High-Level Nuclear Waste Policy & Review Board Meeting

February 17, 1984

1:30 p.m.
Hearings Room
Building #1 - Rowesix
4224 Sixth Avenue, S.E., Lacey, WA

The meeting was opened by Susan E. Gould, Chair.

Since the Legislature is still in session, not all of the legislative members were able to attend. Mary Guay and Barry Bede represented Senator Benitz, and Representative Nelson was represented by Ted Hunter.

Sue Gould reported to the Board the concerns the Advisory Council had that morning with certain sections of House Bill 1637, and their concerns about Senate Bill 4548. Because HB 1637 would augment the Board's responsibilities, the Council thought certain portions of the bill need clarification, including:

> Sections 5, 6, 8, 12, and 13 pertaining to educational programs, delegation of duties, and the hearing process on both major and technical modifications of agreements.

Mr. Stevens reported on the current status of federal programs. The guidelines were to have been final in June of 1983, according to the Congressional Act, but they are still in draft form. NRC had planned to meet again on February 14, but that meeting was canceled, which will delay their final decision on concurring with the guidelines. The state feels concurrence with guidelines prior to an EPA final recommendation would be a mistake. Other states also hold this opinion and all feel that the substance of the guidelines is infinitely more important than initial schedule achievement.

Concerning the Draft Mission Plan, which was circulated for the states' comment, Mr. Stevens explained this was actually a predraft, which was to be incorporated into a Draft Mission Plan. The Draft Mission Plan would then go out for general public comment, about April 13. The Mission Plan is to be a strategy document setting out how the Department of Energy is going to carry out the whole repository program and other features of the act.

He went on to point out a few of the points made in the states' reply to the first draft. First, we felt strongly that although a great deal of comment was contained in the document as to the achievability of the 1998 time frame, they should recognize that they might not be able to meet that target date, and they should deal with the consequences of any potential delay. Second, they did recognize there might be a need to shorten the process and their proposal was to shorten the construction time by requesting a limited work authorization. This would enable DOE to get into the site after the license had been applied for. They would dig the shaft and essentially move down the road to building the repository so that when it was licensed they would be well on their way. The state has taken substantial exception to that proposal.

We also took exception with the department on their interpretation of the federal legislation in nominating five sites, recommending three sites for actual characterization, and concluding with one site they felt to be licensable. They would then proceed to NRC for a license. We feel the statute says fairly directly the President shall recommend for repository one of three suitable sites. We suggest due consideration be given in the Mission Plan to reflect that issue. Every other stage being considered as a repository supports this interpretation.

Further, Mr. Stevens said the state believed consideration should be given to the Monitored Retrieval System in the Mission Plan, in case a major delays happens in the development of a geologic repository, rather than wait until the last possible moment they are suggesting in the early 1990's to ask Congress to authorize the construction of an MRS facility.

Referring to the guidelines, Mr. Lewis wondered if we had any idea when the EPA standards were due out in final form. Mr. Stevens replied they were hoping for April, and we just received a copy of the latest draft. Mr. Provost had copies, which were distributed. He said the Science Advisory Board Report is holding up the regulations. However, he said it should be ready at any time. He said we would receive a copy of the Science Advisory Board report.

Mr. Lewis also asked if there would be an opportunity for additional formal comments on the Mission Plan within the next few weeks. Mr. Stevens said they were planning to submit a formal draft and we would have another opportunity to comment. Mr. Lewis went on to say that since this is a state with a federal reservation, and it seems the target date will not be met, he is very concerned about the possibility of waste just being stored at Hanford if there is no alternative, or fall-back, position. He said he would encourage the state, and others who wished to join, to push USDOE to have such a plan.

In response to Ms. Gould's suggestions for recommendations, Mr. Lewis replied he would recommend we study the EPA regulations first, before commenting on the guidelines, then push for realistic analysis of the schedule under the Mission Plan, and finally urge they establish an earlier MRS plan. Don Provost agreed with Mr. Lewis, and mentioned it was especially important to have a realistic MRS plan in light of the transportation issue.

Dr. Beare inquired to what degree are other states interested in this problem. He wondered if there were a coalition of these states which could bring pressure. Mr. Stevens replied there has been a working arrangement at the staff level with other involved states trying to focus attention on these issues. He said they were working with the governors and legislators of those states in an effort to combine forces to make an impact. A meeting has been scheduled on this subject within the next several weeks, and Mr. Stevens hoped to be able to make a report to the Board on their progress.

Don Provost distributed copies of Working Draft No. 3 just received from the EPA, outlining major changes made in the Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes. (See attached Summary.) He went on to point out some of the changes, one concerning ground water, which

he considered a major issue. Mr. Provost said he was surprised at the number of changes, and felt that all in all it was a pretty good attempt to answer some of the major concerns of the states. He felt there should be a session with EPA to go over the whole draft in detail.

Mr. Lewis asked if this were such a complex document it would be difficult to interpret, therefore subject to a lot of different interpretations. Mr. Provost replied in the affirmative. He continued saying some of the criteria were loosened, and some were tightened, and EPA was having a real conflict within the department with their own Scientific Advisory Board. Mr. Lasmanis brought out another noted change to isolate wastes from the accessible environment from 10,000 years to 100,000 years. He said to geologically model what will happen in 10,000 years was difficult enough, and the confidence of predictions goes down the longer you go into time. Mr. Provost replied that conversely the tests at 10,000 years were not enough to tell what is going to happen, but at 20-25,000 years there could be significant amounts of radioactive materials released to the accessible environment. EPA recognized that the modeling was less precise, but they wanted a more realistic time frame for radioactive materials getting out. Discussion continued and the conclusion was reached that the Review Board should have a presentation by the EPA, if this could be arranged.

Sue Gould then asked how these revised regulations would affect the guidelines, which have been submitted to the NRC for concurrence. Mr. Stevens replied that at the time of the hearing USDOE stated they had substantially complied with the EPA regulations, (Draft #2). This current draft (#3) has numerous changes, and we have not heard that USDOE would request NRC for more time to make sure the statement of substantial compliance in their view was accurate. It is a question he said that should be posed. Mr. Provost said EPA did not plan to have another public comment period.

Mr. Stevens reported on the status of the C & C Agreement. The Joint Subcommittee on Science and Technology had raised 36 items of concern, which were discussed by the state team and the U.S. Department of Energy team. Some of these issues were negotiated, and the rest left for further study. At a later meeting of the Joint Committee the USDOE team was invited to discuss the issues raised by the committee. USDOE limited their remarks to four principal issues: liability, defense wastes, foreign wastes, and the condition under which we could stop work.

A public hearing was called by the subcommittee for the following Wednesday night to hear comments on the proposed draft. It will be held in Hearing Room B of the House Office Building. Mr. Stevens also said with the exception of foreign wastes, the concerns of the Legislature had already been considered by the negotiating team.

Discussion followed and there was general agreement the state should be firm in its position on the liability question.

Mr. Stevens reported on the current status of all the bills before the Legislature which affect the Office of High-Level Nuclear Waste:

Bill	Status (as of February 16, 1984)
ESB 4534	Passed House
SB 4548	In Senate Energy Committee
SB 4558	Passed Senate. In-House Rules 2
SCR 142	On Senate Second Reading Calendar
SJM 127	Passed Senate. In-House Rules 2
ESJM 131	Passed Senate. In-House Rules 2
ESHB 1637	Passed House. In Senate Energy & Utilities Committee
HJM 39	In-House Rules 2
HCR 37	In-House Energy Committee

Further discussion centered on some of the concerns the Advisory Council expressed about the federal liability addressed in ESJM 131; SCR 142, regarding the C & C Agreement and the involvement of the Legislature; HB 1637 which would give more responsibilities to the Policy & Review Board. The question was raised about the language in House Bill 1637 which referred to low-level waste under the federal Act of 1980. Senator Hurley stated an amendment was being prepared to take care of this discrepancy. Mr. Lewis further commented on Section 10, the negotiation process, that he considered it important to have some board member participate in the process on a day-to-day basis. He also stated he was very supportive of the public hearings with adequate notice.

Sue Gould mentioned another amendment discussed in the Council meeting, one which would allow a representative to the Council to be seated in the member's absence. She explained this referred specifically to Dr. Leopold's seat as Dr. Leopold is currently on a six-month sabbatical. Since there is an emergency clause on the entire bill, Dr. Leopold's case would be covered.

