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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

JUN 05 1990

Mr. Warren F. Flint, Chairman
Lincoln Board of Selectmen
P.O. Box 353
Lincoln Center, MA 01773

Dear Mr. Flint:

Your letter of April 23, 1990, to President Bush, enclosing your town's Warrant Article No. 34, was transmitted to us for our review and consideration. The warrant article specifically recommends rescindment of Section 10 of the Low-Level Radiation Waste Policy Amendments Act of 1985.

I would first note that the Nuclear Regulatory Commission (NRC) has not published any proposed regulations which would allow disposal of low-level waste (LLW) under the BRC provisions of the Low-Level Radioactive Waste Policy Amendments Act of 1985 (Pub. L. 99-240). However, in response to the Act, the NRC developed and published in 1986, a Statement of Policy and Procedures which outlines the criteria for considering rulemaking petitions for such disposals. I have enclosed a copy of the statement which you may find informative (Enclosure 1).

Besides this 1986 policy, the Commission continues to be active in pursuing the development of a broad policy that would identify the principles and criteria that govern Commission decisions which could exempt radioactive material from some or all regulatory controls. This broad policy, the subject of the enclosed advance notice (Enclosure 2), would apply not only to BRC waste disposals but also to other decisions which would allow licensed radioactive material to be released to the environment or to the general public. Thus, the policy would provide the basis for decommissioning decisions involving the release of lands, structures, or recycled materials for unrestricted use as well as decisions regarding consumer product exemptions. We believe that this policy, which we expect to be issued within the next few months, will serve the nation's best interests by establishing a consistent risk framework within which exemption decisions can be made with assurance that human health and the environment are protected. Such a policy would also contribute to the focusing of our radiation protection resources on those risks of greatest concern.

In specifically commenting on the warrant and your transmittal letter, I have addressed the specific statements contained therein with the hope that such an approach will best enhance the dialogue on the Below Regulatory Concern (BRC) issue. My first comment, in this regard, addresses the statement in the warrant that the ". . . Congressional Bill . . . would permit unregulated dumping throughout the United States of one-third of the nation's low-level radioactive waste . . . ." Although this statement contains elements of fact, when taken as a whole, I believe it mischaracterizes in two critical ways the true issues involving potential disposals of BRC waste. First, the warrant appears to convey the erroneous impression that a class of hazardous material is being considered nonhazardous by declaration - a process certain public interest groups have deridingly referred to as "linguistic detoxification." I believe that a full reading of Section 10 of the Low-Level Radioactive Waste Policy Amendments Act of 1985 (Pub. L. 99-240) substantiates a different view.

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The Act directs the Commission to only consider exemption of waste streams from regulation ". . . due to the presence of radionuclides in such waste streams in sufficiently low concentrations or quantities to be below regulatory concern," and where ". . . regulation . . . is not necessary to protect the public health and safety . . . ." Second, the wording of the warrant does not convey the fact that any implementing NRC regulations (e.g., one allowing BRC waste disposals from NRC-licensed facilities) would include record keeping, and the possibility of other appropriate controls or constraints against which inspections, compliance determinations, and enforcement actions could be taken.

I would also note that the reference to one-third of the nation's low-level radioactive waste being dumped in an unregulated fashion is not included in the Act. Rather this reference may originate from views expressed by the nuclear power industry and the Environmental Protection Agency. Both have indicated that about 30 percent of the low-level radioactive waste generated by volume (at nuclear power facilities) may be considered for BRC waste classification. The nuclear power industry has estimated that this volume of material would contain approximately 0.01 percent of the radioactivity contained in all their low-level radioactive waste.

Finally, I can assure you that the Commission is aware of Massachusetts and other State and local laws and resolutions which bear on the BRC waste disposal issue. In this regard, the Commission must carefully weigh the importance, on the one hand, of maintaining uniformity in matters affecting basic radiation protection standards and, on the other hand, of providing the flexibility necessary to accommodate significant concerns of States and localities.

I hope these views and the enclosed material will prove useful in responsibly expanding the dialogue on this controversial and technically complex issue. In conclusion, I want to assure you that we take our mandate to protect the health and safety of the public very seriously. As a result, we will continue to do our best in carefully and clearly responding to issues and questions raised by concerned citizens and their elected representatives.

Sincerely,

Original Signed By
Themis P. Speis

Eric S. Beckjord, Director
Office of Nuclear Regulatory Research

Enclosures:
1. Final Policy (51 FR 30839)
2. Federal Register (53 FR 49886)

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Inside N.R.C.

An exclusive report on the U.S. Nuclear Regulatory Commission

Vol. 12, No. 12—June 4, 1990

EPRI PROJECT MANAGER SLAMS NRC STAFF FOR DELAYS IN ALWR REVIEWS

Concern that a majority of the commission will demand an unreasonable—and unreasonably expensive—level of design detail before certifying advanced reactor designs is overblown, according to a critique of the commission's most recent public comments on the issue.

Prepared by Gary Vine, project manager of the Electric Power Research Institute's (EPRI) advanced LWR program, the analysis of the commission's April 27 meeting on advanced reactor certification takes a position far different than that which was generally accepted in the days after the meeting.

At that meeting, NRC Chairman Kenneth Carr and Commissioners James Curtiss and Kenneth Rogers criticized the NRC staff for proposing to amend the requirements for certifying designs of larger, evolutionary and smaller, passive advanced light water reactors (ALWR) and to avoid requiring the "essentially complete design" called for in the certification rule (10 CFR Part 52) adopted last year. The commissioners were concerned that the concept of design standardization would be compromised if the advanced reactor designs are not detailed enough.

The commissioners' pronouncements raised concerns among some in the industry that vendors might be forced to invest upwards of $1-billion in order to draw up the detailed designs the commissioners seem to be advocating.

But in his review—which was sent to Nuclear Management & Resources Council President Byron Lee and others on May 4—Vine portrayed the commissioners as generally supportive of the industry's position on what level of detail is needed in order to certify a design. Vine also argued that the NRC

(continued on page 10)

COMMISSIONERS APPROVE ERC POLICY DESPITE WARNINGS OF POLITICAL TROUBLE

The NRC commissioners have finally voted their approval of the controversial policy statement on exemptions from regulatory control, ending months of in-house hassling over its effects. But in the real world, the controversy may be only beginning.

As confirmed by knowledgeable officials, the vote "by notation"—each commissioner signs a memorandum at his desk—was described as "four and a half to a half," indicating that at least one of the five commissioners still had some doubts. Agency sources said the staff is still revising the final policy statement based on the commissioners instructions and that it will likely be several months before it is published in the Federal Register.

Before the commissioners voted, two recent reports on Chairman Kenneth Carr's campaign to deregulate some very low-level radioactive waste by declaring it either below regulatory concern (BRC) or exempt from regulatory control (ERC) had brought him gloomy or argumentative news on ERC, which he has called one of his "top priorities."

Last month, an in-house situation report to the commissioners from Carlton Kammerer, NRC's director of state programs, reeled off a formidable list of state and local legislation designed specifically to thwart the purpose of BRC and ERC. The general purpose is to allow the disposal of low-level radioac-

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tive waste in municipal landfills, sewers, and solid waste incinerators by declaring it outside of NRC control.

Under this policy, disposers of low-level radioactive waste can theoretically petition a plainly, if not eagerly, receptive NRC to dump in landfills as routine trash such mildly irradiated material as, say, plant workers' coveralls. But NRC has received no BRC petitions to dump. Leery of the public relations backlash, no generator of low-level waste has applied.

During months of back-and-forth hassle with the staff—compounded by fretting over Environmental Protection Agency (EPA) radioactivity standards—the commissioners have been considering as a next step the formal policy statement on exemptions from regulatory control—now approved.

This is the commission's second strategy in complying with the Low-Level Radioactive Waste Policy Amendments Act of 1985, and it would expand BRC by also releasing from NRC regulation land and buildings contaminated at low-levels of radiation. That may prove to be as unpopular as the BRC initiative.

As evidence, Kammerer's memo to the commissioners reported that Maine already had passed a law effectively negating any BRC dumping petitions the commissioners might approve there. Kammerer did not return telephone queries about any subsequent state actions, but other NRC reports now list Minnesota and Iowa as newly equipped by statute to bar BRC waste from any storage, treatment, recycling or disposal facility not specifically licensed for low-level waste. In Vermont, Gov. Madeleine Kunin is expected to sign a similar bill cleared by the legislature. The NRC press office said Virginia has passed a joint resolution against BRC dumping, and similar legislation is in committee in Pennsylvania and Massachusetts.

In his memo, Kammerer warned the commissioners that Connecticut, Delaware, Massachusetts, Minnesota, New Hampshire, Pennsylvania, Vermont, and West Virginia were considering statewide prohibitions of unlicensed BRC disposal, and that towns, cities, and counties had already done so in California, Ohio, New York, Massachusetts, and Michigan.

"The commission should expect to see more of this state and local legislative activity, particularly once it adopts a final policy on exemptions from regulatory control," Kammerer advised.

That wasn't all. Last week, Public Citizen's Critical Mass Energy Project, a Ralph Nader adjunct, joined the fray. In its report, Critical Mass stirred the pot by asserting that BRC and ERC would "release radioactivity into the soil, air, water, and food chain (that) could significantly increase the number of fatal cancers in the U.S. each year."

In a heavily foot-noted six-page paper called "Deregulating Radioactive Waste Disposal: A Status Report," Critical Mass said NRC's proposed policies "would permit higher amounts of radioactivity in consumer products" by opening "some contaminated land and buildings" for unrestricted use, including manufacturing.

Quoting from a 1988 version of NRC's policy statement on exemptions from regulatory control, the Critical Mass study said the commissioners concluded that one additional cancer death per 100,000 persons—which Critical Mass extrapolated to 2,500 deaths per total U.S. population—is "of little concern to most members of society."

Critical Mass said the cancer risk, in fact, is five deaths per 100,000 exposed persons, and that a recent report by the National Research Council of the National Academy of Sciences (in Critical Mass' words) "suggests that the cancer risk from such a level of exposure may be almost 60% higher than NRC's estimate."

