

CERTIFIED BY:  
T. Kress - 10/5/01

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ADVISORY COMMITTEE ON REACTOR SAFEGUARDS  
MEETING OF THE ACRS SUBCOMMITTEE ON ADVANCED REACTORS  
JUNE 4-5, 2001  
ROCKVILLE, MARYLAND

INTRODUCTION

The ACRS Subcommittee on Advanced Reactors met on June 4-5, 2001, at 11545 Rockville Pike, Rockville, MD, in the Two White Flint North (TWFN) Conference Room. The Subcommittee relocated to on June 4-5 and in Room T-2B3 during the afternoon on June 5. The purpose of this meeting was to discuss regulatory challenges for future nuclear power plants.

The Subcommittee received no written comments or requests for time to make oral statements from members of the public regarding the meeting. The entire meeting was open to public attendance. Michael T. Markley was the cognizant ACRS staff engineer and Designated Federal Official for this meeting. The meeting was convened at 9:00 a.m. and recessed at 7:15 p.m. on June 4. The meeting was reconvened at 8:30 a.m. and adjourned at 5:50 p.m. on June 5. The Subcommittee received no written comments or requests for to make oral statements by members of the public. During the course of the meeting, ACRS members Apostolakis, Leitch, Powers, and Sieber and ACNW member Garrick announced that they have conflicts with certain presentations made to the Subcommittee.

ATTENDEES

ACRS/ACNW

T. Kress, Subcommittee Chairman  
G. Apostolakis, ACRS Chairman  
M. Bonaca, ACRS Member  
P. Ford, ACRS Member  
G. Leitch, ACRS Member  
D. Powers, ACRS Member  
W. Shack, ACRS Member  
J. Sieber, ACRS Member

R. Uhrig, ACRS Member  
G. Wallis, ACRS Member  
J. Garrick, ACNW Member  
J. Larkins, ACRS Staff  
J. Lyons, ACRS Staff  
M. Markley, ACRS Staff  
R. Savio, ACRS Staff

Principal NRC Speakers

R. Barrett, NRR\*  
E. Benner, NRR  
A. Cabbage, NRR  
J. Flack, RES\*  
M. Gamberoni, NRR

T. Kenyon, NRR  
A. Rae, NRR  
S. Rubin, RES  
A. Thadani, RES  
J. Wilson, NRR

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## Principal Presenters and Speakers

J. Slaber, PBMR Demonstration Project\*  
M. Carelli, Westinghouse Science & Technology  
G. Davis, Westinghouse Electric Corporation  
C. Forsberg, ORNL\*  
M. Golay, MIT\*  
W. Hauter, Public Citizen  
A. Heymer, NEI\*  
S. Johnson, DOE\*  
E. Lyman, NCI\*

W. Magwood, DOE  
T. Miller, DOE  
L. Parme, General Atomics  
A. Rao, GE Nuclear Energy\*  
R. Simard, NEI  
W. Sproat, Exelon Generation  
N. Todreas, MIT  
R. Versluis, DOE

NRR	Office of Nuclear Reactor Regulation
RES	Office of Nuclear Regulatory Research
DOE	U.S. Department of Energy
GE	General Electric
MIT	Massachusetts Institute of Technology
NCI	Nuclear Control Institute
NEI	Nuclear Energy Institute
ORNL	Oak Ridge National Laboratory
PBMR	Pebble Bed Modular Reactor

There were approximately 94 members of the public in attendance at this meeting. A complete list of attendees is in the ACRS Office File, and will be made available upon request. The presentation slides and handouts used during the meeting are attached to the office copy of these minutes.

JUNE 4, 2001

Introductory Remarks

Dr. T.S. Kress, Chairman of the Advisory Committee on Reactor Safeguards (ACRS) Subcommittee on Advanced Reactors convened the meeting and introduced Subcommittee members in attendance, key participants, and presenters. He presented the planned agenda for the first day of the Subcommittee meeting/workshop and offered members of the public opportunities to ask questions and to provide comments on the matters discussed. Dr. George E. Apostolakis, ACRS Chairman, introduced the keynote speaker, NRC Commissioner Nils J. Diaz, and provided a brief summary of his extensive experience in matters related to nuclear power and research and development of nuclear technology.