Dr. William A. Brewer, head of the team to select a contractor under the RFQ/RPF process, reported on the progress of the selection. Seven responses were received, and the evaluation process is ongoing. After the planned meeting for February 21 the top contenders will be chosen. The goal is to choose one prime contractor on a time and expense basis, who will do as we direct and will charge the office for the actual salaries and overhead and an agreed upon fee. Dr. Brewer explained that because we are going into a higher level of activity on the site, we will need a contractor with substantial technical qualifications. He said Golder Associates, who have done a very good job for us to date, will be unable to continue because of conflict of interest. He further stated because it is virtually impossible to find a company which is good technically, and also expert in the public information field, we will set up a task order type of contract with the prime contractor. The prime contractor will then subcontract for the services we want and need.

Sue Gould drew attention to a copy of a letter in each of the member's packets from Golder Associates, dated January 30, 1984. The letter signed by Lisa Dally and Richard Talbot enclosed a memorandum regarding the PNL report given at the January 20 Policy and Review Board Meeting. (See attached)

Mr. Stevens acknowledged the fine job Golder had done for the office, and noted the close relationship we had with their staff David Pentz, Senior Vice President; Jim Voss, Senior Project Engineer; Lisa Dally, Geologist; and Dick Talbot. He went on to say we appreciated their availability and cooperation. "That is the kind of relationship we hope to be able to continue with a new consultant."

Dr. Brewer was asked to repeat his brief report on the level of technology that is going on at Hanford, which he gave to the Council meeting. He described their "Block Test." This testing of a solid block of basalt approximately six feet square by thirteen feet is being done to see what real rock looks like in place on a scale appropriate to a repository design. The block was drilled with holes and is fully instrumented to measure the forces working on a piece of rock. Rock mechanics and ground water are their main concerns, and it is estimated it will take from three to five years of testing to determine what actually happens. It is a potential data source for verifying the models.

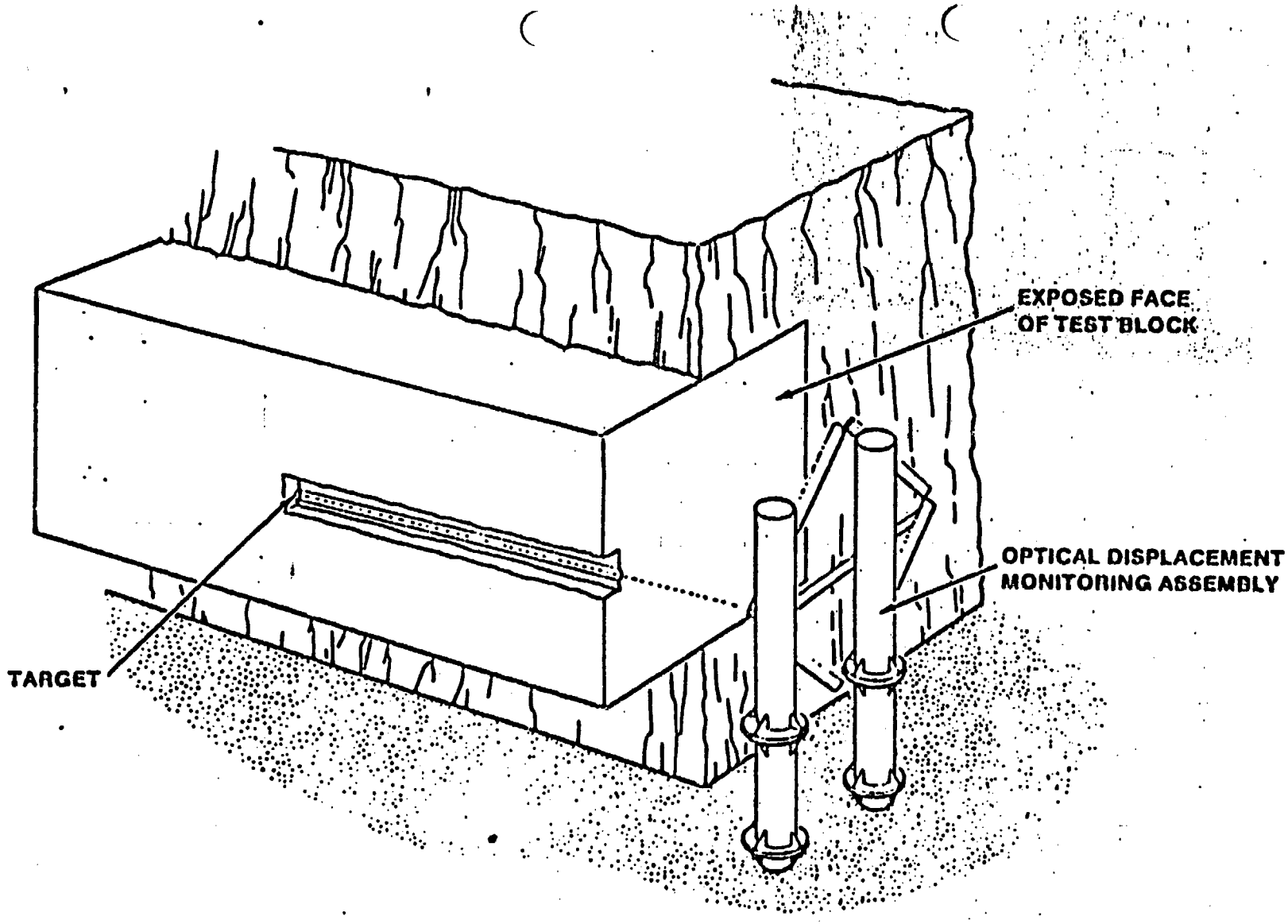
He went on to say this is only one of full-scale tests that are going on, partly as a natural progression in the project, and partly as a result of the critiques from the outside, Golder, State of Washington, USGS, and the hard questions asked by NRC.

Dr. Brewer continued that he estimates it will be a year before they even start to get data and it will then take from three to five years before they even understand what the problem is in the area of hydrology. He predicts next year this office will be concentrating on a full-blown technical plan with the hope our investigations will dove-tail with the Department of Energy's efforts.

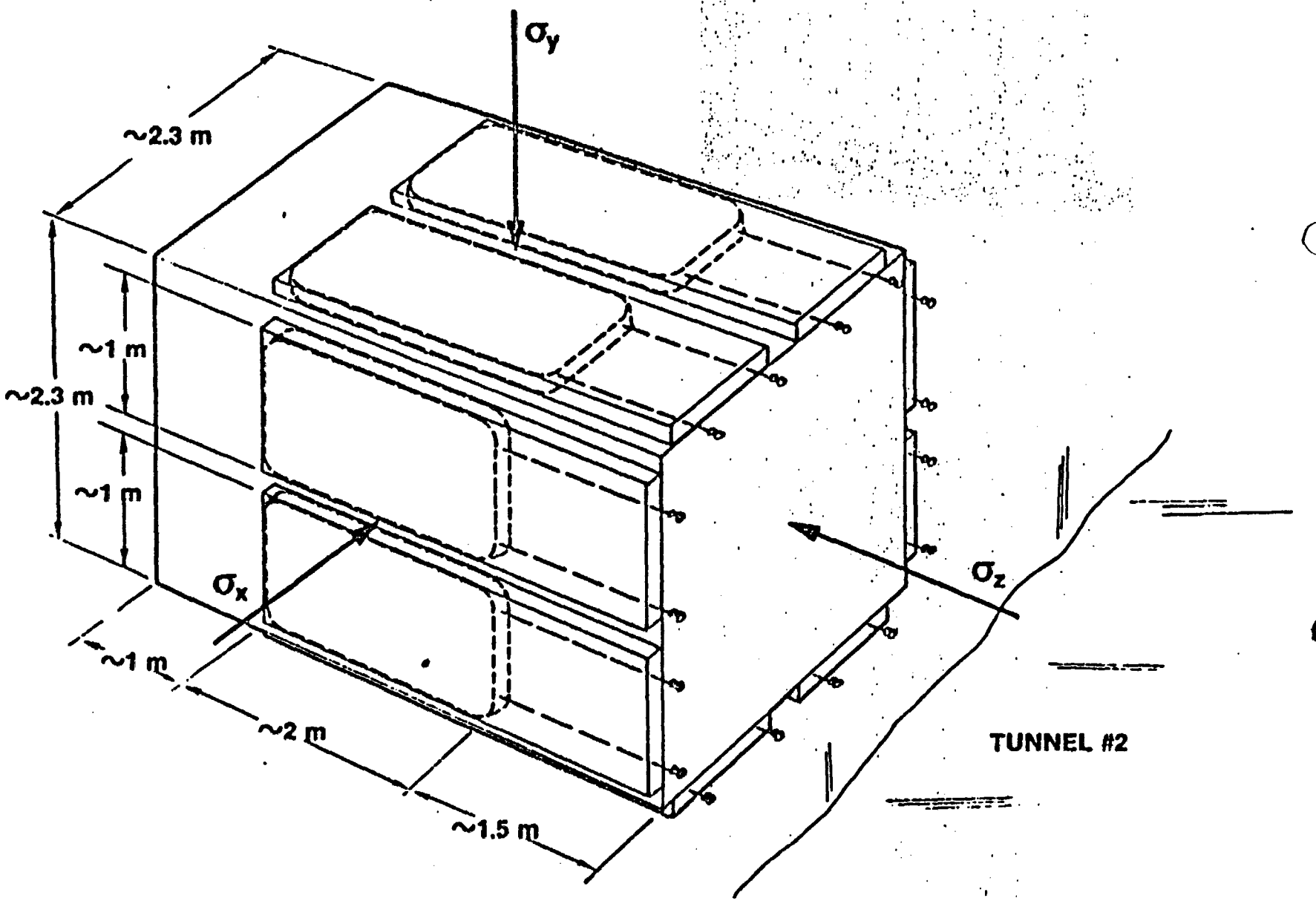
David Stevens reported that the legislative grant has passed through nearly all of the review processes and will soon be forthcoming. He also said we are continuing to search for the technical people needed to help us. He reported the Reference Center is started, and the USDOE is beginning to support our activity. He also said it is hoped the office would soon have the equipment in place to start to build our "Issues" file, which will be an integral part of the office.