"The NRC's impending BRC and ERC policies are not a rational effort to allocate regulatory resources more efficiently as NRC claims," the Critical Mass paper concluded. "Rather, the policies are evidence that this country's attempts to address the growing amounts of 'low-level' radioactive waste are failing. The existing commercial 'low-level' waste sites are closed, closing, or about to restrict severely whose wastes will be accepted. The federal government's desperate effort to hand the problem to the states is in trouble."—*Ben A. Franklin, Washington*

'BIG M VERSUS LITTLE m': UTILITIES, NRC STAFF DIFFER OVER MAINTENANCE

Utilities and NRC staff differ significantly on the connection between maintenance and component failures—a differing perspective that came to be referred to during a maintenance indicator demonstration project as "Big M versus Little m."

In a draft report released last month on the demonstration project, NRC's Office for the Analysis & Evaluation of Operational Data (AEOD) noted that NRC staff in its review of records from Nuclear Plant Reliability Data System (NPRDS) determined that 84% of about 4,000 component failures were related to maintenance—the Big M perspective. Utilities, on the other hand, during the demonstration

project categorized only 14% of such failures as due to maintenance—the Little m perspective. The difference, AEOD said, is that many of the failures the staff assigned to maintenance the utilities assigned to wearout (35%), design (25%), random (7%), or unknown (17%) causes.

With such results, it is not surprising that the utility industry has serious reservations about NRC's development and use of a maintenance performance indicator and why it has resisted the imposition of any new, maintenance-specific rules.

The AEOD report (AEOD/S804C) noted that utilities list design deficiencies as causing component failures about eight times more than NRC staff does. "Such a difference is understandable," AEOD said, "in that the regulatory perspective of maintenance includes the feedback of experience gained through engineering and design modifications used to eliminate component performance problems."

But utilities don't necessarily share this regulatory perspective. For instance, Northeast Utilities, one of the participants in the demonstration project, determined that at Millstone-3 it was more cost-effective to simply periodically repair a marginally designed main feedwater pump seal rather than to pursue a design improvement.

NRC STAFF SAYS UTILITIES SHOULDN'T HAVE TO BACKFIT SAFETY-GRADE PORVs

NRC staff is recommending to the commission that utilities with operating plants or construction permits should not be required to replace commercial-grade PORVs (pressurizer power-operated relief valve) with safety-grade components even if their applications are essential to plant safety.

In a Secy paper to the commission, NRC staff said that in evaluating the generic issue of PORV reliability, it determined that "the role of the PORVs has changed such that PORVs are now relied on by many Westinghouse, Babcock & Wilcox, and Combustion Engineering designed plants with PORVs to perform one, or more, of the following design basis safety-related functions:—"Mitigation of a steam generator tube rupture accident;—"Low temperature overpressure protection of the reactor vessel during startup and shutdown, or;—"Plant cooldown in compliance with Branch Technical Position...'Residual Heat Removal System.'"

Nonetheless, the staff concluded "it is not cost-effective to replace (backfit) existing non-safety-grade PORVs and block valves (and associated control systems) with PORVs and block valves that are safety grade even when they have been determined to perform any of the safety related functions."

The staff emphasized that since 1983, it has required all plants with PORVs intended for any of the specified safety functions to have safety-grade components. That, however, represents less than one-quarter of the nation's 114 licensed plants.

For PWRs in the future, the NRC staff said that when PORVs and the associated block valves are used for any of the specified safety functions, "these components should be classified as safety related."

The staff has also drafted for commission review a generic letter that would resolve the broader issue of PORV reliability which, historically, has been poor. To support a resolution of the generic issue (GI-70), NRC contracted with Oak Ridge National Laboratory (ORNL) to conduct a study of PORV and block valve operating experience and with Brookhaven National Laboratory (BNL) to perform a study on the estimated risk reduction from improved PORV and block valve reliability.

ORNL, according to the agency, concluded that upgrading PORVs and block valves on existing plants would improve reliability, but BNL's study "showed only a small potential decrease in core melt probability due to increased PORV and block valve reliability."

NRC acknowledged, however, that "this was in part because, by staff direction, the (BNL) study did not include consideration of events beyond the design basis, such as feed and bleed capability." It is in the latter situation, where PORVs might have to be opened and closed repeatedly at high pressures, where reliability is the issue, NRC critics charge. In fact, that was the issue raised by many NRC critics following the Three Mile Island-2 accident in 1979.

NRC staff, however, insists that "subsequent to the TMI-2 accident, a number of improvements were required of PORVs and block valves, such as requirements to be powered from Class 1E buses and to have valve position indication in the control room." Therefore, the agency argues, "any additional improvements in reliability that would result from upgrading PORVs to full safety-grade status are considered to be of marginal benefit.

"The staff has concluded that for operating plants and plants under active construction, the most cost-effective improvements in reliability can be derived from adding these valves to the operational quality assurance list, implementing a maintenance program based on manufacturer's recommendations, including the PORVs and block valves in the American Society of Mechanical Engineers (ASME) in-service testing program, and maintaining power to the block valves."

NRC STAFF CITES THREE OPTIONS FOR DEALING WITH BWR POWER OSCILLATIONS

BWR operators have three options for addressing the possibility of power oscillations at BWRs, according to a staff paper to the NRC commission, but only one—involving new, unreviewed software and methodology—may be satisfactory for all BWR designs.

At issue in the Secy paper is the NRC staff's review of the generic implications of power oscillations that occurred at Commonwealth Edison Co.'s LaSalle-2 in March 1988. The incident involved loss of both recirculation pumps leading to neutron flux oscillations peaking at least as high as 118% power (INRC, 4 July '88, 1).

The three options were recommended by the BWR Owners Group (BWROG), which, following the LaSalle power oscillations, established a task group to investigate how best to resolve the core instability issue for BWRs.

For reactors of the BWR-3 or BWR-5 designs, the most simple and practical response for utilities to the possibility of power oscillations is an analysis that would lead to an automatic scram preventing operation within a predefined area of the power and flow where instabilities are considered likely. NRC said it expects to complete the final analyses needed for licensing closure no earlier than September.

For a BWR-2, according to the Secy paper, NRC believes the average power range monitor (APRM) signals can provide sufficient protection against both in-phase and out-of-phase instability modes. BWROG had found through analysis that ARM signals do "not provide protection against the local high neutron flux that can occur during out-of-phase modes of instability." The Secy paper added, "further, the calculations showed that the critical power ratio safety limits could be exceeded in violation of the general design criteria 10 and 12."

For utilities that pursue this option, NRC staff said it anticipates that licensees will prepare plant-specific documentation.

The third option is not limited to particular BWR design types but does involve "advanced technology consisting of new software and methods employed in a microprocessor-based Class 1E (safety-related) hardware system. Staff review will be required to address concerns with the design implementation."

NRC staff describes it as "a conceptually simple solution that should provide the reactor with ample safety margins in the event of an instability. Again, the staff said it does not expect to complete its analyses before September.

NRC said the earliest date for generic resolution of the issue is the end of 1990, with review and close-out of the proposed long-term solutions expected within three months of the utilities individual submittals.

NRC STAFF SAYS THAT IT HAS FOUND NO IMPROVEMENTS FOR CONTAINMENTS other than Mark Is that would warrant generic implementation for all containments of a given type. But staff also says that it has identified a number of potential improvements that licensees should consider as part of their individual plant examinations (IPE).

A generic communication containing staff's insights of potential improvements has been approved by the commission and will be forwarded to licensees shortly. The commission slightly amended the staff's proposed generic communication, instructing the staff to tell licensees that during an IPE, a search should be made "for possible 'outliers' that might be missed absent a system search in areas of both mitigation and prevention."

For the nine BWRs at six sites with Mark II containments, the staff recommends that venting be evaluated using plant-specific hardware and procedures to determine how best to maximize the benefit from venting and minimize potential downsides. Staff says it also recognizes that "other potential means of improving the reliability of suppression pool cooling systems exist and may be investigated on a plant-specific basis as an alternative to venting."

For the four BWRs with Mark III containments, the staff says that licensees should also consider improvements to venting. In addition, staff notes that a potential vulnerability for Mark III plants involves station blackout during which hydrogen igniters would be inoperable. "Under these conditions," staff says, "a detonable mixture of hydrogen could develop which could be ignited upon restoration of power." This potential vulnerability should be examined in the IPE process, staff says.

For the 10 reactors with ice condenser containments (one under construction and one deferred), containment failure resulting from uncontrolled hydrogen burns or detonations is "a potentially important failure mode," staff says. This failure, which should be investigated as part of the IPE process, could occur, staff says, in a station blackout if power to the hydrogen igniter system is lost, high con-

centrations of hydrogen are produced as a result of core degradation, and power is then restored at a later time.

For the 63 PWR plants with large dry containments, hydrogen combustion "on a global basis is not believed to be a significant threat," staff says. And it notes that hydrogen control strategies for dry containments are being investigated as part of the accident management research program. However, staff says, it may be possible for combustible mixtures of hydrogen to build up in localized compartments of dry containments and damage equipment. Owners of dry containments, staff says, should, as part of the IPE process, "examine locations of possible hydrogen evolution and evaluate the potential from damage to important equipment due to localized detonations." Staff also said that it plans to determine whether consideration of hydrogen control under the IPE and accident management research program will resolve generic issue 121 (Hydrogen Control for Large Dry PWR Containments) and will make a recommendation on resolution of this issue in the near future.

NRC OFFERS LICENSEES 'TIPS' ON HOW TO SPOT COUNTERFEIT VENDOR PRODUCTS

Still worried about "the growing number" of illegally misrepresented counterfeit replacement parts finding their way into safety-related reactor applications, NRC's Office of Nuclear Reactor Regulations (NRR) has issued Supplement 1 to its October 1989 bulletin (Information Notice 89-70) "to provide the industry with some tips for detecting misrepresented vendor products."

