
The

Radioactive Exchange®

To promote the exchange of views and information on radioactive waste management

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GOVERNORS SEVERELY CRITICIZE DOE 2ND ROUND REPOSITORY SITE SELECTION

Witnesses from six states and two Indian nations, including five governors, sharply criticized the Department of Energy's siting program for the second high-level waste repository at an April 23 hearing before the Subcommittee on Energy Conservation and Power of the House Committee on Energy and Commerce. Witnesses levelled two broad charges at the second round program: (1) that the second repository is not needed; (2) that the second round siting process is deeply flawed, both technically and procedurally.

Need for Second Repository Questioned

On the question of need, several witnesses pointed out that spent fuel projections had declined sharply since the Nuclear Waste Policy Act was passed and argued that the expectations which had led to the requirement for siting a second repository were no longer valid. Citing these arguments, Rep. James Broyhill of North Carolina (ranking minority member of the Energy and Commerce Committee), said that he intends to introduce legislation that would (See **HLW Hearing in the HLW Focus**)

COMPACT AND DISPOSAL TECHNOLOGY BILLS ADVANCE IN CALIFORNIA

California Assemblyman Steve Peace's compact legislation (A.B. 4269), proposing to establish a two-state compact with South Dakota was reported out of the Assembly Energy and Natural Resources on April 16 by a partisan vote of 7-4. The bill now proceeds to the Intergovernmental Affairs Committee for a markup scheduled for May 7. It is expected to be considered for floor action by June 1. The California Governor's bill, embodying the originally proposed Western Compact with Arizona, continues to languish in conference.

In a separate action, legislation introduced by Los Angeles Senator Art Torres (S. 2121) which requires the use of best available technology in the development of a disposal site and the reopening of the process to select a license designee to operate a state LLRW disposal facility was reported out of the Senate Toxics Committee by a vote of 6-0. US Ecology was awarded license designee status to construct and operate a state disposal site in December 1985 (EXCHANGE, Vol. 4, No. 20). (See **California pg. 2**)

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(California from pg. 1)

Options Open for Discussion

According to Assembly staffer Dave Takashima, there is room for negotiations regarding the compact initiatives now under deliberation in the California Legislature. Though Arizona is not an eligible party state in the compact proposal supported by Assemblyman Peace, Dave reports that there still is the possibility of developing an interstate agreement that would include Arizona. Whether this can be achieved or not depends on Arizona's willingness to accept some degree of responsibility for waste management, rather than have California accept all site responsibility, as provided in the original version of the Western Compact. **

CORRECTION...AEROJET INCINERATORS STOCK EQUIPMENT SUPERCOMPACTOR

The April 18 edition of the Exchange reported that Aerojet was completing test

runs on a mobile incinerator destined for Babcock and Wilcox's (B&W) Pennsylvania Regional Waste Processing Facility. Though Aerojet does expect to deliver almost identical equipment to B&W, the incinerator currently undergoing tests is destined for Commonwealth Edison in Illinois.

Stock equipment also has informed the Exchange that, their supercompactor at Commonwealth Edison's Byron Station "receives the incinerator ash and dryer salt at incinerator temperature, cools it, transfers it, stores it, and then solidifies it in the Dow polymer media. In addition to the interface equipment for the Aerojet system and polymer solidification system, the remainder of the solid radwaste system including, cement solidification system, decanting system, remotely operated filter changing equipment, cranes, compactor and cask, have been supplied by STOCK. All of this equipment has passed its acceptance test...." **

LAST CHANCE TO REGISTER

A final reminder that if you haven't registered for the Radioactive Exchange's SECOND DECISIONMAKER'S FORUM, there are still a few slots remaining. If you want to attend please call our office by May 12.

This year's impressive list of program participants includes:

Congressman Ed Markey; SC Governor Richard Riley; Virginia Power, Board Chairman & CEO, William Berry; Illinois State Senator, Jerome Joyce; LLRW Compact Commissioners and state officials from SC, NV, and WA; key federal officials, including Bob Browning, NRC; Shelley Meyers, EPA; William Voigt, & James Dieckhoner, DOE; Congressional staff including Ben Cooper, and Marilyn Meigs from the Senate Energy & Natural Resources; and more (top level managers from utilities, nuclear services firms, and nationally known consultants).

And, judging from the paid attendees registered to date, this second Forum will be a most extraordinary event! The registrants reflect a good mix of the movers and shakers within the radwaste community, including representatives from utilities, state legislatures, universities, medical centers, radioisotope processors, nuclear service firms, and federal and state administrators.

Discussions will range from the critical problems regarding mixed waste, to how the states will start to meet the mandated deadlines to develop new sites, to requirements that generators will have to meet to use existing disposal facilities.

THE 1986 CONFERENCE ON INCINERATION OF LOW LEVEL AND MIXED WASTES

Overview

The 1986 edition of the Incineration Conference held April 22-25 in Charlotte, North Carolina, was the best yet, judging by the attendance (over 225), the participation of several foreign countries, and the collective comments about the event. Though participation by utility and even non-utility generators was not optimum (outside of Duke Power which sent several representatives) the various sessions seemed to serve the interests of the waste broker and waste processing community. The foreign participation enhanced several companies' business connections.

If there was one central thread running through sessions and the corridor conversation, it was concern over public acceptance and reaction to waste processing and disposal facilities, in particular the development and siting of incinerators for radioactive and hazardous waste.

The participants' attention to the **public's role with regard to utilization** of waste processing technologies was heightened by the fact that North Carolina was recently ranked as the No. 1 candidate to host the Second Southeast Regional Disposal Facility and recently denied US Ecology a license application to construct a regional waste incinerator. Sensitive to both issues, **Captain Bill Briner**, a Southeast Compact Commissioner and Radiation Health Officer for Duke University in North Carolina, changed his luncheon address topic from "Incineration of LLW: Panacea or Problem?" to a general presentation on the compacts and the Low Level Waste Policy Act.

If you hadn't heard enough about the public's role and politics influencing waste management decisions you just had to turn on the TV and wait for a political campaign paid for by a nationally known conservative group which expressed adamant opposition to locating a nuclear waste disposal site in the state.

Excellent luncheon and evening addresses were given by **Dr. Ruth Weiner** of the State of Washington's Huxley College, she cautioned the technical community to be **honest in comparing the risks associated with waste management activities and other "risks"** accepted by the public resulting from activities that the public can freely reject or accept.