Copies of the brochure describing the Waste Management 84 Symposium to be held in Tucson, Arizona on March 11-15, were distributed to the members of the board. Nancy Kirner, who will be attending from the Radiation Control Section of the Department of Social and Health Services, will also be representing the Policy and Review Board. Nancy will report her findings to the Board.

The meeting was adjourned.



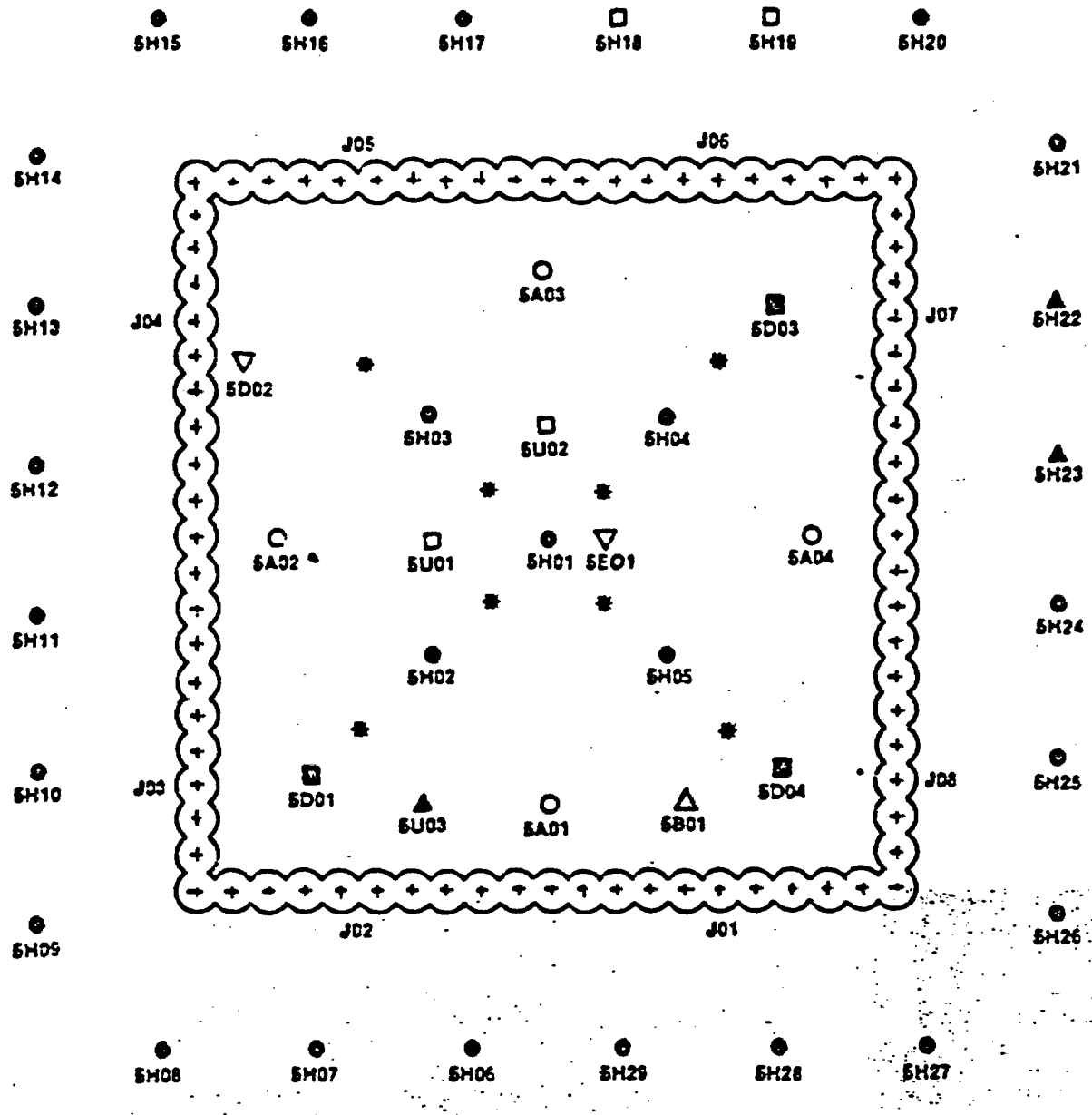
Basalt Deformation Measurement System



BLOCK TEST ISOMETRIC VIEW

APPLICABILIY OF FULL-SCALE HEATER TESTS TO REPOSTIORY DESIGN

- DETERMINATION OF IN SITU ROCK MASS THERMAL CONDUCTIVITY, HEAT CAPACITY, AND THERMAL EXPANSION FOR COMPARISON TO PRE-TEST LABORATORY VALUES
- EVALUATION OF HIGH TEMPERATURE EFFECTS ON INTACT BASALT AT CANISTER SCALE
- POTENTIAL DATA SOURCE FOR MODEL VERIFICATION



- CABLE TENDON HOLE
- EXTENSOMETER
- HEATER
- OPTICAL TARGET
- MONITORING HOLE
- BOREHOLE DEFORMATION GAUGE
- BOREHOLE DEFORMATION GAUGE AND VIBRATING WIRE STRESSMETER
- VIBRATING WIRE STRESSMETER

NOTE EACH INSTRUMENT AND HEATER SHOWN CONTAINS A THERMOCOUPLE

APPLICATION OF BLOCK TEST RESULTS TO REPOSITORY DESIGN

I. DEVELOPMENT AND VALIDATION OF NUMERICAL MODELING TECHNIQUES

   A. PROVIDES MATERIAL PROPERTIES FOR INPUT INTO MODELS:
      - o COEFFICIENT OF THERMAL EXPANSION
      - o DEFORMATION RESPONSE
      - o THERMAL CONDUCTIVITY

   B. ALLOWS COMPARISON BETWEEN MODELING RESULTS AND ACTUAL ROCK MASS DATA

II. DEVELOPMENT OF INSTRUMENTATION AND TEST TECHNIQUES PRIOR TO APPLICATION AT DEPTH

Golder Associates
CONSULTING GEOTECHNICAL AND MINING ENGINEERS

January 30, 1984

Mr. Dave Stevens
Washington State Department of Ecology
MS/PV-11
Olympia, WA 98504

Dear Dave:

Enclosed is a memorandum regarding several comments made at the January 20, 1984 High-Level Nuclear Waste Policy and Review Board Meeting. It was our feeling that certain issues were misrepresented by John Burnham (PNL), and also that some basic concepts regarding data collection and radionuclide travel time estimates at the BWIP may be misunderstood by several members on the board or by the substitutes which were representing them at the January 20 meeting.