The helpful "tips" format reflects NRR's view that detection of counterfeits is difficult because licensee quality assurance programs "generally have assumed vendor integrity and are not focused on identifying intent to deceive."

Drawing on NRR's experience, the tip sheet lists characteristics of "components, products, and services that have been previously identified as having been misrepresented." The list includes:

All inexpensive components with a high turnover rate; which cannot be uniquely marked; which are used in both critical and noncritical applications; which are obsolete and hard to find, and whose use may not give them a used appearance.

Another list includes specific parts or services that NRR knows have been misrepresented, including valves, circuit breakers, fuses, fasteners, fittings and flanges, and eddy current testing.

Parts listed as "vulnerable to misrepresentation" include O-rings and seals, lubricants, adhesives, electrical connectors, motor controls and relays, DC and AC power supplies, bus transfers, generators and motor generator sets, printed circuit boards, splices, vacuum breakers, panel lights and switches, isolation devices, welding materials, piping and pipe supports, spent fuel pool cooling pumps, and diesel generator speed governors, injection pumps and fuel transfer pumps.—*Ben A. Franklin, Washington*

EXECUTIVE BRANCH SUPPORTS NRC RULES ON WASTE EXPORTS/IMPORTS

The U.S. State Department and other executive branch agencies say they support an NRC initiative to develop specific licensing requirements for the export and import of radioactive waste, particularly low-level waste (LLW). The Nuclear Management & Resources Council, however, opposes any new regulations in this area, saying that they are not needed and that they could lead to efforts to impose new requirements on domestic transport of LLW.

NRC published an advanced notice of proposed rulemaking February 7 asking for comments on various options for controlling any radioactive waste imports or exports. The agency noted that there have been a number of inquiries regarding the import of foreign waste into the U.S. for disposal and that the U.S. does not currently have a national policy with respect to transfers of radioactive wastes. Among the options proposed was one that called for amending current 10 CFR Part 110 regulations to require that a specific license be obtained for export/import of any radioactive waste.

In comments, the State Department, on behalf of DOE, and the departments of Defense and Transportation, called the above option "reasonable." It added that such regulations "should be structured flexibly...to ensure, through advance notice of proposed imports and exports, the opportunity to control such imports and exports based on the consent of the ultimate recipient importing state."

Numarc, however, in its comments disagreed that new regulations are necessary, given that NRC did not identify any specific instances where current rules were found inadequate to protect public health and safety. Numarc also said that changing the agency's rules "could have a significant impact on the regulation of domestic transportation of radioactive materials. For example, the commission does not require prenotification of most shipments of LLW, nor does it require a specific license to make such shipments....Yet, if the commission were to impose such requirements on imports and exports of radioactive waste, question could be raised as to whether similar regulations should be imposed on domestic shipments."

LIKE THE BIG GUYS, BYPRODUCT LICENSEES NOW NEED DECOMMISSIONING PLANS, TOO

An NRC deadline requiring suppliers and users of radioactive byproducts in industrial, medical, pharmaceutical and research labs and clinics to have decomissioning plans, with funding commitments to finance them, is closing in on up to 1,000 operators of radioisotope facilities licensed by the NRC. Theoretically, they are subject to stiff fines if they do not comply, but according to NRC enforcers the heat will not be turned on for a while.

By July 27, an estimated 750 to 1,000 users, processors, and laboratory mixers of the hundreds of radioisotopes now commonly employed in industrial and scientific instrumentation, diagnostic and therapeutic medicine, agriculture, and space research must file with the NRC roughly the same kind of decommissioning plans and financial assurances required of licensees of nuclear power reactors since 1988.

The last business-owned U.S. byproduct production reactor shut down in April, so none of the installations affected include an operating reactor. The decontamination work covered by the new decommissioning guarantees will largely involve such things as "hot sinks," ventilation ducts, laboratory equipment, and laboratory and clinic floors and walls.

For electric power reactors, NRC's 1988 decommissioning requirements called for dedicated set-asides of $105-million to $130-million per reactor to guarantee final cleanup—future money, available for no other purpose than decontaminating retired power plants. Although these NRC financial assurance figures are regarded by some as too low, that debate may have become somewhat moot. If there is a surge of utility applications for reactor lifetime extensions under the 20-year license renewals now being promoted by NRC, decommissioning issues at those plants would be moved to a back burner.

In computing the new decommissioning obligations to be imposed on the byproduct industry, licensees are to be cued about their obligations by a complex NRC formula based on the half-life and volume of the radioactive materials handled. Isotope facilities which fall within the parameters of the new decomissioning rule must show proof of dedicated decommissioning funding ranging from $75,000 to $750,000.

What this actually means is that, of the 8,000 or so byproduct facilities licensed directly by NRC, most will escape the decommissioning guarantee requirements because they use radioisotopes with short half-lives (under 120 days) and in small quantities. Moreover, for the time being at least, other hundreds or thousands of byproduct facilities (NRC officials say they are not sure of the number) escape the impending deadline by lucking out geographically—by being located in one of the 29 so-called NRC agreement states.

NRC has delegated to state agencies the authority to license and inspect radioisotope facilities in Alabama, Arizona, Arkansas, California, Colorado, Florida, Georgia, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maryland, Mississippi, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Oregon, Rhode Island, South Carolina, Tennessee, Texas, Utah, and Washington.

Vandy Miller of the NRC's state programs office said the July 27 deadline "will have no immediate impact" in the agreement states. The states will have three years to make their decomissioning rules compatible with NRC's, Miller said. In other ways, too, the July 27 deadline comes with what seems something less than dramatic force.

According to John Glenn, chief of the medical, academic, and commercial safety branch of NRC's Office of Nuclear Material Safety & Safeguards, "we are going to be very demanding of certain information" by the July 27 deadline, "but we probably won't be immediately fining anyone." Instead, Glenn said, "we will try to be a little helpful if some submissions are incomplete. We haven't fully worked out yet what kind of time schedule we will give them to come into complete compliance."

If that seems confusing, nuclear power industry consulting firms which have lost business in the static power reactor industry can rejoice a little at a potentially new market for their how-to-comply counseling. The lack of new construction in nuclear power that has brought such ennui to the utility reactor industry has no parallel in byproduct use.

According to the Oak Ridge National Laboratory (ORNL), which was a pioneer U.S. supplier at the threshold of radioisotope technology in the 1950s, byproducts have grown to a $250-million-a-year industry, used in as many as 40,000 medical procedures a day in American hospitals and clinics practicing nuclear medicine. According to ORNL's quarterly "Review," radioisotopes are involved in the diagnosis and/or treatment of about half of all patients admitted to hospitals in this country. Yet, the ORNL journal notes, "the terms 'nuclear' and 'healing' are seldom linked in the public's consciousness." Or, in fact, linked with Oak Ridge.

Because ORNL is a government facility, operated for DOE by Martin Marietta Energy Systems Inc., it is forbidden to compete with commercial suppliers of radioisotopes. The last U.S. commercial byproduct reactor supplying isotopes, closed last month, was operated by Cintichem of Tuxedo, N.Y., a division of Medi-Physics, which is a subsidiary of Hoffman-LaRoche, Inc., the international pharmaceutical company.

Even though that reactor is closed and will be decommissioned, officials familiar with the radioisotope industry said its absence is unlikely to revive ORNL reactors as isotope producers. When they are running—Oak Ridge reactors are just coming back from several years of shutdown for DOE safety reviews—ORNL is chiefly committed to research. The primary U.S. suppliers of radioisotopes now are in Canada, and market forces are likely to keep it that way, industry officials said.

—Ben A. Franklin, Washington

NRC IS EXPECTED TO PROPOSE CHANGES TO ITS FITNESS-FOR-DUTY RULE that will empower agency staff to determine whether a utility's program is too restrictive. By a three-to-two vote, the NRC commission decided to proceed with a proposed rulemaking, to be published soon in the Federal Register.

The action came in response to questions raised by the Tennessee Valley Authority (TVA) over whether a nuclear plant worker who tests positive for illegal drug use on initial testing should be taken off his job before the results are confirmed by a second round of tests (INRC, 23 April, 5).

The commission's vote at the end of April followed an April 13 Secy paper from Executive Director for Operations James Taylor in which he said that NRC staff had taken issue with TVA's fitness-for-duty program but did not think it had authority under the agency's rule to compel TVA to make its program less restrictive.

TVA's fitness-for-duty program requires removal of an employee who tests positive for drug use on the first round of testing, whereas the NRC rule prohibits barring the employee from his duties until a second round of testing confirms drug use.

NRC staff has argued that the agency's fitness-for-duty rule seeks to balance utility management's safety concerns against the employee's right to privacy—that is, an employee shouldn't be barred from his job based on an initial test which may prove to be wrong on subsequent analysis.

In the Secy paper, NRC staff recommended that the commission agree to rewrite a section of the rule to explicitly prohibit the temporary suspension of an employee on the basis of an initial test result. But staff also said that the commission should consider the wisdom, from a safety standpoint, of allowing immediate suspensions.

NRC's Office of General Counsel basically agreed with TVA's position, emphasizing that because safety is the agency's mission, it's difficult to defend a rule that seeks to balance any interests other than purely safety-related ones.

TVA, according to spokesman Tom Price, "is trying to remain firm in its position that we'll take them off the boards until the tests are completed."

NIAGARA MOHAWK OPERATORS BLOW FEEDWATER PUMP TEST AS OFFICIALS WATCH

It took only six seconds but it left egg on the faces of operators at Niagara Mohawk Power Corp.'s Nine Mile Point-1. NRC officials, including Commissioner Kenneth Rogers, were visiting the unit May 23 when operators, unaware of a closed suction valve, started up a motor driven feedwater pump and ran it dry.

The entire incident lasted only six seconds, but it took maintenance personnel more than 24 hours to decouple the pump and tear it down. They determined that the pump was undamaged. Feedwater pumps and their bearings are water-cooled and, according to industry officials, if they run without water, they will destroy themselves in well under a minute.

