

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TRIP REPORT

SUBJECT: The National Academy of Sciences (NAS) public briefing about their recommendations of a proposed standard for Yucca Mountain (Account No. 5702-711)

DATE AND PLACE: August 2nd, 1995, Las Vegas, NV

AUTHOR: Mark S. Jarzempa

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AUTHOR: Mark S. Jarzempa

PERSONS PRESENT:

See Attachment A

BACKGROUND AND PURPOSE OF TRIP:

The purpose of this trip was to gain insight into the rationale behind recommendations made by a National Academy of Science (NAS) committee to the U.S. Environmental Protection Agency (EPA) for an environmental standard for Yucca Mountain (YM). The NAS conducted a study in accordance with the Energy Policy Act of 1992.

In the Energy Policy Act of 1992, the Congress also asked that the NAS committee address three questions:

- (i) Will an individual protection standard for YM protect the public?
- (ii) Will active institutional controls prevent human intrusion over thousands of years?
- (iii) Will the repository be breached by human intrusion over thousands of years?

It is noted that the EPA is not required by the Energy Policy Act of 1992 to adopt the recommendations of the NAS committee. Also, this report describes the content of the public briefing and thus may not have as much detail about the actual recommendations as the standard itself.

SUMMARY OF PERTINENT POINTS:

The meeting started with Mr. Robert Fri, the committee chair, giving a brief synopsis of the contents of the committee's report. He summarized the report recommendations and also called on some of the panel experts to give summaries of their particular area of interest. Mr. Fri also gave the committee's answers to the above stated questions:

- (i) Yes, an individual standard would protect the public health. The recommendations of the committee were that the "individual" being protected should be an average member of a critical group, the critical group being defined as a small group (tens of people) whose

activities put them at the greatest risk. The maximum risk to such an individual should be less than some threshold value, independent of when in the future this maximum risk may occur. Also, the panel believes that the standard should be based on the risk of additional health effects and not dose. This is because if more accurate dose-health effect relationships are discovered in the future, then the standard would not have to be revised to incorporate these improved relationships.

Interestingly, the critical group recommendation of the panel was not unanimous. One panelist, Dr. Thomas Pigford, dissented and believed that the subsistence farmer scenario should be used to calculate the highest risk to an individual. His dissenting opinion is written in an appendix of the report.

Another justification given for using a risk based method was that risk is easily understood by most people whereas dose is not. The panel did not recommend any particular level of risk to set as the standard, but instead noted that the dose limits now used by the EPA correspond to a risk of 0.0005 health effects in an average lifetime. The panel also mentioned that this was not far off of other countries risk cutoffs (cited as 10^{-3} to 10^{-6} health effects per year). They offered these two numbers as "starting points" for debate.

- (ii) No, there is no evidence that suggests that active institutional controls will be effective in preventing human intrusion for more than a few centuries. In fact, there is quite abundant evidence that suggests that they will not be effective for thousands of years. The committee did, however, recommend using both active and passive institutional controls at the site. The wording that was used seemed to suggest that no credit should be taken for these controls.
- (iii) Yes, the repository will probably be breached by humans in thousands of years. It was the committee's opinion that the type of intrusion that would take place would be inadvertent. They offered no quantitative evidence for this but did mention that this was the "most likely" type of human intrusion to occur of the nine scenarios that they considered.

Another interesting recommendation made by the committee was that the risk from inadvertent human intrusion should be calculated assuming that one inadvertent intrusion event happens (a drill of given radius intersecting one waste package). If the risk from this event is within acceptable limits, then the repository should pass this test. In essence, they described calculating a conditional risk. One panelist called this testing the "resiliency" of the repository.

IMPRESSIONS/CONCLUSIONS:

I believe that the committee recommendations have both strong and weak points. I agree with the committee's recommendation for a risk based standard. Health Physics is a field still in its infancy, and we are rapidly learning more about dose response. For example, it is my opinion that in the future effective dose equivalents will be calculated for a specific health effect (i.e., cancer or cell death). To set a dose limit at this point in time would likely require some revision at a later date. The risk of additional health effects limit would not be susceptible to this shortcoming.