At your discretion, this memorandum could be distributed to members of the Review Board with the hopes of further clarifying the issues addressed. Don Provost would probably also appreciate a copy of the memo.

Please call if you would like clarification of, or further information regarding, the issues addressed in the enclosed memorandum. Thank you.

Sincerely,

GOLDER ASSOCIATES

Lisa Dally

Richard Talbot

LS/RT:gg
Enclosure

cc: J. Voss
D. Pentz

D292
833-1094

MEMORANDUM

TO: Dave Stevens
High-Level Nuclear Waste Policy and Review Board

January 30, 1984

RE: Golder Associates' Comment on the Meeting of January 20, 1984

1. In response to Sue Gould's question addressed to John Burnham (PNL) pertaining to differences between salt and basalt as repository host media:

   Burnham's response indicated that water is present in salt. He discussed "flow through salt" and brine migration interchangeably. It should be clarified that salt is a very low permeability medium and there is essentially no flow through salt as one would typically characterize groundwater flow. Flow in strata where salt deposits are found is usually confined to clay horizons between salt formations. Density and thermal gradients will influence the migration of brine through salt which would otherwise sit in pockets within the salt. The only way Golder Associates' perceives major groundwater flow around waste packages deposited in salt is if a major disruptive event takes place (e.g., fracturing due to borehole drilling and repository construction, major faulting or other natural disruptive events).

2. In response to the questions raised regarding the Rattlesnake Hydrologic Barrier and the refined conceptual model of groundwater flow in basalt (based on new hydrochemical data) being considered by Rockwell (presented in Don Provost's review of the DOE/NRC Hydrology Workshop):

   A lower permeability barrier has been determined to exist just west of the proposed RRL (Reference Repository Location) based on observed hydraulic head differences across the barrier. Differences in the hydrochemistry and methane content of groundwater in the basalt units are also observed across the barrier. The characteristics of the barrier are unknown, although it has been speculated that it is the result of a fault or flow pinchouts.

   RHO has formulated a conceptual model that apparently fits the hydrochemical data. It consists of a zone of vertical upward flow beneath and/or west of the RRL, followed by dilution and further movement to the southeast. The conceptual model, which includes this plume of water with different hydrochemical characteristics, is still considered very preliminary by RHO. The hypothesized source of the

plume is the sedimentary rocks thought to underly the basalts at great depth. It was also pointed out that the hydrologic barrier west of the RRL may be a factor causing the upwelling. Upward flow through the repository area is now being considered as part of RHO's revised conceptual model.

At this time, it is unclear how this alternative conceptual model would affect estimated travel times to the accessible environment. Some important material properties of basalt at this site are as of yet unknown (e.g., vertical permeability of basalt units, vertical pressure distributions).

Until large-scale field tests can be performed and piezometers installed to establish an adequate data base from which to predict true groundwater flow patterns, all travel time calculations should be regarded as highly uncertain.

John Burnham stated in his presentation that he believed groundwater travel time in the unperturbed aquifer to the accessible environment will probably exceed 1,000 years (thus satisfying one of the NRC site criteria). In response to a later question on travel time predictions, he stated that:

(i) No confidence limits were assigned to his statement, and

(ii) The lower bound travel times (20 years) predicted by the NRC (Golder Associates) in their review of the Site Characterization Report (SCR), were based on the use of measured, but unrealistic, values of hydraulic parameters (high head gradients, high conductivity, low porosity) at every point along the predicted flow path.

Rockwell's approach, to which he was alluding, has been that hydraulic parameters along any flow path will vary spatially, and that some "statistical mean value" (greater than lower bound values) will determine travel times. Our comment is that Rockwell has not adequately demonstrated a methodology, or approach, to show how hydraulic parameter data will be analyzed or how uncertainties in the data will be treated in modeling.

3. In response to the question of whether we are "starting all over" now that a new or revised conceptual model of the groundwater flow system is being formulated:

No, analyses of the flow system in and surrounding the Hanford site is not starting over. The data used in previous models of groundwater flow still exist and should be used for future assessment where appropriate. New hydrochemistry data is being incorporated to develop a refined concept of groundwater flow. This conceptual flow model is basically an overall interpretation of what the flow system looks like. As more data is gathered, the interpretation of the flow system is modified to fit existing data. Rockwell is now

incorporating new information regarding the structural barrier and a potential upward flow of deep groundwater in the Grande Ronde in the RRL area into their model of groundwater flow.

4. On performance assessment, Burnham believes Rockwell's approach is well conceived, but is currently limited by the geologic/hydrologic models (see above). It should be stressed that the conceptual models (rather than numeric models) are, in fact, currently limited by lack of data in general and particularly for specific parameters such as vertical hydraulic conductivity.

5. In his presentation, Burnham referred to the microearthquake swarms, believed to originate within the Grande Ronde, as low intensity, high frequency ("constantly shaking") and contrasted them with more major earthquakes which are typically of high intensity, low frequency and relatively short duration. He implied that the microseismic swarms may be a greater potential problem for repository stability.

   While the above may be true, the statement's simplicity may be such as to unduly alarm the non-technical person. Microseismic activity results from rock failure ("cracking"), which results from local tectonic activity, and is undoubtedly manifested by the high horizontal stresses that are currently believed to exist at the Hanford site. The effect of microseismic activity on the stability of underground excavations is not well understood; the effect of high in-situ stresses can be considered in the repository design process. The intensity of the activity may be such that it is undetectable except to sensitive instruments. Golder Associates believes that this is an area where much work is needed.

FEBRUARY 16, 1984

PUBLIC INFORMATION: WHAT CAN A CONTRACTOR DO FOR US?

1) STUDY HIGH-LEVEL NUCLEAR WASTE MANAGEMENT PROGRAM
2) DEVELOP PUBLIC INFORMATION PLAN
   - A) DEVELOP GOALS AND OBJECTIVES
   - B) LONG-TERM AND SHORT-TERM
3) DEVELOP SPECIFIC ACTIVITIES
   - A) WHAT SHOULD BE DONE
   - B) WHO SHOULD DO PROJECTS
   - C) WHEN ACTIVITIES SHOULD BEGIN/END
   - D) HOW TO DO EACH ACTIVITY
4) BUDGET FOR PUBLIC INFORMATION PLAN
   - A) SET TIME SCHEDULE
   - B) MATERIALS NEEDED
   - C) MONEY LIMIT
5) MAXIMUM EFFECTIVENESS/ COVERAGE
   - A) USING WDOE RESOURCES
   - B) USING CLIENTELE GROUPS (I.E. LEAGUE OF WOMEN VOTERS, ENVIRONMENTAL GROUPS, ETC.)
6) MAXIMUM EFFORT/ EXPECTATIONS: EFFORTS--RESULTS

Washington State High-Level Nuclear Waste
Advisory Council Meeting
February 17, 1984 - 9:30 a.m.
EFSEC Hearings Room - Rowesix

Council Attendees:

Susan E. Gould, Chair	Gordon Kunz
Warren Bishop	Anita Monoian
Dr. Jerome Finnigan	W. H. Sebero
Mayor Joe Jackson	Jim Worthington

Sue Gould opened the meeting. She announced the appointment by Governor Spellman of Mr. Melvin Sampson of the Yakima Indian Nation as a member of the Nuclear Waste Advisory Council. He will replace Russell Jim.

Dr. William A. Brewer, who heads the team to select a contractor under the RFQ/RPP process, reported on the progress of the selection. He preceded his report by commenting on the most recent developments in Richland concerning "Block Testing" being carried out by the USDOE contractor. This testing of a solid block of basalt approximately six feet square by thirteen feet is being done to see what real rock looks like in place on a scale appropriate to a repository design. The block was drilled with holes and is fully instrumented to measure the forces working on a piece of rock. Rock mechanics and ground water are their main concerns and it is estimated it will take from three to five years of testing to determine what actually happens. It is a potential data source for verifying the models.

He went on to say this is only one of full-scale tests that are going on partly as a natural progression in the project, and partly as a result of the critique from the outside, Golder Associates, State of Washington, USGS, and the hard questions asked by NRC. The purpose is to reduce uncertainty and allow some reasonable degree of confidence.