Subcommittee Presentations

Commissioner Diaz provided an overview of his paper entitled, "Disciplined - Meaningful - Scrutable." He stated nuclear power has entered the national energy debate on the future of America's energy supply and emphasized that nuclear safety is a priority on everyone's agenda. He stated that the priority should be on what should be done better rather than what was done wrong in the past. Commissioner Diaz stated that the Commission relies on the ACRS for expert advice and the recommendations of the Committee will be valuable to the Commission as regulatory changes are made. He noted that an important change to the regulatory structure has been risk-informed regulation which has enabled both the licensee and NRC to focus on safety issues and reduce unnecessary regulatory burden. He stated that the future of nuclear power is dependent on economic trends and events, the safety and reliability of plants, and the political environment. He expressed the view that it is possible to resolve safety and environmental issues before nuclear plants are built. Commissioner Diaz stated that an important element will be the readiness of the NRC for potential new plant applications but also that the NRC should not become an impediment to meeting the energy demands of the country. He reiterated that every step will need to be disciplined, meaningful, and scrutable and suggested that the industry and NRC will need to proceed in a disciplined and patient manner to ensure that errors are avoided. Commissioner Diaz qualified these statements as being his individual views and noted that they do not represent the views of his fellow Commissioners or the NRC.

William D. Magwood IV of the U.S. Department of Energy (DOE) led the discussions for the DOE staff. Dr. Magwood provided an overview of the Generation IV Initiative to evaluate candidate technology concepts for a new generation of nuclear power plants. Robert Verslius, DOE, presented the Generation IV goals, roadmap effort, and concept evaluation. Mr. Thomas P. Miller discussed the Near-Term Deployment Working Group (NTDG) formed to identify actions and evaluate options necessary for DOE to support new plants. DOE has established a Nuclear Energy Research Advisory Committee (NERAC) to provide independent evaluation and feedback on the establishment of goals and objectives and to examine progress in evaluating candidate nuclear energy concepts. DOE has also established a Generation IV Roadmap NERAC Subcommittee (GRNS) to serve as an advisory group in establishing a proposed roadmap along with a Roadmap Integration Team (RIT) for its implementation. Candidate

technologies must be deployable by 2030. Nuclear systems are expected to meet sustainability goals (resource inputs, waste outputs, and nonproliferation), safety and reliability goals (operating maintainability excellence, limiting core damage risk, and reduced need for emergency response), and economic goals (reduced life-cycle costs and risk to capital). Criteria and metrics for each goal are being developed by an Evaluation Methodology Group (EMG), RIT, and the GRNS. DOE plans to evaluate all candidate concepts equally without prejudice toward existing technologies (e.g., light-water reactors) but recognizes that most energy generation units are likely to be fission based. DOE is presently considering 94 concepts. The output of the Generation IV Program is expected to be a research and development plan to support future commercialization of the best concepts.

Ward Sprout of Exelon Generation and Johan Slabber of the Pebble Bed Modular Reactor (PBMR) Demonstration Project in the Republic of South Africa (RSA) provided a presentation on the safety design aspects and licensing challenges for the PBMR. The PBMR is a modular high-temperature gas-cooled reactor (HTGR). It is helium cooled and uses a graphite moderator (approximately 110 MWe). The PBMR is nearing completion of the preliminary design phase. The feasibility study for application in the United States is in preparation for investor decisions by the end of 2001. RSA demonstration plant construction is expected to begin in late 2002. The PBMR design approach is intended to employ both passive and active design features, provide prevention and mitigation capability, and reduce dependence on operator actions. Central to this approach is the spherical fuel design involving carbon-coated uranium oxide fuel manufactured into a fuel particle or sphere. Key technical licensing challenges include: lack of a gas reactor technical licensing framework; fuel qualification and fabrication; source term; containment performance requirements; probabilistic risk assessment (PRA); regulatory treatment of non-safety systems; classification of structures, systems, and components (SSCs); and lack of technical expertise on gas reactors for both the NRC and the industry. Key licensing challenges include: Price-Anderson Act indemnity, NRC operational fees, decommissioning trust funding, untested provisions of 10 CFR Part 52, and the potential number of exemptions that may be required by the NRC.

M.D. Carelli of Westinghouse Science and Technology provided a presentation on the International Reactor Innovative and Secure (IRIS) nuclear reactor design. IRIS is a small to medium sized pressurized water reactor (100-300 MWe) that utilizes a 5- to 8-year option fuel cycle. The IRIS safety philosophy is "safety by design." Like current generation PWRs, IRIS is designed to have a reactor containment structure. However, Westinghouse proposes to perform scaling tests rather than loss-of-coolant accident (LOCA) analysis. IRIS is scheduled for initial deployment in 2010-2015.