On dealing with the public with regard to the incineration of LLRW she advised that "a meaningful comparison can be made of the maximum risks (risk to an individual receiving the maximum dose) from air emissions of the proposed facility with the risk from diagnostic x-rays."

A discussion on dealing with the public over specific proposed waste management activities, particularly the Babcock and Wilcox proposed volume reduction facility in Pennsylvania and US Ecology's proposed North Carolina Facility was the focus of a panel on Thursday. The session was revealing to a lot of attendees, but what was lacking was a couple of panelists from the press corps.

The **technical papers on waste processing** initiatives in the U.S. and foreign countries were to some degree a revising and rehearing of projects already addressed at past LLRW meetings. They did serve to bring everyone up to date on the status of the projects, and evoke some discussion on problems experienced with testing and demonstration.

In contrast to the generally dismal stories regarding public reaction to LLRW facilities, Bud Arrowsmith of Scientific Ecology Group reported that his company has reached an agreement

with the City of Oak Ridge to use industrial revenue funds to finance the construction of SEG's proposed regional processing center in Tennessee.

A paper presented by Larry Klinger of Monsanto on the application of a glass furnace system to LLRW and mixed waste demonstrated how this technology had the potential of being utilized very effectively for the thermal decomposition of mixed and hazardous waste.

The economic advantage that utility generators can accrue from the use of **supercompactors** was highlighted by papers presented by F. Mis of Rochester Gas and Electric, and Daniel Stember of Northern States Power. Mis revealed how Rochester G&E recently saved \$80,000 by using a "supercompactor" to reduce 540 drums to 225 shippable drums. This supercompactor session led to some very interesting observations from generators about the degree of savings that can be achieved by segregating waste and using "traditional" compactors rather than employing "super" equipment.

The panel session on mixed waste moderated by Exchange Publisher Ed Helminski shed little light on how the jurisdictional conflict between EPA and NRC will be resolved. Some participants were however notably impressed by the presentation made by EPA's Ken Schuster. He remarked to the attendees that the environmental agency was remaining open to options to resolve the problem and did not intend to dictate a solution without hearing from the radwaste community.

Kudos are in order for Char Baker who did the work of many to make this meeting successful.

REPORTS OF NOTE (LLW)

Evaluation of Geologic Materials to Limit Biological Intrusion into Low-Level Radioactive Waste Disposal Sites; (LA-10286-MS UC-70B) Los Alamos National Laboratory, Los Alamos, New Mexico 87545; This report describes the results of a three-year research program to evaluate the performance of selected soil and rock ranch cap designs in limiting biological intrusion into simulated waste. The fact is established that biological processes, including plant root intrusion and animal burrowing, contribute to radionuclide transport at low-level waste sites and cannot be dismissed out of hand. Experimental evidence is presented and interpreted on barrier performance as a function of experimental scale, configuration, and a variety of extreme moisture conditions to identify operational limits should the use of a biointrusion barrier be deemed necessary.

Results of studies at several scales, ranging from 25-cm-diameter columns to 1560-m² field plots, demonstrated that a minimum of 75 cm of cobble covered with 25 cm gravel all covered with 60 cm of topsoil reduces plant root and animal intrusion through the cap profile over a conventional design constructed of soil over crushed tuff. This report should be available from Los Alamos, or a xerox copy can be obtained from the Exchange Readers' Report Service for a copy and handling charge of \$18.00 plus postage.

IN THE NORTHEAST

The Low Level Radioactive Waste Disposal Facility Siting bill introduced in the **Massachusetts** Senate by State Senator Carole Amick is now in its "third reading" in that chamber (See EXCHANGE, Vol. 5, Nos. 1,3). The Senate Ways and Means Committee has begun to look into its financial implications. As was agreed, when the bill was introduced earlier this year, the State Supreme Judicial Court is being asked to rule on the constitutionality of the state law, adopted by referendum, that requires a statewide ballot on the siting of a state LLRW disposal facility and membership in a regional compact. This law, referred to as "Referendum 503," was incorporated into provisions of the siting bill as introduced by the Senator and developed by the Special Commission on LLRW which she chairs. **

IN THE INDUSTRY

NRC has approved the topical report for the **Koch Process Systems VR-System 350™** Radwaste Incinerator System. With this approval the Koch system is "acceptable for referencing in license applications" and when so referenced by a customer, further review by the NRC will not be necessary. Interfaces and specific plant applicability will, of course still require approval. The Koch VR-System 350 Incinerator is based on technology developed by Los Alamos National Laboratory and commercialized by Koch while under a Department of Energy contract.

The system consists of a controlled air incinerator; wet scrubbing equipment comprising a quench column, high energy venturi and packed column; scrub solution processing equipment; a spray dryer for blowdown elimination; HEPA filtration module and an induced draft blower. A programmable controller-based control system allows for automatic, unattended operation. The VR-System 350 Incinerator is designed to process contaminated materials as well as highly corrosive acid gases and scrub solution liquids which result from the combustion of wastes containing up to 25% polyvinyl chloride (PVC). **

ON THE MOVE

International Technology Corporation has announced that **Marvin L. Goldberger**, President of the California Institute of Technology, has been elected a director of the company. Dr. Goldberger is a Fellow of the American Physical Society, a Fellow of the American Academy of Arts and Sciences and a Member of the National Academy of Sciences. He also serves as a member of the Federation of American Scientists and is a member of the Council on Foreign Relations. He has been an advisor to several government agencies for many years and also serves as a member of the Board of Directors of General Motors Corporation.

REPORTS OF NOTE (LLW)

Generic Cost Estimates for the Disposal of Radioactive Wastes (NUREG/CR-4555); Cost Analysis Group, Office of Resource Management, U.S. Nuclear Regulatory Commission, Washington, D. C., 20555; The NRC's Cost Analysis Group sponsored this study. Its purpose is to provide an NRC analyst with estimates of the generic costs of disposing of radioactive wastes that may be generated as a result of NRC regulations requiring modifications or repairs to nuclear facilities. This report also presents descriptions of typical low-level radwastes generated at nuclear power plants. The various processes used to treat the wastes in preparation for shipment and burial are also described. Available from The National Technical Information Service, Springfield, VA 22161.

Disposal Site Use Notification

REVISED HANFORD LLRW SITE USE RULES

In an April 15, letter the State of Washington informed LLRW generators and brokers and the Hanford LLRW site operator, US Ecology, that the procedures governing prenotification, the collection of LLRW surcharges, and other information requirements regarding the use of the Hanford LLRW disposal facility had been revised. The text of the new requirements follow. For more information call Elaine Carlin at (206) 459-6228.