William Young, deputy director of Region I's operations branch, and Larry Burkhardt, Niagara Mohawk executive vice president for nuclear power, were joined by other NRC resident and utility personnel to witness the ill-fated startup of the feedwater pump. (Rogers was on site but not there at the time.)

The six-second performance, according to an NRC official, involved at least one, maybe two, violations of procedures. Apparently, the night shift had changed the suction valve position a few days before the feedwater pump test and did not advise the operators who were conducting the test. Those operators also failed to notice that the valve was closed.

Niagara Mohawk has a history of problems with the Nine Mile Point-1 feedwater system, and a spe-

cial NRC team inspection in 1988 specifically questioned the adequacy of utility testing for the feedwater and high pressure injection system. The unit has been shut down since December 1987, and Niagara Mohawk had been aiming at restart by the end of May. The pump startup was part of a special test to validate system performance. That test is a restart requirement.

NRC officials said the incident probably won't set the utility back any further in the path to restart. "What really took time," said one NRC official, "was doing a root cause analysis of the incident, sitting down with the operators, going over the lessons learned, seeing who did what or who didn't do what, and seeing what can be done to bolster operator training in that area."

SALP REPORTS . . .

SALP HISTORY REPORT

REGION: II
PLANT NAME: Surry

RPT	ASSMT. PERIOD	OPS	RCON	MNT/SURV	EP	SEC	ES	SA
9/89	5/88 - 6/89	3	3	3	3	1	2	3
5/90	7/89 - 3/90	2	2	3	1	1	2	2

Note: NRC's SALP program was revised June 8, 1988 (revision to NRC Manual Chapter 0516) and several new categories were created, while others were dropped. For instance, the maintenance and surveillance categories were combined, and the safety assessment/quality verification area now incorporates what were previously the separate areas of licensing and quality programs.

FOOTNOTES:

RPT - date report issued
ASSMT. PERIOD - assessment period
OPS - plant operation
RCON - radiological controls
MNT/SURV - maintenance, surveillance
EP - emergency preparedness
SEC - security
ES - engineering/technical support
SA - safety assessment/quality verification
N - not rated

Category 1 - Licensee management attention and involvement are readily evident and place emphasis on superior performance of nuclear safety or safeguards activities, with the resulting performance substantially exceeding regulatory requirements. Licensee resources are ample and effectively used so that a high level of plant and personnel performance is being achieved. Reduced NRC attention may be appropriate.

Category 2 - Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are good. The licensee has attained a level of performance above that needed to meet regulatory requirements. Licensee resources are adequate and reasonably allocated so that good plant and personnel performance is being achieved. NRC attention may be maintained at normal levels.

Category 3 - Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are not sufficient. The licensee's performance does not significantly exceed that needed to meet minimal regulatory requirements. Licensee resources appear to be strained or not effectively used. NRC attention should be increased above normal levels.

NRC FINDS SIGNIFICANT IMPROVEMENTS AT VIRGINIA POWER'S SURRY

Virginia Power earned improved ratings in four of seven functional areas for its performance at Surry during NRC's latest systematic assessment of licensee performance (SALP). Only one area—maintenance/surveillance—was rated a low Category 3. But even here the agency said it detected an improving trend.

Region II Administrator Stewart Ebneter said that there were "a few common threads" that were "major contributors to the overall improved performance." He cited "the improvement in safety attitude," "increased management involvement in all activities," and "the progress made in self-assessment."

Ebneter added, though, that while "significant improvements have been made, there are some areas that are more resistant to change—the most notable being maintenance. Improvements have been made in this area, but they are slower to take hold, and this requires increased management attention to over-

come deep-seated issues such as backlogs, scheduling, and work control."

In the area of operations, the report noted that both units "exhibited improved sustained performance during the middle and latter part of the assessment period with no automatic reactor trips occurring during the latter half of the period."

According to Nucleonics Week, Surry-1 and -2, both 824-MW Westinghouse PWRs, had gross capacity factors in 1989 of 46.30% and 13.08%, respectively. Through March 1990, the units' capacity factors were 99.07% and 97.01%, respectively.

In the area of radiological controls, the report said the utility's performance "continued to improve." It said that with management now strongly supporting the radiation protection program, "most radiological control indicators such as collective dose, contaminated floor space, and personnel contamination events decreased during the assessment period."

CARR REJECTS WPPSS COMPLAINT THAT PRESS RELEASES ON NRC FINES ARE UNFAIR

NRC continues to believe that publicizing the fines it imposes on utilities is a good idea, and the agency is not receptive to changing that policy.

Carl Halvorson, chairman of the executive board of the Washington Public Power Supply System (WPPSS) wrote Chairman Kenneth Carr complaining that the agency's press releases announcing such civil penalties are often "exploited by the media and special interest groups to distort the largely exemplary performance of the industry." Halvorson wrote to Carr earlier this year after WPPSS received two proposed civil penalties from NRC. But Halvorson said that his letter was not prompted by those notices. "I have had these thoughts in mind for some time," he wrote Carr.

Carr replied that it is NRC "enforcement policy" that fines receive "substantial attention by the public" as an enhancement of enforcement actions and that publicity is "an important incentive to licensees to adhere to a rigorous standard of compliance."

Without specifying an alternative, Halvorson's letter suggested "some better options" than public announcements of NRC fines. He said press releases reporting cash penalties make the NRC "an unwitting accomplice in this misleading of public perception" by conveying "the impression of significant safety indiscretions by the operators." The publicity, he said, is more costly than the monetary fines.

Halvorson conceded that "$50,000 may not be much of a hit to a multi-billion dollar utility." But he wrote that "in the mind's eye of millions of individuals reading the report in a newspaper or listening to it on TV or radio, it is a large amount of money, so the infractions must be egregious and are equated with safety infractions or shoddy operations in the mind of the recipient."

Of the $50,000 penalty, Halvorson suggested that "these smaller fines are counterproductive to the industry and the NRC in that they conjure up images of malefactions far in excess of reality and are used by special interest groups to paint the most negative picture possible."

Carr replied, in effect, that that was exactly the point. He said: "It has always been the agency's policy to publicly announce proposed civil penalties to ensure that the public is not only aware of the NRC's concerns but also that steps are being taken to address them. I agree with this policy."

—Ben A. Franklin, Washington

THE LONG ISLAND POWER AUTHORITY (LIPA) TOLD NRC officials recently that decon now appeared to be the best route to take in decommissioning Shoreham and that a decommissioning plan would be submitted to NRC sometime next year.

Though the power authority plans to apply for a license transfer this month to take over Shoreham from the Long Island Lighting Co. (LILCO), the actual transfer will be held up until NRC issues a defueled license for the plant. A defueled license would bar any operation of Shoreham.

The decon approach now under consideration would involve the removal or decontamination of irradiated equipment or structures to release the site for unrestricted use and to terminate the NRC license. Though the asset transfer provides that LILCO will pay all costs related to the license transfer, maintenance, and decommissioning of Shoreham, NRC officials expressed concern during the May 24 meeting about the cost of the decommissioning plan.

Thomas Murley, director of NRC's Office of Nuclear Reactor Regulation, said he was concerned about the plant incurring unforeseen costs that could not be paid for and cautioned that NRC would have to look at the financial aspects very carefully. Another meeting might be scheduled this fall on that issue.

Meanwhile, LIPA is working on establishing a framework for such things as quality assurance and training, securing additional support personnel from the New York Power Authority and LILCO, and reviewing a study on the merits of converting Shoreham to a gas-fired plant.

NRC CONSIDERS ISSUING INFORMATION NOTICE ON GE CIRCUIT BREAKERS

NRC is considering issuing an information notice on problems with some General Electric (GE) molded case circuit breakers. The agency is concerned that GE did not adequately test its breakers before selling them to utilities.

The issue involves undervoltage devices in "E" frame-sized breakers that were designed and assembled in different places, said William Russell, NRC's associate director of nuclear reactor regulation. The assembly resulted in interferences in the trip function, he said.

Manufactured in Puerto Rico and Mexico, assembled in Knoxville, Tenn. and "dedicated" and tested in San Jose, Calif., the commercial-grade breakers were inoperable because of binding of the overcurrent trip device, caused by the improper installation of undervoltage devices, according to NRC.

NRC's vendor branch has inspected GE's Knoxville facility where undervoltage devices are installed. The agency is looking into the root cause of the problem and its scope. Bill Brach, chief of NRC's vendor inspection branch said that if the problem involves more than a couple of plants, the agency will issue an information notice, but preliminary information indicates that the problem is not widespread. "There might just be one plant," Brach said.

In early May, five of seven GE molded case circuit breakers failed during pre-installation testing at GPU Nuclear Corp.'s Oyster Creek. The breakers, which were all in one batch, did not pass the utility's current trip test and were sent back to GE, said GPU spokesman Karl Neodenien.

What concerns NRC is that the problem was not caught before GE shipped the breakers. "GE's quality program should have found out about the problem....instead of Oyster Creek," said NRC's Russell. "GE should look into this."

GE is now reviewing its dedication program under NRC's 10 CFR Part 21 rules, which require identifying and evaluating a deficiency to see if it represents a safety hazard. The review started in early May and should be completed sometime in June, said George Stranback, GE's safety evaluation programs manager. A root cause for the failure identified at Oyster Creek has not yet been determined, but GE will inform its customers of its findings once it completes its investigation.

NRC expects further action on this issue with additional inspections planned, and the Institute of Nuclear Power Operations has sent out a notice on the issue.—*Jennifer Nelson, New York*

ALWR DESIGN CERTIFICATION *(continued from page 1)*

staff is guilty of either not recognizing or ignoring information already provided to the agency that would allow the staff to determine whether an advanced design meets NRC requirements.

"I think your first challenge is to convince the (NRC) staff to stop making excuses for why they cannot resolve issues now," Vine wrote in his letter to Lee.

Though he acknowledged that, in the days right after the NRC meeting, members of Numarc's working group on standardization had a "general feeling" that the commissioners' expectations regarding the degree of standardization and the level of design detail "were unreasonable and unworkable," Vine argued that, on balance "the commissioners are entirely reasonable in their expectations for standardization and level of design detail." He maintained, however, that what the commissioners actually said at the meeting and what has been attributed to them are quite different.

