AR TARGET SHEET

The following document was too large to scan as one unit, therefore, it has been broken down into sections.

EDMC#:	0000003
SECTION:	10 OF 11
DOCUMENT #:	DOE/EIS-0113
TITLE:	Final EIS Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes

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MULTNOMAH MONTHLY MEETING
Religious Society of Friends, (Quakers)
North Pacific Yearly Meeting
4312 S.E. Stark Street, Portland, OR 97215

Clerk Janet Berleman

Treasurer Michael Wells

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July 25, 1986

Mr. R. A. Holton
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, WA 99352

Dear Mr. Holton,

We, the members of Multnomah Monthly Meeting of the Religious Society of Friends (Quakers), implore you to consider in earnest our views regarding your draft environmental impact statement for the disposal of nuclear wastes stored at Hanford.

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2.3.2.8 First, we call for more opportunity for informed citizen participation in review of this document and other issues pertaining to waste disposal at Hanford. The draft environmental impact statement is replete with technical and other jargon which is not readily understood by the average citizen, and which therefore inhibits public discussion. Furthermore, we believe that the public has been woefully ill-informed regarding the options for disposal of radioactive material at Hanford, and observe that the hazards of nuclear waste disposal only a few miles from the Columbia River have not adequately been revealed. Because the health and safety of some two million Oregonians downstream are affected by waste handling at Hanford, we insist that Oregon be granted "Affected State" status and given veto power over the siting decision for a commercial nuclear waste repository. We believe that the existence of nuclear waste is a crime against God and nature, and we are appalled by the Department of Energy's hasty handling of public hearings on this critical waste disposal issue.

2.4.1.5

3.5.3.6 Second, we point to the overall inadequacy of the draft environmental impact statement and call for independent hydrogeologic studies to compare with those conducted by the Department of Energy (D.O.E). We observe that the ground water modeling in the document is inadequate insofar as it ignores the existence of underground channels leading to the Columbia River. Estimates are that several million of the 53 million gallons of radioactive wastes currently stored at Hanford in ditches, ponds, and tanks have leaked out and contaminated groundwater that has already reached the Columbia. Moreover, the rights of tribal people in the Hanford area have not been considered in this document or in any of the Department of Energy's planning or decision-making processes. In fact, agreements made for access to sacred Indian lands have not been honored, nor ever can be because of the terrible pollution of the area.

2.4.2.1

2.5.5 Third, we observe the existence of a conflict-of-interest in the D.O.E.'s self-monitoring and self-regulating of all activities, including the hiring and regulating of contractors at the Hanford Reservation. We believe that the highest standards of accountability and credibility are warranted by the potential hazards presented in the handling of such dangerous materials. The administration of activities at Hanford may well affect the lives and livelihood of Oregonians forever. For this reason, we call for an independent environmental impact study (a contractor not chosen and regulated by the D.O.E.) to be performed, along with independent civilian inspection of the existing

2.3.2.9 Hanford storage facilities, independent civilian monitoring of radioactivity levels of the groundwater and soil at Hanford, compliance with civilian standards for storage and disposal of commercial radioactive waste, and independent civilian monitoring of such compliance.

2.5.6 Finally, we call for the immediate, permanent shut-down of the N-Reactor and the production of plutonium at Hanford. The plutonium that you are creating for the manufacture of nuclear bombs, missiles and submarines is one of the most dangerous and persistent of radioactive elements, capable of causing birth defects, cancer or death with very small amounts. We oppose the creation of weapons of destruction on moral grounds alone, but underscore as well the

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health and safety hazards presented by the toxic plutonium and its highly radioactive by-products.

We beseech you to use all of your technical expertise to protect us from the hazards that have already been created by the disposal of radioactive waste at Hanford. Cost cannot be an issue where the very survival of our region and its inhabitants is in question. The disposal of radioactive materials along the shores of the Columbia jeopardizes the fundamental human rights of every resident of this region. As an agency of the United States government, the Department of Energy has a responsibility to protect and defend those rights. 2.2.3

We thank you for your consideration of our comments, and look forward to your reply to the above concerns.

On behalf of Multnomah Monthly Meeting,

Janet J. Berleman

Clerk

cc:
Sen. Mark O. Hatfield
Sen. Robert W. Packwood
Rep. Les AuCoin
Rep. Bob Smith
Rep. Ron Wyden
Rep. Jim Weaver
Rep. Denny Smith
The Oregonian
Willamette Week
The Vancouver Columbian
Governor Victor Atiyeh
Rev. Rodney Page, Ecumenical Ministries of Oregon

9 9 1 1 7 4 3 0 6 0 5

643 Pearson
Walla Walla, Wa. 99362
August 1, 1986

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Mr. R. A. Holten
U.S. Department of Energy
Richland Operations
P.O. Box 550
Richland, Wa. 99352

Dear Mr. Holten:

Since I do wish to make several statements. I'll try to get started. Everyone realizes that atomic or nuclear radiation may be extremely dangerous - especially when out of control. This is one reason energy from radiation is highly prized and when adequately underated very highly respected. Radiation is like so many other things in our surroundings. When it is properly controlled, very valuable and also if out of control, extremely dangerous.

When I began hearing more about nuclear energy I felt there was a possible solution for most of our energy problems. Quick, inexpensive power to replace many conventional sources of energy seemed a huge plus. Then with more insight it seemed apparent there would be residule. That is -- how does one dispose of or take care of left over waste? That is a major concern. How do we provide a safe method of handling nuclear waste material? It would be nice to have plenty of pure, clear water for all people's needs, this should inclued soil, air, as well. Is this possible? Everything seems to have a price. What alternatives are available? Is there a possible way to avoid danger and still benefit from a plentiful, clean source of energy. It is best at this juncture to pause and say this is not a problem only for the U.S.A. but for the world and for space.

3.3.4.2 Where do we put waste? In what form? Why not several retrivable locations? Especially near the sources where it is made?

2.5.6 Now comes the big question. Would it be best to discontinue producing more until there is a safe means of caring for what we have? Do we need the atomic bombs made with plutonium? Can we trust the Russians? Find answers.

Sincerely,

Byron Hunt, D.O.

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August 1, 1986

Dear R. A. Holten,

We are writing to express our concern over the military wastes at Hanford. We find it upsetting that mixed chemical & radioactive wastes are being dumped directly into the soil and that single-shelled tanks holding highly radioactive wastes have also leaked into the soil. We feel that the Environmental Impact Statement drafted by the Department of Energy is inadequate since it fails to deal realistically with cleaning up the existing wastes at Hanford. All of the military wastes currently at Hanford must be included in the EIS. The DOE must also be subject to the same environmental regulations in its management of wastes as is private industry. It must be required to comply with the standards and timelines of the Resources, Conservation, and Recovery Act, Superfund, and the Federal Water Pollution Control Act. We would like to see the EPA and the State Dept. of Energy oversee the DOE's management of waste. Finally, we feel it very important that the DOE continue to search for a second repository. The National Environmental Policy Act has been violated by the

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2.3.1.14

2.4.1.1

2.2.13

3.3.2.1

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DOE's failure to consider the impact of dropping this search for a record repository for disposal of military wastes.

Thank you for your consideration of these issues. We hope they will be resolved in a way that is not detrimental to our state's environment.

Sincerely,
Eric J. Sindell
Marilyn A. Sindell

2.1.8

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SUSAN NUTLEY
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1713 BROADWAY
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State of Washington
House of Representatives

FORTY-NINTH LEGISLATURE
1985-86
COMMITTEES
VICE CHAIR
LOCAL GOVERNMENT
ENVIRONMENTAL AFFAIRS
FINANCIAL INSTITUTIONS & INSURANCE

August 1, 1986

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R.A. Holten
Environmental Impact Statement
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

Dear Mr. Holten:

After reading through the draft Environmental Impact Statement on the Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, I still have several questions. More specifically, what effect will storing this waste have on downwind and downstream communities who rely on the Columbia River for irrigation water, recreation, and fishing? What are you doing to ensure our safety? 3.2.4.1

I realize that the purpose of the study is to decide how to best store the waste that is already there to protect future generations from radiation contamination. But how can we assure people that they are safe when no one really knows what the dangers are?

An example of how unsure and confused we are about nuclear waste storage options is illustrated in the EIS itself. The Battelle Institute, who conducted the EIS for the Department of Ecology, mislead the public to believe the barrier method is safe and in many ways, the most desirable way to permanently store high-level defense wastes. 3.5.1.57

A July 16 Seattle Times article quotes the consulting firm hired to review the EIS as saying that it misrepresents the barrier method of disposal. The EIS states that the mounds of dirt and rock used to cover the tanks filled with radioactive material will safely protect the outside environment from radiation for 10,000 years. But current knowledge and technology does not support that statement. Barriers similar to the one suggested for use at Hanford were used to dispose of waste in New Mexico. The barriers failed during a severe rainstorm. This fact was not reported in the EIS.

Based on such sketchy information from the "experts" who are supposed to know about nuclear waste storage, I am all the more convinced that no one really has an idea of the dangers of storing high-level waste. I suggest the department spend much more time studying the barrier method and the other methods of storage outlined in the EIS, including the underground repository, and in-place stabilization of wastes. Why risk thousands of lives relying on unsubstantiated claims? 3.3.5.1

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The Seattle Post Intelligencer reported April 8, 1986, "One of the key unanswered and most controversial questions is whether the radioactivity in the mounds will eventually find its way into the Columbia River, despite barriers and safeguards the government contemplates installing."

2.1.9 Although those who have studied the Hanford site say that the basalt beds will absorb radioactivity, they do not take into account the vulnerability of the area to earthquakes and volcanic eruptions. What would happen if the basalt were to shift and crack, creating leaks and spaces through which radioactive waste could travel to the Columbia River?

3.1.6.1 An added problem in permanently storing the defense waste at Hanford is that no one knows what chemicals are currently stored in most of the single wall tanks and as a result, no one knows how to prepare for what might be discovered when the tanks are moved in preparation for permanent storage.

According to Robert Alvarez, a scientist with the Washington D.C. based Environmental Policy Institute, "God knows what's in there. If they've been mixing plutonium with organic solvents, that means the plutonium migrates like crazy." In that situation "plutonium could reach the water table in as little as 20 years because the solvents would, in effect, grease its movement."

204 3.5.2.26 Of the factors considered in deciding how to best store radioactive waste, one of the most important is the speed at which groundwater travels through rock. This is because groundwater is the most likely way that radioactive material would be carried from the waste repository to the outside environment. Ground water travels relatively quickly through basalt, which is the type of rock found beneath Hanford.

Battelle's Pacific Northwest Laboratories say that it would take 5,000 years to move wastes from the surface tanks at Hanford to the aquifer 200 feet below and therefore decaying radioactivity would pose little threat to the water table. But Bill Meyer, senior geohydrologist with the U.S. Geological Survey said "there is already radioactivity that has reached the groundwater table. If it takes 5,000 years, why is it already there?" Tritium and iodine 131 have already reached the Columbia River, but the Energy Department tells us the levels are way below what is allowed. How do we know what to believe?

3.5.2.31

2.2.12 Perhaps the most frightening aspect of the defense waste storage problem is that it <u>will</u> eventually leak out of the storage tanks. No one denies that. Twenty-nine of the single shell tanks already leak, and 31 more are assumed to leak. In 1973 115,000 gallons of waste spilled out over a 49-day period before the leak was detected.

The question is not <u>if</u> it will leak, but <u>when</u>. The Energy Department admits that the waste will not be sealed permanently in the storage tanks, no matter which method of storage is used. They argue that even if the waste containers only last an estimated 300 years, the surrounding basalt rock and backfill will absorb the radioactive materials for 10,000 years.

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Between 1958 and 1975 there were 18 confirmed leaks from single-shell tanks storing high-level nuclear defense waste. There were also 59 "unplanned releases" of radioactive materials during that same time period. With this kind of history, how can those of us living downstream on the Columbia River be sure that this kind of thing won't happen again? 2.2.12

Many scientists fear that the soil and rock relied upon to absorb radiation will eventually become saturated. Once the soil reaches that saturation point, radioactive wastes would no longer be absorbed. They would travel through the groundwater to nearby streams and into the Columbia River.

According to a May 18 Seattle Times article, Greenpeace, an environmental organization, funded a study that showed contaminated groundwater from current Hanford operations has been reaching the Columbia River 10 to 12 times faster than the Energy Department estimated. Radioactive tritium may be reaching the river through underground springs in three to five years instead of the 30 to 60 years that the department predicted. 3.5.3.6

In light of all of the conflicting information we are receiving, it is no wonder that those of us living along the Columbia River, and relying on it for a number of activities, are frightened and confused about its future. We don't want the river to glow in the dark. What are you doing to assure us that it will be safe for generations to come? 3.2.4.1

My hope is that the department will spend much more time studying the effects of radiation on downstream and downwind communities, and that more time will be spent on studying the different storage options. 3.3.5.1

Until further study is accomplished and the public is correctly and thoroughly informed, I don't believe we should be discussing complex, costly and potentially hazardous permanent disposal methods. We don't know enough to proceed at this point. Until we know what we are doing, and what risks are involved, we should not have to sacrifice our health and safety for the sake of waste generated by the Reagan administration's "defense activities" — which, in layman's terms, means making bombs. 3.3.5.1

Sincerely,

Busse Nutley
State Representative
49th Legislative District

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TESTIMONY ON HANFORD DEFENSE WASTE DEIS
July 15, 1986
Dick Nelson

My name is Dick Nelson. I represent the 32nd Legislative District of Seattle in the Washington State Legislature, and I serve as a member of the State's Nuclear Waste Board. I wish to comment on several issues either not addressed in or not adequately covered by the DEIS. I also would like to indicate that I subscribe to the comments previously made by a representative of the Nuclear Waste Board.

Future Plutonium Production and Military Waste Generation

The DEIS assumes that the N Reactor and PUREX will be operated until 1995, producing tank wastes from this and other DOE sources corresponding to the processing of 12,000 t of N Reactor fuel. The DEIS takes into account the processing of an additional 20,000 t of irradiated uranium beyond 1995 "in response to national defense or research and development needs" (section 3.2.2). The DEIS does not discuss the military necessity for the future production of plutonium, or alternatives in meeting the need which would not result in more waste being generated. The final EIS must address the need for more plutonium by taking into account weapons systems that are under development or are candidates for development, and which cannot be armed by either our current plutonium stockpile or by recycling plutonium in obsolete warheads. This must be addressed for two reasons important to the citizens of Washington: (1) The total volume of waste will determine the need for a second geologic repository for commingled military and commercial waste. (2) We have a right to know what military purposes require that we assume the risk and the responsibility for the generation and storage of a significantly increased quantity of high-level waste.

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3.3.5.7

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Quantity of TRU in Various Storage Sites

The DEIS provides only approximate values for the quantity of TRU radionuclides in the several sites. Given the great diversity of waste forms and materials contaminated with TRU, and their sources, it is understandable that precise measurements of TRU activity and weight have been difficult over the years in which TRU has accumulated. Estimating techniques were presumably employed to arrive at the values in Table 3.1 and Appendix A. One is led to the inescapable conclusion that there must be considerable uncertainty in the values listed. What is the probable range of activity and weight of TRU for each site? The final EIS should indicate the probable error in the quantities of TRU estimated, and exactly how these quantities were measured or estimated.

3.1.3.9

Long-Term Impacts Following Postulated Disruptive Events

The DEIS does not adequately address possible climatic changes resulting from increased carbon dioxide and trace gases in the earth's atmosphere (the "greenhouse effect"). Current and predicted increases in these gases (produced by deforestation and combustion of fossil fuels) could lead to the melting of the polar ice caps, a significant increase in sea level and groundwater levels, and major climatic changes. Increase in precipitation would increase the expected groundwater recharge, which would speed the migration of radioactivity into

3.5.6.1

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the groundwater, as would a higher water table. The final EIS must consider the possibility that future precipitation at Hanford may be greater than 30 cm (11 inches) per year, and that the water table may rise.

3.5.6.35 Increased volcanic activity, possibly caused by cyclic perturbations in the earth's orbit, could also cause climate change. Higher volcanic activity is proposed as a trigger for increased glaciation over relatively short periods of time (decades or centuries). If a new glacial period is initiated, glacial flooding can be predicted at the Hanford site. The DEIS states that such floods could be of a scale that would scour out the waste sites to a depth of several meters. Smaller floods could erode the waste site progressively and transport long-lived plutonium radionuclides in more concentrated alluvial deposits, rather than entraining them uniformly in a great volume of sediment. The final EIS should address the possibility that glacial

3.5.6.8 action is possible much sooner than the 40,000 years estimated in the DEIS. It should also take into account the possibility that glacial flooding could disperse plutonium from stabilized in-place waste sites in a way that increases environmental risks.

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Effects of Nuclear Explosions

3.4.3.7 The DEIS contains no analysis of the disruptive effects of a nuclear explosion at the repository location. Hanford, because it is a production center for nuclear weapons materials, is considered to be a target for nuclear missiles in the event of an enemy attack. It is also potentially a target for a terrorist attack. A ground burst nuclear explosion at the site of wastes stabilized in place could result in the dispersal of major quantities of radionuclides, far in excess of the amount released by fission of the nuclear warhead. Theodore Taylor, former deputy director of the Defense Atomic Support Agency, stated to a House subcommittee on June 16, "The total inventories of two especially troublesome radioactive isotopes, cesium 137 and strontium 90, in the reprocessing wastes buried [at Hanford] are the same as would be released by the explosions of several thousand one-megaton nuclear weapons." He went on to say that, "Release of these wastes by large chemical or small nuclear explosions could produce long-term fallout contamination on the same scale as a nuclear war." A repository in which high level wastes are stabilized in place could be more vulnerable to terrorist attack than would an operating nuclear reactor. The final EIS should thoroughly analyze the vulnerability of a surface repository to nuclear attack and the health consequences compared to geologic storage.

Funding Clean-Up and Waste Reduction 2.2.9

The DEIS estimates costs for the various alternatives, but suggests no funding source. Spokespersons for the DOE have on several occasions alluded to the probable difficulty of persuading a budget-cutting Congress to appropriate monies to implement the final disposal alternative. They have emphasized the need for strong efforts on the part of Washington citizens and their Congressional representatives to work to secure the necessary funds. The State of Washington should not be placed in the impossible position of lobbying a Congress that is

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preoccupied with balancing a federal budget by eliminating programs. There will be as little support for funds for cleanup outside the few states that produce and store military wastes as there is for a commercial waste repository outside the same states. The final EIS should recommend a guaranteed funding mechanism. A portion of the DOD or DOE budget should be earmarked for the cleanup of existing waste and the reduction and handling of future wastes. The fund should be sufficient to cover the most expensive alternative -- geologic disposal -- should it be chosen.

The DEIS does not speak to the State's role in monitoring the research and analysis that will be required. Independent research will be needed to prove the design of the engineered barrier, to analyze features of hydrology, safety of the waste forms, characterization of wastes (especially the tank wastes), retrieval of the wastes, and to research means of waste reduction, among other projects. This role is comparable to the state's efforts in monitoring the site characterization of the BWIP program for the commercial and military repository. Those efforts are, of course, supported by federal grants under the Nuclear Waste Policy Act. The final EIS should indicate how funding of the State's monitoring responsibility will be guaranteed.

2.3.1.8

DEIS Process Improvement

2.3.2.8

The DEIS public comment process does not serve the concerned public well when issues are as technical and complex as the siting of a nuclear waste repository. Most citizens do not have either the expertise or the time to plow through thousands of pages of the DEIS and references. A new approach to public involvement should be taken before the final EIS is issued and any record of decision is issued. The most important technical issues should be identified and made the subject of public forums in which technical professionals with different viewpoints or holding different assumptions engage in dialogue and debate. Written documents should be issued giving the pros and cons of the issues or the differing assumptions. This process would not replace, but would supplement, the standard comment process and public hearings. This dialogue would shed more light on the technical questions that must be answered before decisions are made that could leave large amounts of high level and TRU wastes in the soil of our State for future generations to contend with.

2.3.2.8

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Jul. 31st, 1986

Oregon

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Dear Gentlemen & Ladies,

With regard to your Defense Waste Environmental Impact Statement (DWEIS) I would like to render my personal opinion.

In regard to defense waste which has already leaked

3.3.2.1 from some (29?) of the old single-wall tanks, I would suggest that it be left in place (stabilized in place). According to Mr. Stottlemyre, your hydrologist, those wastes would take 5000 years to diffuse through the soil to the water table and 30 years to reach the Columbia River through the water table. Mr. Stottlemyre stated to me directly that "by the time those wastes reached the Dalles, they would be diluted by Columbia River water to a factor which would make them literally an insignificant health factor further down stream". With the natural and man-made barriers on the Hanford site and the ultimate final natural basin of the Columbia River & Pacific Ocean, I see no reason to spend $1 billion and risk 2-15 human lives

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Oregon

engaging in a massive clean-up of already contaminated soil.

With regard to the sludge and dried sludge (salt-cake) in the already in-place old single- 3.1.4.32
wall tanks, I don't think, that with the unstable brews of chemicals & radioactive wastes existing in them, the DOE's explanation that the burps which have occurred there are simply heat pressurized gas expansions caused by the hot cesium & strontium existing in them, is sufficient enough to satisfy the public's desire to feel secure that some kind of major reaction will not take place there, now or in the future. In that context I feel it will be necessary for all those tanks (149) to either be completely cleaned up or monitored for potential dangerous reactions.

With regard to the vast amount of liquid radioactive and chemical waste being produced 2.3.1.13
now by the PUREX facility, I feel that the general public feels very uncomfortable, especially in Portland,

[illegible] OR

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about all that low level
liquid wastes reaching the Columbia
River Basin in only approximately
7 years.
2.3.1.14 In regard to the decom-
missioning of the 8 plutonium
production reactors on the Hanford
site, which have been shut down,
this is another subject the general
public feels insecure about the
safety of in regard to how
technically prepared the DOE
is prepared to do this.
With regard to the high
level liquid wastes now being
stored in the single double
walled tanks I think every
3.1.8.9 one would at some time in the
future hope to see all these
wastes vitrified, if and when that
process becomes perfected and cost
effective. Otherwise permanent monitoring
& control.
The parties involved the
DOD (Department of Defense) DOE (Department of Energy)
and the state of the Northwest should be
2.2.12 [illegible] to the legal liability implications
[illegible]. The past 45 years of dealing
[illegible] distribution [illegible] stored
[illegible] with leaks & [illegible] in the

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Oregon

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single walled tanks and the DOD
and DOE should be willing to
take full responsibility and in-
2.4.1.10 stitute full restitution for any
damages to property, personal
health or the natural environment
that could ever remotely possibly
occur here in the Northwest
or for that matter anywhere in
the world, because of their
negligence.

Sincerely,
Bill [illegible]

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8/3/86

Sirs:

Please send me a summary of the draft environmental impact statement on Hanford nuclear waste disposal.

My comments on disposal at Hanford are —

① The waste has to go somewhere obviously and no one, other than those likely to gain from being employed at a disposal site, is going to pleased to have a disposal site nearby.

② The best disposal method for existing waste will only be known after the fact. Due to the potentially dire consequences of choosing the wrong method, D.O.E. should choose the disposal method which can be most readily "cleaned-up" if it turns out to be the wrong method. 3.3.4.2

③ Underground burial would seem to be very difficult to clean-up or contain if something goes wrong. 3.3.1.1
I realize I have no technical knowledge in the field, but it

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appears to me that disposal in above ground vessels would allow for monitoring + containment in the event of a disaster. We are not likely to become aware of leakage from an underground site until our hair starts falling out. Furthermore, those in charge of the site would insist that there was no proven connection between people dying and possible leaks. They would take for years of "studies" at great expense. I cannot imagine any effective method of containing nuclear waste that are migrating underground anyway. 3.3.4.2

④ Disposal near one of the largest river systems in the nation does not seem wise. If wastes enter this system, the disaster will be compounded. 2.1.1

⑤ Wastes should be stored above ground at a site where there is greater opportunity for containment, if that becomes necessary. If there is such a site in Washington, then so be it. 3.3.4.2

Thank you for the opportunity to comment

Yours Faithfully

AUG 5 1986 0158

JOHN F. HALEY JR
4224 N. 39 APT 203
SEATTLE WA 98103

11232 11th ave SW
Seattle, Wash. 98146
August 2, 1986

R.A. Holten / EIS
U.S. Dept of Energy
Richland operations
P.O. Box 550
Richland, Wash 99352

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AUG 5 1986 0159
WM DIVISION

Dear R A. Holten,

As a lifetime resident of Washington State I am in complete and total opposition to the use of Hanford as a national nuclear waste repository. I find the E.I.S. to be inadequate and biased. It does not deal in a realistic manner with the unique geological problems of this site, nor with the pre-existing problems of radioactive and chemical contamination of the area. The problem of transporting waste across the continent to this site is also fraught with danger including human and technical error, accident, hazardous weather conditions and deliberate sabotage. Political expediency is no excuse for the willful betrayal of public safety. 2.1.1 3.4.2.2 2.2.1

Sincerely,

Heather McIntosh

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AUG 5 1986 0160

11232 - 11th Ave. SE.
Seattle, Wa. 98146
Aug. 1, 1986

Mr. B.A. Holten / EIS
U.S. Dept. of Energy
Richland Operations
P.O. Box 550
Richland, Washington 99352

My Dear Mr. Holten

I have one concern that I have not heard addressed. I feel there is a possibility that an accidental or intentional dropping of a bomb on the Hanford Waste Site could release a great deal of radiation that could sweep across the country because the wind usually flows from west to east.

This also adds to the other hazards of having our atomic waste buried at Hanford.

Sincerely yours
Margherita McIntosh

3.4.3.7

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DOE Richland Operations Office
ATTN: R. A. Holten/EIS
Waste Management Division
Richland WA 99352

Dear Mr. Holten:

Enclosed are my comments and questions on the Draft Environmental Impact Statement for the Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes.

Thank you for this opportunity to respond to the EIS.

Sincerely:

Aileen Joffries
P. O. Box 295
Winthrop WA 98862

August 1, 1986

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WM DIVISION

DRAFT EIS

DISPOSAL OF HANFORD DEFENSE HIGH-LEVEL, TRANSURANIC, AND TANK WASTES

Comments:

2.3.1.11 1. In general this EIS is lacking a mechanism to check that the disposal operations are proceeding as specified. I strongly recommend that an advisory group be established to go on site and check radiation levels as the cleanup progresses.

QUESTION: How will the completeness of the cleanup be determined?

2.5.9 2. Most of the data in this EIS was derived from mathematical models. These models appear to be uncalibrated. Even for the case discussed in Appendix V page V.3, where the monitoring program has provided "unprecedented empirical data on geology, hydrology, and subsurface radiocontaminant behavior", "Attempts to model transport of contaminants within the flow system have met with limited success." Before work can proceed with the cleanup it appears necessary to complete sufficient research to be able to analyze the system.

QUESTION: How will the accuracy of the data and models be validated?

3.3.2.1 3. Section 3.3.2 In-Place Stabilization and Disposal, describes operations for which there is no existing technology. In particular, stabilization of waste in single wall tanks, and barrier design will require additional research and development. In addition the condition of the actual wastes is not known, and the probability of failure at a future time is not known. The only way to reliably deal with this problem is to actually excavate and move the wastes to a proper containment site. The condition of these wastes cannot be adequately known without examination.

3.3.2.5

RECOMMENDATION: Given that the wastes must be excavated, the only reasonable action is to eliminate stabilization in place as an option and require geologic disposal.

3.3.1.9 4. In section 3.3.1 The Geologic Disposal Alternative, the EIS states this alternative will remove from surface or near surface storage and disposal on the Hanford site essentially all (98% by activity) of the high activity/ low volume and TRU wastes (to the extent practicable) . . .

This statement immediately excludes 1) anything not near the surface and 2) anything not practicable. In addition it is impossible to tell if 98% has been removed unless it is all excavated.

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RECOMMENDATION: Add the following statements.

1. Remove all soil with radioactivity greater than the levels listed in Table 4.3.
2. Have a review body measure the remaining levels of radiation.
3. Estimate the amount of radiation that has escaped into the soil by taking core samples and fitting data to a model. 3.1.3.4
4. Estimate health effect of escaped material to decide if further cleanup is necessary.
5. Perform additional cleanup measures until the review body verifies that the levels of radioactivity conform to the predetermined safe levels.

5. Considerable leakage from single wall tanks has been noted in Appendix V. The report does not project a conservative (high) leakage rate for these tanks.

QUESTION: How much radiation will have been released from the tanks from failures in future years, if conservative (high) leakage rates are assumed.

6. The EIS states or implies additional research will be necessary to charactyerize waste, to design the barrier system and to develop waste retrieval procedures. (pp. 3.5, 3.11, 3.13) 3.3.5.3

QUESTION: What additional research is necessary to proceed with stabilization in place and with geologic disposal? What is the cost of this research? 2.5.9

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CITY of THE DALLES
313 COURT STREET
THE DALLES, OREGON 97058

OFFICE OF THE MAYOR (503) 296-5481

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'86 6 1986 0162
WM DIVISION

August 5, 1986

Rich Holten
EIS, U.S. Department of Energy
Richland Operations Office
P. O. Box 550
Richland, WA 99352

RE: Hanford EIS

Dear Mr. Holten:

I enclose for the formal record in the above matter, a certified copy of a Resolution which was unanimously passed by the City Council of the City of The Dalles on August 4, 1986.

The Resolution speaks for itself, but I want to reiterate the extreme concerns of our City of more than ten thousand people, located on the south bank of the Columbia River between Hanford and the Pacific Ocean.

Very truly yours,

CITY OF THE DALLES

John Mabrey

John Mabrey
Mayor

JM/jlm

Enclosure

214

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WM DIVISION

RESOLUTION NO. 86-55

A RESOLUTION STATING THE CONCERNS OF THE CITY OF THE DALLES REGARDING THE HANFORD NUCLEAR WASTE SITE

WHEREAS, the Hanford Nuclear Reservation in south-central Washington State has been selected by the Department of Energy as one of three sites to be a permanent disposal respository for nuclear defense wastes; and

WHEREAS, the Hanford Nuclear Reservation is located only 6 miles from the Columbia River; and

WHEREAS, the Columbia River contributes water to local fisheries, agricultural irrigation and, most importantly, potable water to the communities along the Columbia Basin; and

WHEREAS, since 1943, the Pacific Northwest has borne the burden of storing much of the nuclear waste of the entire United States; and

WHEREAS, the storage of additional nuclear wastes at Hanford will have unacceptable implications for the economy and future growth of this region and for the health and welfare of our present and future generations;

NOW, THEREFORE BE IT RESOLVED, that the City Council of The Dalles, Oregon, does hereby express its opposition to the priority site selection process of the Department of Energy which placed the Hanford Nuclear Reservation as one of the final sites for a permanent nuclear waste repository; 2.1.1

AND, BE IT FURTHER RESOLVED, that the City Council requests that the entire Department of Energy selection process be reviewed by an independent Presidential Commission empowered to subpena 2.3.2.9

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necessary documents and conduct an unbiased assessment of the Department of Energy's Final Enviornmental Assessment of Hanford:

AND, BE IT FURTHER RESOLVED, that the above Presidential Commission be required to publicly announce the results of its investigation;

2.5.5 AND, BE IT FURTHER RESOLVED, that the City Council opposes and condemns the abusive waste disposal techniques which have been and continue to be used at Hanford and which have already grossly contaminated that site and its groundwaters;

2.4.1.1 AND, BE IT FURTHER RESOLVED, that The Dalles City Council hereby demands that the operations at Hanford be immediately required to meet the Nuclear Regulatory Commission's safety standards for the handling, disposal and storage of nuclear wastes;

AND, BE IT FURTHER RESOLVED, that notice of this City Council action be made known to the President of the United States, the Governor of the State of Oregon, the Congressional delegation of the Pacific Northwest, the Secretaries of Defense and Energy, and that this Resolution be entered into the official public hearing record of the Department of Energy along with all testimony given at the public hearing held in Portland, Oregon on July 10, 1986.

DONE AND DATED THIS 4TH DAY OF AUGUST, 1986.

Voting yes, Councilmembers: Clark, Christensen, Woods, and Probstfield

Voting No, Councilmembers: None

Absent, Councilmenbers: Ward

Abstaining, Councilmembers: None

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AND APPROVED BY THE MAYOR THIS 4TH DAY OF AUGUST, 1986. 62

John Mabrey, Mayor

ATTEST: Cathryn Babbitt
Cathryn Babbitt
City Clerk/Treasurer

STATE OF OREGON)
County of Wasco) ss.
City of The Dalles)

I, Cathryn Babbitt, the duly appointed and qualified City Clerk of the City of The Dalles, Oregon, a municipal corporation, do hereby certify that the foregoing copy is a true and correct copy of the original of Resolution No. 86-55 on file in my office at City Hall, The Dalles, Oregon.

IN TESTIMONY WHEREOF, I have hereunto set my hand and the official seal of the City of The Dalles this 5th day of August, 1986.

Cathryn Babbitt
City Clerk/Treasurer
CITY OF THE DALLES, OREGON

(no comment identified)

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Affiliated Tribes of Northwest Indians

August 1, 1986

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'86 6 1986 0163
WM DIVISION

Mr. R.A. Holten/EIS
U.S. Department of Energy
Richland Operations
P.O. Box 550
Richland, WA 99352

Dear Mr. Holten:

Please find enclosed the Statement of the Affiliated Tribes of Northwest Indians regarding the Draft Environmental Impact Statement on the Disposal of Hanford Defense Wastes. We understand that there is an August 9 deadline for comment on the DEIS.

If I may provide more information or be of assistance please call me at the phone number listed at the bottom of this page.

Sincerely,

Faith Mayhew
ATNI Executive Director

Enclosure: ATNI Statement regarding the DEIS
on the Disposal of Hanford Defense Wastes

1425 NE Irving, Suite 102 • Portland, OR 97232 • (503) 232-3725

216

(no comment identified)

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The U.S. Department of Energy has issued a Draft Environmental Impact Statement on the Disposal of Hanford Defense Wastes accumulated over the past several decades and for those continuing to be created. There is much in the document that has been released that is helpful in better understanding the nature of the wastes that have been produced. We are also somewhat encouraged that DOE has finally presented some preliminary information on the defense waste issue which is of such consequence to Indian Tribes in the Northwest, and, indeed, all peoples in this region. 2.2.1

There are, however, substantial concerns that we have with the defense waste disposal program, only a portion of which, appears to have been considered in the draft EIS.

1. We are concerned that the Department of Energy has made a determination that the preponderance of wastes that exist at Hanford will be permanently emplaced where they are in "mini" repositories that do not afford the protection of the contemplated deep geologic disposal facilities. This concern results from previous statements of DOE which clearly indicated that their preference was to keep most of the wastes where they were, in single-walled tanks or in the ground where a substantial amount of the wastes have leaked. This appears to be confirmed by the alternatives that have been presented in the DEIS, i.e. moving all of the wastes, moving none of the wastes, or moving "readily retrievable" wastes which DOE defines as those that do not constitute a safety risk and which are cost effective. 3.3.2.1

The Affiliated Tribes of Northwest Indians feel strongly that the clear intent of the Nuclear Waste Policy Act is to permanently contain

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all high-level waste and spent fuel in geologic repositories. Since the President made the decision to commingle commercial and defense wastes, the requirement for geologic disposal covers defense wastes as well and attempts to minimize the amount of wastes going to repositories on the basis of short-term over long-term risks is short-sighted and is not supportable. We would like assurances by the DOE that they truly are looking for the best alternative and are not merely setting forth approaches that may be unachievable or are unrealistic in order to foster their long-held views. 2.4.1.4 3.3.1.1 2.3.1.3

2. We do not feel that the relationship between the defense waste program and the commercial disposal program are adequately described in the DEIS. With the commingling requirement, DOE should have recognized several impacts in the DEIS concerning the repository program, including design, schedule acceptance, operation, transportation, and others. 2.3.1.3

3. We are concerned that the Department of Energy may be considering only an minimum level of safety rather than the maximum level required to fully protect all of the citizens of the region. The DEIS indicated that Hanford defense wastes must be disposed of in such a way that an "appropriate level of protection of public health and safety can reasonably be expected." We expect DOE to do better than talk about an "appropriate level of protection" and reasonable expectations. We expect that the wastes should be disposed of with full safety and with conviction and assurances that all our people will be protected. 2.2.1

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4. We are concerned that DOE may wish to select an alternative that may fulfill the definition of "cost-effective" rather than solving the disposal issue from an overall safety and health perspective. We do not suggest that DOE is not interested in health and safety, but we are concerned that safety decisions may be, in part, driven by economic arguments rather than by the safe and secure isolation of the waste as the motivating force. A portion of our concern is with the potential implications of budget reductions under the Gramm-Rudman Act, as well as the several month delay in determining cost allocations between the commercial and defense programs as a result of the commingling decision. The primary consideration must be safety, not cost. 2.2.1

5. We are concerned that DOE has implied the use of in-place stabilization of defense wastes, since it has indefinitely suspended its search for a second site. Since there is a ceiling on wastes for the first site, it would appear that one way to expand the life of the first repository would be to lessen the amount of wastes from defense activities to be included. 3.3.2.1 3.3.5.7

While we are encouraged by the information that DOE has included in the draft EIS, we are not encouraged by some of the key questions which must be dealt with before final decisions on any preferred alternative are made. DOE must continue its efforts to provide all relevant information well in advance of its decision-making. In the case of Hanford defense wastes, no final decision on an alternative should be made without the inclusion of expanded material on the points we have raised above. 2.3.2.8

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Northwest District Association

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"Lets Plug for Liveability"

NWDA

August 4, 1986

Richard A. Holten
Environmental Impact Statement (EIS)
U.S. Department of Energy
Waste Management Division
P.O. Box 550
Richland, Washington 99352

Re: Comments Submitted by Northwest District Association Concerning Draft EIS: Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, for Consideration in Final EIS

Dear Mr. Holten:

Pursuant to notice set forth in the Department of Energy, Draft Environmental Impact Statement (EIS): Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes, March 1986, the Northwest District Association hereby submits its written comments concerning the Draft EIS for consideration in the Final EIS.

The Northwest District Association (NWDA) is the officially-recognized neighborhood association for Northwest Portland. About 12,000 people live and/or work within the district. On July 7, 1986, the NWDA Board of Directors voted unanimously as follows:

2.2.11 1. that all radioactive defense wastes at the Hanford Nuclear Reservation should be thoroughly cleaned-up and moved off-site for safe storage; and

2.1.1 2. that the Hanford Nuclear Reservation, located on the Columbia River, is a highly inappropriate and most unsuitable site for the establishment of a repository for the permanent storage of nuclear wastes.

Portland is located 250 miles downriver from Hanford. The Columbia River, our lifeline, already has been seriously contaminated by radiation from defense activities at Hanford, primarily the continued production of plutonium. That a permanent repository for all of the nation's high-level commercial and defense wastes also might be located at Hanford, a mere four to six miles from the Columbia River, is unthinkable and must not happen. For good cause, we are gravely concerned about our health and the health of our children and their children to come. 3.2.4.1

The Hanford Nuclear Reservation is radioactive. Hanford's radioactive wastes are in the soil, and in the ditches, cribs, ponds, trenches and tanks. Many of the tanks, all of which contain high-level wastes, are known to leak. Therefore, we are concerned and perplexed that the Department of Energy (DOE) budget for fiscal 1987 should show more money planned for expanding the use of soil as a disposal medium than for protecting the human environment from nuclear wastes. We most emphatically do not want soil to be used as a nuclear waste storage medium. 2.2.10

N.W.D.A., the Community Organization for Northwest Portland, Inc.
1819 N.W. Everett, #205, Portland, Oregon 97209, 223-3331

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Numerous medical studies have shown increases in human cancers with increasing radiation doses and some researchers contend that low radiation doses over long periods cause more cancer and mutations than generally has been believed. We do not understand why DOE, in 1982, without public notice, comment, or hearings, drastically raised the allowable limit of radioactivity in the soil, from 10 nanocuries per gram to 100. This meant that the soil at Hanford could be much more radioactive before it would be considered unsafe. While recommended allowances of radiation exposure are continually being lowered to protect human health, DOE appears to be raising those same allowances regarding defense facilities to the detriment of human health. For the sake of our health and that of the generations to follow, we clearly want and expect that all governmental agencies and our elected representatives will exercise all due care and caution regarding allowable radiation exposures. 2.4.1.8

We believe that we have good cause to be concerned about radiation exposures from Hanford. One reason is that Tritium, a beta radiation emitter, is, by DOE's own admission, in the soils at Hanford and in the Columbia River. This type of radioactivity attaches to fatty tissues in fish and humans. Radiation dramatically increases its concentration as it moves up the food chain from river plankton and insects, to fish and ducks, to water birds, and eventually to human beings. Much of the fish and produce consumed in Portland bears a river connection. Can we continue to safely provide such products to our families and ourselves? Some Portlanders are becoming increasingly skeptical. 3.5.5.1

Also, we are concerned about our drinking water. At a DOE defense facility in South Carolina (Savannah River Plant), the drinking water from one of the nation's most important aquifers, the Tuscaloosa, has been seriously contaminated with radioactive wastes. In early 1986, the Environmental Protection Agency stated that toxic wastes going into the Columbia River at Hanford violate federal safe drinking water standards. The Troutdale aquifer, to name just one aquifer near Portland, is recharged by the Columbia River. We will not sit by idly and suffer the fate of the citizens of South Carolina. It is imperative that our drinking water remain pure. 3.2.4.1

Regarding airborne radiation, we are particularly disturbed about the belated (February 1986) revelations concerning planned and accidental releases of high-level radioactive emissions from Hanford during the mid-1940's and continuing up to 1974. We do not accept DOE's explanation for its repeated deliberate release of Iodine 131 into the atmosphere from Hanford. To conduct atmospheric diffusion studies, as DOE contends, fails to explain why non-radioactive chemicals were not used. Iodine 131 lodges in the thyroid gland and kills cells or causes cancer. In a 1949 experiment of about 5,000 curies, plants had extremely heavy concentrations of Iodine as far away as Gilliam and Morrow Counties, Oregon. In 1951, 19,000 curies of Iodine 131 were accidentally discharged when an exhaust system failed. By comparison, the Three Mile Island accident involved the release of about 15 curies of Iodine 131. 2.2.12

It is unclear what radiation injuries migh have resulted from these high-level radioactive emissions because no discernable efforts on the part of DOE or any other governmental agency to observe such injuries can be found. While Michael Lawrence, Hanford Operations Manager, states confidently that "there are no 3.5.5.42

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3.5.5.42 nuclear accidents with significant consequences," we question the source of his information because, despite 40+ years of plutonium production and other nuclear processes at Hanford, there are no comprehensive health studies of the off-site health effects on human beings. The following, however, is known and documented and of increasing concern to us in Northwest Portland:

1. Infant mortality for Benton County (where Hanford is located) jumped 160 percent between 1943 and 1945 -- the period when Hanford produced plutonium for the Nagasaki bomb and released large quantities of radiation into the environment.