I also agree with the committee's recommendation to calculate risks to an average member of a critical group. This concept will tend to downplay the importance of "radical lifestyles", such as self-sufficiency farming on top of a mountain in the desert, when self-sufficiency farming is rare under the best of conditions.

I strongly disagree with the committee's decision not to limit the time period over which risks should be calculated. To think that risk (or dose) calculations to individuals who live tens or hundreds of thousand of years in the future and which assume today's level of lifestyle/technology, have any physical meaning is not warranted. For example, human beings have only existed on this planet for approximately 50,000 years. I think that the Bowman-Venneri thesis is a perfect example of the false conclusions that can be drawn from a calculation that was done using an unrealistic set of assumptions. Hopefully, the EPA will carefully consider the ramifications of not limiting the time period over which performance assessment calculations should/can realistically be made.

I believe the committee also erred when they stated that "... there exists no scientific reason to limit risk (dose) calculations to 10,000 years." The EPA set this limit when they wrote the original standard because they realized the futility of attempting to apply such long ranged (greater than 10,000 year) dose calculations, and stated so before they published the original 40 CFR 191 in 1985.

PROBLEMS ENCOUNTERED:

None.

PENDING ACTIONS:

None.

RECOMMENDATIONS:

An EPA staff member indicated that the EPA opened its public comment period for the NAS report on August 2, 1995, the day after the report was released. I think the Nuclear Regulatory Commission and the Center for Nuclear Waste Regulatory Analyses should try to make at least minimal comments about the report.

ATTACHMENTS:

- A Participants list of attendees
- B List of committee members
- C Chairman's opening statement
- D NRC news release
- E Related newspaper articles (3)

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**NATIONAL RESEARCH COUNCIL
Commission on Geosciences, Environment, and Resources
Board on Radioactive Waste Management**

Committee on the Technical Bases for Yucca Mountain Standards

Technical Bases for Yucca Mountain Standards

Public Briefing

**Aug. 2, 1995 • 10 a.m. - 11 a.m. PDT
Ballroom C, Holiday Inn Crowne Plaza hotel
4255 South Paradise Rd., Las Vegas**

Participants

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Chris G. Whipple, vice president, ICF Kaiser, Oakland, Calif.

Gilbert F. White, emeritus distinguished professor of geography and emeritus director, Institute of Behavioral Science, University of Colorado, Boulder

NATIONAL RESEARCH COUNCIL
Commission on Geosciences, Environment, and Resources
Board on Radioactive Waste Management

Committee on Technical Bases for Yucca Mountain Standards

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OPENING STATEMENT

**Robert Fri
President
Resources for the Future
and
Chair, Committee on the Technical Basics for Yucca Mountain Standards**

**News Conference to Release the National Research Council Report
Technical Basics for Yucca Mountain Standards
National Academy of Sciences building
2 p.m. EDT, Tuesday, Aug. 1, 1995**

Good afternoon in Washington, D.C.; good morning to all of you who have joined us from Nevada and other parts of the West. Thank you for being with us today as we release our report on Yucca Mountain health standards.

The committee's task in this study was to determine whether or not a scientific basis exists for a health standard that would protect the public from adverse effects associated with the proposed high-level nuclear waste repository at Yucca Mountain. The Congress mandated this study in 1992 as part of its Energy Policy Act. That piece of legislation also directs the Environmental Protection Agency to create a health standard consistent with the recommendations of this study, and to do so within one year. We recognize that our work may play a prominent role in the continuing debate over this standard, because of this statutory linkage to the regulatory process.

Furthermore, we are quite sensitive to the fact that this is both a controversial and long-standing debate. It has gone on for years, and many people have put in a great deal of effort toward crafting an acceptable standard. That it is not yet resolved is testimony to the range of perspectives regarding the desirability of building the Yucca Mountain repository.

