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MINUTES OF THE
ACRS SUBCOMMITTEE MEETING ON
NRC SAFETY RESEARCH PROGRAM
FEBRUARY 4, 1981
WASHINGTON, D.C.

The ACRS Subcommittee on NRC Safety Research Program held a meeting on February 4, 1981, at 1717 H Street, N.W., Washington, D.C. Mr. Sam Duraiswamy was the Designated Federal Employee for the meeting. A list of documents submitted to the Subcommittee is included in Attachment A.

ATTENDEES:

ACRS: C. P. Siess (Subcommittee Chairman), D. Okrent, J. C. Mark, W. M. Mathis, S. Lawroski, M. W. Carbon, M. Bender, P. G. Shewmon (p.m.).

Principal NRC

Speakers: O. Bassett, R. Bernero, H. Sullivan, C. Serpan, F. Arsenault, R. Curtis, G. Knighton.

INTRODUCTORY STATEMENT BY THE SUBCOMMITTEE CHAIRMAN

Dr. Siess, the Subcommittee Chairman, convened the meeting at 8:30 a.m., and indicated that the purpose of the meeting was to discuss:

1. the Draft NRC Long-Range Research Plan (LRRP), and
2. the ACRS comments on RES responses to ACRS recommendations listed in the July 1980 ACRS report to the Commission (NUREG-0699).

He stated that the Subcommittee had received neither written comments nor requests for time to make oral statements from members of the public.

Dr. Siess said that the ACRS comments on NRC's LRRP will be submitted to the Commission subsequent to the March 12-14, 1981 ACRS meeting.

Indicating that it had received comments only from the Office of Nuclear Reactor Regulation (NRR) of the NRC on the Draft LRRP, the Subcommittee stated that comments from other research user offices (NMSS, OSD, etc.) would be also helpful.

Since the Draft LRRP was submitted to the Subcommittee just prior to the start of the subject meeting, the Subcommittee decided to take about an hour to read that report prior to holding detailed discussion.



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PRESENTATION BY THE OFFICE OF NUCLEAR REGULATORY RESEARCH (RES) MR. BASSETT

Mr. Bassett said that the current version of the Draft LRRP dated February 2, 1981 reflects consideration of the comments received from the research user offices and other offices of the NRC on the previous version of the Draft LRRP, dated November 1980. The LRRP for the LOFT Decision Unit is currently being revised and will be included in the final version of the LRRP. He pointed out that the budget information associated with the LRRP will be included in the forwarding letter of this Plan that is being prepared. The forwarding letter will include also significant RES recommendations for the Commission's consideration and use in the preparation of the Policy, Planning and Program Guidance (PPPG) report. The final version of the LRRP is scheduled to be submitted to the Commission on February 17, 1981.

In connection with the Public Law 96-567, "Nuclear Safety Research, Development and Demonstration Act of 1980," Mr. Bassett said that a Steering Group will be formed to develop a Program Plan in accordance with the directions provided in the Public Law 96-567. This Program Plan is expected to be formulated by the end of 1981.

Dr. Okrent asked whether there is any group in the NRC to look at the general area of research to improve reactor safety. Mr. Bernero responded that the Degraded Core Cooling Steering Committee is expected to provide redirection of the improved reactor safety research.

In response to another question from Dr. Okrent as to whether the Draft LRRP identifies "Broad Priorities" of various research programs, Mr. Bassett stated that they intend to include the information related to priorities in the forwarding letter of the LRRP.

The Subcommittee discussed briefly some of the comments made by the Office of Policy Evaluation (OPE) of the NRC.

With reference to one of the OPE comments regarding industry participation in research, Dr. Siess commented he believes that the industry can fill many of the research needs either by cooperative research or guided research. He does not believe that the NRC can carry out all of the research work. He believes

that with proper approach and review a major portion of the research work being performed by the industry can be made useful to the NRC needs.

LRRP FOR LOCA AND TRANSIENT RESEARCH DECISION UNIT

Mr. Sullivan reviewed briefly some of the long-range efforts planned in the LOCA and Transient Research area.

Indicating that it is not clear whether the research effort planned in the pellet-clad interaction area will contribute to the informational needs of the NRC, Dr. Okrent asked whether the NRC Staff has looked at the significance of the research effort in this area from the risk reduction point of view. Mr. Sullivan responded that the NRC Staff will address this issue at a later date.