Lawrence L. Parme of General Atomics (GA) provided a presentation on the GA Gas Turbine - Modular Helium Reactor. He discussed the history of GA as a pioneer of gas reactor technology and noted that the proposed GA design is similar to the PBMR in its use of ceramic carbon-coated spherical fuel. The fuel is passive by design in that the fission products are retained in the coated particles or spheres. Worst-case fuel temperature is limited by low-power density, low thermal rating per module, use of an annular core design, and passive heat removal. GA proposes to apply a risk-informed approach to licensing using performance assessment methods.

Atam Rao of GE Nuclear Energy provided a presentation on the Evolutionary Simplified Boiling Water Reactor (ESBWR). The ESBWR is a 1380 MWe boiling water reactor with improved operating safety margins and passive safety systems. He stated that the ESBWR derived from earlier GE plant design certification efforts and is the result of eight years of international cooperative work. He stated that the biggest challenge is to cross the regulatory hurdles associated with the inspections, tests, analyses, and acceptance criteria (ITAAC) and combined license (COL) programs. He further stated that he did not know how long it might take to license the ESBWR, in part, because the last GE design certification took about 8 to 10 years. Dr. Rao also provided a brief overview of the GE Nuclear Advance Liquid Metal S-PRISM design.

Marsha Gamberoni, NRR, led the discussion for the NRC staff. Nanette Gilles, NRR discussed the future licensing organization and inspection readiness assessment (FLIRA). Thomas Kenyon, NRR, discussed early site permits (ESPs), ITAAC and COL programs. A. Rae discussed the Westinghouse AP1000 review and Eric Benner, NRR, discussed issues related to the regulatory infrastructure. Mr. Jerry Wilson, NRR, also participated. John Flack and Stuart Rubin, RES, provided a brief discussion on research activities in support of possible future plants. The staff stated that an assessment of licensing and inspection readiness is ongoing and is scheduled to be completed by September 28, 2001. The staff is working to develop lessons-learned from past design certifications, preparing guidance on ESPs, and responding to the Nuclear Energy Institute (NEI) petition for rulemaking to 10 CFR Part 52. The staff is reevaluating its ITAAC/COL programs. Short-term plans are to address existing regulations, license conditions, and exemptions. Long-term actions are expected to be addressed via rulemaking. The staff stated that there is a limit on how far they can pursue these initiatives and/or allocate resources without formal submittals by licensees and industry organizations.

### **Subcommittee Questions/Comments on Presentations**

Significant points raised by members of the Subcommittee during the presentations include:

Dr. Apostolakis questioned what DOE representatives considered to be the two most important regulatory challenges facing the NRC in licensing new reactors. DOE representatives stated that the key challenges will be related to making the regulatory environment as risk-informed and performance-based as practicable. DOE representatives stated that the NRC process must be predictable in both its review time and its decisions. Dr. Powers questioned the extent to which performance indicators (PIs) might further performance-based considerations. Dr. Apostolakis suggested that reliability goals be numerical. DOE representatives stated that it is difficult to place goals on PIs or reliability without knowing more about the detailed designs.

Drs. Kress and Powers questioned the nature of fuel performance for the PBMR. Dr. Kress questioned how fuel manufacturing quality and integrity will be ensured. Dr. Powers questioned how friction, ramp rates, and other operating characteristics would be addressed considering the fact that there was limited operating experience for this type of fuel. Exelon and RSA representatives stated that fuel would be subjected to extensive quality assurance and quality control requirements during fabrication and that operating performance would be monitored using gamma spectroscopy for each of the 212,000 fuel spheres cycled through the core.

Drs. Apostolakis and Garrick questioned how the Commission's Safety Goal Policy Statement would be considered for the PBMR. They noted that Safety Goal's use of core damage frequency (CDF) might be challenged if applied to the collective population of modular units at reactor sites across the country. Exelon and RSA acknowledged that this is an issue to be addressed in characterizing the risk metrics. They noted that the modular approach to siting will have substantial licensing expense ramifications as well (i.e., licensing fees per reactor).