WAC 173-325-030 REQUIREMENTS FOR GENERATORS AND BROKERS. (1) Any generator or broker shipping waste which originated outside the Northwest Compact Region for disposal at the site shall pay to the state of Washington a surcharge as follows:

- (a) From March 1, 1986 through December 31, 1987, \$10 per cubic foot of waste.
- (b) From January 1, 1988 through December 31, 1989, \$20 per cubic foot of waste.
- (c) From January 1, 1990, through December 31, 1992, \$40 per cubic foot of waste.
- (2) In addition, the Department may impose penalty surcharges up to the maximum extent allowed by P.L. 99-240.
- (3) Surcharge payments must be mailed or electronically transferred no later than the day the respective waste shipment leaves the state of origin. In the lower left hand corner of the check, the valid site use permit number and shipment manifest number must be recorded. For electronic transfers, the valid site use permit number, and shipment manifest number, followed by the name of the facility (limited to 35 characters) must be transmitted at the time of the transfer. A copy of the face of the check, or of the receipt for wire transfer must be attached to the shipping manifest when the shipment arrives at the disposal site.
- (4) Surcharge payment may be made by a check payable to the State of Washington or by electronic transfer. Checks should be mailed to:

"Pre-notification"
Cashier
Fiscal Office
Department of Ecology
St. Martin's Campus
Mail Stop PV-11
Olympia, WA 98504

Electronic transfers (telegraphic abbreviation RAINIER SEA if needed) should be directed to:

Robert S. O'Brien, State Treasurer
Concentration Account
Rainier National Bank
Olympia Branch
Account #0041399260

(5) Brokers are required to attach to the shipping manifest a tabulated list of those generators whose waste is being shipped. The tabulated list must include the following information in the format specified:

Date of Shipment: _____

Valid Site Use Permit #	Generator	State	Compact Region	Volume	Surcharge
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Prenotification forms (#A-1 and #B-1) are no longer required.

(6) Violation of any of these requirements may result in revocation of a generator's or broker's Washington State site use permit. Upon revocation of a site use permit, subsequent reissuance may be conditioned upon agreement to comply with appropriate conditions, such as a condition that surcharge payments be made by certified or cashier check, and be received in advance, and a condition that the state of Washington be provided specific information at least three days prior to shipment.

NEW SECTION

WAC 173-325-040 REQUIREMENTS FOR SITE OPERATOR. (1) For each waste shipment for which a surcharge is due (as required by WAC 173-325-030 (1)-(2)), arriving at the facility, obtain a copy of the surcharge payment check or receipt of electronic wire transfer before receiving the waste shipment for disposal.

(2) For each waste shipment of a broker arriving at the facility, obtain the written information required by WAC 173-325-030(5) before receiving the waste shipment for disposal.

(3) Provide to the Washington State Department of Ecology information on each waste shipment received for disposal at the facility, as requested by the Department.

NEW SECTION

WAC 173-325-050 EFFECTIVE DATES. This chapter shall take effect April 21, 1986, (1) except the requirements in WAC 173-325-030 (1)-(2) which took effect March 1, 1986, and (2) WAC 173-325-040(3) which takes effect immediately.

REPORTS OF NOTE (LLW)

Consolidation and Shear Failure Leading to Subsidence and Settlement (LA-10576-MS/UC-70B); Los Alamos National Laboratory, Los Alamos, New Mexico 87545; Laboratory studies performed at Los Alamos permit the prediction of settlement caused by consolidation or natural compaction of crushed tuff overburden at shallow land burial sites. Shear failure characteristics of crushed tuff that may lead to subsidence were investigated and reported in this study. Examples of expected settlement and subsidence are calculated based on the known geotechnical characteristics of crushed tuff. The same thing is done for bentonite/tuff mixes because some field experiments were performed using this additive (bentonite) to reduce the hydraulic conductivity of the crushed tuff. Remedial actions, i.e., means to limit the amount of settlement, are discussed, as well as the Los Alamos field experiment, which studies the influence of subsidence on layered systems in general and on biobarriers in particular. The share of the produced cavities is compared with cavities produced by idealized voids in an idealized environment. Study of root penetration at subsidence sites gives us an indication of the remaining degree of integrity.

Low-Level Integrated System Test (LA-10572-MS/UC-70B); Los Alamos National Laboratory, Los Alamos, New Mexico 87545; This report provides data on the results of a test of the integrity of a biobarrier installed in the improved or modified plots in Los Alamos' integrated LLRW disposal system. Although the modified plots had a reduced water-holding capacity, they delivered leachate only at the drain installed above the biobarrier, demonstrating once more that the biobarrier is behaving successfully as a capillary barrier in rerouting the subsurface flow around the tuff beneath the biobarrier. As a result of vertical water flow impedance, more water was made available to plot vegetation, enhancing its growth dramatically. The capillary barrier theory was backed up by the tensiometer results showing saturation at the upper biobarrier interface.

(HLW Hearing from pg. 1)

stop the siting process for the second repository -- a goal shared by most of the witnesses.

When asked whether there was a technical need for a second repository, Ben Rusche, Director of the Office of Civilian Radioactive Waste Management (OCRWM), gave three arguments:

(1) There may turn out to be physical limits on the capacity of the first repository such that a second would be necessary to handle the demand.

(2) The waste to be disposed of includes not only the civilian spent fuel (the only waste mentioned in the discussions about declining demand), but also the defense high level waste, which the President has decided will be disposed of in a civilian repository.

(3) The second round sites provide a backup for the first round, increasing confidence that there will be at least one repository.

East Versus West on HLW Sites

The near-unanimous support for a halt to the second repository program (only Governor Baliles of Virginia abstained on this), plus the recommendation by all five governors (as well as by a representative of the state of Georgia) that the sites identified in their states should be eliminated from consideration, did not sit well with the Western members on the committee (Representatives Wyden of Ore-

gon, Swift of Washington, and Nielson of Utah). At various times throughout the hearing, these members expressed concerns that the second round states were trying to get themselves ruled out of consideration, leaving the first round states to bear the burden alone.