In the course of this debate, several issues have proved to be particularly contentious, and the Congress tossed some of them to the Research Council when it asked for this study. In particular, we were directed to address three main questions:

Number one, would a standard based on individual dose protect public health; that is, would a standard based on protecting those who live and work near the repository also protect individuals living far away — perhaps thousands of miles away?

Number two, is there a scientific basis for estimating the likelihood of human intrusion into the repository some time in the distant future? Speculating about how humans might enter the repository thousands of years from now, and about how to prevent that intrusion to a high degree of certainty, invites controversy. It is hardly surprising that Congress would seek a resolution of these issues more firmly grounded in objective science.

And number three, is it reasonable to assume that such intrusions can be prevented by active institutional controls?

Because the Yucca Mountain standard is a complex and difficult question both scientifically and socially, I want to place our study in context.

We have not evaluated the suitability of the Yucca Mountain site — for example, whether it would meet a standard — nor have we offered an opinion on the management of the civilian waste repository program. These are important questions, but based on our charge, we agreed that it was not our job to address them.

We were asked to consider the technical basis for a health standard for Yucca Mountain only. This site specificity contrasts with the approach EPA took in setting its earlier standard, which was meant to apply to any site. EPA could not have approached the problem in any other way, so this is not a criticism. That difference, however, must be kept in mind. For example, the Yucca Mountain region exhibits long-term geologic stability, and that influences the basis for the standard, as you will see. Other sites have different geology and therefore some of the conclusions we reach about Yucca Mountain may not apply elsewhere, and vice versa.

I want to emphasize that there is a limited technical basis for some elements of the standard. In other words, science simply cannot answer all of the questions, and where it cannot, policy decisions are required. We have tried to point out with care this line of demarcation between science and policy, and to make firm recommendations only when we are dealing with science. When issues move into the policy realm, we have tried only to suggest a scientifically defensible place for the policy debate to begin.

Against this backdrop, let me summarize the key features of our report and how they compare to the approach that EPA took in its most recent version of the standard.

I first want to explain what a standard is — that is, a limit placed on repository performance which, if met, would ensure that public health is protected. The limit can be stated in many ways, and the current EPA standard relies heavily on limiting the amount of radioactive material that can be released from the repository. The Congress asked whether there is a scientific basis for stating the standard in terms of a limit on the *dose* of radiation to which individual members of the public could be exposed. We concluded that the scientific relationships between releases, doses, and health effects are well enough known to establish the standard in this form, and the answer to the first question is "yes." In fact, the committee believes that the standard should focus on the persons likely to be at greatest risk; that is, to Nevadans who live closest to the site.

The committee further concluded that there were benefits to stating a standard in terms of risk to the health of individuals rather than in terms of "dose," which is a measure of exposure. Here's why: First, risk is easier for people to understand and compare than a measure of exposure, which often is expressed in obscure terms. For example, a one-in-a-million risk of getting cancer is easier to understand than a dose of .02 mSvs per year, which is roughly the same thing. Second, over the years, increasing scientific understanding has changed our views of the relationships between doses and effects, such as incidence of fatal cancers. Additional information might lead to further changes in the future, but if the level of acceptable risk remains the same, the standard need not be changed in light of new dose-response data. Our preference for a stable, more readily understood risk-based standard rests

on a belief that it is socially, politically, and administratively undesirable to change so controversial a standard once it is finally in place.

Three things must be taken into account to construct a risk-based standard — how much protection is to be afforded, who is to be protected, and for how long. Establishing the level of risk is a question of policy, not science, so we have not recommended what this level should be. However, both EPA and other organizations have set limits on risks from a variety of radiation sources. Domestic and international practice has been to set these limits so that when they're added up, they do not exceed a total acceptable radiation risk. This framework provides a good starting point for EPA to use in developing a standard for Yucca Mountain.