In the letter, Vine takes issue with several statements made by Thomas Murley, director of the Office of Nuclear Reactor Regulation (NRR). For example, Vine characterized as "misleading" Murley's contention that $1-billion in engineering effort might be required to make safety judgments about advanced reactor designs. Murley based that ballpark figure on the industry's experience at Northeast Utilities' Millstone-3.

Vine argued that the number is "clearly misleading because most of that level of engineering goes way beyond the level needed to make safety judgments—if the judgments are made early as required by (Part 52), not strung out over the entire project as has been the staff's past practice."

"By implying he needs all that engineering work done to resolve issues and make safety judgments, Murley leaves the commissioners no choice but to expect more engineering work done than would be necessary if the staff managed their reviews as intended by (Part 52)," Vine added. "Clearly staff is not comfortable with making decisions that they cannot change and change again during construction. Commission comments calling for adequate engineering detail...are frustrated attempts to get Murley to agree to ask for sufficient information to make safety judgments—no more, no less."

Vine also noted the three commissioners' repeated concerns that the NRC staff will rely too heavily on the so-called ITAAC document in determining whether a plant meets NRC requirements. At the April 27 meeting, Murley said the staff was thinking that "where it's not possible to provide the kind of

details that the staff normally has on a Final Safety Analysis Report for a completed plant, we could put that into the ITAAC document, which is the inspections test analysis and acceptance criteria."

Though the commissioners expressed discomfort with the idea of "compensating for the lack of design information" or "taking stuff out of design" and putting it in ITAAC, Vine maintained that the commissioners' concerns "are not adverse to the concept of or need for ITAAC" and that they do not challenge Numarc's "two-tiered approach" to design approval.

"What they do challenge is Murley's idea of postponing design decisions that should be made at the design certification stage," Vine argued, adding that the commission "has two very valid reasons for questioning (the) staff approach. First, engineering detail needed to make a safety judgment cannot be left out of design certification and postponed to ITAAC, because the ITAAC is required to be developed and submitted along with the design certification.

"Second, the commissioners understand that ITAAC must work," Vine said. "The commission does not want to see significant questions or problems turn up during ITAAC, probably because they recognize the potential this has for inviting a protracted pre-operational hearing. In contrast, the staff seems content with redesigning safety equipment after the plant is built."

Vine argued that the industry groups—Numarc and EPRI—must convince Murley that, contrary to his earlier statements, a plant can be certified without $1-billion in engineering work and without the need for a prototype. Vine added that "the level of detail required to make safety judgments has already been provided in most review areas" through EPRI's ALWR Requirements Document and General Electric and Combustion Engineering standardized design documents, which have been submitted since the early 1980s.

Murley told Inside N.R.C. May 30 that the staff is "working on options to get the commission the level of design detail they want" but in a way that is workable for the industry. "I don't sense that the commissioners are reconsidering their views on the level of standardization they want," Murley said. "I think they're refining their views on what is possible to get and at what cost."

He acknowledged that the commission "does have concerns about trading off the level of detail at the beginning of the process to some sort of certification process at the end." But, he added, there is "clearly going to have to be something left until the plant is built. There is going to have to be some kind of ITAAC, regardless. The question is, how detailed is ITAAC? Is ITAAC just an inch-thick document of required tests, or is it something more? The less standardization you have (up front), the greater level of detail you need in ITAAC."

Numarc's Lee said Vine's interpretation of the commission meeting was just one of several he had read. He added that "Part 52, which includes ITAAC, will provide NRC with the necessary information to reach safety decisions and provide standardization."

Vine and the NRC commissioners were unavailable for comment.

In a related development, the commissioners were scheduled to hear today (June 4) from Edwin Kintner, executive vice president of GPU Nuclear Corp. and chairman of EPRI's ALWR Steering Committee, on Kintner's claim that a recent briefing with NRC staff did not fully represent the ALWR situation.

According to a draft presentation outline, Kintner was to address delays he believes were caused by the NRC staff in writing the Draft Safety Analysis Report (DSAR) for the ALWR. He was to warn the commissioners that meeting their requirement for "essentially complete" designs for certifications could cost more than they believe because of the time the NRC staff is taking for review.

Kintner was also slated to protest the staff proposal in Secy-90-016, which would adopt the ALWR standards as requirements. Those involved in the ALWR requirements process have complained that the EPRI document sets higher standards than needed for a future plant, with a margin within which anything would be acceptable.—*Dave Airozo and Margaret L. Ryan, Washington*

BRIEFLY . . .

— **Michigan challenges LLW policy act.** Michigan has joined New York and a citizens group in Nebraska in filing suit to challenge the 1985 Low Level Waste Policy Act Amendments. The suit, filed in U.S. District Court for the Western District of Michigan, alleges that the act violates the U.S. Constitution and Michigan's state sovereignty. Michigan is also seeking in its suit to compel NRC and DOE to supplement the environmental impact statement prepared in conjunction with implementation of NRC's rules in 10 CFR part 61. The state also wants a new EIS to consider the interrelationship of all potential LLW disposal facilities and the impact on the disposal of LLW of the reductions in volume of such waste.

— **No radionuclide provision in House clean air bill.** The U.S. House of Representatives May 23 cleared its version of new clean air legislation, but de[illegible]ted against including any provision dealing with regulations on radionuclide emissions. The bill now g[illegible] to a House-Senate conference committee. The Senate's version of the bill contains a provision that wou[illegible] give the Environmental Protection Agency (EPA) the discretion not to issue radionuclide regulations [illegible] NRC licensees if it found that the existing NRC regulatory scheme provided ample protection of the public (INRC, 9 April, 5).

— **NRC exempts SMUD from simulator requirements.** NRC has exempted the Sacramento Municipal Utility District from agency requirements that a simulator and simulator training be in place at SMUD's closed Rancho Seco plant. The exemption, according to NRC's Office of Nuclear Reactor Regulation, will not set a precedent for other shutdown commercial reactors.

SMUD requested the exemption in a February letter to NRC on the grounds that Sacramento voters opted to close the plant last June and that it was defueled in December. "There are no plant-referenced simulator or simulator devices that reflect the current defueled condition of Rancho Seco," SMUD said.

— **NRC names Minnick to reactor safeguards advisory panel.** NRC last week appointed Lawrence Minnick, former president of the Yankee Atomic Electric Co., to its Advisory Committee on Reactor Safeguards (ACRS). Minnick, who has a bachelor's degree in mechanical engineering from Worcester Polytechnic Institute, joined Yankee Atomic in 1957 as an engineer and held various positions before leaving the utility to join the Electric Power Research Institute in 1974, where he was director of nuclear engineering and operation. He rejoined Yankee Atomic in 1978 as president and board member and has been working as a nuclear consultant since 1980.

— **Canada, France sign safety agreement.** Canadian and French nuclear regulators have signed a comprehensive agreement to exchange safety-related information and to cooperate on intervention measures in event of an emergency. President of Canada's Atomic Energy Control Board (AECB) Rene J. A. Levesque and the head of France's Service Central de Surete des Installations Nucleaires (SCSIN), Michel Laverie, signed the agreement May 10 while visiting Ottawa.

— **Licensing appeal board remands 'hidden vehicle' contention on Seabrook.** NRC's Atomic Safety & Licensing Appeal Board on May 31 affirmed all but one of the licensing board's earlier decisions on emergency response at the Seabrook nuclear power plant. The appeal board said in its 101-page decision that it was reversing and remanding a portion of the licensing board's decision on evacuation time estimates (ETEs) so that further calculations could be done on how the so-called "hidden vehicles" would affect an evacuation.

Intervenors in the case had testified that there were more than 2,200 parking spaces in the emergency planning zone beach area that were not detected by aerial photographs and, therefore, not accounted for in the New Hampshire radiological emergency response plan.

Meanwhile, Seabrook generated its first electricity for commercial use May 29 as part of its power ascension program and was at 20% power the following day.

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Principal Editorial Offices: Suite 1200, 1120 Vermont Ave., N.W., Washington, D.C. 20005

Washington — (202) 663-1651, -1611 (fax)
Margaret Ryan, chief editor (Nucleonics Week)
Michael Knapik, chief editor (NuclearFuel, Inside NRC)
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New York — (212) 512-3194, -2723 (fax)
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Mark Hibbs, associate editor
Bonn — (49-228) 21-50-51

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Among the questions to be addressed:

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  - Selection of standardized equipment and components.
  - Use of standardized construction plans and procedures.
  - Use of standardized startup and operating organizations, plans, and procedures.
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- What cooperative arrangements would need to be made among potential owners of each plant within a standardized family in order to achieve the maximum benefits of standardization?

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News Advisory

U.S. NUCLEAR REGULATORY COMMISSION PREPARING TO DEREGULATE DISPOSAL OF "LOW-LEVEL" RADIOACTIVE WASTE

PUBLIC CITIZEN ISSUES STATE-BY-STATE ANALYSIS OF POSSIBLE IMPACT

For Release: May 29, 1990
Tuesday - 6:00 pm

Contact: Jonathan Becker 202-546-4996
Ken Bossong

WASHINGTON, D.C. -- The U.S. Nuclear Regulatory Commission (NRC) is expected to act shortly to deregulate as much as one-third (by volume) of the so-called "low-level" radioactive waste generated by the nation's nuclear power plants. It may also permit the recycling of some radioactive materials into consumer products. The consequent release of radioactivity into the soil, air, water, and food chain could significantly increase the number of fatal cancers in the United States each year.

These are among the findings presented in a new paper, Deregulating Radioactive Waste Disposal: A Status Report, released today by Public Citizen. The paper is based on documents obtained from the NRC as well as other government and private agencies.

At issue are two plans now under active consideration by the NRC. The first, would dramatically expand an existing policy, "Below Regulatory Concern" (BRC), which allows the unregulated and unmonitored disposal of nuclear waste whose radioactivity levels the NRC deems to be "below regulatory concern." Radioactive waste deregulated under BRC could be burned in incinerators or dumped into municipal landfills and sewers.