Representative Wyden was particularly persistent, asking several governors whether they were calling for amendment of the NWPA to eliminate the second repository. He pointed out that he had seen no projection of the future inventory of high-level radioactive waste that fell below the 70,000 metric ton limit on the first repository included in the Nuclear Waste Policy Act, so that elimination of the second repository would require amendment of the Act to remove that limit. Representative Wyden observed that if the Eastern states wanted to open the Act for amendment, there were a few things that the Western states would like to amend, too. On the same lines, when the state geologist from Georgia said that his Governor had asked the Georgia delegation to introduce legislation eliminating the sites in their state from consideration, Rep. Nielson of Utah asked, tongue-in-cheek, whether Georgia would entertain amendments to the bill from other states such as Washington, Texas, Minnesota, Maine, etc.

Appeals for Unity

Quoting Ben Franklin, Rep. Swift told the representatives of the second round states that "If we don't hang together, we're going to hang separately." He said that if all of the states fight among themselves to be the first out of the theatre at the first whiff of

smoke, there would be little chance for a fair, sound, and objective siting process to be used. Echoing Swift's concern, Rep. Wyden also called for cooperation between the first and second round states, saying that "We in the West want to join forces with the states in the East to come up with a fair siting process."

Governor Earl of Wisconsin responded that as Chairman of the National Governors' Association's Committee on Environment, he had contacted the other second round governors to urge them to avoid a "beggar thy neighbor" reaction and to cooperate on a common strategy with two elements:

- (1) To persuade Congress and the DOE that the second repository isn't necessary; and
- (2) To make sure that if a second site must be chosen, the site selection process is fair and technically sound.

On the first point, Representative Swift argued that if only one repository is required, as the Eastern states suggested, then it would be sound public policy to look for the very best site that could be found in the United States, and that the Eastern states should not be excluded from the search. In the same vein, Rep. Nielson said that if there is a need for a second site, DOE's search for the best site should not be affected by the political clout of the potential host states.

DOE Technical Program Criticized

There was strong criticism of the adequacy of the data and analysis used in the Draft Area Recommendation Report (DARR) in selecting the areas for further study. Governors Brennan (Maine) and Perpich (Minn.) said that the siting process had failed, and ought to be stopped. Both the Minnesota witnesses (Governor Perpich and Doug Larsen), as well as committee member Sikorski of Minnesota focused their criticism on the survey of crystalline rocks used by DOE to select the areas in 17 states that were screened to identify the sites recommended in the DARR. Governor Perpich released an analysis of the DOE

survey prepared by the Minnesota Governor's Nuclear Waste Council. This report, based on information released by DOE after the state had filed a Freedom of Information Act request, concludes that the 1983 "National Survey of Crystalline Rocks" (OCD-1) was based on a 1979 Dames and Moore draft report that had been severely criticized by reviewers and never released in final form. According to the state's report, the analysis used in the Dames and Moore report and the subsequent DOE document was cursory, inaccurate, and biased against consideration of crystalline rock in the West (See Related story this issue).

Ben Rusche and Sally Mann of DOE argued in response that the report in question was merely the starting point for more detailed analysis and was not the basis for final site selection. Representative Sikorski pointed out that even if the report was only a point of departure, there was no state present at the hearing that had not passed through the first filter that it provided.

Governor Baliles of Virginia took a somewhat different tack, arguing that DOE had overlooked available data that would show that the sites recommended in Virginia do not in fact meet DOE's own siting criteria. Referring to a set of flip charts, he argued that DOE had ignored such relevant facts as the history of seismic activity in the area of the sites, and the proximity of one site to a uranium deposit.

Some witnesses argued that the technical errors and inadequacies of DOE's siting analysis raised questions about whether decisions were being made on political rather than technical grounds. Governor Earl of Wisconsin argued that people in his state were convinced that the ultimate siting judgment might be political, and asserted that "our state is willing to make whatever political sacrifices are necessary to ensure we are not chosen." Expanding on this point in his prepared statement, governor Earl said "We haven't purchased any F-111's yet, but we expect to use every technical and political resource at our command in order to keep this dump and all of its problems out of Wisconsin."

DOE Response Limited by Time

Ben Rusche had little opportunity during the hearing to address specific allegations of technical errors. His formal statement (and those of all the witnesses other than the governors) was limited to two minutes, and the questions from the committee focussed on other issues. However, during a voting break several DOE officials were overheard to say that if the data presented by the states were valid, and it can be shown that some of the sites do not meet DOE guidelines, they would certainly be dropped from consideration.

Public Participation Inadequate

DOE's public participation efforts also took their share of criticism. The biggest bone of contention was DOE's refusal to extend the formal comment period for the DARR beyond 90 days, despite requests from many of the states. In response, Ben Rusche said that he felt that the 90 day period had been adequate, since it was twice the length required for public comment even for an Environmental Impact Statement. He emphasized that the states had been involved in the siting process for three years prior to issuance of the draft ARR. In addition, he noted that DOE had indicated that it would continue to accept comments after the end of the formal comment period, and was still doing so.

DOE's critics were not completely satisfied with this response. Chairman Markey commented negatively on the informality and potential arbitrariness of the process of receiving comments after the deadline, instead of extending the deadline. Henry Warren, Director of Maine's Task Force on High Level Nuclear Waste, observed that although the state had been involved for three years, most of its citizens had been unaware of the siting process until issuance of the draft ARR in January, and had had difficulty getting up to speed on the issues in time to make comments within the 90 day period.

Indian Tribes Cite Non-Involvement

Priscilla Attean, tribal representative for

the Penobscot nation, and Kim Vele, counsel to the Stockbridge-Munsee tribe, were sharply critical of DOE's failure to involve the 28 potentially affected tribes in the process leading up to the DARR. Both presented testimony showing that despite the requirements of the Nuclear Waste Policy Act, the tribes had not been treated equally with the states. Specifically, the tribes had been denied participation in early workshops dealing with the site selection process and did not receive funding from DOE until about the time the DARR was released. Ms. Vele extended her criticism to include the Department of the Interior, which she said did not attend any of the meetings in which the tribes and DOE were involved. She concluded by describing the actions of the federal agencies as a "breach of fiduciary duty to tribal governments."

In a later exchange with Chairman Markey on the treatment of the tribes, Ben Rusche observed that everyone would have been better served if the tribes had been involved earlier.

