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(Friday, February 14, 1997)

NOTE TO EDITORS:

The Nuclear Regulatory Commission has received the two attached reports from its Advisory Committee on Nuclear Waste. The reports, in the form of letters, provide comments on:

-- Comments on selected direction-setting issues identified in NRC's Strategic Assessment of Regulatory Activities.

-- Time of compliance for low-level nuclear waste disposal facilities.

Attachments:
As stated

January 30, 1997

The Honorable Shirley Ann Jackson
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Jackson:

SUBJECT: COMMENTS ON SELECTED DIRECTION-SETTING ISSUES
IDENTIFIED IN NRC'S STRATEGIC ASSESSMENT OF REGULATORY
ACTIVITIES

The Advisory Committee on Nuclear Waste (ACNW) is pleased to provide its comments on several selected direction-setting issues (DSIs) that were identified in the U.S. Nuclear Regulatory Commission's (NRC) Strategic Planning Framework Document released on September 16, 1996. These issues are an important part of Phase II, "Rebaselining and Development of Decision Papers of the Agency's strategic assessment of its regulatory activities." Our conclusions were reached through deliberative discussions within the ACNW based on the Phase II document and a briefing on October 22, 1996, on those DSIs of most interest to the ACNW. The presentations by Mr. James L. Milhoan, Deputy Executive Director for Operations and co-chair of the rebaselining subcommittee, and several members of the rebaselining subcommittee were useful to the ACNW in focusing its deliberations on critical topics.

In the following discussion, our comments on seven of the DSIs pertain to topics that are within the scope of our activities as specified by the Commission. Where appropriate, our review comments on the nature and completeness of the background discussion and decision options are provided for the seven DSIs. In the interest of limiting the length of this letter while

considering numerous issues, we have purposefully minimized the depth of the backup discussion. We will be pleased to expand on topics at your request.

Before discussing specific DSIs, we have the following general comments regarding the Phase II document:

- (1) Rebaselining Nuclear Waste Activities and Related DSIs - We see the rebaselining effort of the NRC as it relates to nuclear waste activities to be extremely important and timely. Regulating the handling, storage, and disposal of nuclear waste to protect the health and safety of the public and its environment is a critical role of the NRC, which permits the use of radioactive materials for a broad range of uses beneficial to our society. Implementation of nuclear waste activities and associated regulations, especially as they relate to storage and disposal, has been contentious and slow. Rebaselining involving the review of NRC's role and procedures is timely because
(a) new standards and regulations are being prepared for the high-level waste program, (b) there is a need to smooth the interface between standards of the Environmental Protection Agency (EPA) and NRC regulations, and (c) the decline in resources for all parties, including potential licensees, demands a sharper focus on what is demonstrably and significantly important to public health and safety. Identification of the DSIs and the introspective view of the NRC that led to their definition, the broad internal and external discussion of the DSIs, and the ultimate Commission decisions on them offer opportunities to establish improved nuclear waste regulations.
- (2) Broadened Role of the NRC in Regulation of Nuclear Material - The current regulatory environment for radioactive materials has been developed over a long period and is administered by a variety of agencies with different philosophies and concerns. The result is a patchwork of regulatory legislation that fails to be as consistent, coherent, effective, and efficient, as possible. The public generally is confused about radioactive waste regulations and unaware of the agencies involved and their specific responsibilities and competence in the regulation of radioactive materials to protect public health and safety. Rebaselining by the Commission should have as an ultimate goal the reorganization of radioactive material regulations into a coherent and internally consistent assemblage. The achievement of this goal will be fostered by minimization of the number of agencies involved. Thus, within the constraints of a regulatory agency, we encourage the NRC to think boldly about taking on increased responsibilities for the regulation of radioactive materials.

- (3) Omissions in the DSIs - In our review of the DSI papers, we have identified a few issues that we believe are especially important to the effective and efficient implementation of nuclear waste regulations, but are not identified as DSIs. We realize that these issues were considered in the mix of nuclear waste issues facing the Commission, but were deemed insufficiently compelling to warrant individual identification and discussion as a DSI. Nonetheless, we wish to bring them to your attention.
- (a) Information Management - We are pleased to see "managing information" identified in NRC's Strategic Plan as a Core Resource Strategy Arena (Figure 2 of the Strategic Planning Framework Document). We understand that this important area has been factored into rebaselining by implementation of the Information Technology Management Reform Act and the appointment in the near future of a chief information officer for the NRC. This is encouraging because we believe that internal management of information which includes the efficient and effective handling, transfer, repositing, and accessing of both technical and administrative information is to a significant degree one key to the success of the NRC in today's data and information-rich society. The pivotal role of data and information management in the knowledge-driven Commission may be cause for the Commission to place greater emphasis on this issue and its integration into all units and activities of the NRC.
- (b) Cross-Cutting Issues - In reviewing the DSI papers, we noted that some concerns to the NRC are relevant to several of the DSIs. Examples of these cross-cutting issues are mixed waste and greater-than-Class-C (GTCC) waste. We draw your attention to these because in our view they are important issues, but may be neglected because they cross DSI boundaries. They are important because multiple agencies or divisions within NRC have overlapping responsibilities that may impede actions by agencies involved, as well as by licensees. The resulting confusion may be potentially detrimental to the public health and safety and lead to inefficiencies. The NRC should be proactive to minimize occurrence of such administratively generated hurdles involving other agencies and should examine its own structure to ensure that such impediments to coherent regulatory activities do not exist within the NRC.

