being pursued by RES contractors will be provided for this study.

The first analysis to be performed will be the base impact of a facility due to expected releases of radioactive material during its operational lifetime (includes trival incidents and small accident releases). The Dollar per Man-Rem Study being performed by the NRC staff could contribute to this base study. The following studies will be performed:

1. Radiological impact associated with Appendix I dose levels and EPA radiation standard dose levels on the environment.

2. Sensitivity study of various pathways on individual and population doses and population density on exclusion area and low population zone doses.

The second analysis to be performed will be the radiological impact of pre-selected design basis accidents (Class 3 through 8 as defined in Regulatory Guide 4.2) which are representative of accidents currently evaluated during the safety and environmental reviews. The following areas are to be investigated:

1. Review of accident scenario - to include an extension of WASH-1400 methodology to the typical accidents currently reviewed for safety and environmental purposes using a realistic, mechanistic development of each accident sequence with stated source release term history and comparison of study results with past licensing practice and experience.

2. Investigate sensitivity of consequences to plant safety features and site characteristics - to include an extension of WASH-1400 results to investigate the consequence variation using selected design concepts for LWR facilities and site characteristics that reduce the radiological impact to individuals, populations and the environment, and compare the results of the sensitivity investigation with past safety evaluations.

3. Assess the radiological impact to individuals and populations over specified site characteristic range of licensed facilities for population distribution and pathways of exposures and compare with past licensing results for safety and environmental reviews.

The third analysis to be performed will be the radiological impact of pre-selected core melt accidents which have been evaluated in WASH-1400. The following areas are to be investigated.

1. Review of accident scenario - to include verification of release source term for selected core melt accidents from core release point in postulated accident sequence to release point to environs and relate pathway to mechanistic accident sequence evaluated in WASH-1400.

2. Investigate sensitivity of consequences to plant safety features and site characteristics - to include an extension of WASH-1400 results for selected design concepts of LWR facilities with plant features and site characteristics available to reduce the radiological impact to individuals, populations and the environment and review the results.

3. Assess the radiological impact to individuals and populations over specified site characteristic range of licensed facilities for population distribution and pathways of exposures and review the results.

The postulated cost in technical assistance contracts would be at least $600,000 and NRC effort would be 7 man-years. The completion of the study would involve the preparation of a NUREG report and a discussion of the generic radiological impact of a typical LWR facility operation on an area surrounding a suitable site that would be used as input to any EIS (See Section II.A. below). The results would be used in support of an eventual change in siting practice and siting regulations. The program would be scheduled to be completed by the end of 1978 or early 1979.

II. Near Future Programs (Within Five Years)

A. Revision of 10 CFR Part 100 to remove ambiguities and clarify statements subject to misinterpretation and to broaden its scope to include all facilities licensed under 10 CFR Part 50 will be initiated. The general policy to be formulated under the revised regulation would be similar to the IAEA Code of Practice for Siting but modified to meet the needs of the United States. Specific guideline values on various accident categories regarding individual and population dose guidelines would be provided in regulatory guides. Other regulatory guides would require revision to implement the general siting criteria to be included in the revised regulation. An environmental impact statement would probably be required for the intended revision to 10 CFR Part 100. The need for a public hearing cannot be determined at this time

but such a hearing might be necessary. The NRC manpower effort could be minimal for the drafting of the intended revision to 10 CFR Part 100 but could become several man-years if an EIS and/or hearings were necessary prior to the promulgation of a regulation.

B. Establishment of an alternative siting policy and evaluation process can be initiated at the completion of the short term programs involving early site review and regional siting studies as well as the state/federal interaction studies. The alternative siting policy should incorporate a means to combine the health and safety issues with the environmental issues to provide a single review regarding alternative siting comparisons. Additional regulatory guides will be required to implement the policy and provide guidance on those issues for which evaluation methods and impact assessments can be formulated.

C. A detailed study of credible events and associated source terms can be initiated following completion of the accident impact study previously described. Research has been initiated in the area of emergency planning for postulated accidents by RES. Based upon the available data and results of such studies, a consequence model for evaluating the probable benefit of emergency planning in reducing the possible impact to people due to different

exposure pathways for these credible events could be developed. Such guidance would aid the local and state agencies in developing more realistic and cost effective emergency plans.