Re-examination of 1998 Deadline Allowed

Several witnesses and committee members questioned whether the pressure of the repository schedule was forcing DOE to cut short some of the intermediate steps, such as the comment period on the DARR. Congressman Swift, for example, asked whether Congress had established timetables in the Nuclear Waste Policy Act that are inconsistent with good technical work and adequate public participation. Addressing this question at another point during the hearing, Ben Rusche responded that the time that is being taken now to receive and analyze additional comments on the DARR is evidence that DOE is not allowing the schedule to force short cuts. Significantly, he also stated that **once DOE gets through the site characterization decision process it is in now, and Presidential approval for sites for characterization for the first round is obtained, it would be appropriate and useful to go back and reexamine the 1998 deadline and other aspects of the program such as the plans for the second repository.**

Since he repeated this observation in various forms three more times during the course of the hearing, it is probably safe to interpret this as a signal that DOE is willing to revisit the schedules for the first and second repositories once sites have been selected for characterization.

National Academy Documents Requested

At a slight tangent to the main subject of the hearing, Representative Swift (D-Washington) questioned Rusche about the Department's response to the committees request for the documents that had been provided to the National Academy of Science's (NAS) Board on Radioactive Waste Management for its review of the site ranking methodology. Explaining why the committee had requested the documents, Swift noted that DOE had asked the NAS to perform a much narrower review than had been requested by Governor Gardner of Washington and endorsed by the committee. According to Swift, the Governor and the committee had wanted an independent peer review of the data used in the site ranking, while DOE only asked NAS to review the application of the multiattribute utility methodology. The documents given by DOE to the NAS Board were requested by the committee in its effort to understand clearly the precise scope of the Academy's review.

Mr. Rusche responded that he had just written the committee a letter indicating that he preferred not to provide the incomplete documents that had been given to the NAS until he could also send the committee the completed final report (the Candidate Site Recommendation Report), and suggesting that he and the committee talk about the matter further.

The NAS Board, at its own request, had reviewed only partial analyses that did not reveal the final ranking, and Rusche expressed concern that release of those partial analyses prior to publication of the final ranking could lead to unproductive speculation about what DOE's final decision would be. Not satisfied with this response, Congressman Swift urged Rusche to provide the material to the committee before

its hearing planned for May 1, and to accompany it with all the caveats necessary to forestall any misinterpretation. Rusche repeated his preference for his original suggestion, and the exchange ended with an expression of displeasure by Congressman Swift and no change of position on either side.

The Repository & Nuclear Power Linked

Several participants explicitly raised the linkage between the resistance to siting a repository and the use of nuclear power. Chairman Markey repeatedly drew attention to the connection, and questioned whether Congress should be promoting reactor licensing reform that would encourage the use nuclear powerplants and create the need for a second repository in face of the strong public opposition to siting it. Governor Earl of Wisconsin noted that one of the arguments against a second repository is that it would give an impetus to those who wanted to generate more waste, and encouraged a focus on waste reduction instead of waste siting. Governor Perpich predicted that the growing awareness of the waste problem will lead to efforts in states to close down operating powerplants.

Schedule for Final ARR Undetermined

Chairman Markey pressed Ben Rusche for a firm schedule for release of the final ARR, citing various DOE statements that it would be this summer, or November, or perhaps as late as early 1987. Rusche replied that the early estimates on the release of the final report were based on an early prediction of the amount of comments that would be received, and that DOE greatly underestimated what has actually occurred. A DOE Spokesman reported to the Exchange that over 60,000 comments have been received thus far. Rusche said that he would not be able to predict when the final ARR would be issued until the full extent and nature of the comments are known.

This leaves open the question of whether DOE will respond to the comments on the DARR in the same way it did to the criticism of the Draft Environmental Assessments on

the potential first round sites. In that case, DOE completely revised the ranking methodology and subjected it to an independent peer review by the National Academy of Sciences, a process which, if current estimates are correct, will lead to release of final site recommendations in May, about 1 1/2 years after publication of the Draft Environmental Assessments. If a similar approach were used to deal with the comments on the DARR, it could delay release of the final report well into 1987, but would be responsive to the suggestion by Governors Perpich and Brennan that an independent body of scientist be empanelled to evaluate the second round siting process. **

MINNESOTA REPORT EXPOSES MAJOR DEFICIENCIES IN 2ND HLW SITE SURVEY

The Minnesota Governor's Nuclear Waste Council took the opportunity at Congressman Markey's hearing focusing on the selection process for the second repository to publicize a recently completed report that provides extensive documentation asserting that DOE's survey of crystalline rocks to determine a suitable geological formation for the second repository was seriously flawed.

The report -- "Review of the U.S. DOE's National Survey of Crystalline Rocks" -- which is based on a review of materials that were finally "freely" provided by DOE after a Freedom of Information Act request was filed by the state, finds that:

"...the initial survey of crystalline rocks conducted in 1979 and summarized in ...ONWI-50, was seriously flawed. The survey was underfunded, and it was assigned little of the time and staff resources necessary for such an important undertaking".

It is pointed out that this initial survey though "harshly criticized" was "resurrected" three years later, "with only four months of additional effort under a different cover (OCD-1) without any state or public review and comment period" to serve "as the foundation for all future siting work."

The twenty-six page report provides several citations and documents to support its claims.

Conclusions Drawn

After providing specific citations to support deficiencies in the survey in several areas (no public review, failure to weight screening variables, inconsistent "use" of "exposed" rock definitions, inadequate consideration of water resources), the report concludes that the process utilized by DOE to select seventeen sites in three regions was inadequate. This inadequacy is attributed to:

- o the lack of commitment, sufficient funding, and time necessary to complete a thorough and systematic survey;
- o an illogical screening process that resulted in the East appearing more favorable;
- o the inappropriate and premature application of the regionality concept which may have led to the arbitrary deferrals of rock masses outside the three targeted eastern regions;
- o and, most importantly, a clearly inferior technical effort put forth in the collection and analysis of geologic formation.

Recommendations

In order to restore credibility to the selection process, the report recommends that DOE:

- suspend the current Crystalline Repository Program siting effort;
- reevaluate and demonstrate the need for a second repository;
- justify the choice of appropriate geological media;
- justify the need for regionality considerations if more than one repository is necessary; and

- initiate a new national survey, after the above actions have been taken, that has the following essential characteristics: sound technical criteria, proper geologic evaluations, reliance on current literature, full public and peer review, and sufficient time and resources to do a thorough job. **

CANADIANS EXPRESS OPPOSITION TO U.S. 2ND ROUND SITE SELECTION

In a meeting with U.S. officials this month, representatives of the Canadian government reiterated their opposition to "any [HLW repository] development which would present transboundary threats to the welfare of Canadians or the integrity of the Canadian environment". In expressing their opposition the delegation, which included representatives from the Canadian Departments of External Affairs, Environment, Energy, Mines and Resource, the Canadian Embassy in Washington, and representatives from the provincial governments of Manitoba, Ontario, and New Brunswick, cited the mutual obligations of the two countries under the 1909 Boundary Waters Treaty that boundary waters "shall not be polluted on either side to the injury of health and property on the other".