The safe storage and disposal of wastes that have the attributes of hazardous waste regulated by the

Environmental Protection Agency (EPA) and low-level waste (LLW) regulated by the NRC or one of its Agreement States remains a perplexing problem. The ACNW has been concerned with mixed wastes for several years (e.g., letter to the Commission dated May 3, 1989) and continues to monitor the ongoing activities and progress of discussions between EPA and the NRC leading to reconciliation of the conflicting requirements for storage and disposal of wastes that fall under the purview of both agencies. We suggest that these activities be given greater attention in the strategic planning of the NRC with emphasis on resolving regulatory overlap with the EPA.

GTCC waste is classified as LLW, but is generally unacceptable for disposal in the surface or near-surface structures being designed for LLW. Thus, storage and disposal of this waste is a problem that transcends several DSIs. We note that this issue is discussed in a memorandum from D. L. Morrison, Director, Office of Nuclear Regulatory Research, January 14, 1997, "Rulemaking Plan - Interim Storage for Greater-Than-Class-C Waste, Changes to 10CFR Part 72." Clearly, this problem along with concerns about mixed waste deserves significant attention in strategic planning, and thus, the Commission may wish to identify it as such.

DSI-2: Oversight of the Department of Energy

Actions in the near term by either the Department of Energy (DOE) or Congress could lead to an expansion of NRC regulatory authority and responsibilities to include DOE nuclear facilities. The DSI-2 paper deals with the question of whether the NRC should seek this authority and responsibility. Further, it provides the background of how this issue arose, a description and discussion of the issue, and the relevant options open to the Commission.

We believe this issue should be decided primarily on the basis of the benefits to the health and safety of the public, but other considerations include minimizing regulations and overlap among them, improving regulatory consistency, maximizing overall regulatory efficiency, and assuring independent oversight and regulatory surveillance. Our review indicates that the DSI paper discussion does not fully address the positive aspects of this issue as they relate to these criteria. Clearly, numerous problems and concerns are associated with regulating DOE facilities as developed in the DSI paper, but these are problems that any agency will face in carrying out the regulatory duties,

and the NRC by virtue of its broad nuclear regulatory experience is best suited to addressing them. As stated in the discussion of Option 1A, "The Commission's support for assuming broad authority over DOE facilities would be based on recognition of the need for external regulation and on the recognition that NRC's expertise places it in the strongest position of any existing agency to assume these responsibilities."

Acceptance of Option 1, "Support broad responsibility for NRC regulation of DOE," has many potential positive attributes. It could simplify the desirable goal of reorganizing the national regulatory framework for radioactive materials into a consistent, integrated entity. These new regulatory responsibilities likely will result in the need for additional technical expertise within the Commission, which will then be available to other more traditional activities of the NRC. Finally, the expansion of NRC to regulatory functions into DOE nuclear facilities will be less burdensome to an evolving NRC if the traditional mission and scope of the Agency is reduced in the future. This reduction may result from a declining nuclear power generation industry and a reduction in materials and other licensing perhaps because of a rising role of Agreement State activities. Despite these very positive aspects to the NRC broadening its oversight role to include DOE nuclear facilities, we are aware of the need to identify clearly the methods, timing, staffing, and funding of the implementation of this responsibility within the NRC, including the preparation of pertinent regulations. In addition, care must be exercised to ensure that current NRC programs and regulatory responsibilities are not adversely affected by these new responsibilities.

In conclusion, we suggest that the Commission explore various derivatives of Option 1, that is, support NRC regulation of DOE, but we believe that co-regulation should be emphatically avoided because of the potential for conflicts and confusion in regulations. Enhancement of public health and safety is neither evident nor can it be envisioned from multi-party regulation of the same general activity, materials, or devices. Finally, only by participating in discussions and decisions regarding the regulation of DOE facilities will the NRC be poised to see that its view of needs for public health and safety is implemented.

DSI-4: Relationship with Agreement States

Current rebaselining efforts of the Commission present an opportunity to review the relationship of the NRC with Agreement States. The direction of the DSI-4 paper is to consider NRC's strategy regarding states becoming and remaining Agreement States. The paper makes a strong case for maintaining a core licensing and review program and a cadre of competent technical staff to conduct the program within the NRC. We believe this is

essential to fulfill the requirements of the Atomic Energy Act (AEA) and is consistent with NRC's mission. Furthermore, any action regarding funding with respect to relationships with Agreement States must be anchored in maintaining the health and safety of the public as well as in the Omnibus Budget Reconciliation Act of 1990. Although we agree with the discussion regarding the need for maintaining a critical mass of talent within the agency, the level of licensing activity required for this as stated in the DSI paper appears to have little basis in fact and fails to consider an expertise resident in the agency as a result of related activities.

The conclusion we reach is that some form of Option 3, "Continue the current Agreement States Program, including adopting current initiatives," is preferable. We believe the agency should maintain the authority and responsibilities it has in this area through the AEA. Further, the hazards of dual regulation as well indicated by experience in nuclear waste regulation and elsewhere strongly argue against Option 4, which would lead to co-regulation.

We believe it is unfortunate that in the discussion of the Agreement State Program in the DSI paper, the staff did not take the opportunity to emphasize additional aspects of this program. Broadening of this topic could lead to consideration of criteria used to evaluate the adequacy and compatibility of an Agreement State's program. We believe that a direct relationship has not been proven between the evaluation criteria and assurance of the competency of the States programs and benefits to protection of public health and safety. One measure of the benefits could be the number and severity of incidents reported (e.g., overexposure, misadministration of radiopharmaceutical and treatments, loss of control sources). Another measure could be the cost to potential licensees. Still another concern associated with the Agreement State Program is the situation in which State regulations are significantly more stringent than those of the NRC. This situation is legal, but the lack of consistency in regulations leads to the public's confusion regarding the hazards of radioactivity and the validity of related regulations. In addition, the impact of removal of this inconsistency on interstate commerce affairs, such as transportation, would eliminate vagaries caused by local, current special interests.