Dr. Kress questioned the PBMR and GA Gas Turbine - Modular Helium Reactor proposals to limit or eliminate the use of primary containment structures and reducing emergency planning zones. He questioned the prudence of this given that the uncertainties that have not been quantified. He also noted that Chernobyl had a graphite core and it burned. Dr. Powers noted that there is a substantial difference between point-ignition and diffuse-ignition of core materials and that one of the largest catalysts in fuel performance is cesium. The GA representative stated that the fuel will not burn in the normal sense of a chain reaction and that most analyzed failures have been associated with fuel oxidation. He also stated that the MHTGR has circulators designed to reduce temperature.

### Panel Discussion

The Subcommittee and participants extensively discussed the use of risk information in considering future nuclear plants. Dr. Apostolakis stated that there seems to be a gap between the staff and industry thinking concerning the importance of risk. He stated that he is not sure that there is a full appreciation how important risk is in the design, licensing, and operation of nuclear power plants. Dr. Bonaca stated that there seems to be a perception that risk is a regulatory constraint rather than a safety benefit. The staff stated that the Commission has been very clear in directing the staff to use risk analysis in deciding what information and analysis is needed. The staff also stated that more confidence is needed than demonstrating that the Commission's Safety Goals are met.

Mr. Rosen encouraged Exelon to provide risk information in support of its PBMR plant design. He stated that it will be important in designating systems and components as being important to risk and that both design and risk information will be needed. Dr. Garrick expressed concern that an important opportunity was being missed in the rush to license new reactors. He stated that there could not be a better time to consider risk. Dr. Powers stated that there is not much risk information available concerning the proposed plants designs and suggested that the NRC will need to perform confirmatory analysis to ensure that vulnerabilities have not been missed. He also stated that the staff will need to perform tests (e.g., to ensure that particle-type fuel does not burn) and testing programs to ensure that actual operating performance reflects design characteristics and to validate thermal-hydraulic modeling and component performance. The staff stated that 10 CFR Part 52 requires licensees to conduct PRAs. Exelon representatives stated that existing bodies of data must be utilized and that they must pursue a COL first, rather than design certification, based on the RSA Demonstration Project. Exelon proposes to certify the design by testing.

Dr. Ford noted that the presentations involved little discussion of material degradation, embrittlement, or cracking. Industry representatives stated that materials were not a top priority.

at this early stage. They stated that their focus was on design first with consideration of materials later. The staff stated that the Commission expects these designs to be safer than the current generation of plants and that issues such as pressurized thermal shock (PTS) will certainly be addressed.

Dr. Kress questioned how defense in depth will be considered in new plant designs. Commissioner Diaz offered his views on the importance of considering defense in depth in the design stage of reactors. Dr. Apostolakis stated that he was encouraged by recent government-wide initiatives to consider both risk information and defense in depth. He expressed concern, however, over the argument that PRA might be viewed as a major challenge if it makes plants uneconomical. He stated that risk analysis is necessary to reduce the uncertainty in new and untested designs.

**JUNE 5, 2001**

### **Introductory Remarks**

Dr. T.S. Kress, Chairman of the ACRS Subcommittee on Advanced Reactors convened the meeting and introduced Subcommittee members in attendance, key participants, and presenters. He presented the planned agenda for the second day of the Subcommittee meeting/workshop and offered members of the public opportunities to ask questions and to provide comments on the matters discussed.

### **Subcommittee Presentations**

Ron Simard of the Nuclear Energy Institute (NEI) provided a brief presentation on the state of energy demand in the United States and discussed the improving economics for new nuclear power plants. He discussed the consolidation of companies under deregulation and suggested that these larger companies will be better able to undertake large capital projects such as nuclear power plant construction. He discussed efforts under way to support a new generation of plants but noted that there needs to be greater certainty in the licensing process. He discussed infrastructure challenges in terms of people, hardware, and services to support new and current plants. He stated that there needs to be fair and equitable licensing fees and decommissioning funding assurance for innovative modular designs such as the PBMR. He concluded that NRC challenges will include resolving 10 CFR Part 52 implementation issues; establishing an efficient and predictable process for siting, COL permits and inspection; and an increasing regulatory workload.

Neil E. Todreas of the Massachusetts Institute of Technology (MIT) provided a discussion on safety goals for future nuclear power plants. He stated that this effort is focused solely on future power plants and not the current NRC Safety Goals and associated quantitative health objectives that use core damage frequency (CDF) and large early release frequency (LERF) as surrogate measures. This work is being sponsored by DOE for Generation IV Initiative technology goals. These goals are being developed for systems to be deployed from 2011 to 2030. They are intended to guide in making trade-offs in the evaluation of candidate technologies. The goals will partition the systems according to categories of sustainability,

safety and reliability, and economics. The outcome is expected to a framework that encourages fundamental design directions that promote safety.