The second is a proposed policy, termed "Exempt From Regulatory Control" (ERC), that would increase public exposure to radioactivity by permitting radioactive materials to be recycled into consumer products and by releasing contaminated land and buildings at nuclear power plant sites for unrestricted public use.

NRC action on the ERC proposal is expected as early as June or July, and will likely be followed by consideration of an anticipated nuclear industry request to substantially broaden application of the BRC policy. The nuclear industry has argued that approval of a BRC petition could reduce its radioactive waste disposal costs by $82 million annually.

6/31

If the industry's expected petition is approved, disposal of 30% to 60% of the current and projected volume of so-called "low-level" radioactive waste from the nation's nuclear power plants could be deregulated. Nationwide, based on current (1988) rates of waste production, the volume of deregulated radioactive waste could total approximately 244,000 cubic feet each year. Pennsylvania, Illinois, New York, North Carolina, Alabama, South Carolina, and California presently generate the largest amounts of "low-level" radioactive waste whose disposal could be deregulated.

At the heart of the BRC and ERC policies is the NRC's assumption that the annual risk of one additional cancer death per 100,000 persons would be "of little concern to most members of society." That risk, projected across the population of the entire United States, equals 2,500 additional cancer deaths each year.

The NRC's own analysis, however, suggests that if people received the maximum allowable dose (100 millirem/year) envisioned by BRC/ERC, the cancer death rate could be as much as five times higher than the level it considers "of little concern." Further, recent studies by the National Research Council suggest that the impact may be significantly greater than the NRC's estimates; children may be at particular risk.

"The NRC acknowledges that there is no safe level of radiation exposure and that the health impacts of even BRC levels of radiation exposure are greater than previously recognized," charged Jonathan Becker, a nuclear waste policy analyst with Public Citizen's Critical Mass Energy Project and primary author of the paper. "Efforts to deregulate the disposal of nuclear waste illustrate the NRC's and the nuclear industry's inability to dispose of their radioactive garbage in a safe, sensible manner."

Public Citizen is consequently urging the NRC to halt all efforts to deregulate the disposal of any radioactive materials and is calling upon individual states and localities to prohibit the unregulated disposal of nuclear waste within their borders. Already, three states, Maine, Minnesota, and Vermont, have enacted legislation banning the practice, as have dozens of cities and towns across the country.

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Public Citizen is a non-profit research and advocacy organization founded in 1971 by Ralph Nader to address a range of consumer and environmental issues. The Critical Mass Energy Project is the energy policy arm of Public Citizen.

A copy of Deregulating Radioactive Waste Disposal: A Status Report, which includes a table listing the potential BRC waste on a state-by-state basis, is enclosed. Copies of the six-page paper are available for $5.00/copy from Public Citizen; copies are available to members of the media without charge.

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Deregulating Radioactive Waste Disposal
A Status Report

by Jonathan Becker

May 29, 1990

Introduction

Facing large amounts of radioactive waste and a lack of safe disposal sites, the U.S. Nuclear Regulatory Commission (NRC) may soon deregulate a large share of the nation's so-called "low-level" radioactive waste. A proposed expansion of an existing NRC policy that now permits radioactive materials to be dumped in ordinary municipal landfills would also permit higher amounts of radioactivity in consumer products. It would also allow some contaminated land and buildings at nuclear power plant sites to be used without restriction by the public. The NRC's proposals could thus subject the general public to higher levels of radiation exposure, thereby posing a significant health risk.

Background

Radioactive waste generated from nuclear power plant operations is classified as either "high-level" or "low-level." High-level radioactive waste essentially refers to spent fuel rods; everything else is called "low-level" waste. Its name notwithstanding, some "low-level" waste is actually highly radioactive.[1] It is not a "low-level" risk to public health.[2]

History of Radioactive Waste Deregulation

The notion of deregulating radioactive material for certain uses and disposal methods is not new.[3] For example, in 1954 and through the following two decades, the use, possession, and disposal of some small amounts of radioactive material was deregulated.[4] In 1981, the NRC allowed its licensees (primarily, in this case, institutional radioactive waste generators like hospitals and research facilities) to dispose of wastes with less than 0.05 microcuries per gram of tritium or carbon-14 "without regard to their radioactivity"[5] – that is, by dumping them down the drain or placing them in municipal landfills.

In 1985, however, the Low-Level Radioactive Waste Policy Amendments Act authorized the NRC to broaden its approach to permit the unregulated disposal of entire categories of radioactive materials.[6] Specifically, the 1985 Amendments stipulated that, where the NRC determines that "regulation of a radioactive waste stream is not necessary to protect the public health and safety, the [NRC] shall take such steps as may be necessary ... to exempt the disposal of such radioactive waste from regulation by the Commission."[7]

In August 1986, the NRC issued its final policy statement for deregulating categories of radioactive materials. The policy is known as "Below Regulatory Concern," or, simply, "BRC."[8] Radioactive waste deregulated under BRC may be burned in incinerators or dumped into municipal landfills and sewers, which could allow radioactivity to escape into the soil, groundwater, air, and, ultimately, the food chain.

Future Plans

The NRC is now considering an expanded version of BRC, known as "Exempt from Regulatory Control" (ERC).[9] While BRC provides for the disposal of radioactive wastes into ordinary landfills and sewers or by incineration, ERC would allow radioactive material to be recycled into a number of materials used by the public. Further, it would permit higher levels of radioactivity in consumer products, the release of contaminated land and buildings for unrestricted public use,[10] and the disposal of radioactive material into the water.[11]

Under the BRC policy the NRC must approve a petition before the unregulated disposal of radioactive waste can commence.[12] The greatest producer of "low-level" radioactive waste, the nuclear power industry,[13] has not yet filed a petition, fearing adverse public reaction.[14] An industry memo obtained by the Nuclear Information and Resource Service in April 1990 shows the industry is worried about public awareness of BRC and is seeking an opportune time to submit a petition.[15]

Such a time, in the industry's opinion, may be after the NRC submits its ERC policy.[16] The ERC policy is now going through a process of revision within the NRC, as the policy moves back and forth between the NRC Commissioners and their staff. An ERC policy was originally to be published in May. At the moment, however, it seems unlikely that will happen, and it may possibly be issued as late as July.[17] It is also not clear whether the policy will be issued as a final policy or a proposed policy, or whether public comments will be invited.[18] At least before the delays in the ERC proposal, the nuclear power industry had been considering filing a BRC petition in June.[19]

How Much Radioactive Waste Would Be Deregulated?

The nuclear power industry estimates that, of the "low-level" radioactive waste produced in nuclear power plants, approximately 30% (by volume) and 0.01% (by radioactivity) could be deregulated.[20] When decommissioning waste is included, the portion could be as high as 60%.[21] (This figure does not include military waste.) The following table gives a rough indication of about how much radioactive waste from nuclear power reactors could be deregulated in each state, and the approximate rank of each state.[22] The numbers listed under "Potential BRC Waste" are 30% of the "low-level" radioactive waste generated in nuclear power plants in that state in 1988.

Why Deregulate Radioactive Waste?

The NRC's stated justification for the BRC and ERC policies is that the resources used to regulate "low-level" radioactive waste disposal practices would be more effective if allocated elsewhere.[23] Theoretically the process should benefit the general public, but the U.S. Environmental Protection Agency (EPA), among others, has expressed doubt that anyone apart from the industry and the NRC will benefit.[24]

The actual justification for BRC may be the savings it will bring to the nuclear power industry, particularly in the course of the decontamination and decommissioning of retired nuclear reactors. In fact, the U.S. Department of Energy (DOE) considers the implementation of BRC an essential prerequisite to a serious reactor decommissioning program.[25] The life span of a nuclear power plant 20-30 years.[26] The average age of reactors in the United States as of December 1989 was 11.1 years,[27] and numerous commercial reactors are scheduled to face decommissioning in the next decade. The DOE is also waiting for BRC standards to use in cleaning up DOE military facilities. As one DOE official remarked in Congressional testimony, "One of the biggest wildcards in determining the cost of cleanup at DOE facilities is the NRC and EPA promulgation of BRC standards."[28]

BRC and ERC: the Ongoing Problem of "Low-Level" Radioactive Waste

Another reason for BRC and ERC may be that the government's efforts to bring the "low-level" radioactive waste problem under control are deteriorating. By 1978, three of the nation's six original "low-level" radioactive waste dumps had closed due to environmental problems and capacity limits.[29] By 1992, two of the remaining three plants will be closed,[30] and the last will not accept waste from outside its region.[31] Even now, there is no legal way to dispose of mixed waste (waste that is both radioactive and hazardous).[32] Even storage of such waste is illegal.[33]

In an effort to deal with the "low-level" radioactive waste problem, the federal government in 1980 passed legislation giving each state responsibility for the "low-level" waste generated within its borders. Since far fewer than 50 waste disposal sites are needed, states were allowed to join together in regional groupings, known as "compacts." These compacts, formed by the member states and approved by Congress, allow states to assume collective responsibility by naming a disposal site or sites (located within the compact's member states) for the whole compact.[34] Initially a deadline of 1986 was set, but in 1985 a new final deadline of January 1,1006, was set, at which time states will be liable for the waste generated within their borders.[35] Even now, the program is in trouble. The states themselves have some objections to being held responsible for waste over whose generation they have no control,[36] and they have had a difficult time

siting dumps in the face of strong citizen opposition.[37]

Concerns about BRC and ERC

The Deregulation of Radioactive Waste is a Threat to Public Health and Safety.