Concerning the RFQ/RFP process, Dr. Brewer said in our quest for an outside contractor we received seven responses. The evaluation process is underway and another meeting is planned for the 21st of February to choose the top contenders. The goal is to choose one prime contractor on a time and expense basis, who will carry out directed tasks and will charge the office for the actual salaries and overhead and an agreed upon fee. The prime contractor will have strong technical capacity in several areas. With the final contract including a satisfactory proposal will include comprehensive work plan to cover the public participation area.

The subject of directed subcontractors was discussed. Dr. Brewer explained we will be able to provide a mechanism for prime contractor to deal with a subcontractor providing any needed consulting support.

Dr. Finnigan wondered about the range of the seven contractors, and Dr. Brewer replied they ranged from the very large to the very small, some national and international.

Sue Gould wondered what the program auditing process would be. Dr. Brewer explained that at the Office of High-Level Nuclear Waste Management would not handle the details. They will be handled by the contract officers in the Department of Ecology. They will take care of the internal audits and take care of the conditions and terms of the contract. Don Provost added that there will be a contract officer who will be accountable for the program and when we lay out the terms of the proposal we will clearly set forth the chain of command for the contractor to make sure to get what we request.

Sue Gould asked about the time frame, and Dr. Brewer responded after the meeting on February 21 the RFP's will be requested, and he hoped we would be at work with the contractor by the middle of April.

Warren Bishop asked for clarification of planned interface with the Advisory Council. Mr. Brewer said since a major part of the office activity for the next 12 months would be with the public information program, the office will be working directly with the Advisory Council. It is planned that each month, or more often, the office will be coming to the council asking for its input, which will be relayed to the contractor and subcontractor for public information. Mr. Bishop thought the Subcommittee of the Council should be involved in the next stage of the selection, and would become more active after the meeting on the 21st.

Marta Wilder, Public Information Officer of the Office, discussed what a contractor can do in the public information field, and what contractors have done in the Department of Ecology in other fields. She described the campaign conducted by a contractor for the Ecology Youth Corps for the litter control program. This was a public awareness campaign directed at a different group, which included developing goals and objectives, slide shows, films, and the enlisting of public groups to advise.

With a larger budget a contractor developed program for the Inspection and Maintenance program in the Department of Ecology. Besides the opinion poll, planning and goal setting, TV, radio, and newspapers were used and brochures and bus billboards were produced. She detailed the more extensive work set out in the RFP which included (1) Program Review and Evaluation, including consulting with WDOE staff, and (2) development of an information/education plan to cover (1) specific activities to be conducted, (2) new and innovative awareness campaigns, (3) use of various clientele groups, (4) effective use of available WDOE resources and outside professional assistance. The contractor's plan also included brochure development, posters, staff media training, news conferences, newspaper and radio advertisements.

Marta was asked to describe the media training program in the Department of Ecology. She replied because of the controversial nature of the Inspection and Maintenance program, it was thought valuable to give some training to staff people on how to talk to the media, and how to interview - basically, how to communicate with the media.

Don Provost further explained a part of the program was to instruct staff how to handle irate telephone calls resulting from the public reaction to the emission control program.

Sue Gould asked how do we decide what the message is we want to get across. She thought the elements have to be spelled out and either the contractor would do that or the council would.

Warren Bishop said that should be an essential function of the contracting firm, who would put it into a package that will be communicated to the council.

David Stevens reported on the current action of state programs, which he identified as state/federal actions. He explained the unfolding events in other states and Washington, D.C. Mr. Stevens reviewed the planned time schedule of the NRC to issue a draft document on the Program Guidelines. The original schedule called for a meeting on the 14th of Februarh, to reach a preliminary decision with draft document to be issued by the end of that month and a decision by the end of April. However, the February 14 meeting was canceled, and has not been rescheduled, so it seems very doubtful they could come up with a document by the end of April. This would cause everything else to slip. The Program Guidelines need to be adopted before a draft environmental assessment can be issued as required in the act, and before they can issue a site characterization plan, which is also required under the act.

Dave Squires of the USDOE was asked if he had any current information on any new dates and he replied he had nothing definite at this time.

Mr. Stevens went on to say we did have an opportunity following the January hearing to outline in more detail our concerns on the guidelines and the draft mission plan. He went on to explain we are trying to emphasize the serious questions we continue to have, and asked the Advisory Council to comment at any time on the concerns we send to the NRR or to a congressional committee.

Concerning the mission plan we could see a substantial number of areas in which we could suggest improvements on how they could approach the task, with particular concern about the time schedules. We suggested a more realistic appraisal of their time lines. We suggested that the department take a careful look and perhaps rewrite that section, and have some sort of a fall-back position in case of delays. Any short cut of the process in order to meet the schedule may jeopardize the full characterization of the site. We think the schedule is of prime importance.

We also felt they need to look more closely at the Monitored Retrievable Storage program, which may be used as an interim storage method. We are suggesting they may want to get congressional authorization as soon as possible should there be any unforeseen delays in the repository program.

Discussion followed concern the problems created by any slippage in the schedule, especially as it would affect the public information program. The council needed to provide clarity to the public, and as Mr. Worthington

pointed out, slippage will cause loss of credibility with any public information program. It was agreed it was going to be difficult, as no one would have anticipated we would be 14 months into the program and still not have the guidelines. Sue Gould suggested that this be built into the public information program. Mr. Stevens added that as we send out to the council these letters and reactions, if the council members need more information on a particular issue, please let the office know.

He went on to say the mission plan is supposed to be the total program strategy document, but we have only seen a piece of it. We have seen Volume I, but there are supposed to be several additional volumes. We have asked for a decision criteria document which would enable the state to review just how they plan to reach a decision on the commingling of commercial and defense wastes. The decision will have an important impact on a repository. That decision is to be made by the President by January of 1985.

Another concern is the forthcoming site characterization plan. USDOE will be nominating at least five sites for characterization, three will be recommended to the President for site characterization. The state has maintained tht following site characterization USDOE needs to have three suitable sites from which the President will make a decision for the first repository. Other states concur in our view.

Dr. Finnigan referred to Mr. Stevens' testimony before the NRC concerning the "Best" versus "Suitable," and suggested this might be an important idea for the public information program.

Mr. Stevens reported on the present status of the bills affecting the Office of High-Level Nuclear Waste, as follows:

Bill	Status (as of February 16, 1984)
ESB 4534	Passed House
SB 4548	In Senate Energy Committee
SB 4558	Passed Senate. In-House Rules 2
SCR 142	On Senate Second Reading Calendar
SJM 127	Passed Senate. In-House Rules 2
ESJM 131	Passed Senate. In-House Rules 2
ESHB 1637	Passed House. In Senate Energy & Utilities Committee
HJM 39	In-House Rules 2
HCR 37	In-House Energy Committee

Questions were raised as to the actual meaning of SCR 142, and Mr. Stevens explained the Legislature wanted to affirm its involvement in agreements between the Department of Ecology and the U.S. Department of Energy. This resolution was introduced to apply specifically to the C & C Agreement.

Further, he said, this was one vehicle they were using, another was Senate Bill 4548, which would put the C & C Agreement into state law. The other bill was HB 1637, which contains language pertaining to negotiation and review of a C & C Agreement.

There was other discussion on ESJM 131, which would request Congress to eliminate the liability limits for nuclear-related accidents as set out under the Price-Anderson Act. This bill simply reinforces our own position that there should be unlimited liability on the part of the federal government. The Price-Anderson Act has a current limit of $560 million, which was set when the law was enacted to relate to nuclear reactor operations. This amount was at that time deemed sufficient. It is our suggestion that when the act is reenacted in 1987, the dollar limitation be eliminated and that the act be extended to cover to apply to repository operations.

The question was raised if there were any precedence for having "unlimited" liablity in any area. Mr. Stevens replied he did not know.

Mr. Stevens briefly discussed House Bill 1637, which was distributed to all members, explaining the main thrust of the bill was to change the name of the Policy and Review Board to the Nuclear Waste Board, which would be the primary contact with the U.S. Department of Energy. It would also have a number of functions which do not appear in existing law. He said the Legislature is trying to get more of a sense of equality in the operation.