Who is to be protected must be established to determine whether a repository complies with the standard. The risk to some individual or representative group of individuals is calculated and then compared to the risk limit established in the standard. We recommend the standard be formed to protect those individuals whose locations and habits place them at highest risk based on using cautious, but reasonable, assumptions.

In regard to how long the standard might be intended to apply, it is important to note that high-level radioactive wastes will pose hazards to human health for more than a million years. Estimates of when risks from the proposed repository might be greatest range from 50,000 to 250,000 years in the future, according to assessments reviewed in our study. Whether it is possible to assess compliance with the standard over the duration of this risk depends on the ability of scientists to evaluate the performance of the repository over these very long periods of time. In the case of Yucca Mountain, the committee concluded that compliance assessment is feasible for most physical and geological aspects of repository performance for a time scale on the order of a million years. Thus, it should be feasible to assess compliance now for the time when the risks are currently thought to be greatest. The current EPA standard limits the analysis of releases to 10,000 years.

Let me return momentarily to the first question — that is, whether a standard created to protect the individual would also protect the general population. Although the main concern of the Yucca

Mountain standard is to protect people living and working nearby, releases could be diffused throughout a very large and dispersed population.

The most likely process leading to such global effects would be the exposure to radioactive carbon dioxide gas that could escape from the nuclear waste canisters. Because this gas would be mixed with the worldwide atmosphere, the amount of exposure from the repository to the average individual would be exceedingly small.

On the other hand, the number of persons exposed globally over the duration of this risk could be extremely large. In this case, multiplying a very small risk by a very large number of persons yields highly uncertain results. Scientifically, there is a real question about how to interpret a number computed in this way.

Faced with this scientific uncertainty, the committee could only observe that the risk to any one individual in the global population would be very small — perhaps ten thousand times lower than the one-in-a-million level at which the basic standard might, for example, be set. A decision-maker could conclude that such risks are so small as to have a negligible effect on public health and should not affect the design of the repository. Such a conclusion is a policy, not a scientific, judgment. The current EPA approach does not provide for this concept of negligible risk.

Once it is decided who is to be protected, by how much, and for how long, then you must determine through a two-step process whether or not the repository system would do its job. First, you have to predict the potential concentrations of radioactive material that would be released into the environment from the repository. Then you would have to specify how humans would become exposed to this material. We concluded that there is a sufficient scientific basis for performing this assessment, but selecting a set of assumptions to use in assessing exposures would be a policy judgment. The report presents two approaches to making these assumptions — the “probabilistic critical group” method and the “subsistence farmer” method. The first considers the average risk to individuals in a small local group that is at highest risk from radioactivity from the facility. The second defines the risk to this

group based on a hypothetical person at greatest risk — in this case, a subsistence farmer who drinks contaminated well water and eats food irrigated with that water.

Most members of the committee consider the first approach the better place to start in regard to creating a health standard, but one member argued for the second option. In my view, selecting between these options cannot be resolved on the basis of science. Accordingly, the committee has described both methods in its report, leaving the choice on what to assume about human behavior in exposure scenarios to EPA as a matter for policy judgment.

Finally, as I noted earlier, Congress specifically asked whether there is any scientific basis for evaluating the likelihood of human intrusion, or for assuming that it can be prevented. The answer to both questions is simply "no," because there is no scientific basis for predicting the behavior of individual humans thousands of years into the future. Nonetheless, it should be possible to assess the performance of the isolation system under a hypothetical intrusion scenario. The committee suggested that the estimated risk assuming a specified scenario should be no greater than the risk posed by the undisturbed repository. In other words, the repository system should be resilient to an assumed intrusion scenario.

I wish to conclude by thanking all those who helped us work our way through this very complicated subject. We benefited from the contributions of a wide variety of stakeholders and specialists. The committee itself could not have functioned without the outstanding support of the Research Council staff, especially Lisa Clendening, Ray Wassel, and Myron Uman. And as chair, I want to thank the members of the committee for their patience and expertise.

