MH&S 3 Hazards frm. Power Reactors Vol. 2

Vol. 1 Correspondence bwginning with 8-10-64 to 7-26-65
Vol. 2 Correspondence beginning with 7-27-65 to

see: I-D-R- 6. Hazard Evaluation

MH&S 3 Hazards of Power Reactors Vol. 2

No.	Date	To	From	Class	Pgs.	No.	To	From	Class.
1	7-30-65	Reactor Safety Research Program	vee						
2	7-27-65	Mann, Marvin	et						
3	8-3-65	Westinghouse	et						
4	8-19-65	AEC 943/25	et						
5	8-24-65	Public Reactor to AE	et						
6	9-22-65	AEC 943/26	eb						
7	9-14-65	Off-Shore Seting of Power Reactors.	et						

OFFICIAL USE ONLY

Reference & Reproduction Branch

UNITED STATES GOVERNMENT

Copy - Germantown

Memorandum

TO : Harold L. Price
Director of Regulation

DATE: May 26, 1966

FROM : W. B. McCool, Secretary (Original signed W. B. McCool)

SUBJECT: GEOLOGIC CONSIDERATIONS RELEVANT TO REACTOR SITING

SECY:GP

1. At the Briefing on Reactor Siting on May 23, 1966, the Commission:

a. Requested a check on the availability of the report on the predictability of earthquakes prepared for the White House by Dr. Frank Press;

b. Requested revisions in the letter to the JCAE;

c. Requested a meeting with Dr. Nathan Newmark, University of Illinois. I will coordinate with you on scheduling.

2. Commissioner Ramey requested a report on the development of structural designs to counteract geologic vibrations and surface faults.

3. The Commission has directed you to take the action required by the above requests.

cc:
Commissioners
General Manager
Deputy General Manager
Assistant General Manager
Exec. Asst. to Gen. Mgr.
Asst. Gen. Mgr. for Reactors
Asst. Gen. Mgr. for Operations
General Counsel
Dir., Reactor Dev. & Tech.
Dir., Congr. Relations
Deputy Dir. of Regulation
Asst. Dir. of Reg. for Admin.
Asst. Dir. of Reg. for Nuclear Safety
Dir., Reactor Licensing
Dir., Safety Standards
Dir., Operational Safety

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UNITED STATES GOVERNMENT

Memorandum

Copy - Germantown

TO : R. E. Hollingsworth, Gen. Mgr.
H. L. Price, Dir. of Regulation

DATE: May 25, 1966

FROM : W. B. McCool, Secretary — Original signed W. B. McCool

SUBJECT: OUTLINE REPORT ON INDUSTRY-GOVERNMENT PANEL ON REACTOR SITING

SECY:GF

1. At the Briefing on Reactor Siting on May 23, 1966, the Commission requested preparation of an outline report discussing the feasibility of an industry-government panel on reactor siting.

2. The Commission has directed you to take the action required by the above request.

cc:
Commissioners
Deputy General Manager
Assistant General Manager
Exec. Asst. to Gen. Mgr.
Asst. Gen. Mgr. for Reactors
Asst. Gen. Mgr. for Operations
General Counsel
Dir., RD&T
Deputy Director of Regulation
Asst. Dir. of Reg. for Admin.
Asst. Dir. of Reg. for Nuclear Safety
Dir., Reactor Licensing
Dir., Safety Standards
Dir., Operational Safety

TID H-5-3-2

Reference & Reproduction Branch

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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

Copy - Germantown

May 20, 1966

MEMORANDUM FOR THE COMMISSIONERS

SUBJECT: BRIEFING ON REACTOR SITING - GEOLOGICAL CONSIDERATIONS

A Briefing on Reactor Siting - Geological Considerations - has been scheduled for Monday, May 23, 1966, at 11:00 a.m., Room 1113-B, D. C. Office. You may recall that this briefing was requested by Commissioner Ramey at Information Meeting 569 on March 18, 1966, was originally scheduled for March 25 and was deferred at that time for further scheduling when Commissioner Ramey could be available. An outline of the earthquake problem for discussion at the briefing was circulated as the attachment to Mr. Price's March 24 memorandum, Subject: Briefing on Reactor Siting.

Original signed
W. B. McCool
W. B. McCool
Secretary

cc:
General Manager
Director of Regulation
General Counsel
Asst. Gen. Mgr. for Reactors
Director, RDT

5-20-66

Cy file:
PFO 1-11
Prdy

OFFICIAL USE ONLY

[redacted] MHS-3 Hagerty Price

Congress of the United States

JOINT COMMITTEE ON ATOMIC ENERGY

May 13, 1966

Mr. Robert E. Hollingsworth
General Manager
U. S. Atomic Energy Commission
Washington, D. C.

Dear Mr. Hollingsworth:

Enclosed is a copy of a letter dated May 6, 1966 which Chairman Holifield has received from Mr. Joseph E. Moody, President, National Coal Policy Conference, Inc. There are a number of issues raised in the letter upon which the Committee would like to receive AEC comments:

(1) Mr. Moody appears to be suggesting that the Commission's reference to exposure to dental X-rays in describing the implication of thyroid dose from fallout iodine is not pertinent, in fact, perhaps misleading.

(2) Mr. Moody speaks of a recent release of "above-routine" amounts of radioactivity from the BONUS reactor. (The Joint Committee is not aware of any unscheduled release of activity from the BONUS reactor with the exception of an occurrence in November 1964 when there was failure of fuel cladding material resulting in a sudden release of a small amount of radioactivity.

(3) Mr. Moody comments upon what he considers to be the proper role of the AEC with respect to public education concerning the safety of civilian nuclear power plants.

In addition to the above, the Committee would appreciate receiving comments on any other portions of Mr. Moody's letter or related matters.

Thank you for your cooperation in this matter.

Sincerely yours,

John T. Conway

John T. Conway
Executive Director

Attachment:
Cy ltr dtd 5/6/66 fm Moody
to Holifield

cy filed O-M. 7. JCAE
LA-5. Puerto Rico
MHS-3.

5-13-66

~~ACRS~~ 7174 S-3 Hazards from Power Reactors

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON 25, D.C.

June 7, 1966

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

SUBJECT: ACRS REQUEST FOR DISCUSSION OF CONCLUSIONS FROM "BROOKHAVEN REPORT RE-EXAMINATION"

When the general conclusions relative to consequences of hypothetical accidents in large nuclear reactors arising from "re-examination of the Brookhaven Report" had been transmitted to the JCAE (June 18, 1965) the Brookhaven staff members immediately terminated all their efforts which had been proceeding toward a detailed updating of the WASH 740 calculations. At this point, a computerized code for accident calculations had been developed. Many of the variables and parameters had been given tentatively assigned values, and some trial-run, sample calculations had been run on portions of the problem. The material was left in incomplete, fragmentary and unverified form in the BNL files.

At this time Brookhaven proposed that they would publish two documents considered to have some interest to the scientific community, one on meteorologic parameters in atmospheric diffusion, and the other on health physics parameters and procedures in accidental releases of fission products.

The first of these documents has been written and sent to a publisher in good form. The second document was sent to the AEC "Steering Committee on the Brookhaven Report" on April 4, 1966. It was in rough draft form, badly in need of editing and coordination. The AEC staff and Brookhaven representatives are working together on this.

Members of the Brookhaven Steering Committee, including Dr. David Okrent and Dr. Frank Gifford, received copies of this second Brookhaven technical report. Apparently, receipt of this report precipitated discussions within the ACRS, which led in turn to requests from the ACRS for Brookhaven to brief the ACRS on the "assumptions, calculations and conclusions" of the re-examination of the Brookhaven Report.

Two meetings have been held between ACRS and Brookhaven representatives, each ending with the ACRS being unsatisfied with the material presented by Brookhaven, particularly on integrated population exposure dose calculations. Brookhaven is extremely reluctant to discuss this material

6-7-66

as filed 0-M-7 ACRS

d for 4/8 Jfo. mtg.

in its present incomplete and unverified status, and is even more reluctant to undertake the work necessary to assemble this material into a form for conveying it to the ACRS or others.

One possible course in this situation is suggested in the two attached draft letters.

Clifford K. Beck
Deputy Director of Regulation

Attachment:
Draft letter to Okrent, ACRS
w/encl. to Winsche, BNL.

cc: G.M.
Secretary (2)

MMOS 3. Hazards & Power Reactors

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

August 12, 1965

UNCLASSIFIED

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

SUBJECT: CHARTER FOR STEERING COMMITTEE ON REACTOR SAFETY RESEARCH

Attached is a proposed revision of the charter for the Steering Committee on Reactor Safety Research.

Revisions are a change in paragraph 2 and addition of a new subparagraph (4) under paragraph 3 concerning programs for criteria, standards and codes for nuclear reactors.

We would like to discuss this at an early information meeting.

E. J. Bloch
Edward J. Bloch
Acting General Manager

H. L. Price
Harold L. Price
Director of Regulation

Attachment:
As stated above

cc: Secretariat (2)
OGC (2)

Copy to file.
C-M-7 - Steering Cmtee on Reactor Safety Research

8-12-65

UNCLASSIFIED

CHARTER FOR THE STEERING COMMITTEE ON REACTOR SAFETY RESEARCH

1. ESTABLISHMENT - There is hereby established the Steering Committee on Reactor Safety Research.

2. PURPOSE AND OBJECTIVES OF THE COMMITTEE - It is the purpose of this Committee to coordinate the interests of the General Manager and the Director of Regulation in the Commission's reactor safety research program and in the development of criteria, standards and codes.

3. SPECIFIC FUNCTIONS OF THE COMMITTEE - The principal functions of this Committee will be to:

   (1) review, evaluate and recommend to the General Manager, priorities in the reactor safety research needs identified by the AEC regulatory and operating Divisions, AEC contractors and the nuclear industry;

   (2) review and evaluate the specific research programs on reactor safety proposed and/or established to meet the needs in (1) above, including budget and program planning and advise the General Manager thereon;

   (3) review and encourage the development of procedures and programs through which the information developed in the reactor safety research programs is made available promptly and in a form usable by the nuclear community in meeting the design and regulatory requirements of reactors;

   (4) review and evaluate plans and programs, including those carried out in cooperation with industrial and professional groups, for the development of criteria, standards and codes for nuclear reactor safety; advise the Director of Regulation and the General Manager concerning their respective interests therein; and act as a focal point for

coordination of the work of the staffs of the Director of Regulation and the General Manager on criteria, standards and codes; and

(5) undertake and carry out such other specific assignments and functions as the General Manager and the Director of Regulation may jointly direct.

4. MEMBERSHIP - The Committee will consist of:

Dr. John Swartout, Assistant General Manager for Reactors - Chairman

Dr. Clifford Beck, Deputy Director of Regulation - Vice Chairman

Mr. Milton Shaw, Director, Division of Reactor Development & Technology

Dr. Marvin M. Mann, Assistant Director of Regulation for Nuclear Safety

Dr. Joseph Lieberman, Assistant Director for Nuclear Safety, Division of Reactor Development & Technology

Mr. Joseph DiNunno, Assistant Director for Reactor Standards, Division of Safety Standards

Dr. David Bruner, Assistant Director for Medical & Health Research, Division of Biology & Medicine

5. MEETINGS - The Committee will have regular meetings at least once a month. Other meetings may be held at the request of the Committee Chairman or of its membership.

DATE:

INDEX: MH&S 3 Hazards of Power Reactors

[redacted]

TO:

FROM:

SUMMARY: Package of reference material relating to a letter to the Chairman frm. ACRS (8-9-65) after review of the Report of the Regulatory Review Panel, package contains 6 enclosures.

FILED: PPC 1 Reg.

INDEXER: 8-9-65

REMARKS:

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

8-9-65

Mtl: G. P. Kingsmith, Power Reactors Res. & Status Br. - GTN

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27

UNITED STATES GOVERNMENT

Memorandum

TO : Milton Shaw, Director
Division of RDT

DATE: August 3, 1965

Original signed by
J. T. Hobbs for

FROM : W. B. McCool, Secretary

SUBJECT: MEETING BETWEEN WESTINGHOUSE REPRESENTATIVES AND AEC STAFF ON REACTOR SAFETY

SECY:GF

1. At the Meeting with Representatives of Westinghouse on July 29, 1965, the Commission noted discussions should be held with the Westinghouse representatives on reactor safety.

2. The General Manager has directed you to take the action required by the above request.

cc:
Chairman
General Manager
Deputy General Manager
Asst. General Manager
Exec. Asst. to Gen. Mgr.
Asst. Gen. Mgr. for Reactors
General Counsel

Copy file: CM-6

8-3-65

MHS 3. Hazards 2 Power Reactors

August 2, 1965

Dear Larry:

Thank you for the report of the reactor subcommittee on the Commission's program of research on reactor safety that was transmitted by your letter of July 30, and your prompt response to the Commission request for this study.

We will look forward to the full GAC consideration of this report at its next meeting. In the interim, the Commission will take under advisement the recommendations included in the report.

It may be of interest to the GAC in considering the subcommittee's report that the Commission has recently established a Steering Committee on Reactor Safety Research for the purpose of coordinating the interests of the General Manager and the Director of Regulation in the Commission's reactor safety research program. The Committee will consist of:

Dr. John Swartout, Assistant General Manager for Reactors - Chairman

Dr. Clifford Beck, Deputy Director of Regulation Vice Chairman

Mr. Milton Shaw, Director, Division of Reactor Development & Technology

Dr. Marvin M. Mann, Assistant Director for Nuclear Safety

2 pmtg 50f

8-2-65

Dr. Joseph Lieberman, Assistant Director for
Nuclear Safety, Division of Reactor Development
and Technology

Mr. Joseph DiNunno, Assistant Director for Reactor
Standards, Division of Safety Standards

Dr. David Bruner, Assistant Director for Medical
and Health Research, Division of Biology &
Medicine.

Cordially,

/S/

Glenn T. Seaborg

Dr. L. R. Hafstad, Chairman
General Advisory Committee to the
U. S. Atomic Energy Commission
P. O. Box 19029
Washington, D. C. 20036

bcc: R. E. Hollingsworth
Harold L. Price

JHR:smk/lg

OFFICIAL USE ONLY Res. & Status Br. - GTN

UNITED STATES GOVERNMENT

Memorandum

TO : File

DATE: July 27, 1965

FROM : W. B. McCool, Secretary

SUBJECT: AEC 943/23 - STEERING COMMITTEE ON REACTOR SAFETY RESEARCH

SECY:JCH

1. At Information Meeting 499 on July 23, 1965, the Commissioners approved, with revisions, the charter and membership for the Steering Committee on Reactor Safety Research, subject to the receipt of early recommendations on standards. (See AEC 943/23) The Commissioners noted that Dr. Marvin Mann would serve on the Committee in the place of Dr. Richard Doan.

2. The Commissioners also noted a press release is to be circulated for the information of the Commission.

3. It is our understanding the General Manager and the Director of Regulation are taking the required action.

cc:
Commissioners
General Manager
Deputy General Manager
Asst. General Manager
Exec. Asst. to Gen. Mgr.
Director of Regulation
Deputy Director of Regulation
Asst. Dir. of Regulation
Asst. Dir. of Reg. for Admin.
Asst. Dir. of Reg. for Nuclear Safety
Asst. Gen. Mgr. for Reactors
Asst. Gen. Mgr. for Operations
General Counsel
Dir., Reactor Develop. & Tech.
Dir., Biology & Medicine
Dir., Safety Standards
Dir., Public Information
Dir., Congressional Relations

Copy for: Chm-7

7-27-65

OFFICIAL USE ONLY

MTR S. 3 Log safe Power Reactor

UNCLASSIFIED

August 19, 1965

ABC 943/25

COPY NO. 26

AEC 943/25

ATOMIC ENERGY COMMISSION

INFORMATION ITEM

MEETING OF STEERING COMMITTEE ON REACTOR SAFETY RESEARCH

Note by the Acting Secretary

The attached minutes of the first meeting of the Steering Committee on Reactor Safety Research is circulated for the information of the Commission at the request of the Executive Assistant to the General Manager.

F. T. Hobbs

Acting Secretary

DISTRIBUTION	COPY NO.
Secretary	1,25-29
Commissioners	2-6,30-33
General Manager	7 - 8
Deputy Gen. Mgr.	9
Asst. Gen. Mgr.	10
Dir. of Regulation	11 - 13
Deputy Dir. of Regulation	14
Asst. Dir. of Regulation	15
Exec. Asst. to GM	16 - 17
Asst. GM for Operations	18
Asst. GM for Reactors	19 - 20
General Counsel	21
Inspection	22
Operational Safety	23
Reactor Dev. & Tech.	24

cy filed O-M-7- Steering Committee

8-19-65

UNCLASSIFIED

STEERING COMMITTEE ON REACTOR SAFETY RESEARCH

MEETING AUGUST 12, 1965

MINUTES

1. The first meeting of the Steering Committee on Reactor Safety Research was called to order at 10:00 a.m. on August 12 in Dr. Swartout's office in Germantown. In attendance were:

Dr. John A. Swartout, Chairman
Dr. C. K. Beck
Dr. H. D. Bruner
Mr. J. J. DiNunno
Dr. J. A. Lieberman
Dr. M. M. Mann
Mr. M. Shaw

2. After a brief discussion, the Committee expressed agreement with its proposed charter which is scheduled to be presented for Commission consideration on August 13, 1965.

3. The Committee unanimously accepted Dr. Swartout's suggestion that Dr. Murray W. Rosenthal serve as Technical Secretary to the Committee.

4. The Committee will begin its approach to the problem assigned to it by reviewing needs for information:

(a) Regulatory
(b) Reactor industry representatives
(c) Design concerns from the Division of Reactor Development and Technology and the Division of Biology and Medicine.

It was agreed that following completion of the above enumerated items there would begin an intensive and detailed review of the Nuclear Safety Program.

5. It was agreed that the next meetings will be scheduled as follows:

August 16 - 2:00 p.m. - Dr. Swartout's office, Germantown
August 19 - 1:30 p.m. - Bethesda office
August 20 - 8:30 a.m. - Bethesda office

The meeting on August 16 will be devoted to a presentation and discussion of the needs of the regulatory program; the August 19 meeting will consist of a presentation and discussion of Reactor Development and Technology's design concerns; and the August 20 meeting will consist of a presentation and discussion of the Division of Biology and Medicine's areas of interest in reactor safety.

6. The Committee would also concern itself with a review of the recently completed General Advisory Committee report on nuclear safety, a review of proposed comments thereon and plans for implementation of the recommendations of the report. Dr. Lieberman is preparing the comments and they will be reviewed by the Committee prior to transmission.

7. During a brief discussion of the General Advisory Committee report, it was agreed that Dr. Lieberman would provide to the members of the Committee copies of the Stoller report and copies of the document entitled "Nuclear Safety Program, Notes for GAC Committee, dtd May 26, 1965".

8. The Committee then discussed at length the need for a better and more inclusive system of quarterly reports on the results of nuclear R&D programs and the significance of these results across the board. It was observed that the Nuclear Safety Quarterly Report as presently constituted provides an inordinate amount of attention to the future plans of the R&D men as compared with the accomplishments achieved during the quarter and intentionally provides no assessment of the significance of the reported accomplishments to the safety problems of the Commission as a whole. Dr. Lieberman was asked to prepare suggested revisions to the reporting procedure for detailed discussion by the Committee at a future meeting.

E. V. McGarry
Secretary pro tem.

August 12, 1965

~~Legal & Laws~~ NH+S-3-Hazards J Power Reactor Sec 10

AUG 18 1965

Dear Charles:

The Joint Committee on Atomic Energy has requested our comments on H. R. 9702, a bill, "To amend the Atomic Energy Act of 1954 to promote the public health and safety."

Our proposed response to the request is attached in draft form. I would appreciate your advice as to whether transmission of these views is regarded consistent with the President's program.

Cordially,

(Signed) G. F. Tape

Acting Chairman

Honorable Charles Schultze
Director
Bureau of the Budget

Enclosure
Draft comments

bcc: Chairman (2)
GM (2), AGMD, DGM, AGM
SDS
GCO
OGC

cy filed Legal 4 - Laws Leg.
Legal 4. Amdt. to A.E. Act

8-18-65

FORM AEC-324 (9-57)

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

DATE:

INDEX: MH&S- 3-Hazards for Power Reactors

[redacted]

TO:

FROM:

SUMMARY: Memo to Commissioner Ramey from H.L.Price "SAFETY RECORD OF NUCLEAR INDUSTRY" Safety statistics for the private sector of the AEC Industry Report to the Director of Compliance - Of considerable interest to Congress and certain members of the public is the effect of the ~~xxxxxx~~ atomic energy industry on the many areas of the nation's life.

FILED: MH&S - 5-

INDEXER: date 8-12-65

REMARKS:

8-12-65

MHTS-3 Hazard

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

No. H-191
Tel. 973-3335 or
973-3446

FOR IMMEDIATE RELEASE
(Friday, August 20, 1965)

AEC APPOINTS STEERING COMMITTEE TO COORDINATE REACTOR SAFETY RESEARCH PROGRAM

The Atomic Energy Commission has appointed a steering committee of members of the staff to coordinate the AEC's reactor safety research program.

The steering committee will work to assure that the experimental information developed in the Commission's extensive program of reactor safety research is keyed to the needs of the continuing development of the nuclear industry and to the requirements of the Commission's regulatory program.

Principal functions of the committee will be to:

(1) Review, evaluate and recommend to the AEC General Manager priorities in reactor safety research identified by the regulatory staff, AEC operating divisions, AEC contractors and the nuclear industry.

(2) Review and evaluate the specific research programs now under way or which may be proposed, including budget and program planning, and advise the General Manager on these matters.

(3) Review and encourage the development of procedures and programs through which the information developed in the reactor safety research program is made available promptly and in a form usable by the nuclear community in meeting reactor design and regulatory requirements.