Concerns With Draft Report

The specific purpose of this session was to discuss the Canadian concerns regarding the Draft Area Recommendation Report (DARR) which narrowed the possible sites for the second repository. The Canadians are particularly concerned about the identified areas which are in or near drainage basins flowing into Canada or into boundary waters, "namely areas in the St. Croix River Basin, the Great Lakes Basin, and the Red River Basin."

They raised a number of questions about the site selection process including;

- its failure to reflect existing, seasonal and future Canadian population levels, or the Canadian dimension of other U.S. criteria such as the heritage status of the St. Croix River.

- the fact that the Red River Basin, including the potential repository sites, is subject to chronic periodic flooding,
- the doubtful merit of siting a nuclear waste repository in any areas of ground or surface water migration.

Outside the meeting, the Canadian Government suggested that the International Joint Commission be asked by the two governments to examine and report on the transboundary implications, if any, of proposed sites in or near drainage basins flowing into Canada. The U.S. representatives undertook to consider this proposal.

U.S. Endeavors To Allay Concerns

U.S. officials reaffirmed their previous commitments that there would be ongoing consultations with Canada regarding Canadian concerns as they arise; that the 15-year screening process being carried out by the DOE is intended to ensure that there are no harmful effects on either side of the border; that any site that would require field work in Canada would be dropped from further consideration; and that international obligations would be respected and considered as a distinct element in the U.S. site selection process. **

SENATORS ASK PROBING QUESTIONS ON MRS PROPOSAL

Though a great deal of time at the April 29 Senate Energy and Natural Resources Hearing focusing on the Administration's nuclear programs was spent discussing the possible effects of the recent Soviet nuclear accident, enough attention was given to MRS issues to indicate that at least some of the Senate Committee members were inclined to move the MRS proposal along without waiting for formal submission by DOE. (N.B. DOE is prohibited from formally submitting the MRS proposal under an injunction issued by the U. S. Circuit of the Middle District of Tennessee. The injunction is being appealed in the U. S. Court of Appeals in Cincinnati.)

The question that gave the strongest indication that movement on the MRS

proposal is being considered, at least within this Committee, was posed by Senator McClure when he asked Office of Civilian Radioactive Waste Management (OCRWM) Director Rusche if the draft MRS proposal submitted to the Committee for their review was essentially the same as the final version of the proposal prepared for formal submission to Congress. Mr. Rusche answered in the affirmative, noting that the only changes in the final version from the review proposal were with regard to spent fuel at West Valley. When Senator Johnston followed by asking Mr. Rusche when Congress should take action on the MRS, the response given was -- as soon as possible.

Mr. Rusche was also questioned by Senator Evans as to whether linking operation of the MRS to the licensing of the first geological repository was necessary and would such a linkage significantly impede the development of the MRS. He responded that this linkage requirement was necessary in order to ensure that the MRS would not become a de-facto repository.

An Upbeat Session for DOE

As opposed to the House hearings on HLW activities, this Senate session could be described as complimentary of DOE activities rather than significantly critical. Senator Warner remarked to Mr. Rusche that VA Governor Baliles commented to him on the professionalism of DOE's interactions with the state. When the Virginia Senator asked if DOE would take full account of the comments provided by his state on the Area Regional Recommendation Report which narrowed down the possible second round repository sites, Mr. Rusche responded, "absolutely."

On the question of whether the first repository could handle all the waste that would be generated, Mr. Rusche did reiterate his view, previously stated in other forums, that technically, based on what the Department knows at this time, the first round sites could be expanded to hold more than 70,000 MTU of spent fuel. **

DOE DOCUMENTS PROVIDED TO NAS FOCUS OF HOUSE HEARING

At the May 1 House Energy Conservation and Power Hearing on the selection of sites for the first repository, Rep. Ron Wyden (D-OR) quickly launched into a severe criticism of the DOE by accusing OCRWM Director Ben Rusche of "corroborating everything we have heard states say they have seen from the Department so far" by his refusal to respond to a Congressional request for release of the National Academy of Sciences (NAS) review of the ranking methodology for HLW repository site characterization decisions.

Wyden called the OCRWM decision to hold all ranking review decision materials until site selection decisions are announced in mid-May "stonewalling", and "A textbook case in non-participation" reflecting "how DOE has handled both the Congress and the states."

Rusche defended the OCRWM decision and said the agency never intended to release NAS comments prior to OCRWM's consideration and application of all ranking methodology criteria. "I regret the stonewalling accusation," Rusche said, calling it a "sweeping generality" based on "one occasion" of disagreement with Congress regarding release of information.

The hearing centered on a series of correspondence between the Subcommittee and Rusche concerning release of the NAS comments on repository ranking methodology. At an earlier hearing Subcommittee members criticised the initial ranking methodology and urged independent review of the method prior to OCRWM's decision to enlist NAS in a comprehensive review of the method and the rankings.

DOE Refuses To Provide NAS Data

According to Rep. Alan Swift (D-OR), who chaired the hearing, in letters exchanged between March 17 and April 22, Rusche initially promised and subsequently refused to release NAS comments as soon as NAS had completed its review. Rusche maintained the OCRWM intent was always that NAS comments would be held until all

pre- and post-closure ranking decisions were completed by the Administration.

In response to an additional inquiry by Swift at the hearing, Rusche indicated that the Secretary of Energy and the President will retain discretion to pre-empt the conclusions of the ranking methodology, saying such discretion is afforded the Administration under the law and under the DOE site selection guidelines.

NWPA A Political Compromise?

Saying that "what the Congress did in the Nuclear Waste Policy Act (NWPA) was almost entirely a political solution, not a technical solution" to high level waste disposal and that "I don't know that compromises made" in the Act "were always the best," Swift suggested that a "pause" be taken in the site selection process to provide more time to resolve political and technical conflicts in the program. Rusche replied he was "skeptical things would be any different a year later than they are now."

State Participation Questioned

The Subcommittee Democrats present at the hearing lead representatives of first-round repository states through a litany of Department disagreements with states, or failures to respond to state requests, regarding state access to DOE documents and decision-making processes. "Participation is not a priori defined" by the Nuclear Waste Policy Act, Rusche responded. "It is clear that we have different views" regarding the rights of states to participate in decisions.