At this time, my colleagues and I would be happy to answer your questions. Please tell us your name and the name of the organization you represent when you ask a question.



NATIONAL ACADEMY OF SCIENCES NATIONAL ACADEMY OF ENGINEERING INSTITUTE OF MEDICINE

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**REPORT RECOMMENDS NEW APPROACH TO HEALTH
STANDARDS FOR PROPOSED NEVADA WASTE SITE**

WASHINGTON — The Environmental Protection Agency (EPA) health standard for the proposed high-level radioactive waste site at Yucca Mountain, Nev., should be based on limiting risks to individuals who live and work nearby, concludes a report* released today by a committee of the National Research Council.

“Such a risk-based standard — designed to protect individuals in the immediate vicinity of the facility — also would protect the global population, as radiation from the repository would pose a much lesser risk to people distant from the site,” said committee chair Robert W. Fri, president of Resources for the Future, a non-profit organization in Washington, D.C.

Congress directed EPA in 1992 to set a health standard for Yucca Mountain, to protect individuals by placing limits on possible radiation “dose” from wastes at the site, and asked whether such a standard also would protect the general public. After reviewing several possible alternatives, the committee determined that an individual standard would provide such protection, but should be based on limiting risk rather than dose.

(MORE)

*The report, *Technical Bases for Yucca Mountain Standards*, is available from the National Academy Press at the mailing address in the letterhead; tel. (202) 334-3313 or 1-800-624-6242. The cost of the report is \$35.00 (prepaid) plus shipping charges of \$4.00 for the first copy and \$.50 for each additional copy. Reporters may obtain copies from the Office of News and Public Information at the letterhead address (contacts listed above).

This approach is a departure from current government health standards for radioactive waste disposal that are based on a specified "release limit" for the amount of radioactive wastes that might leak from a facility, or a specified "dose limit" for the amount of radiation humans might be exposed to from a site. A risk-based standard would be determined by calculating the probability of an individual experiencing health problems from exposure to radioactive releases from the repository. Because it would not be based on specific release or dose limits, a risk-based standard would remain valid even if future scientific advances suggest that levels of radiation different from those specified in current government regulations can cause health problems.

"Over the years, increasing scientific understanding has changed our views of the relationships between doses and effects, such as incidence of fatal cancers," said Fri. "Additional information might lead to further changes in the future, but if the level of acceptable risk remains the same, the standard need not be changed in light of new dose-response data."

The current EPA standard for radioactive-waste disposal facilities relies on release limits to control the dose of radiation that an individual might receive each year. However, because the amount of radiation released does not necessarily equal the amount to which humans would be exposed, such a standard — unlike one that limits individual risk — provides no information on how radioactive releases would affect public health, the committee said.

ESTIMATING FUTURE RISKS

The standard should be designed to protect public health when risks posed by leaks from the repository are greatest, which might occur tens of thousands to even hundreds of thousands of years in the future, the committee said. EPA's current standards call for compliance assessments of the facility based on projections of its ability to meet release limits for 10,000 years. The committee found no scientific basis for this 10,000-year limit, particularly when the most harmful releases might occur after that time.

Determining whether the repository complies with a risk-based standard would require that the small group of individuals at greatest risk from exposure to radiation from the facility be

(MORE)

identified, so that their potential risks can be compared with risk limits specified in the standard. Because the greatest risk of exposure is likely to occur thousands of years from now, EPA must develop an "exposure scenario" to estimate future risks to human health.

Assessing compliance with the standard requires making assumptions about how individuals might be exposed. These assumptions are incorporated into an exposure scenario to estimate future risks, because there is no scientific basis for predicting events in the far future. Determining precisely which assumptions to make is a policy decision, the committee said.