At the heart of the BRC and ERC policies is the NRC's implication that an annual cancer risk of one additional cancer death per 100,000 persons (projected across the entire United States, that equals 2,500 persons) is acceptable.[38] In the NRC's judgement, this level of increased risk is "of little concern to most members of society."[39]

Working backward, the NRC used that number to justify an annual increase in radiation exposure per person per year of up to 100 millirems (mrem) from all BRC and ERC "practices,"[40] an amount equal to approximately 5 chest x-rays.[41] (Millirems measure the biological effect of an absorbed dose of radiation.) Because the NRC believes "most members of society will not expend resources" to avoid an annual risk of one in 100,000, the agency considers it an appropriate framework for regulatory decisions.[42]

Since 1988, when the NRC first proposed its ERC policy, it has increased its assessment of fatal cancer risk from radiation exposure by a factor of two and one-half.[43] Nevertheless, the NRC has not changed the annual dose limit (100 mrem of radiation exposure per person from all BRC and ERC practices) to reflect its increasing estimates of radiation risk.[44]

Even according to the latest data presented by the NRC, the cancer risk from a 100 mrem radiation dose, the limit offered in the current BRC/ERC policy, is in fact five deaths per 100,000 exposed persons.[45] Recent data from the National Research Council of the National Academy of Sciences suggest that the cancer risk from such a level of exposure may be almost 60% higher than the NRC's estimate.[46]

If every person in the United States received the maximum dose proposed by the NRC (100 mrem), the radiation risk data used by the NRC would predict an additional 12,500 cancer deaths per year in the United States.[47] The NRC does not believe this level of exposure will be reached.

The NRC acknowledges that the process of estimating health effects is characterized by "significant uncertainty."[48] Less attention is given to the other effects of radiation and their consequent cost: genetic and fetal effects, including mental retardation, and non-fatal cancers. The rationale, in the NRC's view, is that death is a "more severe outcome" and "the strongest basis exists for quantifying the risk of cancer mortality in humans."[49] In essence, the NRC is stating that non-fatal effects will not be addressed in its policy proposal, because, relative to fatal effects, they are less understood and not as extreme.

Children are at higher health risk from radiation exposure.[50] In the latest ERC policy proposal available to the public from the NRC, however, the extent of the NRC's explicit consideration for children is the admission that "the intentional introduction of radioactive material into toys" is an example of practices "which potentially have little or no benefit to society."[51] In the NRC's August 1986 BRC policy statement there is no explicit mention of children.[52]

BRC and ERC Do Not Comply with Federal Law.

BRC and ERC far exceed the regulatory discretion provided by the 1985 Low-Level Radioactive Waste Policy Amendments, in which the prerequisite for deregulation is that "regulation of a waste stream is not necessary to protect the public health and safety ..."[53] Existing regulations requiring that waste be safely and systematically disposed in licensed radioactive waste facilities do not fit this criterion. The NRC itself predicts that some deaths will result from radioactive waste deregulation, evidence that the regulations are needed to "protect public health and safety."

The language of the 1985 law (stipulating that radioactive waste regulations "not necessary to protect the public health and safety" be discontinued) implies that deregulation of these wastes should result in no harm to public health. This may be impossible: there is no known radiation dose so small that it can be considered safe. Any radiation exposure is a health risk.[54]

The Content of Radioactive Waste Shipped to Landfills and the Exact Exposure Due to BRC and ERC May Be Difficult or Impossible to Check.

Since BRC and ERC exemptions entail, by definition, a lessening or termination of regulatory control over exempted radioactive waste streams there is no guarantee that the exposure level actually experienced by the public will not exceed

those dictated by the policy. Even if the limit of 100 mrem per person per year were considered acceptable, the policies as proposed would provide no assurance that the level will not be exceeded -- especially for individuals who live or work near a dump where deregulated radioactive waste accumulates. Since it seems the NRC has no plans to monitor radiation levels at unregulated disposal sites, there may be no way of measuring actual exposure levels.[55]

Likewise, it will be difficult, if not impossible, to ensure compliance. Once the NRC allows utilities to ship some radioactive waste as BRC, it will be hard to ensure that waste that is more radioactive is not mixed in either deliberately or accidentally. Individual landfills will not be equipped to check incoming waste for radioactivity, and without any federal or state regulation there would be no other way to monitor utility actions.

BRC and ERC Will Not Save Money.

Said one state official: "The result of adoption of a BRC standard will be cost shifting, not cost savings."[56] From society's perspective, even the illusory, up-front savings are small. The Electric Power Research Institute (EPRI), a utility industry research organization, estimates that the BRC policy would save about $82 million per year if it were fully implemented.[57] Critics charge that these estimates greatly exaggerate the potential savings.[58]

Even if EPRI's estimates are correct, the savings will equal less than $750,000 per year per nuclear reactor,[59] or well less than one percent of a plant's annual combined costs for fuel, operation and maintenance.[60] BRC represents an annual savings of perhaps 35 cents per person in the United States.[61] These savings, however, would be offset by the costs of cleaning up municipal landfills contaminated with radiation. In addition, the financial and personal consequences of cancers, genetic defects, and the other health effects of BRC and ERC could be significant.

BRC and ERC Could Leave Behind Contaminated Nuclear Power and Weapons Facilities.

BRC and ERC might justify incomplete cleanups of nuclear power and weapons facilities. Cleanup at a facility could be stopped if it could be shown that the resulting exposures would be within the NRC's deregulation limits.[62]

Growing Opposition to the Deregulation of Radioactive Waste.

BRC and ERC present a large and also largely unknown threat to public health in the United States. The danger is not lost on states, counties, and cities, where strong opposition to radioactive waste deregulation has taken the form of state, county, and local legislation. Minnesota,[63] Maine,[64] [illegible]d Vermont[65] have already passed laws prohibiting the reclassification of radioactive waste. Several more are considering such legislation.[66] There is opposition to BRC beneath the state level, as well. In Massachusetts alone, 27 cities and towns have passed resolutions or ordinances against BRC.[67]

Conclusion

The NRC's impending BRC and ERC policies are not a rational effort to allocate regulatory resources more efficiently, as the NRC claims. Rather, the policies are evidence that this country's attempts to address the problem of growing amounts of "low-level" radioactive waste are failing. The existing commercial "low-level" waste sites are closed, closing, or about to restrict severely whose wastes will be accepted. The federal government's desperate effort to hand the problem to the states is in trouble.

Worse, BRC and ERC, the NRC's non-solution to the "low-level" radioactive waste problem, pose a large threat to public health and safety in the United States. The precise effects may never be known. Meanwhile, the outlook for a solution is poor: the amount of "low-level" radioactive waste will balloon in the near future as power plants are decommissioned and the DOE cleans up weapons facilities.

BRC and ERC carry a simple message from the NRC: the government does not know what to do with "low-level" radioactive waste.

Recommendations

The NRC should halt all efforts to classify generically certain radioactive waste streams as "below regulatory concern." Congress should repeal the provisions of the Low-Level Radioactive Waste Policy Amendments Act that direct the NRC to implement this policy.

Endnotes

1. The hazardous life of "low-level" radioactive waste is in some cases, as much as hundreds of thousands of years. Marvin Resnikoff, Radioactive Waste Campaign, Living Without Landfills p. 9 (1987). Radioactive Waste Campaign, 625 Broadway, 2nd Floor, New York, NY 10012.

2. Even very small "amounts of radioactivity are capable of inducing cancer in the living, birth defects in the unborn, and mutagenic effects in the descendants of those exposed. Ronnie D. Lipschutz, Union of Concerned Scientists, Radioactive Waste: Politics, Technology and Risk, p. 1 (1980), Ballinger Publishing Company, Cambridge, Massachusetts.

3. U.S. Nuclear Regulatory Commission, "Proposed Commission Policy Statement on Exemptions from Regulatory Control" (SECY-89-184 Released) p. 8 (June 16, 1989), U.S. Nuclear Regulatory Commission, Public Documents Room, 2120 L Street N.W., Washington, DC 20555.

4. Ibid.

5. U.S. Nuclear Regulatory Commission, 10 CFR Part 20.306, Federal Register, Vol. 46, p. 18234 (March 11, 1981).

6. The Low-Level Radioactive Waste Policy Amendments Act of 1985, Public Law 99-240 (Jan. 15, 1986), Sec. 10(a).

7. Id. at sec. 10(b).

8. U.S. Nuclear Regulatory Commission, "Policy Statement on Radioactive Concern Below Regulatory Concern," 10 CFR 2, Federal Register, Vol. 51, p. 30839 (Aug. 29, 1986).

9. See N.3 supra.

10. See Id at p. 2.

11. See Id at p. 9.

12. See N.3 supra at p. 30840.

13. Ronald L. Fuchs and Kimberly Culbertson-Arendts, U.S. Department of Energy, The 1988 State-by-State Assessment of Low-Level Radioactive Waste Received at Commercial Disposal Sites (DOE/LLW-87) p. A-7 (Dec. 1989). This is the latest in a series of annual reports that measures the amount of waste sent to commercial "low-level" radioactive waste dumps. Available from Department of Energy, National Low-Level Waste Management Program, P.O. Box 1625, Idaho Falls, ID 83415-2411.

14. "Internal Memo Examines Options for Waste Deregulation," The Nuclear Monitor, p. 8 (April 9, 1990), Nuclear Information & Resource Service, 1424 16th Street NW, Suite 601, Washington, DC 20036 (202-328-0002).

15. Ibid.

16. Ibid.

17. Phone conversation between Andy Bates, U.S. Nuclear Regulatory Commission and Jonathan Becker, Public Citizen (5-21-90) (202-492-1968).

18. Ibid.

19. See N.14 supra at p. 1.

20. Phone conversation between William Lahs, U.S. Nuclear Regulatory Commission and Jonathan Becker, Public Citizen (May 11, 1990) (202-492-3774).

21. Electric Power Research Institute, Below Regulatory Concern Owners Group: Cost-Benefit Analysis of ERC Waste Disposal, pp. 2-1 and 2-2 (March 1988), prepared by Sargent and Lundy, Chicago, IL. The study projects a future annual "low-level" radioactive waste volume of 1,800,000 cubic feet, and suggests up to 790,000 cubic feet annually could be considered ERC.