Andrew C. Kadak of MIT presented an approach to licensing Generation IV technologies entitled, "License by Test." He stated that the major challenges for new reactors are driven by a regulatory framework that generally supports light water reactor technology. He stated that both licensees and the NRC staff lack sufficient knowledge in non-light-water reactor technologies and that the regulatory system is overly rigid in adjusting to change. He suggested that the NRC adopt a risk-informed approach to licensing whereby a safety basis would be established using risk-based techniques to identify dominant accident sequences and systems and components, establishing confidence levels to bridge deterministic and probabilistic approaches, and implementing a license by test approach using a full-size demonstration plant. Successful demonstration would provide the basis for reducing uncertainty and for certifying the design. Traditional performance tests would still be required to demonstrate reliability. However, license by test would serve to validate analyses, shorten time for paper reviews, and demonstrate safety. He suggested that the PBMR be used as the prototype for this licensing approach.

Michael Golay of MIT and George Davis of Westinghouse provided a presentation on the NERI Project being conducted for DOE. The focus of the NERI Project is to take future plant designs and use risk information to evaluate what new design and regulatory processes must be developed to support new plant license applications for Generation IV concepts. Dr. Golay stated that there is a need to improve the regulatory process and suggested that the overall national effort in support for reactors suggests that there is a need for change. These activities are being coordinated with NEI who will be initiating the industry-sponsored development of new regulations. NERI will address the overall risk-informed design and regulatory process. Sandia National Laboratories (SNL) is also providing technical support.

Charles Forsberg of Oak Ridge National Laboratory provided a presentation on the economy of nuclear-generated hydrogen production. He stated that there is enormous need for increased hydrogen production to support the U.S. chemical industry (oil refineries) which uses 5% of all the natural gas consumed in this country. He stated that the major reason for the need is increased use of more abundant heavy-sour crude oils which require more energy to process than the more scarce light-sweet crude oil. He noted that non-light-water reactors (e.g., molten salts) are better suited for this type of application and suggested that an advanced high-temperature reactor (AHTR) could provide dual-purpose electric generation and hydrogen production. This is a joint DOE effort with Sandia National Laboratories (SNL).

Adrian Heymer of NEI provided a brief discussion on the benefits of establishing a new regulatory framework. He suggested that a new paradigm in regulatory thinking is needed and stated that the reactor oversight process (ROP) serves as the appropriate basis for starting these discussions. He suggested that the ROP cornerstones of safety be used as the starting point for developing a new set of General Design Criteria (10 CFR Part 50, Appendix A). He suggested that new operating criteria, generic risk-informed and performance-based regulations be developed with associated design-specific and regulation-specific regulatory guides.



## Subcommittee Questions/Comments on Presentations

Significant points raised by members of the Subcommittee during the presentations include:

Dr. Powers questioned the NEI contention that DOE energy demand estimates are consistently low. He stated that the critics have argued that efficiency and conservation can do the job. Mr. Simard agreed that efficiency and conservation play an important role but concluded that it is unrealistic to suggest that new electricity generation is not needed.

Dr. Powers expressed appreciation for the systems-approach and use of trade-off studies in evaluating new plant designs and safety goals. Dr. Todreas stated that the goal is to stimulate innovation and not to go back to existing reactors as the standard for the future. He stated that they are looking at a balance of utilization in terms of whole fuel cycle, e.g., economics, waste, diversion, etc.

Dr. Powers questioned why the safety goals could not be expressed in terms of release of radioactivity. Dr. Wallis expressed concern that this approach might overly constrain the evaluation of certain designs and lock the evaluation into certain design directions. Dr. Garrick stated that the evaluation should not focus too heavily on fission products as the actinides drive much of the risk in high-level waste. Dr. Apostolakis suggested that safety and reliability can also be expressed in terms of investment protection. He noted that serious plant damage can occur without having releases and suggested that it may be worthwhile to distinguish between technology goals and safety goals. Dr. Wallis suggested that life-cycle costs also be expressed in terms of external costs in comparing candidate nuclear technologies with alternate fuels, e.g., adverse effects of fossil fuels killing fish in New England via acid rain.