2. Cancer rates in small Mormon communities in Utah in the path of fallout from open air atomic bomb tests are 61 percent higher than in other Mormon communities.

3. Residential areas nearest to the Rocky Flats plutonium facility near Denver are suffering an excess cancer rate of 16 percent. The PUREX plant at Hanford discharges about 7.5 times more plutonium on a routine basis than does Rocky Flats.

4. Farmers downwind from Hanford, alarmed by the unusual high rates of cancer, miscarriage, and birth defects occurring in their families, have begun drawing "death maps" to track family and neighbor health histories.

Given the above, plus the revelation of numerous other alarming facts long kept secret, is it any wonder that many people in Northwest Portland endorse the 2.5.6 position of Robert J. Alvarez, Senior Scientist, Environmental Policy Institute, Washington, D.C., that "there is the possibility that in making these weapons (nuclear) that are supposed to protect us we are destroying widening tracks of domestic environment -- and maybe creating a human health legacy of major proportions."

Consequently, concerning the Draft EIS, the NWDA requests that the following be included in the Final EIS:

3.3.2.1 1. That ALL radioactive defense wastes at Hanford be thoroughly and completely cleaned-up and moved off-site for safe storage. "In-place stablization," a less costly alternative, is not acceptable.

2.2.11 2. That the practice of using soil as a storage medium for radioactive wastes be discontinued immediately.

2.2.10 2.4.1.1 3. That DOE nuclear defense facilities comply with all environmental regulations required of commercial nuclear reactors.

3.5.5.42 4. That comprehensive health studies be undertaken to determine off-site health effects on human beings from radioactive wastes/emissions.

3.2.6.3 We in Northwest Portland wish to continue to enjoy living and working in a community of which we are justifiably proud. Portland is a fine and beautiful city with a rich and varied cultural heritage. No one wants to fear that the alfalfa

August 4, 1986
R.A. Holten
page 4

grown near Hanford and fed to dairy cows from which we obtain milk for our children and ourselves may be contaminated by radioactive wastes. Such fear, however, can arouse the citizenry of not only Northwest Portland, but of all Portland, to take action deemed necessary to protect the lives of our children and our own lives. A perceived criminal neglect of public safety will not go unaddressed. 3.2.6.3

Regarding the choice of Hanford as a prime candidate for the establishment of a nuclear repository, we wholeheartedly endorse the position expressed by The Oregonian in an editorial dated June 1, 1986, which states: "This is an outrageous decision that makes a mockery of the highly technical selection process ordered by Congress. That process was designed to exclude political advantage as a variable in determining site selection." This position was further substantiated by the recent disclosure of a DOE site selection document entitled, "Objective: Maximize reduction of political pressure while minimizing costs and not jeopardizing first repository EAs." Upon learning of the damning document, Representative Ron Wyden aptly termed DOE's site selection process, "pure politics." 2.2.14

It is foolhardy to even consider dumping, storing,or burying nuclear wastes near the second largest river system in the continental United States. The June 1 Oregonian editorial succintly states the obvious: "Given the documented health and safety risks to downstream populations along the 343-mile stretch of the Columbia River, it would be unconscionable to place such a valuable resource and the 2 million people it serves at such enormous risk." 3.2.4.1

Everyone agrees that high-level radioactive wastes from a repository at Hanford will eventually reach the Columbia River. The only question is WHEN. The DOE would have us believe that it would not happen for at least 10,000 years. Independent scientists, looking at the same data and data ignored/not explored by DOE, say it could happen in as little as 20 years. 3.5.3.6

The groundwater modeling in the Draft EIS inexplicably ignores the most rapid transport and corridors of water travel from the Hanford Reservation to the Columbia River. Independent scientists from the Hanford Reach Project have concluded, based upon extensive field testing, that contaminated groundwater dumped on the Hanford Reservation follows an underground channel into the Columbia River. Government studies going back to the 1960's confirm the existence of such a channel, yet DOE's Draft EIS totally ignores it. The channel flow greatly reduces the travel time for nuclear wastes from Hanford soils to reach the Columbia River. Surely, such germane findings and conclusios as presented by the Hanford Reach Project warrant close scrutiny and evaluation by DOE. We will look for and expect to find the same in the Final EIS. 3.5.3.6

Granite is widely considered to be a superior material for containment of nuclear wastes, yet no granite sites are being considered or evaluated by DOE. Only basalt, tuff, and rock salt sites -- two of which are on federally-owned reservations -- are under consideration. Furthermore, only basalt at Hanford, a federal reservation, has been studied extensively. Also, all three candidate sites are located in the West, whereas 85 to 88 percent of nuclear wastes are produced in the Northeast. 2.2.14

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It is becoming all too clear that Hanford is the preferred repository choice because only at Hanford will there exist a means to extract weapons-grade plutonium from commercial nuclear reactor wastes. The PUREX plant at Hanford, which presently extracts plutonium for nuclear bombs, is being modified to accept and extract plutonium from commercial spent fuel. How convenient it would be for the Department of Defense if plutonium, which is in short supply, could be readily available from commercial wastes at a repository located at Hanford. The Environmental Policy Institute estimates that by the year 2000 there will be enough plutonium in commercial wastes to produce 69,000 nuclear weapons — paid for by consumers of nuclear-generated electricity.

2.1.3

Thus, the evidence appears to be overwhelming that Hanford is a political, not a technical, candidate, and that we in the Northwest are being sacrificed for political ends. Nuclear policies driven by money and politics, with little concern for public health and safety, could destroy our neighborhoods, our communities, our very lives and those of our children.

2.2.1

We applaud our elected representatives who say, "never a repository at Hanford." We urge the same total and unqualified commitment from others less committed to our health and safety. The selection of a permanent repository site for the nation's high-level radioactive wastes must be a sound decision based upon solid scientific evidence. We will not tolerate a site that is merely politically convenient for certain governmental interest. We in Northwest Portland want a site that is safe for us now and for the many generations yet to come. That site is NOT HANFORD.

2.1.1

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Very truly yours,

Frank Dixon
President

cc: Senator Mark Hatfield
Senator Bob Packwood
Representative Les AuCoin
Oregon Hanford Oversight Committee

Mr. Douglas McIntosh
903 Grant Avenue S.
Seattle, WA 98055

8/4/86

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AUG 6 1986 0165
WM DIVISION

Mr. R.A. Holten/EIS
U.S. Deparment of Energy
Richland Operations
P.O. Box 550
Richland, WA 99352

Dear Mr. Holten:

3.3.1.1
2.1.1

I am totally opposed to the use of Washington state as a Nuclear waste dump site. I am already concerned about the dangers of radioactive contamination of the Columbia river, and contamination of agricultural products grown in eastern Washington from existing nuclear wastes at Hanford. We can not futher endanger the residents of this state.

3.2.6.1

Sincerely,

Douglas McIntosh

Douglas McIntosh
Registered Voter

cc : y

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AUG 6 1986 0166
WM DIVISION

U S Dept. of Energy
Richland operations
P.O. Box 550
Richland, WA 99352

aug. 4, 1986

This letter is about Hanford defense waste & what should be done about cleaning it up. I don't have much time so I will make it short.

2.2.11 All waste at the Hanford site should be cleaned up as complete as is ~~possible~~ possible. Cost should be of no concern.

2.2.1 Cost was of no concern when making the waste so it shouldn't be now.

221

Helen C. Bushman
Beaverton, Oregon
(4835 S.W. Chestnut Pl.)
644-5661

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AUG 6 1986 0167
WM DIVISION

August 4, '86

Sirs—

Here are my comments as a citizen on the 3/86 EIS on disposal of Hanford nuclear waste DOE/EIS-0113 v.1.

(1) The first thing to do with volatile waste is SOLIDIFY IT! At least then it will stay in one place. Rising water tables may inundate it, causing seepage, but it won't seep into an existing watercourse.

(2) GET IT AWAY FROM RIVERS, lakes, streams, the ocean, & subterranean bodies of water. I don't know whether any geological formation is solid enough, but we might as well do our best to contain the stuff. 3.1.8.9

(3) Don't make any more than we can help.

this may be outside the scope of this EIS, but you must know it's pertinent & any permanent storage solution for existing waste — the more there are, the harder they will be to dispose of.

2.5.6

Thank you for the chance to comment.

Lynn W. Baker
3939 N. Overlook Blvd
Portland, OR 97227
503-288-2433

PHOTOGRAPHY BY: CHUCK PLACE
DUDLY KITTENS
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AUG 6 1986 0167
WM DIVISION
Current
CURRENT INC., COLORADO SPRINGS

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AUG 6 1986 0168
WM DIVISION

Seattle, Wash.
8-3-1986

Sir:

2.1.1 I am writing this letter to protest the dumping of "Nuclear Waste" from all over the world at Hanford.

The people from Taiwan can bury their own waste.

3.3.5.2 The people on the east coast should be made to bury their own waste also. Since that Chiasco in Russia, I have changed my mind about "Nuclear Waste". Consider this our protest to dumping waste at Hanford.

Sincerely yours.
John F. Murphy
Gloria Murphy
6546-37th N.E.
Seattle, Wa. 98115

August 3, 1986

Re: Draft EIS on Military Waste at Hanford

Please use all available resources and technology to clean up all military radioactive waste at Hanford. Future generations should not be put at risk by waste we have generated. Cost of clean-up should not be a factor in choosing the best method of disposal. 2.2.1

Please stop using the crib "disposal" system for any waste at Hanford. The Columbia River is a valuable resource for this region and we do not want any more leakage of waste into the river even if that leakage won't reach the river for 10,000 years or more. 2.2.10

Sincerely,
Susan B. Johnson
1501 S.W. Elizabeth St.
Portland, OR 97201

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AUG 6 1986 0169
WM DIVISION

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AUG 6 1986 0170
WM DIVISION

COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT,
DISPOSAL OF HANFORD DEFENSE HIGH-LEVEL, TRANSURANIC, AND TANK WASTES
AUGUST 4, 1986 JULIE ANN BOYLE

One criterion of an Environmental Impact Statement (EIS) is that the environmentally-preferable alternative be identified. The Department of Energy (DOE) has failed to do this by neglecting to identify in this EIS the obvious alternative of ceasing to generate any more radioactive waste at the Hanford reservation, which would negate the need to consider the disposal of future wastes. 2.5.6

This EIS is woefully-lacking in detail and certainty of plan. To quote from the EIS:

p. 3.12- "In this analysis , the stable form except for retrievable TRU is considered to be a slag, but other waste forms may be chosen later." Question: What other waste forms? 3.1.3.21

p. 3.15- "Insofar as practicable, all newly-generated high-level waste would be disposed of in a geologic repository." Question: Who defines practicable? 3.3.1.9

Because of this lack of detail and the obvious high degree of uncertainty expressed in this EIS, I request that the DOE issue another EIS in the future, when more is known about how to isolate radioactive wastes from the environment. I believe the primary concern here needs to be public safety, not cost, not adhering to a timetable, and not convenience. 2.3.2.3 2.2.1

I object to the consideration in this EIS of only a portion of the defense wastes at Hanford. Treatment of low-level wastes, and decontamination and decommissioning of surplus or retired Hanford facilities after 1983, is not considered. 3.1.6.1

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It seems more logical to devise a single, comprehensive plan to isolate all nuclear wastes in this country, because they are all related.

Regarding the vitrification facility, my concerns are as follows:

1) The facility described in Appendix C is the one appropriate only to the "reference" alternative; the facility necessary under the geologic disposal alternative is not discussed at all in detail. I object to this because it indicates to me the DOE's bias towards the "reference" alternative as its preferred alternative, which is invalid in an EIS. 3.3.3.1

2) The design of the vitrification plant uses "to the maximum extent" the design technology of the West Valley Demonstration Project (New York) and the Defense Waste Processing Facility (Savannah River.) Neither of these plants are yet operating, and I feel it is grossly irresponsible of the DOE to issue this EIS based on "preconceptual" designs using as-yet-untested technology. 3.1.8.9

3) A report commissioned by the French government in 1981, commonly known as the "Castaing Report," found that glass is unsuitable as a medium for long-term disposal of radioactive wastes France has the most experience of any country in the world in vitrifying radioactive wastes. 3.1.8.10

4) According to this EIS, borosilicate glass was chosen over crystalline ceramic as the preferred waste form not because it's more stable, but because "process complexity, development requirements, and programmatic costs would be less for borosilicate 3.1.8.11

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glass than crystalline ceramic."

5) In section C.7, it's stated that "Calculated radiation doses are from estimated exposures during feed preparation and vitrification processes..." A few sentences earlier, it's stated that"all radiation doses are within DOE limits..." How can DOE make such a definitive statement as that, based on "estimated exposures" and "preconceptual" facility designs copying as-yet-untested facilities? And do radiation doses fall within other regulatory agency limits? 3.1.8.14

6) I am concerned about the concentration of radionuclides which will be released to the environment during the feed concentration, off-gassing from the melter, and canister cooling steps of the vitrification process. 3.1.8.14

Regarding the grouting process, again, my greatest concern is that there appears to be a lot of uncertainty at DOE about the performance of the grout in isolating these wastes, and my recommendation is that we experiment as much as necessary to satisfy ourselves that a particular process is the best we can devise to isolate these wastes, and that until we are satisfied, that we cease to produce any more wastes at Hanford. 3.1.8.1

As with the vitrification process, I'm very concerned about the concentration of radionuclides released to the atmosphere during the grouting process, e.g., during filling of trenches with grout, and during venting of off-gasses. 3.4.1.3

My other concerns are as follows:

1) I would like to see the terms "farm" and "feed" struck from subsequent Hanford documents; such life-related words are sorely abused in a document discussing the disposal of highly-toxic wastes. 4.1.6

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2) On page 3.15, it's stated that under the geologic disposal alternative for existing tank wastes, contaminated soil around the tanks would be left in place and covered with a protective barrier. In light of the fact that double-shell tanks came into use because the single shell tanks were found to be leaking, and the contents thought to be quite dangerous, and in light of the fact that this protective barrier has never been proven, I feel this policy is unsafe and irresponsible. 3.3.5.4

3) This EIS does not address other toxic chemical wastes adequately. 3.1.6.1

4) At the DOE-sponsored public workshop on this EIS in Spokane (Gonzaga Univ.), a DOE representative told me that all the references for this document, except those published in private periodicals, would be available at the Spokane Public Library. While searching through these references, the Savannah River Plant Final EIS on th Defense Waste Processing Facility was found to be "unavailable." I finally found it in another set of Hanford references, and on the very first page it said, "Parts of this document are illegible." Please comment on on this. 4.1.10

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Department of Energy

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August 5, 1986

R.A. Holten
US Department of Energy
P.O. Box 550
Richland, WA 99352

Dear Rich:

Attached is a copy of Oregon's final comments on the draft EIS for disposal of defense wastes stored at Hanford. Also attached is the Oregon position paper on the disposal option.

Should you have any questions, please call me on (503) 378-6457 or Mary Lou Blazek on (503) 378-5544.

Sincerely,

M W Alsworth

M. W. Alsworth
Manager of Reactor Safety
Siting and Regulation Division

MWA:ja
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Attachments

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OREGON POSITION ON DISPOSAL OF THE HANFORD DEFENSE WASTES

August 1986

Prepared by:

The Oregon Department of Energy

625 Marion Street NE, Salem, OR 97310

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OREGON POSITION
ON
DISPOSAL OF THE HANFORD DEFENSE WASTES

In April 1986 the U.S. Department of Energy issued a draft environmental impact statement (EIS) on Hanford defense waste disposal. The draft EIS sets forth disposal options for radioactive wastes accumulated during four decades of weapons production at Hanford.

The ODOE Hanford Advisory Committee sponsored two public workshops to discuss and comment on EIS issues. The Hanford Review committee reviewed the draft EIS and also provided technical comments. These reviews and comments were used to develop the Oregon position.

The comments reflected the need for Oregon to take a strong position on deciding the permanent disposal of Hanford defense wastes. Our challenge is to obtain the necessary level of health and safety in the most cost effective way. Then, we must work to gain support for our position.

Basis for Oregon's Position

We must eliminate the long-term risks to public health and safety of defense wastes temporarily stored at Hanford. We should make decisions now that can be made now. Those wastes that are easily cleaned up should be. For those wastes for which we have the retrieval and disposal technology, and where current practices eventually will lead to leaks, we should take all reasonable actions to process and dispose of the waste. 3.3.5.3

Some wastes are difficult to deal with, but current storage poses no immediate problem. For those, we must develop greater confidence in our options. This process should be designed to take no more than the next five years. Our priority should be to avoid long term risks to ground water and the river. Research should be focused on ways to dispose of wastes by looking for innovative waste treatment techniques. 3.3.5.3

Based on these criteria, the Governor has taken this position on Hanford defense wastes. 3.1.8.9

1) Transform existing and future high-level liquid wastes into glass. Dispose of these wastes in a future geological repository. 3.3.1.1

2) Treat and ship post-1970 plutonium wastes (called transuranic [TRU] wastes) to the defense repository for plutonium wastes in New Mexico. 3.1.3.25

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3) All other wastes must be better understood in terms of the trade-offs. Reasonable decisions must be made, but in light of the priorities mentioned above.

The various wastes are discussed below.

Double Shell Tanks contain high level liquids and suspended solids.

Option 1. Waste in these tanks could be retrieved, glassified and disposed in a future geologic repository. The plant to glassify these wastes could be completed by 1994. The cost of this option is about $877 million for existing waste, and $1.1 billion for future waste.

Option 2. Dried and stabilized waste could be disposed near ground surface. The waste could be covered with a rock and soil barrier to prevent flow of rainwater through the waste.

Oregon's Position

Oregon recommends option 1. This material is liquid high-level waste. If left in liquid form, these wastes eventually will leak. These wastes also are easily retrievable. They should be disposed in a geologic repository. This approach is consistent with standards for the commercial industry. 3.3.5.3

Single Shell Tanks contain solids in the form of sludge or salt cake. The radioactivity in this material is similar to the wastes in the double shell tanks. But, it is older and more dilute.

Option 1. The waste could be retrieved and separated into high-level and low-level waste. High-level waste could be converted to glass for future repository disposal. The low-level waste could be converted to a cement-like material and disposed on site.

Option 2. The waste could be stabilized in place. This treatment would include filling the empty space in tanks with crushed rock. The rainflow barrier described earlier would also be used.

Option 3. There is not enough information to choose now. We need a better understanding of the trade-offs and more confidence in the options before we decide.

Oregon's Position

Oregon recommends Option 3. The material in single shell tanks should be processed no matter what option is chosen. The best method is to retrieve and glassify it. But, this option involves tremendous 3.3.5.3

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cost and needless potential radiation exposure to workers. USDOE should investigate other cost effective means of retrieval. We believe this can be and should be achieved within five years.

The wastes in single shell tanks have been processed to reduce the water in them. This has reduced the possibility of leakage from deteriorating tanks. Thus, time spent to research disposal options will not significantly impact the environment in the near future.

3.5.1.8 If studies show that in-place stabilization is the best option for single shell tank wastes, engineered barriers should not be the only means of protecting public health and safety. Multiple barriers are needed. An example would be to mix the wastes within the tank with grout. Thus, they would not easily be dissolved in water if it entered the tank. Engineered barriers should be relied upon as a secondary level of protection.

Post-1970 Plutonium Contaminated Wastes consist of contaminated equipment and laboratory wastes. This waste has been stored for retrieval since 1970.

Option 1. Removal and treatment of the waste at Hanford. Eventual disposal at the defense repository for plutonium wastes in New Mexico. This would require a processing facility to be completed by 1990-1993. The cost of this option is $180 million.

Option 2. Near surface stabilization with a cement-like material. A barrier identical to that described in the second option for double shell tank waste will also be used.

Oregon's Position

3.3.5.3 Oregon recommends option 1. The storage of these wastes was designed for retrieval. These wastes pose an extremely long-term radiation hazard. They have been put in wooden boxes and steel drums and buried. The deterioration of these containers eventually will release contamination into the soil. They should be retrieved and disposed in the New Mexico repository.

Pre-1970 Plutonium Contaminated Waste consists of general trash, failed equipment, and 24 soil sites contaminated by releases directly to the ground. These wastes are not readily retrievable.

Option 1. Removal and treatment of buried solid waste and soil sites which exceed USDOE's classification for low-level plutonium contaminated waste. Treated waste could be shipped to the defense repository for plutonium wastes in New Mexico.

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Option 2. Immobilization of the waste burial grounds by filling with a cement-like mixture. The area is to be covered with a rainflow barrier as previously described.

Option 3. There is not enough information to choose now. We need a better understanding of the trade-offs and more confidence in the options before we decide.

Oregon's Position

Oregon recommends Option 3. The wastes should be removed and treated if reasonably achievable. These wastes pose the same hazard as post-1970 contaminated waste and should be treated the same. If this goal cannot be achieved, more confidence in stabilizing the waste and confirmation of barrier protection must be accomplished. Again, this should be completed within five years. 3.3.5.3

These wastes have been buried for many years. Spending more time to research proper retrieval and disposal methods will not increase the the hazard within five years.

Strontium and Cesium wastes are double encapsulated in stainless steel cylinders. These wastes are stored in water basins.

Option 1. The capsules could continue to be stored in water basins. Capsules could then be packaged and shipped to a future geologic repository when a respository is available.

Option 2. Capsules could continue to be stored in water basins until 2010. Beginning in 2010, the capsules could be placed in a dry storage vault. A protective barrier as described earlier could be constructed over the site in the years 2013 to 2015.

Oregon's Position

Oregon recommends Option 1. Many of the capsules have been leased to industry for sterilization facilities and process control. The remainder is stored in water pools and is under constant attention. There is no immediate hazard from short-term storage of this waste. But, these capsules are highly radioactive and will remain so for hundreds of years. Eventual geologic disposal will provide safe long-term disposal. 3.3.5.3

Other Concerns

Oregon also has serious concerns about chemical waste and low level radioactive wastes from defense activities. USDOE's proposal does not deal effectively with these issues. But, they are potentially serious risks to public health and safety and the environment. Oregon supports 2.3.1.13 3.1.6.1

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2.2.2 Congressional initiatives to direct USDOE to comply with current federal and state requirements on waste handling and disposal. A schedule of compliance should be drawn up and enforced. Congress must provide
2.2.9 funding to achieve clean-up of these wastes as well. This funding should be provided before any of these actions are required by Congress.

Forty years of defense materials production has resulted in an enormous amount of radioactive wastes at Hanford. So much waste poses difficult and complex retrieval, processing, and disposal problems. Funding has been ample for the production of the defense materials but not for waste
2.2.9 disposal. Oregon believes that funding policy is not acceptable. Congress requires the commercial nuclear industry to concurrently set aside funds for the disposal of radioactive wastes as they are generated. USDOE also should be subject to this requirement. Plutonium production should not be allowed without concurrently providing funding to dispose of generated wastes.

Governor Atiyeh will be working with Oregon's Congressional delegation to see that these actions are carried out.

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OREGON COMMENTS

Draft Environmental Impact Statement
Hanford Defense Wastes

August 1986

Oregon Department of Energy

Oregon Hanford Advisory Committee

Oregon Hanford Review Committee

Citizen Comments, Public Workshops

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INTRODUCTION

3.2.4.1

These are Oregon's comments of the U.S. Department of Energy's draft environmental impact statement on Hanford defense wastes. They reflect Oregon's chief concerns about USDOE's disposal options: potential impacts on the Columbia River and increased highway transport of high-level radioactive wastes. For the most part, those two issues are the theme both of our technical comments and comments from citizens.

3.4.2.2

Technical comments were written by the Oregon Department of Energy and its Hanford Review Committee. State agencies with relevant expertise comprise the Review Committee. Public comments were gathered by the Department and its Hanford Advisory Committee. The 32-member committee reflects the interests of citizens, business and industry, local governments, and environmental groups.

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2.3.2.12

The Department acknowledges the quality of the draft EIS and the diligent efforts that produced it. The presentation of technical detail, data, and calculations reflect an earnest solicitation of response and comment. The summary was written with special concern for lay readers. The Department, on behalf of the people of Oregon, is grateful for an opportunity to review and comment on the draft EIS.

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GENERAL COMMENTS

1. No-disposal Option - The no-disposal option is not acceptable. This option has much higher long-term radiological impacts. 3.3.4.1

2. Disposal Budget - The language of the draft EIS appears to be biased against the geologic disposal alternative. Geologic disposal as presented is the most expensive option. Readers are led to believe that Congress will not approve enough money for this option. The bias we infer implies that Congress would be more receptive to a cheaper combination of options. We believe there may be more cost-effective ways to remove single shell tank waste. These should be explored before deciding what to do with the waste. 3.3.1.2

3. Irreversible Actions - Some of the disposal options require actions which cannot be undone. Filling single shell tanks with rocks to prevent future tank collapse is an example. These kinds of actions may later prove to be neither wise nor adequate. Any irreversible actions could preclude retrieval or make it unacceptably costly. 3.3.5.4

4. Single Wall Tank Wastes - Waste in the single shell tanks is highly radioactive, although some of the radioactive isotopes have been removed. The draft EIS presents in-place stabilization of these wastes as an acceptable option. This conflicts with requirements that the commercial industry shall dispose high level wastes in a deep geologic repository. 3.3.2.1

   Large quantities of heavy metals are present in the sludge in the single shell tanks. These metals present a significant source of potential contamination to the shallow acquifer. The sludge should be processed to remove the metals as well as the radioactivity because the long-term integrity of the tank is questionable. USDOE should make every effort to address and resolve this problem. 3.3.2.6

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3.5.1.1 5. Engineered Barriers - Each disposal option includes engineered barriers to isolate the waste from wind erosion, water infiltration, and plant, animal, and human intrusion. Such a barrier has never been tested. More research will reveal if a barrier will meet requirements in the draft EIS. If it does not, USDOE must revise the draft EIS. USDOE must then comply with the National Environmental Policy Act (NEPA) to review these revisions. Irreversible actions should not be taken until the engineered barrier has been tested and accepted for use.

3.3.2.1 6. Repository Space - There will be limited space within the deep geologic repository. With only one repository planned, there may not be enough room for all defense wastes that need disposal. We are concerned that the lack of space in one repository may force a decision to leave single shell tank wastes in place. The final EIS should address this question.

3.1.1.9 7. High Level Waste Definition - 40 CFR 191 (EPA) defines "high-level radioactive waste" in terms of concentrations. This definition was not used by USDOE. Rather, USDOE used constituents of the waste to make the distinction. It appears that USDOE is exempting itself from regulations with which the nuclear industry must comply. The final EIS should address this apparent implication.

3.1.1.1 8. Waste Inventory - A total inventory of defense wastes, of which some are transuranic wastes, should be in the final EIS.

3.3.2.7 9. The U.S. Resource Conservation and Recovery Act (RCRA) Standards - RCRA standards require the use of a liner. This requirement is not included in the description of any option. If USDOE intends to meet RCRA standards, the final EIS should show how the standards can be met without the use of liners.

3.1.8.3 10. Grout Stabilization - Performance testing on grout should have been described in the draft EIS.

3.1.3.17 11. Support Equipment - The draft EIS did not state what is to be done with the contaminated support equipment. Such includes the piping to be used to transfer wastes from the tanks.

3.1.1.3 12. Transuranic (TRU) Waste Sites - The draft EIS provides general locations of the TRU waste sites. A complete list of these sites and their contents also should have been provided.

2.4.1.8 13. Transuranic (TRU) Waste Disposal Requirements - The change from 10 nCi/gm to 100 nCi/gm should be better explained or justified. Describe how much of the transuranic waste will fit the low-level waste category because of this change.

3.3.5.4 14. Future Research and Development (R&D) - R&D will be needed before some of the disposal work can be done. The final EIS should provide performance criteria for the work on which the R&D must be done. If any R&D results show a deviation from the criteria to complete the work, public review and comment should be reopened for applicable portions of the final EIS.

4.1.2 15. Accessible Environment - The term "accessible environment" often appears in the draft EIS. There is some confusion on what it means. The term should have been defined in the draft EIS.

3.5.3.8 16. Iodine Cumulative Levels - The cumulative effect of past releases of Iodine-129 in groundwater raised the activity level above background. This level must be determined. Any cumulative effects from future Iodine-129 releases in groundwater also must be determined and added to the previous total. The sum must not exceed the EPA standards for Iodine-129 in groundwater.

2.2.13 17. Independent Audits - An ongoing independent audit of USDOE waste management work should be done.

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2.3.2.2
2.3.2.1
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18. Draft EIS Review Difficulties - Although four disposal options were listed, none was presented as the preferred option. This may make this draft EIS unique among all such impact statements. The four options bound the broad range of those available, and "a final strategy could be selected that uses the best features of each one (p. 1.11)." Defense wastes at Hanford is a complex situation. The options as presented make detailed comments difficult. In some respects, this draft EIS is premature.

    For example, one could list the good and the bad features of each option. A final option that uses as many of the good features of each option as possible could be chosen. That would be commendable. But, this new hybrid final option would not have been reviewed and compared to the others. If this occurs, a new draft EIS is essential.

    The geologic disposal option may have been included because it would be most acceptable to most people. By inference, the in-place stabilization option appears to be preferred. The reference alternative is a compromise between the "preferred" and the "most acceptable" option.

19. Calculation Reviews - Impressive efforts produced the detailed calculations in this draft EIS. In such a short time for review, we cannot affirm that the calculations are correct. To do so with some certainty one would need to:

    a) get the codes;
    b) do a detailed study of each code to assure that it accurately is based on the best scientific model and has no flaws;
    c) have a thorough knowledge of the model itself;
    d) confirm that the data and assumptions used were accurate and appropriate; and,
    e) do several calculations of different scenarios.

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Given the time constraint, this could not be done. 2.3.2.7

20. Code Consistency - The codes (Hanford vs. NRC vs. EPA) and models (ICRP-2 vs. ICRP-30) produce fairly consistent results. The assumptions and data appear to be reasonable. The calculated effects should be accurate. 3.5.5.5

21. Worst-Case Scenarios - What would be the health effects if all of the waste present after 300 years (or 1,000 or 10,000 years) suddenly were deposited in the Columbia River? A few simple, upper-limit, bounding worst-case scenarios could be done. Examples are those done by Bernard Cohen in Scientific American (June 1977, p. 21). 3.5.4.11

22. Disposal Activity Requirements - The draft EIS should have stated that no waste form will be diluted so that it may fall under less stringent disposal requirements. 2.4.1.15

23. Transportation - The geologic disposal option would result in 6,900 off-site shipments if the repository is not at Hanford. The reference alternative would result in 3,100 shipments if the repository is not at Hanford.

    Transportation risks appear to be acceptable. The geologic disposal option to a site 4,800 km away would present the highest transport risk. This estimate is conservative. If Hanford is not chosen, a geologic disposal site likely would be closer -- Texas or Nevada. 3.4.2.2

    If the computer model RADTRAN is accurate, there are no radiological "major health and safety impacts" for this most conservative option. (Oregon has not formally evaluated RADTRAN.) There are an estimated two "major health and safety impacts" from non-radiological transport accidents (i.e., truck wrecks). Society accepts such risks in the transport of other goods. 3.4.2.1

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3.4.1.11 Risk of radiological exposure to workers (geologic disposal) and long-term radiological risks (no action) appear to be higher than transport risks. These higher risks should be weighed in choosing the method of disposal.

3.4.2.26 Actions can improve transport safety: avoiding foul weather; inspecting trucks; preparing for emergencies; and having safe parking areas. Transport safety issues must be addressed in the final EIS. Oregon will cooperate fully.

24. Geology and Seismology - The discussion of the geologic structure under the reservation is incomplete. The draft EIS states that the 3.2.2.2 structures of the Pasco Basin are typical of the Yakima Fold Belt subprovince. This province is characterized by narrow linear anticlines and synclines. They apparently die out towards the center of the Columbia Plateau. Most known faults are associated with anticlinal fold axes. They likely developed concurrently with folding.

What is missing is any analysis of how these structures relate to the reservation. Some of them trend toward the reservation. Are they present in the basalts beneath the sedimentary cover? Has USDOE looked for them? If they are not present, that should be noted. If 3.2.2.2 it is not known if they are present, that too should be noted. Figure 4.3, shows some marked relief in the surface of the Columbia River Basalt Group. This relief is not explained. Is it structurally controlled?

Are the faults associated with anticlinal fold axes active now? The fact that they formed concurrently with folding is not proof that 3.2.2.2 they are not now active. Some of the earthquake epicenters shown on Figure 4.4 appear to correlate with anticlinal axes. Does this indicate historical seismic activity on these structures? Have sedimentary rocks overlying the Columbia River Group been deformed?

The whole question of structure and seismicity on the Hanford Reservation is vital to the integrity of shallow waste disposal sites. This question is not fully addressed in the draft EIS. 3.2.2.2

25. Waste Activity - The draft EIS presents defense waste as considerably less radioactive than commercial spent fuel. Gram for gram this easily can be shown. But, we have concern that this argument 3.1.1.5 obscures more important considerations.

From a public health standpoint, the critical parameter is not specific activity, but potential source term. In our judgment, the solubility and dispersability of single shell tank wastes more than makes up for their lower specific activity. If national policy is deep geological disposal for high level waste, defense wastes should be considered in the same light.

26. Endangered Species - Species now under review (Long-billed Curlew, Columbia Milk-vetch, Persistent Sepal Yellowcress) as "candidates" for the list of threatened or endangered species should be evaluated. As candidates these species have no protection under the 3.2.4.3 Endangered Species Act. USDOE should insure that these species are protected from any adverse impact.

27. Release Rates - The draft EIS concludes that, among all options, the geologic repository results in the lowest releases to the 3.3.1.8 environment. But the draft EIS does not state how the repository will perform. How can this conclusion be drawn?

28. Tank Waste Grouting - Under any of the three waste disposal options, at least some wastes will be stabilized in place in the old tanks. An overlying engineered barrier is to keep water out of the wastes. There is no mention of studies of either in-place transformation of 3.1.8.8 the wastes to a more stable form, or to any physical method (i.e., grouting) of isolating or further stabilizing the wastes in the tanks. Were any such studies done? Would such techniques be safer?

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3.1.3.28

29. Past Practices - Waste discharges, by intent or not, have occurred at Hanford for many years. The draft EIS concludes that TRU wastes are adsorbed near the discharge point. What kinds of evidence/data support this conclusion?

3.3.2.9

30. Dry wells - Under the in-place stabilization option, cesium and strontium capsules will be disposed in dry wells. Potential environmental contamination from these sources is not mentioned. What risks does this method of disposal have? How mobile are these ions under various environmental conditions?

3.5.2.1

31. Ionic Mobility - Do the various radionuclides have different inherent mobilities? Do the relative mobilities change with changing climatic conditions? Do these mobilities have peculiar implications for the final selection of the waste disposal option?

3.5.2.54

32. Glaciation - Glaciation briefly is mentioned as a potential influence on waste isolation. Glaciation is considered in the draft EIS only in regard to its ability to produce catastrophic floods. But, there are more important effects of glaciation that must be considered.

3.5.2.54

Glaciation will change the climate. Temperatures will be lower. They may be much lower depending upon the nearness of ice sheets. Air circulation patterns will be changed. Precipitation may increase dramatically. Vegetation may change dramatically, or may disappear altogether. Loss of water from the soil by evaporation from plants by transpiration may be changed dramatically. Some of these effects will precede glaciation. Others will follow. All of these glacial effects should be addressed. The likelihood of another episode of continental glaciation should also be evaluated.

The best way to evaluate glacial effects is to examine the past. Are there data about effects on local precipitation or vegetation in the Pasco Basin during past glacial episodes?

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33. Recharge - Part of the input data for recharge modeling is laboratory permeabilities based on sediment texture analyses. This technique produces disturbed samples. Permeabilities so derived will not be accurate. They may be wrong by as much as a factor of ten. This could produce major errors in recharge and contaminant migration calculations.

Data about waste migration pathways beneath specific disposal sites may not be available. Permeabilities derived from averaging six near-surface sediment samples, even if accurate at those sites, cannot represent the hydraulic conductivity in the unsaturated zone beneath all the waste sites. Site specific data are needed to accurately calculate water and contaminant migration at each site. To calculate vertical water and waste movement, the vertical hydraulic conductivity and thickness of each sedimentary unit in the unsaturated column must be known.

3.5.2.6

The draft EIS considers that, in evaluating radionuclide movement and recharge, it is not reasonable to think the climate will be wetter before 2150. Precipitation records in arid areas of Oregon show long periods of abnormally high or low precipitation.

Are there data to suggest that Hanford's average annual precipitation now is significant in a long-term sense? Or, is the "average annual precipitation" in fact, abnormally low precipitation? If so, we could expect a substantial increase in precipitation at Hanford sooner than 2150. The five centimeter average annual recharge rate may be too low for a bonding analysis.

3.5.1.81

Under existing wind and temperature conditions, recharge may be quite sensitive to precipitation changes. Small increases in precipitation may be significant, more so if not spread evenly over time. Suppose the average annual precipitation results in small amounts of

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recharge. With a small percentage increase in precipitation concentrated in winter and early spring, actual recharge may increase dramatically.

3.5.1.21

The draft EIS looks at the long-term average annual recharge as the important variable in recharge considerations. That recharge results from a postulated 30.1 centimeters of average annual precipitation. This figure is used to model ground water recharge and radionuclide movement. Looking at a steady precipitation and recharge rate may not be appropriate. In other areas of geological and hydrological sciences, the anomalous event often has a much higher than average impact. This may be true for recharge and radionuclide movement to the water table.

Suppose, under the "wetter climate" scenario, twice the current precipitation, or 30.1 centimeters, is the average precipitation. Some years will have twice the average. If the average results in five centimeters per year of recharge, twice the average may well result in five or ten times the average annual recharge.

This large volume of water may dramatically accelerate the solution and transport of radionuclides. An analysis of recharge and radionuclide transport should be done. It should use precipitation and recharge figures that better reflect the real hydraulic system.

3.2.6.1

34. Population Dose - The draft EIS analyzes the dose persons in the Hanford area get by eating fish caught in the Columbia River. It spreads that dose evenly among the local population. And, it compares it to the background dose result. It then concludes that no significant health effects will result. What is the size of the fishing population from which that dose inference should be drawn? How would this analysis turn out in the Portland area? Is the dose dependent upon the species of fish being considered?

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The data may need to be looked at in other ways. Would the quality of life anywhere between Hanford and Astoria decrease because of waste disposal? Does disposal under any of the scenarios require any person to change their use of the Columbia River? Or use of foods taken from it? The question is not dose distribution over large populations. The question is changes in the quality of life. Will the river ever have to be restricted for recreation? Drinking water? Irrigation? What leakage/recharge conditions at Hanford would require downstream restrictions? How likely are these to occur? This should be shown for each disposal option.

3.2.6.1

Oregon relies on the Columbia River for irrigation. Under any of the waste disposal options, will radionuclide concentration in irrigated soils ever produce food that is not safe? What leakage/recharge conditions would produce such a result? How likely are they to occur?

35. Barrier Performance - Annual precipitation is used to evaluate barrier performance. Data that show how that precipitation was distributed through time should be in the draft EIS. Precipitation will not be the same each year.

3.5.1.81

Functional Failure: A functional failure could affect 50 percent of the area. But, it does not seem likely that recharge through the barrier could be as little as 0.1 centimeters per year. Consider the "wetter climate" scenario. In some years there will be much more than the average 30.1 centimeters of precipitation. Most of that likely will fall when evapotranspiration is low. A bonding analysis requires substantially greater recharge - perhaps up to five centimeters per year on the average. Some years would have five to ten times that amount.

3.5.1.91

36. Hanford Wells - Wastes must be disposed without risking radionuclide movement to the water table through well bores. Are exact locations of all wells ever drilled on the Hanford Reservation known?

3.5.3.7

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SPECIFIC COMMENTS

Page

3.1.6.1 1.8 The hazards from chemicals listed in Table 1 Volume 1 should be described.

1.13 The draft EIS uses these phrases:

- "...most of the defense wastes will go to a geologic repository.
- "The remainder will be stored near surface:
- "The bulk of the waste, containing small quantities of C-14 I-129...
- "...is low-level waste and would be made into cement-based grout."

4.1.18 Imprecise words like "most," "remainder," "bulk," "small quantities," and "low-level" should be defined. Or, actual figures should be stated.

1.17 Short-term risks and costs of retrieval of single shell tank waste should be described.

3.1.4.6

1.19 In several places, the draft EIS states that more environmental protection will be considered if needed. It is not clear what additional environmental protection is to be considered or what conditions would prompt this consideration.

4.1.19

2.2 The draft EIS states that TRU Contaminated Soil Sites consist of ". . . french drains and reverse wells . . ." The radioactive material pumped into wells, the levels of contamination and intentions for further use should have been described. Also, the likely action if more environmental protection is needed should have been stated.

3.1.3.18

2.3 Decontamination and decommissioning wastes were excluded from the proposed options. These should have been included. They should be described as part of all the waste to be disposed.

2.3.1.14

The draft EIS states that further NEPA review is anticipated to support other specific activities before their implementation. The activities which may require NEPA review should have been listed.

2.3.2.3

The draft EIS states: "Current storage practices will continue while research and development (R&D) is underway." Cribs, french drains, reverse wells, ditches and trenches, should not be used pending further R&D.

2.2.10

3.2 The draft EIS should have described all defense-related wastes on the Hanford site. It also should have covered the specific wastes which are not being considered for this EIS.

2.3.1.14

3.3 Z plant - waste did contain "low concentrations" of plutonium and other TRU and was high in metallic nitrates. This waste was discharged via cribs to "soil columns". Definitions of "low concentrations" or the actual data should have been provided in the draft EIS.

3.1.3.19

3.9 The draft EIS states that the definition of TRU contaminated soil sites is based on characterization data that show TRU concentrations to decrease rapidly at increasing depth. Data should be provided to support this statement.

3.1.4.26

The draft EIS states: "Waste in TRU sites is considered disposed of (sic). The sites are being reviewed to determine whether further action is warranted." Further anticipated action should have been described.

3.1.3.18

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The draft EIS talks about an unplanned release in section 3.2.5. Information should have been provided on the details and consequences of this release.

3.10 The draft EIS states that in those instances when only total TRU is known, 100nCi/gm is assumed when average TRU concentration in the site exceeds 10nCi/g. The number and description of the sites to which this will apply should have been included.

3.1.3.2

3.13 We are quite concerned about the presentation of single shell tank waste removal options. It seems clear to us that much research can be done on more cost effective removal. Such could produce a less costly option for Congress to consider.