The report presents two options for EPA to consider in developing an exposure scenario — the "^{(14 PANEL GOV. MEMBERS) OPINION}probabilistic critical group" method and the "^{(1 PANEL MEMBER OPINION)subsistence farmer}" method. The first considers the average risk to individuals in a small local group that is assumed to be at highest risk from the facility. The second defines the risk to this group based on a hypothetical person at greatest risk — in this case, a subsistence farmer who drinks contaminated well water and eats food irrigated with that water. Most of the committee members agreed that the first option provides a better starting point. One committee member, in a personal statement appended to the report, argued for the second option.

PROTECTING AGAINST INTRUSION

Even if the repository is well designed and soundly constructed, there is no scientific basis for assuming that damage from human activities, such as drilling, could be prevented over the long term by government control measures surrounding the site, the committee said. The use of active measures, such as security guards, assumes the stability and continuity of the institutions responsible for maintaining the site. Although potentially helpful, passive measures such as fences, warning signs, and land use records, also could prove unreliable for preventing human intrusion in the long term. The committee acknowledged that there is no basis in experience for assuming that intrusion control measures would remain in place beyond a time scale of centuries.

There is no scientific basis for predicting the behavior of individual humans thousands of years into the future, the committee said. However, control measures could help to reduce the risk of human intrusion at least initially. If the repository is built at Yucca Mountain, the Department of

(MORE)

Energy — the federal agency with primary responsibility for the facility — should be required to put a system of controls around it to reduce the risk of intrusion in the near term. The design of the repository itself also should be evaluated on its ability to meet the standard, even if an intrusion occurs.

The committee's study was mandated by Congress in the 1992 Energy Policy Act, which directed the Environmental Protection Agency to set a new public health and safety standard for the proposed repository at Yucca Mountain. The purpose of the study was to evaluate the scientific basis for such a standard.

The committee did not make judgments about what levels of risk are acceptable, whether the development of a permanent repository should proceed at this time, or whether the Yucca Mountain site could comply with health and safety standards developed from the technical recommendations in its report.

Yucca Mountain has been proposed as the site for permanent underground disposal of high-level radioactive waste from the nation's civilian nuclear power plants and some of the wastes resulting from nuclear weapons production. Scientists have been studying the mountain, located about 100 miles northwest of Las Vegas, to gather information that will be used to determine if the site could comply with federal regulations designed to ensure public safety.

The National Research Council is the principal operating agency of the National Academy of Sciences and the National Academy of Engineering. It is a private, non-profit institution that provides science and technology advice under a congressional charter.

Funding for the study was provided by the Environmental Protection Agency. A committee roster is attached.

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NATIONAL RESEARCH COUNCIL
Commission on Geosciences, Environment, and Resources
Board on Radioactive Waste Management

Committee on Technical Bases for Yucca Mountain Standards

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New Nuclear Dump Standard Is Suggested

By MATTHEW L. WALD

Scientists assigned to tell the Environmental Protection Agency how to write safety standards for a Federal nuclear waste dump issued their report yesterday, and laid the groundwork for the agency to assume that the area in the desert 100 miles northwest of Las Vegas will never be intensively farmed, even hundreds of thousands of years from now.

But the conclusion drew a sharp dissent from one of the authors and from environmentalists. The study, ordered by Congress, was released by the National Academy of Sciences.

The report, in some analysts' view, could open the way for licensing the proposed nuclear waste dump at Yucca Mountain, Nev.

The authors make the assumption that a nuclear waste repository will eventually leak. The extremely arid land is not suitable for agriculture now but could be farmed in the future, if rainfall patterns change sharply. A nearby valley is farmed with underground water.

The report recommends using a new standard for evaluating a proposed nuclear dump — the level of risk posed to groups of people — instead of the present one, the absolute amount of radiation that could be expected to leak hundreds of thousands of years hence. That conclusion was unanimous.

But it also said that in defining a safety standard, the E.P.A.'s rule-making procedure could make assumptions about how the land would be used, and whether subsistence farmers, who would be especially vulnerable to radioactive materials carried in the water they drank and used for their crops and livestock, would ever live there.