Dr. Wallis questioned how human performance would be evaluated using the "license by test" approach. Mr. Leitch stated that the major advantage of license by test appears to be a reduction in the time and costs for paper reviews associated with the licensing process and questioned what technical merits would be derived. Mr. Sieber questioned who should finance the costs of such a facility. Mr. Kadak stated that a containment should be constructed on the PBMR Demonstration Project only for the purpose of demonstrating safety and suggested that operators be allowed to take non-conservative actions to test the robustness of the design. Mr. Kadak stated that the PBMR Demonstration Project should be a legitimate government expense (i.e., DOE) as it is still a concept, and the plant has not yet been designed. He stated that much work needs to be done to develop the models and codes necessary to validate the design.

Dr. Apostolakis questioned whether the licensing process can be made performance-based. Mr. Heymer of NEI stated that the inspection process can be made performance-based as evidenced by the reactor oversight process (ROP). He also noted that certain regulations can be made more performance-based (e.g. 10 CFR Part 20). Mr. Heymer suggested that risk-informing 10 CFR Part 52 will be very important for new reactors. Dr. Apostolakis stated that the ROP is an evolution of the existing regulatory system and suggested that the risk for new reactors may be different thereby requiring a different approach. He noted that NEI does not normally want to depart too substantially from the existing regulatory structure.

## Panel Discussion

Richard Barrett, NRR, offered a four-pillar approach to licensing new nuclear power plants. He stated that success will be based on assuring safety, streamlining the organization to be efficient and effective, not imposing unnecessary regulatory burden, and maintaining public confidence. Dr. Wallis stated that it is not good enough to provide public access to NRC decisionmaking. Mr. Barrett agreed and stated that they need to identify public concerns and act on them.

Neil E. Todreas of MIT provided a brief presentation on regulatory challenges mostly related to fuel and clad materials. He stated that longer operating cycles and higher operating temperatures will result in challenges related to waste toxicity and volume, corrosion control of coolant impurities, qualification of fuel particles or spheres, and new maintenance practices to support longer operating cycles. Dr. Kress suggested that new reactor licensing may be somewhat like digital instrumentation and control in that the NRC controls the process and not the product. Dr. Garrick stated that the regulatory process, like people, are slow to change.

Edwin S. Lyman of the Nuclear Control Institute (NCI) provided a presentation that focused on the role of government in energy matters. He stated that public money should not be spent as a taxpayer subsidy for utilities. He stated that the performance data on PBMR fuel is "spotty" and that the German graphs illustrating the 10% release fraction of Cs-137 were flawed. He also stated that British Nuclear Fuels falsified fuel performance data sent to Japan on this matter. Mr. Lyman suggested that the NRC establish an ITAAC for PBMR fuel manufacture and acceptance. He questioned how the Chernobyl event could not happen at a PBMR and suggested that ignition fuel temperatures could be achieved through sabotage. He stated that the Commission's Safety Goals are not conservative enough and concluded that there is no technical basis for relaxing containment and emergency preparedness requirements. He noted that about half of the U.S. nuclear plants failed the NRC Operational Safeguards Response Evaluation (OSRE) safeguards inspection.

Winonah Hauter of Public Citizen provided a brief presentation concerning the state of energy deregulation and the need for new nuclear power plants. She stated that the demand for and acceptance of nuclear power is being painted as a "rosy picture" based on a recent poll in California. She stated that 58% of the public disapprove of President Bush's energy plan and the public always supports renewable energy as the first option. She suggested that the apparent energy crisis is being misrepresented in order to justify using taxpayer money to subsidize a resurgence of nuclear power and the associated research and development costs for new reactors. She questioned the safety of "merchant" nuclear plants and expressed concern that the recent work on health effects is being conducted with the improper intent of reducing the waste classification of certain radiological materials. Ms. Hauter suggested that licensing is being used as a new code word for deregulation. She stated that the biggest challenge is the issue of subsidies to the utilities and questioned the theme of the Subcommittee meeting/workshop as being biased toward further deregulation that favors getting new plants licensed. Drs. Kress and Wallis expressed concern over the lack of public interest in ACRS meetings and questioned how to get the public more involved in providing broader perspective. Ms. Hauter suggested that meetings be held around the country outside normal business hours (i.e., in the evening) so that interested parties could more conveniently attend after work.

### Expected Subcommittee Action

At the conclusion of the meeting, Drs. Kress stated that the purpose of this meeting was to explore the regulatory challenges associated with future nuclear power plants and for the Subcommittee to examine technical issues for the ACRS to consider in evaluating the safety of candidate reactor designs and applications. The Subcommittee plans to continue its discussion of these matters during future meetings.