3.1.4.5

The mining process described in the draft EIS is difficult and expensive. The draft EIS says sluicing single shell tanks...can be done if visual inspection and the presence of drainable liquid indicates that the tank is sound. (Appendix B.) This section should have included an option for sluicing of the 123 "non-leaking" tanks. Also, the options should have been developed to the extent that reviewers could determine which is the best choice for the single shell tanks. Points which should have been considered include:

3.1.4.5

- Closed-circuit, or nearly closed-circuit sluiced mining equipment. Such a technique limits water use. Water that is used is quickly suctioned away.

- Sealing the soil around the single shell tanks with a resin to prevent further water release during sluicing operations. This could further stabilize soil contamination below tanks that have leaked.

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Insoluble metal compounds reduce efficiency of waste loading in glass. This problem is solved by removing these materials. This is an involved and expensive process which will produce more low level waste. At Savannah River, USDOE used methods other than vitrification to stabilize tank wastes. The draft EIS should have described other means of stabilizing waste.

3.15 The draft EIS states that wastes containing 100 nCi/gm TRU contamination require disposal in a designated disposal facility for TRU wastes. This contamination value was recently changed from 10 nCi/gm to 100 nCi/gm. "Residues from leaks" does not ..."qualify as TRU contaminated soil sites . . ." The draft EIS should have given the actual activity of residues from leaks.

3.1.4.26

3.18 The draft EIS states that 45 percent of TRU waste was reclassified based on "engineering judgment and historical records". It also reflects the change from 10nCi/g to 100/g. The draft EIS does not justify this change.

2.4.1.8

3.24 The draft EIS says that wastes that are difficult and/or hazardous to retrieve will be left in place. Difficult retrieval does not justify this approach.

3.3.2.5

4.8 Hydrology - Section 4.3 (Seismology) states that seismic activity and related phenomena are not believed to be plausible events that might directly release waste. What is not addressed is the possibility that seismic activity might disrupt the integrity of a deep repository. That could create vertical conduits and allow the release of contaminated waters to shallow aquifers. This needs to be addressed.

3.3.1.11

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Section 0.4.3.1 discusses the nature of groundwater modeling as an exercise in averaging data. That is converse to "field modeling". The latter must also consider unique events or unique characteristics within the subsurface. Any modeling scenarios or conclusions based merely on average lithology or average rates will not properly consider the unique course of groundwater transport. It is imperative that any final document properly treat the question of unique lithologies and most rapid transport and corridors. The document mentioned this conceptual problem. It does not pose a solution. Solutions might involve any of three strategies:

a. collection of immense amounts of field data;

b. statistical refinements of scenarios using data about relevant variables; or,

c. field calibration of any completed model to check for accuracy.

Any conclusions of the final EIS should be checked with some kind of field calibration technique.

3.5.6.1 In the scenarios, infiltration rates of 5 cm per year seem to be used in most of the calculations. This is done although the chances of up to 15 cm per year are mentioned. Viewing the sites in terms of a 10,000 year time frame, one must consider changes of climate as a possible problem. Climatic changes should be cranked into the scenarios. Some sort of probablistic statement should be made of the odds of having greater than 5 cm per year infiltration. This is significant because rates of groundwater flow vary widely with different infiltration rates.

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The draft EIS seems to use the supposition that wastes that reach the Columbia River no longer are a concern because of dilution. There is no discussion of concentration of radioactive material reaching the river or of dilution factors when it enters the river. The assumption appears to be that the dilution is so great that there is no problem. If this is so, it should clearly be stated. If the assumption is not valid, then we need discussion of the concentration and deposition of the radioactive elements in sediments up and down the river. We need to know if layers of mud in various parts of the river could become highly radioactive. 3.5.4.5

4.10 Dams on the Columbia River upstream of the Hanford area are given credit for reducing the likelihood of floods like those of the past 57 years. Dams have a finite life span -- which may be short compared to the disposal period. Without dams, natural river forces could alter the river bed. This alteration eventually could encroach upon the disposal site even if it is on the 200 area plateau. 3.5.6.6

4.28 The draft EIS states: "The Hanford site serves as the spawning area for more than one-third of the fall Chinook Salmon in the Mid-Columbia." It should have expanded on and explained the protection policies for Chinook, and threatened and endangered species (Section 4.6.3) within the Hanford site. It should have explained how the area will be affected by the proposed options. Also, the draft EIS should have stated potential threats to these species. 3.2.4.2

5.6 Has the population dose for non-contact handled TRU waste shipments been evaluated?

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5.28 The draft EIS states that most ecological impacts from in-place stabilization and disposal of all waste classes would be minimal because much of the area under consideration already has been disturbed. It does not explain what additional impacts are predicted. The word "minimal" has been used. It is not clear what this means. What group of biota will be affected most? Plants, wildlife, birds? 3.3.3.2

Additional references on ecological impacts should have been included if they are available.

5.34 It is stated that, by comparison with wastes disposed on the 200 Areas plateau, the 300 area waste sites contain "minor" quantities of TRU waste. "Minor" should be defined. Or, actual figures should have been given. 3.1.1.4

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Waste Site Descriptions and Inventories

It is not clear how the supernatant pumped from the single shell tanks is to be disposed. There is no description of the levels of radioactivity in this liquid. 3.1.4.10

Details of the number of single shell tanks which may be leakers was given. But, more information on these tanks is lacking. Such includes the Curie content of the tanks and if the tanks continue to corrode after the supernatant has been removed. 3.1.4.11

No details were given on the overall condition of the wastes in single shell tanks. Such would include how many tanks have not been dehydrated. 3.1.4.12

Justification is needed for disposal of supernatant and sludge washes in grout. 3.1.4.13

Does radiolytically-produced gas cause problems in vitrified waste? 3.1.8.15

What will be done with the double shell tanks when they are emptied? 3.1.4.33

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Appendix C

Hanford Waste Vitrification Plant

3.1.8.9 We believe the vitrified glass form to be an acceptable and workable waste processing option. It has the added advantage of much international involvement to add to our review and experience.

Appendix C seems to concentrate on describing feedstock for the vitrification plant as currently generated waste, or double shell tank waste. The draft EIS should include a discussion of the known and suspected differences among these wastes in the single shell tanks. If process changes or additions are needed to handle single shell wastes, such must be in the analysis. To do otherwise is to convince the public that there is no real option to remove and process these wastes.

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Appendix D

Transportable Grout Facility

Grout treatment of liquid waste streams is far better than soil disposal in cribs. 2.2.10

The final EIS should discuss the expected concentrations of radioactive isotopes in the liquid feedstock. It should also discuss the expected isotopic composition. These obviously will be a trade-off between how much radioactivity is concentrated in vitrified waste, and how much cannot easily be recovered. That which cannot easily be recovered and concentrated presumably will comprise much of the grout facility feedstock.

Research is needed on acceptable mixes of tramp chemicals in the grout, and their effect on the final waste form. Such research should concentrate on the effects of potential complexants. These include the effects of flouride and organics on the mobility of long-lived components of the grout, such as TC-99 and I-129. An account of planned research should be in the final EIS. 3.1.8.6

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Appendix F

Method for Calculating Radiation Dose

3.5.5.5 The dose calculation methods appear to be supported by several cross-checks with other computer codes. The techniques appear to be appropriate. However, it would have been more appropriate to use the newer ICRP-30 dosimetry model rather than the older modified ICRP-2 model.

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Appendix H

Radiation Doses to the Public from Operational Accidents

The upper bound releases postulated likely are conservative.

3.4.2.24 USDOE will need precise planning to coordinate any of the waste recovery options. USDOE and contractors need plans for internal emergency response. All holders of major USNRC and state radioactive materials licenses are required to have such planning.

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Appendix I

Analysis of Impacts for Transportation of Hanford Defense Waste

3.4.2.23

RADTRAN II, is a useful generic transportation code. But, it may be too general. RADTRAN II should be modified to allow for route-specific analysis of accident probabilities and population exposures. It would be more reassuring to the public to know that the transport impact was calculated for citizens who live along the actual rail or truck routes.

The population dose potential at stops or in switchyards is a large fraction of the total dose in any routine shipment. Consideration should be given to limiting the time the truck or train is stopped.

If Table I.10 is correct, the worst case man rem from transport activities is 85. Given the range of latent cancer fatalities (LCFs) in Appendix I of 100 to 1,000 per million man rem, the range of LCFs would be about 0.01 to 0.1. On page I.23 the draft EIS states that under normal transport conditions, about 1 percent of the LCFs would result as compared to LCFs resulting from natural background. The figure of 1 percent seems to be a vast overestimate of the actual calculated risks.

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Appendix M

Preliminary Analysis of the Performance of the Protective Barrier and Marker System

Table M.7 suggests that for fine soils underlain by coarse, clean basalt cobbles a balance between evapotranspiration and precipitation prevents leakage through the barrier. However, in each case, at equilibrium, there is enough stored moisture in the soil to saturate almost the entire soil column even if the porosity approaches 50 percent - which is totally unreasonable. If this interpretation of the data and Table M.7 is correct, why is there not leakage downward out of the soil layer and into the basalt cobbles? 3.5.1.99

If the data in Table M.7 do represent nearly maximum moisture storage in the soils, then leakage through the soils must be assumed. If that is correct, then the calculations of movement of radionuclides to the "accessible environment" must reflect transport not only by diffusion, but also by advection.

The upper surface of the engineered barrier projection is above grade. Wind erosion is an obvious factor that must be evaluated. To think that the surface would not change in 10,000 years is not realistic. 3.5.6.38

Stabilizing the surface with plants may help. But, this raises other questions over long time spans. Precipitation is not steady. Some plants will die during drought. As the roots decay, they leave open vertical passageways for water to percolate through when precipitation increases to, or beyond, average. In humid climates this may not be a problem. In arid climates, such as Hanford's, plant mortality may be a factor. 3.5.1.84

The evaluation in Appendix M suggests that if precipitation increased in the Hanford area, deeper rooted species would invade the barrier soils. That would cause more evapotranspiration. But, given the relatively 3.5.1.84

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3.1.5.84 shallow soils, such species may not have enough moisture to survive the dry years. The result may be open pathways for water to percolate through the barrier soils when precipitation returns. This should be considered in evaluating barrier performance.

3.5.6.14 Several possibilities have been looked at to analyze a functional barrier failure. It likely is not prudent to think in terms of a single event. Hybrid events are more likely. Wind erosion could remove some of the barrier soil. Then might come a wetter climate, perhaps glaciation,

3.5.1.32 lower temperature, and evapotranspiration. Ten thousand years is too long to assume that only one process will affect the barrier.

3.5.1.84 The engineered barrier is designed to keep roots and burrowing animals away from the waste. But, the soils may be ideal habitats for such animals. Burrows could make vertical movement of water through the barrier soils more likely.

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Assessment of Long-Term Performance of Waste Disposal Systems

Table R.1 lists the events that may have a potential impact on the waste disposal systems. Of these 32 events, eight were judged to have sufficient probability and/or consequence to warrant further analysis. 3.5.6.36
Some of the events (e.g., diffusion, terrorism, warfare) were not discussed at all. Some discussion of each of the 32 events should be in this appendix. Estimates of the probabilities and/or consequences of all events should be given so the reader can judge the relative impact of each event. A reader can then judge whether the eight chosen for detailed analysis are the most significant events.

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PUBLIC COMMENTS

1. ENVIRONMENT AND IMPACTS

3.3.5.2 - All of the disposal alternatives considered should be in the draft EIS.

2.2.14 - Some persons believe that the eventual choice of the commercial repository will affect the defense waste disposal options.

3.3.5.1 - The public voiced frustration about making value judgments in a process that involves complex scientific/engineering research.

3.5.5.20 - A worst case human health impact scenario should be evaluated.

- Groundwater contamination risks specifically should be outlined.

3.5.6.1 - The draft EIS should consider the effects of long-term, unforeseen environmental changes such as those similar to the rising of the Great Salt Lake.

3.3.5.1 - The reliability of long-term predictions is suspect.

3.5.6.1 - The final EIS should evaluate the effects of possible global climatic changes.

2. TRANSPORTATION

Container integrity.

3.4.2.12 - How can we be sure testing on the shipping containers was complete and adequate?

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Accident probability.

- Worst case accident analyses were not included in the risk assessments. 2.3.1.7

Pre-notification.

- The final EIS should provide details about waste shipment notifications to municipalities. 3.4.2.2

How well are regulations enforced?

- There has been concern in Oregon about truckers who violate transport regulations. How can the public be confident that drivers of trucks carrying radioactive wastes will do so safely?

How reliably are regulations enforced?

- Radioactive shipments are regulated by the U.S. Department of Transportation (DOT). However, there are not enough DOT inspectors to ensure regulation compliance.

Security of shipments.

- With terrorism increasing in the world, how will USDOE prevent violent acts involving transported wastes? 3.4.3.7

Transport training.

- Truck drivers should be trained on the hazards of radioactivity and know how to deal with any situation which may arise enroute.

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Training to handle accidents.

3.4.2.26 - The waste shipments are the responsibility of USDOE. People along the transport routes must have training to handle accidents. USDOE should provide resources to accommodate that training.

Routing.

3.4.2.3 - Concerns were raised about the routing of the shipments, especially along interstate highways that pass through highly populated areas. The final EIS should discuss states' rights in laying out the routes.

Adequate emergency preparedness.

3.4.2.26 - Accidents will occur with trucks carrying wastes. Provisions must be in place to respond to accidents.

Have weather hazards been considered?

3.4.2.2 - Waste shipments will occur during all types of weather conditions. The draft EIS does not factor in increased transport risk due to bad weather.

USDOE has not made a detailed analysis of truck accidents on I-84 - particularly on dangerous stretches east of Pendleton.

3.4.2.26 The burden of emergency responses to a transport accident falls upon small, mostly rural communities. The draft EIS appears, by inference, to rely on that response to an accident. That is "not acceptable."

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Escorted shipments should be addressed in the final EIS cost analysis.

Local emergency response agencies should have proper equipment and training to handle an emergency involving radioactive materials. 3.4.2.26

Transport drivers should be certified to be able to properly respond to a highway mishap.

Trucks and shipping containers should be inspected with extraordinary care. 3.4.2.12

- In 1985, a truck carrying low level waste was involved in a minor accident on I-84/Cabbage Hill, east of Pendleton. The truck was later driven to and parked at a local truck stop. Although there was no spill, the parked truck may have been a hazard. In such cases, or when road conditions are too severe for travel, trucks should have a 'safe haven' for lay-overs.

- Despite USDOE assurances (via brochures and videotaped test accidents) several persons claim casks used today have not undergone the same kinds of tests. USDOE representatives did not directly refute the statements. 3.4.2.12

Two persons said casks used today ought to be tested to destruction to verify safety claims.

3. SOCIO-ECON ECOLOGICAL IMPACTS

- Technologies are not available for barriers, which are a part of each option. 3.5.1.57

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An option which does not include barriers should have been offered.

- Reservations were voiced about in-place stabilization due to lack of convincing data.
- Low incidence/high impact events should be evaluated.

3.3.1.2

- Concern was expressed regarding the high cost for geologic disposal of defense waste.
- The public is fearful that in-place stabilization would encourage the disposal of all defense waste in the Northwest.
- Oregonians are not willing to compromise the environment to save money. It is believed that in-place stabilization would result in such a compromise.

4. BUDGETS AND ALTERNATIVES

3.3.1.1

- Several persons voiced a preference for maximum use of geological disposal no matter what the cost.

3.3.4.2

- A Monitored Retrievable Storage (MRS) facility should be used while a permanent solution is being researched thoroughly.
- The percentage of waste that will be stabilized in-place for each option should be stated.

3.3.5.4

- All disposal technologies suggested need refinement. The level of funding necessary to develop a sound disposal technology should be included in the final EIS.

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5. GENERAL COMMENTS

- The public is not convinced that the issues of defense wastes and a commercial repository are independent. Resolution of either issue will have a strong influence on the other. 2.2.14
- The repository announcement on May 28 cast doubts on the credibility of public involvement in the defense waste issue. 2.2.14
- If Hanford is chosen as the nation's permanent repository, that decision will provide a strong bias toward keeping defense wastes at Hanford. 2.2.14
- USDOE's lack of credibility enhanced the question of whether public opinions really will be considered. 2.3.2.8
- Cumulative effects of defense waste plus spent fuel in deep geologic repository. 2.1.3

The draft EIS does not include the cumulative effects of commingling.

- Temporary solutions should be found. This would allow sufficient time for complete research and permanent long-term solutions. 3.3.4.2
- Adequacy of current and future containment techniques is a major concern.
- Because of the credibility issue, some of the public are skeptical of USDOE's health risk assessment. 2.5.5

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3.1.6.1 - The effects of chemical wastes on the disposal options should be described.

2.5.6 - Present and future defense waste production levels should be indicated in the final EIS.

2.2.13 - USDOE has safety standards different from others in the nuclear industry. But, USDOE claims to comply with NRC regulations even though they are not required to do so. If this is true, NRC should be invited to participate in this project to attest to USDOE's compliance.

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TO: R. A. HOLTEN/EIS
WASTE MANAGEMENT DIVISION
U. S. DEPARTMENT OF ENERGY

FROM: SUE WATKINS, MANAGER
PORT OF KENNEWICK

RE: DEIS, DISPOSAL OF HANFORD DEFENSE HIGH-LEVEL, TRANSURANIC AND TANK WASTES

DATE: AUGUST 6, 1986

This letter contains my comments on the referenced document as a member of the Northwest Defense Waste Citizens Forum, a citizen of the Pacific Northwest and an administrator of a small public entity in the Tri-Cities. The comments are intended to reflect information and input received while attending Citizens Forum (and "Alternatives" subcommittee) tours and meetings; while attending various other public workshops, hearings and meetings; and from personal meetings and conversations with a broad array of other citizens representing groups and/or themselves.

First and foremost, it should be noted that I support, and voted "for", the consensus opinion approved by the Citizens Forum on August 5, 1986 in Seattle, Washington. Although I do not necessarily agree with 100% of the document and would not necessarily similarly prioritize certain elements of the document, I do believe it is a sound, sincere and constructive opinion and fairly represents the sentiment of the "general public" of the Pacific Northwest.

I believe the proposed cleanup of Hanford defense waste should begin now. Where adequate information and technology exists to do so, action should be taken; where adequate information and technology do not exist, the related research and technological development should occur prior to making final decisions on certain methods of disposal. 3.3.5.3

As recommended by the Forum, DOE should proceed with geologic disposal of double wall tank waste, cesium and strontium capsules and retrievably stored TRU solid waste. Research, including characterization, and technology development should continue on the remaining waste forms, namely single wall tank waste, pre-1970 TRU waste and contaminated soil sites. I believe final decisions as to their ultimate disposal should be based on short and long term risks as well as the relative cost. It should be recognized that the ultimate disposal action for these waste forms may be on a case by case/site by site basis. It is imperative that detailed information on research results be made public as developed. Ultimate disposal decisions should be shared with the public and the public should be provided an opportunity to comment on the same. 3.3.5.3

While the points noted above are crucial, as a matter of reality, the Forum's "Finding Number Three" regarding consistent, dependable funding may prove to be the single most difficult issue to accomplish. I agree with the "pay as you go" concept involving setting aside a percentage of the defense nuclear production budget to cover waste disposal. Production of nuclear defense material <u>includes</u> responsible handling of all elements of the production cycle; disposal of waste is not excluded from that cycle. Hence, the corresponding funding should be assured. Likewise, the public should consider the cost of waste disposal in relationship to the benefits derived and the amount of acceptable associated risk. 2.2.9

The Citizens Forum has appropriately limited its scope of comments and recommendations to Hanford defense waste. The group, admirably but not easily, has separated other currently prevalent nuclear issues from the necessary focus of the DEIS. However, the unfortunate DOE announcement to delay further

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2.1.8 3.3.2.1 siting work for the second eastern United States national repository has caused the repository issue to be a consideration of this DEIS. Charges have been made that the waste volumes associated with the geologic disposal alternative make that alternative no longer viable. Real or perceived, DOE must satisfactorily address these charges. In addition, I urge DOE to reverse the second site decision portion of its May 28th repository announcement. Not only has it cast a shadow on this DEIS, perhaps more relavent, it appears to be grossly unfair to the citizens of the western United States.

3.3.2.1 The Forum has also recommended, and I support, a focused research program for dealing with the disposal of the more difficult to retrieve waste forms. While it is not a Forum consensus, it is my personal belief that the highest research priority should be given to in-place stabilization and isolation technology in that it will be utilized to some degree in every possible scenario. Further, in the event it can be demonstrated that in-place stabilization and isolation will meet the criteria of 40 CFR 191, both risk and cost considerations of this disposal method will far outweigh the alternative for removal and geologic disposal. In this eventuality, the in-place alternative should be chosen.

3.5.1.2 While this personal view involves research and technology development of the entire in-place stabilization system, I believe the single weakest point of the DEIS in the public's view is the method for protecting the groundwater from contamination; specifically, they are concerned with the viability of the protective barrier system. Without question, additional research is necessary in this area. I suspect it is likely that significant applicable information may already exist from years of research and development in the

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agricultural field. Existing data from research on irrigation, tillage, chemical fertilizer, etc. should be explored and presented where applicable. Research priority should also be given to alternative methods of removing single wall tank waste and contaminated soil in the event acceptable in-place protective measures cannot be demonstrated. 3.5.1.8

Although not included in the Forum's document, it is also my personal belief that a stronger research emphasis should be placed on the economic value of some "waste". While it is currently recognized that certain elements in the waste are valuable resources, minimal importance seems to be placed on their safe and economically feasible separation and recovery for commercial purposes. It should be recognized that productive uses of waste can be beneficial inasmuch as this kind of utilization has the potential to reduce waste volumes, preserve depleting natural resources and provide additional beneficial nuclear/chemical applications. One should not lose sight of the fact that 50 years ago this type of waste did not even exist. The possibility that technology resulting in productive uses for waste will be developed within the next 25 years is enormous. 2.5.8

The Forum's statement also contains numerous specific comments, concerns and recommendations about the DEIS. Although I do not personally feel strongly about all of the issues and do not have the technical background necessary to verify the accuracy of all stated issues, I can, and do, endorse the issues as genuine public concerns. Regardless of the complexities involved or any DOE perception of irrelevancy, all issues should receive complete responses to the degree possible. 2.3.2.12

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This comment letter would not be complete without sharing my thoughts about the public process being utilized in this defense waste project. To do so I must depart from restricting my comments to just the DEIS public process.

Creation of the Citizens Forum is an acknowledged "experiment" for improving public awareness and input. If the experiment is considered successful by DOE, and if the desire for public awareness and input is a consistent and sincere policy goal throughout the USDOE, then recognition of historical weaknesses in that regard and commitments for ongoing public programs by DOE are necessary.

The most frustrating difficulty I experienced as a member of the Forum was lack of knowledge about defense waste and other nuclear subjects--my own lack of knowledge as well as the general public's lack of knowledge. Out of lack of knowledge comes suspicion, inability and/or unwillingness to separate and logically deal with issues, loss of perspective and fear of personal and future generation harm. These problems arise with <u>both</u> "pro" and "anti" sides of defense waste and other nuclear issues. Extremism develops on all issues and fragmentation occurs among citizens.

While the sincere and considerable efforts put forth by DOE to improve public awareness and participation for this project are a huge step in the right direction, there is only one solution to the problem over the long term -- public education. Participating in the Forum gave me, and I believe other Forum members, a tremendous opportunity to receive a very large amount of firsthand, balanced information in a very short period of time. This kind of intensive education is

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obviously not possible for the vast majority of the general public. Nevertheless, the public has the right and the desire to obtain enough information to be able to judge for themselves the benefits and the risks of their Government's actions.

Therefore, for the short term, I urge DOE to continue efforts used in this defense waste project with regard to workshops, hearings, public meetings, citizens forums, etc. For the long term, I urge DOE to consider ways to provide the public balanced, fair educational opportunities about nuclear matters. Educational opportunity should provide at least a fundamental understanding of nuclear production. Providing a basic understanding is not intended to mean propagandizing, it should include consistent opportunities to learn about beneficial nuclear applications (medical, energy, defense, food processing, etc.) as well as the negatives such as resulting risks and other problems that clearly exist. Future bias and disputes will certainly still occur but confusion and public division on the scale we are experiencing today will be greatly reduced. An improved level of public consciousness can only benefit our country over the long term.

2.3.2.8

Self-determination is this country's history and will be its future. Let that self-determination, whatever it may be, be the result of decisions made from knowledge not from fear fueled by a lack of knowledge.

In closing, I thank the USDOE for the special courage and effort it has taken to create the Citizens Forum. I especially thank DOE-Hanford management, staff and private contractors for the long hours and extraordinary patience demonstrated during this project. With some trepidation, but with a larger amount of optimism for success, I look forward to the balance of this defense waste project.

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CITY OF VANCOUVER, WASHINGTON
City Hall, 210 East 13th St. - P. O. Box 1995
Vancouver, Washington 98668-1995

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August 4, 1986

Department of Energy
Richland Operations Office
Attn: R. A. Holten
EIS Waste Management Division
Richland, WA 99352

Dear Mr. Holten:

This is to inform you that on July 28, 1986, the city of Vancouver passed Resolution M-2512 regarding nuclear waste management and the siting of a repository at Hanford in Washington. A copy of the resolution is enclosed.

Sincerely,

Carol C Hansen

CAROL C. HANSEN
Management Analyst

C6080401/CCH:BJC:NKW

Enclosure

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RESOLUTION NO. M- 2512

A RESOLUTION supporting Washington State's cooperative stance toward the U.S. Department of Energy's commitment to improved nuclear waste management at Hanford; urging thorough planning be carried out to insure Hanford defense wastes are disposed of safely and effectively, and that all decisions regarding the possible designation of Hanford as the site for a nuclear waste repository be made on sound technical data and not political expediency.

WHEREAS, this is a high priority "quality of life" matter important to all citizens of Vancouver, now and in the future, and;

WHEREAS, the City of Vancouver provides water services to approximately 100,000 people in the urban area of Clark County, and;

WHEREAS, this water is supplied totally by ground water and a significant recharge effect from the Columbia River could be relied upon for future demand, and;

WHEREAS, any contamination of that water would have disastrous effects on the entire urban area of Clark County, and;

WHEREAS, we and all citizens must ultimately rely on the technical analysis performed by the experts and decisions made by our elected officials;

(no comment identified)

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NOW THEREFORE

BE IT RESOLVED BY THE CITY OF VANCOUVER:

Section 1. The Vancouver City Council urges a
3.5.4.2 thorough study of the potential impact on the Columbia River of any nuclear wastes.

Section 2. The council also supports Washington State's cooperative stance toward the USDOE and urges its commitment to improved waste management at Hanford.

Section 3. The council urges recycling of dangerous material to the maximum extent possible, thereby minimizing the amount of material that will have to be
2.5.8 stored for an extended period.

Section 4. The Vancouver City Council opposes the designation of Hanford as a permanent site for the storage
2.1.1 of nuclear wastes until the geological and technological questions are satisfactorily answered.

ADOPTED at regular session of the council of the City of Vancouver, this 28th day of July, 1986.

BRUCE SMITH, Mayor

Attest

H.R. Shorthill, City Clerk
By: June Rosentreter,
Deputy City Clerk

Approved as to Form

Jerry F. King, City Attorney

C6072301/CCH:MW/1

RESOLUTION - 2

HEAL
Hanford Education Action League
SOUTH 325 OAK STREET, SPOKANE, WASHINGTON 99204 • (509) 624-7256

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August 6, 1986

Mr. Rich Holten
EIS Waste Management Division
U.S. Department of Energy
Richland, WA 99352

Dear Mr. Holten:

The following are the formal comments of the Hanford Education Action League (HEAL), a non-profit citizens group of 500 members chartered in the state of Washington, on the March 1986 draft environmental impact statement concerning the disposal of Hanford defense wastes.

First things first. There is ever the danger, in the dry prose of contemporary public policy, that the correct words are not used to describe the lasting value of land and waters that will be the environment for future generations and civilizations long after the last federal paycheck from Hanford is cashed. The danger is that by shortsight we trivialize what is really *precious* and rush to solutions that seem plausible today but are, in the true context of time, illusory and harmful. We suspect this is true of this exercise.

The extensive environmental contamination at the Hanford site resulting from our nation's nuclear weapons program is a sad chapter in the history of this country and of our region. Hanford was not foreordained to be treated this way. It involved conscious decisions by people in authority who had the opportunity to appreciate the risks and consequences of operating the plants at Hanford. Decisions were made, in secret, that have effectively rendered parts of the Hanford site unfit for human habitation for untold generations to come. The lack of concern for those who live near the site and lack of custodianship for the Hanford environment has often been contemptible. The record gives us profound doubts that the Department will be willing to invest the resources necessary to adequately mitigate harm from the Hanford wastes the moment Hanford becomes less important to the nuclear weapons assembly-line the agency is charged with running. 2.5.5

In the course of the past few months members of our group have had the opportunity to meet and work with employees of the DOE on the problems posed by the Hanford wastes. By and large we respect their

STEERING COMMITTEE — Allen B. Benson, Ph.D., Chemistry — William Harper Heuti, Ph.D., Clergyman & Research Chemist Liz Christensen, Homemaker — Jack T. Hoheit, M.D., Physicians for Social Responsibility — Gayle Lindeman, Editor of Future Times Amy Mickelson, Civil Engineer — Kendall Feeney, Concert Pianist & Journalist — Jeffery Coulter, Businessman — Larry Shook, Journalist J.R. Wilkinson, Surveyor & Writer — James P. Thomas, Public Issues Consultant — Al Mangan, Retired Federal Employee

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sincerity and individual qualities. What we fear, for our sake and the sake of our children's children, is that the institution fails them as surely as it fails us.

Nothing in the history of the Department and its predecessors encourages people of Washington state that a nuclear weapons bureaucracy is capable of regarding Hanford as anything other than a place where it gets plutonium. The burden is upon the Department to demonstrate otherwise. It can begin by providing meaningful consideration to our comments, and providing solid, comprehensive answers to our questions.

2.3.1.14 **Comment #1: The draft statement is not a comprehensible portrayal of the magnitude of the Hanford waste problem.**

HEAL takes strong exception to the organization of the draft. The scope is far too narrow as it deals only with tank wastes and transuranic wastes. There are hundreds of other disposal sites (cribs, trenches, ponds, etc.) at Hanford that are not included in the draft and which should be. From our examination of past Hanford documents we know these disposal sites contain significant amounts of harmful radionuclides and, in many instances, toxic chemicals as well. To put them outside the scope of this document makes no sense and certainly raises the question about whether the Department is being candid with the public about the extent of environmental contamination at Hanford. In the questions we've attached we ask that, as part of this exercise, these facilities be identified so that the *full* environmental impact of nuclear waste disposal and storage at Hanford is addressed. The environmental impact statement is simply incomplete and unacceptable without this information.

2.5.6 **Comment #2: The draft statement wrongly ignores a discussion of the need to generate future wastes at Hanford.**

The draft's authors have somehow concluded that no discussion of the need to continue plutonium production at Hanford--and hence the continuation of high-level waste generation--is necessary. Every "option" considered in these pages assumes that plutonium production will continue unabated, at least until 1996, along with the commensurate accumulation of large volumes of nuclear waste. This is simply outrageous. It assumes there are no public policy choices to be made in which the alleged need for plutonium production is considered together with the long and short-term risks to human health and the environment this document is supposed to address.

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HEAL rejects this mindset in the strongest terms. Evidence in recently released Hanford documents strongly suggests scores of Washingtonians may have died or become ill as a result of emissions from past plutonium production activities at Hanford. Yet the government never so much as informed these people they were at risk. To suggest that it is not necessary to discuss the need for continued plutonium production activities at Hanford is to continue to deprive those living downwind and downstream of the human dignity and the basic rights our nation promises *all* its citizens.

In the final environmental impact statement DOE should consider the need to dispose of the existing Hanford wastes and the need to generate and dispose of future Hanford wastes as two separate issues. HEAL agrees existing wastes need to be disposed of in order to protect public health and the environment. However, we profoundly *disagree* that the need to continue to produce plutonium and generate additional wastes is self-evident. It is not. To suggest that it is self-evident is simply Orwellian in light of the current magnitude of the U.S. nuclear arsenal. HEAL calls upon the Department to explain, in precise terms, how the government concludes that the benefits of continued plutonium production are worth the risks to present and future generations who live and, we hope, will continue to live downwind and downstream from Hanford.

2.4.1.1 **Comment #3: Disposal alternatives and continued operations at Hanford should comply with all applicable laws governing the handling and disposal of radioactive and non-radioactive hazardous wastes.**

HEAL could not agree more with Washington Governor Booth Gardner's demand that DOE leave "the shadow of the 1954 Atomic Energy Act exclusions and (move) into the sunshine of current federal legislation." The Atomic Energy Act, because it arbitrarily exempts nuclear weapons plants from public health and environmental laws that apply to all other facilities, is well overdue for the dustbin of history. The suggestion that the Hanford facilities must continue to operate unlicensed and free from state and federal laws for national security reasons is both dangerous and unfair to those put at risk.

Specifically, with regard to the disposal plans discussed in the draft EIS we request DOE reverse its position (Volume 1, page 6.10) that the Hanford wastes "are not subject" to requirements of the Resource Conservation and Recovery Act of 1976. The assertion of the Atomic Energy Act exemption here is totally without merit. While we disagree with Congress's rationale in adopting the AEA, the clearly stated reasoning for this bad law was to promote national defense. There is no conceivable

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relationship between the disposal of the Hanford wastes and national defense.

3.3.2.1 **Comment #4: The safety of in-place disposal of tank wastes has not been demonstrated.**

No matter how many barriers and signs, we fail to see how in-place disposal of Hanford tank wastes is acceptable as a permanent solution, given the large amounts of long-lived radionuclides and hazardous chemicals that remain in the tanks. We will oppose any assertion by the Department that the wastes in these tanks is not of the high-level variety and any premature action that would further complicate the removal of these wastes for eventual geologic disposal. The only conceivable circumstances under which 3.1.4.30 in-place disposal should be considered is with licensing by the Nuclear Regulatory Commission, the states of Washington and Oregon, and the affected tribes.

Comment #5: The government should, without further delay, adopt a pay-as-you-go ethic to assure funding for the proper disposal of 2.2.9 **all wastes resulting from the production and separation of plutonium or other special nuclear materials at Hanford.**

The most important element of any plan to successfully dispose of the Hanford wastes is going to be money. It is frightening to think that DOE is having to rely on the annual budget process to develop the technologies and then implement disposal solutions. Here again, the double-standard: where commercial nuclear waste generators are mandated to pay into a fund to help assure adequate disposal, DOE continues to externalize these costs. Given that the minimum cost among the options presented still runs into the billions of dollars it is more than reasonable to fear that among the dangers lingering in the growing Hanford waste dilemma is a situation where solutions--whatever their merits--must be aborted because of a lack of budgetary commitment.

A clear message this problem sends to us and should be sending to Congress and the Department is the need to begin fully incorporating the costs of disposal into the costs of production. To the appropriations that lead to the irradiation of uranium at DOE production reactors the agency should pay a reasonable, additional sum into a fund that would be used for final disposal purposes. There is no reason the same ethic we've adopted for civil high-level wastes should not apply as well to those generated by the Department of Energy's weapons plants. Because high-level wastes at Hanford and Savannah River is generated in liquid form, the potential for harm is, if anything, much greater.

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Comment #6: The Department has used general terms and hypotheses in many instances where specific terms and actual experience are in order. 4.1.18

In the appendix dealing with transportation alone there are over 80 references to "probable," "likely," "unlikely," "hypothetical," "assumed," and similar words having no fixed meaning or content. To the extent such language is all that is available we must conclude, again, that continuing to add to the Hanford waste problem only compounds the risks we are asked to bear. But still there are instances the Department could do much better. Again, just to use the transportation appendix as an example, two of three hypothetical factors were known at the time the draft was being prepared. All proposed repository sites were known, thus the routes from Hanford to other proposed repositories were known. From this knowledge other information such as route specific studies could and should have been initiated and studied for inclusion in the draft.

In the discussions of possible waste accidents both in Chapter 3 and in Appendix H, it is very unclear what kinds of accidents have already occurred at the Hanford tank farms and other waste storage sites. This experience is clearly relevant to the forecast of accidents. In our questions we will ask the Department to provide a listing of accidents that have occurred on the Hanford tank farms.

Also, there is no valid reason--when addressing the future contamination of Hanford groundwater and the hazards this poses--to completely ignore existing contamination of the Hanford aquifer with long-lived radionuclides (plutonium-239, uranium, iodine-129, technetium-99, strontium-90, cesium-137) and hazardous chemicals. While we appreciate DOE's discussion of what it calls the "full garden" scenario where Hanford groundwater is used in the future for drinking water and irrigation, there's no valid reason to limit contamination of this water to hypothetical future releases from Hanford tanks. The water is *already* contaminated and, assuming continued migration from the vadose zone of amounts of the above-cited radionuclides and chemicals, will become more contaminated barring *any* additional pollution from Hanford tank wastes.

Comment #7: The Department should identify a valid "No Action" 3.3.4.1 **alternative for future wastes and identify a valid "environmentally preferable alternative" concerning the entirety of the Hanford wastes in past and future terms.**

HEAL believes the Department must, in keeping with the letter and spirit of the National Environmental Policy Act of 1969 (NEPA) identify the

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options that would result in the least possible environmental harm and potential risk. With so many of the proposed measures to secure the wastes described as "preconceptual" and like terms, clearly there is an inescapable connection between the amounts of waste and the magnitude of real and potential harm. It follows then that the Department should discuss the advantages of halting PUREX operations versus the disadvantages of operating the plant between now and 1996 and beyond. To clarify discussion of this "No Action" alternative for future waste generation, we recommend the Department properly assume that N-Reactor operations cease as well.

In terms of the entire waste picture the Department should include the "No Action" alternative for future waste generation in an "environmentally preferable alternative" including the entirety of the Hanford wastes.

Comment #8: The Department's timeline should favor development of the environmentally safest solutions regardless of short-term plutonium production campaigns or other political considerations. 2.2.1

While scientists employed by the Department of Energy and its contractors at Hanford may indeed possess the skills and expertise necessary to solve the Hanford waste problem we fear, as we have in the past, that their efforts are misappropriated to projects that are propelled more by political considerations rather than for their environmental and technical merits.

It is clear, for instance, that the generation and storage for any length of time of high-level waste in liquid form is not a good practice. This was recognized in Atomic Energy Commission regulations which stated that liquid high-level waste from fuel reprocessing be converted to a solid material within five years after reprocessing and that the waste be encapsulated and shipped to a federal geologic repository within five years after that. (See WASH-1297, "High-Level Radioactive Waste Management Alternatives," May 1974, page 6) We presume that although DOE has avoided complying with this regulation that there is, still, some motivation to mitigate the risks of high-level liquid waste storage. We also see that these risks will, indeed, escalate as PUREX continues to generate huge volumes of liquid high-level waste.

The solution we recommend to this immediate problem is to stop operating PUREX at least until DOE can comply with the above requirement, let alone justify the need the operate the plant in the first place. We expect DOE will ignore this recommendation. We expect PUREX will continue operating and that the liquid waste problem will escalate such that for waste management and public relations reasons DOE will be pressed to enforce a solution to this problem before the best solution can be readied and before

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the true ramifications of the solutions adopted (i.e. vitirification and grouting) are objectively understood. We fear that pressures to begin action toward disposal of the waste volumes generated by the ongoing plutonium production campaigns will compel DOE toward premature decisions that could be made more objectively and soberly. We fear bad decisions are more likely to occur under these circumstances and may, indeed, make worse the existing problems.

Recommendation #9: Bring current Hanford operations into compliance with all state and federal environmental protection and public safety regulations. 2.4.1.1

As noted above, HEAL does not believe that DOE's continued exemptions under the Atomic Energy Act are justifiable. The AEA presumes DOE is continually able to regulate itself. History disproves that misguided notion. 2.2.13

We are particularly concerned with the continuing discharge of liquid low-level radioactive and chemical wastes directly to the environment. Here again the AEC, recognizing the unacceptable risks posed by such disposal, called for an end to this practice more than a decade ago (AEC policy manual 0511). More recently (DOE Order 5820.2) DOE reiterated the unacceptability of this practice. Yet it continues with consequences such as the recent disclosure that strontium-90 from an N-Reactor disposal crib seeps to the Columbia River via springs where its concentration is measureable at hundreds of times in excess of Environmental Protection Agency drinking water standards. Disposal cribs at the Hanford PUREX plants continue to pollute groundwaters that are already contaminated over a 100 square mile area of the reservation between the plant and the Columbia River. 2.2.10

QUESTIONS

PLUTONIUM CONTAMINATED SOILS

1) What was the justification for the redefinition of TRU Waste as published in DOE order 5820.2 page 5? 2.4.1.8

2) Of the participating agencies involved in this decision which agency (EPA, NRC, DOE) first proposed the change? 2.4.1.8

3) Of the soil reclassified as low-level waste--containing between 10 nCi/g and 100 nCi/g of transuranics--how much is being considered for removal? If not removed, what will become of this soil? 3.1.3.2

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3.1.3.5 4) For each of the disposal alternatives discussed in the draft EIS, please list the volumes of tranuranic waste, and content by isotope, that would remain in place at Hanford.

3.1.2.8 **SEPARATED BYPRODUCTS**

5) When did the practice of leasing and shipping of encapsulated, separated byproducts (cesium-137, strontium-90) begin?

6) How many of these capsules have been shipped offsite to date?

7) Please provide the names and addresses of customers to whom capsules have and are being leased.

8) Please provide the locations to which these capsules have been shipped and the number of capsules shipped to each location.

9) Please identify the transportation routes in the states of Washington, Oregon, and Idaho upon which these capsules are shipped and the frequency with which these shipments occur for each route.

10) How long will the practice of shipping byproduct capsules offsite continue?

3.4.2.14 11) How many capsules have been returned for retirement to Hanford to date?

12) Please state specifically how returned capsules have been disposed.

13) Please identify the number, if any, of capsules disposed to Hanford burial grounds, and the remaining radioactivity of such capsules as of January 1986.

3.1.5.4 **LOW-LEVEL AND INTERMEDIATE LEVEL WASTE SITES**

14) Please list the active disposal sites for cooling waters, low-level and intermediate level liquid wastes.

15) Please provide, in tabular form, the following information.

3.1.5.6 a) Depth to water table beneath each site.
b) The number of the nearest monitoring well and its distance from the disposal site.

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c) The frequency with which the well is sampled and the constituents routinely sampled for.
d) Whether the well is co-monitored with the State of Washington.
e) Whether the well meets U.S. Environmental Protection Agency and State of Washington specifications.