Extensive discussion followed as the council members studied House Bill 1637. Questions were raised concerning the council's role in the educational programs, the delegation of duties to the department, the review board as a negotiating team, and the question of more than one hearing on agreements. In response to the question as to what the bill defines as the Board's ability to delegate, Vic Moon of the Senate Energy and Utilities Committee staff replied parts of the bill do allow the Board to delegate authority. He said the Senate staff was looking at this question as it relates to the C & C negotiations. It is very unclear as parts of the bill do allow the Board to delegate authority but you could assume that the Legislature by not delegating authority for the C & C agreement negotiations, indicated that it could not be delegated. He further said this is something the Senate staff is looking at very carefully.

Sue Gould thought this issue should be taken to the Board, and would also have them look at sections 5, 6, 8, 12, and 13 pertaining to educational program, delegation of duties, and the hearing process on both major and technical modifications of agreements.

Mr. Stevens went on to say amendments were being considered and one by Senator Williams would have direct reference to the Advisory Council, which would deal with the temporary inability of one council member to serve. The language has been drafted but not yet considered by the committee, to allow the Governor to appoint a temporary replacement.

There was further discussion of the responsibility of the public information program, and other responsibilities of the Board. It was felt the concerns of the council regarding the clarity of delegating administrative authority for functions, particularly the negotiation of the C & C agreement, should be transmitted to the Board.

SUBCHAPTER F - RADIATION PROTECTION PROGRAMS

PART 191 - ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR MANAGEMENT AND DISPOSAL OF SPENT NUCLEAR FUEL, HIGH-LEVEL AND TRANSURANIC RADIOACTIVE WASTES

Major Changes in Working Draft No. 3 from Working Draft No. 2 (11/1/83)

(1) The applicability of Subpart A has been changed again to restore coverage of waste management, storage, and disposal facilities that are under the jurisdiction of the Department of Energy (DOE). The dose limits in Subpart A apply separately to facilities: (a) regulated by the Nuclear Regulatory Commission (NRC) or Agreement States and (b) under the jurisdiction of DOE.

(2) The variance provision in Subpart A has been deleted.

(3) The definition of "high-level waste" has been changed somewhat--Table 1 is retained, but the Commission is given latitude to change the Table as it sees fit in order to define the term "sufficient concentrations" in the Nuclear Waste Policy Act of 1982 (NWPA).

(4) The definition of "transuranic waste" has been changed to allow both DOE and NRC to remove wastes from the applicability of this rule, but only with the concurrence of the EPA Administrator.

(5) The various sets of requirements in Subpart B have been rearranged to reflect their relative importance. The containment requirements are stated first (191.13), followed by the assurance requirements (191.14), the groundwater protection requirements (191.15), and the guidance for implementation (191.16).

(6) A definition of "implementing agency" has been added to Subpart B to reflect the responsibilities of the Nuclear Regulatory Commission (NRC) and DOE under the Energy Reorganization Act of 1974 and the NWPA.

(7) The wording of the containment requirements has been slightly modified to reflect the fact that the final rule assumes that performance assessments will be done as part of the process of judging compliance with the containment requirements. A definition of "performance assessment" has been added.

(8) The assurance requirement dealing with picking a "best" site has been revised in several ways: (a) comparative evaluations based on performance assessments of long-term containment are now only mandated for the selection of the final site from the three sites characterized in accordance with the NWPA; (b) the time period for this comparison is now fixed at 100,000 years; and (c) partial credit is allowed for the waste canister and waste form when making these comparisons (but no more than an order of magnitude less effective than the corresponding requirements of 10 CFR 60).

(9) The assurance requirement dealing with "recovery" of waste--which was in the proposed rule but was deleted from Working Draft 2--has been restored.

(10) The groundwater protection requirements (191.15) have been extended to include "sole source aquifers" as well as "major sources of groundwater."

(11) The groundwater protection requirements have been changed to adopt the concentration limits establisned in the Interim Drinking Water Standards (40 CFR 141).

(12) In the "guidance for implementation," the instruction that referred to only needing compliance by "best estimate" values has been revised to indicate that compliance should be based on values within one standard deviation of the best estimate (about a 85% confidence level when dealing with normal distributions).

(13) Appendix B, which indicates the most severe assumptions that need be made with regard to inadvertent human intrusion, is now included.

(14) In Note 1 to Table 2, where the multiplier for the release limits based on the amount of waste is described, the correction for fuel burnup has been dropped.

SUBCHAPTER F - RADIATION PROTECTION PROGRAMS

PART 191 - ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR MANAGEMENT AND DISPOSAL OF SPENT NUCLEAR FUEL, HIGH-LEVEL AND TRANSURANIC RADIOACTIVE WASTES

AUTHORITY: The Atomic Energy Act of 1954, as amended; Reorganization Plan No. 3 of 1970; and the Nuclear Waste Policy Act of 1982.

SUBPART A - ENVIRONMENTAL STANDARDS FOR MANAGEMENT AND STORAGE

191.01 Applicability

This Subpart applies to radiation doses received by members of the public as a result of the management (except for transportation) and storage of spent nuclear fuel, high-level, or transuranic radioactive wastes at:

Clarification

(a) facilities regulated by the Nuclear Regulatory Commission or by Agreement States, to the extent that these operations are not subject to the provisions of Part 190 of Title 40; and

(b) facilities conducting atomic energy defense activities under the jurisdiction of the Department of Energy.

191.02 Definitions

Unless otherwise indicated in this Subpart, all terms shall have the same meaning as in the Nuclear Waste Policy Act of 1982 or in Subpart A of Part 190.

(a) "Administrator" means the Administrator of the Environmental Protection Agency.

(b) "Commission" means the Nuclear Regulatory Commission.

(c) "Department" means the Department of Energy.

(d) "Agreement State" means any State with which the Commission or the Atomic Energy Commission has entered into an effective agreement under subsection 274b of the Atomic Energy Act of 1954, as amended (68 Stat. 919).

(e) "Spent nuclear fuel" means fuel that has been withdrawn from a nuclear reactor following irradiation, the constituent elements of which have not been separated by reprocessing.

(f) "High-level radioactive wastes," as used in this Part, means either of the following: (1) the highly radioactive materials resulting from the reprocessing of spent nuclear fuel (including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste) that contain radionuclides in concentrations greater than those identified in Table 1 (Appendix A), except that the Commission may replace Table 1 with other provisions that it determines by rule are appropriate to identify such materials that require permanent isolation; or (2) other highly radioactive materials that the Commission determines by rule require permanent isolation.

(g) "Transuranic wastes," as used in this Part, means wastes containing more than 100 nanocuries of alpha-emitting transuranic isotopes, with half-lives greater than twenty years, per gram of waste, except for: (1) specific wastes that the Department has determined, with the concurrence of the Administrator, do not require permanent isolation; or (2) specific wastes that the Commission has approved for disposal on a case-by-case basis in accordance with 10 CFR 61.58, provided that the Administrator concurs that disposal of such wastes should not be governed by this Part.

(h) "Storage" means placement of radioactive wastes with planned capability to readily retrieve such materials.

(i) "Management" means any activity, operation, or process, except for transportation, conducted to prepare spent nuclear fuel, high-level or transuranic radioactive wastes for storage or disposal, the storage of any of these materials, or activities associated with the disposal of these materials.

(j) "General environment" means the total terrestrial, atmospheric, and aquatic environments outside the boundaries of sites within which any activity, operation, or process associated with the management and storage of spent nuclear fuel, high-level or transuranic radioactive wastes is conducted.

(k) "Doses to members of the public" means the annual dose equivalent received by any individual except during the time when that individual is a worker engaged in any activity, operation, or process that is covered by this Subpart. The unit of dose equivalent is the rem.

191.03 Standards for Normal Operations

(a) Operations covered by this Subpart that are conducted at facilities regulated by the Commission or by Agreement States shall be conducted in such a manner as to provide reasonable assurance that the combined annual dose equivalent to any member of the public due to: (1) operations covered by Part 190, (2) planned discharges of radioactive material to the general environment from operations at these facilities that are covered by this Subpart, and (3) direct radiation from these operations; shall not exceed 25 millirems to the whole body, 75 millirems to the thyroid, or 25 millirems to any other organ.

(b) Operations covered by this Subpart that are conducted at facilities under the jurisdiction of the Department shall be conducted in such a manner as to provide reasonable assurance that the combined annual dose equivalent to any member of the public due to: (1) planned discharges of radioactive material to the general environment from operations at these facilities that are covered by this Subpart, and (2) direct radiation from these operations; shall not exceed 25 millirems to the whole body, 75 millirems to the thyroid, or 25 millirems to any other organ.