(4) Review and evaluate plans and programs, including those carried out in cooperation with industrial and professional groups, for the development of criteria, standards and codes for nuclear reactor safety; advise the Director of Regulation and the General Manager concerning their respective interests; and act as a focal point for coordination of the work of the staffs of the Director of Regulation and the General Manager on criteria, standards and codes.

(more)

cy fld O-M-7

(5) Undertake and carry out such other specific assignments and functions as the General Manager and the Director of Regulation may jointly direct.

The committee will consist of Dr. John A. Swartout, AEC Assistant General Manager for Reactors; Dr. Clifford K. Beck, Deputy Director of Regulation; Milton Shaw, Director of the Division of Reactor Development & Technology; Dr. Marvin M. Mann, Assistant Director of Regulation for Nuclear Safety; Dr. Joseph A. Lieberman, Assistant Director for Nuclear Safety in the Division of Reactor Development & Technology; Joseph J. DiNunno, Assistant Director for Reactor Standards in the Division of Safety Standards; and Dr. H. D. Bruner, Assistant Director for Medical & Health Research in the Division of Biology and Medicine. Dr. Swartout will be chairman and Dr. Beck vice chairman of the committee.

Establishment of such a committee is consistent with recommendations by the special Regulatory Review Panel in its report released July 21, and by other advisory groups.

#

8/20/65

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

SEP 14 1965

MEMORANDUM FOR COMMISSIONER RAMEY

(Signed) Dwight A. Ink
THROUGH GENERAL MANAGER

SUBJECT: OFF-SHORE SITING OF POWER REACTORS - SAFETY ASPECTS

In connection with our reactor safety program we have been considering a study of the safety aspects of off-shore reactor siting as suggested in your July 23, 1965 memorandum. We plan to investigate the technical and economic aspects of schemes such as those proposed by Dr. McCullough, so that the results would be applicable to both power-only and dual purpose desalting plants. The study will emphasize the safety features of such designs to determine if the concept has the potential for significantly reducing the siting problems of large nuclear reactors. An assessment of the costs associated with the safety features also would be made.

The current study of the dual purpose desalting plant for the Metropolitan Water District (MWD) will not result in a plant design which is in sufficient detail for direct use in our study, as we now conceive it. We believe, however, that an investigation of a large power-only plant for which we can obtain a preliminary design and an approved hazards analysis will provide valuable information to any MWD project. We would expect to have the initial study results by early next spring and thus they could be factored into any definitive plans for the MWD plant.

If improved safety features require development or extensive engineering test, their application to the MWD project may be questionable, especially if the project proceeds according to

SEP 14 1965

the proposed schedule. Also, estimates of the additional costs involved in building such plants below sea level as you requested would be one of the principal objectives of our planned study, and it would therefore be premature to speculate as to what these might be at this time.

It is our intention to achieve close coordination between this investigation and the MWD study and to attempt to obtain the desired results on a schedule consistent with the plans of the MWD. Towards this end I have asked Dr. Lieberman and Mr. Williams to closely coordinate their efforts. I expect to provide you a copy of our proposed scope of work shortly.

Milton Shaw, Director
Division of Reactor
Development and Technology

cc: Chairman Seaborg
Commissioner Palfrey
Commissioner Tape

bcc: J. Lieberman
General Manager (2)
J. A. Swartout, AGMR
RDT:D
C. K. Beck, L&R

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27

~~OFFICIAL USE ONLY~~

Res. & Status Br. - GTN

UNITED STATES GOVERNMENT

Memorandum

TO : Harold L. Price, Director of Regulation

DATE: September 1, 1965

FROM : W. B. McCool, Secretary (Original signed W. B. McCool)

SUBJECT: AEC-R 101/6 - AMENDMENT TO 10 CFR 150 WITH RESPECT TO QUANTITIES OF SPECIAL NUCLEAR MATERIAL INCLUDED IN COMPUTATION OF AMOUNT NOT SUFFICIENT TO FORM A CRITICAL MASS

SECY:AJ

1. At Regulatory Meeting 221 on August 31, 1965, the Commission:

a. Approved publication of the Notice of Rule Making contained in Appendix "A", to AEC-R 101/6 to be effective thirty days after publication in the Federal Register;

b. Noted that the Joint Committee on Atomic Energy will be informed of the rule making action by letter such as Appendix "B" to AEC-R 101/6; and

c. Noted that a public announcement such as Appendix "C" to AEC-R 101/6 will be issued upon filing of the amendment with the Federal Register.

2. The Commission has directed you to take the action required by the above decision. It is our understanding that your office will prepare the correspondence to the JCAE. Copies of this letter together with other pertinent correspondence should be provided the Office of the Secretary.

cc:

Chairman	General Manager
Deputy Director of Regulation	Deputy General Manager
Asst. Dir. of Regulation	Asst. General Manager
Asst. Dir. of Reg. for Admin.	Exec. Asst. to the Gen. Mgr.
Asst. Dir. of Reg. for Nuclear Safety	General Counsel
Director, State and Licensee Relations	Director, Congressional Relations
Director, Materials Licensing	Director, Public Information

~~OFFICIAL USE ONLY~~

MHS-3 Mgt 16 g Power Reactors

AUG 24 1965

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

THROUGH GENERAL MANAGER (Signed) John V. Vinciguerra fsg

SUBJECT: PUBLIC REACTIONS TO ATOMIC ENERGY

Attached is a letter from the Atomic Industrial Forum outlining the action they are taking relative to a survey of public reactions to nuclear power. The questionnaire referred to in the letter is expected to develop a Public Understanding Committee position on the matter which will be reported to the Forum's Executive Committee at its next meeting on September 16. A formal response from the Forum on the Atomic Energy Commission's suggestion is expected shortly thereafter.

Ernest B. Tremmel, Director
Division of Industrial
Participation

Attachment:
Letter from AIF dated 8/3/65

cc: Oscar Smith, LR

bcc: GM Secretariat

OFFICE ▶	DIP	DIP-DEP-DIR	DIP-DIR	GM	DGM	EAGM	AGM
SURNAME ▶	CEMcColley:ws	RWRitzmann	ERTremmel				
DATE ▶							

8/24-65

ATOMIC INDUSTRIAL FORUM INC.

850 THIRD AVENUE · NEW YORK, N.Y. 10022 · PLAZA 4-1075

August 3, 1965

Mr. Ernest B. Tremmel
Director
Div. of Industrial Participation
U. S. Atomic Energy Commission
Washington, D.C. 20545

Dear Ernie:

This is to follow up our interim reply on the Forum's reaction to a joint venture with the AEC to get information on public reactions to atomic energy.

As you know, our Executive Committee referred this matter to the Steering Committee of the Public Understanding Program for consideration and recommendations. An ad Hoc Task Force has been appointed by the Steering Committee and it has had several discussions on the proposal and the conduct of such a poll. Additionally, the Forum's staff has met with opinion research representatives to get a better grasp of the involvements of such an undertaking.

Charles Hoppin of Consolidated Edison of New York (Task Force Chairman) is now drafting some notes on the poll as well as a questionnaire which will be sent to our Public Understanding Committee, which will attempt to obtain their views as to the kinds of information they would like to have a survey expose.

We will send you a copy of our letter and questionnaire as soon as they are available.

All this is by way of saying that we are giving the matter our attention, and that we should be back to you within the next very few weeks.

Best wishes.

Sincerely,

Charlie

Charles Robbins
Executive Manager

CR/b

MH&S-3 Legal / Power Reactors

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September 22, 1965

AEC 943/26

COPY NO. 54

ATOMIC ENERGY COMMISSION

ACRS REVIEW OF REACTOR SAFETY RESEARCH PROGRAM

Note by the Secretary

The attached memorandum of September 17, 1965, from the Chairman, Advisory Committee on Reactor Safeguards, together with its attachments, is circulated for the information of the Commission.

W. B. McCool

Secretary

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

SEP 17 1965

Honorable Glenn T. Seaborg
Chairman
U. S. Atomic Energy Commission
Washington, D. C.

Subject: REVIEW OF REACTOR SAFETY RESEARCH PROGRAM

Dear Dr. Seaborg:

The Advisory Committee on Reactor Safeguards has continued its review of the Reactor Safety Research Program since its last report on this subject. Several meetings have been held with representatives of the Division of Reactor Development and Technology and its contractors.

The Committee has summarized its views on the program in a letter to the General Manager, a copy of which is attached. In response to a request from Dr. J. A. Lieberman, Assistant Director for Nuclear Safety, DRD&T, the Committee has also transmitted to the General Manager its comments on a proposed reactivity accident test program. A copy of this letter is also attached.

Sincerely yours,

W. D. Manly

W. D. Manly
Chairman

Attachments:
1. Letter to AEC General Manager, dated September 17, 1965
   Subject: Report on Reactor Safety Research Program.
2. Letter to AEC General Manager, dated September 17, 1965
   Subject: Report on Proposed Reactivity Accident Test Program.

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

SEP 17 1965

Mr. R. E. Hollingsworth
General Manager
U. S. Atomic Energy Commission
Washington, D. C.

Subject: REPORT ON REACTOR SAFETY RESEARCH PROGRAM

Dear Mr. Hollingsworth:

The Advisory Committee on Reactor Safeguards wishes to transmit further comments concerning certain aspects of the Reactor Safety Research Program. Though many of these comments reflect the briefing on parts of the program that the Reactor Safety Research Subcommittee received on August 3, 1965, others are of a more general character. The Committee is transmitting in a separate letter its views on the proposed program for experimental study of reactivity-induced accidents.

One question that arises in many safety analyses and that will be interesting in the LOFT experiment is the temperature-time history of a reactor core that has lost coolant. The analysis of this relation is complex and is hindered by the lack of experimental data obtained with realistic cores. It appears possible and of real value to perform an experiment in a facility such as SPERT-III, in which the coolant is removed after a power run, and the temperature transient of the fuel is measured under conditions which assure that fuel clad temperatures do not closely approach the melting-point. This experiment would help to provide insight into analysis of core heating and melting after a loss of coolant, and the Committee recommends that it be considered.

Relative to LOFT, the Committee wishes to offer several comments:

1) The decision to use zirconium alloy clad for the fuel in the LOFT meltdown seems to be reasonable in view of the current trend toward general use of this cladding material for water reactors. The Committee suggests that a few stainless steel clad elements be included among the predominantly zirconium clad elements, however, so that further insight into the relative behavior of the two fuel clad materials may be obtained from the test.

2) The LOFT program is already making contributions to safety through the methods of calculation and analysis that are being developed. It is to be expected that many of these methods will be useful in safety analysis of reactor plants by supplementing or replacing many of the existing methods, a number of which are proprietary. Careful documentation of the analytical techniques and general results obtained therewith is suggested.

3) The Committee recommends that calculations be made of the sensitivity of the expected consequences of the LOFT tests to the accuracy of the input data used in the analysis.

4) The intensive instrumentation studies being made for LOFT should generate a considerable amount of new information on instrument reliability, sensitivity, speed of response, etc. The Committee suggests that much of this information would be of wide interest and that it should be published.

5) If, as is still planned, the LOFT reactor is not scrammed just before or at the time of the blowdown leading to core melting, the calculated pressure-time history should include the contribution of any associated power excursions that might be considered plausible.

The Committee recommends that a study be undertaken to determine whether existing experimental information, supplemented by data from presently planned experiments, will be adequate for understanding and predicting the course of blowdown during a postulated loss of coolant accident. This should consider both the large-scale flow from the reactor vessel and the flow through the core.

The Committee believes that well-planned tests of transient behavior with an oxide-fueled core in SPERT-III will be valuable in improving the understanding of the dynamic behavior of pressurized water power reactors. The Committee is of the opinion that it is unnecessary to do nondestructive transient tests with both stainless steel clad and zircaloy clad fuel.

It is questionable that useful results would be derived from experiments to determine whether center melting affects the Doppler coefficient significantly, because of the need for high accuracy required in calculating or estimating the values of such parameters as temperature and compensated reactivity.

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Mr. R. E. Hollingsworth

The Committee wishes to encourage research such as that leading to the newly-developed sonic method of locating defects in reactor vessels by triangulation. The development of this and other methods of inspecting and testing pressure vessels during their service lives is important to reactor safety.

The Committee wishes to emphasize the need for promptly obtaining definitive information concerning the rate of production of iodine compounds from airborne elemental iodine, and the degree of retention of these compounds in air cleaning apparatus.

The Committee also recommends experiments on metal-water reactions in meaningful, reactor-like configurations, if possible, to check some of the assumptions now made in analyses of such accidents.

The Committee wishes to suggest research in several areas in addition to those now approved. These are:

1) The development of greater reliability of certain components of nuclear power plants that have not shown evidence of the complete dependability desired for nuclear use. Examples are: airlock seals, isolation valves in gas and liquid systems, containment penetration seals, instrumentation components and systems, control mechanisms, and emergency power supplies.

2) Theoretical studies of the course and consequences of postulated accidents to very large water reactors including the metal-water reaction and hydrogen recombination phases. The effects of operability of various combinations of engineered safeguards should be considered.

3) The development of sophisticated analytical methods of predicting the course and effects of postulated destructive reactivity transients in large water reactors.

4) The development of methods to store and dissipate fission product gases, especially the noble gases, from confined reactors in the unlikely event of a major accident.

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Mr. R. E. Hollingsworth

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In addition to the areas of reactor safety considered in the foregoing, the problems of shipping highly radioactive fuel without undue hazard to the health and safety of the public will become of increasing importance as the number of reactors increases. Present shipping containers are lead-shielded. Lead has good shielding properties, but it has certain drawbacks, such as the possibility of loss by melting in accidents involving exposure to fire. Investigations made thus far in regard to container design and construction have been restricted in concept and scope. Available basic and design information should be correlated and supplemented by a co-ordinated program of additional analysis and research leading to more suitable shipping containers.

Sincerely yours,

W. D. Manly
Chairman

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
UNITED STATES ATOMIC ENERGY COMMISSION
WASHINGTON 25, D. C.

SEP 17 1965

Mr. R. E. Hollingsworth
General Manager
U. S. Atomic Energy Commission
Washington, D. C.

Subject: REPORT ON PROPOSED REACTIVITY ACCIDENT TEST PROGRAM

Dear Mr. Hollingsworth:

The following Advisory Committee on Reactor Safeguards views are in response to the letter of July 19, 1965 from Dr. J. A. Lieberman, concerning a proposed reactivity accident test program. Dr. Lieberman provided copies of two related reports by Phillips Petroleum Company, and the Reactor Safety Research Subcommittee of the ACRS heard a presentation by representatives of Phillips Petroleum Company at a Subcommittee meeting on August 3, 1965.

In his letter, Dr. Lieberman posed four questions, as follows:

(1) "Is a damaging reactivity excursion still considered credible? If so, what are the most likely means of initiating such excursions? What is the maximum reactivity insertion possible from a single ejected control rod or a single dropped fuel element?"

(2) "Can you identify the probable initiating mechanisms and, if so, why can it not be designed against?"

(3) "If your recommendation is to conduct an integral destructive reactivity accident test to realistically assess the consequences, should a PWR or BWR be tested -- or should both? Why?"

(4) "If you consider it necessary to perform destructive reactivity accident tests, should they be done on clean cores to minimize construction and operating costs or should they be done in a contained facility after a long period to build in the fission product neutronic effects, fission product gas pressure, radiation and

Mr. R. E. Hollingsworth

SEP 17 1965

cycling effects in the cladding, and high burnup materials' properties in the fuel? Do you know of any methods by which all these high burnup effects can be simulated to permit valid scoping tests to be run on a clean core?"

The Committee's views are as follows:

Generally speaking, a damaging reactivity excursion is still considered credible. The ways of initiating such accidents depend on the particular reactor. In reactors with rod drives from below, a rod drop-out is considered credible in some cases. In reactors which are pressurized, some combinations of thermal stress, brittleness, corrosion, manufacturing defects, and pressure-induced stresses could cause failure of a control rod housing nozzle, or of its means of attachment, so that the control rod is ejected rapidly from the reactor core. Where control rod drives are mounted on the reactor vessel head, failure of head bolts or of other vessel head hold-down devices could cause rapid lifting of the head and removal of the attached control rods from the core en masse. A fire in control circuitry could simultaneously cause control rod withdrawal and failure of scram capability. Sudden injection of coolant at a lower than normal temperature could cause a "cold water accident" through a sudden increase in reactivity. In reactors with soluble neutron poison, a sudden injection of unpoisoned water could begin a reactivity transient. In some reactors, sudden shifts in the position of core components could cause an increase in reactivity. During reloading, there could be inadvertent dropping of fuel or fuel casks, removal of neutron poison such as control rods or poison shims, or assembly of a highly undermoderated reactor in a partly loaded geometry which is more reactive than the fully-loaded one. Future large, water-cooled reactors using boron shim may have positive central void reactivity effects, which could lead to a sudden increase of reactivity. In boiling reactors with a large reactivity defect due to the existence of voids, a sudden rise in pressure could add significant amounts of reactivity. This list is not exhaustive, nor is it implied that all possibilities exist for all reactors.

The maximum worth of a single ejected control rod or a single dropped fuel element depends on the reactor in question. As nuclear power plants become larger, the trend may be to make fuel elements and control rods larger; this may lead to greater individual reactivity worths. Methods have been proposed by which rod withdrawal is programmed, so that individual rod worths are kept below limiting values. The limits are usually chosen so that a rod ejection or drop-out accident would not lead to major damage to the core or primary system. The Committee has considered such proposals on a case-by-case basis.

Mr. R. E. Hollingsworth

SEP 17 1965

In some cases, design against possible initiating mechanisms can be done. For instance, interlocks and slow-opening valves are sometimes used to preclude the initiation of a cold water accident. Structural members could presumably prevent single-rod ejection or the lifting of the reactor vessel head if head bolts were to fail.

It is difficult to foresee the course of future large pressurized or boiling water reactor designs, but it is likely that potential reactivity excursions involving significant amounts of reactivity will remain a factor in evaluating their safety. The Committee would be reluctant to conclude that all possible initiating mechanisms could be prevented by design with enough reliability to render reactivity accidents incredible, or even that all possible initiating mechanisms have been identified in any given case. Inclusion of preventive systems is necessary, and is considered vital in the review of the safety of reactors and their locations. But it is not considered likely that accident prevention alone can remove the need for consequence-limiting features of the plants. The safety of reactors continues to depend on compounding the low probability of a major accident and the low probability of failure of features to limit the effect of accidents.

The Committee believes that an integral, destructive reactivity excursion test, or tests, would be valuable. However, the Committee believes that a careful and thorough program should be laid out before experimental work begins. The program should specifically outline the objectives to be achieved and the data or measurements to be taken, and should demonstrate that theoretical interpretation of the results is feasible. The Committee believes that the experimental program and a strong accompanying theoretical program should go hand-in-hand.

There are several possible objectives for the experimental program. Perhaps the most urgent objective is to obtain a better definition of the accident magnitude which would lead to rupture of the pressure vessel in water-cooled power reactors currently in the design stage, or likely to be built in the near future. Another possibility is to look for a natural limit to the energy release in reactivity accidents of interest. Another objective could be to look for unforeseen effects. Or, one could devise an experiment to check theoretical methods of calculating the course and consequences of postulated violent reactivity accidents in boiling and pressurized water reactors.

The Committee feels that the last two objectives, namely, providing a check point for analytical techniques, and possibly uncovering additional phenomena or a different course of events than hypothesized, are likely to be the most fruitful objectives for destructive, integral reactivity tests.

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Mr. R. E. Hollingsworth

The schedule for the proposed experimental program is quite long. Dr. Lieberman's letter states that the completion of the test program described in PTR-738 is not expected until 1972; the results therefore could not be applied to reactors operating much before 1975. The Committee believes that a well thought-out experimental and theoretical program should be initiated at an early date, and that the program schedule must be shortened to give information urgently needed within the next five to six years.

The Committee feels that there could be considerable difference between the course of reactivity accidents in pressurized water reactors and in boiling water reactors. Experimental programs on both seem equally desirable. The possibility of using SPERT-III for both should be investigated further.

Dr. Lieberman's questions concerning the possible need for separate experiments on a PWR and a BWR, and on the significance of fission products and pre-irradiation on the course of a destructive reactivity accident, are representative of some of the many significant parameters which can influence such an experiment. This is particularly true if it is hoped to apply the results of an experiment empirically to the safety analysis of future large reactors. Concrete pressure vessels, new cladding materials, positive void coefficients, and superheat are some possible different aspects of water reactors to be built in the 1970's.

All features cannot be tested full-scale and in timely fashion. Small-scale, in-pile experiments in the Power Burst Facility, coupled with other work aimed at providing a basic knowledge of the phenomena involved, and corroborated or redirected by a carefully designed, integral destructive reactivity experiment can provide increased understanding to help judge the safety of large boiling and pressurized water reactors in this respect. Careful review is required to decide which individual features may be vital to any specific integral experiment.

The Committee does not believe that the effects of high burnup can be simulated adequately with tests on a clean core.

In summary, the ACRS recommends that planning for a meaningful, destructive reactivity experiment begin immediately, together with an accelerated program of analyses, and that the program be pursued vigorously.

Sincerely yours,

W. D. Manly

W. D. Manly
Chairman

References attached.

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Mr. R. E. Hollingsworth

SEP 17 1965

References

1. PTR-738 (Rough Draft), "A Review of the Generalized Reactivity Accident for Water-cooled and-Moderated, UO_2-Fuelled Power Reactors", undated, received July 20, 1965 (OUO).

2. PTR-755 (Rough Draft), "Reactivity Accident Test Program, Proposal Number One: Integral System Scoping Tests", dated May 28, 1965 (OUO).