With regard to the Code Development work, indicating that the NRC Staff has been spending much more money for developing codes in the LOCA and Transient area than for codes in other areas, Dr. Okrent asked whether the NRC Staff has looked to see whether the priority and resources assigned to the development of certain codes in the LOCA and transient area are appropriate as compared to those assigned to the code development work in some other areas. He also commented that the work for developing codes to analyze the seismic behavior and electrical system behavior does not seem to be adequate. Mr. Sullivan responded that they have some ongoing effort to develop codes in support of areas other than LOCA and Transient research. Mr. Bassett added that the NRC Staff intends to do some work for analyzing the electrical system behavior in the future.

LRRP FOR PLANT OPERATIONAL SAFETY DECISION UNIT

Mr. Serpan discussed briefly some of the research efforts planned in the Plant Operational Safety area.

With regard to the research program associated with steam generator corrosion and water chemistry, Dr. Siess asked why does the NRC do all the work in this area instead of the industry. Mr. Serpan responded he believes that a major portion of the steam generator program could be carried out by the industry. As a matter of fact, Electric Power Research Institute (ERPI) has

a large on-going steam generator program. However, the NRC Staff's program is not to duplicate the work being done by ERPI. NRC Staff's program is intended to provide some background information for evaluating and understanding the work done by the industry and for formulating licensing decisions.

Indicating that the risk studies assume low probability of failure for reactor pressure vessel and certain other large pressure-containing components, Dr. Okrent asked whether the planned research program will look at possible scenarios to determine the appropriateness of this assumption and justify the assumed high reliability for these components. Mr. Serpan responded that, at the present time, the NRC Staff is performing a review of the entire area of pressure vessel integrity.

Pointing out that, during the review of a proposed Regulatory Guide on "Ultrasonic Testing of Reactor Vessel Welds During Pre-service and Inservice Examination," the NRC Staff stated that a research program to look at the reliability of methods for detecting flaws in the reactor vessel will be started sometime at the end of FY 1982, Dr. Siess commented that it seems that the priorities are sort of reversed in this area. He asked why didn't the NRC Staff start with programs aimed at reactor vessels instead of piping. Mr. Serpan responded that they have started programs aimed at piping because they were thinking that a rupture in the reactor vessel would be an incredible accident. Further, they wanted to look at the "leak-before-break" issue. Although they now recognize the need to look at the reactor vessel, they do not have the capability of looking at both the reactor vessel and piping areas simultaneously. They plan to initiate programs in the reactor vessel area as soon as possible.

Dr. Siess commented that the Draft LRRP does not include a clear distinction of which programs are responsive to existing user requests and which ones are submitted to the user offices for endorsement. He asked also several questions with regard to the interaction between RES and the user offices in formulating the LRRP. Mr. Bassett responded that RES has been coordinating with the user offices in developing the LRRP. He believes that the LRRP will reflect close agreement between the RES and the user offices. However, there may be some differences between RES and the user offices on policy matters; such differences

will be included in the forwarding letter of the LRRP and submitted to the Commission for judgment.

Dr. Okrent asked whether the NRC has planned any program to evaluate the merits of the light-water-reactor regulatory requirements in other countries which differ significantly from those of the NRC. Mr. Basset responded that such evaluation has not been done so far. Mr. Serpan added that they have a research contract which, he believes, will provide some information on the licensing activities in certain foreign countries.

Dr. Okrent stated that he believes that the NRC ought to have a program to compare and evaluate the differences in regulatory requirements between NRC and other foreign countries.

LRRP FOR SEVERE ACCIDENT PHENOMENA AND MITIGATION RESEARCH DECISION UNIT

Mr. Curtis discussed the planned research efforts in the Severe Accident Phenomena and Mitigation Research area.

With regard to the Fuel-Melt Behavior program in this Decision Unit, Dr. Okrent commented that neither the cost-effectiveness of this program nor its ability to provide the needed information for the Degraded Core Cooling rulemaking in a timely manner is clear at present.

Mr. Curtis said that consideration will be given to making this program cost effective during the development of the details of the program.

Dr. Okrent commented that it is nice to hear that a task force has been established, in accordance with the recommendation made by the ACRS in its July 1980 report to the Commission (NUREG-0699), to develop some recommendations in the area of Fuel-Melt Behavior. However, he believes that the Commissioners, Mr. Denton and Mr. Minogue, along with certain personnel from the task force, should try to see whether proper interaction has been established and whether the proposed program will provide that essential information. They should also try to determine what information is needed for the rulemaking proceedings. He does not believe that the program, as proposed and scheduled presently, will provide the necessary information in time to support the rulemaking proceedings.