### Background Materials Provided to the Subcommittee Prior to this Meeting

1. Subcommittee agenda.
2. Subcommittee status report.
3. ACRS reports dated February 19, 1993, from Paul Shewmon, Chairman, Advisory Committee on Reactor Safeguards, to Ivan Selin, Chairman, NRC, Subject: Issues Pertaining to the Advanced Reactor (PRISM, MHTGR, and PIUS) and CANDU 3 Designs and Their Relationship to Current Regulatory Requirements.
4. Report dated July 20, 1988, from William Kerr, Chairman, Advisory Committee on Reactor Safeguards, to Lando W. Zech, Jr., Chairman, NRC, Subject: Report on Licensing Issues Associated with DOE Sponsored Reactor Designs.
5. Report dated June 9, 1987, William Kerr, Chairman, Advisory Committee on Reactor Safeguards, to Lando W. Zech, Jr., Chairman, NRC, Subject: ACRS Comments on Draft NUREG-1226, "Development and Utilization of the NRC Policy Statement on the Regulation of Advanced Nuclear Power Plants."
6. Report dated April 16, 1986, from David A. Ward, Chairman, Advisory Committee on Reactor Safeguards, to Nunzio J. Palladino, Chairman, NRC, Subject: ACRS Comments on NRC Review of Advanced Reactor Designs.
7. Report dated October 16, 1985, from David A. Ward, Chairman, Advisory Committee on Reactor Safeguards, to Nunzio J. Palladino, Chairman, NRC, Subject: ACRS Comments on NRC Advanced Reactor Policy Statement.
8. Draft Memorandum dated May 1, 2001, from William D. Travers, EDO, NRC, to The Commissioners, Subject: Staff Readiness for Future Licensing Activities. **(Pre-Decisional Draft)**.
9. Draft Memorandum dated April 25, 2001, from William D. Travers, EDO, NRC, to The Commissioners, Subject: SECY-01-0070 - Plan for Preapplication Activities on the Pebble Bed Modular Reactor (PBMR). **(Pre-Decisional Draft)**
10. Letter dated May 10, 2001, from James A. Muntz, Exelon Generation Company, to Thomas L. King, Office of Nuclear Regulatory Research, NRC, Subject: Regulatory Issues related to the Pebble Bed Modular Reactor (PBMR).
11. Memorandum dated February 12, 2001, from Thomas L. King, Office of Nuclear Regulatory Research, NRC, Subject: Meeting with Exelon Generation Company and Other Interested Stakeholders Regarding the Pebble Bed Modular Reactor. (Publicly Available)
12. Handouts from May 7, 2001 meeting, concerning International Reactor Innovative and Secure (IRIS), by M.D. Carelli, Westinghouse Electric Corporation.
13. Handouts from March 2001 meeting, on Gas Turbine-Modular Helium Reactor (GT-MHR): Commercialization Program Briefing, by General Atomics.

14. Handouts from International Symposium on the Role of Nuclear Energy in a Sustainable Environment, presentation entitled, "The GenIV Nuclear Energy System Program: Expectations and Challenges," by Professor Neil E. Todreas, April 20, 2001.
15. Letter dated January 12, 2001, from William D. Travers, EDO, NRC, to James A. Muntz, Exelon Generation Company, Subject: Response to Letter dated December 5, 2000. (Publicly Available)
16. Letter dated December 5, 2000, from James A. Muntz, Exelon Generation Company, to NRC Document Control Desk, Subject: Pebble Bed Modular Reactor Review Requirements.
17. Memorandum dated May 17, 1994, from James M. Taylor, EDO, NRC, Subject: SECY-94-133 - Updated Commission Policy Statement on Advanced Reactors to Reference the Commission's Metrication Policy.
18. U.S. Nuclear Regulatory Commission, NUREG-1226, "Development and Utilization of the NRC Policy Statement on the Regulation of Advanced Nuclear Power Plants.

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Note: Additional details of this meeting can be obtained from a transcript of this meeting available for downloading or viewing on the Internet at "<http://www.nrc.gov/ACRSACNW>" or can be purchased from Neal R. Gross and Co., Inc., (Court Reporters and Transcribers) 1323 Rhode Island Avenue, N.W., Washington, DC 20005 (202) 234-4433.