(c) In addition, in conformity with Federal Radiation Protection Guidance (25 FR 4402-3), every effort shall be made to maintain annual dose equivalents to members of the public as far below the limits in 191.03(a) and 191.03(b) as is practicable for all of the operations covered by this Subpart.

191.04 Effective Date

The standards in this Subpart shall be effective January 1, 1986.

SUBPART B - ENVIRONMENTAL STANDARDS FOR DISPOSAL

191.11 Applicability

This Subpart applies to radioactive materials released into the accessible environment as a result of the disposal of spent nuclear fuel or high-level or transuranic radioactive wastes, and it also applies to contamination of major sources of groundwater or sole source aquifers in the vicinity of disposal sites for spent nuclear fuel or high-level or transuranic radioactive wastes. This Subpart does not apply to disposal directly into the oceans or ocean sediments.

191.12 Definitions

Unless otherwise indicated in this Subpart, all terms shall have the same meaning as in Subpart A of this Part.

(a) "Disposal" means isolation of radioactive wastes with no intent to recover them.

(b) "Barriers" means any materials or structures that prevent or substantially delay movement of the radioactive wastes toward the accessible environment.

(c) "Disposal system" means any combination of engineered and natural barriers that contain radioactive wastes after disposal.

(d) "Controlled area" means a surface location, to be identified by permanent markers and other passive institutional controls, extending no more than ten kilometers in a horizontal direction from the original location of any of the radioactive wastes in a disposal system, and the

underlying subsurface, which area has been committed to use as a disposal system and from which incompatible activities would be restricted after disposal.

(e) "Groundwater" means water below the land surface in a zone of saturation.

(f) "Aquifer" means an underground geological formation, group of formations, or part of a formation that is capable of yielding a significant amount of water to a well or spring.

(g) "Lithosphere" means the solid part of the Earth, including any groundwater contained within it.

(h) "Transmissivity" means the product of horizontal hydraulic conductivity and saturated thickness of an underground formation. Transmissivity of a series of formations is the sum of the individual transmissivities of each formation comprising the series. The product of transmissivity and hydraulic gradient is horizontal discharge per unit width of the formation.

(i) "Major source of groundwater" means an aquifer that: (1) is saturated with water having less than 10,000 milligrams per liter of total dissolved solids, (2) is within 2,500 feet of the land surface, and (3) has a transmissivity greater than 200 gallons per day per foot (or 30×10^{-6} meters squared per second) as averaged (using harmonic mean) or integrated for at least a period of a year over the controlled area of a disposal system site.

(j) "Sole source aquifer" means an aquifer that has been designated by the Administrator pursuant to sections 1424 (a) or (e) of the Safe Drinking Water Act (Public Law 95-523, as amended by Public Law 95-190, 42 U.S.C. 300(f) et seq.)

(k) "Accessible environment" means (1) the atmosphere, (2) land surfaces, (3) surface waters, (4) oceans, (5) parts of the lithosphere that are beyond the controlled area, and (6) major sources of groundwater that are beyond the controlled area or that are more than two kilometers in a horizontal direction from the original location of any of the radioactive wastes in a disposal system.

(l) "Undisturbed performance" means the predicted behavior of a disposal system if it is not disrupted by human intrusion or the occurence of unlikely natural events (such as seismic or volcanic activity), including consideration of the uncertainties in predicted behavior.

(m) "Reasonably foreseeable releases" means the cumulative releases of radioactive wastes (from a disposal system to the accessible environment) that are estimated to have more than about one chance in 10 of occurring within 10,000 years after disposal.

(n) "Very unlikely releases" means the cumulative releases of radioactive wastes that are estimated to have between about one chance in 10 and about one chance in 1,000 of occurring within 10,000 years after disposal.

(o) "Performance assessment" means an analysis that: (1) identifies the events and processes that might affect the disposal system, (2) examines their effects on the various barriers of the disposal system, (3) estimates

the radionuclide releases and associated probabilities caused by each event or process, and (4) assembles these estimates into complementary cumulative distributions of the total probability of radionuclide release over the 10,000 year period after disposal.

changed

(p) "Active institutional controls" means (i) controlling access to a disposal site, (ii) performing maintenance operations or remedial actions at a disposal site, and (iii) controlling or cleaning up releases from a disposal site.

slight change

(q) "Passive institutional controls" means (i) permanent markers placed at a disposal site, (ii) public records and archives, (iii) Federal Government ownership and control of land use, and (iv) other methods of preserving knowledge about the location, design, and contents of a disposal system.

(r) "Heavy metal" means all uranium, plutonium, or thorium placed into a nuclear reactor.

(s) "Implementing agency," as used in this Subpart, means the Commission for spent nuclear fuel or high-level or transuranic wastes to be disposed of in facilities licensed by the Commission in accordance with the Energy Reorganization Act of 1974 and the Nuclear Waste Policy Act of 1982, and it means the Department for all other wastes covered by this Part.

191.13 Containment Requirements

Disposal systems for spent nuclear fuel or high-level or transuranic wastes shall be designed to provide a reasonable expectation, based upon performance assessments, that for 10,000 years after disposal:

added

(a) Reasonably foreseeable releases of waste from the disposal system to the accessible environment shall be less than the quantities calculated according to Table 2 (Appendix A).

(b) Very unlikely releases of waste from the disposal system to the accessible environment shall be less than ten times the quantities calculated according to Table 2 (Appendix A).

191.14 Assurance Requirements

To provide the confidence needed for compliance with the requirements of 191.13, disposal of spent nuclear fuel or high-level or transuranic wastes shall be conducted in accordance with the following:

Slight change

(a) Active institutional controls over disposal sites should be maintained for a reasonable period of time after disposal; however, isolation of the wastes from the environment shall not rely upon any of the active controls for more than 100 years after disposal.

new

(b) During the period that active controls are maintained, disposal sites shall be monitored to detect any substantial and detrimental deviations from expected performance. The monitoring should be done with techniques that do not jeopardize the isolation of the wastes.

(c) Disposal sites shall be identified by the most permanent markers and records practicable to indicate the dangers of the wastes and their location.

(d) Disposal systems shall use several different types of barriers to isolate the wastes from the environment. Both engineered and natural barriers shall be included. Each barrier shall be designed or selected so that it complements the others and can significantly compensate for possible failure of one or more of the other barriers.

(e) When selecting repository sites from among those evaluated in detail (e.g., from among those characterized in accordance with the Nuclear Waste Policy Act of 1982), a major consideration should be selection of sites that have natural properties that are expected to provide better isolation of waste from the accessible environment for 100,000 years. To compare the capabilities of different sites to isolate wastes (with regard to this provision only), the performance of the waste packages and waste forms should be assumed to be the same from site to site and should be assumed to be at least an order of magnitude worse than the performance required by 10 CFR 60.113. Furthermore, no credit should be taken for other engineering controls intended to correct preexisting natural flaws in the geologic media (e.g., grouting of fissures should not be assumed, but effective sealing of the shafts needed to construct the repository should be assumed). Sites that differ by less than about a factor of ten in projected releases to the accessible environment may be assumed to provide equivalent isolation.

(f) Places where there has been mining for resources, or where there is a reasonable expectation of exploration for scarce or easily accessible resources, or where there is a significant concentration of any material that is not widely available from other sources, should be avoided in

selecting disposal sites. Such places shall not be used for disposal of the wastes covered by this Part unless it is demonstrated that, compared to other alternatives, the favorable characteristics of such places more than compensate for their greater likelihood of being disturbed in the future.

(g) Disposal systems should be selected so that removal of most of the wastes is not precluded for a reasonable period of time after disposal.

191.15 Groundwater Protection Requirements

Disposal systems for spent nuclear fuel or high-level or transuranic radioactive wastes shall be designed to provide a reasonable expectation that, for 1,000 years after disposal, undisturbed performance of the disposal system shall not increase the radionuclide concentrations in any major source of groundwater or any sole source aquifer by more than:

(a) 15 picocuries per liter of alpha-emitting radionuclides; or

(b) the combined concentrations of radionuclides that emit either beta or gamma radiation that would produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem per year if an individual continuously consumed 2 liters per day of drinking water from such a source of groundwater.

191.16 Guidance for Implementation

The implementing agencies will determine compliance with 191.13 and 191.15 of this Subpart by evaluating long-term predictions of disposal system performance. Determining compliance with 191.13 will also involve predicting the likelihood of events that may disturb the disposal system.