Mr. Bernero said that the NRC Staff is trying to identify the essential information needed for the rulemaking proceedings and thereby provide re-direction for the Fuel-Melt Behavior program as appropriate.

LRRP FOR ADVANCED REACTORS

Mr. Curtis pointed out that the LRRP in the Advanced Reactor area has been added to the long-range plan report only recently; therefore, the research efforts planned in this area have not yet been reviewed by the NRR.

Dr. Okrent asked whether there is any section in the LRRP report that discusses the research programs to look at the reliability of Liquid Metal Fast Breeder Reactor (LMFBR) safety. Mr. Bernero responded that there are no such programs included in this report.

Dr. Okrent commented that it does not seem appropriate to omit such programs in the LRRP and he believes it is a major omission.

Dr. Carbon provided the following comments on the proposed LRRP for Advanced Reactors:

1. One of the statements in the summary section of the LRRP report (page 1.1-3), which indicates that the programs in few of the Advanced Reactor area have been planned primarily because of the past Congressional direction, does not sound appropriate and seems to give a very negative sort of approach.
2. There is no effort to explore and identify high priority areas.
3. It does not seem appropriate not to include a program to perform a probabilistic risk assessment for LMFBRs.
4. There is no mention of a program to look at "Accident Prevention".
5. There does not seem to be any effort planned to develop safety design criteria.
6. There is still undue emphasis placed on code development and code verification.
7. NRR should participate from the beginning in laying out the long-range research programs in the Advanced Reactor area.

8. There should be some effort to define a total research package that would be needed to support properly the licensing of a commercial LMFBR.

Drs. Siess and Carbon asked about the reasons for not including the Gas-Cooled Reactor program in the LRRP. Mr. Bassett responded that the NRC Staff has some programs in this area and he believes that they should have been included in the LRRP.

Dr. Siess commented that if there is any long-range interest in the Gas-Cooled Reactor area, there ought to be some effort in obtaining information from the operating experience of Fort St. Vrain Gas-cooled-reactor plant. He believes that there are lessons to be learned from that plant. Mr. Bassett stated that the NRC Staff will give consideration to the comment made by Dr. Siess.

LRRP FOR SYSTEMS AND RELIABILITY ANALYSIS DECISION UNIT

Mr. Bernero reviewed briefly the long-range research efforts planned in the Systems and Reliability Analysis area.

Dr. Okrent asked, when developing the LRRP, whether the NRC Staff had thought about the need for a program to answer safety-related design questions. Mr. Bender also asked a question along the same line. Mr. Bernero responded that he does not know of any program in the LRRP that addresses this issue. He believes that this general area is being discussed specifically in the rulemaking processess. He believes also that the rulemaking processess will identify specific research projects that are needed to answer questions in this area.

Mr. Bender commented that we ought to know more about the fundamentals of certain issues in order to have a sound technical basis for the rulemaking proceedings. The NRC Staff should think about whether they are putting the available resources in the right place.

Dr. Okrent asked whether long-range eiforts for the improved shutdown heat removal system are included in the LRRP. Mr. Bernero responded that

it is not included in the LRRP. MR. Basset added that he believes that the Degraded Core Cooling Steering Group study may provide additional information to formulate a program in this area.

Dr. Okrent commented that in view of the fact that the LRRP is supposed to include programs for high-priority items, he does not understand why a program for improved shutdown heat removal system, which is considered to be of high priority, is not included in the LRRP.

LRRP FOR WASTE MANGEMENT, SITING AND ENVIRONMENTAL RESEARCH, AND SAFEGUARDS AND FUEL CYCLE SAFETY DECISION UNITS

Mr. Arsenault discussed the long-range efforts in the above areas.

Mr. Arsenault said that he would welcome ACRS comments on certain implicit assumptions used in the research planning such as, there will be no reprocessing of light-water reactor fuel for certain number of years.

Dr. Lawroski commented that if there is going to be some activity in the LMFBR area, it is absolutely inappropriate not to include plans for reprocessing. He believes that there ought to be some plans to develop improved guidelines for the next generation of plants.

Mr. Arsenault responded that exclusion of research plans related to reprocessing in the LRRP is due to the agency policy on this issue.

Dr. Lawroski provided the following comments on the Waste Management research plans:

1. The question of priorities are not addressed clearly.
2. Most of the work specified here seems to be duplicative of what DOE plans to do. There is no apparent effort to distinguish between what research should be done by NRC and what should be done by DOE.
3. The schedule for initiating work in certain programs is very inappropriate.
4. The objectives of the low level waste programs are not specific.