16) Please provide, in the same or separate table, the following information. 3.1.5.6
a) The date of the most recent sample from each of the monitoring wells.
b) Compare sample results of specific radionuclides present to EPA drinking water standard.
c) Compare sample results of specific chemicals present to EPA drinking water standard.
d) Compare sample results of physical properties (ph, hardness, conductivity, suspended solids, etc.) to applicable EPA drinking water standards.
e) Please specify whether well has been sampled for potentially hazardous organic constituents (toluene, chlorinated hydrocarbons, etc. and, if so, compare results to applicable EPA drinking water standard.

17) For each active liquid waste disposal sites, please provide, in same or separate table the following information.

a) The volume of waste (gallons) discharged to the site through January 1, 1986.
b) The volume of waste discharged to the site during 1985.
c) Characterize the waste streams to the site by volume, radionuclide species, and concentration.
d) Characterize the waste streams to the sit by chemical, physical, and organic concentration, including ph, toxic metals, organics, nitrate, etc.
e) Please report on the inventory of radionuclides, by species, discharged to each site through January 1, 1986. Please adjust inventory to account for decay of radionuclides through January 1, 1986.

18) Please list the inactive disposal sites for cooling waters, low-level, intermediate-level, "marginal," and high-level liquid wastes? Please include in this listing all inactive cribs, ponds, trenches, French drains, reverse wells, and "organic graves" as described in HW-54599, April 18, 1958. Please, then, provide the following information in tabular form.

a) The dates of operation and the volume of waste (in gallons) discharged to each site.
b) The amount of radionuclides, by species, discharged to each site.

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c) The chemical composition and ph level of the waste discharged to each site.

19) For the inactive disposal sites requested above, please provide in the same or separate table the following information. 3.1.5.6

a) The depth to the water table beneath each site.
b) The proximity of the nearest monitoring well.
c) The frequency with which the well is monitored.
d) Whether the well is co-monitored with the State of Washington.
e) Whether the well meets U.S. EPA and State of Washington specifications.

20) For the wells monitoring the inactive disposal sites cited above, please provide the following information in the same or separate table. 3.5.3.22

a) The date of the most recent sample from each monitoring well.
b) Compare the sample results of specific radionuclides present to the applicable EPA drinking water standards.
c) Compare sample results for specific chemicals present to EPA drinking water standards.
d) Compare sample results of physical properties (ph, hardness, conductivity, suspended solids, etc.) to applicable EPA drinking water standard.
e) Please specify whether well has been sampled for potentially hazardous organic constituents and, if so, compare results to applicable EPA drinking water standard.

3.1.4.29 **SINGLE-SHELL TANK WASTES**

21) What are the inactive single-shell defense waste tanks at Hanford? Please provide in tabular form the following information.

a) The date the tank was constructed.
b) The dates the tank received wastes.
c) The plants from which the wastes discharged to each tank originated.
d) The inventory of organic and inorganic chemicals in each tank.
e) The inventory of heavy metals in each tank.
f) The inventory of radionuclides in each tank.
g) Whether the tank is known to have leaked or has been suspected of leaking. 3.1.4.26

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h) If tank did leak, please cite the volume known or suspected of having leaked. 3.1.4.26

i) Please specify whether or not the tank has been "blanked off" so that pumping or sluicing is no longer possible without retrofitting.
j) Please specify if the waste in the tank has been reclassifed as anything other than "high-level" and, if so, discuss the reasons for such reclassification.

22) For the single-shell tanks, please provide in the same or separate table the following information.

a) The depth to the water table beneath each tank.
b) The number of the nearest monitoring well and its proximity to the tank.
c) The frequency with which the well is monitored.
d) Whether the well is co-monitored with the State of Washington.
e) Whether the well meets EPA and State of Washington specifications.

23) For the monitoring wells deployed around the single-shell tanks please provide, in the same or separate table, the following information.

a) The date of the most recent sample from each monitoring well.
b) Compare the samples results of specific radionuclides present to EPA drinking water standards.
c) Compare sample results for specific chemicals present to the EPA drinking water standard.
d) Compare sample results of physical properties (ph, hardness, conductivity, suspended solids, etc.) to applicable EPA drinking water standards.
e) Please specify whether well has been sampled for potentially hazardous organic constituents and, if so, compare results to EPA drinking water standard.

24) Please specify the tanks, dates of episodes, and volumes of "liquid intrusion" (as discussed in "Assessment of the Surveillance Program of the High-Level Waste Storage Tanks at Hanford," Robert J. Catlin, March 1980, p. 68) into single-shell tanks at Hanford. 3.1.4.24

25) Has leaching of wastes from tanks occurred as a result of such "liquid intrusions?" If so, please specify episodes by date and nature of such leaching.

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26) What is the number of single-shell tanks where retrieval of waste for geologic disposal is consdiered infeasible? If any, please identify by tank number.

DOUBLE-SHELL TANKS

3.1.4.29 27) Please list the active and inactive double-shell waste tanks at Hanford and provide, in tabular form, the following information.

a) The date the tank was constructed.
b) The date the tank received wastes.
c) The facilities from which the tank received wastes.
d) The inventory of organic and inorganic chemicals in each tank.
e) The inventory of heavy metals in each tank.
f) The inventory of radionuclides in each tank.
g) The waste types, by volume, in each tank (i.e. drainable fluid versus salt cake and sludge.
h) Specify whether the tank currently receives self-boiling wastes.

3.1.4.16 28) What action did the Department of Energy-Richland take in response to the 1980 discovery at the Savannah River Plant of corrosive pitting in double-shell tanks under construction?

3.4.3.5 29) Please provide a listing and description of accidents (steam explosions in tanks, fires, accidental releases of radioactivity) that have occurred at Hanford tank farms.

SOLID WASTES

30) What are the active and inactive solid waste burial grounds at Hanford?

3.1.3.8 31) In tabular form, please provide the following information:
a) The radioactive inventory (decayed through January 1, 1986) at each burial ground.
b) The chemical (as hazardous waste or mixed waste) inventory at each site including the volumes of contaminated solvents in storage.
c) Please summarize exising monitoring practices, and other safeguards emplyed at these sites, comparing these practices with provisions for solid radioactive waste burial in 10 CFR Part 61, and regulations promulgated under the Resource Conservation and Recovery Act (RCRA) as amended.

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32) Please describe the status of the Hanford CERCLA program and include the number, location, and hazardous chemical inventories of sites this program has been able to identify thus far.

COLUMBIA RIVER SPRINGS 3.5.3.11

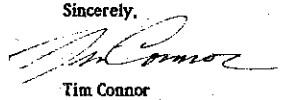
3.5.4.10 33) Please identify the location along the Columbia River shoreline where Hanford waste water is present. Then provide, in tabular form, the following information.

a) The estimated flow, per year, from each spring to the river.
b) The concentration (pCi/liter) of the following radionuclides: uranium-238, plutonium-239, cobalt-60, ruthenium-106, iodine-129, technetium-99, cesium-137, strontium-90, and compare each to the EPA drinking water standard.
c) The chemical constituents and physical properties of the spring water, to include nitrate, organic carbon, toxic metals, ph, hardness, suspended solids, etc. and compare with applicable EPA drinking water standards.
d) Please cite suspected source for each pollutant identified above background levels.
e) Please discuss the significance of elevated levels of strontium-90 in monitoring wells near the Hanford townsite, as reported by Pacific Northwest Laboratories in the 1982 groundwater surveillance report (See PNL-4659 p. C.3)

DOE DECISION-MAKING

2.1.8 34) Please explain how the Department can consider the geologic disposal alternative for the entirety of the Hanford wastes now that the Secretary of Energy has postponed, indefinitely the search for a second geologic repository whose capacity would be needed if all commercial and defense high-level wastes are to be disposed of in this fashion.

Sincerely,



Tim Connor
Staff Researcher
Hanford Education Action League

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MULTNOMAH COUNTY OREGON

DEPARTMENT OF HUMAN SERVICES
DISEASE CONTROL OFFICE
426 S.W. STARK STREET
PORTLAND, OREGON 97204
(503) 248-3406

DENNIS BUCHANAN
COUNTY EXECUTIVE

August 6, 1986

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DOE Richland Operations Office
Attn: R.A. Holten/EIS
Waste Management Division
Richland, WA 99352

Dear Mr. Holten:

I have reviewed the draft environmental impact statement "Disposal of Hanford Defense High Level Transuranic and Tank Wastes" dated March, 1986 and have the following comments.

1. Scope. In your draft EIS you indicate that a very small number of comments (28) were received during the 30-day scoping process. Our agency did not receive notification of the scoping process. I suspect this is true of many agencies and individuals throughout the Northwest. Therefore, the small number of comments is not surprising. 2.3.2.8

   The scope of the environmental impact statement is defective just as the scope of your statement on the Plutonium Uranium Extraction (PUREX) was. The conclusions which you may draw from the EIS are severely limited by lack of adequate scope. 2.3.1.14

   Military wastes do not appear out of thin air. It's quite obvious that they will not disappear into thin air or you wouldn't have done the extensive analysis. Generally, the most effective way of controlling an environmental hazard is through source control. The source was not included in the scope of your statement; however, it should be considered in any reasonable environmental impact statement. 2.5.6

   Elimination of the source could be accomplished in several ways. One is to stop manufacturing additional plutonium for nuclear weapons. Nowhere in the EIS do you comment on the amount of plutonium already in national inventories or on the impact of other potential developments as well as existing treaties on the amount of plutonium likely to be required for national defense purposes. There are no statements which suggest that recycling materials from atomic devices which are obsolete has been investigated as a means to reduce or eliminate the need for new production. 2.5.6

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   The number of atomic devices being tested each year is relatively small. There are treaty limits on the number of warheads which our country may have. In addition, technology is constantly improving the efficiency of nuclear devices. From these three observations a reasonable person could deduce that there is an upper limit on the amount of plutonium needed, given its relatively long half life. It would be appropriate to define the limit in the EIS. 2.5.6

   Because you erroneously omitted such considerations from the scope of the document, it is now impossible to entertain such discussion. However, because Multnomah County was not adequately notified of the scoping process I would request that you reopen consideration of these issues. 2.3.1.1

2. Qualifications of the authors and conflicts of interest. In reviewing the list of authors, I note that only one has health credentials (Dr. Gilbert). The National Library of Medicine lists four recent publications of Dr. Gilbert. These have mainly to do with high level exposures to radionuclides (for example: atomic bomb casualties). While this experience may be very useful should catastrophic events occur, I am not certain that these publications indicate that Dr. Gilbert is fully qualified to be your sole health authority. Furthermore, all of the authors seem to be directly or indirectly in the pay of the Department of Energy or its contractors, all of whom have a vested interest in proceeding with one or another disposal scheme and none of whom has the main responsibility to community health. 2.3.2.6 2.5.4

   Accordingly, even if I accept all of the analysis in the environmental impact statement as adequate, there is the serious question of conflict of interest. This conflict can only be resolved by a review of the health related issues by a panel of outside experts such as epidemiologists from the Centers for Disease Control and appropriate personnel of the affected state health and environmental health departments. 2.5.5

   I am most reassured by the small estimates of casualties expected to result from foreseeable accidents and normal operation of all of the disposal schemes. If these results can be confirmed by individuals without a conflict on interest, than I would accept them as valid.

3. Failure to consider all foreseeable hazards.

   a. Attack on site.

      A recent article in Scientific American has convinced me that the major hazard to the US population from nuclear power production is not accidents at nuclear power plants, even if we should have one as devastating as the Chernobyl incident. The reason for this is that nuclear power plants are not designed to explode. When they do explode, they scatter their radioactive cores inefficiently. 3.4.3.7

      However, nuclear munitions are quite another matter. An explosion of a nuclear device at ground level can loft a substantial amount of material. This poses a particular problem with regard to the military waste environmental impact statement. 3.4.3.7

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First of all, the purpose of your production at Hanford is military. This makes Hanford an inviting target for two or three different types of attack - sabotage, terrorism, and a nuclear war (sabotage and terrorism may be different perspectives of the same problem).

3.4.3.7 Given the publicized deficiencies of the N-reactor I would shudder to think of the consequences of a terrorist attack on that installation by a moderately sophisticated homing missle. While the N-reactor itself is outside the scope of the EIS, the waste storage tanks and the waste reprocessing operations are not. There are many critical steps of reprocessing which would be severely disrupted by an explosive attack, even one using conventional weapons. You have neither predicted the probability of such an attack, described the most vulnerable locations, indicated what security measures, if any, you have in place, nor predicted consequences.

b. Transportation.

3.4.2.2 The same deficiencies can be found with regard to transportation incidents in which these materials are brought to or taken from Hanford for eventual disposal. In attempting to get information about transportation of nuclear materials through our state I was rebuffed by the U.S. Department of Energy and given blanket assurances that such transportation is "perfectly safe", and that, in any event, the details of what was being transported were classified. While I do appreciate seeing a photograph of an undamaged cask in a nuclear materials transport truck which was destroyed in an experimental collision, I am not reassured by this one example in that the population is protected against all kinds of transportation accidents, let alone sabotage. I'm even less reassured when I consider the large number of trucks or train loads which will have to be moved in order to handle Hanford waste and the inevitble decline in safety which will accompany routinization of transport.

c. Nuclear war.

3.4.3.7 The largest omitted hazard, however, is that which would result if the Hanford Reservation were targeted in an intentional nuclear attack. Perhaps you have omitted this from your environmental statement because you make the assumption that if there is an intentional nuclear attack the entire country will be destroyed and therefore the additional consequences of scattering of the wastes from Hanford around the Pacific Northwest will merely be icing on the cake.

Defense nuclear planners do not seem to make the assumption that a nuclear attack will completely destroy the country; therefore, you should not either. You should model the probability of a nuclear attack on Hanford. You should then model the consequences of dispersal of the nuclear wastes from military production based on the means of disposal you select and the time during the disposal process that the attack occurs.

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I believe this is an important step to carry out because the major population hazard from nuclear power is that due to possible deliberate disruption of a power plant by a nuclear attack, with atomization of the core of the power plant and scattering over a very wide area downwind. Your document indicates that there are two tons of plutonium in the soil on the Hanford Reservation, concentrated in specific areas. You would plan to strip and relocate this contaminated soil in one or more of your disposal scenarios. I submit that two tons of plutonium would make a very inviting target if it was lofted into the air and dispersed with a reasonable expenditure of nuclear warheads. I am quite certain that the productive capacity of Hanford is in and of itself an inviting military target. At certain times of the year, Multnomah County is downwind of such attacks. We would be most interested in such an analysis. 3.4.3.7

I anticipate that this analysis will lead to the conclusion that the disposal alternative selected should be deep underground and well away from Hanford. If there is any probability of a nuclear attack, the consequences of the attack would be dramatically escalated if large concentrations of nuclear wastes were hit. 3.3.1.1

Thank you for the opportunity to comment on your environmental statement. I look forward to receiving the final document and hope that you will take my comments into consideration in its preparation.

Sincerely,

Charles P. Schade, MD
Health Officer

[KK-3652H/m]

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July 31, 1986

To whom it may concern,

I would like to submit this testimony in opposition to the
2.1.1 Department of Energy's decision to include Hanford as one of the three finalist sites for the proposed Nuclear Waste Repository. I, and many other Oregonians and Washingtonians whose voices have not yet been heard, know that the decision was not based on the data from geologic studies or any other scientific studies. This decision is highly unethical. Such an important decision should rest on sound scientific data and not on political or economic considerations.

I have recently been involved in a project which required that I research and write about the geology of the region around Hanford; the Columbia Plateau on which the Hanford Reservation is situated in particular. I have included a report on the geology of the Boardman, Oregon, region for you to view. It makes frequent mention of geologic and tectonic structures in the vicinity of Hanford.

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While researching the geology of the area I learned that it has quite a seismic history. Several earthquakes with intensities
3.2.2.3 ranging from V to VII have originated from within 50 miles of Hanford in the past ninety years. Also, it has been determined that an earthquake with an intensity of VIII is entirely possible within 50 miles of Hanford. We know that southeastern Washington is seismically active and unstable! Hanford needs a national Nuclear Waste Repository like the world needs more nuclear weapons! Let's be smart about this. Withdraw Hanford as one of the finalists, find a geologically stable site, close the N-Reactor, and STOP PUREX!!! Please.

David Shively

David Shively
606 Jefferson
La Grande, OR 97850
(503) 963-6536

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BOARDMAN SSC SITE

FACT BOOK

Prepared for the

East Columbia Basin Task Force

by

David Shively
Student Intern
Regional Services Institute
Eastern Oregon State College

July 1986

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C. GEOLOGY

Introduction

The geologic setting of the proposed Boardman Superconducting Super Collider site is well suited for the SSC project. The area in which the collider ring might be located is perhaps the most geologically stable section of the Columbia Plateau. This fact is substantiated by the data of numerous geologic, tectonic, and seismologic studies conducted in the area in the last fifteen years. This report on the geology, physiography, and seismicity of the proposed Boardman site is a summarization of the findings from several selected studies, and is intended only to provide an initial overview of the site's geologic setting.

Geologic Setting

The site is located on a relatively shallow sloping section of the Deschutes-Umatilla Plateau whose topography is significantly interrupted in only one area by the Service Anticline (See Figure 1. in Appendix). As with the rest of the Columbia Plateau, the site is underlain by the Columbia River Group basalt formation which is composed of a layered series of basaltic lava flows of the Miocene and early Pliocene ages.

> "The thickness of the Columbia River Basalt is in excess of 2,500 feet and may exceed 5,000 feet in some areas of the Columbia Plateau. Columbia River basalts are made up of individual lava flows which were poured out one upon the other over a broad area of Washington, Oregon, and Idaho. Individual flows in the formation vary from 10 to 150 feet in thickness."
> [Norton and Bartholomew - p. 11]

A stratigraphic conceptual model of the Umatilla Structural Basin was developed by Ann Smith of the U.S. Geological Survey in Portland following her research in the area which began in 1980. The different individual flows of basalt which make up the Columbia River Group were classified and placed in subgroups. Because the basalts are for the most part located just at or below the engineering depth of interest (approximately fifty feet below the surface), and because they tend to have similar characteristics (relative hardness and density of the basalts increases with depth; color, and chemical composition), a discussion of the conceptual model and basalt stratigraphy is included in the appendix. A brief description of the flows follows.

> "Individual lava flows in this formation vary from about 10 to 150 feet in thickness and commonly extend laterally for about 1 to 12 miles. Typically, the flows are a hard, dense, non-porous, olivine basalt near the base grading upward to coarser grained, vesicular, and scoriaceous zones near the top. The flows commonly display columnar jointing patterns consisting of polygonal or hexagonal shaped, roughly vertical, columns that developed along cooling joints. Diameters of the columns may vary from a few inches to several feet near the bottom of individual flows but usually become progressively smaller near the top. Rectangular or diced jointing is also common to some flows in the area. This type of jointing separates the basaltic rocks of the flows into angular blocks having dimensions of about 1 to 24 inches on a side. Almost all of the jointing patterns within the basalts are relatively tight and are only rarely open and well developed. Vertical permeability, therefore, is believed to be quite low."
> [McCall - p. 5]

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Norton and Bartholomew noted the following:

> "When these jointing systems are open and well developed, they provide some permeable zones in which ground water can move vertically through the dense rock formation. It is common, however, that overlying silt cover and rock weathering have closed, to some degree, the fractures and joints which reduces the vertical permeability of the basalt."
> [Norton and Bartholomew - p. 12]

> "At most places in the area [Ordnance area], these rocks [Columbia R. Group] lie buried beneath sedimentary deposits of Pliocene and Pleistocene (1 million years) age. Above an elevation of about 750 feet, near the southern boundary of the area, Pliocene fanglomerate directly overlies the basaltic lavas . . . . These sediments are composed of a heterogeneous mixture of tightly cemented sand, silt, and clay with embedded basaltic rock debris derived as slope wash from the weathering of basaltic rocks on upland slopes to the south. Below the 750 foot elevation, the older alluvium (glaciofluviotile deposits), consists of lenticular, poorly sorted deposits of sand, gravel, silt, and clay laid down by the ancestral Columbia River during various flood stages in the Pleistocene time."
> [McCall - p. 4]

> "All pre-Pleistocene rock units in the area [Umatilla R. Basin] are overlain by a veneer of loess. This wind deposited silt of Pleistocene age was derived at least partly from the glacial-lake beds previously mentioned [shallow lakes of Pleistocene age formed in the Umatilla R. Basin by downstream flooding of the Columbia R. from ice and debris]."
> [Hogenson - p. 18]

The depths and relative thicknesses of the Columbia River basalt and overlying sediment beds have been determined at various locations in the site area through the use of published well records and geologic maps. In general, the basalts of the Columbia River Group lie much closer to the surface at higher elevations (1,000 - 1,500 ft.) south of the river. The sedimentary layers increase in both thickness and depth at elevations lower than 1,000 ft. closer to the river. A schematic north-south cross section of the proposed Boardman site was prepared by CH2M/HILL following a brief investigation into the feasibility of locating the SSC Ring there, and it is reproduced on the following page [See also Norton and Bartholomew's series of three geologic cross sections located in the appendix].

Physiography and Tectonic Structures in the Site Area

Technical discussions of the topography and physiography of the Deschutes-Umatilla Plateau have been offered by McCall and Newcomb, and they have been included in the text below.

> "The topography of the Ordnance area [this area is encompassed by the proposed site] is largely controlled by the tectonic structure of the underlying basaltic rock. The basalt dips almost imperceptibly along gentle slopes from the uplands of the Blue Mountain anticline, several miles to the southeast of the area, to the east-west trending, 160-mile-

(no comment identified)

(no comment identified)

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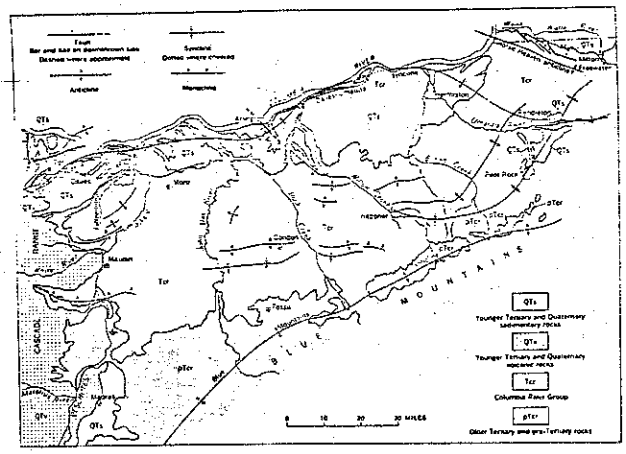
long, Dalles-Umatilla syncline described by Newcomb (1967)."
[McCall - p.6]

"The crustal deformation that has framed the large structural and physiographic characteristics of the Deschutes-Umatilla Plateau resulted from broad open folding in Pliocene and Pleistocene time. This folding is most readily discerned by the tilt and altitude of the once-horizontal Columbia River basalt. The master structure is the broad Dalles-Umatilla syncline, whose axial trough extends 160 miles from the Cascade Range to the intersection of the Horse Heaven anticline with the Blue Mountains anticline east of Pendleton...

Figure V



17.—Structural geology of the Deschutes-Umatilla Plateau.

Figure V.

Source: DOGAMI Bull. 64
p. 63

"...The broad trough of the Dalles-Umatilla syncline locally plunges into shallow sag areas along its trend; the principal sags are centered at Umatilla, The Dalles, and Mission (east of Pendleton). In the sags at Umatilla and The Dalles, the top of the basalt stands only about 200 feet above sea level. Between these sags the top of the basalt in the synclinal trough rises to the 900-foot altitude that extends from Arlington westward beyond the Deschutes River."
[Newcomb, State of Oregon DOGAMI Bulletin 64, 1969, pp. 62-64]

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"The Service anticline, shown on Plate 2 of this report, lies approximately 3 miles to the east, and generally parallels the eastern boundary of the Ordnance ground water area. The anticline is an upturned structural fold in the basaltic rocks extending northward from Service Buttes to Sillusi Butte in Washington across the Columbia River from Umatilla. It is believed thatthe structure serves as a barrier to the movement of ground water from up-slope areas to the southeast."
[McCall - pp. 6&7]

"North from Service Butte in the 17 miles to Sillusi Butte, which is at the north side of the Columbia River, the anticline is expressed mostly as a line of isolated basalt knobs [Hermiston Butte, Emigrant Buttes, Service Buttes] that are flanked on the east and west by alluvial material 50 to 100 feet thick."
[PGE Report - p. 8-35]

"Well data and topography indicate that a small northeast-southwest trending anticline is present beneath the alluvial cover located approximately 3 miles west of Hermiston. The axial trace of this structure generally parallels the Service Buttes anticline. Well data also suggest the existence of a down-warped, northeast-southwest trending fold in the basalt in Townships 3 and 4 North, Range 26 East, and a moderately deep depression in the south half of Section 19 and part of Section 20, Township 4 North, Range 27 East (See Plate 2). An anomalous high area on the basalt surface lies a short distance to the north of this depression. These features are probably structural in origin, the result of local faulting of the basaltic rocks."
[McCall - p. 7]

The major topographic features in the site area are the Emigrant Buttes, Service Buttes, and Hermiston Buttes. As was mentioned above, these buttes are remnants of the heavily eroded Service anticlinal ridge. Also located within the site area is a less pronounced topographic feature, the Willow Creek Monocline. This tectonic structure extends westward from the Service Buttes to a point directly south of Boardman.

Seismicity

The proposed Boardman SSC Site, like the entire state of Oregon, is in an Oregon Uniform Building Code seismic zone 2. The siting parameters document asks that if a proposed site is located in a seismic zone 3 or 4, that "additional site-specific seismic data should be obtained." But because this topic, seismicity, is of such concern to the central design group and those responsible for project siting, I have excerpted pertinent site-specific seismic data.

In the early 1970's, the Portland General Electric Company proposed constructing a nuclear-fueled thermal power plant at one of two locations, the Pebble Springs site southeast of Arlington, and the Carty West site south of Boardman. The Carty West application which was submitted to the Oregon State Nuclear and Thermal Energy Council also included a proposed coal-fired thermal power plant. A report on the Carty West site characteristics was written and submitted in support of that application, and much of the following information on seismicity in the region comes from

(no comment identified)

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(no comment identified)

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(no comment identified)

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that report. The nuclear-fueled plants were nor constructed because of potential conflicts with the Boardman Bombing Range approaching flight paths. The coal-fired plant was constructed and is operating.

This section on seismicity in the Boardman area is arranged such that information on regional tectonic structures and faulting is presented before the discussion on the earthquake history of the region. Following this discussion is one which attempts to associate the epicenters of regional seismic movements with specific tectonic structures.

Tectonic Structures and Faulting

The Rattlesnake Hills-Walla Walla structural trend was identified in the PGE Report as being "... by far the most significant tectonic feature in the area..." [PGE Report - p. 8-28] The text below contains a summarization of the PGE Report discussion on the Rattlesnake Hills - Walla Walla Structural Trend. Following the summarization are excerpts from the report which discuss other topographic and tectonic features in the region.

> "The only tectonic structure in the region of the site that is considered active is the Rattlesnake Hills-Walla Walla fault system. This structure consists of two structural elements: the Rattlesnake Hills-Wallula lineament and the Wallula-Walla Walla fault system. The Rattlesnake Hills-Wallula structural lineament forms the northwestern part of the trend and consists of approximately 20 miles of unfaulted anticlines and 30 miles of discontinuous domal anticlines in which Binham and others (13) indicate faulting. The Wallula-Walla Walla fault system, which forms an en-echelon fault boundary for approximately 30 miles along the south side of the Walla Walla Valley, seismically is the most important structural element in the region. The combined total length of the Rattlesnake Hills-Wallula lineament and the Wallula-Walla Walla fault system is approximately 80 miles with faulting indicated on approximately 60 miles of the trend."
>
> [PGE Report - p. 8-48]

> "The major faulting along this structural trend was dated by Newcomb (1958, Reference 15) as Ringold (Pleistocene) in age and interpreted by Bingham and others (1970, Reference 13) to have occurred during Ringold time, or pre-late Pleistocene. However, the historical seismicity near Walla Walla suggests that the eastern part, the Wallula-Walla Walla fault system, is still tectonically active."
>
> [PGE Report - p. 8-30]

> "This fault system [Wallula-Walla Walla fault system] was found to be the most probable earthquake producing structure in the region."
>
> [V.C. Newton, Jr. and Peterson - p.4]

> "The Horse Heaven anticline is a second dominant topographic and tectonic feature. It extends as a broad arch for nearly 150 miles from the Cascade Range in south-central Washington eastward to the Blue Mountains in northeastern Oregon. Throughout the length of this broad, elongated structure, 700 to as much as 2000 feet of vertical relief (amplitude) occurs on the fold...
>
> "Although some isolated faults occur throughout most of its length, the Horse Heaven anticline is essentially unfaulted. Laval (16) mapped a short thrust fault in the asymmetrical north limb near Prosser and Newcomb (17) mapped a normal fault farther west, north of Goldendale. Major faulting of the structure is known to occur only along the northern flank of the fold at its eastern end along the south edge of the Walla Walla Valley. Here, a series of en-echelon normal faults extends for approximately 30 miles from near Milton-Freewater northwesterly to near Wallula Gap on the Columbia River....
>
> "The Columbia Hills anticline, a third major structure, is a discontinuous series of small- and medium-sized anticlines; its trend continues nearly 100 miles from the flanks of the Cascade Range west of The Dalles. It extends eastward along the north side of the Columbia River to approximately the position of Umatilla where it merges with a northeasterly line of anticlines trending off the service anticline.
>
> "Faulting is present locally in short segments along the Columbia Hills anticline and appears to be largely related to the steeply folded parts. Paterson Ridge contains the largest faulted segment, as mapped by Newcomb (18), who also mapped a 1-mile-long thrust fault along the oversteepened south flank of the anticline north of the John Day Dam ....
>
> "Atthe west end of an asymmetrical segment of the Columbia Hills anticline the northwest-trending Warwick fault emerges from north of the mouth of the Deschutes River and runs 25 miles across plateaus to where it meets a cross fault trending northeast along the edge of Camas Prairie. The fault has little vertical displacement over most of its length.
>
> "Within the asymmetrical segment of the Columbia Hills anticline the Warwick fault has had some strike-slip motion, possibly as much a 0.25 mile, but to the northwest the strike-slip along most of its length is judged to be less than a few hundred feet . . . .
>
> "The Laurel fault runs parallel to the Warwick fault, approximately 6 miles to the west. It extends at least 18 miles from near Laurel, Washington, southeast across the Columbia River to Fairbanks Gap to within 74 miles of the Carty West Site...The Laurel fault, along with the parallel Warwick and Goldendale faults are considered to be Cascadian structures.
>
> "The southeasterly-trending Goldendale fault swings around the west end of a greatly folded asymmetrical segment of the Columbia Hills anticline and into a 7-mile-long thrust fault which cuts the steeply upturned south limb just north of the Columbia River. The eastern end of the mapped thrust fault is 33 miles west of the Carty West Site. The eastern end of the fault has been mapped . . . as trending through a talus-covered cliff of steeply folded basalt and as changing progressively into a symmetrical anticline on the east. A few hundred feet of southward movement on the thrust was taken up by strike-slip on the Goldendale fault at the west end of the asymmetrical anticline.
>
> "A probable fault, which generally follows for 9 miles the northwesterly course of Rock Creek 25 miles west of the Carty West Site, and a parallel probable fault 2 miles farther south, collectively termed the Rock Creek faults, are mapped mostly on physiographic and topographic evidence."
>
> [PGE Report - p. 8-31]

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Earthquake History of the Region

Because this region is only recently settled, a historical overview of the frequency and intensity of regional earthquakes can only be sketchy and somewhat assumptive. The Portland General Electric Company, for its report, assembled two lists of earthquakes detected within 100 and 200 miles of the Carty West Site, and located the estimated epicenters on a Regional Tectonic and Earthquake Epicenter Map. These lists cover the period of time from 1833 to 1971. Both lists and the map are contained in the Appendix.

Earthquakes Within 200 Miles

"The earthquake history indicates that a meaningful seismic history extends back only about 110 years. Such a limited record is considered to be insufficient in length of observation to establish directly either the largest size earthquakes to be expected or the frequency of occurence of earthquakes within the area. Although it is likely that many more earthquakes large enough to be felt occurred in the region, it is unlikely that any earthquakes larger than M = 5.0 passed unreported during this time. The earliest earthquake reports are clearly dependant on the population distributions at the time (34).

"The earthquake records indicate that at least 14 shocks, ranging from intensity VII (MM) and/or magnitude 5.0 to intensity VIII and an observed magnitude of 7.1, have occurred during historic time within a 200-mile radius of the site. The largest of these, the April 1949 earthquake at Olympia, Washington, had an epicentral intensity of a VII (MM) at an approximately [SIC] distance of 160 miles northwest of the site. The closest major shock to the site was the 1893 Umatilla, Oregon, earthquake with a reported epicentral intensity of VII (MM) approximately 25 miles east/northeast of the site."

[PGE Report - pp. 8-44 - 8-45]

Earthquakes Within 100 Miles

"The earthquake records indicate that more than fifty shocks, ranging from a felt intensity of II or III (MM) to a maximum intensity of VII (MM), have occurred within this radius. One relatively large cluster of earthquakes occurs approximately 85-90 miles east-northeast of the site in the Walla Walla area; relatively minor clusters of earthquakes also occur at approximately 65 miles north of the site in the Yakima area, approximately 50 miles west of the site in The Dalles area and five earthquakes have occurred approximately 25 miles east-northeast of the site in the Umatilla area. Most of the shocks within this 100-mile radius are of low intensity, ie, V (M) or less; however, two intensity VI (M) and two intensity VII (M) earthquakes have been reported in the area. The latter include the 1936 Milton-Freewater earthquake with a reported magnitude of 5.8 at an epicentral distance of approximately 65 miles east-northeast of the site and the smaller 1893 Umatilla earthquake with an epicentral location of approximately 25 miles east-northeast of the site."

[PGE Report - p. 8-45]

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(no comment identified)

A list of those earthquakes which may have been felt at the Carty West site, located approximately five miles from the west side of the proposed SSC site, was included in the PGE report and is reproduced on this page.

Note: M = Magnitude
MM = Intensity

Year	Date	Lat.	Long.	Location	Int.	Est. Int. At Site
1872	12/14	49 10	121 00	Southwest B.C., Canada	VIII-IX	I-II
1893	3/7	45 54	119 24	Umatilla, Oregon	VII	VI
1921	9/14	46 04	118 20	Walla Walla, Washington	VI	IV
1936	7/16	46 00	118 30	Milton-Freewater, Oregon	VII	IV-V
1949	4/13	47 06	122 42	Olympia, Washington	VIII	I-II
1951	1/7	45 55	119 14	McNary, Oregon	V	IV-V
1959	8/18	44 36	111 06	Hebgen Lake, Montana	VIII	I-II

Source: PGE Report p. 8-46

"Two of the above-listed earthquakes are within approximately 30 miles of the site, five are within 200 miles of the site and two are more distant than 200 miles from the site.

"The Umatilla earthquake of 1893 and the Milton-Freewater earthquake of 1936 are estimated to have caused the highest intensities and produced the maximum ground accelerations at the site. Unfortunately, mapped isoseismals of the 1893 Umatilla earthquake are not available. However, newspaper accounts indicate that the felt area was rather small; for example, the earthquake was not felt in Pendleton, at a distance of only 35 miles southeast of Umatilla. The ground acceleration this earthquake could have produced at the site, therefore, is estimated to have not been more than 0.05-0.07g. The isoseismal map of the Milton-Freewater earthquake of 1936 (Figure 8-17) indicates that this earthquake probably produced a maximum ground acceleration at the site of approximately 0.02-0.04g."

[PGE Report p. 8-46]

"The Umatilla earthquake had a reported intensity VII (MM) at a distance of approximately 30 miles northeast of the site but the exact epicentral location of the earthquake is not known. This earthquake is estimated to have produced maximum intensity levels of possible V to VI (MM) at the site, although there is some disagreement with the assignment of an intensity of VII (MM) to this earthquake, on the basis of the small extent over which the earthquake was felt.

"Isoseismals of the Milton-Freewater earthquake, shown on Figure 8-17, indicate that this earthquake, which had a reported intensity of VII (MM) at an epicentral distance of approximately 70 miles east-northeast of the site, may have produced a maximum intensity level of V (MM) at the site.

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The historical maximum earthquake to affect the site, therefore, is the Umatilla earthquake with an epicentral intensity of VII at a distance of approximately 30 miles."

[PGE Report p. 8-49]

Correlations of Earthquake Epicenters with Regional Tectonic Structures

"Although earthquake epicenters within the 200-mile study area apparently cluster in certain localities, it is only in a few places that meaningful correlations can be made between concentrations of earthquake epicenters and tectonic structures. In most places a particular geologic source of the earthquake energy is obscure. Figure 3 in Shannon & Wilson's report (41) shows the earthquake epicenters plotted on Newcomb's (17) map of regional structures. The most specific example of a correlation of earthquake epicenters with a tectonic structure is in the Walla Walla Valley, where the earthquake occurrence is clearly related on the eastern end of the Rattlesnake Hills-Walla Walla structural trend to faulting and particularly to the downward movement of the Walla Walla syncline. Although the Horse heaven anticline is one of the larger structural features in the Columbia Plateau Province, only two scattered low-intensity events have occurred near its trace and it can be considered essentially aseismic. The Columbia Hills anticline which lies south of the Horse Heaven anticline is an even less significant system of en-echelon anticlines with only local faulting associated with some of the steepest folding. It, too, appears to be essentially aseismic. Only one questionably "felt" event (reported by one individual at Roosevelt, near Arlington) has been reported along the trend of the structure. The four low-intensity earthquakes (intensity II-V reported east of the westerly end at The Dalles) appear to be associated with the Chenoweth fault and other unnamed faults which diagonally cross the Columbia Hills anticline. Historical seismicity in the Umatilla area cannot be correlated with any known major structure in the area."

"Where only a few widely scattered epicenters exist, it is not possible, on he basis of geologic knowledge alone, to establish any correlation of the seismic activity with specific tectonic structures. Some concentrations of earthquake epicenters, however, can be clearly related to larger tectonic provinces. Earthquakes in the Puget Sound and Willamette lowlands (Portland area) are good examples of such a correlation. In both areas, thick alluvial or glaciofluvial deposits obscure lowland bedrock structures. Although some faults have been mapped in the bedrock bordering the basins, none of these mapped faults can be correlated definitely with the seismic activity located in the lowlands under the cover of youthful sediments. Earthquake epicenters in the Cascade Range north of the Columbia River can be loosely segregated into two groups; one centering near Mt. Ranier, and the other in the Northern Cascades. Correlation with known tectonic structures in these areas is obscure, but geologic mapping in the areas to date is largely reconnaissance in scope and is not adequate to define specific structres. Small clusters of earthquake epicenters, such as those at Chelan, Washington and on the Snake River, east of Baker, Oregon, appear to be associated with nearby faults or folds that have been mapped."

[PGE Report p. 8-46 - 8-48]

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Determination of the Site Specific Maximum Credible Earthquake

The SSC siting parameters document specifies that "an estimate of the site specific maximum credible event" be included in the information on site seismicity. As would be expected, this information was also of great concern to PGE and its plans to locate a nuclear-leveled thermal energy plant in the Boardman area. Because of the relatively short period of record in the area, which is definitely insufficient to formulate an estimate of the maximum earthquake, PGE used three different methods to establish the maximum credible earthquake that might occur in the Boardman area.

"One method of determining the maximum earthquake is based on an evaluation of the historical maximum earthquake intensities and their relationships to major tectonic structures in the region or to the seismic-tectonic province within which the site is situated. Another technique that can be utilized to establish the maximum earthquake is based on a determination of the earthquake recurrence frequencies for the area. A third method utilizes the empirical relationships that appear to exist between the length of fault rupture and the size of the earthquake."

[PGE Report - p. 8-48/8-49]

These three methods and their applications to the area of interest are discussed in great detail in the PGE Report, and the text which follows is a summarization of the discussion.

"Because the earthquakes in the Umatilla area cannot be associated definitely with any known major tectonic structures, it is assumed that the maximum earthquake of intensity VII (MM) that occurred in the area in 1983, could occur anywhere within the tectonic province of the site, inlcuding the immediate vicinity of the site. This earthquake then would produce a maximum intensity level at the site of VII (MM)."

[PGE Report - p. 8-49/8-50]

The method of determining the max earthquake by recurrence frequencies uses a mathematical model fitted to available regional data. A curve of "Best fit" was plotted through available historical regional quakes and it indicated that in a 130-year recurrance interval (which was determined to be a period of time sufficient to include the largest quakes which might occur).

"It is estimated that a maximum earthquake of M = 6.5 earthquake could occur on the Rattlesnake Hills-Walla Walla structural trend at a distance of 45 miles from the site.

[PGE Report - p. 8-51]

Using the method which utilizes the empirical relationships that appear to exist between the length of a fault rupture and the site of an earthquake it was determined that a quake originating in the Rattlesnake Hills-Walla Walla structural trend (a distance of approximately 45 miles from the western edge of the site area) would have a magnitude of 6.7.

"...on the basis of historical records, fault length solutions and

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recurrence frequencies, the following earthquakes should be considered in selecting the design earthquake for the site:

Earthquake Number	Basis	Intensity (MM) or Magnitude (M)	Distance from Site (Miles)
1	Geologic-Seismic Relationships	MM VII	Site Vicinity
2	Fault Length	M = 6.7	45
3	Geologic-Seismic Relationships	MM VIII	45
4	Recurrence Frequencies	M = 6.5	45

The empirical attenuation relationships of earthquake intensity with distance as given by Gutenberg and Richter (44) and Newmann (54) indicate that Earthquakes 3 and 4 would produce intensities at the site less than those produced by Earthquake 1 and Earthquake 2. For the purpose of the ground response studies, therefore, it is only necessary to consider in detail the effects at the site produced by Earthquakes 1 and 2, namely an intensity VII event occurring in the vicinity of the site and a M = 6.7 earthquake at an epicentral distance of 45 miles."

