

**Babcock & Wilcox**

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Mr. Saul Levine, Director  
Office of Nuclear Regulatory Research  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Dear Saul,

I appreciate very much the opportunity to serve as a consultant to the NRC Research Review Group on Improved Safety Systems for Nuclear Power Plants. In the short time that you have had to comply with the Congressional mandate to develop a plan for developmental safety research, I believe that you and your staff have approached the task in an open and logical way and that you should be commended for the draft plan which you prepared for review at our February 10 meeting.

My purpose in writing to you at this time is to summarize the principal points which I made at the two meetings we have had thus far and to expand upon or add to these points as seems appropriate at this time. The principal points and comments are as follows:

1. As a representative of the manufacturing segment of our industry, I view this expansion of the NRC research charter from confirmatory-only to confirmatory-plus-developmental research with considerable apprehension. I believe that the NRC will have to make an extraordinary effort to manage this expansion in a systematic, objective way so as to counteract the tendency toward even greater instability in the definition and implementation of regulatory requirements. My comments at our last two meetings have focused on the development and use of risk assessment methods as one of the most important means for accomplishing this systematic approach to safety research project selection, as well as to the formulation of regulatory requirements.
2. The draft report attempts to deal with the conflict of interest which could arise when the NRC is both defining systems and methods to be used in the design and construction of nuclear power plants and reviewing these same systems and methods in an independent way against safety criteria promulgated by the agency itself. The argument that

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the NRC would be involved only in conceptual safety system design with detailed designs provided, if necessary, by DOE is not very persuasive in assuaging concern over this potential conflict of interest. In addition, the assignment of developmental safety research responsibility to the NRC blurs the delineation of responsibilities between NRC and DOE in the LWR technology area, and this is simply not good management. I suggest that the Congressional Committee on Interior and Insular Affairs could have accomplished their objective of increased developmental safety research in a manner more consistent with the charter of the two principal government agencies involved in light water reactor research by:

- (a) directing the NRC to identify and transmit to DOE their ideas and recommendations for safety system improvement which do and will continue to arise as a natural consequence of the NRC's confirmatory research work.
  - (b) direct the DOE to "develop a long-term plan for projects for the development of new or improved safety systems for nuclear power plants" and specify that the plan address ideas arising from the NRC's confirmatory program, ACRS generic concerns, etc. In addition, the DOE would be directed to research the value of and means for implementing such improvements.
  - (c) direct the DOE to submit the results of its research work to the NRC for an assessment of the need for or value of regulatory requirement change and to industry via Research Information Letter for consideration in future power plant designs.
3. The long-term plan should explicitly identify a high priority project leading to the development of criteria and methods for determining just what an "improvement" is and what incremental benefit to reactor safety any given improvement would make. More specifically, the WASH 1400 methodology should be refined to the point that the NRC accepts it as an objective means for making such determinations. It is very likely that the continued viability of this industry (that is, availability of the nuclear option in this country) is dependent upon the regulatory agency having and using a methodology that (1) provides a systematic basis for cost benefit analysis of regulatory requirement change, and (2) quantifies an acceptable risk target. Without these two items, the nuclear power industry will continue to be subject to an unacceptable level of regulatory requirement instability,

wherein almost any means for improving reactor safety can be mandated without the agency being held accountable for its impact. If I were to speak to you only as a taxpayer (for whom Congress acts as my agent), I would express the concern that without such a systematic methodology, a large amount of tax dollars could be wasted on nuclear regulatory research projects with little or no assurance that the improvement in safety is worthwhile. ALARA evolved into reasonable regulatory policy when cost-benefit analysis became an explicit element of the policy. I suggest that a de facto ASAP (As Safe As Possible) policy is emerging, and the disastrous consequences of such a policy can only be avoided by a systematic approach to cost-benefit assessment.

4. At times during our discussions on January 10 and February 10, various attributes of West Germany's approach to nuclear regulation were mentioned as attractive means for improving reactor safety (bunkered decay heat removal systems, four-fold redundancy in ECC Systems, power limit control systems, etc.). I would like to reiterate my view that the regulatory approach here in the United States can be and should be conducted in an entirely independent way and that ideas for improving reactor safety arising from whatever source, foreign or domestic, should be reviewed quantitatively and systematically for benefit vs. cost impact using methods and criteria which I believe the regulatory authority is obligated to generate. Let me mention again that the German approach to safety regulation has arisen from an entirely different and unique environment and relationship between the German government and the public. Population density differences, differences in federal vs. state licensing responsibilities, the lack of any suitable alternative to nuclear power, etc., are important considerations in viewing West Germany's safety systems and regulatory practices.
5. At our January 10 meeting, I suggested that the long-term research plan address the development of better incore instrumentation for defining more precisely the nuclear, thermal, and hydraulic state of the core at any given time. The development of more accurate instrumentation and the ability to predict instrument performance during its service life are important pre-requisites to developing systems for maintaining the reactor in the safest configuration given single control system failure or other abnormal conditions.
6. I strongly endorse your selection of increased consideration of "human features in the design of the control room and monitoring systems to aid the operator in responding to accidents." The minimization of operator error prior to, during, and after an upset or accident event through pattern recognition, alarm



display simplification, automation, etc., could, in my opinion, make a worthwhile contribution to improved reactor safety.

7. In the January 10 meeting, I suggested that many of the elements related to determination of sub-cooled blowdown loads and other structural loads associated with the loss-of-coolant accident are in need of a more realistic research foundation. I stated that this was particularly true of jet plume definition, discharge of fluids at high pressure from large diameter pipes, and structural/fluid interaction. Though this was not selected for inclusion in the long-term plan, I would like to recommend it to you for inclusion in your confirmatory research program.
8. I believe that the overall impact of your report will be enhanced if, for each of the items selected for inclusion in your plan, you identify within the body of the report how each such item explicitly deals with specific concerns expressed by other government agencies and by other branches of the NRC. In the future, it might be useful for the plan to address the relationship between the long-term research projects selected for inclusion in the report and chronic items of safety significance reported in Licensee Event Reports.
9. I understand the basis for the consensus among all of the sources providing recommendations to you regarding the need for research into alternative emergency core cooling system concepts. I personally would place much less emphasis on this category for the following reasons:
  - (a) The need for such improvements simply cannot be established in any reasonably objective way without an understanding of the margin of conservatism in the current 10 CFR 50.46/Appendix K regulations and models. I believe that substantial conservatism will be verified by the current confirmatory research programs and that the current regulations and models provide more than adequate assurance that today's ECCS Systems will act to mitigate the consequences of a LOCA.
  - (b) The upper core support cylinder vent valves used in the B&W NSSS already constitute an "improved" ECC System in that they eliminate steam binding problems.

Again, I commend you and your staff on the job you have done in preparing this first report to Congress on long-term research projects for the development of new and improved safety systems for nuclear power plants. I look forward to continued association with the Research Review Group.

Sincerely yours,



Dr. Donald H. Roy

cc: William R. Corcoran  
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