UNITED STATES GOVERNMENT

Memorandum

TO : J. V. Vinciguerra, Executive Assistant to the General Manager

DATE: December 23, 1965

THRU : J. A. Swartout, AGMR

FROM : Milton Shaw, Director
Division of Reactor Development & Technology

SUBJECT: IN-PLANT ENGINEERING TEST PROGRAM FOR REACTOR SAFETY

RDT:PM

Pursuant to your inquiry as to the status of RDT discussion with the Rural Cooperative Power Association (RCPA) subject as above, I am attaching a copy of my memorandum to Dunbar on this matter.

As noted in my memorandum to Dunbar, as well as the attachment, discussions have taken place between my staff and RCPA as well as Nuclear Utility Services (NUS), technical consultants to RCPA, leading to an agreed-upon test program similar to that described.

If you have any further questions on this matter, please contact me.

Attachment:
Cy memo Shaw to Dunbar,
subject as above.

UNITED STATES GOVERNMENT

Memorandum

TO: K. A. Dunbar, Manager
Chicago Operations Office

DATE:

FROM: Milton Shaw, Director, Division of Reactor Development & Technology, HQ

Original Signed by
Milton Shaw

SUBJECT: IN-PLANT ENGINEERING TEST PROGRAM FOR REACTOR SAFETY; ELK RIVER REACTOR

RDT:MS

Recent discussions relating to reactor safety have emphasized the need to augment the Nuclear Safety Program in order to increase our experience in power reactor safety and, thereby, to contribute to the solution of problems relating to siting large reactors in metropolitan areas.

To this end, it is our intent to examine the costs and benefits related to in-plant tests at various AEC-owned and commercial reactors. The objective of the tests will be to validate the operability and reliability of various safety or safety-related systems, and their performance if possible, and to accumulate usable experience data on them. Tests to be considered on these plants would include but not be limited to the following:

1. Containment leakage tests - determine total leakage under conditions which can be readily extrapolated to the MCA leakage; determine degradation of leakage as a result of building aging, settling, post-construction changes and normal maintenance or operation.

2. "Open" penetration leakage - ditto the above on airlocks, access hatches, ventilation valves.

3. "Closed" penetration leakage - ditto the above on pipes, nozzles, drains, and cable penetrations.

4. Containment spray systems - operability of pumps, storage systems, valves, distribution system.

5. Air cleaning systems - leakage and efficiency tests to demonstrate probable performance under intended operating conditions; development of tests to periodically indicate any in-place degradation of component performance in the normal plant operating environment.

6. Core coolant spray or injection system tests - to indicate operability of pumps, valves, storage systems and actuating systems.

7. Poison injection system test - to demonstrate operability of pumps, valves, storage systems and actuating systems; to measure reactivity worth with highly dilute poison injection.

8. Emergency power systems - switchover, starting of internal combustion engines, pick-up of actual connected load.

9. Primary pressure envelope - evaluation of crack detection techniques, application and inspection of NDT monitoring specimens, physical or visual inspection of component internals.

10. Primary safety systems - methods for checking response of various scram circuits with realistic input signals, control rod insertion time measurements, physical or visual inspection of components.

11. Instrumentation - signal availability, quality and reliability of power supply, continuous monitoring and/or intercomparison of read-out, frequency of calibration, procedures and results.

The Elk River Reactor should be considered in implementing the subject test program. Accordingly, I request that you contact the Rural Cooperative Power Association (RCPA) to develop the scope, cost and schedule of an in-plant test program compatible with our needs. RCPA and their technical consultants (Nuclear Utility Services - NUS), have already taken the initiative in proposing such a program to Headquarters' personnel. We have prepared a draft letter which reflects these discussions and the understandings reached.

The above contacts with RCPA and NUS constitute our first step in an expanding program of in-plant safety testing on AEC-owned and commercial reactors. In this regard, we plan to assign Phillips Petroleum Company a lead role (technical) in the in-plant safety testing program. They will be expected to prepare guidelines, procedures, and criteria for maximizing in-plant safety testing capability and for periodic inspection, test and evaluation of the safety and protective system built into such reactors. They may, in certain instances, play an active role in the conduct of such tests. Although the details of the Phillips Petroleum Company assignment have not been worked out, I will invite them to sit in on a meeting to discuss such testing in the Elk River Reactor.

In scheduling the meeting in Washington regarding the proposed test program on this reactor, I request that you coordinate the scheduled date with Mr. W. R. Voigt, extension 3548.

It is recognized that implementation of this proposed testing program may require the following:

1. Revision and resubmission of the program justification data sheet to the JCAE reflecting possible expansion of contract scope; fixed fees and scheduling;

2. Possible revision of technical specifications and submission to and consideration by DRL and/or ACRS.

Please explore these and any other pertinent considerations which may occur to you with RCPA and be prepared to discuss them at the above suggested Headquarters meeting.

Attachment:
Draft Letter to Wolter
fr. Dunbar w/attachment

NOTE FOR CHICAGO OPERATIONS:

COULD THIS WORK BE DONE UNDER SUBCONTRACT TO AT(11-1)-651?

Mr. E. E. Wolter
Rural Cooperative Power
Association
Elk River, Minnesota

Dear Mr. Wolter:

During August 1965, a meeting was held at Germantown involving the Rural Cooperative Power Association (RCPA), Nuclear Utility Services (NUS) and representatives of the Division of Reactor Development and Technology (RDT) to discuss a NUS prepared safety program dated August 18, 1965, which could be conducted in the Elk River Reactor. On September 14, 1965, after RDT had completed its review of the safety proposal, further information was offered by NUS in regard to the proposed tests. This information was provided on November 5, 1965.

As result of the additional information that has been provided and the technical discussions we have had with NUS, I believe it is now an appropriate time to re-open this matter with RCPA. I therefore suggest for your consideration, that RCPA and the AEC undertake a test program similar to that indicated in the attachment to this letter. If a program of this type is agreeable to you, I propose development of an RCPA/AEC agreement which would define the test program, test schedule, cost sharing principals, and related matters.

Assuming that the above is generally acceptable to you, I suggest that a meeting in Washington be arranged in the near future involving RCRA, NUS, CO, and EDT to further delineate the test program, funding, and the administrative procedures to be followed.

Sincerely yours,

K. A. Dunbar, Manager
Chicago Operations Office

Attachment

ATTACHMENT TO LETTER, DUNBAR TO WOLTER
DATED _____

This attachment describes the types of testing which the AEC is interested in performing in cooperation with RCPA, assisted by NUS, on the Elk River Reactor. The information contained has been developed as the result of an internal review of an NUS folder dated August 18, 1965 and in meetings between NUS and AEC representatives on September 14, and November 5, 1965:

I. Containment Leak Rate Testing

A. Air-Pressure Tests up to 21.5 psig

The intent is to measure, as accurately as is practicable, every six months, the gross leakage of the Elk River containment. This would permit comparison of information obtained over several years to determine if degradation exists in the leakage rate as a function of time.

B. Testing with Containment Vessel Atmosphere at Elevated Temperatures

NUS representatives consider, subject to further examination, that it is feasible to heat the containment volume in increasing steps up to about 220°F. Containment leakage would be measured prior to heatup, and at various elevated temperature levels. After the maximum temperature is obtained, the cooling rate of the containment volume would be observed in order to measure the heat loss through the containment shell to the outside environment. After the volume has returned to ambient temperature, another measurement would be made of the gross containment leakage, to determine whether or not the leakage had changed as a result of the combined effect of elevated pressure and temperature.

C. Leakage Rate Testing of Individual Piping or Electrical Penetrations

A number of piping and electrical penetrations would be chosen for individual leakage measurements. The intent is to determine any leakage degradation with time as a function of penetration type. These tests would also be performed every six months.

D. Continuous Leak Rate Monitoring

NUS suggested that with modification for reactor operation with the butterfly valves (in the ventilation system) in a closed position, a low pressure blower could be installed to maintain the containment pressure at one to two psig. This pressure would be monitored continuously to observe any substantial deviation in a strip-chart recording, which would indicate any large change in leakage from the containment building. Engineering effort would be required to assess the modification cost for operation of the containment without continuous ventilation, at the small elevated pressure.

E. Containment Vacuum-Breaker Test

The Elk River vacuum breaker could be tested in one of two ways. An exhaust blower capable of decreasing the internal pressure by 0.22 psig could be installed to determine that the vacuum breaker opened at its set point, or, perhaps more simply, the containment could be opened, and the interior heated slightly. The containment could then be sealed and a slight vacuum created as the building cools to determine whether the vacuum breaker operates as intended.

II. Testing of Systems Intended to Limit Consequences of Postulated Nuclear Accidents

A. In-Core Cooling System

NUS has changed its initial recommendation to lower the core water level during shutdown as a means of following fuel cladding temperature before and during core spray, for reasons associated with risk of damage to the fuel elements. They now suggest simply to exercise the system, without special maintenance, during shutdown, to see if it works as designed. A minimum cost would be involved, probably associated with the addition of a flow meter to determine whether the in-core cooling system flow changes from one exercise period to the next.

B. Poison Injection System

NUS suggested the use of tracers for indication of dispersion of poison throughout the system as a function of time after poison injection. Although no substantial quantities of boron could be used because of system clean-up problems, a controlled amount of boron could be inserted and measurements of reactivity loss versus time could be extrapolated for a determination of system effectiveness in the postulated accident situation.

C. Charcoal Trap Degradation Studies

The AEC is interested in developing statistical information on any degradation which may occur in charcoal traps as a result of exposure to normal air contaminants in a reactor containment atmosphere. Of the several alternatives explored with NUS, most interest exists in the simple exposure of static charcoal trap components to the Elk River containment volume. These components would be tested, perhaps

every six months, to determine if air contaminants (such as dust, paint fumes, cleaning fluid fumes, etc.) had degraded the capability of the charcoal to remove halogens.

III. Primary System Pressure Relief Valve

Elk River and other boiling water reactors contain valves in the primary system which are intended to open at a preset level if an overpressure condition occurs. These valves, according to NUS, are initially tested by the vendor who uses a small volume pressurizing unit. Once the valve opens the pressure reduction is very rapid and the valve closes quickly again. If the valve were tested in a large volume system, such as the reactor primary system itself, we do not know whether such valves would tend to remain open or would oscillate and damage their seats. If they were to remain open, or if the seats were sufficiently damaged, a loss-of-coolant situation would be initiated. At present, the valves are generally tested on a periodic basis (about once a year) by pressurizing the system cold, to just the valve pressure setting, and then lifting it mechanically. Overpressuring the Elk River primary system (which normally operates at about 920 psig) to the valve setting of 1250 psig, cannot be considered because of possible damage to primary system components. An alternative approach is to consider removing the present valve and testing it in a large volume system, if such a facility can be located and used. Prior to this time, AEC desires that RCPA and NUS try to determine if applicable information exists on the reliability of such valves.

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27

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UNITED STATES GOVERNMENT

Memorandum

TO : Harold L. Price, Director of Regulation

DATE: December 15, 1965

FROM : W. B. McCool, Secretary

SUBJECT: LICENSING REQUIREMENTS FOR FOREIGN NUCLEAR MERCHANT SHIPS

SECY:ICB

1. As you will recall, during discussion of AEC 1202 - Legislative Program for CY 1966, at Meeting 2158 on November 30, 1965, the Commission requested that the development of procedures in lieu of licensing requirements for foreign nuclear merchant ships be expedited in the context of protecting the public health and safety and providing appropriate indemnification. Also, the Commission requested that consideration be given to whether the formal licensing procedures now applicable to U.S. nuclear merchant ships should be retained.

2. The Commission has directed you to take the action required by the above requests.

cc:
Commissioners
Deputy Director of Regulation
Asst. Dir. of Reg. for Admin.
Asst. Dir. of Reg. for Nuclear Safety
General Manager
Deputy General Manager
Asst. General Manager
Exec. Asst. to Gen. Mgr.
Asst. Gen. Mgr. for Reactors
General Counsel
Director, Reactor Dev. & Tech.
Director, Congressional Relations

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12-15-65

DATE: December 1, [redacted]3

[redacted]

INDEX:

TO:

FROM:

SUMMARY: AEC 120[redacted] - PROGRESS REPORT OF THE STEERING COMMITTEE ON REACTOR SAFETY RESEARCH

FILED: CRR-7 Steering Committee

[redacted]

REMARKS:

U. S. ATOMIC ENERGY COMMISSION

CORRESPONDENCE REFERENCE FORM

FORM AEC-204
★ U. S. GOVERNMENT PRINTING OFFICE: 1948 - 683163

WM H+S-3-2
Hazards Summary Reactors

NOV 29 1965

Honorable Abraham Ribicoff
United States Senate

Dear Senator Ribicoff:

This is in response to your referral of November 8 requesting information on questions arising from publication of an article in the October 18, 1965, issue of The Nation entitled, "Atomic Insurance: The Ticklish Statistics." This article was cited by Miss Patricia Taylor in her letter to you of October 24.

The article by Mr. David Pesonen suggests that the Atomic Energy Commission may have suppressed a "report" dealing with the theoretical consequences of a major accident in a large nuclear power plant. The "report" referred to by Mr. Pesonen is described in the article as an updating of the 1957 report, "Theoretical Consequences of a Major Accident in a Large Nuclear Power Plant." This 1957 report, made public at the time, was prepared at the Commission's request and was submitted to the Congressional Joint Committee on Atomic Energy in connection with its consideration of proposed legislation which ultimately resulted in enactment of the Price-Anderson Act in 1957. The report is commonly referred to as the "Brookhaven Report," since it was prepared primarily by a group of scientists from the Commission's Brookhaven National Laboratory in New York.

In connection with the recent Congressional extension of the Price-Anderson Act, members of the AEC staff and the staff of the Brookhaven National Laboratory reviewed the 1957 report. The reviewers determined at the conclusion of their study that no detailed refiguring was required to provide the Joint Committee on Atomic Energy with the information it needed to consider extension of the indemnification legislation. The conclusions of their review were set forth by Chairman Seaborg in his letter of June 18, 1965, to the Joint Committee (copy of which is enclosed), which was made public. A copy of a letter from Commissioner Palfrey to Mr. Pesonen, dated October 8, 1965, also is enclosed, which gives further information on the review.

As to the potential dangers involved in nuclear power, the Congress, the Commission and the nuclear industry have been conscious from the beginning of the overriding need for safeguarding the public in the

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11-29-65

Form AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-3

peaceful uses of atomic energy. The Commission is specifically charged by the Atomic Energy Act with protection of the public health and safety in this field, and elaborate procedures have been established to assure safety in the design and operation of any nuclear power plants before licenses are granted. AEC inspection and review of a power reactor does not end with the issuance of an operating license. The reactor remains under the Commission's surveillance throughout its lifetime. Two publications are enclosed which describe in detail the licensing procedures and the safety features built into atomic power plants.

To date, the safety record of the nuclear power industry has been excellent, and I assure you that continuance of this record is a foremost objective in the nuclear power program of the AEC.

In response to Miss Taylor's inquiry as to why utilities are pressing for the development of nuclear power, the choices of means of power generation, of course, are dictated by economics. I am enclosing a recent address by Chairman Seaborg on the U. S. civilian nuclear power program and forecast which gives detailed information on this subject.

I trust that this information will be helpful.

Sincerely yours,

(signed) Harold L. Price

Harold L. Price
Director of Regulation

Enclosures
1. Ltr to JCAE fm Chairman Seaborg
2. Ltr to DPesonen fm Commissioner Palfrey
3. Address by Chairman Seaborg
4. "Atomic Power Safety" Booklet
5. "Licensing of Power Reactors" Booklet

bcc: Joint Committee
Chairman (2)
General Manager
Secretariat (2)
Cong. Lia. (2)
OGC (2)
HLPrice, REG
CKBeck, REG
MMMann, REG
RLDoan, DRL:REG
CLHenderson, REG
WGDooly, REG
Joyce Shafer, REG

SEE ATTACHED SHEET FOR CONCURRENCES - CHANGE INVOLVES DELETION OF LAST PARAGRAPH PAGE 1; ADDING INTRODUCTORY PHRASE TO PARAGRAPHS ONE & THREE ON SECOND PAGE.

bcc: Comm. Palfrey
Comm. Ramey
Comm. Tape

OFFICE ▶	REG	DIR:REG	OGC	CONG. LIA.		
SURNAME ▶	WGDOOLY:DDS CLHenderson	HLPRICE				
DATE ▶	11/26/65	11/ /65	11/ /65	11/ /65		

Form AEC-318 (Rev. 9-53)

7114.5.3 · Hazards & Incid. Reactors

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27

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Copy - Germantown

UNITED STATES GOVERNMENT

Reference & Reproduction Branch

Memorandum

TO : File

DATE: November 23, 1965
(Revised December 14, 1965)

Original signed
W. B. McCool

FROM : W. B. McCool, Secretary

SUBJECT: POSSIBLE EFFECT OF CONTRACT PROVISIONS ON PROPOSED DESIGN CRITERIA FOR NUCLEAR REACTORS

SECY:GF

1. At Regulatory Meeting 223 on November 10, 1965, the Commission noted staff would undertake a review of the effect the design criteria as proposed in AEC-R 2/49 would have on existing contract provisions regarding reactor safety.

2. We understand that the Divisions of Reactor Development & Technology and Contracts are taking the required action and that they will insure coordination of such efforts as necessary with the Director of Regulation.

cc:
Chairman
General Manager
Deputy General Manager
Asst. General Manager
Exec. Asst. to Gen. Mgr.
Asst. Gen. Mgr. for Reactors
Asst. Gen. Mgr. for Operations
General Counsel
Director, RD&T
Director, Contracts
Director of Regulation
Deputy Director of Regulation
Asst. Dir. of Reg. for Admin.
Asst. Dir. of Reg. for Nuc. Safety

11-23-65

copy filed.
OF-1-1 Reg Prod.
+ Util Facilities

OFFICIAL USE ONLY

M-S-3 Hazards ~~PFC-1-1~~

November 22, 1965

Hon. Glenn T. Seaborg, Chairman
U. S. Atomic Energy Commission
Washington, D. C. 20545

Dear Mr. Chairman:

During the meeting between the Commission and the Regulatory Review Panel on July 1, 1965, the Commission expressed its interest in the Panel's suggestion that the latter might provide the Commission with an informal listing of some of the problems which the Panel had not reviewed in depth and therefore did not discuss in its report, but which might deserve study in the future.

After that meeting, the Panel did not have an opportunity to discuss this matter as a group. Accordingly, the brief suggestions which follow are the result of letters from individual members of the panel, the substance of which has in turn been passed on to the other members.

Operators' Licenses

The Commission may find it useful to review the present system of licensing individuals as operators, including, among other things, such questions as the need for issuing separate categories of licenses for operators and senior operators; the uniformity and the proper scope of examinations; and the relative importance of factual knowledge and other personality traits.

In this connection, we understand that for some time the staff of the Director of Regulation has been conducting a study in an attempt to describe in some quantitative way the capabilities and aptitudes which are required to qualify individuals as operators, and whether the present system of examinations (or indeed any system of written examinations which can be devised) is appropriate for the purpose.

Review of the Safety of AEC-Owned Reactors

It may also be useful for the Commission to re-assess the relationships between the operating divisions and field offices, on the one hand, and the regulatory staff, on the other hand, in safety analysis reviews of AEC-owned reactors. The present system may involve an unnecessary proliferation of effort in an area where skilled talent is in short supply.

In addition, if the Commission adopts the Panel's recommendations concerning the revised role of the ACRS in reviewing the safety of licensed reactors, a similar change may be desirable in the role of the ACRS with regard to AEC-owned reactors.

Respectfully yours,

William Mitchell

William Mitchell
Chairman, Regulatory Review Panel

11-23-65

Copies filed:
PFC-1 Reg
PFC-1-1 Reg Operator Licenses
M-S-3 Reg Hazards & Power Reactors

4/4 H+S -3
Hazards for Power Reactors

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

November 12, 1965

Advisory Committee on Reactor Safeguards
United States Atomic Energy Commission
Washington, D.C. 20545

Attention: R. F. Fraley
Executive Secretary

SUBJECT: REPORTING OF REACTOR INCIDENTS AND OPERATING EXPERIENCES FOR AEC-OWNED REACTORS

Gentlemen:

In accordance with our letter to you of August 10, 1964, we attach 18 information copies of the Plutonium Recycle Test Reactor incident involving fuel element rupture. Tentatively, this experience has been classified as a Class A incident until final determination can be made on the total cost involved.

Sincerely youre,

Gordon M. Dunning

Gordon M. Dunning, Acting Director
Division of Operational Safety

Attachments: (18)
As stated above

cy filed PLB+L-50 Plut. Recycle Reactor
PLB+L-9

11-12-65

Fuel Element Rupture Test Facility Incident at the Plutonium Recycle Test Reactor (PRTR)

Class A

At 05:05 on September 29, 1965, an unplanned fuel failure occurred in the Fuel Element Rupture Test Facility (FERTF), a light water loop in the center of the Plutonium Recycle Test Reactor (PRTR). The containment system sealed automatically at 05:11 and the building was cleared of nonessential personnel by 05:20. No injuries or overexposures occurred and no appreciable radioactivity was released to the environment. The containment ventilation was returned to normal after sampling at 00:34 on September 30. The reactor was operating at a power of 65.3 Mw and the loop at a power of 1765 kw at the time of the incident.

While the investigation is not complete at the time of this writing, it appears that:

1. A substantial enlargement of a deliberate defect (from 1/16" diameter to 1/2" x 2") occurred in a fuel tube containing mixed oxide fuel (4% Pu O_2, 96% UO_2) in the test loop section.

2. Preliminary estimates indicate that about 750 gm of fuel was discharged from the enlarged defect.

3. When the enlarged defect formed in the fuel tube, it caused a puncture of the process tube surrounding the fuel tube. Light water was thus discharged by the loop internal pressure into the heavy water moderator in the calandria surrounding the fuel tubes.