[PGE Report - p. 8-52/8-53]

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TABLE 8-1

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HISTORIC EARTHQUAKES 1833 TO 1971
WITHIN 200 MILES OF SITE

WN: Washington
OR: Oregon
ID: Idaho

Source: PGE Report, Table 8-1

EARTHQUAKES FOR 94/02/23

YEAR	DATE	TIME	LATITUDE 43N TO 49N LAT	LONG	LONGITUDE 116W TO 124W LOCATION	M	OR	MC	INT	DEP	DUR	REF[a]
1833	0629	134000	47	85	122 45 FT NISQUALY		WN	2.3	2			2
1841	1233	3800	45	38	122 40 VANCOUVER		WN	4.3	5			4
1846			45	18	122 36 OREGON CITY		OR					4
1856	1226		48		123 PT TOWNSEND		WN	2.3	2			5
1859	0432	1030	47	03	122 53 OLYMPIA		WN	4.3	5			5
1863	0507		48		123 PT TOWNSEND		WN	2.3	2			5
1866	1124	1810	45	36	121 12 THE DALLES		OR	3.7	4			4
1866	12		45	36	121 09 THE DALLES		OR	3.8	3			4
1868	0530		48		122 MUKILTEO		WN	2.3	2			5
1868	0620		47	57	122 18 MUKILTEO		WN	2.3	2			5
1869	0218		48	07	122 45 PT TOWNSEND		WN	2.3	2			5
1870	0607	08	45	38	122 40 VANCOUVER		WN	2.3	2			5
1871	0221	1340	47	03	122 53 OLYMPIA		WN	2.3	2			5
1871	0519		46	42	122 06 HORTON		WN	2.3	2			5
1872	12		46	04	118 20 WALLA WALLA		WN	2.3	2			5
1872	12		47	30	122 30 PUGET SOUND		WN	2.3	2			5
1872	1215	1540	47	30	122 30 PUGET SOUND		WN	5.7	7			5
1873	0119		47	14	122 26 TACOMA		WN	2.3	2			5
1873	0116	2230	47	03	122 53 OLYMPIA		WN	2.3	2			5
1873	1019	22	47	36	122 20 SEATTLE		WN	3.7	4			5
1873	1217		47	03	122 53 OLYMPIA		WN	3.7	4			5
1874	01		46	36	120 31 YAKIMA		WN	2.3	2			5
1875	0530	2330	46	36	120 31 YAKIMA		WN	2.3	2			5
1875	0546	2325	46	36	120 31 YAKIMA		WN	2.3	2			5
1875	0507	1915	46	36	120 31 YAKIMA		WN	5.0	6			5
1877	1012	17	45	45	121 50 CASCADES		OR	6.3	8			4
1877	1012	2153	45	26	122 48 PORTLAND		OR	3.0	3			4
1877	1130	1244	45	26	122 48 PORTLAND		OR	3.0	3			4
1878	0316	1430	47	14	122 26 TACOMA		WN	3.3	3			5
1878	0402	17	47	03	122 53 OLYMPIA		WN	2.3	2			5
1879			45	26	122 48 PORTLAND		OR	3.7	4			4
1879	1126		43	36	116 13 BOISE CITY		ID	2.3	2			1
1880	0322	2125	47	39	123 36 NW WASHINGN		WN	2.3	2			5
1880	1208	1154	47	03	122 53 OLYMPIA		WN	2.3	2			5
1880	1210	13	47	39	122 32 BAINBRIDGEI		WN	3.7	4			5
1880	1213	1445	47	23	122 34 PUGET SOUND		WN	5.7	7			5
1880	1215	12	47	39	122 32 BAINBRIDGEI		WN	3.0	3			5
1880	1221	0716	47	39	122 32 BAINBRIDGEI		WN	3.7	4			5
1880	1230	0725	47	39	122 32 BAINBRIDGEI		WN	3.0	3			5
1881	0126	0656	47	39	122 32 BAINBRIDGEI		WN	3.0	3			5
1881	0127	0920	47	39	122 32 BAINBRIDGEI		WN	3.0	3			5
1881	0127	0615	47	39	122 32 BAINBRIDGEI		WN	3.0	3			5
1881	0117	17	47	39	122 32 BAINBRIDGEI		WN	3.0	3			5
1881	0131	1545	47	39	122 32 BAINBRIDGEI		WN	3.0	3			5
1881	0315	0630	47	39	122 32 BAINBRIDGEI		WN	3.0	3			5
1882	0501	0425	45	26	122 47 PORTLAND		OR	3.0	3			4
1883	56		47	14	122 26 TACOMA		WN	3.0	3			5
1883	1025	24	45	26	122 47 PORTLAND		OR					4
1884	0114	0440	45	26	122 47 PORTLAND		OR	3.7	4			4
1884	0922		47	14	122 26 TACOMA		WN	2.3	2			3

[a] See list of references at end of table.

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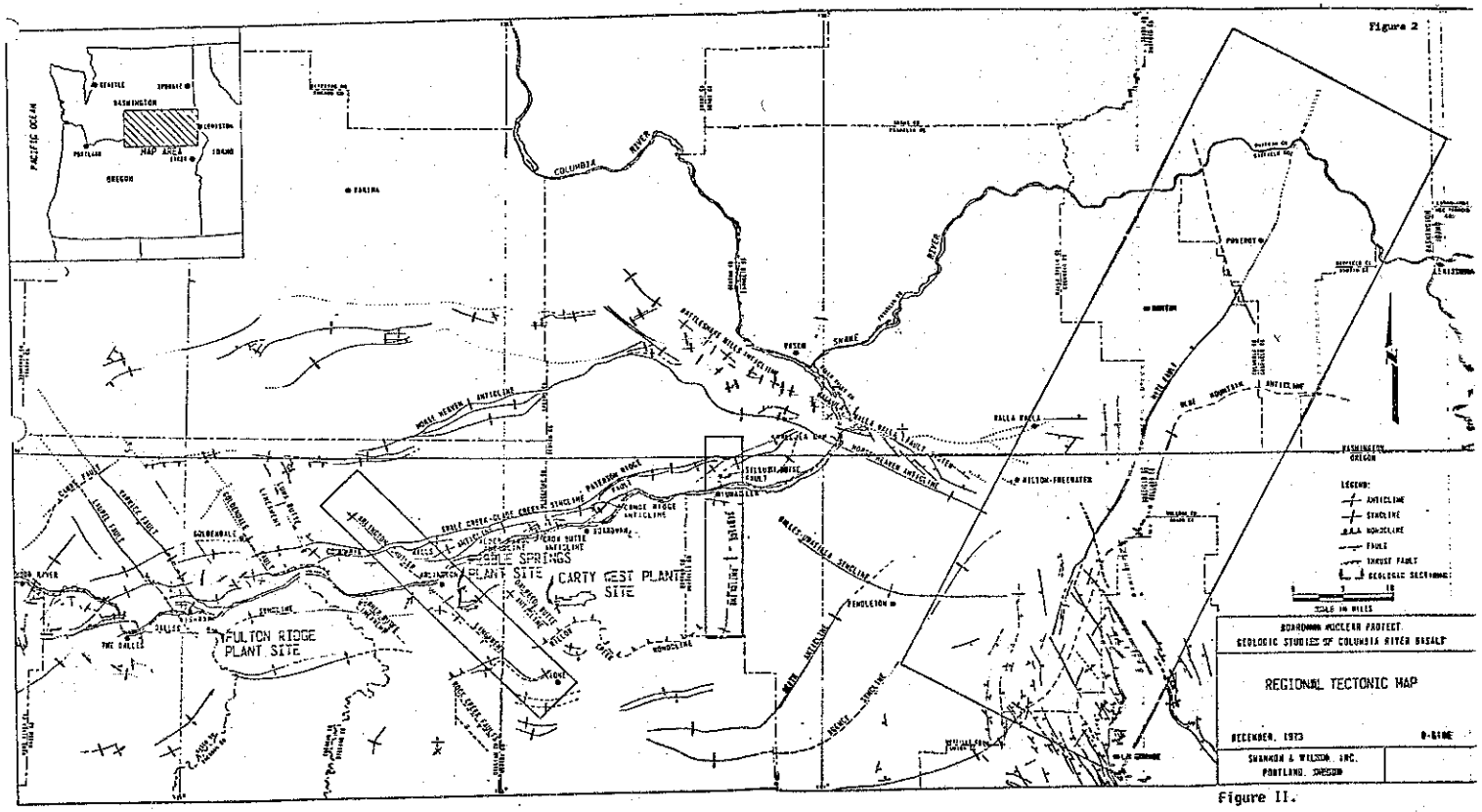

Figure II.

Source: V.C. Newton, Jr.
N.W. Peterson

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EARTHQUAKES FOR 04/02/73
LATITUDE 43N TO 49N LONGITUDE 116W TO 124W

YEAR	DATE	TIME	LAT	LONG	LOCATION		M	OB	MC	INT	DEP	OUR	REF
1884	0922	06	47	14	122	26	TACOMA	WN			3.0	3			5
1885	0504	0730	47	03	122	53	OLYMPIA	WN			2.3	2			5
1885	0627	1326	47	03	122	53	OLYMPIA	WN			3.7	4			5
1885	1009	16	47		123		OLYMPIA	WN			4.3	5			5
1885	1010		45	26	122	47	PORTLAND	OR			2.3	2			4
1885	1010		45	26	122	47	PORTLAND	OR			2.3	2			4
1885	1010	09	45	26	122	47	PORTLAND	OR			3.0	3			4
1885	1209	0640	47	30	122	30	PUGET SOUND	WN			4.3	5			5
1885	1209	0940	48	07	123	27	PRT ANGELES	WN			2.3	2			5
1886	0416	0605	47	39	122	32	BAINBRIDGEI	WN			2.3	2			5
1887	0429		46	04	118	20	WALLA WALLA	WN			2.3	2			5
1888	0201	1200	47	54	122	31	POINT NO PT	WN			2.3	2			5
1889	0316	2200	47	54	122	31	POINT NO PT	WN			2.3	2			5
1889	10	02	47	12	122	18	PUYALLUP	WN			2.3	2			5
1889	1020	23	47	54	122	31	POINT NO PT	WN			2.3	2			5
1890	0202	0115	48	10	122	54	ADMIRALTYHO	WN			2.3	2			5
1890	0708		47	03	122	53	OLYMPIA	WN			3.0	3			5
1890	0316	0400	47	13	120	59	ROSLYN	WN			3.0	3			5
1890	0329	2230	47	13	120	59	ROSLYN	WN			3.0	3			5
1890	1008	22	47	54	122	31	POINT NO PT	WN			2.3	2			5
1891	0308	0330	48	18	122	54	SMITH IS	WN			2.3	2			5
1891	09		47	14	122	26	TACOMA	WN			2.3	2			5
1891	0917	0430	44	54	123	06	SALEM	OR			3.7	4			4
1891	0921	1300	48	08	123	30		WN			4.3	5			5
1891	1129	2321	48	07	123	27	PRT ANGELES	WN			5.0	6			5
1892	0204	0430	45	26	122	48	PORTLAND	OR			5.0	6			4
1892	0229	1045	45	36	121	09	THE DALLES	OR			3.7	4			4
1892	03	0530	46	01	122	51	KALAMA	WN			2.3	2			5
1892	0417	2250	47		123		OLYMPIA	WN			5.0	6			5
1892	11		45	25	122	36	OREGON CITY	OR			2.3	2			4
1893	0307	0103	45	54	119	24	UMATILLA	OR			5.7	7			4
1893	37		45	42	121	18	PLEASANT RG	OR			2.3	2			4
1893	0814	1307	46	12	122	18	MT ST HELEN	WN			3.7	4			3
1894	0524	0630	47	14	122	26	TACOMA	WN			2.3	2			5
1894	1121		46	49	121	48	MT RAINIER	WN			2.3	2			5
1894	1224	1209	43	36	116	13	BOISE	ID			2.3	2			3
1894	1224	1400	43	36	116	13	BOISE	ID			2.3	2			3
1894	1224	1510	43	36	116	13	BOISE	ID			5.0	6			3
1895	0225	1247	46	30	122	24	KOSMOS	WN			4.3	5			5
1895	0416	0302	48		123		PT TOWNSEND	WN			5.0	6			5
1896	0109	1556	48	41	123	14	TURN PT ISL	WN			2.3	2			5
1896	0402	1117	45	12	123	12	MCMINNVILLE	OR			5.0	6			4
1896	0826		45	18	121	42	MOUNT HOOD	OR			2.3	2			4
1897	1217	0430	45	32	123	10	FORREST GRV	OR			3.0	3			4
1898	0222	0225	45	26	122	48	PORTLAND	OR			3.7	4			4
1898	0222	0315	45	26	122	48	PORTLAND	OR			3.0	3			4
1898	0928		46	54	122	34	ST HELENS	OR			2.3	2			4
1902	0615	0430	44	49	124	02	NEWPORT	OR			3.7	4			4
1902	1215	04	45	45	121	33	HOOD RIVER	OR			2.3	2			4
1902	1218		44	49	122	30	FOX VALLEY	OR			3.0	3			4

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EARTHQUAKES FOR 04/02/73
LATITUDE 43N TO 49N LONGITUDE 116W TO 124W

YEAR	DATE	TIME	LAT	LONG	LOCATION		M	OB	MC	INT	DEP	OUR	REF
1962	1218	1540	44	45	122	30	FOX VALLEY	OR			3.0	3			4
1904	0616	1625	45	26	122	47	PORTLAND	OR			3.7	4			4
1904	0616	1940	45	26	122	46	PORTLAND	OR			2.3	2			4
1904	0616	2240	45	26	122	46	PORTLAND	OR			2.3	2			4
1906	0102	1345	48	30	117	30	NE WASHINGN	WN			4.3	5			5
1906	0601	1255	47	36	122	20	SEATTLE	WN			4.3	5			5
1906	0911		44	48	117	51	BAKER	OR			3.0	3			5
1906	1152	1149	48	33	117	54	COLVILLE	WN			4.3	5			5
1907	0527	1200	45	26	122	46	PORTLAND	OR			3.0	3			4
1907	0728	1620	48	07	122	45	PT TOWNSEND	WN			4.3	5			5
1909	0111	2349	49	00	122	42	BLAINE	WN			5.7	7			5
1909	0524	1720	47	36	120	00	WATERVILLE	WN			2.3	2			5
1909	1231	1023	45	27	122	48	PORTLAND	OR			2.7	4			4
1910	0228	1945	45	27	122	48	PORTLAND	OR			2.3	2			4
1910	0215	2400	45	27	122	47	PORTLAND	OR			3.7	4			4
1911	0705	03	47	00	120	32	ELLENSBURG	WN			4.3	5			5
1911	0929	1239	48	48	122	42	FERNDALE	WN			4.3	5			5
1912	0636		47	35	122	20	SEATTLE	WN			3.0	3			5
1912	1125	1321	47	37	122	20	SEATTLE	WN			3.0	3			5
1912	1125	1430	47	36	122	21	SEATTLE	WN			3.0	3			5
1912	1125	0505	47	36	122	19	SEATTLE	WN			3.0	3			5
1913	0316	12	43	28	123	20	ROSEBURG	OR			3.7	4			4
1913	0729	1615	47		122		FAIRFAX	WN			4.3	5			5
1913	1014	2300	45	33	116	40	SEVEN DEVIL	ID			5.0	6			5
1913	1225	1545	47	42	122	36	SEATTLE	WN			4.3	5			5
1913	1225	1440	47	42	122	38	SEATTLE	WN			2.3	2			5
1914	0221		47	50	125	44	LAKESIDE	WN			2.3	2			5
1914	0322	1430	45	27	122	47	PORTLAND	OR			3.7	4			4
1914	0806		47	52	126	34	LAKESIDE	WN			2.3	2			5
1914	0905	0935	47		123		OLYMPIA	WN			4.3	5			5
1914	0915	1000	45	27	122	47	PORTLAND	OR			3.0	3			4
1915	0118		45	30	118	30	SUMMERVILLE	OR			3.0	3			4
1915	0126	0855	46	45	121	49	LONGMIRE	WN			3.7	4			5
1915	0331	1800	47	50	120	04	LAKESIDE	WN			3.0	3			5
1915	0332	2330	47	50	126	34	LAKESIDE	WN			2.3	2			5
1915	0315	0510	47	50	120	04	LAKESIDE	WN			3.7	4			5
1915	0335	1930	47	50	120	04	LAKESIDE	WN			2.3	2			5
1915	0422	1834	47	12	122	18	PUYALLUP	WN			2.3	2			5
1915	0519	1340	45	27	122	46	PORTLAND	OR			4.3	5			4
1915	0526	02	45	36	122	42	PORTLAND	OR			4.3	5			5
1915	0718	2354	47	51	120	04	LAKESIDE	WN			3.7	4			5
1915	0818	1405	48	39	121	24	NEWHALEM	WN			4.3	5			5
1915	1020	1730	45	29	116	45	FRUITA	OR			2.3	2			4
1915	1118	2342	45	52	122	40	LA CENTER	WN			4.3	5			5
1915	1210	2345	47	43	117	24	SPOKANE	WN			3.7	4			5
1916	0102	0252	47	16	122	19	AUBURN	WN			4.3	5			5
1916	0222	2245	48	48	122	36	ORCAS ISLE	WN			4.3	5			5
1916	0322	2315	47	22	121	47	CEDAR FALLS	WN			2.3	2			5
1916	0424	1443	47	12	122	14	SUMNER	WN			2.3	2			5
1916	0430	2315	43	37	116	14	BOISE CITY	ID			3.0	3			1

(no comment identified)

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EARTHQUAKES FOR 04/02/73
LATITUDE 43N TO 49N LONGITUDE 116W TO 124W

YEAR	DATE	TIME	LAT	LONG	LOCATION		M	OB	MC	INT	DEP	DUR	REF
1916	0517	1230	44	45	117 00	ROBINETTE	OR		5.7	7		10	1
1916	0528		44	45	117 48	BAKER	OR		3.8	3			4
1916	1121	1930	48	05	121 35	SILVERTON	WN		3.7	4			5
1917	0328	1705	46	48	122 00	ASHFORD	WN		4.3	5			5
1917	0601	1035	46	03	116 28	COTTONWOOD	ID		3.7	4		12	1
1917	0609	1430	46	48	122 00	ASHFORD	WN		4.3	5			5
1917	1112	1947	46	48	121 48	LONGMIRE	WN		4.3	5			5
1917	1114	2057	46	48	121 48	LONGMIRE	WN		4.3	5			5
1918	0213	0200	45	27	122 46	PORTLAND	OR		3.0	3			4
1918	0228	2315	46	30	120 30	YAKIMA	WN		4.3	5			5
1918	0312	1326	48		116 30	NORTHERN	ID		4.3	5		20	1
1918	0418	2113	46	40	117 30	WHITE BLUFF	WN		3.7	4		4	5
1918	0537	2115	48	12	121 30	SAUK RIVER	WN		3.7	4		5	5
1918	0621	0647	46	30	121 42	PACKWOOD	WN		4.3	5		2	5
1918	1101	1720	46	42	119 30	HANFORD RES	WN		5.0	6			5
1919	0606	0630	47	36	122 20	SEATTLE	WN		2.3	2			5
1919	1226	0600	45	20	122 20	BULLRUN	OR		3.7	4			4
1920	0124	0749	49	00	122 42	BLAINE	WN		5.7	7			5
1920	0302	0420	46	31	122 16	GLENOMA	WN		3.7	4			5
1920	1109	2020	45	29	122 48	PORTLAND	OR		3.8	3			4
1920	1128	1130	45	43	121 31	HOOD RIVER	OR		3.7	4			5
1920	1129	1410	47	41	117 24	SPOKANE	WN		2.3	2			5
1920	1215	1850	44	25	122 30	CASCADIA	OR		3.8	3			4
1921	0225	2000	44	25	122 25	CASCADIA	OR		4.3	5			4
1921	0304		45	29	122 46	PORTLAND	OR		2.3	2			4
1921	0304	2000	45	29	122 48	PORTLAND	OR		3.8	3			4
1921	0914	1103	46	04	118 20	WALLA WALLA	WN		5.0	6			5
1921	0914	1300	46	05	118 28	WALLA WALLA	WN		2.3	2			5
1921	0914	1355	46	03	118 28	WALLA WALLA	WN		2.3	2			5
1921	0914	1720	46	04	118 21	WALLA WALLA	WN		2.3	2			5
1921	0922	1920	45	29	122 47	PORTLAND	OR		3.7	4			4
1922	0131	1430	48	42	119 26	TONASKET	WN		3.8	3			5
1922	0131	19	48	39	118 44	REPUBLIC	WN		2.3	2			5
1922	0327	1615	45	29	122 47	PORTLAND	OR		3.7	4			4
1922	0515	1730	45	29	122 46	PORTLAND	OR		3.7	4			4
1922	0601	2330	47	40	117 24	SPOKANE	WN		3.7	4			5
1922	0705	1905	45	40	122 00	STAGLER	WN		3.7	4		20	5
1922	1016		45	50	119 14	HERMISTON	OR		2.3	2		3	4
1922	1016		45	50	119 14	HERMISTON	OR		2.3	2		1	4
1922	1016	3420	45	50	119 14	HERMISTON	OR		3.0	3		3	4
1922	1217		45	40	122 45	PENDLETON	OR		3.0	3			4
1923	0212	1830	48	00	122 42	BLAINE	WN		4.3	5			5
1923	0312	1515	48	30	122 37	ANACORTES	WN		3.7	4			5
1923	0714	2330	48	05	121 35	SILVERTON	WN		3.7	4			5
1923	0715	0212	48	05	121 35	SILVERTON	WN		3.7	4			5
1923	0715	1145	48	05	121 35	SILVERTON	WN		3.7	4			5
1923	09		47	45	121 48	SULTAN	WN		2.3	2			5
1924	0106	1309	46	04	118 20	WALLA WALLA	WN		3.7	4		6	5
1924	0106	2310	45	53	118 20	MILTON	OR		4.3	5			4
1924	0210		47	36	122 20	SEATTLE	WN		2.3	2			5

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LATITUDE 43N TO 49N LONGITUDE 116W TO 124W

YEAR	DATE	TIME	LAT	LONG	LOCATION		M	OB	MC	INT	DEP	DUR	REF
1924	0218	1405	47	36	122 20	SEATTLE	WN		2.3	2			5
1924	0425	1803	47	36	122 21	SEATTLE	WN		3.0	3		5	5
1924	0527		46	04	118 19	WALLA WALLA	WN		2.3	2			5
1924	0527		46	04	118 24	WALLA WALLA	WN		2.3	2			5
1924	0527		46	04	118 23	WALLA WALLA	WN		2.3	2			5
1924	0527	3019	46	04	118 20	WALLA WALLA	WN		3.7	4			5
1924	0919	1730	45	44	122 33	BRUSH PRAIR	WN		3.7	4			5
1925	0601	2305	48	07	123 27	PRT ANGELES	WN		3.7	4			5
1925	0814	1008	47	36	122 20	SEATTLE	WN		3.0	3			5
1925	1126	2140	48	30	123 15	HARO STRAIT	WN		3.0	3			5
1926	0411	1328	46	04	118 20	WALLA WALLA	WN		3.6	3			5
1926	0423	1356	46	04	118 20	WALLA WALLA	WN		3.7	4			5
1926	1017	1245	45	44	121 29	WHTE SALMON	WN		4.3	5			5
1926	1128	0125	47	30	116 00	COEURDALENE	ID		5.0	6			5
1926	1204	1355	48	30	122 37	ANACORTES	WN		4.3	5			5
1926	1230	1757	47	51	120 31	CHELAN	WN		5.0	6			5
1927	0103	0458	47	36	120 40	LEAVENWORTH	WN		4.3	5			4
1927	0405	0503	44	53	117 12	RICHLAND	OR		4.3	5			4
1927	0409	17	44	50	117 19	RICHLAND	OR		3.7	4			4
1927	0409	0930	44	49	117 05	RICHLAND	OR		3.7	4			4
1927	0409	1408	44	45	117 14	RICHLAND	OR		3.7	4			5
1928	0202	1252	47	48	121 42	START UP	WN		5.0	6			5
1928	0706	1530	46	06	121 36	SILVERTON	WN		2.3	2			5
1928	0904		44	38	123 54	NEWPORT	OR		3.7	4			5
1928	0904		48	18	121 36	DARRINGTON	WN		2.3	2			5
1928	0904		48	18	121 36	DARRINGTON	WN		2.3	2			5
1930	0617	0430	46	42	122 30	MINERAL	WN		2.3	2			5
1930	0617	1540	46	48	122 18	EATONVILLE	WN		3.0	3			5
1930	0616	0709	47	06	122 30	FAIRFAX	WN		2.3	2			5
1930	0707	0830	47	52	121 49	SULTAN	WN		3.0	3			5
1930	0716	2330	45	01	123 15	PERRYDALE	OR		3.0	3			5
1930	0719	0236	45	00	123 12	PERRYDALE	OR		5.0	6			4
1930	0819	0705	47	48	121 48	SULTAN	WN		3.7	4			5
1930	0903	1300	47	18	117 48	EHAN	WN		4.3	5			5
1931	0121	1710	47	52	121 49	SULTAN	WN		2.3	2			5
1931	0417	1200	48	13	120 05	TWISP	WN		2.3	2			5
1931	0418	0355	48	42	122 12	JELLINGHAM	WN		5.0	6			5
1931	0529	1710	47	52	121 49	SULTAN	WN		2.3	2			5
1931	0612	0730	47	53	121 49	SULTAN	WN		3.0	3			5
1931	0819	1505	47	52	121 49	SULTAN	WN		2.3	2			5
1931	0918	2320	47	50	120 04	LAKESIDE	WN		2.3	2			5
1931	1206	1429	47	50	120 04	LAKESIDE	WN		3.7	4			5
1931	1229	1827	47	52	121 48	SULTAN	WN		2.3	2			5
1931	1231	1525	47	38	123 06	ELOON	WN		5.0	6			5
1932	0105	2312	48	00	121 48	SILVERTON	WN		4.3	5			4
1932	0114	1618	45	29	122 46	PORTLAND	OR		3.7	4			5
1932	0121	1525	47	53	122 16	ALDERWOOD M	WN		3.6	3			5
1932	0211	1710	47	52	121 49	SULTAN	WN		3.0	3			5
1932	0219	2013	47	52	121 49	SULTAN	WN		3.6	3			5
1932	0229	1745	48	07	122 12	FLORENCE	WN		2.3	2			5

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YEAR	DATE	TIME	LAT	LONG	LOCATION		M OR MB	MC	INT	DEP	DUR	REF	
1932	0423	1320	48 30	122 14	SEDRO-WOOLY	WN		3.0	3				5
1932	0611	0255	48 18	121 46	FORTSON	WN		3.7	4				5
1932	0613	1830	47 52	121 49	SULTAN	WN		2.3	2				5
1932	0718	0601	48 00	121 48	SILVERTON	WN		5.7	7				5
1932	0826	2216	47 42	122 18	SEATTLE	WN		5.0	6				5
1932	0827	0600	48 00	121 48	SILVERTON	WN		4.3	5				5
1932	0815	1033	47 51	120 01	CHELAN	WN		3.0	3				5
1932	0825	1120	47 36	122 20	SEATTLE	WN		3.0	3				5
1932	0831	0750	47 52	121 49	SULTAN	WN		3.0	3				5
1932	0905	1830	47 50	120 04	LAKESIDE	WN		3.0	3				5
1932	0926	0705	47 52	121 49	SULTAN	WN		3.0	3				5
1932	1005	1900	48 38	122 37	ANACORTES	WN		3.7	4				5
1932	1005	1929	48 30	122 37	ANACORTES	WN		3.7	4				5
1932	1006	0045	48 51	122 36	FERNDALE	WN		3.0	3				5
1933	0103	0120	47 36	122 20	SEATTLE	WN		3.0	3				5
1933	0103	0600	47 36	122 20	SEATTLE	WN		3.7	4				5
1933	0129	1945	48 17	122 45	PT TOWNSEND	WN		3.0	3				5
1933	0318	1901	47 52	121 49	SULTAN	WN		3.0	3				5
1933	0429	1905	47 51	120 01	CHELAN-PATR	WN		3.0	3				5
1933	0529	2030	47 51	120 01	CHELAN	WN		3.0	3				5
1933	0531	2020	47 51	120 01	CHELAN	WN		3.7	4				5
1933	0531	2330	47 51	120 01	CHELAN	WN		2.3	2				5
1933	0822	1135	47 59	122 12	EVERETT	WN		3.7	4				5
1933	0822	1230	47 46	122 12	BOTHELL	WN		3.7	4				5
1933	0822	1235	47 36	122 20	SEATTLE	WN		3.7	4				5
1933	1123	1425	45 29	122 46	PORTLAND	OR		3.0	3				4
1934	0101		48 43	122 12	ACME	WN		3.0	3				5
1934	0206	1320	47 36	122 20	SEATTLE	WN		3.7	4				5
1934	0208	0960	47 52	121 49	SULTAN	WN		2.3	2				5
1934	0309	1600	47 50	120 04	LAKESIDE	WN		3.7	4				5
1934	0310	1553	47 48	119 59	CHELAN FALL	WN		3.0	3				5
1934	0318	0300	47 39	120 04	WATERVILLE	WN		3.0	3				5
1934	0428	1515	47 59	122 12	EVERETT	WN		2.3	2				5
1934	0428	2230	47 59	122 12	EVERETT	WN		3.7	4				5
1934	0429	1330	47 59	122 12	EVERETT	WN		3.7	4				5
1934	0429	0400	47 59	122 12	EVERETT	WN		2.3	2				5
1934	0429	0800	47 59	122 12	EVERETT	WN		2.3	2				5
1934	0505	1446	48	123	DISCOVERY B	WN		4.3	5				5
1934	0510		48 50	122 13	DEMING	WN		3.0	3				5
1934	0914		47 30	120 30	ELLENSBURG	WN		3.0	3				5
1934	0916		47 03	120 30	ELLENSBURG	WN		3.7	4				5
1934	0918		47 30	120 30	ELLENSBURG	WN		3.7	4				5
1934	0920		47 00	120 30	ELLENSBURG	WN		3.0	3				5
1934	0922		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	0924		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	0926		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	0928		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	0930		47 00	120 30	ELLENSBURG	WN		3.0	3				5
1934	1032		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1004		47 00	120 30	ELLENSBURG	WN		4.3	5				5

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YEAR	DATE	TIME	LAT	LONG	LOCATION		M OR MB	MC	INT	DEP	DUR	REF	
1934	1006		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1008		47 00	120 30	ELLENSBURG	WN		3.7	4				5
1934	1010		47 00	120 30	ELLENSBURG	WN		3.0	3				5
1934	1012		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1014		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1016		47 03	120 30	ELLENSBURG	WN		3.0	3				5
1934	1018		47 00	120 30	ELLENSBURG	WN		3.0	3				5
1934	1020		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1022		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1024		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1026		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1028		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1030		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1101		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1103	1450	48	123	DISCOVERY B	WN		4.3	5				5
1934	1104		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1107		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1110		47 00	120 30	ELLENSBURG	WN		4.3	5				5
1934	1113		47 02	120 30	ELLENSBURG	WN		4.3	5				5
1934	1116		47 00	120 30	ELLENSBURG	WN		3.7	4				5
1934	1119		47 00	120 30	ELLENSBURG	WN		3.7	4				5
1934	1122		47 00	120 30	ELLENSBURG	WN		3.0	3				5
1934	1125		47 00	120 30	ELLENSBURG	WN		3.0	3				5
1934	1128		47 00	120 30	ELLENSBURG	WN		3.0	3				5
1934	1252		47 00	120 30	ELLENSBURG	WN		3.0	3				5
1935	0206	1320	47 20	122 50	GRAPEVIEW	WN		3.7	4				5
1935	0217	0607	49 15	121 36	DARRINGTON	WN		3.0	3				5
1935	0729	2245	47 42	120 00	CHELAN	WN		4.3	5				5
1935	0724	1914	47 13	123 06	SHELTON	WN		2.3	2				5
1935	1212	1103	47 43	120 13	ENTIAT	WN		4.3	5				5
1935	1024	1157	47 20	120 32	ELLENSBURG	WN		2.3	2				5
1935	1031	11	47 25	120 19	MCNATCHEE	WN		2.3	2				5
1936	0222	1630	46 49	122 17	ALDER	WN		2.3	2				5
1936	0508		43 07	123 24	ROSEBURG	OR							4
1936	0620	1357	47 36	122 20	SEATTLE	WN		2.3	2				5
1936	0626	1156	47 46	122 12	BOTHELL	WN		2.3	2				5
1936	0716	2430	45 44	121 29	WHITE SALMON	WN		2.3	2				5
1936	0716	270748	46 03	118 30	MILTON	OR	5.8						7
1936	0716	2737	45 58	118 44	ATHENA	OR		3.0	3				4
1936	0716	1238	45 45	118 30	ATHENA	OR		3.0	3				4
1936	0717		46 04	118 20	WALLA WALLA	WN		2.3	2				5
1936	1718		45 55	118 17	MILTON-FREE	OR							4
1936	0718		45 55	118 18	MILTON-FREE	OR							4
1936	0718	1518	45 55	118 18	MILTON-FREE	OR		3.0	3				4
1936	0718	1633	45 55	118 17	MILTON-FREE	OR		4.3	5				4
1936	0720		46 04	118 20	WALLA WALLA	WN		2.3	2				5
1936	0725	1213	45 55	119 16	FREEWATER	OR		2.3	2				4
1936	0725	1730	45 55	118 15	FREEWATER	OR		2.3	2				4
1936	0721		46 03	118 25	UMAPINE	OR							4
1936	0724		47 36	122 20	SEATTLE	WN		2.3	2				5

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YEAR	DATE	TIME	LAT	LONG	LOCATION	M	OB	MC	INT	DEP	DUR	REF
1936	0725	0345	47 46	122 12	BOTHELL	WN		3.7	4			5
1936	0726	0900	47 36	122 20	SEATTLE	WN		2.3	2			5
1936	0730	1120	45 56	118 19	FREEWATER	OR		3.7	4			4
1936	0730	1200	45 56	118 18	FREEWATER	OR		3.7	4			4
1936	0730	1220	46 04	118 20	WALLA WALLA	WN		3.7	4			5
1936	08		46 04	118 20	WALLA WALLA	WN		2.3	2			5
1936	0804	0919	45 55	118 47	HELIX	OR		4.3	5			4
1936	0824	0950	45 56	118 17	MILTON-FREE	OR		3.0	3			4
1936	0824	2350	45 56	118 16	MILTON-FREE	OR		3.0	3			4
1936	0828	0439	45 57	118 19	MILTON-FREE	OR		4.3	5			4
1936	1117	1000	46 04	118 20	WALLA WALLA	WN		3.0	3			5
1936	1117	1930	46 04	118 20	WALLA WALLA	WN		3.0	3			5
1936	1117	12	46 04	118 20	WALLA WALLA	WN		3.0	3			5
1937	0208	2015	46 00	118 15	FERNDALE	OR		3.0	3			4
1937	0209	2220	46 04	118 20	WALLA WALLA	WN		3.7	4			5
1937	0604	1443	46 04	118 20	WALLA WALLA	WN		3.7	4			5
1937	0611	0022	47 40	117 24	SPOKANE	WN		2.3	2			5
1937	0926	1533	46 04	118 20	WALLA WALLA	WN		2.3	2			5
1937	0928	0815	47 34	121 53	FALL CITY	WN		2.3	2			5
1937	1101	1315	47 03	122 53	OLYMPIA	WN		3.7	4			5
1937	1111	1630	47 03	122 53	OLYMPIA	WN		3.0	3			5
1937	1127	0620	48 15	121 36	DARRINGTON	WN		2.3	2			5
1937	1214	09	44 52	123 15	DALLAS	OR		3.7	4			4
1937	1218		49 36	116 00	LUCILLE	ID		4.3	5			2
1937	1229	0201	47 55	122 23	POSSESSION	WN		2.3	2			5
1938	0103	1419	45 57	122 34	ARIEL DAM	WN		2.3	2			5
1938	0106	1311	47 48	122 24	EDMONDS	WN		4.3	5			4
1938	0430	0535	48 12	122 06	ARLINGTON	WN		2.3	2			5
1938	0509	0900	46 04	118 20	WALLA WALLA	WN		2.3	2			5
1938	0524	1742	46 04	118 20	WALLA WALLA	WN		2.3	2			5
1938	0524	1742	46 04	118 20	WALLA WALLA	WN		2.3	2			5
1938	0723	0250	46 10	123 50	ASTORIA	OR		3.7	4			4
1938	0811	1952	45 57	118 18	MILTON	OR		3.7	4			4
1938	1027	2310	45 57	118 17	MILTON	OR		3.7	4			4
1939	0126	2759	45 40	118 46	MISSION	OR		3.7	4			4
1939	0128	2048	47 49	122 53	QUILCENE	WN		2.3	2			5
1939	0206	1000	47 00	120 32	ELLENSBURG	WN		2.3	2			5
1939	0214	13	45 25	123 55	TILLAMOOK	OR		3.7	4			4
1939	0413	1945	45 33	122 48	PORTLAND	OR		3.0	3			4
1939	0722	16	47 59	122 21	CLINTON	WN		2.3	2			5
1939	1113	074554	47 12	123 30	SHELTON	WN		5.7	7			5
1939	1115		45 30	122 48	PORTLAND	OR		3.0	3			4
1939	1125	0915	47 43	119 59	CHELAN FALL	WN		2.3	2			5
1939	1129	1820	46 16	122 41	TOUTLE	WN		2.3	2			5
1939	1130	0700	47 48	119 59	CHELAN FALL	WN		2.3	2			5
1939	1130	1700	47 48	119 59	CHELAN FALL	WN		2.3	2			5
1939	1130	2319	47 48	119 59	CHELAN FALL	WN		2.3	2			5
1940	0106	08	47 19	119 33	EPHRATA	WN		2.3	2			5
1940	0323	0310	47 36	122 20	SEATTLE	WN		3.0	3			5
1940	0323	2330	47 12	122 18	PUYALLUP	WN		2.3	2			5

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EARTHQUAKES FOR 04/02/73
LATITUDE 43N TO 49N LONGITUDE 116W TO 124W

YEAR	DATE	TIME	LAT	LONG	LOCATION	M	OB	MC	INT	DEP	DUR	REF
1940	0324	0304	46 44	121 48	MT RAINIER	WN		3.7	4			5
1940	0324	18	47 24	121 24	HYAK	WN		2.3	2			5
1940	0425	1311	47 36	122 20	SEATTLE	WN		3.0	3			5
1940	0425	1902	47 36	122 20	SEATTLE	WN		2.3	2			5
1940	1027	2230	48 07	122 40	PT TOWNSEND	WN		4.3	5			5
1940	1114	0724	47 42	121 30	BARING	WN		3.0	3			5
1940	1119	07	47 14	122 26	TACOMA	WN		2.3	2			5
1940	1125	1100	47 14	122 26	TACOMA	WN		2.3	2			5
1940	1125	1247	47 14	122 26	TACOMA	WN		2.3	2			5
1940	1125	19	47 14	122 26	TACOMA	WN		2.3	2			5
1941	0103	2130	46 44	117 10	PULLMAN	WN		2.3	2			5
1941	0216		45 38	122 46	PORTLAND	OR		3.0	3			4
1941	0407	0810	48 39	118 44	REPUBLIC	WN		2.3	2			5
1941	0407	0925	48 18	119 36	MALOTT	WN		5.0	6			5
1941	0412	1740	47 39	120 04	WATERVILLE	WN		2.3	2			5
1941	0726	2000	45 24	122 55	TIGARD	OR		3.7	4			4
1941	0729	2017	47 40	117 24	SPOKANE	WN		2.3	2			5
1941	1223	1748	44 45	117 00	ROBINETTE	OR		3.7	4			4
1941	1223	2220	44 40	117 06	ROBINETTE	OR		3.7	4			4
1941	1229	1537	45 30	122 46	PORTLAND	OR		5.6	6			4
1942	0131	0654	48 30	123 00	SAN JUAN IS	WN		2.3	2			5
1942	0223	1503	47 25	120 19	WENATCHEE	WN		4.3	5			5
1942	0511	1150	48 57	122 27	LYNDEN	WN		2.3	2			5
1942	0511	2100	48 33	122 12	NOOKSACK	WN		2.3	2			5
1942	0513	0052	44 32	123 16	CORVALLIS	OR		4.3	5			4
1942	0612	0930	44 55	117 06	HALFWAY	OR		4.3	5			4
1942	0612	0935	44 55	116 52	PINE	OR		3.0	3			4
1942	0614	16	44 50	116 55	PINE	OR		3.0	3			4
1942	1014	1230	48 19	123 39	STEHEKIN	WN		4.2	5			5
1942	1101		48 00	116 42	SPIRIT LAKE	ID		5.0	6			2
1942	1101	1800	45 36	122 42	VANCOUVER	WN		4.3	5			5
1942	1101	1930	44 43	121 06	MADRAS	OR		3.7	4			4
1942	1101	1950	48 09	116 42	CLAGSTONE	ID		5.6	6			5
1942	1201	1435	47 48	120 13	ENTIAT	WN		2.3	2			5
1942	1215	0345	48 16	122 48	CLEAR LAKE	WN		2.3	2			5
1943	0414	1153	45 50	122 30	CLARK CO	WN		2.3	2			5
1943	0424	001046	47 18	120 36	WENATCHEE	WN		5.0	6			5
1943	0613	1420	47 48	120 13	ENTIAT	WN		2.3	2			5
1943	0624	1644	44 04	121 20	BEND	OR		3.0	3			4
1943	0712	0540	46 46	121 49	LONGMIRE	WN		2.3	2			5
1943	0814		43 20	117 35	ROCKVILLE	OR		3.0	3			4
1943	0827	0550	47 56	118 56	COULEE DAM	WN		2.3	2			5
1943	1006	1549	47 31	121 49	SNOQUALMIE	WN		4.3	5			5
1943	1029	1356	47 39	120 04	WATERVILLE	WN		2.3	2			5
1943	1027	1954	48 22	119 35	OKANOGAN	WN		2.3	2			5
1943	1129	0143	48 24	122 54	SAN JUAN IS	WN		5.0	6			5
1944	0109	122803	46 36	123 31	YAKIMA	WN		2.3	2			5
1944	0129	2730	47 43	119 59	CHELAN FALL	WN		2.3	2			5
1944	0303		47 36	122 20	SEATTLE	WN		3.0	3			5
1944	0305	09	44 55	123 30	DALLAS	OR		3.0	3			4