We also wish to comment on two of the related issues discussed in Section VI of this DSI paper. To ensure the compatibility and adequacy of the Agreement State Program, we believe that it is essential to incorporate all aspects of the LLW programs of the States (Section VI.A.). The site review of an LLW disposal facility is a critical component in the evaluation of the technical capability of an Agreement State's program. The

quality of results and the technical intensity of the Agreement State review process should be one measure of the adequacy of the program. In addition, we support NRC's Independent Radiation Monitoring Program (IRMP) implemented at NRC-licensed facilities, which is discussed in Section VI.B of the DSI paper. The IRMP provides important verification of results reported by licensees and thus serves to assure public health and safety from potential radioactive releases to the environment.

DSI-5: Low-Level Waste

In a recent letter to the Commission (December 29, 1995), the ACNW concluded that "... in the radioactive waste field, the management of LLW poses broader, more direct and ubiquitous potential risks to the health and safety than any other activity...." As a result, we believe the rebaselining efforts of the Commission with regard to this DSI are especially important. Further, this conclusion was critical to our recommendation in the letter of December 29, 1995, that the NRC adopt a strong regulatory role in LLW disposal. This recommendation is supported by an extensive discussion in the letter of the needs for a Federal presence in this radioactive waste area and the strengths that the NRC brings to the solution of the problems of LLW. Thus, we highly recommend Option 2, "Assume a strong regulatory role in national LLW program," of the DSI paper. However, the DSI paper implies that a national LLW disposal program exists. Our view of the current situation is that, other than in the words of the LLW policy act and its amendments, a functional coherent national policy is absent. The volatility of the current LLW activities as associated with the current and past conflicts in policy, special interests, and variable practices provides ample evidence for this conclusion.

We are concerned about several items in this DSI paper. We note the following:

- (1) A number of waste types are missing from the discussion. In our general introductory comments, we noted our concern about the omission of DSI cross-cutting issues such as mixed wastes and greater-than-Class-C wastes. As stated previously, we believe these issues need to be adequately addressed in the strategic planning of the agency.
- (2) NRC's acceptance of long-term storage of LLW, although attractive as a practical solution to a current problem, may not be acceptable to the Nation. The current national policy is to provide final disposal by the present generation in a manner that does not jeopardize public health and safety now and in the future. The DSI paper does not adequately address the requirements for implementing long-term storage of LLW. We also are concerned about the rather favorable light placed on interim storage in the DSI paper presumably because to date no incident has been reported as a result of storage on the originating site. However, no evidence exists that onsite storage can be effective over the expected life of the waste and the proliferation of storage sites enhances the risk.
- (3) We suggest that caution be exercised in using "rules of thumb" to define waste types in terms of the length of time

over which they may be hazardous. In view of the absence of a *de minimis* position regarding radioactivity and the broad application of the no threshold-linear view of the health effects of radiation, we suggest rules of thumb are a significant oversimplification.

- (4) Finally, we question the acceptance of DOE waste sites as potential disposal sites for civilian wastes. The DOE sites were not selected on the basis of criteria used in siting and licensing civilian disposal facilities, and evidence is lacking that these sites could meet the standards and regulations in effect.

In conclusion, we recommend Option 2 of this DSI paper but encourage additions to

- (1) develop a more comprehensive definition of LLW and (2) evaluate the potential implementation and impact of assured storage with adequate protection and termination procedures.

DSI-6: High-Level Waste and Spent Fuel

Rebaselining of the NRC comes at a propitious time for the high-level waste (HLW) program considering the implementation of new standards by EPA and siting regulations by DOE for the proposed Yucca Mountain repository and related modifications in the Yucca Mountain regulations by the NRC. In addition, the viability assessment of the proposed Yucca Mountain deep-geologic-burial repository will soon be completed and Congress is considering to legislate significant changes in the national HLW program.

Before we recommend an option for this DSI, we have several observations regarding NRC's HLW program and related comments in this DSI.

- (1) The DSI paper lists key specific barriers to the program's success as identified by the DOE's Office of Civilian Radioactive Waste Management. Although we agree that some of these represent significant hurdles for the program, we believe that a critical barrier pertains to the final one of the list provided, that is, "General program and budgetary constraints." Within the scope of this barrier, we find that changes in the laws and funding levels have led to instability in planning and conducting the characterization of the site and design of the repository. This is exacerbated by the lack of implementation of multiyear funding plans. These problems are of special concern now that an achievable program plan, the Viability Assessment, has been instituted by DOE to achieve the will of Congress in a reasonable time with a modest budget. The advantages of a stable program and budget for the successful licensing

by the NRC of a HLW repository need to be conveyed to Congress.

- (2) The barriers to DOE's HLW program are important to understand, but the NRC must recognize that these are not necessarily the critical hurdles for the NRC to overcome in the licensing process. The NRC needs to sharpen the focus of its HLW program beyond the key technical issues and identify significant problems facing it in regard to the program.
- (3) A related topic is the implied direct connection between changes in the HLW program of DOE and the NRC. No evidence exists that a change in the DOE program should lead to a direct proportional modification in NRC's program. NRC's role in the HLW program is much different than DOE's. In fact, a case can be made that some cutbacks in the DOE program may necessitate increases in the NRC program, for example, to ensure sufficient data and analysis for the licensing processes. The effects of reductions in the DOE program on the NRC licensing plans need clarification.
- (4) DOE has made it clear that the viability assessment of the Yucca Mountain repository is not a technical site suitability (TSS) evaluation. This evaluation will come later, but it is unclear what new DOE data gathering and analyses will be available considering the marked reduction in operating budget and the likely decrease in key scientific/technical personnel and related infrastructure. Thus, we believe prudence requires that the NRC define as much as possible critical data and analyses it requires to conduct a comprehensive license review. If some are missing at the time of the completion of the Viability Assessment, DOE should be notified of these deficiencies while data and analyses personnel and programs are intact.