Substantial uncertainties are likely to be encountered in making these predictions, which may use computational models, theories, and prevalent expert judgment. The following instructions indicate how the Agency intends 191.13 and 191.15 to be applied regarding certain questions that may arise when implementing these standards:

(a) The implementing agency should not require that a very large percentage of the range of estimated radiation doses or radionuclide releases fall below the limits established in 191.13 and 191.15. Instead, the implementing agency may determine compliance based upon the part of the range of predictions that falls within one standard deviation of the mean of the appropriate distribution (e.g., for a "normal" distribution, compliance may be based upon approximately an 85 per cent "confidence level" of falling below the appropriate limit).

(b) The implementing agency should evaluate compliance with 191.13 through performance assessments as described in Section 191.12(o). Such performance assessments need not consider events that are estimated to have less than one chance in 10,000 of occurring over 10,000 years. Furthermore, the assessments need not evaluate in detail the releases from all events estimated to have a greater likelihood of occurrence; however, the assessments should provide a reasonable expectation that the expected releases from events not evaluated are small compared to the releases that are evaluated by the performance assessments.

(c) The implementing agency should assume that none of the active institutional controls can prevent or reduce radionuclide releases for more than 100 years after disposal. However, it should be assumed that the

Federal Government is committed to retaining passive institutional control of disposal sites. Such passive controls should be assumed to be effective in deterring systematic or persistent exploitation of a disposal site, and it should be assumed that they can keep the chance of inadvertent human intrusion very small as long as the Federal Government retains such passive control of disposal sites. However, it should not be assumed that such passive controls can eliminate the chance of inadvertant human intrusion.

(d) As an upper limit, the implementing agency should assume that the likelihood and duration of inadvertent human intrusion into a geologic repository will be no greater than the values described in Appendix B of this Part, unless there is compelling evidence that more severe assumptions are appropriate for a particular repository site.

(e) When predicting disposal system performance, the implementing agency should consider realistic projections of the protection expected from all of the engineered and natural barriers of a disposal system.

191.17 Effective Date

The standards in this Subpart shall be effective immediately upon promulgation of this rule; however, this Subpart does not apply to wastes disposed of before promulgation of this rule.

APPENDIX A - TABLES FOR PART 191

TABLE 1 - CONCENTRATIONS IDENTIFYING HIGH-LEVEL RADIOACTIVE WASTES UNDER 191.02(e)(1)

Fission Product Radionuclides	Concentration (curies per cubic meter of waste)
Carbon-14	8
Cesium-135	800
Cesium-137	4600
Strontium-90	7000
Technetium-99	3
Tin-126	1
Any other radionuclide with a half-life greater than 20 years	700

Transuranic Radionuclides	Concentration (nanocuries per gram of waste)
Plutonium-241	3500
Any alpha-emitting transuranic radionuclide with a half-life greater than 20 years	100

NOTE: In cases where a waste corresponding to 191.02(e)(1) contains a mixture of radionuclides, it shall be considered a high-level radioactive waste for the purposes of this Part if the sum of the ratios of the radionuclide concentrations to the concentrations in Table 1 exceeds one.

For example, if a waste containing radionuclides A, B, and C in concentrations C_a, C_b, and C_c, and if the concentration limits from Table 1 are CL_a, CL_b, and CL_c, then the waste shall be considered high-level radioactive waste if the following relationship exists:

$$\frac{C_a}{CL_a} + \frac{C_b}{CL_b} + \frac{C_c}{CL_c} \geqslant 1$$

TABLE 2 - RELEASE LIMITS FOR CONTAINMENT REQUIREMENTS

(Cumulative Releases to the Accessible Environment

for 10,000 Years After Disposal)

Radionuclide	Release Limit (curies)
Americium-241	100
Americium-243	100
Carbon-14	100
Cesium-135	1000
Cesium-137	1000
Neptunium-237	100
Plutonium-238	100
Plutonium-239	100
Plutonium-240	100
Plutonium-242	100
Radium-226	100
Strontium-90	1000
Technetium-99	10000
Tin-126	1000
Any other alpha-emitting radionuclide	100
Any other radionuclide that does not emit alpha particles	1000

NOTE 1: The Release Limits in Table 3 apply to the amount of wastes in any one of the following:

(a) an amount of spent nuclear fuel containing 1,000 metric tons of heavy metal (MTHM);

(a) the high-level wastes, as defined by 191.02(e)(1), generated from each 1,000 MTHM;

(b) each 100,000,000 curies of gamma or beta-emitting radionuclides with half-lives less than 100 years that are identified by the Commission as high-level waste in accordance with 191.02(e)(2);

(c) each 1,000,000 curies of other radionuclides (gamma or beta-emitters with half-lives greater than 100 years or any alpha-emitters) that are identified by the Commission as high-level waste in accordance with 191.02(e)(2); or

(d) an amount of transuranic (TRU) wastes, as defined by 191.02(f), containing one million curies of alpha-emitting transuranic radionuclides.

To develop Release Limits for a particular disposal system, the quantities in Table 3 shall be adjusted for the amount of wastes included in the disposal system. For example:

(a) If a particular disposal system contained the high-level wastes from 50,000 MTHM, the Release Limits for that system would be the quantities in Table 3 multiplied by 50 (50,000 MTHM divided by 1,000 MTHM).

(b) If a particular disposal system contained three million curies of alpha-emitting transuranic wastes, the Release Limits for that system would be the quantities in Table 3 multiplied by three (three million curies divided by one million curies).

(c) If a particular disposal system contained both the high-level wastes from 50,000 MTHM and 5 million curies of alpha-emitting transuranic wastes, the Release Limits for that system would be the quantities in Table 3 multiplied by 55:

$$\frac{50{,}000 \text{ MTHM}}{1{,}000 \text{ MTHM}} + \frac{5{,}000{,}000 \text{ curies TRU}}{1{,}000{,}000 \text{ curies TRU}} = 55$$

NOTE 2: In cases where a mixture of radionuclides is projected to be released, the limiting values shall be determined as follows: For each radionuclide in the mixture, determine the ratio between the cumulative release quantity projected over 10,000 years and the limit for that radionuclide as determined from Table 2 and Note 1. The sum of such ratios for all the radionuclides in the mixture may not exceed one.

For example, if radionuclides A, B, and C are projected to be released in amounts Q_a, Q_b, and Q_c, and if the applicable Release Limits are RL_a, RL_b, and RL_c, then the cumulative releases over 10,000 years shall be limited so that the following relationship exists:

$$\frac{Q_a}{RL_a} + \frac{Q_b}{RL_b} + \frac{Q_c}{RL_c} \leq 1$$

APPENDIX B - ASSUMPTIONS REGARDING INADVERTENT HUMAN INTRUSION

The most speculative potential disruptions of a geologic repository are those associated with inadvertant human intrusion. Some types of intrusion would have virtually no effect on a repository's containment of waste. On the other hand, it is possible to conceive of intrusions (involving widespread societal loss of knowledge regarding radioactive wastes) that could result in major disruptions that no reasonable repository selection or design precautions could alleviate. The most productive consideration of inadvertant intrusion concerns those realistic possibilities that may be usefully mitigated by repository design, site selection, or use of passive controls (although passive controls should not be assumed to completely rule out the possibility of intrusion). Therefore, inadvertant instrusion by exploratory drilling for other resources should be the most severe intrusion scenario considered by the implementing agencies. Furthermore, it should be assumed that passive institutional controls or their own exploratory procedures are adequate for the intruders to soon detect, or be warned of, the incompatibility of the area with their activities.

The implementing agencies should consider the effects of each particular repository's site, design, and passive controls in judging the liklihood and consequences of such inadvertant drilling. However, the liklihood of such inadvertant drilling should not be assumed to be greater than 0.003 boreholes per square kilometer of repository area per year for repositories in sedimentary sequences, or more than 0.0003 boreholes per square kilometer per year for repositories in other geologic formations. The consequences of such inadvertant drilling should not be assumed to be

more severe than: (1) creation of a groundwater flow path with a permeability typical of a filled (but not well-sealed) borehole; and (2) direct release to the land surface of all the groundwater in the repository horizon that could promptly flow into the borehole--or 200 cubic meters of groundwater, whichever amount is greater. The implementing agencies are free to develop less severe assumptions than these as appropriate to the expectations for particular repository sites.