Some of the fission product inventory from the failed element was released to the containment building. The containment system functioned as planned. It appears that the heavy water moderator was degraded by light water to a point where it will probably be considered a total loss (about $385,000).

The incident is under investigation by a committee composed of personnel from the Richland Operations Office and the contractor, Battelle Northwest Laboratories.

2nd. 5. 3. August 7 Power Reactors

OCT 26 1965

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER ANDERS
COMMISSIONER TAPE

SUBJECT: RESPONSE TO INQUIRY ON DAVID PESSEMER ARTICLE IN THE NATION MAGAZINE

Attached is a response to inquiry developed for use in the event we are asked about David Pessemer's article in the October 18 issue of The Nation magazine. We transmitted a copy of the article to you on October 20.

In his article, Mr. Pessemer suggests that an updated Brookhaven report on theoretical consequences of a major accident in a large nuclear power plant has been suppressed by the AEC.

The response to inquiry was developed with the assistance of the acting Director of Regulation, and has his approval. It closely tracks Commissioner Palfrey's letter of October 6 to Mr. Pessemer.

(Signed) Philippe G. Jacques
for
Duncan Clark, Director
Division of Public Information

Attachment

Cc: E. E. Hollingsworth, General Manager
C. K. Beck, RED
J. P. Hennessey, GC
H. C. Brown, AGMA
J. J. Burke, OCR
W. B. McCool, SECY

PI PI PI PI

JFoushard/poa
10/26/65

10-26-65

RESPONSE TO INQUIRY ON DAVID PESONEN
ARTICLE IN NATION MAGAZINE

Q. David Pesonen has suggested in an article in The Nation magazine that the AEC has suppressed a report which deals with the theoretical consequences of a major accident in a large nuclear power plant. He refers to this report as an updating of the 1957 Brookhaven report. Is this so?

A. In connection with Congressional consideration of an extension of the Price-Anderson indemnity law for an additional 10 years to August 1, 1977, members of the AEC staff and the staff of Brookhaven National Laboratory reviewed the 1957 study on theoretical consequences of a major accident in a large nuclear power plant (known as the Brookhaven report).

While this review was going on, no one knew what the results would be or the form they would take, but the process was commonly referred to as the "updating of the Brookhaven report."

No new report is in existence or contemplated. It was the judgment of the persons from Brookhaven and the AEC staff at the conclusion of their review that no detailed refiguring of the 1957 report was needed to provide the Congressional Joint Committee on Atomic Energy with the information it needed to consider extension of Price-Anderson indemnity.

Chairman Seaborg reported the results of this review to the Joint Committee by letter of June 18, 1965. This letter is a public document and is reprinted on Pages 347 and 348 of the Joint Committee print of testimony and correspondence concerning public hearings held June 22-24, 1965. The review did disclose two areas in which the basic parameters used in 1957 have become substantially outdated by the development of new parameters and calculational methods. These were of little import to the basic conclusions of the overall review of the Brookhaven Report, but were judged to be of significance to the nuclear community. Accordingly, Brookhaven National Laboratory technical reports are being prepared and should be available for public distribution in a few months. They will deal with (1) meteorological parameters relating to atmospheric dispersion of radioactive contamination; and (2) health physics aspects of meteorologically dispersed contaminants.

75 Bellridge Road
Glastonbury, Connecticut
October 24, 1965

Senator Abraham Ribicoff
U.S. Senate
Washington, D.C.

Dear Senator Ribicoff:

I have followed your Senate career and noted the types of issues in which you take particular interest--matters of concern to the ordinary person who must cope with the complexities of the modern world--highway safety, recreation area, air pollution, water pollution. In reading the October 18, 1965 issue of the Nation, an article discussing the likely suppression of evidence on the dangers of nuclear power plants in or near metropolitan areas by the Atomic Energy Commission disturbed me a great deal. (David E. Pesonen, "Atomic Insurance: The Ticklish Statistics", pp. 242-45) After giving some thought to what Senator or Congressman might be interested in pursuing this matter, I realized that my own Senator from Connecticut was the most likely person.

If the Atomic Energy Commission is in fact suppressing concerning the consequences of a major accident in a large nuclear power plant, this is certainly cause for public concern. Moreover, since privately-owned public utility corporations are in effect guaranteed a reasonable profit by the mode in which their rates are set, why should they be pressing for the development of a source of power which carries with it the possibility of disaster?

I hope that you will be able to give this matter some attention, as it is certainly a situation which needs to be investigated and exposed for public consideration.

Sincerely,
Patricia Taylor
Patricia Taylor

DR-61

Rec'd Off: D
11/2/65
4:00
Date
Time

United States Senate

Washington, D. C., Dec. 8, *19*65

Respectfully referred to

Congressional Liaison
Atomic Energy Commission
Washington, D. C.

I would appreciate a full

report on the matter raised

in Miss Taylor's letter.

Wm Proxmire

U. S. S.

U. S. GOVERNMENT PRINTING OFFICE 16—66102-6

W. B. McCool

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

October 8, 1965

Dear Mr. Pesonen:

Your letter was awaiting me upon my return the other day from Japan. I had thought the Chairman's letter to Congressman Holifield on the Brookhaven study was self explanatory and responsive to your inquiry, but perhaps further clarification is needed.

There was a review of the 1957 study; the conclusions of that review were set forth by the Chairman in his letter. But no new report is in existence or contemplated.

At the time I gave my talk in San Francisco, no one knew what the results of the review would be, or the form it would take, but the process was commonly referred to as the updating of the Brookhaven report. It was, however, the judgment of Brookhaven and the staff of the Commission that no detailed refiguring of the entire report was needed to provide the Joint Committee with the answer to its basic inquiry. That answer is set forth in the letter from Dr. Seaborg to Mr. Holifield.

The review did reveal the desirability of updating a few details of the earlier study. Accordingly, Brookhaven National Laboratory technical reports concerning (1) meteorological parameters relating to atmospheric dispersion of radioactive contamination (by Irving Singer and others), and (2) health physics aspects of meteorologically dispersed radioactive contaminants (by Fred Cowan and others), are being prepared, and should be available for public distribution in a few months.

I hope this explains the situation.

Sincerely,

John G. Palfrey
Commissioner

Mr. David E. Pesonen
2323 Bowditch
Berkeley, California 94704

MHOS-3-Magazine & Power Reactors

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

SEP 30 1965

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

(Signed) Dwight A. Ink
THROUGH GENERAL MANAGER

SUBJECT: PUBLIC REACTIONS TO ATOMIC ENERGY

Attached, for your information, is a copy of a letter and questionnaire from the Atomic Industrial Forum directed to the 150 members of their Public Understanding Committee. It was mailed about mid-September and replies are anticipated in sufficient time that it can be discussed at the October 17 meeting with the AIF.

Ernest B. Tremmel, Director
Division of Industrial
Participation

Attachment:
Letter and questionnaire from
Atomic Industrial Forum

bcc: Oscar Smith, LABR
Duncan Clark, PI
GM (2)
Secretariat (2)
General Counsel

9-30-65

ATOMIC INDUSTRIAL FORUM INC.

850 THIRD AVENUE · NEW YORK 22, N.Y. · PLAZA 4-1075

September 3, 1965

To individuals interested in public attitudes toward atomic energy:

The Atomic Energy Commission is considering a country-wide sampling of public attitudes toward atomic power plants. The Commission has approached the Atomic Industrial Forum and asked whether the Forum would be willing to join the Commission in approaching a third disinterested party to conduct such a survey, with the third party's own funds.

As Chairman of a task force of the Public Understanding Committee to assess the desirability of Forum cooperation with such a project, I have prepared the attached questionnaire. Our purpose is to determine not only your feeling about the desirability of Forum cooperation in the project but also to seek guidance concerning the subjects such a survey should cover. Will you take a minute to check off your preferences and return the questionnaire to Chuck Yulish at the Forum.

One of the purposes of the questionnaire is to determine whether there are differences of attitude in areas that now have atomic power plants and communities which do not have them or communities in which such power plants are presently being contemplated. For this reason it is particularly important for us to know whether your company would want to have such a survey conducted in its service territory. We should also like to know whether you believe the results of the entire survey should be made public or should be used for the guidance of the Commission and Forum members.

I will appreciate hearing from you by September 28.

Sincerely,

Charles E. Hoppin
Chairman, Task Force

Guidelines for a Poll of Public Attitudes
Toward Atomic Energy

The following are some areas of information which the poll could conceivably develop. Please indicate how you would rate the importance of each.

1. Does atomic power today have greater public acceptance in areas where utilities operate atomic power plants than in the country at large?

   Very important ___ Important ___ Not so important ___ Least important ___

2. What is the public image of atomic power in terms of the positive and negative concepts that people have about it? (In other words, what good and bad impressions first flash across the public mind today when atomic power is mentioned. These should be identified and arrayed. For maximum value, the results should permit meaningful comparisons between areas that do and do not have utility-operated atomic power plants in the vicinity and, within each of these universes, by age group, sex and level of education.)

   Very important ___ Important ___ Not so important ___ Least important ___

3. What is the current state of public comprehension of atomic power in terms of whether or not its salient features are grasped? (By "salient features" is meant both (a) basic principles, such as the nature of the fuel, the fact that the plants are designed to contain the consequences of accidents, etc., and (b) basic facts about its use, such as the role of utilities, the role of AEC, the incentives for atomic power development, etc. Again, the results should permit meaningful comparisons as under (2) above.)

   Very important ___ Important ___ Not so important ___ Least important ___

4. What are the public attitudes about atomic power in one or more areas where there have recently been highly vocal resistance to a project -- e.g., the San Francisco area? (The objective here would be to measure the true extent of the opposition and identify the factors contributing to it.)

   Very important ___ Important ___ Not so important ___ Least important ___

5. What is the media through which the public currently receives information about or impressions of atomic power?

   Very important ___ Important ___ Not so important ___ Least important ___

6. What are the current comparative attitudes toward atomic power and power from fossil fuel?

   Very important ___ Important ___ Not so important ___ Least important ___

7. What are the current attitudes toward electricity generation and supply in general?

   Very important ___ Important ___ Not so important ___ Least important ___

8. As an extension of (3) above, a testing of whether or not the respondents' attitudes change on exposure to factual information about atomic power and, if so, which facts have the greatest impact, good or bad? (This presumably could be done either by interviewing respondents before and after giving them a primer to read or by dividing respondents into two groups and giving Group B a primer to read before interviewing them.)

   Very important ___ Important ___ Not so important ___ Least important ___

9. What and how much do the respondents know about other areas of atomic energy? Can they, without prompting, identify specific areas; and, from a list of atomic activities, relate progress they have heard of in these areas? What image do the respondents have of government, industry, university work, etc.?

   Very important ___ Important ___ Not so important ___ Least important ___

10. Can you suggest additional information that should be sought? Please identify.

11. Which of the above would you consider most important? Which additional questions would you consider essential in order to justify the poll?

12. Can you suggest how the power portion of the poll should be conducted, e.g., in a broad electric power context _____? in a specific atomic power context _____? in another way _____? (Please list your suggestions and elaborate on them.)

13. Would you be willing _____ unwilling _____ to see the results of the poll made generally available regardless of the findings?

14. To utility representatives: Would you be willing _____ unwilling _____ to have polling conducted in your service area?

15. Do you consider it essential for the Forum and/or the AEC to review the proposed questionnaire, interview form, or other polling material for technical accuracy and adequacy of content thereof before they are utilized by the polling organization?

16. Comments:

Name _____

Title _____

Organization _____

Address _____

NH+S-3-7
Hazards Jun Power Rea

JAN 2 7 1966

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

THROUGH GENERAL MANAGER Howard C. Brown, Jr. for FEB 1 1966

SUBJECT: REACTOR SAFETY STORY PLANNED BY FRANK CAREY

Frank Carey of the Associated Press has called to let us know that he has been assigned to write a story on reactor safety. Mr. Carey reported that the initial stimulus for the story resulted from David Pesonen's article in The Nation in which Mr. Pesonen suggested that the AEC has suppressed an updated Brookhaven Report. We have given Mr. Carey the approved response to his inquiry about the "updated Brookhaven Report." This response was sent to you on October 26, 1965, and is, in essence, that no new report is in existence or contemplated and that it was the conclusion of the persons who made the review that no detailed refiguring of the 1957 report was necessary to provide the JCAE with the information it needed.

Mr. Carey has informed us that he wants to do a story on the "status of reactor safety" in connection with the plants now being built and planned. We have sent him considerable general material on reactor safety and have arranged for him to talk with Dr. Clifford Beck, Deputy Director of Regulation. We also will suggest that he talk with Dr. Joseph Lieberman of DRDT concerning the reactor safety research program.

(signed) Philippe G. Jacques

Philippe G. Jacques
Acting Director
Division of Public Information

cc: H. L. Price, Director of Regulation
M. Shaw, DRDT
H. C. Brown, AGMA
J. J. Burke, OCR
W. B. McCool, SECY

OFFICE ▶		PI	PI	PI	
SURNAME ▶		JFouchard/pa			
DATE ▶		1/26/66			

1-27-66

FORM AEC-318 (Rev. 9-53) U. S. GOVERNMENT PRINTING OFFICE 16—62761-6

MH+S-3. Hanford Power Reactors

December 28, 1965

AEC 943/27

COPY NO. 23

AEC 943/27

ATOMIC ENERGY COMMISSION

INFORMATION ITEM

IN-PLANT ENGINEERING TEST PROGRAM FOR REACTOR SAFETY

Note by the Secretary

The General Manager has requested that the attached memorandum of December 23, 1965 from the Director, Division of Reactor Development and Technology, with attachment, be circulated for the information of the Commission.

W. B. McCool

Secretary

DISTRIBUTION	COPY NO.
Secretary	1, 22-27
Commissioners	2-6, 28-31
General Manager	7 - 8
Deputy Gen. Mgr.	9
Asst. Gen. Mgr.	10
Dir. of Regulation	11 - 13
Deputy Dir. of Regulation	14
Exec. Asst. to GM	15 - 16
Asst. GM for Reactors	17
General Counsel	18
Controller	19
Reactor Dev. & Tech.	20
Reactor Licensing	21

12-28-65

NH+S-3-I
Hazards from Power Reactors

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

March 9, 1966

Dear Mr. Pesonen:

The status of the two technical studies emerging from Brookhaven National Laboratory's recent reexamination of the 1957 Brookhaven Report (WASH-740), about which you inquired, is as follows:

> The meteorological study, entitled, "An Improved Method of Estimating Concentrations and Related Phenomena from a Point Source Emission," by Maynard E. Smith and Irving A. Singer, has recently been completed and submitted by the authors as a paper to the Journal of Applied Meteorology, but no publication date has yet been set. For your convenience, we are enclosing a copy of the paper, although as a courtesy to the Journal we request that you not publish it before they do. You may check directly with them, at the American Meteorological Society, 45 Beacon Street, Boston, Massachusetts, 02108, to determine when that will be.
>
> I understand that the other study, concerning health physics aspects of meteorologically dispersed radioactive contaminants, is still under preparation at the Laboratory. I have asked Mr. Harold L. Price, the Director of Regulation, to let you know when this paper is available.

Sincerely,

John G. Palfrey
Commissioner

Enclosure

Mr. David E. Pesonen
Executive Secretary
Northern California Association
to Preserve Bodega Head and Harbor
2323 Bowditch
Berkeley, California 94704

3-9-66

Hazards Regulation
MHTS. 3 -
Hazard from Power Reactors

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

SUBJECT: MASSACHUSETTS PROPOSAL TO REGULATE NUCLEAR FACILITIES

The Public Health Committee of the Massachusetts House has scheduled hearings in Boston on Tuesday, March 1, 1966, on a bill which would prohibit the construction or operation by any "person, city, town, or political subdivision" of a reactor or nuclear fuel fabrication or reprocessing plant, unless the "plans" for such facility "have been submitted to and such portions thereof as may affect the environment or the public health, comfort, and convenience have been approved by" the Massachusetts Department of Public Health.

We have been informed by Mr. Charles Keenan, Vice President of Yankee Atomic Electric Company, that Yankee and the Boston Edison Company plan to offer testimony to the effect that the proposed legislation is unnecessary since the types of facilities involved are already regulated by AEC.

No request has been received for AEC's views on the bill, nor do we plan to be represented at the hearing.

(Signed) HLP

Harold L. Price
Director of Regulation

CC: General Manager
Secretary (2)
General Counsel (2)

RECEIVED

cy filed Legal - 4. Laws & Legislation - MHTS. 3. Reg. Lic. (Pow. Power Reactors

3-3-66

CROSS-REFERENCE *(Name, number, or subject under which this form is filed)*		[redacted]
		MH&S 3 [redacted] Hazards of Power Reactors
IDENTIFICATION OF RECORD	DATE	
	TO	
	FROM	
	BRIEF SUMMARY OF CONTENTS	Memo for the Commissioners frm. H. Price re Proposed Response to Mr. Conway's Letter of Jan. 20, 1966 re Hazards from Earthquakes.
FILED *(Name, number, or subject under which the document itself is filed)*		PSC 1-1 Reg. Prod. & Util Facility date of memo: 2-24-66

2-24-66

MHTS-3 Hazards from Power Reactor

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

FEB 23 1966

Dear Chet:

The purpose of this letter is to keep the Committee informed regarding the engineering test program for reactor safety.

The continuing expansion and development of the nuclear power industry and the increasing motivation to locate power reactors closer to metropolitan load centers demand careful attention to the safety factors related to design, construction and operation of reactors which potentially affect the health and safety of the public.

It is our intent to examine the costs and benefits related to in-plant tests at various reactors to validate the operability and reliability of various safety or safety-related systems.

The Elk River and BONUS reactors are initially being considered for implementing this test program. Accordingly, the management of these reactors have been requested to develop the scope, cost and schedule for an in-plant test program which would include such items as:

1) Containment leakage tests - determine total leakage under conditions which can be readily extrapolated to the maximum credible accident (MCA) leakage; determine degradation of leakage as a result of building aging, settling, post-construction changes and normal maintenance or operation.

2) Air cleaning systems - leakage and efficiency tests to demonstrate probable performance under intended operating conditions; development of tests to periodically indicate any in-place degradation of component performance in the normal plant operating environment.

2-23-66

My file MHTS-3 Reg. Hazards from Power Reactor

3) Poison injection system test - to demonstrate operability of pumps, valves, storage systems and actuating systems; to measure reactivity worth with highly dilute poison injection.

4) Emergency power systems - switchover, starting of internal combustion engines, pickup of actual connected load.

5) Primary safety systems - methods for checking response of various scram circuits with realistic input signals, control rod insertion time measurements, physical or visual inspection of components.

We will keep you informed as to the progress of our discussions with Rural Cooperative Power Association and Puerto Rico Water Resources Authority.

We will also evaluate any possible effects of a nuclear safety program on the operation of the Elk River Reactor under AEC's cooperative arrangement; if significant changes in the cooperative arrangement would be entailed, a revised program justification data sheet would be presented for the Committee before such changes were effectuated.

Cordially,

(Signed) Glenn T. Seaborg

Chairman

Honorable Chet Holifield
Chairman, Joint Committee on Atomic Energy
Congress of the United States

cc: CH (2)
GM (2)
OCL (2)
SECY (2)
J. A. Lieberman

RAM:SUBJ RDT:D
RAM:RF AGMR
DEP:RF
RDT:RF (2)

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OC 1/ /66

OGC 1/ /66

OFFICE ▶	RDT:D	OCL	AGMR	AGM	DGM	GM
SURNAME ▶	MShaw					
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(?) In 19.5-3- Hazards, Power Reactor

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

FEB 7 1966

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

(Signed) John L. Vinciguerra [illegible]

THROUGH GENERAL MANAGER

SUBJECT: SURVEY OF PUBLIC REACTIONS TO NUCLEAR POWER

By memorandum dated December 30, 1965, the report of the Atomic Industrial Forum's Committee on Public Understanding regarding a survey of public reactions to nuclear power was forwarded to the Commission. The report recommended that no formal survey be initiated by the Forum at this time. They intend to consider the matter again after the results of the survey being conducted by the Coordinator for Atomic Energy Development for the State of California are available later this spring.

Attached for your information is a reprint of an article from the January 24, 1966 issue of Electrical World. This article presented the findings of a study made by Marsteller Research, New York, for the Babcock & Wilcox Company. The survey covered three areas: Buchanan, New York; Philadelphia, Pennsylvania; and Atlanta, Georgia.

The residents of Buchanan reported 60.5% in favor of the use of nuclear energy as a means of producing electricity for the home. Only 3% of the responses were unfavorable.

In Philadelphia, the response was 60% favorable and 4.5% unfavorable.

In Atlanta, where there was no known public education regarding nuclear plants, the response was 45.3% favorable and 7.7% unfavorable.

2-7-66

SECY (2)

In all cases, the remainder of those responding were either neutral or had no comment.