We support Option 3, "Maintaining NRC's existing high-level waste repository program," in the DSI-6 paper. As we have stated previously (e.g., in our letter to the Commission, "Comments on High-Level Waste Prelicensing Program Strategy and Key Technical Issues," February 16, 1996), we believe in general that the NRC, through its identification of key technical issues and the vertical slice approach to the prelicensing program, has taken appropriate action. Further, we support flexibility in the program so as to adapt to potential actions that Congress may take in the near future. In addition to supporting Option 3 we suggest that serious considerations be given to incorporating the following suggestions raised in other options:

- (1) The use of rulemaking as discussed in Option 2 is a potentially efficient procedure to deal with contentious

issues. Rulemaking may be useful in stabilizing the repository approval process and reducing NRC-related uncertainties.

- (2) As discussed in Option 2, we encourage the NRC to prepare a new part of *Title 10 of the Code of Federal Regulations (10CFR)* covering the regulations for Yucca Mountain. These new regulations could avoid the burden of some aspects of 10CFR Part 60 that: (a) are not really pertinent to an unsaturated repository, (b) have proven to be points of weakness as they have been reviewed in the prelicensing period, and warrant modification, such as the subsystem criteria. The ACNW has developed suggestions regarding time of compliance (letter to the Commission, "Time Span for Compliance of the Proposed High-Level Waste Repository at Yucca Mountain, Nevada," June 7, 1996) that should be considered in the new regulations together with suggestions regarding the reference biosphere and critical group, which are currently under final development by us.
- (3) The interim storage of spent fuel appears to be an action that is increasingly needed. However, Option 5, seems unnecessarily complex for the purpose of providing storage facilities until the repository can accept fuel. Such facilities (dry, onsite storage) exist now and seem to be quite satisfactory. The need to involve Congress is unjustified and should be avoided. The polemics that may arise from a desire to use a centralized facility are likely to be divisive to the HLW program. Several regional centralized facilities may be more likely to be acceptable. Some form of centralized facility for spent fuel will likely be a requirement if the rate of progress on the underground repository does not increase. The legislation likely to be considered by Congress and the possibility of a Presidential veto suggest that the Yucca Mountain repository program may be terminated regardless of the results of the technical site suitability evaluation. Such events would require identification of an alternate repository site requiring several years, perhaps a decade or more. The Commission should consider inclusion in Option 3 the task of ensuring that centralized, dry, spent-fuel storage facilities can be readily licensed by a process that is simple and adequate for the protection of the public and the environment (e.g., ground water) for sufficiently long periods. Public involvement should be ensured, but sufficiently prescribed to avoid crippling legal maneuvering. The safe license period for interim storage is an unknown. This is a subject for study and further deliberation by the Commission.

Concerning the broader issue of managing the nation's HLW, the Committee found the ideas of DSI-6 on a quasi-government agency

and a joint committee oversight function as stimulating and thought provoking. While we have no position on this issue at this time, the Committee encourages the Commission to examine such creative ideas for considering future directions for the management of the nation's radioactive waste.

In conclusion, rebaselining offers an excellent opportunity to revamp and streamline the HLW program of the NRC. We offer several general suggestions and recommend an option for the DSI that incorporates the present program, and also several supplementary actions that will speed the licensing process without weakening it.

DSI-9: Decommissioning - Non-Reactor Facilities

The regulation of and progress in decommissioning of non-reactor facilities by the NRC are problems requiring significant Commission efforts and are attracting increasing public scrutiny. Thus, rebaselining of the Commission's strategic plans in this area is especially important. In our view the problem that needs consideration is placement of the scope and system of decommissioning regulations into a comprehensive strategy for all "low-level" waste leading to consolidation of regulatory controls and consistent regulatory criteria on all radioactive materials (uranium mill tailings, NORM, NARM, decommissioning waste, etc.) within a single agency, the NRC. Rather than simply addressing the rather limited focus of the question considered in the DSI-9 paper, we suggest that the Commission would be better served by first developing a document that specifies the elements of an adequate decommissioning program for non-reactor facilities in the manner of our letter to the Commission of July 24, 1996, in which we developed the elements of an adequate NRC low-level radioactive waste program.

Elements of an adequate NRC program for decommissioning non-reactor facilities should include:

- (1) protection of the safety of the public and preservation of the environment,
- (2) timeliness of actions,
- (3) reasonable waste disposal processes and economics,
- (4) demonstration to the public of acceptable residual risk, and
- (5) fiscal and technical capability of the licensee to accomplish decommissioning. The ACNW also has indicated in previous reports that there are several issues key to the success of the Site Decommissioning Management Plan as

described in SECY-90-121 and subsequent revisions. One of the key items is the quality of the final survey, especially when levels of residual contamination are close to background. Other issues include: (1) prioritization of scheduling of a site for decommissioning based on risk posed by the site and (2) assurance that wastes generated can be disposed of in a reasonable fashion (e.g., they are not mixed wastes). Finally, high priority must be placed on ensuring consistency of the residual risk criterion (e.g., equivalent to 15 mrem/yr for unrestricted access) with a generally accepted standard that includes the risk of groundwater contamination.

In view of the preceding discussion, we find none of the options presented to the Commission totally acceptable. Nonetheless, elements of some of these options offer useful suggestions. Option 2, "Change the decommission review process," is worthy of consideration and testing as specified in the Commission's preliminary conclusions. However, we are reminded that the review process is only a tool to ensure that the decommissioning product will be satisfactory. The product is the important point. We strongly disagree with Option 6, "Focus on decommissioning cases in which progress can be made: Transfer stalled sites to the Environmental Protection Agency's Superfund Program." The Commission needs to identify those sites posing the greatest risk to the public and the environment and direct its resources to those cases. The second part of this option to transfer stalled sites to EPA is ill-advised. The Commission should make any decisions to transfer its responsibilities to other agencies on the basis of furthering the protection of public health and safety, not simply on cost saving consideration.