The report said, "Although not strictly a scientific issue, we believe that the appropriate objective is to protect the vast majority of members of the public while also insuring that the decision on the acceptability of a repository is not unduly influenced by the risks imposed on a very small number of individuals with unusual habits or sensitivities."

But one of the 15 members of the panel, Thomas H. Pigford, a graduate professor at the University of California at Berkeley, and a founder of the nuclear engineering program at the Massachusetts Institute of Technology, dissented from the report. By excluding the possibility that the area, now owned by the

Government, will be farmed later, he said: "They end up with such a less stringent result that cannot be defended. That's bad for the project; it's bad for the country."

The normal scientific procedure, he said, is to define the "maximally exposed individual" for any risk, and that in case of environmental threats like this one, that would be a farmer who grew all his food locally.

In Nevada, Robert Loux, head of a state office created to fight the repository, said he was encouraged by the report because it called for the E.P.A. to go through a formal rule making, with public hearings and comments, to determine what rules should prevail. But Mr. Loux said it would be impossible to predict what land uses would be.

The report is part of a chain of events meant by Congress to result in opening a permanent geologic burial site for high level nuclear wastes at Yucca Mountain, at the

Sharp dissents greet a report on nuclear waste safety regulations.

edge of the Energy Department's nuclear weapons test site. The E.P.A. is supposed to write standards for the repository "based on and consistent with" the report. The Energy Department is supposed to build the repository and apply for a license, based on the E.P.A. standards. And the Nuclear Regulatory Commission, an independent agency that supervises power plants and other places that use radioactive materials, is supposed to decide whether the application meets the environmental agency's rules.

The agency is supposed to hold hearings and issue licensing rules within a year of yesterday, although people involved in the process predict it will take longer. In any case, the Energy Department is some 1 years from being ready to apply for a license.

At the Energy Department's Office of Civilian Radioactive Waste Management, in Las Vegas, Dr. Daniel A. Dreyfus, the director, said the issue was whether the repository was intended to protect "an average person in a target group," or "some postulated community that has forgotten about drinking ground water, and doesn't know how to test for radionuclides."

He added, "You can come up with all kinds of bizarre notions about the future."

But a physicist and nuclear critic, Dr. Arjun Makhjianof of the Institute for Energy and Environmental Resources, a private research group, said that the recent past should give caution. He pointed out that uranium had turned up in the well of a house near the Fernald Feed Materials Center, a weapons plant near Cincinnati, and that the Energy Department knew of the contamination for four years before it told the woman who lived there. She was among a group of neighbors who settled with the department for \$78 million.

"To assume an institutional memory of thousands of years is perfectly outrageous," Dr. Makhjianof said.

The report is decidedly modest in describing the ability of science to settle questions that must be answered before a waste dump is opened. It says: "We have not recommended what levels of risk are acceptable; we have not considered whether the development of a permanent repository should proceed at this time; nor have we made a judgment about the potential for the Yucca Mountain site to comply with the standard eventually adopted."

Another author, Dr. R. Darryl Banks, a biophysicist at the World Resources Institute, an environmental group based in Washington, said that recent history is a guide to the value of predictions. "One argument could be, 100 years ago," he said, "one would not have theorized that you would have a major metropolitan area in that part of the region."

Complicating the problem is the performance of the repository over future years; the report said that the biggest exposures might not occur until hundreds of thousands of years into the future. Dr. Banks said that testing the whole project was impossible. So was testing components, he said. "If you're going to test them to failure in an engineering mode, you'd need a time machine to do that," he said.

Another author, John F. Ahearne, a former chairman of the Nuclear Regulatory Commission, pointed out that the scientists had not said what standard should be used. He added, "there's science and there's public policy, and the boundary is not clear. Science blends over into the policy."

Dr. Ahearne said that Dr. Pigford's position, that the standards should assume the land use and economic and social pattern that is the most vulnerable, "is a classical regulatory philosophy."