Rep. Jim Hall (D-TX) said that Section 117(a) of the NWPA requires that DOE respond to all requests for information made by states within 30 days of the request, calling the requirements of the section unqualified "thou shalt's".

Wyden and Swift asserted that DOE is also required under Section 303 of the Atomic Energy Act to respond to all information requests of the Congressional committees of jurisdiction over the relevant DOE activity.

Rusche Refuses To Give In

Rusche and his general counsel continued to argue for DOE discretion in the timing of response to state and Congressional information requests, leading to threats by subcommittee members of subpoenas. The response of DOE's Counsel to the threats was "If you want something in a time frame of your own choosing, you may have to consider" using a subpoena.

Subcommittee members on the Republican side of the dais attempted to moderate the friction evidenced throughout the hearing. Howard Nielson (R-UT) suggested the hearing was "stacked against" Rusche, and that "the committee has been very unfair" to him.

The hearing consisted solely of one panel comprised of representatives of the five states being scrutinized for characterization in the first-round repository site search, and Rusche, accompanied by his counsel. **

HOUSE INTERIOR P-A MARKUP STALLED BY MEMBER WALKOUT

The principle of unlimited compensation for victims of accidents related to construction and operation of high-level radioactive waste repositories was agreed to on April 23 by the House Committee on Interior and Insular Affairs. The committee failed, however, to report the Price-Anderson Amendments Act due to intense nuclear industry dissatisfaction with other committee recommendations in the bill.

Under provisions of the bill currently agreed to by the Interior Committee, all Department of Energy contractors would be indemnified for liability for full compensation for repository-related incidents, including transportation accidents.

Other Interior Committee actions increased the liability of utilities for off-site damages from nuclear reactors. This approval by a majority of the members sparked a walkout by those objecting to the provision and denied the committee the quorum necessary to report the bill April

23. Another mark-up was then scheduled for April 30. However, at that meeting, an amendment attempting to overturn the votes on reactor accident liability and other issues was offered but objected to for lack of adequate notice. The committee agreed to postpone further consideration of the bill for two weeks.

In the view of some observers this stalemate will not be resolved by the next scheduled mark-up and Reauthorization of P-A could be killed for this session of Congress.

HLW Liability Folded into P-A

The liability and compensation scheme for repositories was adopted in the context of the renewal and amendment of the Price-Anderson Act, which establishes limits on liability for accidents involving nuclear materials for utilities operating nuclear power reactors and for Department of Energy contractors. Under current law, contractors on Department of Energy nuclear-related projects are indemnified by the Secretary of Energy up to a total limit on contractor liability of \$500 million.

The unlimited compensation for repository accidents proposal, offered in the Interior Committee by Barbara Vucanovich (R-NV), has been a consistent demand of potential repository host states in negotiations with the Department of Energy. The Department had balked at supporting the proposal.

Nuclear Waste Funds to Support Programs

Under the Interior Committee amendment, nuclear utilities would finance the first \$8.2 billion in compensation awarded for repository damages under State tort law. Payments would be made through the Nuclear Waste Fund established under the Nuclear Waste Policy Act. The Federal government--through the Secretary of Energy--would be liable for any further damages.

The House Interior bill places more financial responsibility for repository accidents on utilities than does the measure reported out of the Senate Energy Committee (See **Wrap-Up (HLW)**), which limits payments

from the Waste Fund to about \$2 billion. Both bills provide Federal responsibility for full compensation of claims, and Federal indemnity of DOE contractors.

The extent to which claims are paid from the Waste Fund is significant in that the Fund may be a more certain source of compensation than the Federal Treasury, since one Congress cannot guarantee that a future Congress will appropriate funds to fulfill a statutory commitment.

Coverage of DOE Contractors

The Interior bill would establish for all nuclear-related accidents involving DOE contractors a threshold--called an Extraordinary Nuclear Occurrence (ENO)--at which certain provisions of state law restricting the ability of plaintiffs to receive awards would be waived. If the Secretary of Energy determines that substantial off-site releases of radiation and resulting injury have occurred, the Committee bill provides that state statutes of limitations, sovereign immunity and needs to prove negligence would be waived. The ENO concept is applicable under current law to reactor accidents, although the ENO determination for reactors is the responsibility of the Nuclear Regulatory Commission.

The liability proposal falls short of the repository states' initial demand for a new Federal tort system for repository accidents, strict liability for both ENO and non-ENO accidents and reimbursement of state and local governments for expenses incurred for any precautionary evacuations.

HLW Coverage Parallels Utility Program

The \$8.2 billion liability limit for utilities for repository accidents parallels the limit set by the Interior Committee for utility liability for nuclear reactor accidents. The limit far exceeds both the current Price-Anderson liability limit for reactors of \$640 million, and the nuclear industry proposal that any increase in that limit not exceed \$2.2 billion. Compensation funds under Price-Anderson are financed by assessments on all utilities licensed to operate nuclear reactors.

Under Price-Anderson, for both the repository and the reactor compensation schemes, payments into a compensation fund are made only if and after an accident occurs.

The amendment increasing the liability limit for power reactor accidents from \$2.2 billion to \$8.2 billion passed the Interior Committee in a hard-fought 21-20 vote. Many opponents of the increase quit the mark-up in protest, contributing to the wider margin of the 20-13 majority supporting the Vucanovich amendment.

Opposition To Utility Liability Limits

Nuclear utility spokesmen indicated that utility support of renewal of the Price-Anderson Act may be retracted if aggregate utility liabilities are not reduced below the Interior Committee level. The current Act will expire on August 1, 1987.

Congressional failure to renew Price-Anderson would probably leave liability limits for operating reactors consistent with the original Price-Anderson levels, but would provide no limits on liability for any reactors licensed after the Act expires. No limits on liability or indemnification provisions would be in effect for DOE contractors. **
this proposal.

REPORTS OF NOTE (HLW)

GAO's Quarterly Report on DOE's Nuclear Waste Program as of December 31, 1985; (GAO/RCED-86-86); As requested by Sens. McClure and Johnston, GAO has compiled this report. It contains no recommendations and basically summarizes activities undertaken during the quarter. It does include a brief description of current litigation and an overall summary of expenditures.