In conclusion, we believe strategic planning with regard to decommissioning should start with developing a coherent view of an adequate decommissioning program and the issues inherent in it. Further, this program should be consistent with regulations for other low-level waste and should be based on well defined risk-based protocols. Emphasis should be placed on remediating sites that pose the greatest risk to public safety and the environment. Within the regulations flexibility should be encouraged in remediation to husband resources as long as

the public safety is protected as determined by high-quality, final radiation surveys of the residual contamination.

DSI-12: Risk-Informed, Performance-Based Regulation

The Commission's policy to incorporate risk insights into all nuclear regulatory activities is most heartening. We believe that risk-informed, performance-based (RIPB) regulations based upon probabilistic risk assessment (PRA) are necessary for efficient protection of the public's health and safety and the Nation's environment from nuclear waste materials. Unfortunately, the discussion of RIPB regulation in the DSI-12 paper is too superficial in the nuclear waste area to be useful in detailing courses of action to be considered. One of our members, B. John Garrick, sent you a letter, dated January 17, 1997, stating his personal views on this DSI. Our views parallel those of Dr. Garrick.

The RIPB approach has not been translated into a generic concept useful in waste management in this DSI paper. Clearly, there is no adequate definition of RIPB regulation in the waste area that will be helpful in setting related regulatory protocols. The basic concepts and tenets necessary for application to the waste field need to be identified. Critical among these is the need to understand the processes that result in significant risks and procedures for specifying these risks and their attendant uncertainties. This requires a minimum level of information and/or knowledge of the processes and related phenomena for the application of the RIPB methodology. Criteria for recognizing this minimum level need to be developed through sensitivity studies and other PRA procedures.

We believe that the development of RIPB regulations at the NRC is especially timely in the waste management area because of, for example, impending decisions regarding new standards and regulations for the proposed HLW repository at Yucca Mountain and the possible regulation of DOE nuclear waste facilities. The extensive experience of the NRC in performance assessment in regard to both low- and high-level waste management should be especially useful in this regard. In terms of options, we encourage an aggressive move toward RIPB regulation, that is, Option 3. However, we note that critical regulatory decisions are needed in the near term in the waste field, so a truly proactive stance is needed to capitalize on the opportunities of RIPB. In addition, we support Option 2; that is, we believe it is necessary to justify the application of RIPB protocols in terms of benefits to public health and safety.

DSI-22: Research

Throughout its history the ACNW has maintained a strong interest in the research of the NRC and has continued to monitor both the low- and high-level waste programs of the agency. Although we have provided critical reviews of the programs, generally we have been supportive of this research as it contributes to the effectiveness of NRC's regulatory responsibilities. Thus, we are pleased to support the research program in the strategic planning of the Commission. In the waste management area, we see cause for a more aggressive approach to research, but planning should be focused on specific topics. We support our colleagues from the Advisory Committee on Reactor Safeguards in their letter to you of November 19, 1996, in regard to the need for research to support NRC's transition to risk-informed, performance-based regulation.

NRC is a knowledge-driven organization requiring new and confirmatory information to carry out its mission. Thus, confirmatory research is critical to its role. We see no need for NRC to maintain a basic research program that acquires new fundamental information, for example research supported by the National Science Foundation. Thus, we question the role of exploratory research in general, rather we would encourage the use of anticipatory research wherein topics are identified for potential future use by the NRC that require a somewhat longer time to research and evaluate than the shorter term applied or confirmatory research. In addition to these general statements and concerns, we raise the following points and observations regarding the DSI:

- (1) The DSI does not resolve the issue of who should perform NRC research. There are three possibilities: staff at NRC headquarters, contractors at the Center for Nuclear Waste Regulatory Analysis (CNWRA); and researchers at Universities and research centers. We believe that a strong research program at NRC headquarters is inappropriate. However, a relatively small cadre of staff with special expertise in selected core technical areas should be maintained to serve as technical consultants, mentors, and tutors to the staff. These staff will likely have strong research experience in their background, but not necessarily currently involved directly in anticipatory or confirmatory research. The research performed at the CNWRA has been responsive to the needs of NRC's HLW program and has been done efficiently. We think that the NRC should continue to support the work at CNWRA. Finally, we encourage university-based research as an integral component of the NRC research program. The Educational Grant Program, with an increase in maximum funding level to \$100,000/yr, will not only make available to the Commission expertise and facilities that are unavailable internally, but will aid in the support and

encouragement of students who form the future cadre for the protection of public health and safety from nuclear waste.

- (2) The implication of the DSI is that there is a direct linkage between current NRC licensing activities and the quantity of research that is needed. The lack of current LLW licensing within the NRC is cited as an example. This view requires reconsideration. Although it may be defensible from a short-term budget standpoint, such a policy is based on the erroneous assumption that research can be easily started up. Further, in the case of LLW, although the NRC has no licensing actions on the immediate horizon, the Agreement States do face near-term licensing. Agreement States have neither the broad role of the NRC nor the resources to conduct research and thus depend on the NRC for LLW research.
- (3) The ACNW generally has continued to support participation in international research programs related to nuclear waste. The potential benefits far outweigh the cost.

Thus, we support Option 7, that is, continuing to actively participate in international safety programs.