22. See N.18 supra.

23. See N.3 supra at p. 1.

24. Richard Guimond, Director, Office of Radiation Programs, U.S. Environmental Protection Agency, Proceedings, Workshop on Rules for Exemption from Regulatory Control, Oct. 11-12, 1988, p. 45. The U.S. Environmental Protection Agency (EPA), which is working on ERC standards of its own, finds the NRC's proposed exposure levels to be "totally inappropriate." Richard Guimond, Statement on the Nuclear Regulatory Commission's Proposed Policy for Exemptions from Regulatory Control, pp. 6, 10 (Jan. 12, 1989) Washington, DC 20460.

25. U.S. Department of Energy, Integrated Data Base for 1988: Spent Fuel and Radioactive Waste Inventories, Projections, and Characteristics (DOE/RW-0006 Rev. 4), p. 178 (Sep. 1988), Office of Civilian Radioactive Waste Management, Washington, DC 20585.

26. As of March, 1989, only five reactors had operated for more than 20 years. Thirteen others had been retired before they were 20 years old. Dan Borson et. al., Public Citizen, On Again, Off Again: The Unreliability of U.S. Nuclear Power Plants, 215 Pennsylvania Ave., S.E., Washington, DC 20003 (202-546-4996), $5.

27. Dan Borson et. al., Public Citizen, A Decade of Decline p. 11-2 (Dec. 1989), based on documents in U.S. Nuclear Regulatory Commission, Licensed Operating Reactors, Status Summary Report, NUREG-0020, Vol. 13, No. 8, pp. 5-6 (Aug. 1989), U.S. Nuclear Regulatory Commission, Public Documents Room, 2120 L Street N.W., Washington, DC 20555.

28. Statement by Leo Duffy, Special Assistant to the Secretary for Waste Coordination, before the DOE/Defense Nuclear Facilities Panel of the House Armed Services Committee (May 9, 1989) cited by Linda Taylor, "DOE and ERC: Will the Military's Low-Level Nukewaste Go Public Too?", The Workbook, Vol. 14, No. 2, p. 50 (April/June 1989), Southwest Research and Information Center, P.O. Box 4524, Albuquerque, NM 87106.

29. League of Women Voters Education Fund, The Nuclear Waste Primer: A Handbook for Citizens p. 84 (1985), Nick Lyons Books, distributed by Schocken Books, 62 Cooper Square, New York, NY 10003, $5.95.

30. The radioactive waste sites in Beatty, NV and Barnwell, SC will close. The site in Richland, WA will stay open. Phone conversation with Joe Coleman, Acting Director, Division of Technical Support, Office of Civilian Radioactive Waste Management, Department of Energy (202-353-4728).

31. U.S. Congress, Office of Technology Assessment, Partnerships Under Pressure: Managing Commercial Low-Level Radioactive Waste p. 8 (Nov. 1988), Superintendent of Documents, Government Printing Office, Washington, D.C. 20402-9325, $8.00.

32. Id. at p. 5.

33. Ibid.

34. See N.29 supra at p. 87.

35. See N.6 supra at Sec.5(d)(2)(C).

36. Letter from Governor James J. Blanchard of Michigan to Joan Claybrook, President, Public Citizen (February 26, 1990).

37. See, for example, Thomas W. Lippman, "Plans for 'Low-Level' Nuclear Dumps Generate Growing Citizen Opposition," Washington Post, p. A6 (July 31, 1989).

38. U.S. Nuclear Regulatory Commission, "Policy Statement on Exemptions From Regulatory Control," 10 CFR Ch. 1, Federal Register, Vol. 53, No. 238 p. 49889 (Dec. 12, 1988).

39. Ibid.

40. Conversation between Bill Lahs, U.S. Nuclear Regulatory Commission and Jonathan Becker, Public Citizen (May 1, 1990), (202-492-3774). The final definition of a practice given by the NRC will be important determinant of the actual effect of ERC and ERC.

41. Priscilla Laws, Public Citizen, The X-ray Information Book (1988), 2000 "P" Street N.W., Washington, DC 20036 (202-293-9142).

42. See N.3 supra at pp. 12-13.

43. See N.3 supra at p. 8 and N.38 supra at p. 49889.

44. See N.3 supra at p. 11, 13 and N.38 supra at p. 49888.

45. See N.3 supra at p. 8.

46. Committee on the Biological Effects of Ionizing Radiation, National Research Council, National Academy of Sciences,

Health Effects of Exposure to Low Levels of Ionizing Radiation: BEIR V, p. 6 (1990). National Academy Press, 2101 Constitution Avenue, N.W., Washington, DC 20418. For a 10,000 person-rem exposure, the study predicts 5 to 12 deaths (mean 7.6) for men, and 6 to 12 (mean 8.1) deaths for women. This is 57% higher than the prediction made by the NRC's data.

47. The NRC's proposed limit is 100 mrem. If 100,000 persons received this dose, according to radiation risk assessments used by the NRC, 5 persons would be expected to die. Across the population of the United States, at that dose and risk level, 12,500 deaths would be expected.

48. See N.3 supra at p. 6.

49. Ibid.

50. See N.46 supra.

51. See N.3 supra at p. 16.

52. See N.8 supra.

53. See N.6 supra at 10(b).

54. "It is important to emphasize that [the proposed ERC policy] does not assert an absence or threshold of risk but rather establishes a baseline where further government regulations to reduce risks is unwarranted." See N.39 supra at p.49887.

55. Caroline Petti and James M. Gruhlke, Office of Radiation Programs, U.S. Environmental Protection Agency, "EPA's Draft Environmental Standards for Low-Level Radioactive Waste Management and Disposal," Speech at Tufts University, March 17-18, 1990.

56. Letter to Arthur Fraas, Chief, Office of Information and Regulatory Affairs, Office of Management and Budget, from Terry Lash, Director, Department of Nuclear Safety, State of Illinois, p.3 (Sept. 19, 1988). Quoted in Michael E. Lee et al., Minnesota Public Interest Research Group, Imminent Danger: Radioactive Waste Dumping In Minnesota, p. 5 (Dec. 1989), 2512 Delaware Street S.E., Minneapolis, MN 55414 (612-627-4035).

57. See N. 21 supra at pp. 6-14. From Joseph Kriesberg, Massachusetts Citizens for Safe Energy, Lethal Landfills: How Radioactive Waste Could End Up in Your Community's Landfill, 87 Temple Place, Boston, MA 02111 (617-292-4821).

58. Personal communication between Joseph Kriesberg, Executive Director, Massachusetts Citizens for Safe Energy and Marvin Resnikoff, Radioactive Waste Campaign (March 26, 1990). Quoted in Joseph Kriesberg, Massachusetts Citizens for Safe Energy, Lethal Landfills: How Radioactive Waste Could End up in Your Community's Landfill, p. 15 (April 1990), 87 Temple Place, Boston, MA 02111 (617-292-4821).

59. As of December 31, 1988, there were 110 licensed nuclear power plants in the United States. U.S. Nuclear Regulatory Commission, Annual Report 1988 (NUREG-1164, Vol. 5) p. 240 (June 12, 1989). U.S. Government Printing Office, Post Office Box 37082, Washington, DC 20013-7082.

60. Phone conversation between Sharon Luongo, Sales Manager, Utility Data Institute and Daniel Berson, Public Citizen (May 21, 1990) (202-466-3660). Based on total production costs in 1988 of $11,566,050,000.

61. As of the middle of 1989, the U.S. population was approximately 249,000,000. The Population Institute, 110 Maryland Ave. NE, Washington, DC (202-544-3300).

62. Speech by Kenneth Carr, Chairman, U.S. Nuclear Regulatory Commission, at the Health Physics Society, Falls Church, VA (Feb. 20, 1990).

63. Letter from Darcy Ann King, Legislative Director and Attorney, Minnesota Public Interest Research Group, 2512 Delaware St. S.E., Minneapolis, MN 55414 (612-627-4035) and Jonathan Becker, Public Citizen (May 12, 1990).

64. H.P 1141 - L.D. 1561 (An Act to Protect the People of Maine from Exposure to Radioactive Waste), approved June 26, 1989.

65. Letter from Vermont Public Interest Research Group, 43 State Street, Montpelier, VT 05602, to Jonathan Becker, Public Citizen (May 22, 1990).

66. The states include New Hampshire, Massachusetts, Connecticut, West Virginia, Nebraska, and Iowa. "U.S. Rethinks Radioactivity," Cleveland Plain Dealer (April 19, 1990).

67. Letter from Joseph Kriesberg, Executive Director, Massachusetts Citizens for Safe Energy, 87 Temple Place, Boston, MA 02111 (617-292-4821), to Jonathan Becker, Public Citizen (May 14, 1990).

Annual Amount of "Low-Level" Radioactive Waste Generated by U.S. Nuclear Power Plants That Could Be Deregulated Under BRC

(Amount shown is 80% of the "low-level" radioactive waste generated by commercial nuclear power plants in 1988.)

State	Potential BRC Waste (Cubic Feet)	State	Potential BRC Waste (Cubic Feet)
Pennsylvania	39080.09	Ohio	4552.80
Illinois	30641.40	Massachusetts	3843.72
New York	16445.22	Nebraska	3791.52
North Carolina	14355.90	Wisconsin	2976.78
Alabama	13542.39	Minnesota	2169.03
South Carolina	13059.25	Arkansas	2089.47
California	9629.46	Vermont	2051.52
Georgia	9529.82	Iowa	1881.26
Florida	8628.21	Maine	1571.94
Arizona	8283.[illegible]	Kansas	1238.12
New Jersey	8142.32	Oregon	1249.95
Connecticut	7678.88	Missouri	1014.93
Michigan	7181.82	Maryland	968.14
Virginia	6715.71	Colorado	74.25
Tennessee	6678.71	New Hampshire	0.00 *
Louisiana	5371.68	Texas	0.00 **
Mississippi	5286.09		
Washington	4984.80		
		Total	243352.16

* "Low-level" radioactive waste will be generated in New Hampshire by the Seabrook-1 nuclear power plant which began commercial operation in 1990.

** "Low-level" radioactive waste will be generated in Texas by the South Texas-1 & 2 reactors as well as by the Comanche Peak-1 plant, all of which were licensed subsequent to the compilation of data presented in the above table.