D. Incorporation of decommissioning aspects of site suitability and plant design into the siting practice of reviewing applications for licenses should be initiated. Preparation of regulatory guides for implementation would be necessary. The standard review should initiate consideration of decommissioning in the licensing review. More definitive guidance is required for decommissioning of nuclear facilities than is provided in Regulatory Guide 1.86, "Termination of Operating Licenses For Nuclear Reactors." Development of this program will be performed by the SD/NRR staff within the next year for incorporation into the development plan for revising siting policy and practice. Technical assistance contracts have been initiated in this area by the SD staff.

ENCLOSURE C
Five Year Program for Resolving Important Siting Policy Issues

Category Issues	1977 Jan-July	1977 July-Dec	1978 Jan-June	1978 July-Dec	1979 Jan-June	1979 July-Dec	1980 Jan-June	1980 July-Dec.	1981 Jan-June	1981 July-Dec	Remarks
I. Geologic and Seismic Program											
a. Appendix A, Part 100, Revision	Staff review	Initial Revision	Comment Period	Issue Revision							May require hearings
b. Regulatory Guides	Staff Review	Initial Drafts	Comment Period	Issue Guides							Continue revisions as needed
c. Resolve Petitions (B-10 & B-11)	Complete review and issue position										Staff positions to be formulated
II. Early Site Review											
a. Regulation Revision	Issue Revision										May be issued in 1976
b. Regulatory Guide	Initial Draft	Issue Guide									May be issued as Findings Document
III. Emergency Planning											
a. Resolve Petition (B-2)	Complete review and issue position										
b. Appendix E, Part 50, Revision	Initial Revision	Issue Revision									
c. Regulatory Guides	Comment Period	Issue Guides									Continue revisions as needed
d. Study Program on Impact		Complete Research	Impact from Accident Study	Modeling Study	Guidance to States						NUREG report may be issued
IV. Alternative Sites											
a. Resolve Petition (B-4)	Issue Position										
b. Study Program (State/Federal)											
1. Section 102	Initial Study	Complete Study	Issue Report								Coordination on environmental decision
2. WINB	Initial Study complete										Regional (Western) Siting study
3. SINB		Demonstration Project Complete									Regional (Southern) Siting study
c. Establish Policy and Practice											
1. Review & Evaluate				Initiate	Complete	Initial draft	Comment Period	Issue Guide Initial Policy	Issue Policy		Program input from II. and IV.b and V. to initiate review. Guide revision may be needed.
2. Regulatory Guides											
3. Policy Statement											

ENCLOSURE C (Continued)

Five Year Program for Resolving Important Siting Policy Issues

Category / Issues	1977 Jan-July	1977 July-Dec	1978 Jan-June	1978 July-Dec	1979 Jan-June	1979 July-Dec	1980 Jan-June	1980 July-Dec	1981 Jan-June	1981 July-Dec	Remarks
V. Accident Evaluation Practice											
a. Resolve Petitions (B-1 & B-3)	Complete review and issue position										To compile data on previous licensing actions in accident evaluation and establish models and accidents for study.
b. Staff Accident Data Compilation	Complete Study										
c. Siting-Radiological Impact Study											
1. Base Impact-Normal Operation	Complete Review										Review of accident evaluation models and methods as well as operation evaluation for LWR power plants. All technical assistance from FRA labs using input from NRC internal data compilation study.
(a) Dollar per Man-Rem Study											
(b) Appendix I Levels											
(c) EPA Standard Level											
2. Design Basis Accident											
(a) Accident Scenario	Initial Study	Complete Study									
(b) Sensitivity Review	Initial Study	Complete Study									
(c) Impact Range-Consequences		Initial Analysis	Complete Study								
3. Catastrophic Accident											
(a) Accident Scenario	Initial Study	Complete Study									
(b) Sensitivity Review	Initial Study	Complete Study									
(c) Impact Range-Consequences		Initial Analysis	Complete Study								
4. Summary Report											
(a) NUREG		Initial report	Draft report	Issue report							
(b) Environmental Statement				Issue draft	Issue final						
VI. Other Site Related Petitions											
a. Transmission Lines (B-5)	Complete review and issue position										
b. Construction Work (B-6)	Complete review and issue position										
c. Physical Security (B-7)	Complete review and issue position										
d. Significant Hazard Consideration (B-8)	Complete review and issue position										
e. Survey of Environmental Consideration for HFC (B-9)	Complete resolution of this issue and related issues may require further staff action										The petition should be completed in 1978
VII. Siting Policy Revision											
a. Part 100 Revision		Staff Review	Initial Revision	Comment Period	Hearing	Issue Revision					Additional programs may be included in this issue as the plan develops and other siting policy issue programs are completed.
b. Regulatory Guides				Initial Drafts	Comment Period	Revisions	Issue Guides				
c. Decommissioning Aspect	Research Study	Complete Study	Staff Review		Initial Policy	Comment Period	Issue Policy				
d. Regulatory Guide							Initial Draft	Comment Period	Issue Guide		