- (4) There is a need for greater discipline within the NRC regarding the selection of research topics in nuclear waste. A principal goal of research should be to provide the understanding of the phenomena and processes that lead to risk to public health and safety and the Nation's environment, quantification of this risk under applicable source and site conditions, and definition of attendant uncertainties. Topics should be selected for research programs accordingly. There are two general classes of research topics at the NRC: (1) research pertinent to licensing considerations of a particular facility (e.g., site characterization, inventory and its chemistry, corrosion of engineered barriers, and waste containers) and (2) research topics pertinent to the development of regulations, including generic topics such as health effects of low levels of radiation, biotransport of radioactive elements, food chain studies, and role of colloids. We believe there are many current research needs at the NRC that can readily be identified. Considerable confirmatory research is needed to ensure that license applicant's results are viable and sound. Emphasis should be placed on research in potentially risk-sensitive and controversial areas. The Commission in its strategic planning should provide guidelines for the selection of research topics based on the above discussion.

In conclusion, we believe an aggressive research program is needed to fulfill the responsibilities of the NRC to the nation. However, it is not clear that a basic research program is a requirement. Rather, a focused approach to research is needed, within guidelines established by the Commission that involves both short- and long-term programs and deals both with immediate licensing agendas and generic problems that contribute to the NRC's transition to risk-informed, performance-based regulation.

Conclusion

In conclusion, we have presented general comments on the Phase II NRC document, "Strategic Assessment and Rebaselining Initiative - Stakeholder Involvement Process Papers," of September 16, 1996, and specific comments on seven DSIs detailed in the Phase II document. These seven DSIs are related to regulating the handling, storage, and disposal of nuclear waste and as such fall within the purview of the ACNW.

We present numerous positive comments related to the rebaselining efforts and options submitted to the Commission in regard to nuclear waste issues. We find that discussions of several of the DSIs and the identified in the DSI papers do not provide, in our view, a comprehensive range of opinions or options. Our discussions attempt to fill these voids and suggest courses of action for the Commission to take in its rebaselining efforts. Clearly, our discussions covering this broad range of topics do not comprehensively treat all the issues or arguments. We will be pleased to provide more exhaustive discussions of any of the topics upon your direction.

Thank you for the opportunity to contribute to this important process in the strategic planning for the future role of the NRC.

Sincerely,

/s/

Paul W. Pomeroy
Chairman, ACNW

February 11, 1997

The Honorable Shirley Ann Jackson
Chairman
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Chairman Jackson:

**SUBJECT: TIME OF COMPLIANCE FOR LOW-LEVEL NUCLEAR WASTE DISPOSAL
FACILITIES**

In this letter, we communicate the observations and recommendations of the Advisory Committee on Nuclear Waste (ACNW) on the time span for compliance of low-level waste (LLW) disposal sites. This letter complements our letter of June 7, 1996, on "Time Span for Compliance of the Proposed High-Level Waste Repository at Yucca Mountain, Nevada," in which we proposed a set of general principles for establishing the time span for compliance of nuclear waste facilities. Building on these principles, we recommend a two-part approach to establishing the time frame for LLW compliance. The first part utilizes a site-specific time span based on an analysis to determine the time at which release and transport of the more mobile radionuclides produce a peak dose to the critical population group. The second part is a qualitative evaluation, not requiring a specific measure of compliance, which is used to identify any significant deficiencies in the performance of the disposal system.

Our observations and recommendations are derived from a working group meeting on "Regulatory Time of Compliance for Radioactive Waste Disposal" held during the 82nd meeting of the ACNW on March 27, 1996, at which the time of compliance for both high- and low-level waste facilities was discussed; a presentation by the Office of Environmental Policy and Assistance in the Office of the Environment, Safety, and Health of the U.S. Department of Energy (DOE) at the 84th meeting of the ACNW on June 27, 1996; and remarks made at both the 84th and 85th meetings of the ACNW on June 27 and August 22, 1996, respectively, by officials of several States involved in developing LLW facilities.

The Problem

Performance assessment provides useful information on how an LLW facility may perform over a period of time. Thus, performance assessment is an important tool for demonstrating LLW regulatory compliance as specified in Part 61 of Title 10 of the Code of Federal Regulations (10 CFR Part 61) and related guidance of the U.S. Nuclear Regulatory Commission (NRC). A critical element of a performance assessment is the length of time over which the calculated dose should be compared to the specified standard or regulation. This is the time span of compliance. The current NRC regulation for LLW disposal facilities (10 CFR Part 61) does not specify this time span. The rule is concerned with minimum times of analyses. For example, 10 CFR 61.7(a)(2) states, "In choosing a disposal site, characteristics should be considered in terms of the indefinite future and evaluated for at least a 500-year time frame." This statement is, in part, the origin of the misconception that 10 CFR Part 61 is a "500-year rule," which only requires a demonstration of compliance for this time period. A time specification of 10,000 years is included in the draft Branch Technical Position (BTP) on Low-Level Waste Performance Assessment and was included in the Draft Environmental Impact Statement (DEIS) for 10 CFR Part 61 (NUREG-0782). However, the Final Environmental Impact Statement (FEIS) for 10 CFR Part 61 (NUREG-0945) does not include a compliance period.

The DOE is preparing radiation protection requirements for the public from its near-surface disposal of LLW and residual radioactivity in soil. DOE officials have informed us that they intend to promulgate regulations (10 CFR Part 834) in the near future. The DOE Format

and Content Guide and Standard Review Plan for DOE Low-Level Waste Disposal Facility Performance Assessments specifies a time of compliance of 1,000 years. This decision is not based on a scientific or technical rationale but rather is believed to be consistent with the intergenerational equity principle. This principle states that no generation should needlessly deprive its successors of the opportunity to enjoy a quality of life equivalent to its own and is an often-cited benchmark in establishing policy on time of compliance. In developing guidance on time of compliance, DOE points out that dose analyses beyond 1,000 years could be used in evaluation of facility alternatives, but that these results should be used with caution because of the potential uncertainties. This two-part approach to time of compliance using a shorter, quantitative evaluation followed by a longer, qualitative consideration is widely employed in other national and international regulations and guidance.