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YEAR	DATE	TIME	LAT	LONG	LOCATION		M	OB	MC	INT	DEP	OUR	REF	
1944	0305	1350	45	00	123 25	DALLAS	OR		4.3	5				4
1944	0331	3430	48	16	122 08	CLEAR LAKE	WN		2.3	2				5
1944	0331	2215	47		123	OLYMPIA	WN		4.3	5				5
1944	0401	3545	46	16	122 09	SPIRIT LAKE	WN		3.0	3				5
1944	0516	043030	47	30	121 47	NORTH BEND	WN		3.8	3				5
1944	0902	122514	46	04	118 20	WALLA WALLA	WN		3.7	4				5
1944	0908	071652	46	46	122 12	ELBE	WN		3.7	4				5
1944	0918	3914	47	03	122 53	OLYMPIA	WN		2.3	2				5
1944	0918	095237	47	03	122 53	OLYMPIA	WN		3.7	4				5
1944	0920	3300	43	12	117 05	ROCKVILLE	OR		3.7	4				4
1944	1007	1945	47	48	119 59	CHELAN FALL	WN		3.0	3				5
1944	1031	123429	47	48	120 36	ENTIAT	WN		4.3	5				5
1944	1207	3449	46	59	123 53	HOQUIAM	WN		5.0	6				5
1944	1225	141239	47	40	120 13	ENTIAT	WN		3.7	4				5
1945	0104	123449	47	40	120 13	ENTIAT	WN		4.3	5				5
1945	0128	050608	48	15	122 23	STANWOOD	WN		5.0	6				5
1945	0227	12	48	17	120 07	WINTHROP	WN		3.7	4				5
1945	0302	185459	47	40	120 13	ENTIAT	WN		3.7	4				5
1945	0429	211617	47	24	121 42	HUMPHREY	WN		5.7	7				5
1945	0430	184545	47	24	121 42	HUMPHREY	WN		5.0	6				5
1945	0531		47	24	121 42	HUMPHREY	WN		4.3	5				5
1945	0531	204604	47	24	121 42	HUMPHREY	WN		4.3	5				5
1945	0532	050143	47	30	121 47	NORTH BEND	WN		2.3	2				5
1945	0603	20	47	29	121 47	NORTH BEND	WN		2.3	2				5
1945	0615	232512	48	48	123 01	STRT GEORGA	WN		4.3	5				5
1945	0923	0340	46	04	118 20	WALLA WALLA	WN		3.7	4				5
1945	1112	1505	47	30	122 30	PUGET SOUND	WN		5.0	6				5
1945	1124	0030	46	36	121 40	PACKWOOD	WN		2.7	4				5
1946	0206	161242	47	51	120 31	CHELAN	WN		3.7	4				5
1946	0206	0320	48	32	121 26	MARBLEMOUNT	WN		3.7	4				5
1946	0206	1011	48	30	122 14	SEDRO-WOOLY	WN		3.7	4				5
1946	0215	031747	47	18	122 54	BELFAIR	WN		5.7	7				5
1946	0215	121715	46	52	122 16	EATONVILLE	WN		5.0	6				5
1946	0223	085453	47	03	122 52	OLYMPIA	WN		5.0	6				5
1946	0320	1427	47	32	122 02	ISSAQUAH	WN		4.3	5				5
1946	1227	1643	47	34	122 38	BREMERTON	WN		3.7	4				5
1947	0112	0943	47	31	121 49	SNOQUALMIE	WN		4.3	5				5
1947	0402	0058	47	03	122 53	OLYMPIA	WN		4.3	5				5
1947	0920	1630	47	12	122 18	PUYALLUP	WN		4.3	5				5
1947	1222	1030	47	40	120 13	ENTIAT	WN		3.7	4				5
1948	0113	3655	48	12	123 26	LUCERNE	WN		4.3	5				5
1948	0213	2103	46	38	123 04	ADNA	WN		3.7	4				5
1948	0301	1638	45	43	123 10	BUXTON	OR		3.7	4				4
1948	0313	2200	47	31	121 49	SNOQUALMIE	WN		4.3	5				5
1948	0807	0205	46	43	122 56	CHEHALIS	WN		3.0	3				5
1948	0828	2225	47	57	117 28	DEER PARK	WN		3.7	4				5
1948	0924	2235	47	51	122 35	PONT GAMBLE	WN		5.0	6				5
1944	1025	1950	47	51	120 31	CHELAN	WN		3.7	4				5
1948	1220	1619	45	03	120 10	FOSSIL	OR		3.7	4				4
1949	0206	1900	46	27	120 25	WAPATO	WN		3.0	3				5

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YEAR	DATE	TIME	LAT	LONG	LOCATION		M	OB	MC	INT	DEP	OUR	REF	
1949	0413	195541	47	06	122 42	OLYMPIA	WN		7.1		8			5
1949	0414		46	44	117 10	PULLMAN	WN			2.3	2			5
1949	0420	3645	46	16	122 41	TOUTLE	WN			2.3	2			5
1949	0527	3145	47	25	120 19	WENATCHEE	WN			3.0	3			5
1949	1020	1660	48	36	120 24	LOST RIVER	WN			3.7	4			5
1949	1129	1303	47	36	122 20	SEATTLE	WN			3.7	4			5
1950	0308	3625	47	40	120 13	ENTIAT	WN			3.7	4			5
1950	0414	110348	48	00	122 30	LANGLEY	WN			5.0	6			5
1950	0625	2345	47	30	117 35	CHENEY	WN			3.7	4			5
1950	1203	3157	47	57	122 18	MUKILTEO	WN			4.3	5			5
1951	0104	1345	47	51	120 01	CHELAN	WN			4.3	5			5
1951	0107	2245	45	55	119 14	HONARY	OR			4.3	5			4
1951	0325	1700	45	30	122 46	PORTLAND	OR			2.3	2			4
1951	0720	3745	48	03	122 11	MARYSVILLE	WN			3.0	3			5
1951	1009	225924	48	06	122 42	PT TOWNSEND	WN			3.7	4			5
1952	0220	190707	48	42	123 12	SAN JUAN IS	WN			3.7	4			5
1952	0221	3305	48	15	122 55	LOPEZ	WN			3.0	3			5
1952	0222	093631	48	36	123 06	SAN JUAN IS	WN			4.3	5			5
1952	0223		47	54	122 00	SNOHOMISH	WN			2.3	2			5
1952	0223	190750	47	54	122 00	SNOHOMISH	WN			3.7	4			5
1952	0304	1942	47	40	117 24	SPOKANE	WN			4.3	5			5
1952	0314	140936	48	36	123 06	SAN JUAN IS	WN			3.7	4			5
1952	0322	120134	47	42	122 24	PUGET SOUND	WN			3.0	3			5
1952	0727	195216	47	48	121 54	SULTAN	WN			3.7	4			5
1952	0727	2014	47	48	121 54	SULTAN	WN			3.7	4			5
1952	0729	201351	47	48	121 54	SULTAN	WN			2.3	2			5
1952	0806	1731	47	30	122 24	SEATTLE	WN			4.3	5			5
1952	0909		48	41	116 18	BONNERS FRY	ID			3.7	4			5
1952	0913	225541	48	42	122 12	BELLINGHAM	WN			2.3	2			5
1952	0922	172145	48	30	122 54	SAN JUAN IS	WN			2.3	2			5
1952	1012	170603	47	36	122 36	BREMERTON	WN			2.3	2			5
1952	1118	225403	47	36	121 36	SKYKOMISH	WN			2.3	2			5
1953	0224	193905	47	36	122 20	SEATTLE	WN			3.7	4			5
1953	0410	1107	47	00	124 00	GRAYS HARBR	WN			3.7	4			5
1953	0427	1530	46	36	121 40	PACKWOOD	WN			3.0	3			5
1953	0527	1733	48	30	122 14	SEDRO-WOOLY	WN			3.7	4			5
1953	0711	0015	47	36	122 20	SEATTLE	WN			2.3	2			5
1953	1216	043212	45	30	122 46	PORTLAND	OR			5.0	6			4
1954	0212	3123	45	15	122 40	CANBY	OR			2.3	2			4
1954	0316	155639	47	24	122 06	RENTON	WN			4.3	5			5
1954	0422		47	36	122 20	SEATTLE	WN			2.3	2			5
1954	0423		47	36	122 20	SEATTLE	WN			2.3	2			5
1954	0422	191926	45	06	122 54	PORTLAND	OR			3.7	4			4
1954	0424		47	36	122 20	SEATTLE	WN			2.3	2			5
1954	0426		47	36	122 20	SEATTLE	WN			2.3	2			5
1954	0505	1142	47	14	122 24	TACOMA	WN			4.3	5			5
1954	0515	170216	47	30	122 36	BREMERTON	WN			5.0	6			5
1954	0523	134142	48	13	120 05	TWISP	WN			4.3	5			5
1954	0617		45	30	116 06	LUCILLE	ID			4.3	5			2
1954	0618	150444	47	36	122 36	BREMERTON	WN			2.3	2			5

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YEAR	DATE	TIME	LATITUDE 43N TO 49N LAT	LONG	LONGITUDE 116W TO 124W LOCATION		M OB	MC	INT	DEP	DUR	REF
1954	1111	221512	46 41	123 44	RAYMOND	WN		3.8	3			5
1954	1111	2230	46 41	123 44	RAYMOND	WN		2.3	2			5
1955	0111	102008	48 00	123 36	PT ANGELES	WN		4.3	5			5
1955	0124		43 36	116 13	BOISE	ID		2.3	2			2
1955	0126		43 36	116 13	BOISE	ID		2.3	2			2
1955	0216	1900	47 57	118 59	GD COULEE D	WN		3.7	4			5
1955	0224	100850	47 54	123 00	DUILCENE	WN		3.0	3			5
1955	0326	065651	48 06	122 00	HARYSVILLE	WN		5.0	6			5
1955	0715		47 23	119 29	SOAP LAKE	WN		3.7	4			5
1955	1103	014026	48 06	121 42	SILVERTON	WN		4.3	5			5
1956	0107	042936	47 24	122 30	BREMERTON	WN		4.3	5			5
1956	0209	005711	48 24	122 36	SAN JUAN IS	WN		4.3	5			5
1956	0209	112835	48 18	122 36	SAN JUAN IS	WN		2.3	2			5
1956	0214	1355	48 07	122 45	PT TOWNSEND	WN		3.7	4			5
1956	0224	2200	47 54	119 00	ELECTRIC CY	WN		4.3	5			5
1956	0408	222812	48 24	123 18	JUAN DE FUC	WN		3.7	4			5
1956	0426	164822	47 36	122 18	SEATTLE	WN		3.8	3			5
1956	0722	205212	47 02	122 36	OLYMPIA	WN		2.3	2			5
1956	1118	035701	47 54	122 06	EVERETT	WN		2.3	2			5
1956	1118	144356	48 06	121 48	SILVERTON	WN		2.3	2			5
1956	1122	202336	48 54	122 24	LYNDEN	WN		2.3	2			5
1956	1126	000046	47 06	123 24	MCCLEARY	WN		2.3	2			5
1956	1215	1950	46 09	122 54	KELSO	WN		3.7	4			5
1957	0108	134612	47 54	122 48	DISCOVERY B	WN		2.3	2			5
1957	0126	011606	48 18	122 30	LA CONNER	WN		5.0	6			5
1957	0211	170556	47 30	121 42	SNOQUALMIE	WN		5.0	6			5
1957	0314	1116	48 46	122 29	BELLINGHAM	WN		3.7	4			5
1957	0322	2400	44 25	123 38	ALSEA	OR		3.0	3			4
1957	0514	110927	47 24	122 24	SEATTLE	WN		4.3	5			5
1957	0529	093557	47 30	123 12	OLYMPIC N P	WN		3.7	4			5
1957	0727	1723	47 30	121 47	NORTH BEND	WN		3.7	4			5
1957	1029	1530	46 52	122 16	EATONVILLE	WN		3.7	4			5
1957	1101	101200	47	121	CLIFFDELL	WN		4.3	5			5
1957	1117	060929	45 15	123 48	BEAVER	OR		5.0	6			4
1957	1129	0447	45 31	122 47	PORTLAND	OR		3.0	3			4
1957	1218		47 24	116 30	WALLACE	ID		5.0	6			2
1958	0106	0000	46 45	121 49	LONGMIRE	WN		3.7	4			5
1958	0313	012725	45 31	122 46	PORTLAND	OR		2.3	2			4
1958	0412	31	47 54	119 00	ELECTRIC CY	WN		3.7	4			5
1958	0412	223711	48	120	PATEROS	WN		5.0	6			5
1958	0522		44 38	116 00	CASCADE	ID		3.7	4			2
1958	0522	2013	48 36	121 00	DIABLO DAM	WN		3.7	4			5
1958	0713	0142	47 30	122 36	BREMERTON	WN		3.7	4			5
1958	0823	0500	48 35	122 54	ORCAS ISLE	WN		4.3	5			5
1958	0922	0735	46 46	122 02	ASHFORD	WN		3.7	4			5
1958	1007	050752	46 42	124 00	BAY CENTER	WN		5.0	6			5
1958	1118	2215	45 33	122 26	GRESHAM	OR		3.0	3			4
1959	0121	0715	46 04	118 20	WALLA WALLA	WN		3.7	4			5
1959	0713	052724	47 54	122 24	EVERETT	WN		2.3	2			5
1959	0804	2352	45 31	122 47	PORTLAND	OR		3.8	3			4

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YEAR	DATE	TIME	LATITUDE 43N TO 49N LAT	LONG	LONGITUDE 116W TO 124W LOCATION		M OB	MC	INT	DEP	DUR	REF
1959	0606	034435	47 54	120 00	CHELAN	WN		5.0	6			5
1959	0617	043610	47 46	120 00	WATERVILLE	WN		2.3	2			5
1959	0818	1808	47 51	120 01	CHELAN	WN		2.3	2			5
1959	1014	213539	47 48	122 00	WOODINVILLE	WN		4.3	5			5
1959	1109	2110	45 20	119 32	HEPPNER	OR		3.7	4			4
1959	1118	234851	48 30	122 37	ANACORTES	WN		3.0	3			5
1959	1119	043003	48 30	122 37	ANACORTES	WN		2.3	2			5
1959	1123	101525	46 42	121 42	MT RAINIER	WN		4.3	5			5
1959	1212	062417	48 42	123 18	SAN JUAN IS	WN		4.3	5			5
1960	0107	091604	46 42	122 42	RAINIER	WN		5.0	6			5
1960	0411	064739	47 36	122 48	BREMERTON	WN		5.0	6			5
1960	0511	3305	46 48	121 48	MT RAINIER	WN		3.0	3			5
1960	0530		47 51	121 58	MONROE	WN		2.3	2			5
1960	0614	1030	46 45	121 49	LONGMIRE	WN		3.0	3			5
1960	0615	1030	46 45	121 49	LONGMIRE	WN		2.3	2			5
1960	0616	103245	46 45	121 49	LONGMIRE	WN		3.7	4			5
1960	0717	235358	46 45	121 49	LONGMIRE	WN		2.3	2			5
1960	0726	172157	47 44	121 55	DUVALL	WN		2.3	2			5
1960	0816	132739	46 03	122 18	COUGAR	WN		2.3	2			5
1960	0910	150634	47 42	123 06	OLYMPIC N P	WN		5.0	6			5
1960	1011	1159	46 00	122 12	COUGAR	WN		3.7	4			5
1961	0103	1555	46 00	122 06	SWIFT RES	WN		3.7	4			5
1961	0104	0726	46 00	122 06	SWIFT RES	WN		4.3	5			5
1961	0104	1726	45 40	122 50	SCAPPOOSE	OR		3.7	4			4
1961	0106	02	46 00	122 06	SWIFT RES	WN		2.3	2			5
1961	0202	065018	46 42	122 48	DABOB BAY	WN		4.3	5			5
1961	0205	22	46 00	122 12	SWIFT RES	WN		2.3	2			5
1961	0210	0555	46 00	122 18	COUGAR	WN		2.3	2			5
1961	0221	0635	46 00	122 18	COUGAR	WN		2.3	2			5
1961	0522	015751	47 36	120 12	ORONDO	WN		3.7	4			5
1961	0526	0551	46 00	122 18	COUGAR	WN		3.7	4			5
1961	0602	1405	46 00	122 18	COUGAR	WN		3.0	3			5
1961	0628	102253	47 23	120 18	ROCKY REACH	WN		3.7	4			5
1961	0728	145244	46 00	122 06	SWIFT RES	WN		3.7	4			5
1961	0819	145624	44 42	122 30	MILL CITY	OR	4.5		6			9
1961	0909		45 42	123 12	ROOSEVELT	WN		2.3	2			5
1961	0916	032458	46 00	122 00				5.0	6	33	CGS	
1961	0917	155958	46 00	122 00				4.3	5	33	CGS	
1961	1011	033430	49 24	120 00	THISP	WN		4.3	5			5
1961	1107	012903	45 42	122 24				5.0	6	33	CGS	
1961	1107	1753	47 40	117 25	SPOKANE	WN		2.3	2			5
1961	1107	1805	47 40	117 25	SPOKANE	WN		2.3	2			5
1961	1107	2130	45 30	122 48	PORTLAND	OR		4.3	5			9
1961	1129	1354	45 42	122 54	SCAPPOOSE	OR		2.3	2			5
1961	1129	1135	45 25	122 48	PORTLAND	OR		3.7	4			4
1961	1129	1153	45 42	122 54	SCAPPOOSE	OR		2.3	2			5
1961	1130	081249	47 36	122 30	SEATTLE	WN		3.7	4			5
1961	1215	1135	45 45	122 52	SCAPPOOSE	OR		3.0	3			9
1962	0115	052845	47 49	120 12	HANSON	WN		5.0	6			5
1962	0716	1400	47 00	122 54	OLYMPIA	WN		3.7	4			5

Amendment 3
(June 1974)

(no comment identified)

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TABLE B-1

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EARTHQUAKES FOR 04/02/73
LATITUDE 43N TO 49N LONGITUDE 116W TO 124W

YEAR	DATE	TIME	LAT	LONG	LOCATION		M OB	MC	INT	DEP	DUR	REF
1962	0511	1653	46 00	123 30	VESPER	OR		5.0	6			5
1962	0905	053706	44 30	122 54	LEBANON	OR	3.5		4			9
1962	0912	2313	46 00	122 12	SWIFT RES	WN		3.8	3			5
1962	1017	1833	45 20	122 38	WEST LINN	OR		2.3	2			9
1962	1018	135632	44 36	116 00						33		CGS-B
1962	1103	1742	46 30	122 16	COUGAR	WN		3.7	4			5
1962	1106	033646	45 33	122 36	PORTLAND	OR	5.0		7			9
1962	1106	1330	45 54	122 42	WOODLAND	WN		2.3	2			5
1962	1109	1353	46 00	122 12	SWIFT DAM	WN		3.7	4			5
1962	1109	1412	46 00	122 12	SWIFT DAM	WN		2.3	2			5
1962	1231	204935	47 06	122 00				5.0	6	33		CGS-B
1963	0131	2230	47 00	122 00	CARBONADO	WN		2.3	2			5
1963	0124	214311	47 36	122 06				5.0	6	17		CGS-B
1963	0125	0639	46 46	122 20	LA GRANDE	WN		3.8	3			5
1963	0302	1630	45 33	122 36	PORTLAND	OR		3.7	4			9
1963	0307	235325	44 54	123 30			4.6		5	33		CGS-B
1963	0905	1555	46 00	122 12	SWIFT DAM	WN		2.3	2			5
1963	0906	192555	44 48	117 06						33		CGS-B
1963	1222	025408	48 30	119 54				4.3	5	33		CGS-B
1963	1227	023621	45 42	123 24			4.5		6	33		CGS-B
1964	0115	230636	45 54	120 00						33		CGS-B
1964	0126	214043	46 06	122 24	COUGAR	WN		4.3	5			5
1964	0320	1647	46 00	122 12	SWIFT DAM	WN		2.3	2			5
1964	0714	155003	48 54	122 30	LYNDEN	WN	5.0		6			5
1964	0730	153315	47 42	122 36	SCENIC	WN	3.5		5			5
1964	1001	123124	45 42	122 48			5.3		5	33		CGS-B
1964	1015	143237	47 42	122 06			4.1		5	33		CGS-B
1964	1017	123418	47 36	122 06	REDMOND	WN	3.4		3			5
1964	1018	120234	47 54	121 54	LK STEVENS	WN	3.5		4			5
1965	0429	152843	47 24	122 24			6.5		8	57		CGS-B
1965	0819	210215	44 36	118 24			4.4			33		CGS-B
1965	1023	162759	47 30	122 24			4.8		5	23		CGS-B
1965	1023	162759	47 30	122 24	SEATTLE	WN	4.8		5			5
1965	1107	164147	44 54	117 00			4.3			5		CGS-B
1966	0225	145730	44 42	116 06			3.5			33		CGS-B
1966	0531	010623	46 30	116 24						33		CGS-B
1966	0611	173403	47 54	122 36	HANSVILLE	WN	3.7		4			10
1966	0624	1745	47 12	122 24	TACOMA	WN		2.3	2			10
1966	0723	015748	47 12	119 30			4.3			33		CGS-B
1966	0730	160238	47 12	122 06			3.4			16		CGS-B
1966	0817	144833	48 00	123 36			3.5			33		CGS-B
1966	1121	072253	47 36	122 18				3.6	3			10
1966	1206	105054	47 54	119 06						33		CGS-B
1966	1224	050212	47 54	121 48			3.2		3			10
1966	1230	035140	44 54	117 00			4.2			10		CGS-B
1967	0118	065926	47 18	122 34			3.6		4	22		CGS-B
1967	0213	192220	46 10	119 50						33		CGS-B
1967	0307	175106	47 51	122 39			4.2		5	35		CGS-B
1967	0525	232234	48 06	122 48			4.5			35		CGSPDE
1967	0606	171257	48 12	119 06			3.9			33		CGSPDE

(no comment identified)

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EARTHQUAKES FOR 04/02/73
LATITUDE 43N TO 49N LONGITUDE 116W TO 124W

YEAR	DATE	TIME	LAT	LONG	LOCATION		M OB	MC	INT	DEP	DUR	REF
1967	0805	111154	46 06	120 00						33		CGSPDE
1967	0805	144606	44 54	118 00			3.5			33		CGSPDE
1967	1218	2140	47 27	122 20	S. SEATTLE	WN	2.7		3			10
1968	0127	082825	45 36	122 36	PORTLAND	OR	3.7		4	37		9
1968	0306	131535	47 37	122 10	KIRKLAND	WN	2.0		3			10
1968	0412	102607	48 48	116 18						22		CGSPDE
1968	0513	135217	45 36	122 36	PORTLAND	OR	3.8		4			9
1968	0619	065144	47 30	122 06	ISSAQUAH	WN	4.7		4			10
1968	0906	121630	47 48	122 48	DABOB BAY	WN	4.3		5			10
1968	0925	200935	47 48	122 42	DABOB BAY	WN	2.5		4			10
1968	1126	144035	46 29	122 26			4.3			13		CGS 96
1969	0214	083336	48 56	123 05			4.2		5	33		CGS 11
1969	0325	114307	45 38	122 49	PORTLAND	OR	3.5		3			9
1969	0611	214595	48 51	121 58			3.6			33		CGS 45
1969	0813	160441	48 30	122 30	SAMISH BAY	WN	2.0		3			10
1969	0813	185349	48 30	122 30	SAMISH BAY	WN	2.5		3			10
1969	0814	143739	45 00	117 46	MEDICAL SP	OR	3.6		6	33		9
1969	0819	154249	48 30	122 30	SAMISH BAY	WN	2.5		3			10
1969	1009	170757	46 51	121 34			4.4		6	33		CGS 69
1969	1101	154424	47 51	121 43			4.1		5	5		CGS 75
1969	1110	073844	48 32	121 31			4.3		5	33		CGS 75
1969	1128	095134	47 23	122 31						33		CGS 81
1970	0210	252111	47 42	122 20	KINGSTON	WN	2.5		5			10
1970	0212	375225	44 39	122 44			2.5		1			9
1970	0518	052954	46 34	122 45			4.0			11		CGS 42
1970	0625	074628	45 30	122 45	W. PORTLAND	OR	3.6		4			9
1970	1024	223207	47 20	122 25	KENT	WN	4.0		4			10
1971	0114	382936	47 24	123 36	QUINAULT	WN	3.8		3			10

M OB Observed Magnitude (body wave magnitude as reported by cited reference)

MC Calculated magnitude (computed from intensity: $M_B = 1 + (2/3)I$)

INT Intensity (as reported by reference)

DEP Depth in kilometers

DUR Duration in seconds

REF Reference (see Reference List following this table)

(no comment identified)

9 0 1 1 7 4 2 0 6 7 8

1. G. P. Woollard, Catalogue of Earthquakes in the United States Prior to 1925, Hawaii Inst. of Geophysics Data Report No. 10 (June 1965).

2. N. H. Rasmussen, Seismology Report on Washington, Idaho, Northern California, and the Hanford Area, Washington, to Douglas United Nuclear, Inc., Richland, Washington (May 3, 1966).

3. S. D. Townley and M. W. Allen, Descriptive Catalog of Earthquakes of the Pacific Coast of the United States 1769 to 1928, Bull. of Seismol. Soc. of Amer., Vol 29(1) (January 1939).

4. J. W. Berg and C. D. Baker, Oregon Earthquakes, 1841 Through 1958, Bull. of Seismol. Soc. of Amer., Vol 53(1) (January 1963).

5. N. H. Rasmussen, Washington State Earthquakes, 1840 Through 1965, Bull. of Seismol. Soc. of Amer., Vol 57(3) (June 1967).

9. R. W. Couch and R. P. Lowell, Earthquakes and Seismic Energy Release in Oregon, The ORE BIN, Vol 33(4) (April 1971).

10. N. H. Rasmussen, Unpublished Additions to Washington State Earthquake List, June 1966 to February 1971 (1971).

CGSxxx NOAA Earthquake Hypocenter Data Tape for Period 1961-1970 (number following CGS indicates the PDE number; CGSxxx replaced by NOSxxx recently).

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(no comment identified)

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HISTORIC EARTHQUAKES 1833 TO 1971
WITHIN 100 MILES OF SITE

YEAR	DATE	TIME	LAT	LONG	LOCATION		M OB	MC	INT	DEP	DUR	REF[a]
1866	1124	1810	45 36	121 12	The Dalles	Or		3.7	4			1
1866	12		45 36	121 09	The Dalles	Or		3.0	3			1
1872	12		46 04	118 20	Walla Walla	Wn		2.3	2			2
1874	01		46 36	120 31	Yakima	Wn		2.3	2			2
1875	0506	2330	46 36	120 31	Yakima	Wn		2.3	2			2
1875	0506	2335	46 36	120 31	Yakima	Wn		2.3	2			3
1877	1012	17	45 45	121 50	Cascades	Or		6.3	8			4
1887	0429		46 04	118 20	Walla Walla	Wn		2.3	2			5
1892	0229	1045	45 36	121 09	The Dalles	Or		3.7	4			4
1893	0307	0103	45 54	119 24	Umatilla	Or		5.7	7			4
1896	0826		45 18	121 42	Mount Hood	Or		2.3	2			4
1902	1205	04	45 45	121 33	Hood River	Or		2.3	2			4
1911	0705	08	47 00	120 32	Ellensburg	Wn		4.3	5			5
1915	0118		45 30	118 00	Summerville	Or		3.0	3			4
1918	0418	2113	46 40	117 30	White Bluff	Wn		3.7	4	4		5
1918	0621	0647	46 30	121 42	Packwood	Wn		4.3	5	2		5
1918	1101	1720	46 42	119 30	Hanford Res	Wn		5.0	6			5
1920	1128	1130	45 43	121 31	Hood River	Or		3.7	4			5
1921	0914	1100	46 04	118 20	Walla Walla	Wn		5.0	6			5
1921	0914	1300	46 05	118 20	Walla Walla	Wn		2.3	2			5
1921	0914	1305	46 03	118 20	Walla Walla	Wn		2.3	2			5
1921	0914	1320	46 04	118 21	Walla Walla	Wn		2.3	2			5
1922	1016		45 50	119 14	Hermiston	Or		2.3	2	3		4
1922	1016		45 50	119 14	Hermiston	Or		2.3	2	1		4
1922	1016	0420	45 50	119 14	Hermiston	Or		3.0	3	3		4
1922	1212		45 40	122 45	Pendleton	Or		3.0	3			4
1924	0106	1309	46 04	118 20	Walla Walla	Wn		3.7	4	6		5
1924	0106	2310	45 50	118 20	Milton	Or		4.3	5			4
1924	0527		46 04	118 19	Walla Walla	Wn		2.3	2			5
1924	0527		46 04	118 20	Walla Walla	Wn		2.3	2			5
1924	0527		46 04	118 20	Walla Walla	Wn		2.3	2			5
1924	0527	0019	46 04	118 20	Walla Walla	Wn		3.7	4			5
1926	0411	0328	46 04	118 20	Walla Walla	Wn		3.0	3			5
1926	0423	1356	46 04	118 20	Walla Walla	Wn		3.7	4			5
1926	1017	0245	45 44	121 29	White Salmon	Wn		4.3	5			5
1934	0914		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	0916		47 00	120 30	Ellensburg	Wn		3.7	4			5
1934	0918		47 00	120 30	Ellensburg	Wn		3.7	4			5
1934	0920		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	0922		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	0924		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	0926		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	0928		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	0930		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	1002		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1004		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1006		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1008		47 00	120 30	Ellensburg	Wn		3.7	4			5
1934	1010		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	1012		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1014		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1016		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	1018		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	1020		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1022		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1024		47 00	120 30	Ellensburg	Wn		4.3	5			5

[a] See list of references at end of table.

(no comment identified)

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TABLE 8-2

YEAR	DATE	TIME	LAT	LONG	LOCATION		M OB	MC	INT	DEP	QUR	REF
1934	1026		47 00	120 36	Ellensburg	Wn		4.3	5			5
1934	1020		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1030		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1101		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1104		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1107		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1110		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1113		47 00	120 30	Ellensburg	Wn		4.3	5			5
1934	1116		47 00	120 30	Ellensburg	Wn		3.7	4			5
1934	1119		47 00	120 30	Ellensburg	Wn		3.7	4			5
1934	1122		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	1125		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	1128		47 00	120 30	Ellensburg	Wn		3.0	3			5
1934	1202		47 00	120 30	Ellensburg	Wn		3.0	3			5
1935	1024	1157	47 00	120 32	Ellensburg	Wn		2.3	2			5
1936	0716	0430	45 44	121 29	White Salmon	Wn		2.3	2			5
1936	0716	0707	46 00	118 30	Milton	Or	5.8		7			4
1936	0716	0737	45 50	118 40	Athena	Or		3.0	3			4
1936	0716	1230	45 45	118 30	Athena	Or		3.0	3			4
1936	0717		46 04	118 20	Walla Walla	Wn		2.3	2			5
1936	0718		45 55	118 17	Milton-Free	Or						4
1936	0718		45 55	118 18	Milton-Free	Or						4
1936	0718	1510	45 55	118 18	Milton-Free	Or		3.0	3			4
1936	0718	1630	45 55	118 17	Milton-Free	Or		4.3	5			4
1936	0720		46 04	118 20	Walla Walla	Wn		2.3	2			5
1936	0720	1210	45 55	118 16	Freewater	Or		2.3	2			4
1936	0720	1730	45 55	118 15	Freewater	Or		2.3	2			4
1936	0721		46 00	119 25	Umapine	Or						4
1936	0730	1120	45 56	118 19	Freewater	Or		3.7	4			4
1936	0730	1200	45 56	118 18	Freewater	Or		3.7	4			4
1936	0730	1220	46 04	118 20	Walla Walla	Wn		3.7	4			5
1936	08		46 04	118 20	Walla Walla	Wn		2.3	2			5
1936	0804	0919	45 55	118 47	Helix	Or		4.3	5			4
1936	0824	0950	45 56	118 17	Milton-Free	Or		3.0	3			4
1936	0824	2050	45 56	118 16	Milton-Free	Or		3.0	3			4
1936	0828	0439	45 57	118 19	Milton-Free	Or		4.3	5			4
1936	1117	1000	46 04	118 20	Walla Walla	Wn		3.0	3			5
1936	1117	1030	46 04	118 20	Walla Walla	Wn		3.0	3			5
1936	1117	12	46 04	118 20	Walla Walla	Wn		3.0	3			5
1937	0209	2220	46 04	118 20	Walla Walla	Wn		3.7	4			5
1937	0604	1443	46 04	118 20	Walla Walla	Wn		3.7	4			5
1937	0920	1633	46 04	118 20	Walla Walla	Wn		2.3	2			5
1938	0509	0900	46 04	118 20	Walla Walla	Wn		2.3	2			5
1938	0524	1742	46 04	118 20	Walla Walla	Wn		2.3	2			5
1938	0524	1742	46 04	118 20	Walla Walla	Wn		2.3	2			5
1938	0811	1852	45 57	118 18	Milton	Or		3.7	4			4
1938	1027	2310	45 57	118 17	Milton	Or		3.7	4			4
1939	0206	1000	47 00	120 32	Ellensburg	Wn		2.3	2			5
1942	1101	1930	44 40	121 08	Madras	Or		3.7	4			4
1944	0109	1228	46 36	120 31	Yakima	Wn		2.3	2			5
1944	0902	0225	46 04	118 20	Walla Walla	Wn		3.7	4			5
1945	0923	0340	46 04	118 20	Walla Walla	Wn		3.7	4			5
1948	1220	1618	45 03	120 10	Fossil	Or		3.7	4			4
1949	0206	1900	46 27	120 25	Wapato	Wn		3.0	3			5
1959	0121	0715	46 04	118 20	Walla Walla	Wn		3.7	4			5
1959	1109	2110	45 20	119 32	Heppner	Or		3.7	4			4
1963	0125	0635	46 46	122 20	La Grande	Or		3.0	3			5
966	0723	0157	47 12	119 30			4.3			33		CGS-B
1967	0213	1832	46 10	119 50						33		CGS-B
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Amendment 1
(June 1974)

(no comment identified)

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Amendment 3
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(no comment identified)

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1-60 Blacker House
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Pasadena, CA 91126
August 5, 1986

R. A. Holten
DOE Richland Operations Office
EIS, Waste Management Division
Richland, WA 99352

Dear R. A. Holten:

As a science student, I have become very interested in the management of technology especially in light of political concerns. I am a Washington State resident, and upon coming home for the summer I learned of the release of the Draft EIS analyzing various disposal options for radioactive waste at Hanford.

I have read or skimmed the complete document this summer. I am disappointed with parts of the Draft EIS. It lacks the scientific tightness and accuracy required by respected technical journals. I believe the quality of environmental impact statements should live up to these standards. If it is to be accepted as a thorough and accurate analysis of Hanford waste storage methods, the final EIS must meet the highest standards.

My specific comments on the Draft EIS are enclosed.

Thank you for including public opinions in considerations for waste disposal alternatives. Allowing public input is an important part of the American system.

Sincerely,

Dawn Y. Sumner

Dawn Y. Sumner

cc: Jolene Unsoeld
Washington State House of Representatives

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(no comment identified)

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Analysis of

DRAFT EIS - HANFORD WASTE DISPOSAL

August 5, 1986

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California Institute of Technology
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DRAFT EIS - HANFORD WASTE DISPOSAL

This analysis consists of two parts. The first includes specific technical weaknesses and inaccuracies. The second section covers general concerns about the content and approach of the report.

TECHNICAL CONCERNS

Technical oversights and inaccuracies occur throughout the Draft EIS. The following is a partial list of problems I spotted while reviewing this document. The location of the text in question is listed first. Then the problem is stated and explained.

Appendix D: Transportable Grout Facility

GROUT SAFETY NOT ADDRESSED IF THE CLIMATE BECOMES 10% WETTER. In Volume 1 of the Draft EIS, it states that the safety of all alternatives would be also be considered for a 10% increase in climate moisture. This was not done in connection with grout immobilization which is part of the reference disposal alternative. This section simply states, "The grout waste form, cured and covered with a protective barrier, can be expected to isolate the waste in the arid Hanford environment for a long time." (section D.3.5 Solidification) It is imperative that increased moisture be considered in this case because the lifetime of grout is very dependent on the extent of its contact with water. 3.1.8.7

THE PROPOSED IMMOBILIZATION OF COMPLEXED CONCENTRATE WASTE IN GROUT. This waste is to be treated for the removal of strontium and cesium before being mixed with other grout ingredients. If, for any reason, the 3.1.8.6

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strontium and/or cesium are not fully removed, the lifetime of the grout will decrease greatly. These two elements are the greatest heat producers among Hanford nuclear wastes. Grout, which includes large amounts of water within its structure, would decompose very quickly in a hot environment, especially if in contact with hot water. Additional problems arise with the release of strontium 90 to the environment. This element, when ingested, attaches itself to bone marrow in the place of calcium making it an extremely hazardous radiation source.

Appendix M: Protective Barrier Analysis

DEPENDENCE ON THE EFFECTIVENESS OF A BARRIER SYSTEM. Section M.1 of this appendix states "multilayer barriers may be effective for disposal of high-level waste at arid sites." (from Winograd 1981 according to the Draft EIS) Extreme uncertainty exists concerning the effectiveness of all current barrier designs. The rest of the document, however, assumes the durability and the dependability of these systems. It is unsafe to assume the development of a specific safety device in considering the dangers of a waste disposal alternative. Each method for the disposal of Hanford's nuclear waste must be able to stand on its own merits without depending on the protection of an uncertain barrier system. 3.5.1.8

NARROW SCOPE OF FAILURE SCENARIOS. The Draft EIS addresses a 10% barrier failure and a 50% barrier failure. It fails to address the continued erosion of the system once the failure has occurred. If 50% of a barrier is lost within the first 1,000 years after disposal, the Draft EIS has not addressed the 9,000 years of continued erosion to the barrier. A damaged barrier would be particularly susceptible to decay from wind and water. Another situation in which the effectiveness of a barrier would be reduced, involves the burrowing of animals. Rodents could dig down to the level of the riprap through the fines at the top. This would expose the waste to more water percolation than predicted. 3.5.1.95

Appendix R: ASSESSMENT OF LONG-TERM PERFORMANCE ...

FURTHER DETAILED ANALYSIS NECESSARY FOR SEVERAL TOPICS. Sufficient information on flooding possibilities is not given. A 100-year flood scenario is presented, yet its effects are not mentioned. The possibility of many 100-year floods must be considered since the waste should stay immobilized for at least 10,000 years. 3.5.6.4

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3.5.6.32 Further study is also needed concerning seismology. A 135 year earthquake record is not enough to base predictions for lack of seismological activity at Hanford for 10,000 years. The subduction zone off the Washington coast puts pressure on the Columbia Basalt flows that lie beneath Hanford. If the pressure grows, earthquakes become more likely to occur. This pressure could also make a deep geologic repository on site extremely hazardous. The third area needing greater attention is the possibility of damage sustained during a war or from terrorism. Since Hanford is a key defense plant, it could easily be the target of an attacking force. The release of waste radioactivity must be considered in the event of a conventional bombing raid or a similar attack. In a non-nuclear raid, the release of any stored radioactivity would greatly increase the damages sustained to the public.

3.4.3.7

3.5.6.8 UNIFORM RESETTLING OF FLOOD DISTURBED WASTES. In R.8 Glacial Flooding, it is assumed that a huge flood would evenly redeposit wastes throughout the Pasco Basin. Wastes immobilized in grout or glass would not evenly distribute over the flooded area. Such a flood could wash up large pieces of glass or grout, but it would not shatter them enough to evenly distribute the radioactivity. Thus large concentrations of waste would occur at the surface of the basin possibly causing tremendous damage.

Appendix S: Radionuclide Release and Transport

3.5.6.47 FIGURE S.3. PROBABILISTIC SCENARIO TREE AND ASSOCIATED COPY. This figure assumes the probability of the climate becoming dryer is 90% while the rest of the document states that the climate is much more likely to become more moist.

GENERAL CONCERNS

Certain general problems show up repeatedly in the Draft EIS concerning the disposal of Hanford nuclear wastes. They concern aspects of radioactive waste disposal that are either left out or inconsistent within the document itself.

The most critical of these problems is the continual impression that the analyses are good for only the first few hundred years after the waste is disposed of. The contain-

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ment facilities have to last for 10,000 years according to the Draft EIS itself. Yet none of the failure scenarios includes more than one cause of radiation release. Conceivably, in this length of time, more than one damaging event could occur. A second event would have a much greater impact if it affected an already damaged disposal site. The scenarios also do not include erosion sustained after the initial event. Once a site is damaged it is much more susceptible to conditions that would not significantly affect an undamaged sight. The Draft EIS also shows too much trust placed on estimated timing of predicted events. Continental glaciation will occur again in a region that would affect Hanford, yet the Draft EIS does not satisfactorily address this danger because its occurrence is predicted at 15,000 years from now. This type of attitude is dangerous. Geologic and atmospheric conditions have many hidden variables and are extremely difficult to estimate accurately. All conceivable conditions beyond 10,000 years should also be taken into consideration in the safety of a waste disposal system.

3.5.6.14

3.5.6.14

Another point that shows lack of understanding of the nuclear waste time scale is the attitude that the release of nuclear waste would be a "small devastation" compared to the catastrophic event that would release it. At the time of the event, it may have little influence. The effects of radioactive nuclides, however, would outlast the effects of something such as a huge glacial flood. If a large waste

3.5.6.9

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release occurred about 5,000 years after disposal, the waste would still be highly radioactive for several thousand

3.5.6.9 years. The length of time necessary for the waste to decay is much greater than the time it normally takes for an area to recover from a natural catastrophe. The presence of radioactivity would greatly complicate the recovery of the area.

The absence of detailed analysis of chemical wastes mixed with radioactive ones is an alarming oversight. In both the vitrification and grout stabilization processes it

3.1.6.1 was stated that some wastes may not be suited for that method of stabilization due to chemical composition. These problems should be addressed in depth in the final EIS. Chemical properties are a major cause of the extreme danger of radiation. The issue of chemistry and its effects on each of the disposal alternatives must be thoroughly studied before any attempt is made to reach a conclusive decision concerning the disposal processes.

Inconsistency is a problem cutting down the credibility of the Draft EIS. The most obvious case is that of future weather predictions. The beginning of the document says all alternatives will be studied with a 10% increase in mois-

3.5.6.1 ture. Some of the analyses, however, do not address a change in climate at all. Others even assume a dryer climate is more likely. This inconsistency is unacceptable in a scientific document, especially one of this importance. A review of the EIS by a committee checking for such prob-

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lems should eliminate them and would add to the credibility of the statement.

As a department using new technologies and scientific methods, the DOE could take a prominent role in the scientific community. At the very beginning of the Nuclear Age, the Manhatten Project was a tremendous show of cooperation between the United States government and top American scientists. This same cooperation is now needed to properly dispose of the nuclear waste. The safety of a permanent waste disposal site is of the upmost importance. I strongly recommend that a panel of independent technical experts review the final EIS before publication. This would help insure the technical accuracy of the document as well as the safety and viability of the chosen disposal alternatives.