Enclosure D

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

November 23, 1976

MEMORANDUM FOR: R. Minogue, Director
Office of Standards Development

FROM: T. A. Rehm, Assistant to the
Executive Director for Operations

SUBJECT: DEVELOPMENT PLAN FOR NUCLEAR FACILITY SITING POLICY AND PRACTICE

The subject paper has been coordinated with OGC and OPE per our agreement.

OGC and OPE comments are attached.

Please: (1) Review comments.

(2) Modify the paper to the extent that you deem appropriate after objective analysis. No change is required.

(3) Add an Enclosure which will be your comments indicating what you have changed (if anything) in response to OGC/OPE and comment on why you have not accepted other points, i.e., a rebuttal and OGC/OPE comments attached.

(4) Modify coordination block to add "OPE and OGC comments are responded to at Enclosure," and summarize succinctly OGC/OPE comments.

T. A. Rehm
Assistant to the Executive
Director for Operations

Attachments:
As stated

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

November 23, 1976

MEMORANDUM FOR: Thomas A. Rehm, Assistant to the Executive Director of Operations

FROM: Peter L. Strauss, General Counsel

SUBJECT: DEVELOPMENT PLAN FOR NUCLEAR FACILITY SITING POLICY AND PRACTICE REVISION

(b)(5)

Contact:
Richard S. Mallory
492-8155

Enclosure "D"

(b)(5)

Enclosure "D"

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

November 11, 1976

MEMORANDUM FOR: Tom Rehm

FROM: Ben Huberman

SUBJECT: COMMENTS ON NOVEMBER 3 DRAFT OF "DEVELOPMENT PLAN FOR NUCLEAR FACILITY SITING POLICY AND PRACTICE REVISION"

The subject paper fails almost completely to respond to the Commission's guidance contained in the Secretary's memorandum of August 30, 1976.* It needs major rework, if it is to be helpful to the Commission in connection with its stated "need for development of a cohesive, explicit siting policy." I urge that the rework be undertaken and completed with as little further delay as possible. OPE would be glad to help.

The following specific comments illustrate some of the respects in which the draft falls short of an adequate response to the Commission's guidance of August 30.

1. Guidance item 1, first sentence: The Commission asked the staff to "identify the most important issues".

   The paper does this in a most sketchy manner. The "identification" of issues is generally limited to identifying subject areas in which the issues alluded to but not stated exist. E.g.:

   - In the seismic area, there are references to "ambiguities", "statements subject to misinterpretation", "modification . . . to clarify", "surface faulting requirements", etc. (p. 3 of paper and p. 1 of Enclosure B). But nowhere is there an indication of what major questions are at issue.

   - "Pending and future petitions for rulemaking" are selected as a most important issue. Eleven pending petitions are listed, with identification of petitioner and subject. (P. 3 of paper and pp. 1 and 2 of Enclosure B.) There is no indication of what is at issue. Nor is there an attempt to relate the subjects of rulemaking petitions with important issues selected on other grounds. Within the group of rulemaking-petition items there is no differentiation as to importance or urgency.

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* Page 1 of the paper gives the memo's date as August 31.

CONTACT:
George Sege (OPE)
634-1384

Enclosure "D"

- The "state/federal interaction" item (p. 3 of paper and pp. 4-5 of Enclosure B) mentions ongoing programs in this area, with no identification of the issue or issues that these programs are intended to resolve.

2. Guidance item 1, second sentence ("Describe alternatives and their pros and cons (supported by value-impact analyses")):

   No alternatives are described. No pros and cons are given. No value-impact analyses are reported.

3. In guidance item 1, the Commission suggested six criteria as examples of criteria that could be helpful in judging the importance of an issue.