The ACNW has a long-standing interest in the development of guidance by the NRC for LLW performance assessment, as evidenced in numerous discussions with the Division of Waste Management, Office of Nuclear Material Safety and Safeguards, and several letters over the past half decade to the Chairman of the Commission. The time frame for performance assessment has been of special concern. In our letter of June 3, 1994 (Appendix A), we pointed out the need for a specified time of compliance in the LLW regulations. Later, in a letter to the Chairman of the Commission on regulatory policy issues in LLW performance assessment dated June 28, 1995 (Appendix B), the Committee again suggested the need for a maximum time frame for analyzing the safety of an LLW disposal site. The Committee pointed out that much larger quantities of long-lived radionuclides are being disposed of as LLW than was anticipated in the DEIS/FEIS, resulting in the potential for peak dose times in excess of 10,000 years. A letter received by the Committee from James M. Taylor, Executive Director for Operations, dated May 17, 1996 (Appendix C), confirms the staff's continuing interest in this topic. Subsequently, a working group on regulatory time of compliance and deliberations and discussions led to our letter of June 7, 1996, in which we outlined a set of principles for establishing a regulatory time of compliance for the proposed high-level waste repository at Yucca Mountain.

Considerations Regarding LLW Disposal Time of Compliance

We seek to devise a rational basis for selecting a time of compliance that relates the characteristics of a disposal site and its impact on public health and safety. The principles stated in our letter of June 7, 1996 (Appendix D) provide a rational approach for establishing a time span of compliance. The period of time must be short enough so that meaningful evaluations can be made without excessive uncertainty, but long enough to permit the evaluation of processes that may lead to the loss of integrity of the facility and transport of the radionuclides to the critical group. These principles need to be sufficiently generic so that they can be applied to a variety of LLW disposal facilities.

The regulatory principles involve a two-part approach. In the first part, the time of compliance should be established by the estimated time at which transport of the more

mobile radionuclides produce a peak dose to the critical group. This time estimate is based on a systems analysis using data from site characterization, modeling, analogs, and experimental studies. The specified time of compliance is not a direct measure of the facility's performance, but defines the span of time over which the performance of the facility is assessed by comparing the calculated dose with the standard. This definition leads to an apparent paradox in that a disposal facility with superior containment qualities has a longer time of compliance than a site of lesser quality. However, in the proposed methodology, the time of compliance is not a measure of safety, but is the time at which the calculated dose from the facility must meet the standard. The goal is not to set a specific time that would be enforced like the dose standard. On the contrary, the objective is to allow the regulator to evaluate the dose versus time relationship from the site-specific performance assessment calculations that will serve as a benchmark of facility performance and an indicator of long-term safety. The specified time of compliance may be of such a long duration that the procedure could lead to the calculated doses having unacceptably large uncertainties. In this case, a time of compliance shorter than that calculated on the basis of transport should be specified using the time history of the source term hazard as a criterion.

The second part of our proposed regulatory approach generally pertains to facilities for which the highest dose occurs as a result of less mobile radionuclides. These instances require calculation of a point estimate of the dose to the critical group at the time of overall peak dose, which is compared with the standard. The latter comparison should be only qualitative because of the anticipated long periods required to reach the peak dose and the attendant uncertainties in both the time period and dose. This calculation permits the identification of important performance factors that define risk to the critical group. Ameliorating actions such as modification of the source term or waste form may be needed to minimize the difference between the calculated dose and the standard. We believe, as stated in our letter of June 7, 1996, that this latter comparison should not become a *de facto* regulation because of the potential for large uncertainties in the assessment of performance and risk. In addition, as stated in our previous communication on time of compliance, the specified time is strongly influenced by assumptions about the reference biosphere and the critical group. As such, the procedures for identifying and documenting the assumptions for a specific facility are an integral part of the regulations and guidance.

Several significant features that are unique to the LLW program should be recognized.

- Surface and near-surface LLW facilities are subject to deleterious surficial processes such as erosion and flooding. Rates of surficial processes may be altered by climatic change. Such considerations should be factored into the performance assessment.
- In many areas of the Nation, LLW facility sites could be located within a few tens of meters of the saturated zone, resulting in relatively short periods for water to move from the surface through the facility and through the unsaturated zone to the water table. This situation, coupled with the possibility of a limited distance to the critical

group from the disposal site in many regions of the United States, may lead to relatively short times of compliance when the waste containers and engineered barriers of the facility fail.

- The concrete vault disposal system proposed in some LLW facilities may delay releases for long periods, but the time period over which the concrete is able to withstand degradation is not well established.
- The potential for significant quantities of certain long-lived radionuclides, such as uranium in near-surface LLW sites, is greater than was anticipated in the DEIS for 10 CFR Part 61. The result is that peak doses may not occur until a long period of time has passed, perhaps tens or hundreds of thousands of years. In addition, the risk from some decay products may be higher than that of the parent. If the calculated doses at very long periods exceed the standard by significant factors, the LLW disposal system may require modification.

Recommendations for an LLW Disposal Time of Compliance

On the basis of the regulatory principles and observations discussed above, the ACNW recommends that the LLW disposal regulations or guidance include a generic, two-part approach to the time of compliance used in assessing the capability of an LLW site to protect the public health and safety. This approach will lead to different compliance times, depending on the waste, the facility, the associated geosphere, the specified reference biosphere, and the critical group.