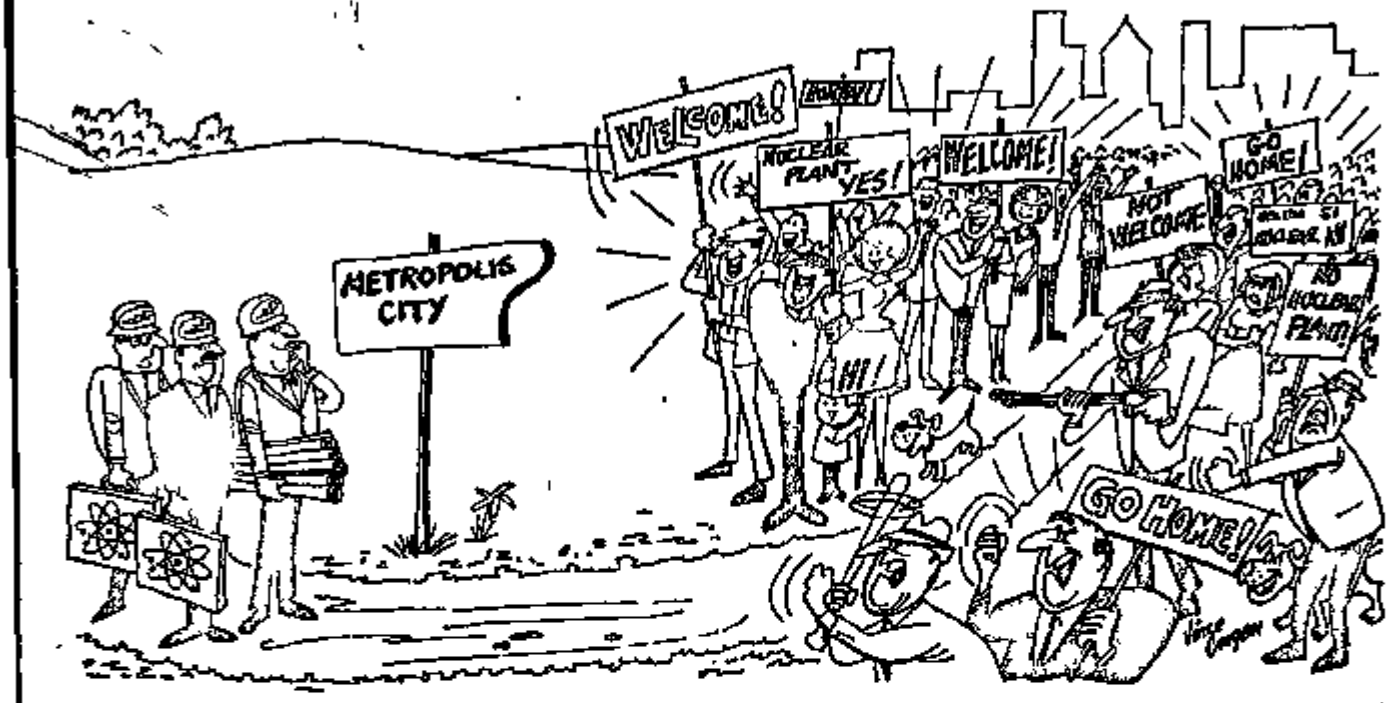
We intend to maintain close contact with the Forum and the California group and report the results of the California survey to the Commission as soon as they are available.

Ernest B. Tremmel, Director
Division of Industrial
Participation

Attachment:
Reprint from
Electrical World

cc: R. E. Hollingsworth, GM(2)
Howard C. Brown, Jr., AGMA
Philippe G. Jacques, PI
Willis Hay, LABR
E. E. Fowler, IO
E. J. Brunenkant, TI
M. B. McCool, SECY (2)

MANAGEMENT NEWSLETTER



Are Nuclear Plants Winning Acceptance?

Atomic power has had a nasty image problem, what with its first publicized use being that of blowing up a healthy chunk of Japan. As government and industry dreamed up "peaceful" uses for this awesome energy source, the associations of holocaust, ruin, and rubble were difficult to dispel from the public's mind.

This new source of power had another image-damaging feature, as harmful as halitosis to a salesman—radioactivity. Not understanding the nature of it, or the means by which it could be controlled to provide "safe" power, the public threw up its arms at the mere mention of atomic energy.

Yet education and "safe" operation of nuclear power plants have had their effects on public opinion. This newsletter will present the findings of a study made by Marsteller Research, N.Y., for the Babcock & Wilcox Co. The survey was designed to compare the differences in public attitudes toward nuclear power plants in three different areas—where an atomic plant has been in operation (Buchanan, New York); where there has been some public education to the idea of atomic-electric power (Philadelphia); and where no known public education program on nuclear plants is known to have taken place (Atlanta). Let's look at a summary of the findings.

In general, Buchanan residents like the idea of a nuclear plant, and the majority of those personally interviewed (101 residents were surveyed in all) are aware of specific contributions the plant has made to the community's economic welfare, reports the study (see chart, p 116).

OVER-ALL IMPRESSIONS

... about use of atomic energy as a means of producing electricity in the home

(Respondents=100%)	Buchanan (101)	All Respondents Philadelphia (200)	Atlanta (203)
Positive, Favorable	**60.5%**	**60.0%**	**45.3%**
Lower cost	6.9	13.0	7.2
Safe, clean	3.0	.5	1.0
"Peaceful use"	.....	7.5	.....
Efficient	3.0	3.0	1.0
Better living	5.0	6.0	1.0
Tax help	3.0	.....	.....
General	39.6	30.0	35.1
Neutral	**9.9**	**3.0**	**9.1**
Negative, Unfavorable	**3.0**	**4.5**	**7.7**
Raises cost, expensive	2.0	.5	4.3
Hazardous, dangerous	.....	2.0	.....
General	1.0	2.0	3.4
No Comment	**26.6**	**32.5**	**38.0**

Source: Marsteller Research Marketing Counsel, "A Public Opinion Study on Atomic-Electric Power."

Philadelphia residents are a little more cool to the idea of a nuclear plant than those queried in Buchanan. And in Atlanta, where there was no known public education regarding nuclear plants, the atom got its poorest reception.

Fear of atomic power still lingers, but not in Buchanan. No one in that city expressed any concern over worker safety in an atomic plant, whereas a small but discernible number of people expressed such a concern in Philadelphia and Atlanta.

Community safety too, was of more concern to Atlanta and Philadelphia residents than to the people in Buchanan—as far as an atomic plant is concerned.

Women in the survey proved to be more hostile to nuclear plants, as a rule, than men. Younger people warm up to the idea more than their elders, and college trained individuals are more favorable to it than the less educated (See box, p 118). How do the respondents view a nuclear plant's effect on electric bills?

Buchanan residents have seen no noticeable effect in their electric bills. In both Philadelphia and Atlanta, however, people expect smaller bills when atomic plants are built in their areas. Now let's look at the specific reactions of the people surveyed, and the questions which were asked of them.

About 60% of the over-all impressions about nuclear plants expressed in Buchanan and Philadelphia were favorable. In Atlanta, only 45% of the respondents played back favorable reactions. In all, only 3% of Buchanan residents reacted negatively, compared to 4.5% in Philadelphia and 7.7% in Atlanta, who take a dim view of the whole concept.

Sex, age, and education proved to be significant among respondents, as regarded their over-all impressions of atomic energy. In Buchanan, 84% of the men polled were specifically favorable and positive in their reactions, compared with 38% of the women interviewed. And of Buchanan residents more men were

committal in their responses (92%) than women (55%). In both Atlanta and Philadelphia, the same general pattern held true in study results—women were less favorable and less committal.

People under 45 in all areas polled were more favorable to atomic plants than those older. And persons with college training showed a more favorable reaction than those with less formal education.

Many respondents had no answer to the question of how "clean" atomic plants are. Nearly 40% in Buchanan, 48% in Philadelphia and 50% in Atlanta offered no opinions. Some 7% of the respondents in Buchanan have reservations about cleanliness of atomic plant operations, but only 1.5% in both Philadelphia and Atlanta feel that an atomic plant will not be clean.

On the question of "cleanliness," there were no significant differences between men and women, or between those on opposite sides of 45. However, college trained persons in the Buchanan area were at once more negative to plant cleanliness and favorable to it—indicating they were more likely, and able, to articulate their opinions.

Asked about worker safety, no one in Buchanan showed worry, although nearly half (47%) didn't venture an opinion. In Philadelphia nearly 10% of the respondents do not feel an atomic plant is a safe place to work in, and in Atlanta this figure climbs to 13%.

Atlanta women are the most concerned of any group about worker safety. And the less educated in each area are moderately more anxious about this question than the college trained.

Community Safety: Ladies Are More Fearful

Only a handful (3%) of Buchanan respondents think their community's safety is impaired by the presence of an atomic plant. Yet in Philadelphia and Atlanta where no plants are in operation, one in seven (15%) of the respondents are concerned about community safety. Women appear more concerned than men, and older persons show moderately more anxiety than younger people. Degree of education seems to have no distinguishable effect on attitudes regarding a nuclear plant's "threat" to community safety.

People were asked what effect a nuclear plant has on electric bills. The majority (65%) of Buchanan respondents feel that there has been no change in their electric bills. In both Atlanta and Philadelphia, however, approximately 40% of the respondents feel their electric bills will shrink with atomic-produced electricity and, in both areas, only 7% feel there will be no change. A noticeable minority (13%) of the Buchanan people indicated that they feel their electric bills are higher.

Men, more than women in Philadelphia, and women, more than men in Atlanta, feel their bills will be smaller. Age had no effect. However, college trained people, more often, expect smaller electric bills.

Asked their choice of an atomic or a conventional power plant, Buchanan residents sounded a resounding "yea" for nuclear. Over 75% of the heads of households prefer their atomic plant to a conventional plant. Seventeen percent were noncommittal, and only 6% would prefer a conventional power plant. Young men are most strongly in favor of the atomic plant. Education, again, seems important to winning the public's acceptance of atomic plants.

An overwhelming majority (87.1%) of Buchanan people cited specific community benefits resulting from the nuclear plant. However, one in every 11 or 12 is not aware of any community benefits.

Atomic plants are expected in Philadelphia and Atlanta. About 55% in Philadelphia and 49% in Atlanta said they anticipated it, while 20% in Philadelphia and 33% in Atlanta indicated they do not expect nuclear plants to supply their electricity.

The reason most often cited by people who expect an atomic plant was that "progress in atomic energy" will bring safe and economic power to them. Those who do not envision nuclear plant to supply their electricity most often cited these reasons: "The utility can't afford to change it"; "Atomic power is for research, not for the production of electricity."

Respondents' personal reactions favor an atomic plant. In Philadelphia, 58% are favorable, 15% neutral, 8% negative, and 20% noncommittal. In Atlanta, 67% are favorable, 13% neutral, 10% negative, and 10% noncommittal. In both areas, men are much more favorable to the idea than women.

When can a nuclear plant be expected? About 30% of the respondents have no idea. Eleven percent expect an atomic plant in less than 5 years in Philadelphia; 6% that soon in Atlanta. Forty-four percent of the Philadelphia people expect a plant in from 5 to 15 years; 48% of the Atlanta people agree with them. Fourteen percent in both markets think it will take over 20 years.

Long Island Residents Like Nuclear Plants, Too

According to the Marsteller public opinion study, the typical "fan" who roots for nuclear plants is under 45, male, and college educated. Opinion Research Corp recently undertook a survey of customers of Long Island Lighting Co, geared to measure the attitudes of LILCO's customers to the utility. One of the questions asked of LILCO's customers was, "Some electric power companies use nuclear energy to generate electricity. Do you think this is a good idea or a bad idea?"

Some 63% of the 1,035 Long Islanders surveyed answered that it was a "good idea," while only 3% thought it was a "bad idea." Men were more solidly in favor of the idea than women, as was found in the Marsteller survey. Seventy-five percent of the Long Island men supported the idea of a nuclear plant, and another 23% offered no opinion. Only a shade over half (51%) of the women polled thought nuclear power would be beneficial, while 46% offered no opinion.

Age and education were proven to be significant of LILCO customers, as was indicated in the survey of Philadelphia, Atlanta and Buchanan residents. Some 54% of those 50-years old and over thought electricity produced by nuclear energy was a good idea. But those younger showed higher percentages (under 30, 60%; 30-39, 69%; 40-49, 67%).

Almost three out of four (74%) of college trained LILCO customers favored the idea of nuclear plants. Among high school grads, the figure was lower (62%), while less than half (49%) of those who didn't complete high school thought atomic plants a good idea.

It should be noted, however, that compared to national averages, LILCO customers are better educated and therefore are more informed about nuclear energy. It was found that better than three fourths of Nassau-Suffolk residents are high school graduates, compared with the nation's average of about 50%. A total of 35% of LILCO's customers has attended college, almost twice the national percentage of 19%.

9 WH43-3-*
Hazards for power plants

Northern California Association To Preserve Bodega Head and Harbor

DAVID E. PESONEN
2323 BOWDITCH
BERKELEY, CALIF. 94704

January 30, 1966

Mr. John G. Palfrey, Commissioner
U.S. Atomic Energy Commission
Washington, D.C., 20545

Dear Commissioner Palfrey:

After an inquiry from me, your reply last October 8th concerning the commission's up-dating of the 1957 Brookhaven Report (WASH-740) noted that certain BNL technical reports on selected areas of the original report would be available later for public release.

Specifically, these were meteorological parameters relating to atmospheric dispersion of radioactive contamination (by Irving Singer and others), and health physics aspects of meteorologically dispersed radioactive contaminants (by Fred Cowan and others).

I have seen no mention of these reports in the trade journals and wonder if you could advise if they have been completed, and if so where they may be obtained.

Sincerely,

David E. Pesonen
Executive Secretary

Asst. ___
J.G.P. ___
Action ___
Prep ___
___
Date 2/4

Purpose: To work for preservation of the scenic and historic headlands of Bodega Bay and to insure the ecological integrity of the surrounding marine environment.

A California Non-profit Corporation

1-30-66

~~OFFICIAL USE ONLY~~ MH+S-3 Hearings & Power Reactors

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

MAR 31 1966

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

SUBJECT: FURTHER CONTACT WITH NORMAN COUSINS ON NEW YORK CITY POLLUTION STUDY

After unsuccessful attempts to discover from other sources the status of NYC's atmospheric pollution study under the chairmanship of Mr. Norman Cousins, I called him directly to extend our discussion of March 22, at the ANS meeting.

A number of interesting items were discussed, as summarized on the attachment hereto. The Committee will recommend that nuclear reactors for the present be located outside the city, but intends to do this in ways as harmless to the future of nuclear reactors as possible.

I am still concerned that troublesome items may be included through inadvertence or misunderstanding. I tried to clear up one or two such items as they arose in the conversation. However, to my suggestion that AEC representatives would be pleased to meet with him and his committee on any matters that might be of help, Mr. Cousins responded that time was pressing "at this late date." It would be appropriate, I think, and might possibly gain some advantage for the Commission, if Chairman Seaborg should call Mr. Cousins directly to express Commission's interest in his assignment, to offer Commission help if it should be needed, and explore as far as possible what the committee might have in mind re matters of Commission interest.

Reg Info Mtg 188

cc: General Manager (2)
Secretary (2)
Clifford K. Beck
Deputy Director of Regulation

Attachments
1. Summary of Conversation
2. List of Mayor's Committee

3-31-66

2 filed MH+S-3-3 Confer & ~~OFFICIAL USE ONLY~~ Dec. Materials

SUMMARY OF ITEMS DISCUSSED WITH MR. NORMAN COUSINS, N. Y. C. RE POLLUTION STUDY:

1. The Committee is in the "home stretch," with its report due in two weeks.

2. Mr. Cousins leans to the position that the Committee "probably would not benefit" at this late stage from a meeting with 'AEC' experts."

3. There is one specific problem, however, on which Cousins would appreciate what information we can supply him: He has a report prepared by U. S. Public Health Service (the only identification I could elicit) containing "a table on page 13." This table shows the radioactive contamination in the Hudson River from (a) fallout from weapons tests; and (b) "fallout from KAPL." (Cousins did not know what KAPL was but understood it to be a power reactor of some sort) and from Consolidated Edison (Indian Point). According to Cousins, this table showed that the contamination from weapons fallout greatly exceeds the "fallout from KAPL and Consolidated Edison."

   This is fine now, Cousins said, but his problem: What will happen to the contamination picture on the Hudson and over the country "when there is fallout from many other reactors?" I tried to explain the difference between weapons fallout and radioactivity in reactor cooling water effluents, the latitude of effluent control via design, our policies of contamination limits, etc., which I thought answered his question. Nevertheless, he requested that I send him any information we might have on this. I agreed to do so.

4. Cousins could think of no further issues on which the AEC could be of assistance.

5. I probed a little on his view about reactors in cities. He believes that reactors should be built outside of cities but will not say this in the context of possible accidents, or in any negative way, "which will make it hard for reactors to move toward or into cities." He will refer, I understand, to AEC programs addressed to any problems remaining in the way of reactors being authorized in cities.

He asked how close to a city reactors could now be approved. I replied that reactors have been approved for sites closer to cities than formerly; that specific distances could only be determined in the context of a particular application; that it is not possible now to determine when gaps in information needed for reactors to be approved adjacent to or in cities will be filled; that this conceivably could occur within the time schedules of reactors now being considered, or that it might require a longer period.

6. Mr. Cousins volunteered that his committee in its struggle to find suggestions it might make on ways to meet the rising demand in the city for more power and, at the same time, diminish the air pollution problem, had received an interesting proposal from the Pennsylvania Railroad. This company, fearing the committee would recommend mine-mouth plants (which they were, and may still do), proposed large coal fired plants "on the Delaware, 60 miles from New York City," -- and the Railroad would make their road right-of-way available to Consolidated Edison for transmission lines into the city. Cousins intends, I understand, to recommend that some nuclear plants be included in this package.

MAYOR'S ADVISORY COMMITTEE ON AIR POLLUTION
(The list may not be complete; some titles may be inaccurate)

CHAIRMAN

Norman Cousins

William Bernbach - Partner in Doyle, Dane and Bernbach

Ira Ehrlich - Stevens Institute

Hugh Gallagher - President of College of the City of New York

Tom Glennan - Newscaster with CBS

Robert Fox - Columbia Gas and Electric Systems

Harry Krone - Vice President of the Welfare and Health Council of New York City

Meredith Gordine - Gordine Systems and Air Precipitation

Robert Hudson - Senior Vice President, City of New York

Seymour Melman - Professor at Columbia

Gerard Piel - Editor, Scientific American

April 20, 1966 AEC 943/29

COPY NO. 72

ATOMIC ENERGY COMMISSION

REPORT OF MEETING ON LOCATING NUCLEAR POWER PLANTS

Note by the Acting Secretary

The General Manager has requested that the attached memorandum of April 14, 1966 from the Director, Division of Reactor Development and Technology, with attachment, be circulated for the information of the Commission.

F. T. Hobbs

Acting Secretary

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Deputy Dir. of Regulation	13	State & Lic. Relations	53 - 54
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X-O&M-6
MH&S-3-Reg-Hazards for Power Reactors

4-20-66

OPTIONAL FORM NO. 10 5010-107
MAY 1962 EDITION
GSA GEN. REG. NO. 27

UNITED STATES GOVERNMENT

Memorandum

TO : R. E. Hollingsworth, General Manager
THRU: G. M. Kavanagh, AGMR

DATE: APR 14 1966

FROM : Milton Shaw, Director
Division of Reactor Development & Technology

SUBJECT: REPORT OF MEETING ON LOCATING NUCLEAR POWER PLANTS IN CITIES

RDT:NS

Attached for your information is a copy of a trip report describing the activities at a recent meeting of the New York Section of the American Nuclear Society on reactor siting in cities. Stanley A. Szawlewicz of RDT participated as a panelist at the evening session on the "Safety Aspects of Urban Siting". Other panelists of this session were Oliver Townsend, Chairman of the New York State Atomic and Space Development Authority, Dr. Clifford Beck, Deputy Director of Regulation, Norman Cousins, Chairman of Mayor Lindsay's Task Force on Air Pollution, W. Donham Crawford, Vice President of Consolidated Edison Company, and Joseph Rengel, General Manager, Atomic Power Division, Westinghouse Electric Corporation.

Attachment:
Trip Report w/o attachments

OPTIONAL FORM NO. 10 5010-107
MAY 1962 EDITION
GSA GEN. REG. NO. 27

UNITED STATES GOVERNMENT

Memorandum

TO : Joseph A. Lieberman, Assistant Director for Nuclear Safety, RDT

DATE: APR 1 1966

FROM : Stanley A. Szawlewicz, Chief
Research & Development Branch, RDT

SUBJECT: TRIP REPORT - STANLEY A. SZAWLEWICZ TO NEW YORK, N.Y., MARCH 22-23, 1966

RDT:NS

Purpose: To participate as a panel member on the discussion of the safety aspects of urban reactor siting at a regional meeting of the American Nuclear Society, co-sponsored by the New York State Atomic and Space Development Authority.

Summary of Events:

The meeting was organized to review the dilemma currently existing on the subject of air pollution - as influenced by coal fired power plants - and the potential for radioactive releases, from reactor plants if they are substituted for the former.

New York City is rapidly approaching SO_2 levels, during inversion periods, that could become catastrophic, if the inversion periods, were protracted over long time periods, as in the case of Donora or the London incidents.

The advocates for nuclear plants in cities were strongly represented by the utilities and reactor vendors, including W. Donham Crawford, Vice President of the Consolidated Edison Company.

Those that were opposed were aptly represented by the coal lobby and by Norman Cousins, Chairman of the Mayor's Task Force on Air Pollution, editor of the Saturday Review, author of a number of books championing the cause of man in the atomic age, and dilettante at large.

The afternoon sessions treated the specific problems of New York City and what should be done to alleviate the air pollution problem. With present emphasis on pollution control, it appears that any large sized coal fired plant would be just as difficult to site in New York City as a nuclear reactor. Presentations on siting experience related to Indian Point #1 and #2, Oyster Creek, and Nine Mile Point stressed the progressive increased attention that is being given to engineered safeguards designs. The implication in the presentations seemed to be - "if such reactors are deemed to be safe for present locations, where population levels are not insignificant, why should they not be judged safe for in-city sites?" In

particular, it appears that the location of the reactor plants themselves will play a strong role in aiding the growth of neighboring communities. This seems to be the projection for the Oyster Creek and Oswego areas.

The key discussions were held in the evening session when Mr. Cousins made his appearance. After some introductory statements in which he defined his role as the Mayor's advisor on air pollution and in-city reactor siting, he presented six key questions which he felt the other panelists should answer. The questionswere:

1. What is the range (limits) on the accidents that can occur in a nuclear power plant?

2. Are the consequences of reactor accidents the same in a city or outside?

3. Has there been a steady improvement in the operating and safety records of reactors (to justify in-city siting at this time)?