   The table in Enclosure A, titled "Evaluation of Important Siting Policy Issues," is apparently an application of the Commission's six criteria. However, the table headings stating the criteria are simplified to a point where their meaning is more or less obscured. The two-value ("Often/Seldom", "Helpful/Adverse", etc.) evaluation of all selected "issues" with respect to each criterion is simplistic and sheds little light on the issues' importance. E.g.:

   - In the last column of the Enclosure A table the criterion is stated as "Effect on Legal Concerns". Two possible values are tabulated, "Reduce" and "Increase". Both the heading and its values when applied to the tabulated issue subjects are obscure.

     This last column is apparently an interpretation of the Commission's suggestion of "controversiality and litigation proneness" as one criterion for gaging the importance of an issue. A reasonable application of this criterion should involve such considerations as:

     - Whether there have been any court suits on an issue, how many, how serious or trivial, with what potential impact.

     - Whether the issue has been contested before Licensing or Appeal Boards, how often, etc.

     - Existence or absence of major differences in view among responsible staff members.

     - Public controversy (as reflected in public meetings, local or national newspapers, Congressional correspondence, etc.)

- The next-to-last column of Enclosure A is headed "Effect on Applicant", its possible values being "Helpful" and "Adverse". Both the criterion and its values lack sufficient precision to be helpful. (The Enclosure A criterion may have been derived from the Commission's suggested criterion of "Extent to which applicants would be helped, in terms of better predictability of NRC action, avoidance of unnecessary constraints on latitude in site selection, applicants' site analysis efforts, etc.")

4. Guidance item 2 calls for identification of "alternative general policy frameworks (with respect to evaluating adequacy of proposed sites and with respect to consideration of alternative sites)" and for comparison of "these alternatives as to substantive merit, resources and time required, and transition problems."

   The paper responds to this guidance only by listing seven elements "upon which a policy framework . . . has been built." (pp. 6-7)

   No general policy framework is described. Nothing is said about policy for evaluating site adequacy. Nothing is said about policy with respect to alternative sites under NEPA. No comparisons are made. Nothing is said about time and resources in this context. Transition problems are not touched on.

5. Guidance item 3 reflects the Commission's sense of need for timely policy development action by asking the staff to "concentrate on codifying what we already know, rather than emphasizing adding to our information base."

   Yet the paper proposes a leisurely pace: Even the most urgent group of issues (pp. 1-9 of Enclosure B) takes up to two years to address; is discussed in terms of "programs", rather than resolution actions; and involves extensive study work for some items (pp. 5-9 of Enclosure B).

   "Near-future programs" are defined as taking two to five years. Revision of 10 CFR Part 100 "to remove ambiguities and clarify statements subject to misinterpretation" is put in this two-to-five-year time frame.

   Scores of site-review decisions will need to be made by NRC while policy formulation awaits the outcome of the long-duration "programs" called for by the paper.

6. With respect to each identified study or research need, the Commission's guidance item 3 calls for six items of information related to the expected value, impact, etc. of the proposed work in relation to policy formulation. (Guidance items 3(a) through (f)).

   No such information is provided.

7. According to Commission guidance item 4, the paper should "reflect knowledge and perspectives gained from licensing experience. NRR should be very much involved (if indeed not in the lead) in preparing the paper."

   Licensing experience is nowhere addressed (though one may suspect that some account was taken of it).

   Though NRR concurrence in the recommendations is indicated, the paper shows no evidence of NRR leadership or partnership in its preparation.

8. I believe that the entries on p. 1 of the paper under the headings "Subject", "Purpose," "Category", "Issue," and "Background", as well as the "Recommendations" on p. 7, tend to misconstrue the Commission's basic intent as reflected in the August 30 guidance.

   The Commission requested substantive information and analysis with respect to general policy and specific major issues. (Guidance items 1 and 2.) These entries suggest, instead, an emphasis on a program or process whereby the substantive policy matters would, in the course of time, be addressed.

   The Commission's perceived need was for "development of a cohesive, explicit siting policy." (P. 1 of the August 30 memo). The staff paper's reference to "revision" creates an impression of emphasis on change, as if the sort of policy sought by the Commission already existed, but needed updating.

9. Decision criteria (pp. 1 and 2 of the paper): The paper provides no information for the Commission to use in evaluating the staff recommendation (p. 7) on the basis of the seven decision criteria here listed.

10. Alternatives (p. 2 of the paper): The three "alternatives" considered in SECY-76-286 were (only very generally stated) alternatives of process and timing. They did not address general policy or specific major issues. Thus, this paragraph dismissing the consideration of substantive alternatives called for by the Commission (in its guidance items 1 and 2, <u>after</u> the Commission had read SECY-76-286) is inappropriate.