Mr. Arsenault responded that DOE efforts are aimed at the design and construction of a waste disposal site. On the other hand, the NRC work is aimed at assessing the uncertainties associated with the data gathered by DOE, and the uncertainties

in the various techniques that will be used to demonstrate repository performance. He pointed out that the application of the above criteria is not perfect at the present time. However, as the coordination between NRC and DOE improves, these criteria will be adopted in a better way.

With regard to the uncertainties issue, Dr. Lawroski commented that it is not clear what the NRC Staff is doing to determine the importance of these uncertainties in reducing risks. He believes that the NRC Staff should perform a risk assessment study for the entire fuel cycle area.

Mr. Arsenault stated that he believes that the risks associated with high level waste disposal are less than those associated with low level waste disposal, which in turn are less than those associated with uranium recovery. He believes also that the uncertainties associated with risk assessment are small for uranium recovery, intermediate for low level waste disposal, and large for high level waste disposal.

COMMENTS BY NRR ON THE LRRP

Mr. Knighton discussed the NRR comments on the LRRP; some of those are as follows:

1. The program of research outlined in the LRRP is generally responsive to NRR needs with certain exceptions.
2. Work on LOCA and ECCS should be decreased in the future and more emphasis should be given to programs on Operational Safety, Severe Fuel Damage, and Systems and Reliability Research.
3. A comprehensive program to identify the potential safety problems associated with plant aging, such as electrical equipment, seals, mechanical equipment degradation, and material embrittlement should be developed.
4. After the Commission's decision on the long range future of LOFT, NRR will work with RES to optimize the remaining test program.
5. NRR cannot give a blanket endorsement for all the code work proposed in the LRRP. However, NRR supports strongly the work on developing codes for analyzing plant structural and piping systems; gives higher priority to the programs on standard problems, code benchmarking and development of NRC audit capability in these areas. Efforts on fine-tuning thermal-hydraulic models should be reduced and more emphasis

- should be placed on developing codes to deal with current problems such as steam generator tube leaks and secondary system effects.
6. In the Advanced Reactor area, a modest effort should be undertaken to develop a plan to meet the potential needs for information for establishing licensing acceptance criteria and the technical information to assess potential license applications.

In response to a question from Dr. Siess regarding LOFT, Mr. Knighton stated that as far as NRR is concerned, they have not been able to find enough requirement to justify continuing LOFT beyond FY 1983.

With regard to the format of the LRRP, Dr. Siess commented that some thought about the usefulness of a particular format would be helpful.

Mr. Knighton said that NRR also believes that improvements in the format of the research descriptions would facilitate the communication of essential information and aid in its review.

Dr. Siess asked about the amount of money that is being spent by DOE, industry, and foreign countries to carry out safety research programs related to Fast Reactors. Mr. Arsenault responded that he will provide this information at a later date.

With regard to the coordination of research between NRC, DOE, and industry, Mr. Knighton pointed out that NRR plans to help RES by developing criteria to decide who should be requested to carry out needed safety research.

Dr. Siess commented that it would be better if they are guidelines rather than criteria because there should be some flexibility. He believes also that such guidelines have to come from the Commission eventually because some of the Commissioners have had some concern about doing cooperative research work with industry. He believes that it is possible to work with the industry to get certain research work done in an acceptable way. NRC should seek more benefit from industrial research programs.

Indicating that the LRRP has been scheduled for discussion at the full Committee meeting on February 5, 1981, Dr. Siess identified the following items for discussion:

1. What is the concept of the LRRP and how will it fit into the research needs picture according to the Commissions directive outlined in COMJA-80-13, "Procedures for Endorsing Research Contracts," dated April 22, 1980?
2. How the review process has been handled with the research user offices?
3. What will be included in the forwarding letter of the LRRP?
4. How the priority picture gets addressed in the LRRP?

With regard to priorities, Dr. Siess suggested that a plot of the trend of priorities for various research programs for a five-year period would be helpful. Mr. Bassett said that they will provide such plot at a later date.

Dr. Siess thanked all participants and adjourned the meeting at 3:20 p.m.

ATTACHMENT A

LIST OF DOCUMENTS SUBMITTED TO THE SUBCOMMITTEE

1. Draft RES Long-Range Research Plan, dated February 2, 1981.
2. NRR comments on Draft Long-Range Research Plan, dated January 14 and 15, 1981.
3. Comments from the Office of Policy Evaluation, Office of Standards Development, Office of Nuclear Materials Safety and Safeguards on Draft Long-Range Research Plan.