4. What do we mean by permissible levels of safety in the routine release of radioactivity?

   a) Can an absolute determination be made between radioactivity levels and their effect upon humans?

   b) What are the synergistic effects of released radioactivity upon other contaminants already in the atmosphere?

5. Does private operation of nuclear plants require greater government control than presently exist (in order to make them safer)?

6. In spite of our high confidence in the adequacy of design and the low probability of accident occurrence, can we prove that after everything humanly possible has been done, that a serious reactor accident will not happen?

Answers to the questions were reserved until after Dr. C. Beck, S. Szawlewicz, W. D. Crawford and J. C. Rengel, the other panelists, expressed their views on reactor safety and siting problems.

Dr. Beck essentially stressed the need for more time to a) gain information and experience on the safe operation of existing reactor plants, b) study carefully each new reactor application with particular emphasis on the differences in safety that may exist by virtue of increased reactor sizes, larger fuel lifetimes, and evolving design concepts, and c) obtain safety data on the integrity of primary vessel and piping structures, the control of fission product releases, the true nature of metal-water reactions, and proof on the efficacy of engineered safeguards.

W. D. Crawford of Con. Ed. reviewed the history of the Ravenswood program with emphasis on the design of safety features (including the design of the double barrier, popcorn concrete containment system). He stated that the prospect of cheaper power from Canada plus public opinion against Ravenswood caused them to drop Ravenswood. He gave no indication of reactor plans beyond Indian Point #2.

Szawlewicz mentioned (see attached copy) AEC, ACRS announcements on pressure vessel failure as a criterion for safety research and siting judgments; described the role of the Steering Committee in reviewing safety research programs; stressed the emphasis that will be placed on upgrading Commission reactors through sound engineering principles; summarized the objectives of the research program and status of major facilities associated with engineered safeguards testing; listed the topics that will be studied, evaluated and described in various state-of-the-art summary reports; and announced the assignment of Phillips Petroleum Company to a major role in assisting RDT in water reactor safety program planning.

Mr. J. C. Rengel, General Manager of the Atomic Power Division, Westinghouse emphasized the attention that is given in nuclear design as the first requisite for safety assurance. He felt that hypothetical accidents were receiving too much attention compared to the review of the adequacy of the design itself, which usually is warranted over a forty year lifetime.

Before reverting to the questions raised by Norman Cousins, Oliver Townsend, panel chairman directed the following question to me: "In view of the confidence that utilities and reactor vendors have in the safety of present designs, what is the purpose of perpetuating and expanding safety research and test programs, what do we hope to achieve which isn't already known?"

My answer was somewhat along the following lines: "The status of our knowledge in safety is such that we can fairly accurately predict the effects of a complex reactor accident given a set of initial assumptions that defines the start of the accident. However, differences in the selection of initial assumptions can affect the results by orders of magnitude. For example, fission product deposition rates onto surfaces can vary significantly depending upon values selected for steam condensation rates, surface absorptivity, and the influence of reducing versus oxidizing environments. Metal-water reaction analyses show results that differ by factors of ten depending upon the steam supply rates that are used in the calculations.

Such differences can only be resolved by more detailed safety analyses of specific reactor designs and by undertaking larger scale engineering tests to more nearly model reactor accidents related to given designs so that we may determine the real degree of pessimism in our analytical predictions and the reasonability in the selection of initial assumptions. Only in this way can we obtain credit not only for the effectiveness of engineered

safeguards in controlling accident levels, but also in the inherent or passive mechanisms that are known to reduce the levels of airborne activity that may be released to the outer environment.

Regarding the questions raised by Norman Cousins, no one volunteered to answer questions 1, 2, and 6. Beck responded to 3 and 4 by stating that there has been an exceedingly good record of experience in the safe operation of reactor power plants, although there have been some incidents, which if not caught in time, might have led to serious consequences. Dr. Beck also mentioned that he saw no problem in the ability of reactor plants to control routine releases of radioactivity (below tolerance levels), but that he and other regulatory personnel were mainly concerned with large releases associated with serious accidents.

Mr. Crawford of Con. Ed. replied to number five regarding the need for additional controls over the nuclear industry with an emphatic "No". He then asked Dr. Merrill Eisenbud, former manager of the AEC New York Operations Office, to respond to question number four regarding the level of radioactive exposure which is tolerable by man without short or long range physical consequences.

Dr. Eisenbud stated that routine releases of radioactivity were always prescribed and limited to levels which are below or of the order of background activity already in the atmosphere. He mentioned that in certain cases of coal fired plant operation, the release of radium species as impurities in coal were not insignificant and invariably are not monitored as are the releases from nuclear plants.

Regarding "synergistic effects" of released activity upon contaminants already in the atmosphere, since routine releases are the same as background, whatever synergistic effects would be created are probably produced on a continuing basis by the already existing radiation (including fallout).

Mr. Frank Bevilacqua of Combustion Engineering asked the question of Dr. Beck as follows: "Since you mentioned the need for more information on the safe operating experience of reactors and more data from the research and test programs - such as LOFT - as a criterion for siting judgments, must one wait until 1970 until the LOFT experiment is completed before in-city siting decisions can be made?"

Dr. Beck replied that the connotation of a one to one ratio between siting decisions and the research and test programs were Mr. Bevilacqua's and not his. What he did say was that each reactor case had to be treated

separately based on its own merits and that the information from operating reactors and research programs was highly desirable, but they would not necessarily wait until all the information was in before giving a judgment.

Szawlewicz responded to the question regarding LOFT schedules by stating that the LOFT program was essentially a proof test of one reactor accident model and that it should not be regarded out of context with the over-all safety program where a large amount of effort was directed not only to the pre-prediction of the LOFT results but to the applicability of research data to the analysis of other systems as well. The heavy emphasis that is being placed on the pre-analysis of the LOFT results will lend confidence to r&d data and diminish the uncertainty and the importance of the final test.

Conclusion:

At the end of the meeting, it was difficult to determine whether Mr. Cousins, or anyone for that matter, felt any better about in-city reactor siting. Perhaps a philosophical discussion, such as engendered by Mr. Cousins presence, shouldn't be expected to resolve technical problems. On the other hand, how does one translate the technical language into a form that is recognizable not only by the public, but by those that regulate the industry. This is a continuing problem to say the least.

Attachments:
1. The AEC Reactor Safety Program
2. Letters of Invitation to Participate in Meeting
3. Agenda - "Locating Nuclear Power Plants in Cities"
4. Partial Attendance List

Return to 67 File

April 20, 1966

AEC 943/28

COPY NO. - 72

ATOMIC ENERGY COMMISSION

LOCATING NUCLEAR POWER PLANTS IN CITIES

Note by the Acting Secretary

1. The Deputy Director of Regulation has requested that the attached memorandum of March 24, 1966 be circulated for the information of the Commission.

2. This matter was discussed at Regulatory Information Meeting 188 on March 28, 1966.

F. T. Hobbs

Acting Secretary

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Draft material filed:
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6-20-66

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

MAR 2 4 1966

MEMORANDUM FOR CHAIRMAN SEABORG
COMMISSIONER PALFREY
COMMISSIONER RAMEY
COMMISSIONER TAPE

SUBJECT: A SYMPOSIUM - "LOCATING NUCLEAR POWER PLANTS IN CITIES", TUESDAY, MARCH 22, 1966, NEW YORK CITY

On Tuesday, March 22, I participated as a speaker in a program sponsored by the Metropolitan Section of the American Nuclear Society on the subject "Locating Nuclear Power Plants in Cities". The meeting had been planned as a cooperative venture between New York City officials concerned with the general problem of atmospheric pollution and the posture the new city administration should take toward nuclear reactors in New York, and the officers of ANS who are generally interested in seeing reactors "progress".

An attendance of 75 or so had been anticipated. Actually I estimate about 300 were present, including a number of important people in the city administration and in the nuclear industry.

In the course of the meeting it became immediately apparent that there was more significance to the discussion than usually attaches to a Nuclear Society meeting. In essence, various officials in the city administration have been assigned the responsibility of recommending to Mayor Lindsay in the very near future an official position which the city should adopt with respect to nuclear reactors in New York. This meeting became a discussion forum in which these officials exposed their preconceived ideas and inclinations, and members of the nuclear community, both speakers and members of the audience, undertook to present concurring or differing viewpoints.

With respect to the city officials, I had two distinct impressions:

(1) They were (the ones present) of extremely high calibre, able, thoroughly knowledgeable about the pollution problem and about ways in which reactors would be of benefit. These included:

Mr. Norman Cousins, Chairman (as the principal spokesman)
Mayor's Task Force on Air Pollution

Mr. Robert Wilson, Director
Division of Basic Studies
City Planning Commission

Alfred Pieratti, Asst. Director of Engineering
Dept. of Air Pollution Control, City of N.Y.

Mr. O'Kelly
Operations Division, City of N.Y.

(2) On a number of important points these officials seem to be inadequately and in some cases erroneously informed. There appeared to be a predilection against nuclear power plants, on some points for reasons which were erroneous or were based on misunderstanding. I obtained the impression that Mr. Conway and Captain Bauser from the JCAE Staff (who attended from having sensed the importance of this meeting) shared these same opinions from their participation in some impromptu discussions after the meeting.

(3) It was my further impression that these officials are likely to recommend against nuclear power plants in the city. The way in which this might be done could be highly detrimental to the reactor program everywhere, though this would be by inadvertence. These people are thoroughly impressed by the (future) potential benefits of nuclear plants in cities and would in no way want to harm their development.

It occurred to me therefore that the Commission might want to volunteer to discuss with these N.Y. City officials some of the basic problems involved before they have completed their recommendations to the city administration, which I gathered would be within the next few weeks. This would ensure that whatever recommendations are eventually made would at least be based on a correct understanding of the problems. I believe the city officials would be very grateful for an offer of this assistance from the Commission.

Incidentally, the ANS program included by far the best and most sober discussions of reactors in urban areas that have been held thus far. Particularly good papers, containing both candid appraisals and broad perspectives, were given by:

Mr. Wilson, N.Y.City on Planning
Mr. Pieratti, N.Y. City on Air Pollution
Mr. W. Donham Crawford, Con Ed., on his company's position
Mr. J. C. Rengel, G.M., APD, Westinghouse, on his company's plans to meet this problem.

My own paper, being separately circulated to the Commission for information, was surprisingly well received and got considerable discussion.

Original Signed by C. K. Beck

Clifford K. Beck
Deputy Director of Regulation

AEC 943/30

April 21, 1966 COPY NO. 68

ATOMIC ENERGY COMMISSION

REACTOR LOCATION AND SAFETY REQUIREMENTS

Note by the Acting Secretary

The Director of Regulation has requested that the attached speech delivered by the Deputy Director of Regulation at the Metropolitan Section of ANS on March 22, 1966, be circulated for the information of the Commission.

F. T. Hobbs
Acting Secretary

DISTRIBUTION	COPY NO.
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CURRENT TRENDS AND PERSPECTIVES IN REACTOR LOCATION AND SAFETY REQUIREMENTS

Clifford K. Beck
Deputy Director of Regulation
U.S. Atomic Energy Commission
Washington, D.C.

(Presented at the Metropolitan Section of ANS, March 22, 1966)

We are living in an age when a great many technological endeavors present threats of potential danger not only to the participants in these activities but to large sectors of the general public as well. Poisonous gases, insecticides, explosive chemicals, utilization of electricity, airplanes and environment polluting machinery of many kinds all present the possibility of hazards of different kinds and in various degrees. We have learned to live with these potential sources of hazards by developing systems of protection which avert the actual realization of all but a small fraction of the latent threats of danger inherent in the endeavors.

In the application of atomic energy to electricity generating plants this same old problem is encountered in still another form. Inherent with this endeavor is a potential danger of large magnitude that must be controlled. This can be tolerated within our society only if there are adequate systems of protection to insure that the inherent threat does not become a realized damage. In this particular instance, however, one new aspect of public protection has been added. For atomic energy, the dimensions of potential danger were so clearly

realized from the outset that a full-blown system of protection was developed even without having the experience of accidents to spur the initiation of appropriate counter-measures, such as has been the normal pattern in most other technologies.

The detailed record of safety in nuclear reactor operation has been extensively described elsewhere. Its general status can be summarized in two brief statements:

(1) In the operation of almost 300 reactors of all types in this country over the 23 + years since the first reactor was built, not a single accident has interfered with activities of people in public areas.*

(2) In central station nuclear power plants, no reactor accident has caused injury or death of employees, or has interfered in any way with public activities in surrounding areas.**

Actually, the operation of nuclear power reactors poses what at first appears to be two different types of potential threats to public safety. As it turns out, the first of these hazards, that arising from release of routine effluents into the environment from normal operations, are controllable to whatever extent is desirable, and hence is more of an economic

*Only 3 workers have been killed by reactor accidents, all in one accident in a small experimental reactor at NRTS.

**4 workers have been killed in inadvertent nuclear reactions in manipulation and chemical processing of nuclear fuels and in accidents in criticality experiments, and a few others have received radiation injuries in these incidents. But no such accidents have occurred in large nuclear power stations.

than a safety problem. There is left the one real potential hazard of great magnitude; namely, the possibility, a very unlikely one, that an accident might occur which would release a significant fraction of the fission product inventory accumulated within the reactor fuel from within the facility into the environment.

I have suggested above, but want to make it quite explicit, that there is a vast difference between the existence of potential hazards to health and safety and the actual occurrence of damage to health and safety. We live calmly and securely in the midst of potential hazards of many kinds. We have come to recognize that dependence on protective systems of safeguards is a part of our way of life. But it is necessary that those safeguards be there and that they be adequate and reliable in performance of necessary protective functions.

Such a system of safeguards has been developed for protection of health and safety against the potential hazards of nuclear power plants. It is worth while identifying and briefly describing the six basic elements in this system:

1. The overall design, construction and operation of atomic power plants must be carried out in accord with high levels of engineering and quality standards. In many areas of vital importance to safety, the requirements of excellence surpass what is required in established codes and in usual engineering practices. There is a constant effort to insure that the necessary standards are in fact achieved in all the vital parts of the facility.

2. A comprehensive system of safeguards -- called accident-prevention safeguards -- is provided to prevent failures, mishaps, malfunctions and other inadvertent perturbations from escalating into major accidents. Redundancy in controls, emergency power from independent systems in duplicate or triplicate, multiple systems of back-up and emergency cooling, and other such systems are added onto and backup the basic reliability of systems designed in the first place to unusually high standards.

3. The third level of defense consists of extensive safeguards - called consequence-limiting safeguards -- designed to contain and limit the escape of fission products to the environment in the unlikely case a major accident should cause their initial release within the facility. E.G., one key part of this system is the external containment building enclosing the entire reactor facility. The containment building is designed with sufficient strength to withstand the effects of a wide range of conditions that conceivably might be experienced, with negligible leakage of radioactivity to the environment.

4. Systematic analysis is made of the completed reactor design with respect to the accidents that might occur through various combinations of circumstances, and the consequences of these accidents are evaluated. This accident analysis is extended to situations considered to define the extremes with which the facility must be designed to withstand in the context of providing "reasonable assurance" of no undue risk to the health and safety of the public.

The accident situation postulated in establishing such limits has been commonly referred to as the "Maximum Credible Accident". More accurately, it might be characterized as the "Maximum Design Accident". The Maximum Credible Accident, on one hand, defines requirements and specifications for various safeguards systems (e.g., the strength and leakage of the containment vessel). On the other hand, analysis of the consequences of these accidents serves to test the adequacy of overall protective systems. These safeguards must be found to afford sufficient protection against even the maximum credible accident that radiation exposure of people in adjacent areas would be within the low radiation limits specified in the site selection guides.

5. For power reactors thus far authorized, the reactor is so located that surrounding exclusion and low population zones are protected by dispersive effects of extensive atmospheric distances between the facility and populated areas. Under most atmospheric conditions, a quite large factor of safety results from dilution and diffusion of contaminants as they spread through the atmosphere.

Our siting rules do provide that where engineering safeguards of sufficient capability and adequacy are provided, there may be some reduction in the distances that otherwise would be required. This leads to the possibility of reactor sites near to or within population centers, on which I will comment further below.

6. The final element, and one of the most important in the system of safeguards, consists of the extensive sequence of independent technical reviews of all aspects of the reactor

facility by qualified experts. After the reactor owners, his designer, his vendor and his consultants have discharged their own safety responsibilities in design and safety protection and are satisfied that both the public and their own interests will be protected, there are successive and independent safety reviews of the entire facility by the Regulatory Staff of the AEC and by the statutory Advisory Committee on Reactor Safeguards. Finally, there is another review in a public hearing before a 3 member Safety and Licensing Board, with an opportunity for appeal to the 5 member Atomic Energy Commission. There is further, a continuing safety surveillance by the AEC regulatory staff and the compliance inspectors.

Details of the several basic elements of this overall system of safeguards are extensively described elsewhere in the nuclear literature. It is not immodest or unfair, I think, to suggest that the extraordinary record of safety in nuclear reactor operation in this country can in part be attributed to this system. It must be admitted immediately, however, that a major part of the credit for this record should be given to the high priority and expert attention to safety in design and operation of reactors by the designers and manufacturers of these facilities. From the outset, out of the sober realization of the nature and magnitude of potential hazards involved, any disagreements on this point among all the people involved have not been on the necessity for adequate protection, but only on means of achieving it.

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This brings us to a consideration of the situation as it stands today; some trends are discernable and some considerations to be faced in the near future can be identified.

As of now three distinct trends in reactor technology are in evidence which have significant relevance to matters under consideration in this symposium.

(1) Reactors are becoming larger, and their fuel cycles longer. The economics of operation are favored by this trend. Many utilities are of such size that major increments of power from larger plant cannot only be accommodated but are desirable.

Both the larger plant and the lengthening fuel cycles, however, lead to increases in the potential hazard of such plants through the directly increased inventory of fission products in the reactor.

(2) There is rapid progress toward standardization for the water type reactors. For the first time, there are appearing repetitive facilities of essentially similar design in BWRs and PWRs. Even in cases where certain features are modified, most of the components and systems remain the same. There is strong indication that this trend will continue.

This trend is already leading to possibilities of standardization which were not feasible as long as rapid evolution of technology was still in progress. Our general reactor design criteria recently published for comment, and the supplementary criteria for water type reactors now in development, are examples of what undoubtedly will be extended naturally into standards and codes as common practices become firmly established.

It should be borne in mind, however, that this trend toward standardization is a paper trend only, for reactors which have been approved or are under consideration. Not one of the large, latest design, "standardized" prototypes have yet been built and put into operation. This lack of actual operating experience constitutes one of the particular and specific difficulties in our present projections into the future, as I will discuss further below.

(3) Strong incentives are emerging for locating reactors closer to metropolitan load centers. The economics and other factors behind this trend have been amply discussed elsewhere.

The effect of such a move, however, could be to add a disproportionately large increase in the potential hazard to people.

The concentration of an atmospheric contaminant, such as radioactivity, varies in rough approximation inversely in proportion to the square of the distance traversed. That is, for a contaminant being dispersed in the atmosphere, the concentration at a given distance would be on the order of four times as great at half the distance, sixteen times as great at one fourth the distance, etc. Thus, any radioactive materials that might be accidentally released at a metropolitan site where the protection of separation distance would be absent, would be dispersed very little before reaching inhabited areas; and the number of people would be very large.

Thus, the reliance that would have to be placed on design reliability and on performance of engineering safeguards would require an exceedingly high level of confidence in their effectiveness.

The implications of these three trends have been under consideration by the Commission for some time. In June of last summer a statement by the AEC was made to the JCAE with respect to some of the problems involved and what would be done in response to these problems. After summarizing some of the factors I have noted above, the Commission's statement continued: "... Consequently, further important advances* in reactor plant design, in the capability of safety systems and engineered safeguards, in adopting critical components and systems, must evolve* to keep pace..." The Commission further indicated that "augmented efforts and redirected emphasis" within the AEC's own research and development program and in collaboration with industry would be addressed to solution of the problem.

Since that time concentrated attention within the AEC's Steering Committee for Reactor Safety Research and some contacts with industry leading toward its involvement in defining the specific problems and defining programs for their solution, have been carried out.

It is not difficult to describe the general dimensions of what is required. If reactors are to be built which inherently possess greatly increased potentials for hazard, at locations where the extensive protective characteristics of

*Underlined for emphasis.

atmospheric dispersion and dilution are missing, and where dependence for safety must be placed on adequacy of design and performance of safeguards, the general character of the prerequisities should be obvious. They are indicated as items (1) - (4) below.

Note, however, that a suggestion that safety improvements in reactor facilities must be accomplished before reactors are moved nearer to population centers, does not imply that present reactors, in their present locations are not adequately safe. If a given reactor, presently operating, should be moved closer to people than it now is, and closer to a population center, with all other factors remaining unchanged, there would be an increase, first, in the risk per individual because each one is closer to a source of radiation and, second, in the risk to the population as a whole because many more people come within range of possible large exposures. If the reactor should be increased in size at the same time, the increment of risk would be still larger. Thus, just to maintain the level of risk to individuals and to the population where it now is, a movement of reactors closer to population centers would require improvements in the safety status of the facility.

Such improvements would include the following:

(1) Reactor design, construction and operation standards for power reactors should be fully established at the high quality level required. For many systems and components the quality standards are better defined and are more clearly

satisfactory than in others. This whole matter is under systematic consideration.

(2) Any residual technical areas of uncertainty should be clearly resolved. Two such technical items come to mind as examples:

a. The practical aspects and likelihoods of water-metal reactions during the transient conditions accompanying reactor accidents need further clarification. Much of the basic scientific data on this has been established, but certain aspects of the practical engineering aspects of these potential reactions, their implications in plant design and the surety of preventive safeguards are not clearly established.

b. Certain problems have been identified relating to design, codes, construction practices and testing of steel pressure vessels. The realtionship between technology available and actual practice in construction of vessels, the factors affecting rate of defect growth in thick walled vessels, and feasible methods for periodic inspection or otherwise verifying continued acceptability of the vessel are among the problems requiring further clarification.