- The first part of the approach requires compliance with the numerical standard over a specified period of time. This time span should be no shorter than an estimate of the anticipated time it takes for the more mobile radionuclides to produce a peak dose to the critical group and no longer than a time period over which scientific extrapolations can be convincingly made. This time period should be determined on the basis of site-specific characteristics of the entire disposal system using modeling, analog studies, and results from laboratory and *in situ* experiments. If the disposal system fails to meet the standard during the specified time period, ameliorating actions should be required or the site should be rejected.
- The time period of compliance must be defined in concert with the reference biosphere and the critical group. Thus, the regulations also must include requirements and guidance for defining the latter on a facility-specific basis using known site characteristics and effects of long-term processes that are technically supported.
- In certain cases, the calculated time of compliance should be replaced with a maximum time of compliance such that uncertainties in performance assessment can be reasonably bounded.

- The second part of the compliance regulation is designed to be used in evaluation of the robustness of the facility over the range of external processes and events that may affect the performance of the facility over long time periods. This evaluation also will ensure that no significant changes in the dose from the disposal site will occur in the near term after the calculated time of compliance. Estimates of the peak dose from the facility beyond the time of compliance are qualitatively compared with the dose standard. This part should not become a *de facto* regulation.

Summary

The ACNW recommends implementation of regulations that will establish procedures and guidelines for setting the regulatory time of compliance for LLW disposal facilities. The recommendation proposes a two-part approach that is based on generic regulatory principles modified for LLW. This approach is supportive of the two-part program being discussed by the NRC staff and views held by a variety of national and international regulatory agencies.

We believe that our recommendations can be used to shape a robust and defensible regulation.

Sincerely,

/s/

Paul W. Pomeroy
Chairman, ACNW

Appendix A

Excerpt from ACNW letter to Chairman Selin, dated June 3, 1994, entitled "Review of the Low-Level Radioactive Waste Performance Assessment Program," Item B.6 concerning time of compliance.

B. Branch Technical Position

6. The Committee believes that there is significant uncertainty about the required time frame for PA. The presently used arbitrary numerical values (e.g., 10,000y) lack bases in either standards or regulations. The Committee recommends that, as a minimum, the time frame for site-specific PA should be guided by the dose-time profile as depicted in the draft BTP and used in conjunction with an explicit upper time limit. The

NRC staff is urged to develop a position on the appropriate time frame and submit it to the Commission for discussion, review, and approval.

Appendix B

Excerpt from ACNW letter to Chairman Selin, dated June 28, 1995, entitled "Regulatory Issues in Low-Level Radioactive Waste Performance Assessment."

TIME FRAME FOR PERFORMANCE ASSESSMENT

The Committee believes there is merit in choosing a generic maximum time frame for analyzing the safety of an LLW facility. We do caution the staff against letting time-frame limits detract from focus on the actual performance of a site-specific LLW facility.

One important attribute of the LLW field is the variability in the radionuclide content of LLW. For example, much larger quantities of long-lived radionuclides are being disposed of as low-level waste than was previously anticipated. The result is that at some sites, peak doses will occur at times longer than 10,000 years. We believe the application of peak dose calculations to be an important issue and plan to report to you on this subject after a timely review of this topic. Again, the Committee urges the principle of completeness by assessing first the safety of a specific facility and then being satisfied that it is in compliance with the regulations. Nevertheless, the BTP should identify a time period such as 10,000 years for which performance assessment of an LLW site should be completed and beyond which such analyses should not be required.

Appendix C

Excerpt from enclosure to letter of May 17, 1996, entitled "Regulatory Issues in Low-Level Waste Disposal Performance Assessment," from James M. Taylor, Executive Director for Operations, to the ACNW.

Regulatory Issue 3. - Timeframe for PA

The staff appreciates ACNW's support on the selection of a 10,000-year generic maximum timeframe for analyzing the safety of an LLW facility. The staff shares ACNW's concern that a generic timeframe should not distract from assessing actual facility performance in cases where large amounts of long-lived radionuclides are being disposed of. In particular, the staff is concerned about the appropriateness of disposing of very large quantities of

uranium at near-surface LLW disposal facilities and believes that further discussions on uranium disposal are needed with U.S. Department of Energy and U.S. Environmental Protection Agency staff.

Appendix D

Excerpt from ACNW letter to Chairman Jackson, dated June 7, 1996, entitled "Time Span For Compliance of the Proposed High-Level Waste Repository at Yucca Mountain, Nevada."

Regulatory Principles for Establishing the Time Span for Compliance

On the basis of the preceding considerations, the ACNW recommends that a two-part approach to definition of the compliance period be established for nuclear waste facilities. The first part involves the following three elements:

- (1) The time period for compliance should be based on the estimated time for release and transport of the radionuclide contaminants to reach the critical group. This time estimate should be based on geologic, geochemical, and hydrologic characterization of the site and its environs, as well as regional study of geologic processes and their potential effects on the site, and total systems performance assessment. This estimate must confirm the ability of the repository system to retain radionuclides for a minimum of several thousand years. The selection of the time of compliance must be evaluated along with the specification of the reference biosphere and critical group.
- (2) The reference biosphere and the lifestyles of the critical group should be defined on the premise that no major changes will occur in society that will significantly affect their lifestyles as they relate to risk from the repository and that the climate can be reasonably bounded. The minimum distance from the boundary of the repository to the critical group will be a major decision.
- (3) The compliance time should be sufficiently short such that extrapolations of significant processes and their rates can be made robustly with reasonably modest uncertainties.

The second part of the compliance period regulations should be based on assessments extending from the specific compliance period to the calculated time of the peak risk to the critical group. There is no definitive measure of compliance in the sense of a numeric match between a standard and the calculated peak risk, and this second part should not be allowed to become

a de facto regulation. A comparison between the standard used in the first part and the calculated peak risk should lead to identification of important performance factors that define risk to the critical group. Depending upon the extent to which the peak risk exceeds the standard, ameliorating actions to reduce this difference should be initiated, such as increasing the integrity of the engineered barriers, improving site characterization to more closely bound uncertainties, or, in the extreme, abandoning the candidate site.

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