Dr. Ahearne added, "As he says in his dissent, it is the most conserva-

Panel OKs storing nuke waste at test site

Lawmakers move forward with legislation to house both temporary and permanent waste storage in Nevada.

Tony Batt
Senior Washington Bureau

WASHINGTON — A bill calling for a Nevada Test Site to begin storing clear waste in 1998 cleared a hurdle Wednesday when the House Commerce Committee approved it by a vote 80-4. The vote sends the measure to the next floor, although a vote by the full House is not expected until after Labor

HEALTH STANDARDS: The EPA begins accepting public comments to be used to fashion health standards for Nye County residents.

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Day when Congress returns from its August recess.

The Nevada Test Site, 65 miles northwest of Las Vegas, would begin storing highly radioactive spent fuel rods from nuclear power plants by Jan. 31, 1998, under the bill. Meanwhile, the Department of Energy would continue its efforts to open a permanent

nuclear waste repository at Yucca Mountain, 100 miles northwest of Las Vegas, by 2010.

Nine amendments were either withdrawn or rejected as the committee passed the bill with little debate.

"We owe it to the taxpayers and ratepayers in this country to have a safe repository, and this bill does that," said Rep. Frank Pallone, D-N.J.

Rep. Edward Markey, D-Mass., argued the bill does not solve the issue of radioactive waste disposal but allows the nuclear power industry to avoid the public relations problem of storing the waste at reactor sites.

While the House continues to move

ahead on legislation making Nevada the site for temporary and permanent storage of nuclear waste, the Senate is exploring other sites for interim storage.

Earlier this week, the Senate agreed, at least for the time being, to maintain a provision in current law that prohibits a temporary nuclear waste storage facility from being located in Nevada as long as Yucca Mountain continues being studied for a permanent repository.

At some point late this year, differences between the House and Senate approaches to nuclear waste will have to be resolved in conference committee negotiations.

EPA begins task of setting Yucca health standards

By Keith Rogers
Review-Journal

It's sounds like an insurmountable task: Set health standards for the proposed Yucca Mountain nuclear waste repository that will apply to people living primarily in Nye County tens of thousands to hundreds of thousands of years from now.

But, with a freshly printed book of recommendations from a National Academy of Sciences panel, the Environmental Protection Agency began accepting public comments Wednesday that will be used to fashion those health standards.

Panel Chairman Robert Fri and a few of the 15 members on

his committee fielded questions from an audience of federal and state officials and environmentalists who packed into a meeting room at a Paradise Road hotel.

The panel has recommended the EPA base the standards on calculated risks of people dying from exposure to radioactive contaminants that might escape the repository, if one is built, rather than setting limits on the amount of radioactive materials that could escape.

"We think in the case of Yucca Mountain it is a better approach," he said, referring to the flat-top ridge of volcanic rock, 100 miles northwest of Las Vegas, the only site being studied to

entomb the nation's high-level nuclear waste.

Fri said the panel's view is that health standards should focus on the time when the risk of exposures is greatest "tens to hundreds of thousands of years from now," when long-lived radioactive materials could seep into ground water layers from leaky, corroding canisters.

Fri reacted defensively when asked if Yucca Mountain would not meet the current standards, or ones that dissenting panel member Thomas Pigford said later in a telephone interview would be more stringent.

"I have no idea," Fri said. "It is not a question the panel looked

at. We weren't trying to fix it so Yucca Mountain would pass."

But Pigford, who founded the nuclear engineering departments at the University of California, Berkeley and at the Massachusetts Institute of Technology, had a different view.

"That is just wrong," Pigford said. "We did look at it. We were presented lots of information by (Department of Energy) contractors. He can say we decided not to go into that issue."

Pigford said the committee came up "with a far less stringent standard than I would have."

"I've been on a lot of committees and this is the first time I've written a dissent, and I'm sorry I had to write it," Pigford said.