(3) The adequacy of safeguard systems, both those on which dependence is placed for prevention of accidents and those for limiting the consequences of accidents, should be firmly established. Three criteria have been suggested for these systems, as principles which should be satisfied:

a. That each system be capable of performing its prescribed protective functions, at any time and under all the conditions that might accompany possible accidents.

b. That for each system a high degree of dependability and reliability be established.

c. That means be devised for adequately testing the functionable readiness of the systems over the presumably long periods when there is no demand for its use.

For some of the systems, it will require imagination and clever design and engineering to satisfy all three of these criteria.

(4) Finally, there should be sufficient experience with large power reactors of the type and characteristics proposed for locations near populated areas to assure a high level of confidence in their satsifactory performance.

It is impossible, of course, to define what "sufficient experience" might be. In part, relevant experience is gained from operation of reactors of all sorts, under many conditions, and observing the categories of things that might go wrong with them. In part, however, relevant experience on the specific type of reactors involved is also highly desirable, but if such experience consists of steady, uneventful operation, with no abnormality or malfunctions, as would be expected and hoped for, this would have quite limited usefulness in indicating the effectiveness of protective safeguard systems which had not been called on for service.

The effectiveness of such systems can in part be established by experimental tests in mockup situations and extrapolation of the results to the anticipated real-life circumstances. Certainly it is not feasible to consider precipitation of actual accidents of major dimensions -- the only ones of real concern -- in full size, prototypes of high power level. But, on the other hand, laboratory tests and mockup experiments alone leave some residual elements of uncertainty. These, to some extent, can be offset by observation and periodic in-situ testing of safeguard systems, to the extent that such tests can be devised. Such a program, carried out over a period of time on a full size, full-power prototype, would give valuable indications of the reliability and readiness of such systems to perform their prescribed functions.

In the final analysis, the adequacy of experience is a matter of judgment, which takes into account overall general experience accumulated in addition to the specific direct and indirect observational data from engineering analysis, mockup tests and experiments, and any in-situ tests available. Up to the present, and as of now, taking into account the status of all these matters, it appears that "adequate experience" has not as yet been accumulated.

In final summary of the situation, we believe that reactors are safe, that safeguard systems are fully adequate to prevent the inherent potential hazards from becoming real dangers, and

that major accidents that would result in public hazard are so unlikely as to be incredible. Nevertheless, before large power reactors are moved into areas where substantial increases in magnitude of potential hazard would result, and as a means of assuring that the present low levels of risks to individuals and to the overall population at least do not increase, these matters must be established at the highest possible level of confidence.

The procedures for accomplishing these objectives, for identifying those specific elements which should be given added efforts and deciding the direction the efforts should take, are receiving concentrated attention within the Commission's Steering Committee for Safety Research, within the AEC staff, and by the Commissioners themselves. The scope and content of the "augmented" safety research program are being worked out. Some discussions have already been held with representatives of industry and further meetings are planned to explore their participation. But, in a larger sense, there rests on industry a separate obligation to come to grips with this problem, to exercise initiative in defining the scope and emphasis in the program required to resolve the issues and to join in the efforts to accomplish this. The nuclear industry has responded fully to such challenges in the past and I am sure they will in this case also.

As to time schedules, since the full scope of this program has not yet been resolved and the dimensions of efforts to accomplish the program have not been established, it is obviously premature to attempt to predict the time schedules which may be required for completion of this work. That will have to await the results of further study, and the outcome of discussions and of research and development programs which may be undertaken by the nuclear industry generally and by specific organization having direct interests in these matters.

AEC

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

W.H.S. 3- Regan & Press Room

No. H-165
Tel. 973-3335 or
973-3446

FOR IMMEDIATE RELEASE
(Wednesday, July 21, 1965)

AEC RECEIVES REPORT FROM REGULATORY REVIEW PANEL

Chairman Glenn T. Seaborg of the Atomic Energy Commission announced today that the Commission has received the report of a special seven-member panel of persons from outside the Government who were asked by the AEC to recommend ways of streamlining its procedures for licensing nuclear facilities.

The Panel's recommendations deal with two principal areas - the over-all policies applied and being developed to administer the Commission's licensing program for nuclear facilities, and the decision-making process in the AEC regulatory program.

In making the 74-page report public, Chairman Seaborg said: "The report of the regulatory panel reflects careful thought and study by a distinguished group of persons with long experience and diverse backgrounds in the atomic energy field. The Commission is impressed with the depth of understanding by the Panel of problems involved in the AEC reactor licensing program and the soundness of its recommendations for future courses of action. The report could well constitute a milestone in the continuing development of the program, and should provide a firm foundation for our future efforts to improve the regulatory process. We now are considering measures to implement the recommendations."

The Commission has transmitted the report to the Congressional Joint Committee on Atomic Energy, to the Advisory Committee on Reactor Safeguards, and to members of atomic safety and licensing boards.

Members of the review panel were Dr. Manson Benedict, head of the Department of Nuclear Engineering at Massachusetts Institute of Technology, Cambridge; Roger J. Coe, Vice President, Yankee Atomic Electric Company, Boston; Dr. Emerson Jones, President, Technical Management, Inc., Lincoln, Nebraska; Dr. C. Rogers McCullough, Senior Vice President, Nuclear Utility Services, Washington, D. C.; James F. Young,

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Vice President-General Manager, Atomic Products Division, General Electric Company, San Jose, California; Dr. Walter H. Zinn, Vice President, Combustion Engineering, Windsor, Connecticut; and William Mitchell, Washington, D. C. attorney and former General Counsel of the AEC. Mr. Mitchell was chairman.

In its recommendations, the panel said that "The findings of the Regulatory Review Panel have to a remarkable degree borne out the foresight of the Joint Committee on Atomic Energy expressed in 1962 at the time of the regulatory amendments to the Atomic Energy Act. The panel believes that the improvements suggested here are compatible with the spirit of flexibility advocated by the Joint Committee, in its conception of the Atomic Safety and Licensing Board as an experiment in new administrative law techniques, and in its desire to permit the Advisory Committee on Reactor Safeguards to give full attention to safety problems of broad importance.

"While the recommendations are presented separately, they are closely related. As indicated in the conclusions, it is the cumulative effect of the suggested changes which the Panel expects will result in substantial improvements."

The recommendations of the panel are attached. Copies of the full report are available at the Commission's Public Document Room, 1717 H Street, N. W., Washington, D. C., or may be obtained by writing to the Secretary, U. S. Atomic Energy Commission, Washington, D. C. 20545.

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ATTACHMENT

RECOMMENDATIONS OF REGULATORY REVIEW PANEL

A. In the discharge of the Commission's regulatory responsibilities, the primary element in the safety review of every reactor project should be the analysis conducted by the staff of the Director of Regulation. This should continue to be the most thorough and complete analysis of safety conducted at any stage of the regulatory process and the only one required of every facility. The safety review staff of the Director of Regulation should continue to be made up of a sufficient number of individuals of sufficient maturity, experience, and competence to do this work expeditiously, thoroughly, and competently. The Commission should emphasize that this group is the public's primary protection in reactor safety matters, that its review of the safety of a reactor project is the most complete, thorough and objective review conducted during the regulatory process, and that its review is subject to the checks and balances provided by the ACRS and the Atomic Safety and Licensing Boards as described below.

B. A part-time, statutory, Advisory Committee on Reactor Safeguards made up of exceptionally well-qualified men who collectively have competence in disciplines bearing on reactor safety should be a permanent element in the AEC's regulatory system. As the regulatory workload of the Commission increases and as the primary responsibility for safety review is placed upon an increasingly competent staff, more of this Committee's attention should be directed to novel safety problems and new types of reactors, with correspondingly less attention given to routine safety review of more conventional types of reactors. The ACRS should also devote more time than it has in the past to developing criteria, standards and general principles for safety review. The statutory requirement that the ACRS review and report on all applications for a license under Sections 103 and 104 of the Atomic Energy Act should be modified. The ACRS should be informed of each new license application, and should be privileged to undertake a review on its own initiative if it feels this to be desirable. The Director of Regulation should be free to request the ACRS to review the

(more)

safety of any complete reactor project or any particular aspect of a project, but the ACRS should decide for itself whether or not to review, and in the case of a refusal of the Director of Regulation's request, should provide a statement in explanation of its action. The ACRS should be permitted and encouraged to decline to review the safety of a reactor-site combination very similar to ones already judged to be safe and proved to be so by operating experience. The talents and time of this uniquely qualified group should be reserved for the more difficult and novel reactor safety problems and not dissipated in repeating the work of the regulatory staff in routine review of the safety of conventional reactor installations.

C. Every effort should be made to continue the close working relationship between the regulatory staff and the ACRS which has existed in the past. If it appears that the ACRS and the regulatory staff are likely to reach different conclusions or make divergent recommendations, the two groups should hold joint meetings and make every effort to reconcile differences. Only after it is clear to both parties that agreement cannot be reached should divergent reports be issued, simultaneously, and the divergence in views identified.

D-1. The AEC should define more precisely and realistically the scope of information to be supplied by the applicant at the construction permit stage. It would be desirable also for the AEC to establish a format for the application and Preliminary Hazards Summary Report to facilitate use by the staff, the ACRS, and the Atomic Safety and Licensing Boards.

D-2. The regulatory staff review at the construction permit stage should deal primarily with design features and criteria that are directly related to the health and safety of the public. The report prepared by the regulatory staff, describing the results of its safety review, should be organized in such a way as to facilitate demonstration at the subsequent hearing that a thorough review has been made of all relevant safety issues.

D-3. Upon completion of the regulatory staff review and coordination with the ACRS as required, the Director of Regulation should come to a conclusion whether or not a construction permit should be issued. This conclusion

(more)

should be announced in the Federal Register in the form of an intention either to issue or deny the requested construction permit, subject to a showing of cause at a public hearing why the announced intention should be set aside. Where practical, this same notice should also be used to announce the public hearing.

E-1. The function of the Atomic Safety and Licensing Boards in facility licensing cases should be redefined specifically to recognize that a board cannot undertake, de novo, an independent technical review of the safety of a proposed facility. Rather, the function of the Board should constitute the following:

(1) Determination on the record whether or not a proper application containing sufficient technical and other information has been filed by the applicant;

(2) Determination whether or not a review of the application has been made by the regulatory staff and, in some cases, the ACRS, which is adequate to support either the granting or denying of a construction permit or license;

(3) Provision of a formal public hearing opportunity for any affected person to show cause why the construction permit or license should or should not be issued in accordance with the previously announced intention of the Director of Regulation; and

(4) In contested cases, determination as to which of the opposing arguments should prevail.

E-2. The function of prehearing conferences in both contested and uncontested cases should be expanded. Such a conference should be held in every case to settle matters of procedure and to attempt to define any substantive issues.

E-3. During the conduct of public hearings greater emphasis should be placed on (1) the exclusion or limitation of extraneous and irrelevant issues over which the Commission has no jurisdiction, (2) the preservation of continuity of the hearing, and (3) the use of the hearing as a legitimate instrument to enhance the public's impression of the regulatory staff's competence and objectivity.

(more)

E-4. The action of the board at the close of a hearing should be modified as follows:

(1) The initial decision should consist either of a determination that the Director of Regulation's proposed action be set aside, with an order to that effect, or a determination that no cause has been shown why this should be done;

(2) A time limit should be established for action by the board;

(3) The present machinery for granting expedited effectiveness should be modified; and

(4) The jurisdiction of any board should end when the Commission action in issuing or denying the construction permit becomes final.

E-5. The present practice of including two technical members on Atomic Safety and Licensing Boards in both uncontested and contested cases should be continued. In addition, consideration should be given to the appointment of a third technical member as an alternate in future cases.

F. Technical specifications should be limited to those aspects of the reactor system which bear a direct relation to public safety, rather than a detailed description of all components of the reactor such as is suggested in Appendix A of Part 50 of the Commission regulations. The Task Force on Technical Specifications, which has been working on this approach, should be encouraged to complete its work and issue a report. The regulatory staff should adopt the new approach as rapidly as possible and especially on new reactors.

G-1. The present practice under which the Commission may review proceedings for issuance of reactor licenses on its own motion should be continued. Where a party to a proceeding seeks Commission review, the present cumbersome procedure requiring preliminary petition for leave to appeal should be eliminated and Commission review should be permitted as of right. In review either on

motion of the Commission or on appeal by a party, the function of the Solicitor's office should be limited to advising the Commission on questions of a legal nature and should not include substantive evaluations of the technical aspects of safety questions.

G-2. The AEC regulations concerning ex parte communications (Sec. 2.780) should be modified so that, in uncontested cases involving initial licensing, communication would be permitted between Commissioners, members of their immediate staffs, and AEC personnel who advise the Commission in the exercise of its quasi-judicial function, on the one hand, and members of the AEC organization, including the Director of Regulation and members of his staff, on the other hand. In contested cases involving initial licensing, the Commission should be free, in its discretion, to initiate such consultation. In any case, if the Commission's decision rests on fact or opinion, obtained in any such communication, which does not appear in the evidence in the record, the substance of the communication should be made a matter of public record in the proceeding with opportunity for rebuttal.

H. The principle of Part 115 of the AEC regulations, which requires that certain reactors exempt from licensing be given the same safety review as licensed reactors, is desirable and should be retained with changes in implementation to conform to the recommendations made elsewhere in this report. The division of the Commission with programmatic responsibility for a reactor of this class should participate with the operating contractor in applying for a construction or operating authorization rather than delegating all responsibility for obtaining these authorizations to the contractor.

I. The Atomic Energy Commission should establish a mechanism, which should include a Reactor Safety Research Committee, to coordinate the Commission's program of research on reactor safety, and to ensure that the needs of the Director of Regulation for experimental information to be used in developing reactor safety criteria and in evaluating the safety of reactor projects submitted for licensing will be met.

J. The AEC should continue and intensify its efforts, in cooperation with industrial and professional groups, to develop criteria, standards and codes for nuclear reactors. In the case of criteria, the AEC should assume primary responsibility, with the assistance of industrial and professional groups. In the case of standards, industry, working through professional groups and with the assistance of the AEC, should assume primary responsibility. The AEC should also encourage and assist industry to develop codes for nuclear reactors following the same practices that have been used in other fields.

K. The Commission's preparations to meet future requirements of the Compliance function should be coordinated with the evolving practices of Reactor Licensing, and should explore means for applicants and suppliers to provide evidence of their own compliance.

MH&S-3-Organization & Personnel Regulation Res. & Stat. Reg. of CTW / Reg Procedures

OPTIONAL FORM NO. 10
MAY 1962 EDITION
GSA GEN. REG. NO. 27

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UNITED STATES GOVERNMENT

Memorandum

TO : File

DATE: July 15, 1965

FROM : W. B. McCool, Secretary

Original signed W. B. McCool

SUBJECT: REPORT TO THE ATOMIC ENERGY COMMISSION BY THE REGULATORY REVIEW PANEL

SECY:JCH

1. At Regulatory Information Meeting 160 on July 12, 1965, in response to Commissioner Ramey's query, Mr. Price said he would propose early staff review and recommendations on the forthcoming Report to the Atomic Energy Commission by the Regulatory Review Panel. Commissioner Ramey said it might be appropriate to develop a statement regarding the organizational improvements with respect to reactor safety.

2. It is our understanding the Director of Regulation is taking the required action.

3. Copies of the Report were circulated to the Commissioners on July 14, 1965.

cc:
Chairman
Commissioner Ramey
Director of Regulation
Deputy Director of Regulation
Asst. Dir. of Regulation
Asst. Dir. of Reg. for Admin.
Asst. Dir. of Reg. for Nuclear Safety

7-15-65

Also filed: OF-C-1 Reg Policy

OFFICIAL USE ONLY

DAS GT FILE
GT.

GENERAL ADVISORY COMMITTEE
TO THE
U.S. ATOMIC ENERGY COMMISSION
P.O. BOX 19029
WASHINGTON, D.C. 20036

JUL 30 1965

The Honorable Glenn T. Seaborg
Chairman
United States Atomic Energy Commission
Washington, D. C.

Dear Glenn:

I am forwarding herewith five copies of a report, "Review of Reactor Safety Research Program", which has been prepared by the Reactors Subcommittee of the GAC, augmented by Dr. Bugher, Dr. Froman, Dr. Lawroski, and Dr. Kouts. This report will be considered by the full GAC at its next meeting, on November first through third, in Washington, D. C.

This review was conducted in response to your request to the GAC at its meeting with the Commission on March 29.

If you wish additional copies of this report, they may be obtained from the GAC office.

Sincerely,

Larry

L. R. Hafstad
Chairman
General Advisory Committee

Encl.

Copy of ltr files:
O-M-7-GAC Cases
O-M-8-GAC Report

7-30-65

REVIEW OF REACTOR SAFETY RESEARCH PROGRAM

By

Reactors Subcommittee, General Advisory Committee

Manson Benedict, Chairman
L. R. Hafstad
William Webster

Other Members of the General Advisory Committee, USAEC

J. C. Bugher
Darol Froman
Stephen Lawroski

Consultant: H.J.C. Kouts

July 30, 1965

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REVIEW OF REACTOR SAFETY RESEARCH PROGRAM

I. Introduction

At the 91st Meeting of the General Advisory Committee, on March 29-31, 1965, the Atomic Energy Commission requested the GAC to review the Commission's program of research on reactor safety, with the objective of answering the following questions:

1) Will the program of research on reactor safety formulated by the Division of Reactor Development and Technology provide the Director of Regulation and his staff with the information on reactor safety they require for a sensible and definitive evaluation of the safety of reactors submitted for licensing?
2) Will this program of research on reactor safety provide sufficient information on the reliability and cost of engineered safeguards for reactors to implement intelligent technical and economic decisions regarding alternative designs and sites for proposed reactors?
3) Should additional topics be added to the AEC's program of reactor safety research?
4) Should the relative emphasis on different phases of this program be changed?
5) Are the various phases of the safety research program being conducted effectively?

To be of maximum value, the AEC requested that the report on this review be completed by August 1, 1965.

#-92 Mtg was held on these dates

This review has been undertaken by the Reactors Subcommittee of the GAC, augmented by Drs. J. C. Bugher, D. Froman, and S. Lawroski of the GAC and Dr. H. J. C. Kouts. This report is the summary of the findings of this review group. This report will be considered by the full GAC at its next meeting, on November 1-3, 1965.

The review group held discussions of the safety research program with Messrs. Swartout, Shaw, Lieberman, Szawlewicz, Hembree, Belter, and Booth of the AEC's reactor development organization; with Messrs. H. L. Price, Beck and DiNunno of the regulatory organization; and with Messrs. Kouts, Newson, Okrent, Rogers, and Thompson of the Safety Research Subcommittee of the ACRS. The review group visited the National Reactor Testing Station and had further general discussions of this program with Messrs. Ginkel and Kaufmann of the Idaho Operations Office and with Messrs. Lyon, Nyer, Schroeder, Wilson and others of the Phillips Petroleum Company. Visits were paid to the TREAT, SPERT, CDC and LOFT facilities at NRTS and discussions were held regarding these and other facilities with the members of the Argonne and Phillips staffs responsible for their design and operation. To all these individuals the review group expresses thanks and appreciation for their cooperation and assistance.

The review group also made valuable use of the series of reports summarizing and evaluating the AEC's nuclear safety research program issued in 1964 by S. M. Stoller Associates.

II. Scope of Review

Because of the short time available, the scope of this review has been limited in the following respects:

1) In accordance with instructions from the AEC, attention has been focussed primarily on the reactor safety research program itself rather than on such broad general questions as AEC policy in licensing and regulating reactors or approving reactor sites.

2) Attention has been further limited primarily to research programs relating to the safety of water-cooled reactors. Nevertheless, many of the comments of this report are applicable to all reactor types. For all types of reactors other than the water-cooled type, the research being done on reactor safety is so closely related to development of the reactor concept itself that reactor safety research could not be reviewed intelligently without reviewing the entire reactor development program, which could not be done in the limited time available. This is particularly true of fast reactors, where research on reactor safety is presently the critical element in the entire fast reactor development program. The GAC plans to review the fast reactor development program on November 1-3, 1965, at which time research on fast reactor safety will also be considered.

3) Detailed comments are made only on the reactor safety research projects at NRTS actually visited by the review group, in Sections IV, V, VI and VII of this report. General conclusions regarding

these and other safety research projects are given in Section III following.

4) Research on safety of aerospace reactors has been specifically excluded from this review.

III. Conclusions and Recommendations

1. General

So far as the review group has been able to determine, the present AEC reactor safety research program is useful, necessary and not wasteful of funds or personnel. As noted later in this report, however, there are deficiencies in the present program which lead us to recommend augmentation of research in certain areas.

The questions raised at the beginning of this report are thus answered briefly as follows:

1) The program of research on reactor safety will provide the regulatory staff with some, but not all, of the information needed for evaluation of the safety of reactors submitted for licensing.
2) This research program will provide some, but not all, of the information on engineered safeguards needed to implement decisions regarding designs and sites for reactors.
3) The additional topics discussed later in this report should be added to the AEC's safety research program.
4) This will involve some change in relative emphasis.
5) The individual phases of this program are being conducted effectively, but better coordination is needed.

More detailed answers to these questions are given in the balance of this report.

2. Stoller Reports

The review group found the reports on the AEC's research program

issued in 1964 by S. M. Stoller Associates well done and useful. We are in general agreement with the analyses and conclusions in the Stoller reports.