Enclosure "D"

Enclosure E

SD Response
To
OGC and OPE Comments

The Offices of the General Counsel and Policy Evaluation provided comments to the Executive Director for Operations following their review of the Policy Paper in parallel with Program Office concurrence. The memoranda containing their comments are attached as Enclosure "D".

(b)(5)

(b)(5)

The following response represents a point-by-point discussion of the OPE comments given in Enclosure "D" with an indication of any changes made to the paper.

1. The staff used the criteria suggested by the Commission (Enclosure "F") to evaluate the most important issues and, thereby, identify the most important aspects of the issues. Since the paper was to be crisply organized and to produce, in a step-wise fashion for the long term, a more cohesive and explicit NRC siting policy (Enclosure "F" and "G"), the extensive detail found in the previous paper, SECY-76-286, was not justified.

   a. In the seismic area, a detailed Commission paper concerning the clarification of Appendix A to 10 CFR Part 100 is in preparation by SD and NRR. It will discuss the concerns of OPE. In the case of the present paper, only the important aspects of this issue were addressed, not the details.

b. NRC practice is to give timely consideration to all petitions for rulemaking. Thus the petitions now in house are required to be treated within a short period, which is equivalent in a staff resource sense to having a high priority. Some of the listed petitions also treat important siting issues of potential impact on NRC's overall siting policy. The level of impact cannot be precisely determined until resolution of the petition is established. Petitions are included as elements of this program plan in order to coordinate their resolution with the overall siting policy.

c. The issue regarding federal/state interaction is to improve the relationships and cooperation of all concerned agencies, thereby increasing the efficiency and effectiveness of site certification. Details for a coordinated federal/state siting study have been provided in SECY-76-507 and NUREG-0128 (the so-called Section 102 study).

2. As given in Enclosure "A", the most important issues and important aspects of these issues were evaluated by the staff of NRR, NMSS, RES and SD most familiar with NRC siting policy and practice in accordance with the criteria provided by the Commission. The basic alternatives to the proposed program are those inherent in the scheduling and assignment of priorities as presented in the paper. In the meetings held between senior technical staff members of NRR, RES, NMSS and SD, the important issues and the priorities to be given to resolving

these issues were discussed. The development program plan and the program approach presented in the paper were jointly developed by the NRR and SD technical staffs. The scheduling and assignment of priorities within the predicted contract and personnel resources as given in the paper were jointly developed by NRR, SD and RES staffs. Similar scheduling and assignment of priorities for fuel cycle facilities are to be developed between the NMSS and SD staffs. Further, meetings were held between the senior technical staff and division level management of NRR and SD to assess, iron out and fine tune the overall program plan for addressing the most important issues.

3. We agree that the table headings in Enclosure "A" are a simplified version of the criteria specified by the Commission. That was done for brevity. They are representative of the value/impact judgments used to evaluate the importance of each siting issue. As stated in response to a similar concern of OGC we have provided an explanation to help clarify the meaning of these terms. Details at the level given in the previous paper (SECY-76-286) are not provided, since a crisp, concise paper was requested. For the issues being addressed in the program, the concern of importance is future litigative risk - not past history. Furthermore, as explained in SECY-76-286, statistics concerning contested issues in past hearings are not available, but "landmark" hearing treatment of the various issues were described in the previous paper. The considerations listed by OPE reflect both external legal objections, i.e., courts and public intervention, and

internal legal objections, i.e., Licensing and Appeal Boards, as well as internal technical objections, i.e., staff members. Such detail considerations except for internal technical objections were discussed in SECY-76-286. The procedure for handling internal technical objection is the topic of a memorandum from the Executive Director for Operation to all NRC employees, "NRC's Regulatory Mission", November 3, 1976, and was followed in the preparation of this paper.