2.3.2.9

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COLUMBIA RIVER INTER-TRIBAL FISH COMMISSION
975 S.E. Sandy Boulevard, Suite 202, Portland, Oregon 97214 Telephone (503) 238-0667

8 August, 1986

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Mr. R. A. Holten
DOE Richland Operations Office
Waste Management Division,
Richland, WA 99352

Dear Mr. Holten:

The Columbia River Intertribal Fish Commission is composed of the Fish and Wildlife Committees of the confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes and Bands of the Yakima Indian Nation, the confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe. These four tribes have rights reserved by treaty to take fish tht pass their usual and accustomed fishing places in the Columbia River basin. All of the tribes also have reservations within the basin. The tribes are directly affected by any nuclear activities in the area.

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The Commission has, therefore, commented on DOE's Draft Environmental Impact Statement on the "Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes. The following Sections detail the Commission's assessement of the DEIS' compliance with the National Environmental Policy Act.

Cumulative Impacts

2.3.1.14

The CEQ regulations implementing NEPA and the NEPA case law clearly establish the obligation of agencies with projects significantly affecting the environment to consider and analyze in their EISs the cumulative impacts that will flow from their projects in conjuntion with other related activities. 40 CFR 1508.25(c)(3). The DEIS section on cumulative effects fails in a number of crucial respects to do this.

These omitted or inadequately addressed issues include: 1) the effects of the military waste in combination with those of other nuclear activities in the area, 2) as affect non-human resources, and 3) as will be compounded over time. The following sections explain these errors and omissions in greater detail.

The DEIS Fails to Cumulate the Effects of the Proposed Project with Those of Other Nuclear Projects in the Area

The military waste project at Hanford is only one of numerous radioactive developments in the immediate area. As the DEIS explains, DOE also runs the N reactor, PUREX, the waste fractionation plant, and the uranium recovery process plant on the Hanford reservation. DEIS at 3.2- 3.4. Along with these functioning installations one must consider the various abandoned but nonetheless radioactive structures that DOE has operated in the past. Id. On the waste side, the State of Washington leases land within the Hanford Reservation which it uses for storage of low level wastes from its own nuclear activities as well as those of other states. FEIS, Waste Management Operations, Hanford Reservation at vol. I, p. II.1-I. (ERDA 1538). DOE is also responsible for large quantities of low level nuclear waste not a primary focus of this DEIS. DEIS at ix, 2.3. However, because these wastes are clearly sources of radioactivity affecting the local population and environment, their contribution to the total sum of Hanford area radioactivity must be considered. NRDC v. Calloway, 524 F.2d 79, 88 (2d Cir. 1975), National Wildlife Federation v. U.S. Forest Service, 592 F. Supp. 931, 941 (D. Or. 1984). The Washington Public Power Supply System maintains WPPSS plant number two and anticipates the startup of plant one, both of which will, through their operation and waste storage, add to the area's radiation load. Finally, there remains the distinct possibility that Hanford will become the site of the nation's nuclear waste repository.

2.3.1.14

All of these sources and potential sources must provide a baseline consideration for the effect that the current waste disposal plans will have upon the local environment. The impacts generated by the military waste project must be viewed in conjunction with similar existing and probable effects. N.W. Indian Cemetary Protection Ass'n v. Peterson, 565 F. Supp. 586, 600-601, (N. D. Cal. 1983) aff'd 764 F.2d 581, 588 (9th Cir. 1985) The DEIS fails utterly to consider the cumulative impacts of existing and anticipated radiation sources and the military waste project. DEIS at 5.4 - 5.6.

The DEIS dispatches the effects of WPPSS plant number two by stating that the radiation impacts are "low relative to naturally occurring background radiation. DEIS at 5.5. Plant number one is assumed to be comparable in its output once it is on line. DEIS at 5.4. These statements are meaningless by themselves. it comes as no suprise, therefore, that DOE makes no effort to integrate them into a larger cumulation of overall radiation impact.

DOE's comparison of WPPSS radiation output with "naturally occurring background radiation" is particularly alarming because it evidences a DOE habit within the DEIS of comparisons between individual sources and "naturally occurring levels". DEIS at 1.5, 1.19, 1.22. This analytic method allows the agency to reassure its readers as it discusses each of the numerous nuclear sources in the area, that that entity poses no independent threat. This

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method implicitly denies the additive environmental effects of the various radioactive emitters at Hanford. This is the type of "divide and minimize" tactic that the CEQ's cumulative effects and related actions regulations were designed to forestall. National Wildlife Federation v. U. S. Forest Service, 592 F. Supp. 931, 941 (D. Or. 1984), Thomas v. Peterson, 753 F. 2d 754, 760-761 (9th Cir. 1985). As the following sections will demonstrate, DOE consistantly takes this tack with respect to radiological impacts, which severely undermines the DEIS's utility as a meaningful presentation of the proposal's overall effects. This in turn must reduce DOE'S ability to reach the detached and informed decision that NEPA mandates.

The DEIS addresses the collective impacts of other currently operating plants by presenting a total human exposure level for one year averaged for all persons within an eighty kilometre radius. DEIS at 5.4. The document also gives an exposure from these plants of .ØØ2 rem for the "hypothetically maximally exposed individual", though it does not mention how this theoretical figure was deduced. Id. This approach creates several problems.

First, the bald assertion of a "hypothetical maximum", with no data or procedure to support it, compels the reader to accept a conclusion with no apparent analytic basis. The use of a total rate for all persons within 8Ø km also fails to explain the actual exposure of different groups, particularly those located close to the plant.

A more subtle, and more serious, lapse in the cumulative effects materials concerns the type of data presented for radiation within the local environment. Nowhere in the DEIS does the agency cumulate the actual or projected emmissions of the different radiation sources. Human exposure rates, particularly when given for only one year, do not necessarily correlate with the amount of radiation released into the environment. Nor do such measurements address long term health effects that may result from repeated exposures over multiple generations.

As a minimum, unless some reasonable release estimate is made, the agency and its public have no way to gauge the total radiation load to which the military waste will contribute at Hanford. Without this information, cumulative effects cannot be determined. 1984 data say nothing about materials that have been released in the past but have not yet migrated to positions where they are available for human contact via the ground or surface water, soil, or atmosphere. Nor do they address 1984 or later releases that were or are not available for uptake.

Without a clear picture of what has been, is being, and will be released, no meaningful estimation can be made of the cumulative impact that the military waste disposal project will have. While it comes as no suprise that DOE has not attempted such a calculation, it is incumbent upon the agency to marshall the necessary data and perform the analysis required to provide meaningful cumulative impacts information.

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3.5.5.32

2.3.1.14

Non-Human Impacts

A related limitation on the usefulness of human exposure data is that such data, even if properly prepared, cannot be extrapolated to inform users of the document about the effect that the existing plants, in conjunction with the military waste project, will have on organisms other than humans. Making this information available is important both to our understanding of the effect that the proposal will have on the larger environment and also because humans tend to consume plants and animals grown in the area.

3.2.4.2

3.5.5.1

With regard to cumulative effects and local fauna, DOE notes only that "(a)lthough ^{60}Co, ^{90}Sr, and ^{137}Cs were detected in some of these samples, concentrations were low enough that any radiation dose resulting from consumption of the edible portion of any fish or animal containing the highwest concentration would be well below applicable radiation protection standards." DEIS at 5.4. This is pablum, not information or analysis.

3.2.4.2

First, whether consumption of a maximally contaminated organism will exceed radiation protection standards has no bearing on the net human effect of eating a number of such animals, or of eating different animals and plants in combination with each other. However, even if information on the human effects of consumption had been rigorously prepared, it would be irrelevent to the cumulative effect that the new project will have on the continued viability of the affected Hanford plant and animal communities, or those that lie downstream or downwind.

3.2.4.2

Exposed individuals of any species could easily have experienced sublethal radiation injury, including genetic damage. Contaminated organisms will be consumed by other species, which will then absorb the radiation burden of their fodder. The extent of these effects are critical to an understanding of the future health of local flora and fauna. DOE must acquire such interactive data and use it to assess the effects that the waste disposal project will have on both human and non human biological communities.

3.2.4.2

The lack of data on non human organisms has a backlash effect on DOE's ability to understand the degree to which the human food source will become contaminated. The DEIS does not permit a determination of pre implementation food source impacts, and so it follows that no judgment can be essayed about the total impact of existing and planned radioactive activities.

3.2.4.2

The DEIS Does Not Consider the Disposal Project's Effects as Compounded Over Time

DOE provides the reader of its DEIS with a generally spotty record of radiation releases and their effects on the surrounding environment. However, the document's greatest overall failing may be the absence of any attempt to assess the cumulative effects of the military waste proposal over the tens of thousands

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of years that it will pose a continuing environmental hazard. This lapse includes human health as well as environmental cumulative impacts.

The DEIS' cumulative effects section does not mention the effects of radiation from the Hanford reservation on the health of successive generations. DEIS at 5.4- 5.6. The possibility of genetic damage does not appear. Id. The DEIS does provide a table summarizing the impacts for the alternatives. Table 3.28, DEIS at 3.70-.71. The entry for long term (10,000 year) offsite population effects declares that, if the climate becomes drier, there will be no radiological health effects; if it becomes wetter, a maximum of one health effect for the on site disposal alternative is expected. If the geologic disposal alternative is chosen, the agency projects zero health effects. (The DEIS defines health effects as fatal cancers or genetic effects. DEIS at 3.71.) The portion on ecosystems and socioeconomics declares that "no significant impacts were found". DEIS at 3.71. No explanation appears for either of these conclusions. The summary also contains figures for onsite intrusions with similarly low impact figures. Id.

3.5.5.32

These conclusions seem even odder when the reader reviews the specific impacts data as presented in the document's tables and charts. Projected dosages from the waste disposal project are given for one year, for seventy years, and for a single lifetime. DEIS at 3.55- 3.59, 3.61, 5.10. Nowhere does DOE consider the possibility of health effects accumulating over generations, as would occur with genetic damage. Nor does the DEIS attempt to consider the effect that the area's other radiation sources will have as a group on the local population and environment over tens of thousands of years.

3.5.5.32

The numerous gaps in DOE's cumulative effects analysis severely limit the DEIS' ability to inform either the public or the decision that it ostensibly supports. As this section has endeavored to show, the problem is compounded when more than one form of cumulative impact affects a single part of the ecosystem. Perhaps the clearest example within the DEIS is the cumulation of radiological effects over time and as a result of the combined output of all sources. These two forms of cumulative impacts together will produce a multiplicative effect. Unless this total cumulative effect is presented by the agency, not only does the EIS not provide the information that NEPA requires of it, it actively misleads its readers.

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DIRECT IMPACTS

DOE's analysis of direct impacts contains gaps and distortions which singly warp the picture of the Hanford military waste project and, when considered together, shed further doubt on the document's utility as the sole determinant of future DOE actions with respect to military waste disposal. The specific concerns treated in this section are the leaking single wall tanks, the limited design lifespan of the double wall tanks, the potential for flooding of the site in the event of dam failure,

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and the proposal's unique effects on the Hanford area's Native American population.

With regard to the older single shell tanks, DOE provides a series of statements that can most generously be described as conflicting. The DEIS first mentions the possibility of a leakage problem with the single shell tanks at the outset of the document, and gives the impression that leakage is a strictly historical phenomenon. "Monitoring and sampling have shown that nearly all of the wastes that leaked from single-wall tanks, in early stages of the program, prior to changes in waste management practice and use of double-wall tanks, were absorbed by the arid soil next to the tanks. DEIS at 1.5. An ordinary reading of this restricts leakage to the past; even if one could somehow find within the statement sufficient ambiguity to allow for a contrary conclusion, such a self serving ambiguity demonstrates questionable good faith on the part of the agency in preparing a neutral presentation of its proposal.

3.1.4.9

The DEIS reinforces the impression of single shell tank structural integrity in Appendix A on "waste site descriptions and inventories". DEIS at A.3-A.4. "Concrete in the single shell tanks has maintained its integrity, preventing tank collapse, during many years of service. Id. at A.3. Waste in single shell tanks has generally been converted to solid forms (sludge or salt cake) to reduce the chance of content leakage to surrounding soil in the event of tank failure". Id. at A.4. Both of these remarks convey DOE's further assurances that the single shell tanks remain whole and undamaged.

3.1.4.9

In Appendix B, however, DOE reverses its position. "As of May 1982, 26 tanks among the 149 single-shell tanks at Hanford were designated as confirmed leakers". DEIS at B.1. This is difficult to reconcile with any of the above three statements, particularly the first. While the comment regarding tank integrity does not explicitly state that no leaks exist, concrete that has "maintained its integrity" is not the variety that one would assume to be leaky. Similarly, efforts taken to "reduce the chance of leakage" do not indicate that leakage is the ongoing event that Appendix B explains it to be.

3.1.4.9

This muddle is exacerbated by DOE's decision to place its reassurance that leakage is no longer continuing prominently at the beginning of the DEIS, while it buried the confirmation of current leakage in the appendices. The agency could not have chosen a more effective ordering of information to leave the average reader with a mistaken impression of safety.

3.1.4.9

None of the above discussion, of course, even reaches the fact that DOE is contemplating the permanent disposal of high level radioactive wastes in the open ground surrounding the tanks from which they continue to leak. It deals with this somewhat startling fact with the conclusionary announcement that arid soil will prevent migration by the waste. DEIS at 1.5. DOE gives no explantion of how it knows that this will hold true for tens of thousands of years; the agency relies on a conclusion that

3.1.4.9

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removal would be complex and difficult and so is not warrented. DEIS at 1.7-1.8. Such a balancing decision may well be justified, but the reader cannot tell how because DOE does not show the other side of the equation,, or explain how the two were compared. DOE needs to clearly present both that it is planning the uncontained disposal of high level wastes and then what the environmental results of this action might be.

Another tank waste issue not properly explained in the DEIS concerns the in place permanent disposal of wastes in double wall tanks. While these tanks do not appear from the DEIS to be leaking at present, DOE does state that they do have a design 3.1.4.33 life expectancy of fifty years. DEIS at 3.29. The empty tanks themselves will be a source of radiation even when emptied, and must be disposed of securely. DOE also suggests that it may use them for disposal of grouted high level waste as well. DEIS at 3.19.-3.21. Empty double wall tanks will be filled with gravel as support material to prevent actual collapse. DEIS at 3.20. However, DOE does not address any potential long term outcomes of tank failure, decay or leakage. This is of particular concern should the DOE decide to reuse the tanks for permanent disposal.

In its assesment of flooding impacts, DOE takes the unexplained, and inexplicable, position that Grand Coulee dam will never be breached by more than 50% over the project's 3.5.6.6 duration. This particular analysis concerns only an instantaneous breach, which the agency concludes can only be the result of a "direct hit by a large nuclear weapon". DEIS at 4.12. Two unresolved questions suggest themselves.

First, it seems unlikely that the dam is incapable of collapsing at some point over the next 100,000 years. DOE fails to explain how and why it arrived at its 25-50% maximum breach figure, so a reader cannot tell whether this figure has some basis in fact, or is simple conjecture. If a greater breach is possible, this would increase the extent to which the Hanford site would be flooded, and so the change the safety considerations attendant upon use of the site for disposal.

A more far reaching concern surrounds the continued existance and integrity of the entire dam system above and around Hanford for the next hundred thousand years. The DEIS obtains its water flow figures from a sixty five year average, almost all of which represents a period when the river was heavily regulated by dams. DEIS at 4.10. DOE in fact specifically relies on the 3.5.6.6 upstream storage and flood control dams to protect the site from flooding in future. Id. However, the DEIS does not discuss the projected lifespans of these dams, and it is difficult to imagine that any of them will endure even for the majority of the Hanford disposal site's existance. In the absence of the dams, DOE at least intimates that floods would be more severe than they are currently. Id. In the absence of any flood control, it is impossible to tell from the DEIS how badly the site might be damaged. DOE needs to communicate this information to its public.

Finally, in its socioeconomic impacts sections, the DEIS overlooks the entire area of the project's impact on the area's native peoples. The Yakima Indian Reservation lies within a fifty mile radius of and downstream from the Hanford site. Its inhabitants enjoy a unique spiritual and legal relationship with the land and its biological communities. 2.4.2.2

As the cumulative effects section explains in greater detail, the DEIS fails entirely to explain how the project will interact with the project's fish and wildlife populations. Salmon and Steelhead from the Columbia River basin provide a sizeable portion of many Indians' diets and economic bases. To the extent that the waste disposal project will affect the long term viability of local and downstram fish and wildlife, DOE must also explain the socioeconomic impacts that will attend the biological ones. 3.2.4.2 3.2.6.1 3.5.5.1

Even ignoring the possibility of resource impacts that will affect the tribes, it is suprising to see no mention whatsoever of project impacts on the reservation and nearby Indian communities. The Yakima reservation is the land base for a culturally distinct group of people. The continued survival of this culture depends upon the continued habitability of the reservation. These people, unlike local non indians, are without the option of departing and beginning anew elsewhere if environmental, economic, or social conditions militate against continued residence. 2.4.2.2

The Yakima also suffer more than any other identifiable group in the area from poverty and unemployment, and so are more vulnerable to any labor or economic dislocations that the Hanford project might cause. As the DEIS concedes, unemployment is affected by in and out migration. DEIS at K.7-K.10, K.20. Members of the local Indian population are less apt to move in the event of an economic downturn, a further reason for them to suffer disproportionately any negative outcome of the project. The DEIS provides considerable data on the project's anticipated population and labor effects. See DEIS Appendix K. These figures, however, do not sort impacts by population, job class or skill. It is impossible to determine from them the magnitude of the impacts that the project will have on the reservation economy. 3.2.6.4

The Indian peoples living within the Hanford site's sphere of influence are in a position to suffer injury unique both in kind and in extremity from any adverse impacts that DOE's disposal actions may produce. DOE has a responsibility to investigate and publicize any such impacts. 3.2.6.4

Alternatives

DOE provides an array of four alternative means of disposing of its Hanford military wastes. A cursory examination reduces these four to two, however: on site near surface disposal and deep geological disposal. As DOE concedes, the no action alternative would be legally impossible and

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unacceptable. DEIS at 3.10. The reference alternative is simply a combination of the geologic and on site alternatives. Id.

Because geologic disposal is the subject of a NEPA process and regulatory system of its own, the DEIS does not address its logistics beyond treating it as a potential receptical for the problem at hand. DEIS at 1.13. This leaves the on site disposal alternative, in its single variation, as the only actual disposal method extensively discussed.

An adequate EIS requires the exploration of a reasonable range of alternatives to the proposed action. 42 U.S.C. 4332 (2)(C)(iii). In this DEIS, DOE discusses what is for practical purposes only one alternative. Even including the geological alternative, these two options hardly bound the range of reasonable alternatives open to DOE. Intermediate possibilities that suggest themselves, as a start, include on site disposal within lined repositories (particularly where tanks are already leaking), the use of water proof barriers across the tops of the waste, more stringent efforts to seal leaking tanks, near surface disposal elsewhere or repackaging the waste in containers designed for permanent disposal, rather than temporary storage as is true for the existing containers. Exclusion of reasonable, obvious alternatives renders an EIS deficient. Coalition for Canyon Preservation v. Bowers, 632 F.2d 774, 784 (9th Cir. 1980). 3.3.5.2

DOE does say that other alternatives were eliminated prior to this DEIS, but because it does not specify what these were or why they were discarded, it is impossible to know the breadth of alternatives that DOE has considered. DEIS at 3.1. In any event, the DEIS does not allow the public a meaningful opportunity to comment on and participate in the decisionmaking process. Elimination of the great majority of reasonable alternatives prior to publication goes a long way to defeating the decisionmaking function of the EIS. Forelaws on Board v. Johnson, 743 F.2d 677, 685 (9th Cir. 1984). 3.3.5.2

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Public Information Function

Public involvement and interagency communication and cooperation are primary NEPA purposes. Warm Springs Dam Task Force v. Gribble, 621 F.2d 1017, 1021-1022 (9th Cir. 1980). The DEIS fails to perform its information function adequately for a number of reasons. The greatest problems stem from a simple lack of information and analysis, as the previous sections on direct and cumulative impacts explain. The DEIS' limited presentation of alternatives places third parties in the position of critiquing a decision rather than facilitating a choice among alternatives.

However, two additional problems are unique to the DEIS' function as a document for public consumption and review. The DEIS' overall inpenetrability presents an overwhelming obstacle to the ordinary user. The agency also exercizes such circumspection in its section on the licensing of its disposal site by the NRC that it avoids actually communicating anything. 4.1.1

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DEIS at 6.11.

DEISs must be comprehensible by the interested public. 40 CFR 1502.1, 1502.2(b), 1502.8. OEC v. Kunzman, 614 F. Supp. 657, 665 (D. Or. 1985). This public is not populated soley by nuclear physicists, lawyers, statisticians, and engineers. Inclusion of technical information within EISs is crucial. However, it is incumbant upon authoring agencies to present sufficient information, and more importantly analysis, in the text that individuals of ordinary intelligence can ascertain whether the agency has met NEPA's minimum substantive requirements. 4.1.1

Such an inquiry is impossible with DOE's DEIS. Preceeding sections of these comments have documented numerous gaps in the agency's substantive coverage of its project. Almost equally distressing for the reviewer is the convoluted process required to find the ommissions and piece together the charts, tables, and text to create meaningful body of information. The DEIS' health effects data is probably the most extreme example of DOE's shotgun organizational style. In order to determine as much of the radiological effects upon human health as DOE conveys, one must winnow through Chapter 1, 3, 5, and Appendix N. The task would no doubt be simplified if more of the data was present; as it is, attempting to analyze the DEIS is much like trying to construct a jigsaw puzzle with most of its pieces missing. 4.1.1

Another element of the DEIS that complicates the reader's comprehension of DOE's proposal is the agency's dissembling on the subject of NRC jurisdiction. DEIS at 6.11. With regard to the other regulatory schemes that might affect DOE's management authority over its program, DOE states reasonably clearly whether it believes itself subject to or free from additional regulation (eg., See DEIS at 6.3-6.6 on the Federal Water Pollution Control Act and Clean Air Act). The problem posed by DOE's failure with regard to NRC jurisdiction is uncertainty with respect to further review and oversight. If an NRC licensing proceeding is to begin, the project will definitely be reviewed at another level, and announcement of that fact in the DEIS will permit interested persons to review alternative disposal schemes in conjunction with NRC licensing. 2.4.1.23

DOE concedes that the CEQ regulations require a listing of other regulatory requirements that will impinge on its project. DEIS at 6.1, citing 40 CFR 1502.25. The CEQ regulation does not permit DOE to create a list of obligations that it might have to fulfill. DOE does have the option of stating that it is uncertain of the applicability of a given regulation. DOE does not even do this. It simply states that if its actions implicate NRC licensing jurisdiction, it will comply with NRC requirements. DEIS at 6.11. Nuclear waste disposal lies at the center of a complex collision of regulatory jurisdictions. Without a firm idea of the regulatory controls that will be in place once implementation of the proposal begins, it is difficult to appraise intelligently how well protection of the environment has been provided for.

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Section 202 of the Energy Reorganization Act, under which non-repository disposal would fall, is not complex legislation. However, DOE does not explain why it cannot know its responsibilities under the ERA, and does not in fact say that it is uncertain of them. This is at a minimum unhelpful to the reader and bespeaks DOE's disinclination to be open with its public. It may constitute a violation of the CEQ regulations.

4.1.1 When the DEIS is assessed as a whole, it cannot be said to present the information, analysis, and organization required of an adequate EIS. It does little to assist the public in understanding the issues and options surrounding military waste disposal. By constricting its presentation of the data and alternatives, the DEIS actively works against rather than invites suggestions for improvement or modification.

Reasoned Decisionmaking

Underlying NEPA's EIS requirement and the specific substantive requirements for adequate EISs is the Congressional command that agencies make informed, reasoned decisions about projects that will affect the environment. 42 U.S.C. 4332, National Wildlife Federation v. U.S. Forest Service., 592 F. Supp 931, 941 (D. Or. 1984), Southern Oregon Citizens Against Toxic Sprays v. Clark, 720 F.2d 1475, 1480 (9th Cir. 1983). An EIS is inadequate to the extent that an EIS fails to provide sufficient information to permit others to assist in informing it and for the agency itslf to make a reasoned decision. Foundation for North American Wild Sheep v. U.S. Department of Agriculture, 681 F. 2d 1172, 1179-80 (9th Cir. 1982), Citizens for a Better Henderson v. Hodel, 768 F.2d 1051 (9th Cir. 1985).

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4.1.1 DOE's Hanford military waste disposal EIS contains a wealth of gaps, inconsistancies, and obscurity. These faults rise to a level that prevents the document from objectively informing the public or other agencies, which in turn are unable to effectively assist DOE in reaching a reasoned decision. Many of the failures are documented in the previous sections on cumulative and direct impacts and on alternatives. Other aspects of the document remain that interfere with its usefulness.

3.1.1.1 Despite its willingness to make predictions, DOE makes clear that it is less than certain about the nature and distribution of its high level wastes. DOE explains that "(t)hese wastes have been processed and transferred among tanks to the point where some might be classed as high-level and some might not". DEIS at 1.4. DOE is also uncertain about the status of pre- 1970 transuranic buried solid waste. DEIS at 3.9-3.10.

Whether specific quantities of waste are low level, high level, or transuranic controls how they will be treated under the different alternatives. For example, under the deep geologic repository alternative, high level wastes would be separated and stored in a repository, the remainder would be stored on site near the surface. DEIS at 1.13. Under the reference alternative, transuranic wastes would be sent to WIPP for disposal. DEIS at 1.17. This information is not necessary to procede with the on-site disposal option.

DOE does not at any point discuss how it might go about determining the radiological classification of its waste. The absence of any evidence of planning or ability to follow through on alternatives other than the in-place option, together with suggestions from DOE that this may be the preferred alternative, cannot help but give a reader pause. These considerations carry some weight in assessing the extent to which the disposal decision is a technical one and how much it is driven by institutional preferences and expediency.

2.2.13 The appearance of agency bias along with all of the DEIS' substantive defects, calls into question DOE's capacity to maintain the primary oversight role for the permanent disposal of the nation's high level military wastes. NRC licensing, a regulatory process mentioned above, would place a less interested agency in an oversite capacity with respect to the waste disposal problem. Such licensing is probably mandated by law in any event. However, DOE's dismal performance with respect to its NEPA obligations lends further support to the argument for outside oversight of its disposal activities.

Conclusion

DOE has failed to adequately convey or analyze the impacts anticipated for its proposed waste disposal project. It does not provide a sufficient array of alternatives to permit allow for a choice between reasonable options. The lack of much important substantive information, together with poor presentation of that which is included, defies rather than assists the public and other agencies participation in the decisional process. All of these in combination with an apparent agency refusal to use the NEPA process as Congress intended prevent the DEIS from assisting a reasoned decision. As NEPA's EIS requirement exists to acheive this result, the DEIS cannot be found to have served its statutory purpose adequately. DOE will have to remedy the defects within its document before it can comply with NEPA.

Sincerely,

S. Timothy Wapato
Executive Director

cc: Senator Mark O. Hatfield
Honorable Booth Gardner
Mel Sampson, Tribal Council Chairman, Confederated Tribes and Bands of the Yakima Indian Nation
Ken Hall, Chairman, Confederated Tribes of the Umatilla Indian Reservation Board of Trustees
Herman Reuben, Chairman, Nez Perce Tribal Executive Committee

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August 8, 1986

Rich Holten, EIS
U.S. Dept. of Energy
Richland Operations Office
P.O. Box 550
Richland, Wash. 99352

2.5.6 As a private citizen, I hope that the N Reactor will be shut down as its design plan is outgrown.

2.1.1 As for using Hanford as a national repository for nuclear waste, this seems inefficient because of transportation and several states working together would be the answer to the storage of nuclear waste in the future.

Sincerely,

Frank F. Bayley

F.S. Bayley
900 University St.6A
Seattle, Wn. 98101-2728

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Route 1, Box 1629
Benton City, WA 99320
August 9, 1986

Rich Holten/EIS
U.S. Department of Energy
Richland Operations Office
P.O Box 550
Richland, WA 99352

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Dear Mr. Holten: Subject: Comments on Hanford Defense Waste Draft EIS

After reviewing the Draft Environmental Impact Statement, *DISPOSAL OF HANFORD DEFENSE HIGH-LEVEL, TRANSURANIC AND TANK WASTES*, I would like to submit the following comments:

1. Long term safety has to be the only criterion by which the alternative disposal options are compared. This is not an optimization process to select a process which provides the greatest net benefit to society. Rather society has enjoyed or is enjoying the accrued benefits. The costs associated with the safest disposal option must be considered as a reduction of the net benefit which accrued from the production of weapons grade plutonium in the first place and not separately as a criterion in selection of a disposal alternative. 2.2.3

2. The health effects risk to occupationally exposed personnel should not be considered because (a) these risks are under constant surveillance and control by operational health physics organizations and regulatory agencies, and (b) the individuals in this category receive real benefits from these activities as well as being able to choose whether or not to participate. The public and environment, especially in future generations, will not have such a choice. 3.4.1.1

Keeping these two points in mind dictates the obvious conclusion: the geologic disposal of all high-level, transuranic, and tank wastes at Hanford is the only rational option. 3.3.1.1

Sincerely yours,

Roger C. Brown

Roger C. Brown, PhD, CHP

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Aug. 1986

R.A. Hotten / EIS
Waste Management Division

As an Eastern Oregon resident with a young family, I absolutely
2.1.1 disagree with the way Hanford has been named in the selection of possible national nuclear waste sites. I very strongly dis-
3.4.2.2 agree with shipments traveling through Eastern Oregon & Washington at all — particularly from the east coast. The population of "baby boomers" and their families is increasing in these western areas, as well as it being prime agricultural land under irrigation. My husband is an irrigation technician in this area and we
3.2.6.1 share the valid concern of land and water contamination — as well as it effecting humans and the diversified livestock so abundant around here. Eastern Washington and Eastern Oregon is not the "wasteland" it is made out to be. Agriculture is ever increasing with the high technology of advanced irrigation systems and planning. The

climate is well suited for excellent crop growing and management. We would like to see the whole nuclear plant situation dismantled and moved out, so we can get down to what really matters — making and keeping living things healthy and fed through responsible agricultural management, unthreatened by super doses of radiation, which has proven to be a subject of real concern. Our own generation has learned not to be so trusting. I only wish our parents had questioned the nuclear situation more. They were effected by the early releases of radiation in the 1950's —.

My husband and I strongly support smart politicians who say "thumbs down" to nuclear waste, weapons, and power. It is the truly responsible stand to take. 2.5.6

Also, as far as foreign policy goes, who needs enemies when you nuke yourself and your own people. We strongly believe in the lasting benefits of cultural exchange !!!

Sure hope you will consider this.

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Sincerely & firmly,
Patricia M. Carpenter & family
Rt. #1 Box 1799
Hermiston, Oregon
97838

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Mr. Rich Holton/EIS
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, WA 99352

August 8, 1986

Re: DOE/EIS 0113
"Disposal of Hanford Defense High Level, Transuranic and Tank Wastes"

Dear Sirs:

I am responding to DEIS process, and also to a personal sense of responsibility in the outcome of your decisions. I have read Volume I of the Enviornmental Impact Statement. Many questions and concerns came up, including: Are there "hot" landfills on the Handford Reservation which are not being included within the scope of the DEIS? How much irradiated earth is contained in the statement, "Contaminated soil around and under tanks resulting from tank leaks in the past (ERDA 1975) would be left in place"? What went into the decision to downgrade "safe" levels of transuranic waste from 10nCi TRU/g to 100nCi TRU/g? Does this 1985 decision affect cost estimates on the DEIS? Are these extraction decisions based on economics and politics, or are they technical impossibilities? What is the procedure for determining radioactive contamination of equipment used to handle HLW? How is it disposed of?

3.1.3.17
2.4.1.8

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Obviously some of these questions could be answered by further study. But my strength is common sense and discernment, and these traits call to key issues which desperately need to be addressed. Common sense tells me that once there is a leak of nuclides and other nasty substances into the biosphere full containment is impossible. Discernment tells me our society is seeking a hasty solution to the most insidiously patient problems mankind has ever faced.

Instruments act as our eyes in detecting radiation. We bury the waste, cover it with a "geotextile barrier", measure, and relax. But we close our eyes to the real problem. Radiation is ever active; it lives longer than anyone can truly conceive. No existing technology can contain radiation for as long as it is active and dangerous to life. Therefore, we plant generational time bombs of death and genetic mutation with our decisions, whether technical experts, committees and two-term legislators choose to face it or not.

3.3.4.2

I suggest we spend alot of money containing existing waste, in accessable, transferable, movable repositories. I suggest we contain waste where it has been created, in regional sites across the country, rather than subjecting the Dept. of Transportation to the daily terror of wondering where and when the next major nuclear highway accident will occur.

I strongly suggest the decision makers in the Department of Energy make an intensive about-face in attitude. These issues are not primarily technical, as the DEIS represents, they are enviornmental first and foremost. Complex problems spawned by the nuclear age must not be hidden in bureaucratic process - they must be publicised as honestly and to the greatest extent possible. There is no "us" and no "them" in making decisions, hiding them from a "reactionary public," and covering up the responsibility with the phase that rings a death knell in my great-granddaughter's ear, "It was decided."

Very truly yours,

Jalair L. Box

Jalair L. Box
1231 NE 92nd Street
Seattle, WA 98115

P.S. - Failed to sign original copy, you will receive 1 signed and 1 unsigned copy of this letter.
JB

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Aug. 5, 1986

Rich Holton, E.I.S.
U.S. Dept. of Energy, Richland Operations Office
P.O.Box 550, Richland, Wash. 99352

Subject: DOE/EIS-0113, Hanford Radioactive Wastes.

Most governmental proposals are overly complicated, and this, for the handling of radioactive waste, is no exception. It is only reasonable that those who generate the waste, or who collect the product that results in the waste, assume the responsibility for disposal.

Commercial Waste:

3.3.5.2 Each state that allows commercial activities that result in the production of radioactive waste should be responsible for the permanent disposal within the borders of that state. Appropriate site selection and safeguards should be the task of the state.

This will avoid the dumping of the garbage of one state into another and removes the opportunity for political blackmail.

Military Waste:

Since excessive accumulation of nuclear armament is the paranoia of certain politicians and the military, waste from this manufacture should be the responsibility of the military. The waste that has accumulated at Hanford, and elsewhere, should be equally divided between Air Force, Army and Navy and deposited on military reservations. These are the appropriate places, since the military should be responsible for their garbage, and presumably knowledgeable in its care.

Since certain states and their politicians have been eager to participate in the manufacture of military equipment, military

2.2.9 bases should be selected within those states. The number should be determined according to their share of the federal military dollars. Complaints by political representatives and favored populations would generate little sympathy. Those funds customarily misused by the military, and collected by their manufacturing partners, should be used to pay expenses.

The continued production of nuclear armament by anyone, for defense or to maintain the balance of power, is ludicrous. The devices are armed, aimed and already capable of destroying humanity. It can only be done once. It's time those who are playing good guys against bad guys grow up.

Sincerely,
Richard D. Moore
Richard D. Moore M.D.
53236 E. Marmot Rd.
Sandy, Ore. 97055

cc. Hatfield
Packwood
Weaver
AuCoin
Smith
Smith
Wyden

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JOHN V. EVANS
GOVERNOR

OFFICE OF THE GOVERNOR
STATE CAPITOL
BOISE 83720

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WM DIVISION

August 7, 1986

R. A. Holten/EIS
U.S. Department of Energy
Richland Operations Office
Post Office Box 550
Richland, Washington 99352

Dear Mr. Holten:

I am pleased to comment on the Draft Environmental Impact Statement on the Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes on behalf of the State of Idaho. Although the Hanford site is some distance from the Idaho border, the citizens of the Palouse and the Idaho Panhandle have legitimate concerns as downwind residents and upstream beneficiaries of Columbia River fisheries. Also, because any decision to transport Hanford wastes out of Washington to a national respository could significantly impact Idaho's transportation corridors, it is incumbent on Idaho's elected officals to voice the concerns of her citizens.

First, Idaho has chosen to intervene in Washington's suit against the DOE with respect to the second repository decision. My support for the Nuclear Waste Policy Act was contingent on the first repository not being the sole repository for the country. It is interesting to note that, in determining needed repository volume, DOE made the assumption in the Hanford Final Environmental Assessment that the defense HLW in single-shell tanks would be stabilized in place. This is in sharp contrast with the Defense EIS which assumes that the decision on the tank wastes has yet to be decided. My greatest concern is that the NEPA decisionmaking process has or is being violated in view that the interrelated policy decisions on the first repository siting, the second respository indefinite delay, and the Hanford defense wastes appear to be improperly meshed. 2.1.8

Second, I am concerned that the chemical hazard of all the defense wastes are not adequately considered in the DEIS. Since those involved with low-level waste management are continually concerned wiht the toxic nature of many of those wastes, I expect the DOE would be equally alert to the chemical hazard posed by the defense wastes. I urge you to fully address the hazardous aspect of the Hanford defense wastes in the final EIS, particularly how the applicable federal laws (RCRA and CERCLA) will be followed. 3.1.6.1

Third, I concur with those who disagree with DOEs technical and economic assessment of a geologic disposal alternative for the tank wastes. The DEIS leads one to the prudent conclusion that repository disposal is impractical in terms of cost and worker hazard. However, it appears that safe, technically feasible, low-cost alternatives for pumping 3.3.12

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sludges and liquids from the single-shell tanks may have been overlooked by DOE. I encourage you to examine several means of retrieving the tank wastes in order to provide a wider range of alternatives which may involve geologic disposal.

2.3.2.12

Finally, I wish to commend DOE on seriously addressing the problem of defense waste management at Hanford. The document clearly explains the history of waste generation and storage at the reservation, and presents sufficient detail for the lay reader. I am most impressed with the figures noting that by the year 2000, there will be 10 times the volume of Hanford defense wastes as there will commercial spent fuel nationwide. The sheer volume of the defense wastes, while not always posing hazards equal to spent fuel, demands the attention of neighboring states who will either be affected by transportation of those wastes to a repository or will be confronted with the long-term reality of potentially hazardous materials right next door. Because the decision on the Hanford defense wastes will likely come long after I leave this office, I urge you to involve the next Idaho Governor in your decisionmaking process. Likewise, I encourage you to hold more public meetings on this topic in Idaho, similar to the one recently held for the Nez Perce Tribe.

Sincerely,

JOHN V. EVANS
GOVERNOR

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JVE:jjp

cc: Terry Husseman, Director
High-Level Waste Office
State of Washington

Ammonia-gas leaked from storage tank at Hanford

Associated Press

RICHLAND — A discharge of 900 to 3,501 pounds of anhydrous ammonia gas escaped from a storage tank at the Hanford nuclear reservation early this summer, Rockwell Hanford officials say.

The release may have exceeded a federal limit for such discharges, said Rockwell Hanford spokesman Bill Klink.

Klink said yesterday that the discharge was discovered during an inventory conducted July 21 at Hanford's B Plant, which recovers and purifies cesium 137 and strontium 90 from waste produced by the reservation's Plutonium Uranium Extraction facility.

The discharge apparently occurred through a pressure relief valve when a temperature controller on the storage tank's heat system failed, Klink said.

Bob Higbee, the plant's processing manager, said anhydrous ammonia, sometimes used as an agricultural fertilizer, routinely is emitted from processing plants. Higbee said those releases are permitted under regulations established by the Environmental Protection Agency and the Washington State Department of Ecology.

Federal and state officials have been notified of the release.

Ecology Department spokesman Roger Stanley said Rockwell Hanford officials could not be sure of the exact amount of the release, which escaped "as a sort of slow leak."

Stanley said officials told him the release occurred over a 30-day period before the inventory.

The discharge may have exceeded the EPA's discharge limit of 3,000 pounds of release every 30 days, but did not violate the state's limit of 12,000 pounds every 30 days, Stanley said.

Stanley said the tank has been emptied and is not operating. The discharge did not produce ground or water contamination, he said.

N-waste statement not adequate, state tells federal agency

by Elouise Schumacher
Times staff reporter

The state of Washington is warning the federal Department of Energy that its key document outlining ways to dispose of radioactive defense waste at the Hanford Nuclear Reservation is insufficient and too narrow in scope.

At the same time, an advisory panel appointed by the Energy Department calls the report "uneven and inconsistent" and lacking in technical detail.

The critical comments came yesterday during meetings of the state Nuclear Waste Board and Advisory Council in Olympia and the Northwest Citizens Forum on Defense Waste gathering in Seattle.

Both groups approved their comments on the government report. The comments must be sent to Hanford by this weekend.

Most of the remarks are critical of the Energy Department's 1,000-page draft environmental-impact statement, which explains four possible disposal methods for 53 million gallons of highly radioactive waste stored in huge tanks and elsewhere on the southeast Washington federal complex.

The waste is the byproduct of more than 40 years of atomic-bomb production and other defense work, and Hanford is the nation's largest junkyard for radioactive defense waste, storing two-thirds of the total.

The state will send the Energy Department nearly 100 pages of comments from state and local agencies, technical consultants, citizens, Gov. Booth Gardner and individual members of the Nuclear Waste Board.

Most remarks cite shortcomings in the draft report, saying they should be addressed in the final document, expected next summer.

"The DEIS (draft statement) should have included all defense wastes, chemical and radioactive, as part of the long-range waste-disposal program at issue," says the state Nuclear Waste Board and Advisory Council. "An overriding concern with the DEIS centers on the lack of specificity."

The state notes that a major flaw in the so-called barrier method of waste disposal, where the tanks would be buried under mounds of dirt and rock expected to safely contain the radioactive garbage for thousands of years, is:

"The board's contractor ... found more than 20 cases where the ... effect was to make the engineered barrier appear more effective or more highly developed" than the scientific studies cited show, the state notes.

"This document is grossly premature," said Philip Berntsen, University of Washington professor and advisory council member. "All it does is lay out uncertainty! ... A lot more research and development needs to be done before the alternatives are presented in the

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Democrats hit safety of roads to Hanford

PORTLAND

Two former U.S. transportation secretaries have called the Hanford Nuclear Reservation "the worst possible site from a transportation perspective" for a national repository for high-level radioactive wastes.

Democrats Neil Goldschmidt, a candidate for governor in Oregon, and Brock Adams, Washington senatorial candidate, said at a news conference yesterday that Hanford is too far from most of the nation's nuclear waste, and that the major highway leading there is unsafe.

Oregon's inadequate transportation network would form "the gateway to Hanford," handling an estimated 6,000 waste shipments a year for nearly 30 years, Goldschmidt said.

The main route to Hanford, Interstate 84, is notorious among truck drivers as dangerous in the winter, and other routes through the least-populated areas of the state are as poor, he added.