The Rustler Formation as a Transport Medium for Contaminated Groundwater; Environmental Evaluation Group, Environmental Improvement Division, Health and Environment Department, P.O. Box 968, Santa Fe, NM, 87503. The report examines the geological and hydrological characteristics of the Rustler Formation which is the main potential pathway for release of radionuclides to the biosphere in the event of a breach of the Waste Isolation Pilot Plant (WIPP) nuclear waste repository. It concludes that the geological and hydrological characterization of the Rustler Formation has not yet been completed to a desired level of detail for a realistic modeling of transport scenarios following an assumed breach of the repository. Since the WIPP site is located in a region where karst processes have shaped the topography and hydrology, the report contains an analysis of radionuclide transport through a Rustler water-bearing zone which is assumed to contain karst conduits. The analysis shows that if such conditions exist and if the mode of breach is such that radionuclides are introduced into this Formation, the resulting releases could be significant.

More than 1300 ft. of salt separate the Rustler water-bearing horizons from the WIPP repository which is located in the Salado Formation underlying the Rustler Formation. The probabilities of radionuclides entering the Rustler water-bearing zones after a breach will be addressed in the future in order to determine compliance with the EPA Standard for the disposal of transuranic and high-level wastes (40 CFR 191).

The report make recommendations to complete the studies currently in progress as well as some additional work, to better understand the Rustler hydrology. It also recommends that the WIPP design include engineered barriers for an extra measure of safety.

IN THE OCRWM

Case you haven't heard Bob Bauer, OCRWM Associate Director for Resource Management retired on April 11. Ed Kay is now functioning as acting director of this OCRWM office.

IN THE CONGRESS...REPORT ON HLW PROGRAM

A recently released report of the **House Subcommittee on Energy Research and Production**, chaired by Congresswoman Marilyn Lloyd, includes the recommendation that the "Secretary of Energy's preliminary determination on site suitability...should be made prior to site characterization." This supports DOE's current policy and runs counter to views in other committees.

Among other listed recommendations are the following:

- DOE should plan to characterize three sites and no more for the first repository;
- Congress should not seek to amend the Waste Act at this time;
- DOE should bring states and Tribes into the process of decision-making prior to any formal publication of "drafts" regarding proposed decisions;
- the HLW Mission Plan should be amended to include more detail on the program;
- the discussions regarding the handling of defense waste should be open to public participation;
- the Price Anderson Act should be extended to cover waste activities and the activities of all nuclear contractors.

.....PRICE-ANDERSON REAUTHORIZATION

The **Senate Energy and Natural Resources Committee** completed markup of the **Simpson-McClure Price-Anderson Reauthorization of Bill on April 23**. The Committee Report was filed on April 24. Under a prior agreement with the Senate Environment and Public Works Committee, the bill will now be considered and must be reported out by that Committee within 120 days (August 24). If the Public Works Committee fails to report out the legislation by that time it will automatically be sent to the floor for action by the full Senate. The Committee has scheduled a hearing on the P-A proposal for May 13. The contact is James Curtiss (202) 224-2441.

No changes were made to the waste related provisions at the final markup session. Senator Evans did not attempt to introduce an amendment that would have reduced the time period of application of the legislation. He was expected to do so in order to give the potential repository states another opportunity to enhance liability coverage for activities at the waste repository prior to the receipt of spent fuel.

One interesting aspect regarding the P-A Reauthorization, is that, according to a Committee staff analysis, certain provisions are in conflict with the Congressional Budget and Impoundment Control Act of 1974, as amended. A recent staff memo to Committee members points out that certain provisions in the current version of the Price-Anderson Act that allow the NRC and the Secretary of Energy to -- make contracts in advance of appropriations and incur obligations without regard to section 3679 of the Revised Statutes, as amended are in conflict with Section 401 of the 1974 Budget Act as amended.

In the opinion of the majority staff of the Senate Budget Committee, though the P-A reauthorization proposals would just extend this provision, which is already in effect under the current P-A Law, "the enactment of legislation that extends provisions that are in violation of the Budget Act are the same as the enactment of a new law that violates the act."

In order to avoid this conflict, the Energy minority staff recommended an amendment to the Committee version that would permit payments under the indemnification contract provided for in the proposed reauthorization "only to the extent provided for in advance in appropriations Acts; or to retain the provisions as adopted and during Senate floor consideration move to "waive or suspend application" of the relevant portions of Section 401 of the Budget Act.

Since the Committee elected not to seek an amendment to the reauthorization proposal, it is apparent that they will pursue the second course of action, to seek a waiver from the Budget Act provisions when the P-A Authorization reaches the floor. Committee staff do not expect this to be a problem. **

REPORTS OF NOTE (HLW)

Preclosure Radiological Calculations to Support Salt Site Evaluations; (BMI/ONWI-541 [Rev. 1] Distribution Category UC-70); Office of Nuclear Waste Isolation, Battelle Memorial Institute, 505 King Avenue, Columbus, OH 43201-2693; This document is a revision of the August 1984 report of the same name and its purpose is to provide data, methods and results of preclosure radiological calculations to support salt site evaluations on the basis of the U.S. DOE final siting guidelines (10 CFR part 960). The data and methods portion is of sufficient detail to enable a reader to derive the values used and reported. Results are presented for easy comparison with pertinent radiological regulations.

Waste Package Reference Conceptual Designs for a Repository in Salt (BMI/ONWI-517) Office of Nuclear Waste Isolation, Battelle Memorial Institute, 505 King Avenue, Columbus, OH 43201-2693; This report provides the reference conceptual waste package designs for the office of Nuclear Waste Isolation to baseline these designs, thereby establishing the configuration and interface controls necessary, within the Civilian Radioactive Waste Management Program, to proceed in an orderly manner with preliminary design. Included are designs for the current reference defense high-level waste form from the Savannah River Plant, an optimized commercial high-level waste form, and spent fuel which has been disassembled and compacted into a circular bundle containing either 12 pressurized-water reactor or 30 boiling-water reactor assemblies. For compacted spent fuel, it appears economically attractive to standardize the waste package diameter for all fuel types.

The reference waste packages consist of the containerized waste form, a low carbon steel overpack, and, after emplacement, a cover of salt. The overpack is a hollow cylinder with a flat head welded to each end. Its design thickness is the sum of the structural thickness required to resist the 15.4-MPa lithostatic pressure plus the corrosion allowance necessary to assure the required structural thickness will exist through the 1,000 year containment period.

Based on available data and completed analyses, the reference concepts described in this report satisfy all requirements of the U.S. Department of Energy and the U.S. Nuclear Regulatory Commission with reasonable assurance. In addition, sufficient design maturity exists to form a basis for preliminary design; these concepts can be brought under configuration control to serve as reference package designs. Development programs are identified that will be required to support these design during the licensing process.