3. TREAT

The TREAT experiments have contributed valuable information on reactor safety especially in the areas of fuel meltdown phenomena and chemical reactions. It was observed that the principal current limitation on the use of TREAT for nuclear safety research was not lack of available time but was conception and development of new significant experiments. It is urged, therefore, that the Commission continue to encourage and support competent organizations to devise experiments which would exploit as fully as possible the TREAT capability for nuclear safety research.

4. SPERT

The SPERT transient experiments have been valuable in developing general understanding of the kinetic and dynamic behavior of water-moderated reactors. The causes of most of the important phenomena observed during SPERT transients have been identified, and the quantitative understanding of these phenomena has been shown to be reasonable. This has led to a conviction that transient behavior of water-moderated reactors is generally understandable in terms of recognized physical processes, in the parametric region that has been studied so far. The extension of these experiments to operating power and temperature conditions is a necessary step in assuring that reactivity accident analysis is also

applicable in detail under such conditions. The forthcoming SPERT-III oxide core test series is meant to provide information on transients under operating conditions, and thus should be quite valuable.

5. CDC and PBF

The Capsule Driver Core (CDC) and Power Burst Facility (PBF) experiments are important and should be run as soon as possible. These proposed experiments make possible extension of tests of the destructive overheating of fuel to much shorter periods than are obtainable with TREAT. The PBF will also permit tests of much larger fuel assemblies, thus reproducing more nearly conditions in full-scale power reactor fuel, and it can be used for transient experiments in which the power density is initially high. Information obtainable from these tests on the conditions necessary to melt fuel and on the manner of fuel failure will be of great value in interpreting the consequences of reactivity transients in water-cooled power reactors.

6. Fuel Meltdown and Fission Product Escape

The interrelated experiments dealing with fuel meltdown and the escape and subsequent history of fission products being conducted at Oak Ridge in the NSPP program, at Hanford in the projected CSE experiments and at NRTS in the planned LOFT series are well conceived and will yield useful and important information. Caution must be exercised, however, in interpreting the behavior of fission-product simulants in the CSE series, and recognition must be given of the various respects

in which the LOFT experiments fail to reproduce the fission product inventory of power reactors and the shielding and other features of power reactor design which affect fission product transport.

7. LOFT

The LOFT experiment is a very desirable reproduction of the loss-of-coolant accident, under controlled and well-instrumented conditions. Experiments of this type are important to our understanding of the behavior of pressurized water reactors under extreme accident conditions. It is important, however, to recognize some of the risks and limitations of this experiment. The experiment is only one point in a complex, multivariable manifold. The AEC should be prepared to resist the temptation to regard a single experiment as if it answered all questions regarding fuel meltdown and fission product escape. If fission product release and contamination of the containment vessel or external environment is unexpectedly high it should not be concluded that this will be the case in all loss-of-coolant accidents; similarly, if release or contamination is unexpectedly low, this should not be the basis for general optimism. Two important respects in which the first LOFT experiment fails to reproduce conditions in a typical power reactor are: (a) the absence of a biological shield in LOFT eliminates one possibly important barrier to fission product escape; and, (b) the inventory of stable and long-lived fission products for LOFT's low burnup core is much lower than for a typical power reactor of the same power level.

8. LOFT Schedule

The present schedule for the first series of LOFT experiments is undesirably long, as the culminating meltdown experiment is scheduled for April 1969. This is so late that it cannot be useful in resolving siting problems of reactors until the early 1970's. Every effort should therefore be made to accelerate the schedule for this series of experiments.

9. LOFT Follow-on

For the same reason cited above, Phillips and the AEC should plan and budget now for follow-on LOFT experiments. One reactor meltdown following loss of cooland will not answer all questions regarding this type of accident. All long lead-time items for follow-on experiments should be ordered sufficiently early to ensure starting the follow-on experiments as soon as cleanup from the previous test has put the site in readiness.

10. Technical Competence

The review group was very favorably impressed by the competence of the staffs at NRTS conducting the TREAT, SPERT, CDC, PBF and LOFT experiments. These men are resourceful experimentalists. The SPERT staff should be encouraged to make more extensive use of theory in interpreting the results of their experiments.

11. Biological Effects of Fission Products

A vast amount of work has been done over the past 15 years in the general area of the effects on man of fission products released to the

environment. It is not evident from our review that adequate cognizance of this information has been taken. In the matter of radioiodine distribution in the environment, its uptake and ultimate fate in the human body, much work has been done, especially in connection with weapons tests and chemical separation plant operation. The quantitative information may be found in special reports from LASL, UCLA-AEC Project, Hanford Works, NYOO Health and Safety Laboratory, U. S. Public Health Service and others. It would be desirable to request the Division of Biology and Medicine to review the relevant data with the purpose of preparing a summary for the Reactor Safety Research Program.

The suggestion of the AEC's guidelines for reactor siting that estimates of the exposure to offsite individuals in a catastrophic reactor accident should not exceed the 25 rem dose considered acceptable for planned emergency exposure seems inappropriate to us. The GAC plans to discuss this with the ACRM in November and will comment further at that time.

12. Core Cooling Systems

Additional work should be done on measures to reduce the possibility of a loss-of-coolant accident that would be followed by the escape of fission products. It seems possible that, with careful thought given to the design and the failure analysis, emergency reactor core cooling systems could be made reliable and effective so that appreciable core meltdown need not follow a loss of primary coolant. This result might eliminate a large class of conceivable reactor accidents from consideration. Other ways of achieving the same goal might also be possible.

13. Limitation of Reactivity Transients

Research should be undertaken to establish if there are natural limits to the size of reactivity transients. It was seen in the two SPERT-I oxide core destruction tests that the failure of fuel cladding and the rapid disintegration of the fuel caused strong reactivity feedback that limited the size of the transient. If this observation proves generally true, it might be found that water reactors have built-in fast fuses, that are in fact their own fuel elements. It is also possible that transients begun in large reactors by local reactivity addition are limited to a small fraction of the core in the region of the reactivity change. Such considerations could reduce considerably the severity of credible reactivity transients.

14. Reliability of Components

Much more work should be done in improving the reliability of components on which reactor safety depends and particularly on the quantitative evaluation of such components, separately and as combined into a system.

Higher standards of reliability and continued dependability are needed for many items that are too often taken for granted. The components we refer to would include:

a) isolation valves;

b) electrical and electronic control circuits;

c) various electrical components that could malfunction in unpredictable and undesirable ways in the event of an electrical fire;

d) emergency power units;

e) stuffing-box type joints where pipes or cables penetrate a vapor container or other bulkhead.

These assorted items are now often bought "off the shelf" and are often designed and built according to standards that were developed in other industries where reliability is less vital. For nuclear service in some cases new design features and higher standards are needed. In other cases one need only specify a special type of item or standard now available as distinguished from those in more common use.

Along a similar line, a study should be undertaken to identify things that might be done to improve the reactor safety situation in a host of smaller ways whose cumulative effect could be considerable. These are along lines of improved reliability or effectiveness or simplicity. They would involve efforts both to (a) reduce the chances of an accident happening; and, (b) reduce or minimize the effect of an accident. It may be felt that much of this sort of work is proceeding now but more is left undone because it seems too simple or too obvious to warrant being called research. A systematic effort to identify such things seems justified.

15. Evaluation of Engineered Safeguards

While the review group is favorably impressed by the research program currently under way, and convinced of the ultimate usefulness of the extensive data which are accumulating, much of this information

will not be available in time to influence significantly the current reactor siting problems of the Commission. Immediately forthcoming decisions must be made largely on subjective assessments of the relative effectiveness of various engineered safeguards. It is the opinion of the review group that on a short range program considerably more emphasis should be placed on operations research studies of the relative effectiveness of various types of engineered safeguards. With continuing analysis of this type, supplemented by specific experiments on occasion, it should be possible to approach a situation in which, for example, the trade-offs between isolation and engineered safeguards could be specified with conviction. More work along the lines of a recent progress report entitled "An Evaluation of the Applicability of Existing Data to the Analytical Description of a Nuclear-reactor Accident" (Report #BMI-X-10119 Battelle April 1, 1965) would appear to be helpful in the current situation. It is suggested that a number of small contracts for studies of this type be deliberately made in parallel until additional groups with special talent for work of this kind could be found. To insure that such evaluation studies will yield results of maximum benefit to the user groups, consideration should be given to having such studies made under the auspices of the regulatory staff.

16. Safety Research and Reactor Siting

The Commission and the industry should be prepared for a possible conclusion that the results of the LOFT experiment and other similar

experiments will not by themselves justify relaxing reactor siting criteria.

It may be found when LOFT is run that the course of the accident and its results had been improperly predicted. Such a result could be caused by the appearance of unpredicted phenomena or by the discovery that certain physical or chemical assumptions used to predict part of the accident history are not applicable. The test would then have failed to achieve its purpose. It is possible that the test will lead to results more severe than those expected, or that the course of events will be different enough from that possible for large, long burnup power reactors as to make extrapolation unreliable. In these or in other possible ways, it may be found that the siting problem is not eased.

Regardless of any possible effect on siting, the LOFT experiment and interrelated experiments will be extremely valuable, and are needed.

17. Improved Coordination

At present there is insufficient interaction between the groups directing research on reactor safety and the regulatory staff who need the information flowing from this research. The regulatory staff should participate more actively in planning the experimental program and should utilize the experimental results more fully and more promptly than it now does. Without attempting to determine the cause of this lack of coordination, it is recommended that the AEC establish a mechanism which will ensure the fullest possible

interaction between these two groups. One aspect of this mechanism should be a Reactor Safety Research Coordinating Committee which would include specifically designated members of the regulatory staff and the Divisions of Reactor Development and Technology and Biology and Medicine. This committee should meet regularly, at sufficiently frequent intervals, and should make recommendations regarding the safety research program, the schedule of the work and the manner in which it is to be reported, and the use to be made of the results. This committee should work closely with the groups conducting the experiments, with the ACRS, with equipment manufacturers, with voluntary committees of the American Standards Association, and with the Atomic Industrial Forum's Reactor Safety Committee. If properly used, this committee could become the focal point for all AEC reactor safety research.

IV. TREAT

The review group visited the Transient Reactor Test Facility (TREAT) at NRTS and was given a brief summary of the activities by Mr. James Boland, ANL.

The reactor can irradiate fuel assemblies up to several inches in diameter with an integrated flux of 3×10^{15} neutrons per cm^2 in a pulse of 200 to 300 milliseconds duration, with periods down to 40 msec. This pulse can induce heating of 300 or 400 calories per gram of fuels, i.e., enough energy to melt or vaporize uranium oxide or uranium carbide. However, because of flux depression, the upper limit on enrichment of fuel is about 20%.

Many of the applications of TREAT lie in the fast reactor field. For example, an ingenious grid neutron collimator fitted with many photomultipliers has just been built and is about to go into operation. This device is designed for taking a "picture", by neutron self emission, of a fuel element melting in liquid sodium. Optical pictures of fuel elements melting in air or water can be taken routinely and this is part of the technique used in the study of water-reactor fuel elements.

A rather extensive series of measurements have been made on the metal-water reaction of both clad and unclad fuel samples at various initial water temperatures and with various fission energy inputs to the fuel samples. In addition, a large number of important experiments of fuel behavior under meltdown conditions have been performed.

The TREAT facility is well adapted to measuring cladding deformation

when fuel is melted and can be used to observe fission product release and diffusion from pre-irradiated fuel elements.

The authors received the distinct impression that the facility, while fairly busy, was certainly not overloaded with work even on a one-shift basis. The annual operating cost is about 15% of the capital cost and operation of a second shift would cost relatively little. Additional data might be obtained through greater use of TREAT at low incremental operating cost. It was noted, however, that the current limitation on the use of TREAT is the conception and development of new fruitful experiments. The Commission should continue to support and encourage competent organizations to achieve fuller use of TREAT capability for nuclear safety research.

V. The Capsule Driver Core (CDC) and the Power Burst Facility (PBF)

These two facilities are to be operated by the Phillips' staff at the National Reactor Testing Station. The PBF is to be a reactor that can subject samples to sharp, high pulses of radiation, with short reactor periods, comparable to those considered in water reactor safety analysis. In three significant ways, it will extend the class of experiments now done in TREAT. The minimum period that will be achievable with the PBF will be about 1 msec. The samples that can be tested in the PBF will be much larger than those in TREAT, and will be as large as many-rod clusters of fuel elements. Transients starting from high steady state power will be possible with PBF, and these cannot be done with TREAT. The PBF will make it possible to extend the useful results that have been found in the TREAT program to conditions of high power operation of water-cooled power reactors. These results should provide information needed on failure modes and physical and chemical processes involved in the destruction of fuel in a reactor excursion accident. Information on the nature and extent of chemical reactions and on the generation of pressure will be particularly valuable.

Because construction of the PBF has not yet been started, it will be several years before the experiments in these new areas can be performed. The Phillips' staff has designed and constructed the CDC to permit carrying out in the interim some experiments of the kind desired.

The CDC makes use of the existing SPERT-IV facility, and of fuel elements that were already on hand. The driver core consists of an array of stainless-steel-clad UO_2 fuel elements, arranged with a central flux trap to accommodate

the samples to be irradiated. The periods achievable with the CDC will be nearly as short as those with the PBF, but the volume available for sample irradiation is smaller, and initial high-power operation is not possible.

VI. SPERT

Four SPERT (Special Power Excursion Reactor Tests) facilities have been operated by the Phillips' staff at the National Reactor Testing Station.

SPERT-I was a facility used for experiments on the transient behavior of plate-type reactor cores cooled and moderated by water at atmospheric pressure, such as are used in many research and test reactors. It was also used for a destructive excursion test of a core of this kind, and for two destructive excursion tests with water-moderated, stainless-steel-clad UO_2 fueled cores. SPERT-I is no longer used for reactor transient research.

SPERT-II was built for similar studies on heavy-water-moderated reactor cores. It has been used in a series of transient experiments with plate-type cores, both loosely-packed and tightly-packed, and with and without coolant flow. The results obtained were very valuable in analysis of the safety of heavy water research reactors. The facility is now deactivated.

SPERT-III was built for transient tests on water-moderated cores at high initial pressure and power. Tests with high initial pressure have been done with plate-type cores. The test program shortly to be started will use stainless-steel-clad UO_2 fuel that is surplus from the SM-1 reactor. It will culminate in transient experiments from a high steady-state power level. This will be very important in understanding the transient behavior of water-cooled power reactors. Some thought is also being given to a follow-on destructive test, starting from the same initial conditions.

SPERT-IV was originally meant to be used for studies of the stability of pool-type reactors. It was later decided that the facility could be used more profitably for the Capsule Driver Core (CDC), and the necessary changes to accomplish this redirection have been made.

The SPERT program has contributed substantially to a steady improvement in the understanding of the kinetic and dynamic behavior of nuclear reactors, such as is needed both for normal operation and the analysis of possible reactivity excursions.

VII. LOFT Program

The review group was given an intensive briefing on the LOFT (Loss-of-Fluid Test) Program, its objectives, the current status and its prospects. The program is clearly an ambitious one and gives every indication of having been competently and carefully planned technically.

It was stated in the briefing that a full description of this program can be found in Phillips' "Preliminary Safety Analysis Report - LOFT Experiment" (IDO-16981). It was also stated that at present only administrative controls exist to prevent a loss-of-fluid type of accident. Even though this is an overstatement, it is clear that in the absence or failure of conceivable engineered safeguards, it is important to understand the sequence of events likely to occur in such an accident and to be able to assess the probability and magnitude of possible damage.

The LOFT approach to this problem is a plan to create such an "accident" under conditions which will permit detailed observations and to make the results of the accident as realistic as possible. This involves the deliberate omission of core flooding and a biological shield along with any other engineered safeguards that might reduce the violence of the accident or even prevent its happening. Such a procedure results in more effective research but makes it doubly necessary to emphasize that this is not at all to be accepted as the probable sequence or result to be expected from loss of coolant in an actual power reactor.

By a long series of preliminary tests on components, it is hoped to be able to predict points of failure and to a considerable degree the

sequence of events in a maximum loss-of-fluid accident. In the words of the briefer, "this event is really to be not so much an experiment, as a demonstration that we do understand the consequences of a loss-of-fluid accident and can predict the sequence of events likely to occur."

To attain this highly desirable, though ambitious goal, a major program is under way leading from component testing to a full-scale test to destruction of a 50 Mwt water-cooled power reactor subjected to sudden loss of coolant. An elaborate and ingenious system for diagnostic observations is being provided, but perhaps most important, by using facilities from the now defunct ANP program, it has been possible to mount the entire reactor on a dolly so that after the accident, the entire unit can be moved bodily into the associated machine shop facility specifically designed to permit the disassembly and inspection of radioactively hot equipment.

Because of the scale of the program and the elaborate preparations for detailed analysis, there is little question that the program will yield information of unique importance in the reactor safety program. The GAC feels, however, that it would be unwise to place much emphasis on this program as a solution to the currently acute siting problems. Even as now planned, the definitive results of the program cannot be available before 1969, so that many decisions on siting problems must be made in the meantime. Further, granting complete success of the program, and the hoped-for provision of a uniquely valuable point at the upper end of the reactor accident spectrum, it must be remembered that this point is representative only of the conditions of this particular test. It is a single point on what should more

realistically be thought of as a family of curves.

In a test of the kind proposed, it is unavoidable that various compromises must be made in trying to duplicate realistic conditions. Two important respects in which the first LOFT experiment fails to reproduce conditions in a typical power reactor are: (a) the absence of a biological shield in LOFT eliminates one possible important barrier to fission product escape; and, (b) the inventory of stable and long-lived fission products for LOFT's low burnup core is much lower than for a typical power reactor of the same power level. This lower inventory means that less frothing will occur when fuel melts in the LOFT test than would take place in a meltdown in a power reactor and that the concentration of fission products in the containment atmosphere in LOFT will be much lower than in a comparable power reactor. This could have a strong affect on plate-out and transport of fission products.

Thus, while it is hoped that the results of the proposed test will be representative of a "large reactor accident", clearly it is representative only of pressurized water reactors and, even here, only of those with similar fuel element composition and similar exposure conditions. Valuable as the results may be, therefore, it would seem wise for the Commission to emphasize that this is simply a demonstration of a single "staged" maximum event and also to take special care not to over-publicize the experiment or the results. More damage than "predicted" could lead to undue pessimism. Less damage than "predicted" could lead to over-confidence and dangerous complacency.

VIII. Organizational Problems

As a result of our review of the reactor safety research program and our discussions with the groups carrying out the research and using the information being developed, we are convinced that there is a serious lack of interaction between the organizations responsible for the conduct of research and the regulatory staff. There is, in effect, an open circuit in the channel of communication between these two groups. It is true that the AEC has established a Nuclear Safety Liaison Group, with representatives from the regulatory staff, the Division of Reactor Development and Technology, the Division of Biology and Medicine and other appropriate divisions, but we understand that meetings of this group have consisted primarily of talks by individuals on work being done by their organizations.

What is needed is a mechanism for more effective coordination between the conduct of research on reactor safety and the use made of the results of this research by regulatory groups. As part of this mechanism, this report has recommended creation of a Reactor Safety Research Coordinating Committee, which might include, for instance, the senior technical member of the AEC regulatory organization, the Director of Reactor Development and Technology or the Assistant Director for Reactor Safety, and other specifically designated members of these organizations and the Division of Biology and Medicine. This committee should meet at regular, frequent intervals to make recommendations regarding the research to be undertaken and the schedule of work, to review research in progress, to recommend the manner in which results are to be reported and to consider the use to be made of the results. These

functions would give this coordinating committee a much more responsible role than that played by the present liaison committee.

We understand that there have been some reservations within the AEC about giving a coordinating committee this much responsibility. There is concern that it might interfere with the clear responsibility of the General Manager and the Director of Reactor Development and Technology to direct the reactor safety research program. The opinion has also been expressed that if representatives of the Director of Regulation were to participate in recommending conduct of certain experiments, they might lose objectivity in applying the results of these experiments in regulatory decisions. We believe that neither of these undesirable possible consequences need occur if the committee is set up to coordinate rather than to direct.

Unless an effective mechanism such as this can be developed for coordinating reactor safety research with the needs of the regulatory staff, one of the most important advantages of retaining the regulatory function within the AEC would be lost. The decisions to be made by the regulatory staff must rest on technical assessments so that the staff must be thoroughly cognizant of the significance of the latest results emerging continuously from the research program. Further, without in any sense becoming responsible for the success or failure of specific projects, the user groups, who in a very real sense are customers, should be able to give guidance to the people responsible for the experimental work as to the relative urgency or priority of various parts of the overall program. It is for this reason that we strongly recommend a coordinating committee to aid in guiding the experimental program.

As a further observation, a much better mechanism seems to be needed to collect, to compile and to evaluate the massive information bearing on reactor safety which is accumulating in a form where it can be understood and be appreciated by non-technical people.

As a result of our review, it is our opinion that the Division of Biology and Medicine has not been adequately utilized in the development of the research program in reactor safety. It is a part of the mission of the Division of Biology and Medicine to give special attention to the problems of health and safety in the Commission's operations and to furnish guidance in the development of research plans having to do with health and safety. This Division should, therefore, be represented on the coordinating committee.

DATE:

[redacted]

INDEX: MH&S 3 Hazards frm Power Reactors

[redacted]

TO: PFC 1-1 Reg. Production Utilization Facility

FROM:

SUMMARY: ABC-R 122 - DETERMINATION THAT THE FISSION PRODUCT CONVERSION AND ENCAPSULATION FACILITY IS A UTILIZATION FACILITY Plant is proposed for construction at Hanford and there is considerations involved in the safety evaluation; indemnity extended to the facility & reg. by an agreement State (Wash is in process of becoming an Agree. State).

FILED: PFC 1-1 Reg. Utilization Facility

INDEXER: date of paper: 7-28-65

REMARKS:

U. S. ATOMIC ENERGY COMMISSION

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