4. The senior technical staff within SD and NRR have discussed several alternates to the current approach to siting. These were considered in SECY-76-286. Since that paper was discussed with the Commission, these staff members have developed backup material on alternative policy frameworks for discussion during the briefing on the present paper with the Commission. The material was not included in the paper itself because the additional detail and complexity would not meet the "concise" and "crisp" constraints placed upon the paper. Briefly, the alternative policy frameworks serve to show that one of the difficulties in isolating individual site suitability elements in the overall site approval policy is the close relationship between facility design and site features. Four principal approaches could be considered as alternative approaches to current siting policy but all of the approaches are so interrelated that clear interfaces could not be maintained if a cohesive, explicit siting policy were to be developed. These approaches or elements necessary for a cohesive, explicit siting policy can be characterized as follows:

a. Deterministic - site adequacy evaluated on basis of explicit criteria and established procedures such as 10 CFR Part 100 guidance. Does not accommodate improved design feature interfacing with site features.

b. Relativistic - plant/site adequacy evaluated on basis of baseline or envelope criteria such as WASH-1400 methods and results. Requires repetitive subjective judgements with less predictability.

c. Value/impact - combine deterministic and relativistic approach to evaluate design adequacy relative to site features of selected or alternative sites. Requires baseline and relative merit criteria such as the effluent treatment system design to meet Appendix I requirements. Population density considerations for alternative site reviews are another example of this approach.

d. Specifications - blanket requirements on plant features and site features could be established from experience for which suitability reviews would not be required such as overpressure protection design and minimum safety features for plant with minimum exclusion and low population zone distance and maximum population density values and specific seismic criteria for site features.

5. As stated in the answer to the second OPE concern, the program plan was developed in light of resources available in NRR, RES, NMSS and SD. This is consistent with the step-wise approach directed by the Commission and with the guidance received from EDO, the Commission

and OMB in the course of developing the FY 78 budget and working on the NRC Five-Year Plan. The coordinating group described in the Discussion and Coordination Sections of the paper would coordinate the long range program and could recommend modifications to the program if critical site-review decisions were to arise during the normal course of the program.

6. As stated in the answer to the second OPE concern, the technical staff in RES, NRR, NMSS and SD held numerous meetings in which the criteria provided by the Commission were used to establish the program plan developed in the paper and discussed in Enclosures "A", "B" and "C". Division and office level management reviewed, in some cases added to, and then concurred in the judgment reached by the technical staff. Continuing coordination of the program will be provided by the aforementioned interoffice coordinating group and in the course of yearly budget development.

7. The extensive meetings and discussions held with NRR, NMSS and RES regarding the proposed program plan are reflected in the Coordination Section of the paper. Licensing experience was an input criteria for establishing the program priorities but was not a detail to be addressed in this paper as it was in SECY-76-286. Meetings and discussions are continuing with NMSS staff to establish a parallel and coordinated development plan for fuel cycle facility siting policy and practice.

8. As stated in the SD memorandum (Enclosure "G"), we have produced a program plan aimed at reformulation of siting policy and, in a stepwise fashion for the long term, aimed to document a more cohesive and explicit NRC policy for the siting of nuclear power plants. As provided by the listed seven elements of general siting policy, there is an existing NRC siting policy, but the elements are scattered among many sources and need to be combined, coordinated and made more explicit and understandable. Said another way, consolidation and clarification of the current siting policy is the purpose of the program plan, not the development of a different siting policy.

9. The stated decision criteria represent considerations made in the judgmental process described above for developing the NRC staff recommendations for the proposed program plan. If the Commission were to now disagree with any of these decision criteria (most of which were suggested by the Commission), the proposed program plan might not represent the needs in all areas as determined by the Commission. A discussion of possible differences between the proposed program plan based upon the decision criteria and some other program plan or constituents as viewed by the Commission is one of the purposes of this paper and its associated discussion in a Policy Session.

10. As stated in SECY-76-286 and in response to the fourth OPE concern, there exist alternatives and different approaches to siting policy. Evaluation of these alternatives will be aided through review of

principle decisions to be made on a siting policy. Briefly, four basic questions can be asked as follows:

a. Should Part 100 be supplemented to include nonradiological safety criteria?

b. Should plant design features be specifically treated in NRC siting criteria?

c. Should more explicit risk assessment methodologies be used in site evaluation?

d. Should the siting criteria be relaxed, stay the same or be made more restrictive?

All of these questions will require answers to be developed out of the proposed program. These questions were discussed in more detail in SECY-76-286 and the answers were not obvious. The proposed program has been developed to provide a basis for answering these and other questions about NRC siting policy and practice.

Enclosure F

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

AUG 31 1976

MEMORANDUM FOR: Lee V. Gossick

FROM: Samuel J. Chilk

SUBJECT: REACTOR SITE EVALUATION POLICY STUDY

The Commission has reviewed SECY-76-286 and received a staff briefing on reactor site evaluation policy and practice, and has concluded the following:

- SECY-76-286 provides valuable partial background for site-evaluation policy formulation. Its comprehensive cataloging of current site-evaluation practices has been an especially necessary contribution.

- The Commission sees a need for development of a cohesive, explicit siting policy, in general philosophy and on specific key issues. The potential benefits of such a policy would include:

  (a) Systematization and simplification of the decision process, increasingly necessary for manageability as the nuclear power industry grows.

  (b) Improved efficiency of applicants' analysis and NRC's review.

  (c) Reduced time lag.

  (d) Improved predictability of the outcome of reviews.

  (e) Perhaps enhancement in quality of future sites; certainly more evident soundness, consistency, and equity in the balancing of site-evaluation factors.

As the next step, the Commission requests a crisply organized staff paper in which the staff should do four main things:

1. Identify the most important issues. Describe alternatives and their pros and cons (supported by value-impact analyses). There should be an emphasis here on selecting the most important issues only, and on concentrating only on the most important aspects of the issues.

Importance of an issue could be judged by such criteria as:

(a) How often relevant

(b) Likelihood of affecting outcome of the site review where the issue is relevant

(c) Effect on quality of sites approved

(d) Effect on efficiency and timeliness of the review process

(e) Extent to which applicants would be helped, in terms of better predictability of NRC action, avoidance of unnecessary constraints on latitude in site selection, applicants' site analysis efforts, etc.

(f) Controversiality and litigation proneness.

2. Identify alternative general policy frameworks (with respect to evaluating adequacy of proposed sites and with respect to consideration of alternative sites). Compare these alternatives as to substantive merit, resources and time required, and transition problems.

   Consideration of a general policy framework can be quite useful even if a general siting policy should not be found "ripe" for promulgation, by helping to structure goals and priorities with respect to specific issues, assisting in the analysis of issues, and helping to guide case decisions in a reasonably coherent pattern as numbers of cases accumulate.

3. Concentrate on codifying what we already know, rather than emphasizing adding to our information base.

   Identify study and research needs, recognizing this present-knowledge emphasis, and taking into account the likely delaying effects of awaiting new information before developing policy.

   The following should be done for each identified study or research need:

   (a) Identify information sought and its relevance to general policy formulations.

   (b) Describe intended use of the information, potential impact, value, and ability to establish general policy without it.

(c) Describe work (briefly).

(d) Estimate likelihood of getting the information.

(e) Estimate cost and personnel resources.

(f) Estimate schedule.

4. Reflect knowledge and perspectives gained from licensing experience.

NRR should be very much involved (if indeed not in the lead) in preparing the paper.

The paper should be submitted for Commission consideration by October 29, 1976.

cc: Chairman Rowden
Commissioner Mason
Commissioner Gilinsky
Commissioner Kennedy
Peter Strauss
Ben Huberman

Enclosure "F"

Enclosure G

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

SEP 24 1976

Lee V. Gossick, Executive Director
for Operations

REACTOR SITE EVALUATION POLICY STUDY

This is in response to your note of August 31, 1976, requesting reaction to the enclosed memo from S. J. Chilk of that date concerning the Commission review of SECY-76-286, "Staff Review of Reactor Site Evaluation Policy and Practice."

In line with the discussion with the Commission on SECY-76-286, we interpret the memo to require this Office to produce a program plan aimed at reformulation of siting policy, as identified in Part 100 and associated regulatory guides. The program is to recognize and be keyed to ongoing licensing issues and projects (petitions, research, GEIS for accidents, follow-on to WASH-1400, etc.) within NRC program offices in such a way as to produce, in a step-wise fashion for the long term, a more cohesive and explicit NRC policy for the siting of nuclear power plants. A crisply organized paper describing and discussing the plan from a policy perspective is to be submitted for Commission consideration by October 29, 1976. We have begun preparation of the plan. We have not identified significant problems in meeting the deadline. R. J. Mattson will notify T. A. Rehm by the end of September if we anticipate such difficulties. Staff of ELD, NRR, and RES will be involved in formulation of the plan, with the largest contribution coming from NRR staff by virtue of its knowledge and perspectives from licensing experience.

Robert B. Minogue

Robert B. Minogue, Director
Office of Standards Development

Enclosure: As Stated

cc w/encl:
B. Rusche
H. Shapar
S. Levine
K. Chapman