From
E. ZAHN
295 Fleet
Port Ludlow,
WA 98365

People are prone to make mistakes. You do not need to call "permanent" a plan which is not. The earth is not that stable. Containers are not permanent. Waste needs local storage - not distribution. If energy shortage, the need is for birth control. There should be a world ban on nuclear missiles and NO defense department waste. 3.3.5.4 2.5.6

Thank you for wisdom,
E. Zahn

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890 Mount Angeles Road
Port Angeles, WA 98362

August 7, 1986

Rich Holten/EIS
U.S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, WA 99352

To: Department of Energy re: Draft Environmental Impact Statement (DEIS)
"DISPOSAL OF HANFORD DEFENSE HIGH LEVEL, TRANSURANIC AND TANK WASTES"
DOE/EIS-0113

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Our earth is a living, breathing organism in motion. To deposit nuclear waste in any form in the vain hopes of eternal stabilization is to once again defy the laws of nature, even in solid granite; much less Hanford, which as a repository is clearly untenable due to its hydrology, geology and proximity to one of the earth's mightiest rivers, running through some of the earth's most fertile and beautiful land.

3.3.4.2 It may prove to be necessary to use Monitored Retrievable Storage(MRS) or interim storage using state of the art technology while researching technology for permanent storage. However, this should not stop the DOE from committing itself to a permanent solution as a top priority and should not be used as an excuse to further stall the development of a permanent solution.

2.2.9 One of the main flaws of the DEIS is the absence of a time line and a set funding structure and mechanism for the accomplishment of a permanent disposal scenario. Without these factors in evidence it is impossible to believe that DOE is serious. Rather it is apparent that the DOE is placing on the back burner what is obviously in need of immediate attention.

I understand that the initials DOE stand for Department of Energy. Yet, the primary mandate for your agency is obviously to produce nuclear weapons. If this is so, please change your agency's name to the Department of Nuclear Weapons.

Witness the historical lack of accountability on the part of the DOE. In my personal experience, the vulnerability of the agency to scrutiny was confessed by the agency itself when last year I organized a public forum on the subject of Hanford. I contacted the DOE requesting an informed and technically competent representative to answer the questions of the public. I was told that the DOE prefers to avoid such public forums because they find it awkward to field such questions as "We understand you are polluting the Columbia River." They essentially stated that the DOE prefers to structure its own controlled environments, without the presence of opposing viewpoints, in which to "educate the public" according to the DOE's objectives. Thus, my request for a knowledgeable speaker was denied.

However, on July 10 in Portland, Rich Holten of the DOE stated that the DOE is happy to provide speakers upon request. This misleading contradiction underscored the double standards and hypocrisy of the DOE and the degrading manner in which empty reassurances and promises are given to an increasingly skeptical and intolerant public. We simply do not trust you anymore. This fact is entirely due to the DOE's fatally flawed policies. 2.5.5

Because the DOE has been a renegade agency heedless of the consequences of its actions, committing crimes against society and the environment while writing its own regulations to escape detection and punishment, there should be no period of probation and there will be no parole. You must become and remain totally under public scrutiny, in a much more involved way than at present. This will be necessary if this issue of permanent disposal of defense waste is to be dealt with adequately. 2.5.5

You are no longer deserving of our trust because you have failed repeatedly in isolating nuclear waste from the environment and have failed in fact to realize and recognize just what it is you are dealing with.

Words fail in describing the magnitude, the enormity, and the insanity of pursuing the nuclear industry of destruction. To believe for an instant that an agency composed of human beings is omnipotent and all-knowing enough to capably handle the forces that shaped the Universe, and to ensure the adequacy of the safeguards surrounding these forces tens and hundreds of thousands of years into an unknown future is ethnocentric, egotistical, shortsighted, arrogant, absurd and irresponsible to the extreme. 2.5.5

The involvement allowed the public through the hearings was a welcome step though perfunctory and long overdue. The waiving of scoping hearings has fatally flawed not only the DEIS but the entire process involving it. The deliberate omission of the scoping hearings has rendered the DEIS invalid. 2.3.1.1

Simply put, there are no technologically proven methods for safe and/or permanent storage of this waste. So, I feel, the mass of DOE's large budget for FY 87 and beyond needs to be directed towards the researching of alternative forms of power generation (including refining conservation techniques) that will render nuclear power unnecessary and allow it to be phased out. To safely deal with the waste now in existence and to stop producing more are equally imperative mandates that we the public are giving you now. The scale has been far too heavily weighted with funding for nuclear power and weapons. This trend must be reversed immediately. 3.3.5.1 2.5.6

I have briefly addressed the nuclear power issue because civilian and defense wastes are not totally separate issues. That much is clear from the intent of the DOE to comingle the wastes and to extract weapons grade plutonium from the waste of the so-called peaceful atom. 2.1.3

Hanford, above all, is unsuitable as a permanent repository for either commercial or defense waste and to entertain thoughts of its being suitable is to fly in the face of reason. 2.1.1

This inherently implies that the waste now at Hanford must be transported which further underscores the urgent need to stop producing waste and to research methods of handling and permanently storing the waste as no proven methods to do so now exist. 3.4.2.2

To a degree we are talking about a dose related toxic substance in terms of immediate effects. However, a microgram of plutonium can cause cancer if it

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abnormalities. With this information there can be no validity to the concept of a margin of safety, an acceptable risk , or a conservative estimate of the hazards to humans and other living things. You should be telling me this, and not the reverse. Unfortunately, it seems you must be reminded of this truth.

For 40 years many of the world's people, including the governments of nations, have maintained a spear and arrow mentality regarding weapons. The belief has been that more is better, and in the case of spears and arrows that may well be true. But if nuclear weapons are truly to be the weapons to end all wars, we must change our way of thinking, as Einstein stated so clearly stated in his famous quote: "The unleashed power of the atom has changed everything save our way of thinking, and thus we drift towards unparalleled catastrophe."

We begin here to recognize Hanford as the top of an iceberg rerresenting a way of thinking that is diametrically opposed to life on earth, not just for the human race but for every defenseless organism with which we share the planet.

All of the considerable powers of denial inherent in the human mind have been brought into play to protect ourselves emotionally from the truth, but we have gone past the point where denial is possible. We can no longer tolerate the existence of the nuclear war machine and its spiraling escalation. We must adapt our thinking in order to survive, and that revamping must begin with the people. The DOE has not questioned the validity of the course it has taken and so instead of protesting our nation in doing quite the contrary. The people must take the lead as the DOE has not shown the capability of doing so.

2.5.5

To dissent, to question, to assemble and to demand the truth is the American way. To lie to the public, victimize all forms of life and endanger the earth is not compatible with the principles upon which this nation was founded.

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We are at a crossroads of unprecedented magnitude. The most massive responsibility yet experienced by man on earth belongs to our generation. The DOE has proven unworthy of its part in this scenario. To confront the truth now is not only overdue, but imperative. Life on earth would not survive a nuclear war.

One of the widely held beliefs in our society is that nuclear power and the threat of annihalation by nuclear weapons is here to stay. However, these monstrous threats are no more imbedded in our society than were human sacrifice, slavery, and the denial of women's and minority group's rights to vote. Our acceptance of these conditions was their only means of survival and it is within our power through thought, education, dissent, redress and a revolution in thought to change the course of history and win a stay of execution for life on Earth.

I feel that this issue should be handled not by the DOE which is narrow in its scope and unable to handle or even to realize the implications of what it is doing. An independent coalition of scientific groups, and public advocates should oversee the selection of a new agency to take on this waste disposal problem and the broader issues it is tied to. These issues are, undeniably, the most urgent concerns in the history of the earth.

2.2.13

Submitted by Jennifer Paine
Representing NORTH OLYMPIC PEACE FELLOWSHIP

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AUDUBON SOCIETY OF PORTLAND
A Branch of National Audubon Society
PHONE 292-6855 5151 NORTHWEST CORNELL ROAD PORTLAND, OREGON 97210

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Mr. R.A. Holten
Waste Management Division
Department of Energy
Richland Operations Office
Richland, Washington, 99352

Dear Mr Holten:

I am writing on behalf of the Conservation Committee of the Portland Audubon Society to comment on the Draft Environmental Impact Statement on disposal of radioactive wastes at the Hanford site. Portland Audubon Society is a 5000 member chapter of the National Audubon Society, and one of the 12 chapters comprising the Oregon Audubon Council (OAC). The OAC identified nuclear waste disposal at Hanford as a priority conservation issue for 1986. While we recognize there are major implications for human health and environment, our comments will focus on the implications of radioactive waste storage for wildlife and wildlife habitat.

The following topics are our greatest concerns:

1) The lack of detailed analysis of the effect of Hanford operations and the resultant waste on the plants, animals and environment. 3.2.4.2

2) The lack of consideration of the resident, migratory and breeding populations which use the Hanford area. 3.2.4.5

3) The lack of consideration of the impact of Hanford operations on endangered and threatened species. 3.2.4.3

4) The lack of information on radioactive and toxic chemicals in the food chain within the bounds of Hanford, in migratory species and the Columbia River. 3.5.5.1

5) The lack of consideration of the Columbia River as a prime resource, which if contaminated would have dire consequences not only for wildlife and habitat, but for human and economic concerns downstream. 3.2.4.1

6) The inaccessible and incomprehensible nature of the document. 4.1.1

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3.3.5.2 7) The failure to consider the full range of alternatives for disposal of waste.

3.2.4.2 The DEIS asserts that there is no effect to humans from the Hanford operation, past or future, based on the computer models (which we must accept without documentation). Based on that conclusion we must therefore extrapolate to also conclude that there should be no concerns relating to wildlife or the environment.

3.2.4.2 The impact of the Hanford operation on the environment in general and on wildlife in particular, was not addressed at all. There was a total of two and one-half pages covering a brief, general description of the area and its plants and animals, and a one page table of endangered and threatened species. Within the description of each alternative, the DEIS states "ecological impacts ...of all waste classes would be minimal since much of the area under consideration has already been disturbed as a result of radioactive waste management and other nuclear-energy-related activities"; and the biggest impact would be as a result of earth moving and road building. Are we to believe that 7×10^7 Ci of tank waste, 1% of which had leaked by 1975, 5×10^3 Ci of TRU-contaminated soil, and 5×10^4 Ci Pre-1970 buried TRU solid waste in a volume greater than 5×10^5 tons would have no effect on the plants and animals of an area? Surely, there are more data available regarding the effect of Hanford operations during the last forty years on the environment.

3.2.4.2 The obvious omission of data concerning the radioactivity present in the biota at Hanford should be included in this DEIS. It is those plants and animals which reside, feed and breed on radioactive storage basins and soil that best show the impact of their environment. Perhaps the study of the organisms which live and breed within the Hanford site would provide as good an indication of the effects of the Hanford activities as the complicated mathematical and computer models.

3.2.4.2 There are meager data given in table 4.4 concerning the concentrations of radionuclides in plants and animals, but there are no dosimetry data to show the effects of the radiation these organisms have received or to relate this radiation to the theoretical dosimetry data provided by your sophisticated modeling system for humans. This information is not given in rems which would make it comparable and

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understandable in terms of human radiation dosimetry. There is no mention of the impact of either high or low level radiation in the soil or ponds, which are prime habitat. Nor is there any discussion of the extremely toxic effects of these elements and their compounds, discegarding their radioactivity. Without proof to the contrary, it is very hard to believe the statement: "(t)he limited public access to the Hanford reach of the Columbia River plus the prohibition of public use of most of the Hanford Site land provides a sanctuary for the fish and wildlife of the area". In place of an adequate analysis of the ecology of Hanford, we are to be dissuaded from even considering its biological value by descriptions of the place as a rather desolate, and therefore, rather worthless area. 3.2.4.2

The DEIS gives the approximate number of species within each large group of animals, insects, birds, mammals, etc. It does not list these species or give any indication of the numbers within each population nor how these numbers fluctuate with migration seasons. How many species and individuals use the ponds and riparian zones during the spring and fall migrations? Is the contamination they receive at Hanford carried to other ecosystems? 3.2.4.5

There is very limited discussion of the species which breed at the Hanford site. What is the effect of contamination with radioactivity or toxic chemicals on breeding success or genetic impairment? 3.2.4.2

In section 3.4.1.5, Ecological Impacts, the DEIS states "(t)here are no federally designated threatened or endangered species on which disposal actions would likely impinge." This not only ignores the endangered and threatened species listed by Washington State in table 4.12, but it provides no documentation to support this assertion. Table 4.4 gives the concentrations of radionuclides in several species which are prey for the bald eagle. What effects will consuming such contaminated prey have on the bald eagles? 3.2.4.3

There is no discussion of food chains and how radioactive wastes or other processing chemicals are incorporated within them. Outside of the meager information given in Table 4.4, there are no actual data on the concentration of radionuclides in the biota. There is an outrageously complicated formula (F.2) in section F.2.4., Ingestion of Food Crops, which intends to show the "concentration of radioactive material in vegetation 3.5.5.1

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resulting from direct deposition onto foliage and uptake of radionuclides previously deposited in the soil". There are no hard numbers derived from this equation to show how much radioactive material is present in plants of the Hanford area nor even theoretical values. The same is true for equation (F.3) which deals with radionuclide concentrations in animal products. So, despite the claim of the ability to monitor these parameters, there has been a failure to do so either directly or by models. There has certainly been no attempt to determine how radioactive nuclides or toxic chemicals move through the food chain.

3.5.5.1

No mention is made of the effects of radionuclides in surface water, ground water and the effect of these nuclides reaching the Columbia River to contaminate both human and wildlife activities downstream. The Columbia River and associated resources are crucial to the ecology, economy and well being of the entire Northwest. There appears to be a recognition of the importance of spawning habitat in the statement "(t)he Hanford site serves as the spawning area for more than one-third of the fall chinook salmon in the mid-Columbia". Beyond this admission, there is a failure in the DEIS to fully appreciate the implication of contamination of the Columbia, for not only would contamination affect the fish spawning in the Hanford area, but there would be severe implications for all fish and wildlife (both resident and migratory) that use and inhabit the river. Damage to the salmon as well as other species which use the river, both at Hanford and downstream, could cause economic and political repercussions.

3.2.4.1

While we recognize that the subject of this DEIS is technical and complicated, it appears that there has not been an adequate attempt to make the contents accessible to someone trained in science, much less the general reader. The first volume makes Hanford activities and all waste disposal alternatives seem free of risk and health or environmental impacts. Yet, one cannot determine how these conclusions were reached based on the supporting documentation. The reliance on overly technical formulas, obscure analytical techniques, inaccessible computer models and jargon, makes it impossible to have confidence in the conclusions. It would appear that about two-thirds of the references cited in this DEIS were from sources associated with Hanford directly, and not unbiased in their view. The document would be more credible if sources not associated with the Hanford operation had been used.

4.1.1

The final inadequacy of the DEIS involves the disposal alternatives themselves. None of the alternatives adequately solves the problem of what to do with the leaking, and possibly explosive, high level waste from the 149 single wall tanks, not even the Geologic Disposal Alternative. There is inadequate evidence to show that any of the alternatives would provide safety from these wastes, nor is there adequate consideration of the effects from the chemical hazards.

3.3.5.1

3.1.6.1

It appears that the DEIS favors the In-Place Stabilization and Disposal Alternative. This alternative is the simplest and least expensive. Just cover it up and let it continue to leak and leach. This DEIS makes all the alternatives seem equal in their environmental consequences so the decision seems to hinge on expense rather than good science.

3.3.5.9

The DOE has been careless in the Hanford operations in the past forty years. The release of 300,000 Ci per year into the Columbia River in the 1960's, the release of 5500 Ci of I-131 in 1949, are practices which have been discontinued, we hope. Then there is the matter of changing the criteria for low level waste from 10 nCi TRU/g to 100 nCi/g just because is was the easy way to solve the problem of too much high level waste. Clearly, based on the cavalier approach to all aspects of Hanford activities, and the history of mismanagement, the DOE cannot be relied on to adequately consider the environmental effects of its operation. The objective of the DOE at Hanford is to sustain itself and make radionuclides for weapons; to expect the DOE to fairly monitor and regulate itself as well, is unrealistic.

2.4.1.8

2.5.5

The best disposal alternative is one which was not considered because it is too costly: the Geologic Repository Disposal of Entire Tank Contents. "For commercial waste, geologic disposal was determined to be the alternative of choice (Record of Decision 46 FR 26677, May 14, 1981), which choice was confirmed by the Nuclear Waste Policy Act of 1982 (PL 97-425)." The DOE endorsed this concept in 1980 and again is this DEIS: "Geologic disposal of defense wastes is, therefore, also the choice from among other alternatives cited above and those other alternatives not reexamined here." The problems you cite are risks of transportation, (a risk which is not too great to transport the waste and debris from Three Mile Island to Idaho or to consider Hanford as permanent repository for all nuclear

3.3.1.1

3.3.1.5

3.4.2.2

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waste), and cost. The total amount of nuclear waste projected for disposal at Hanford is twice the current amount. Cessation of plutonium production would eliminate the need for dealing with future waste and would save money, which could be used for the adequate clean up of existing waste. 2.5.6

We recognize that there are other areas of this DEIS which could be commented upon. We are confident that other groups and individuals will consider those shortcomings. We intend to stay involved in the decision making process concerning waste disposal at Hanford in order to insure wildlife and habitat values at Hanford and the Columbia River are adequately considered.

Thank you for this opportunity to comment on the DEIS.

Sincerely,

Diana Bradshaw

Diana Bradshaw
for the Conservation Committee

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Rena M. Strahl
9367 S.W. Morrison St.
Portland, OR 97225
August 6, 1986

R. A. Holten
U.S. Department of Energy
Richland, Washington

Dear Mr. Holten,

Let me add my voice to the others who would protest making the Hanford Nuclear Reservation a permanent nuclear waste repository. Certainly there is a more safe site than along the Columbia River. I also urge that existing defense wastes be cleaned up and the N-Reactor shut down. This does not mean, however, that plutonium production should then be started by resurrecting a WPPSS plant, as is now being planned. 2.1.1 2.5.6

Sincerely,

Rena M. Strahl

Rena M. Strahl

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August 6, 1986

To Rich Holten
U.S. Department of Energy
Richland, Wash.

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I am a newcomer to Hanford related issues, trying to educate myself in the face of impending decisions regarding defense and civilian nuclear waste management. I do not doubt the vital imperative to safely dispose of and clean up the wastes. I have studied the entire DEIS and Appendices for the Disposal of Hanford High-Level, Transuranic and Tank Wastes in a sincere attempt to understand the problems and possible disposal alternatives.

And yet, after researching the entire DEIS, my most profound impression is that instead of contributing to public understanding, the DOE's draft was misleading and at times deceptive. As a result, I have lost trust in the DOE to be able to choose the safest long-term public health and environmental approach (as opposed to choosing a political and/or the cheapest economic alternative). 2.5.5

I highly recommend that there be a strong, independent, civilian watchdog agency to oversee DOE nuclear waste management. I also recommend that activities at Hanford comply with the same strict standards that commercial reactors are required to operate within. 2.2.13 2.2.7

What are the reasons for this serious erosion of DOE credibility? I perceive the DOE to be selling an unsafe bill of goods. Item -"The present storage is providing a high level of public protection while final, long-term systems of containing the waste are planned, developed and built.(1.5)" I'm sure that DOE really wants to believe the above statement. The following quote also emphasizes the 'nearly' positive. "Monitoring and sampling have shown that nearly all of the wastes that leaked from single-wall tanks, in early stages of the program, prior to changes in waste management practice and use of double-wall tanks, were absorbed by the arid soil next to the tanks.(1.5)" Where is the discussion of the wastes that didn't fit into the neat category of being absorbed next to the single-wall tanks? I find it unbelievable that DOE in many cases doesn't even know what wastes are present in the single-walled tanks, including potentially explosive chemical combinations. I find it very revealing that it isn't until the last of the Appendix pages, that one finds site monitoring information describing the un-conscionable levels of radioactive contamination resulting from leaks of cribs, trenches, French drains, reverse wells and single-wall tanks.(Appendix V, 1-39) 3.1.4.26 3.1.1.1

"Normally, the radionuclide concentrations in these ponds and ditches remain below concentration guides, but occasionally, non-routine releases of higher-level wastes do occur.(V.1)"

It appears that the few cribs, trenches, French drains and reverse wells that have been 'characterized' have all showed significant contamination, in some cases already penetrating the water table (V.24)! Here we are trying to develop strategies that will protect public health and the environment for tens of thousands of years, and already we have characterization site monitoring showing serious contamination of ground water in less than 40 years. How many untested cribs, trenches, French drains and reverse wells will also show significant levels of contamination? No, I do not agree with the DOE assessment that present storage is providing a high level of public protection.

How do DOE alternatives propose to deal with these high levels of contamination? The in-place stabilization and disposal alternative and the reference alternative propose the same strategy- "Wastes in TRU-contaminated sites, soil sites, and pre-1970 solid waste sites are already disposed of, but they would be further protected by the addition of the protective barrier and marker system. (3.19)" Although these sites are 'already disposed of' in DOE eyes, these sites are also actively contaminating and poisoning aquifers. Sure, we can cover over the active leakages with a protective barrier and markers and pretend that the problem is solved, but it would be self-deception. I feel the DOE is pushing in-place stabilization and the reference alternative because it is cheaper though not necessarily safer in the long-term.

The deep geologic disposal alternative is the only alternative that deals with these contaminated soil sites and solid waste burial grounds, by retrieving the contaminated material. 3.3.1.1

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Yes, deep geologic disposal will be expensive. The myth of 'electricity too cheap too meter' reveals its true cost in the need to deal with long-term radioactive waste. As the Environmental Protection Agency realizes with toxic waste management, the initial rosy predictions of the clean up costs and the time span needed to clean up, are vastly underestimated compared to what is necessary to complete the job safely. If we can't provide the financial means to safely deal with our present wastes, then by all means we should halt production of future plutonium, nuclear energy and nuclear wastes. My God, don't we already have enough plutonium stockpiled for nuclear warheads to wipe out the entire planet many times over?

2.1.1 I support the deep geologic disposal alternative, but definitely not sited at Hanford. The underlying hydrology of Hanford is complex and not well understood. Most of the DEIS modeling predictions admit to their imprecision. The potential for groundwater contamination of the Columbia River is very real. Again, we are dealing with public health safety and environmental protection from nuclear wastes over 10,000 year time spans. The DEIS professes neutrality in site selection, yet it seems obvious that the politics of a nuclear waste repository, for commercial and defense wastes, are centering on Hanford. When there were 9 sites possible, Hanford was ranked 9th. When the sites were down to 5, Hanford was fifth, and now Hanford is one of three finalists. On top of this, the search for a second Eastern site was cancelled. Sure, wouldn't it be convenient if the deep geologic repository were located at Hanford since most of the waste volume is presently there and on Federally owned property? Yes, it would be convenient, but most definitely not safe.

The National Academy of Science and the U.S. Geological Survey both question the underlying geology and hydrology of the Hanford area in regards to a repository site. Where would be a better site? I would suggest being buried deep within a solid granitic pluton.

3.3.2.5 I do not trust in-place stabilization to safely control the wastes over time. We have seen the leakages from single-wall tanks, cribs, trenches, etc. To leave the wastes near ground level, is to leave too much to chance over time. Indeed, if we find out that in-place grouting of tank wastes doesn't work, then what do we do with all the now concrete radioactive mass?

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To use the DOE terminology, we are using 'pre-conceptual' technology to deal with the long-term disposal of wastes. This is speculative work. Our greatest chance of success is to pick the safest environmental location without regard to politics. With this criteria of maximum safety emphasis, Hanford would long ago have been eliminated as a site candidate. 3.3.2.5

Finally I would like to suggest to DOE and Hanford folks ways to restore credibility to a sceptical public. Recently, there have been Freedom of Information Act disclosures pried out of Hanford files pointing to enormous discharges of radioactive iodine (over 1 million curies of I-131 over a 10 year span). The world decries the initial Soviet cover up at Chernobyl, and justifiably so. And yet how do the actions of Hanford between 1945 and 1955 compare. Here is a ten year period where the residents of Eastern Washington were unknowingly subjected to hazardous levels of radioactivity, all in the name of national security. The responsible officials ought to be ashamed to their very soul by this deception. 2.5.5

There have also been struggles to get the DOE to admit to recent plutonium emissions from the reopened PUREX plant. Purex scientists confirming the plutonium emissions were later repudiated by DOE's new manager at Hanford Michael Lawrence. When will we ever learn that the way to gain people's trust in a democracy is through honesty and openess. This isn't a cat and mouse game about how much the citizens should know. The public health, and trust in their government, demand an open accounting. I'd like to read somewhere, anywhere that DOE admits openly to mistakes being made, instead of hearing rosy jargon about how nuclear installations are no threat to the public health. 2.5.5

DOE has not been forthcoming, open, or honest on nuclear issues. Until DOE demonstrates a concern for the long-term health of the citizens of the Pacific Northwest, and the integrity of the biosphere, they should be held under strict, open , civilian supervisory control on nuclear issues.

Sincerely, George Halekas and Family
George Halekas
Star Route, Wauconda Wash. 98859

P.S. Please put my name on any mailing lists requesting public input on Hanford related activities.

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1708 West Brown
Pasco, Washington 99301
August 8, 1986

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R. A. Holten/EIS
U. S. Department of Energy
Richland Operations
P. O. Box 550
Richland, Washington 99352

Concerning disposal of Hanford Defense Wastes:

I am a lifelong resident of the Tri-Cities and take a keen interest in the role Hanford plays in the environmental and economic status of our region. Taking advantage of public involvement in the defense waste issue, I attended an open house at Cavenaugh's in the spring and a public hearing at the Federal Building on July 8th. At the hearing it became clear that the more explosive issues, using Hanford as a possible high-level national repository and the recent accident at Chernobyl with its implications for the N-reator, overshadowed the question of defense waste disposal. I, however, will limit my comments to the singular subject of this review.

3.3.3.1 After studying the materials made available at the hearing and open house, as well as a copy of the complete EIS draft, I believe the best balance between long term safe disposal, risk of retrieval and processing, and the cost of operations is found in the reference alternative as defined in the EIS, with the following reservations. It appears that a great deal of confidence is being placed in the natural properties of our arid climate and soil. While it is true that water does not move easily between two disparate mediums (i.e. coarse rock and fine soil), it can; if the upper medium reaches the saturation point, gravity will draw it downward. Evidence of this is found on page 4.19 of the EIS. This is most relevant regarding the wastes buried in trenches and cribs, particularly 1301-N crib and trench with its proximity to the Columbia River. "Waste waters discharged on the Hanford Site have reached the uncofined aquifer. The primary constituents that have reached the aquifer are tritium, ^{129}I, ^{106}Ru, ^{99}Tc, uranium and nonradioactive nitrates. These constituents are nonattenuated and have moved from waste disposal sites, through the unsaturated sediments, to the unconfined aquifer. Some radionuclides such as ^{90}Sr and ^{130}Cs have reached the groundwater, primarily through cribs." (EIS pg. 4.20). The integrity of the Columbia River and its tributaries must not be breached even with "acceptable" levels of radioactive substances.

3.2.4.1

3.3.3.1 It appears that deep geologic disposal is regarded as the safest permanent alternative, after the initial risk of retrieval, for high level solid waste. I don't pretend to understand how a 2000 ft. shaft to an underground cavern that must pass through the groundwater at 140 to 230 ft. can avoid possible contamination. I couldn't find the answer in my information. It is, however, with the new technique of vitrification, one of the brighter developments in the nuclear industry. Reducing liquids to solids seems always preferable, since it reduces the chance of seepage, be it through borosilicate glass, grout, or, in the case of single wall tanks, sludge and saltcake.

3.1.8.9

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For the most part, the reference alternative combines the best aspects of geologic disposal with in-place stabilization. The most important considaration on everyone's list is safety for the environment and its inhabitants. Whether or not we can do so with a clear conscience, we are forced to place our confidence in the DOE and its contractors. We can't afford to live with the results of wrong choices. Do it right. 3.3.3.1

Respectfully submitted,

Carolyn L. Siebe

Carolyn L. Siebe

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TO: Rich Holten/EIS
U. S.Dept. of Energy
P. O. Box 550
Richland, WA.

As a citizen of Coeur d'Alene, Idaho, Pacific
2.5.6 Northwest of the U. S. A., Planet Earth, I am opposed
to the production of nuclear waste and weaponry altogether.
3.4.2.2 I am especially opposed to the unnecessary transportation
of Hanford's nuclear waste which will further endanger
our fertile home and perpetuate the myth that there is
3.3.5.1 anyplace safe for such waste. Bury it as "safely" as
possible and HALT further production as soon as possible!

Thank you for this chance to be heard,

Ann Bradford

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OFFICE OF THE GOVERNOR
STATE CAPITOL
SALEM, OREGON 97310

July 30, 1986

Michael J. Lawrence, Manager
Richland Operations Office
U.S. Department of Energy
Richland, WA 99352

This letter presents Oregon's position on the disposal of defense wastes at Hanford. This position was announced by Lynn Frank at your public hearing on July 10.

Oregon's position is based on the following criteria:

1. Long-term risk to the public and the environment must be very low. 3.3.5.3
2. We must not expose workers, the public, or the environment to avoidable risks during recovery, transport and disposal. 2.2.1
3. We must dispose of the wastes in a cost-effective way. 3.3.5.3
4. We should not take irreversible actions until we have great confidence in those actions. 3.3.4.2

Based on these criteria, Oregon's position is: 3.1.8.9

- transform existing and future high-level liquid wastes into glass. Dispose of these wastes in a future repository for high-level wastes 3.3.1.1
- treat and ship retrievable plutonium wastes to the repository being built for these wastes in New Mexico 3.1.3.25
- dispose of strontium and cesium wastes in a future repository for high-level wastes 3.3.5.3

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3.1.4.5 - increase the confidence to dispose of residual high-level wastes in tank bottoms and plutonium wastes that are difficult to retrieve

3.3.1.1 - emphasis should be on disposal in repositories

- continued study of in-place disposal should focus on multiple barriers to releases

3.1.4.30 - decisions should be made within five years

3.1.6.1
2.3.1.13 Oregon is also concerned about the chemical and low-level radioactive wastes from defense activities. We encourage you to implement a comprehensive program and schedule to clean-up these wastes as well. We believe clean-up should meet federal and state standards for such wastes at other locations.

2.2.9 Finally, Oregon believes that funds must be set aside to dispose of future wastes from plutonium production. We require the commercial nuclear industry to set aside funds to handle their wastes. We should require no less of the federal government.

Further technical comments will be made by August 9.

I hope that you will adopt this position as your own. I realize that these decisions will require broad political support and lots of money to implement. I pledge my support to help gain these.

Sincerely,

Victor Atiyeh
Governor

VA/DS-S:jt

302

DAVID J. TAUBEN, M.D.
801 BOREN, SUITE 1776
SEATTLE, WASHINGTON 98104
Telephone 682-3215

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Testimony by: David J. Tauben, M.D.
Representing: Seattle Washington Chapter, Physicians for Social Responsibility

United States Department of Energy sponsored, Northwest Citizens Forum on Defense Waste Panel on Health Impacts of Radiation, Draft Enivironmental Impact Statement, June 12, 1986.

As a physician of Internal Medicine, I have a very different perspective than either a radiological scientist or a Department of Energy (DOE) health physics statistician. I also have a very different agenda: care and promotion of the health of the community.

I do not study adverse health effects either in a research laboratory or with the aid of a computer model. I see real people, with real disease, who express real concerns with preventative health. I diagnose, treat, and attempt to prevent illness. Because of this experience and attitude, I recognize that despite assurances to the contrary, medicine is an inexact science, with imperfect understanding of the delicate yet resourceful human individual.

Yet, physicians and their patients are given assurances of health and safety by the DOE with an erroneous absolute predictive certainty. The possible regional health consequences of errors in their calculations are enormous and potentially catastrophic. In addition, the underlying purpose of this risk-taking is consistently understated: the defense waste problem is a direct result of the totally uncontrolled nuclear weapons production of the past 40 years. The recently accelerated arms race now contributes an additional 8½ billion gallons of combined radioactive and chemical waste each year, plus unrecorded and probably unmeasured amounts of airborn particulate radioactive materials. It is obvious to all but the DOE that this represents a significant burden on the health and safety of the people of the Northwest.

As a physician, I devote much of my professional thinking to risk - benefit analyses, and I assign scientific and intuitively reasonable criteria to assess hazard and determine intervention outcome. As a physician and citizen of Washington State, I see the problem of Hanford as potentially the greatest health risk posed to the Northwest community for now and for all future generations, yet I see only politically and economically expedient solutions offered in a desperate context with short-sighted terms. If reflective caution regarding our head-long rush to disaster has made me a critic, so be it.

Testimony will focus on four categories of problems with the DOE Draft Environmental Impact Statement (DEIS): 1) inadequate data; 2) inaccurate assumptions; 3) suspect conclusions; and 4) incomplete scope.

Inadequate Data

Review of the three volume document shows a preponderance of in-house DOE or DOE subcontracted data and reports. Obviously, any scientist must be skeptical of research performed by only one institution, especially when its conclusions promote that institution's success. In addition, such data fails to satisfy the standard referee process of legitimate scientific research. Independent

2.5.4

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2.3.2.9 review and criticism is a fundamental process of all legitimate scientific discovery, and failure to meet this need raises responsible concerns regarding validity of data collection, accuracy of methodology, and quality of conclusions.

Criticism of DOE research can also be found in its track record of cover-up and scandal. Recent revelations of long hidden hazardous waste mismanagement and blantantly irresponsible intended and accidental atmospheric releases of I-131, does not inspire confidence. The firing of principal investigators from research projects when their data proves unfavorable does not encourage credibility. The overlooked, yet crucial health studies of not only workers, but off-site individuals does not invoke a sense of forsighted responsibility. Good scientists can only judge on the basis of such poor performance.

2.5.5

2.2.12 Inaccurate Assumptions

Assumptions underlying the DEIS defense waste proposal are also problematic, and seem mostly to serve its predetermined conclusion of absolute safety. For instance, assuming that there will be no release of radionuclides into groundwater for 5,000 years is preposterous. There is already compelling independent and DOE evidence that there is ready access to groundwater, as demonstrated by the tritium and ruthenium transit from PUREX cribs measured in the Columbia within seven years of dumping. I do not believe that even the DOE finds disposal of radioactive material directly into the ground a satisfactory technique, yet "in-place stabilization" seems little more than this. The scientific support for effective containment of grout remains scanty, unproven, and presumptuous. The transuranic contaminated soil inventories are not yet fully characterized to the satisfaction of most independent reviewers, though they already exceed the 53,000 tons reported in the DEIS. The reclassification of transuranics containing less than 100nCi/g to "Low-Level" seems economically motivated, not scientifically or safely justified. Further, the potential interference of the high-level commercial waste repository characterization, in terms of monitoring, construction design, and contribution to the total allowable limits of radionuclides in aquafers and the Columbia is not even considered.

2.2.10

2.4.1.8

3.1.1.10

2.1.6

Another misleading assumption is the choice of a linear-quadratic model for determining health risks of low level radiation exposures. Even the chairman of the BEIR III (Biologic Effects of Ionizing Radiation) committee, Dr. Edward Radford, disagreed with this model. Yet, the DOE health risk estimates are entirely founded on this model which essentially establishes "zero risk" at low exposures. By so doing, a zero (or nearly so) multiplier eliminates any possibility of health risk in all subsequent calculations, preordaining safety, regardless of anticipated operating conditions. In fact, the DEIS concludes that so much debate exists as to low level radiation health effects, that a comparison only to backround radiation exposures (and risks) is appropriate. Nevertheless, I find repeated assertions of negligible helath consequences based on linear-quadratic conclusions.

3.5.5.37

Even more disturbing is the complete dismissal of any late genetic effects, and the omission of spontaneous abortions (miscarriages) from adverse health determinations. There is reasonable evidence that such effects may outweigh any cancer induction problems.

3.5.5.32

Despite the claim that the DOE intends to "overprotect" the individual, according to Appendix N, it assumes the least cautious approach. The document proceeds then to confirm this by defending the ALARA model (as low as reasonably achievable), which undoubtedly is an economic and techical convenience criterion

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for safety, not one that should prejudice real health impact considerations.

An unavoidable problem of health physics research is broad confidence limits in population studies, forcing any careful reviewer to multiply by an uncertainty factor of at least 5 to 10 for assuring any numerical coefficent of risk. Here, we are misled in the DEIS by the natural backround radioactivity exposures compared to the defense waste proposal. At only 2% of the natural backround dose, we are reassured of negligible effects. Any increase in risk coefficent certainly will change this conclusion. We must remember that defense waste is artificially concentrated ("enriched") radioactivity, and statements suggesting its direct resemblence to natural uranium ore is a misrepresentation.

3.5.5.11

In regard to natural backround exposures, the DEIS also fails to consider dose rate, as crucial a determinant of adverse health consequences as total dose delivered. The DOE conclusions assume smooth and uniform population dosimetry, obviously not the case in such a construction and shipping operation.

3.5.5.32

The extraordinarily limited imagination of the DEIS in its listing of possible accidents involving radiologic hazard, also raises serious concern. The same unabashed reliance on unproven technology cost the U.S. seven astronauts in the shuttle disaster. The Soviet reactor accident reminds us again of the breadth of human technologic fallibility. Our engineers can never foresee all possible accidents, but they must at least try harder than the DEIS shows.

3.4.3.1

Suspect Conclusions

As a result of these inaccurate assumptions, no serious medical reviewer can be confident of conclusions of safety regarding the defense waste proposal. In fact, the entire proposal suggests an unwitting, but enormous human population study, though the DOE certainly does not intend this project as experimental. Should any of their questionable data and debatable interpretations combine with an unplanned event, an untold health catastophe might result. While we must all assume some risk when dealing with hazardous materials, we should also assume that those subject to this risk are made aware of its real extent.

3.4.3.1

Incomplete Scope

Lastly, the DEIS suffers from incomplete scope. It does not fully address future defense waste management and decommisioning. A full inventory of existing on-site radioactive and toxic waste is lacking. Operational radiation doses extend only to 2050, which assumes perfect schedule and flawless techniques. Linkage to commercial waste repository characterization and construction is absent. Comingling of defense and commercial waste is not addressed. The proposal is really an interim solution, since there is no assurance that a deep geologic repositry will ever be built. Liability issues are not adequately reviewed. No considerations are made for outside agency monitoring of the DOE's activities. There is no call for the stopping of further plutonium production until a definite plan is available for the waste of such senseless and hazardous arms building. Perhaps the waiving of the pre-EIS scoping hearings has critically flawed this document.

2.3.1.14

2.3.1.1

In conclusion, while I do agree with the urgent and imperative need to deal with the huge problem of Hanford defense waste, I still find the existing DOE proposal worthy only of complete reconsideration. My above specified concerns are based on the recognition that the political and economic process of radioactive waste management has historically overpowered real scientific

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Testimony, Dr. David Tauben, Defense Waste DEIS, p. 4

review of serious and permenent regional health effects. I expect that a decision with such significant regional health consequences be reasoned, balanced, reviewed, criticised, rewritten, and more assuredly proven than the present DEIS. Anything less is to experiment with the future health and safety of the entire Northwest.

These remarks are preliminary, and prepared for distribution and submission at the June 12th hearing sponsored by DOE. Washington Physicians for Social Responsibility requests permission to submit a more thorough analysis of the DEIS in written form to help make a more adequate record for agency decisions on this most important topic.

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TO: Rich Holten/EIS
U. S. Dept. of Energy
P. O. Box 550
Richland, WA.

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As a citizen of Coeur d'Alene, Idaho, Pacific 2.5.6
Northwest of the U. S. A., Planet Earth, I am opposed
to the production of nuclear waste and weaponry altogether. 3.4.2.2
I am especially opposed to the unnecessary transportation
of Hanford's nuclear waste which will further endanger
our fertile home and perpetuate the myth that there is
anyplace safe for such waste. Bury it as "safely" as 3.3.5.1
possible and HALT further production as soon as possible!

Thank you for this chance to be heard,

Alan Wasserman

Alan Wasserman
1512 Fruitdale Ave
Coeur d'Alene, ID 83814

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Delores Porch
3245 SE 136th Ave.
Portland, OR 97236

August 7, 1986

Rich Holten/EIS
U.S. Dept. of Energy
Richland Operations Office
P.O. Box 550
Richland, WA 99352

Dear Mr. Holten:

I have reviewed the Department's Environmental Impact Statement regarding disposition of military nuclear wastes and feel that the geologic disposal would be the best way to isolate these wastes. 3.3.1.1

I believe that cost should not be a factor in this decision because of the extreme toxicity of these wastes and the unproven reliability of the barrier methods proposed in the second alternative. Also, because of the close proximity of the Hanford Reservation to the Columbia River I am not convinced that the nuclear wastes would not leak into the ground water and subsequently into the river. 3.3.1.1

Sincerely,

Delores Porch

Delores Porch

cc: Ron Wyden
Bob Packwood
Mark Hatfield

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TO: Rich Holten/EIS
U. S.Dept. of Energy
P. O. Box 550
Richland, WA.

As a citizen of Coeur d'Alene, Idaho, Pacific Northwest of the U. S. A., Planet Earth, I am opposed to the production of nuclear waste and weaponry altogether. 2.5.6
I am especially opposed to the unnecessary transportation of Hanford's nuclear waste which will further endanger our fertile home and perpetuate the myth that there is anyplace safe for such waste. Bury it as "safely" as possible and HALT further production as soon as possible! 3.4.2.2 3.3.5.1

Thank you for this chance to be heard,

Pam D. Gardiner
7844 Harbor Lake Rd
Post Falls, ID
83854

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Dear R.A. Holten

As an Oregonian all my life and concerned with our planets ecology. I must speak to the Draft Environmental Impact Statement by the Department of Energy regarding the storage of Radioactive military wastes located in Hanford Washington.

I'm sure that your well aware of Hanfords 40 year legacy of nuclear waste production. It's amazing that in this brief time that millions of gallons of high and low levels of the radioactive waste have been produced. 53 million to be exact. Yet, there exists relatively few methods for its storage and safe disposal. The military continues to extract plutonium and uranium at its Purex plant from the fuel rods in the N-Reactor for the production of nuclear warheads while simultaneously dumping thousands of gallons of contaminated water into the ground. Furthermore the N-Reactor has leaked radioactive water at the rate of 140 gallons per minute during the early 1980's and eventually this waste found its way to the Columbia River. DOE officials ever admit this fact.

2.2.10 Present methods of disposal that employ trenches, ponds, cribs and single-shell tanks are grossly inadequate. Continuation of these insane practices must cease immediately for the above mentioned reasons, I submit these alternatives to the DOE'S Draft Environmental Impact Statement:

2.5.6 * Terminate the N-Reactor and Purex plant operations.

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* Acquire clean-up funds from the Defense budget. 2.2.9
* Do not place radioactive military waste in ditches, ponds and cribs 2.2.10
* Remove leaking radioactive single-shell tanks and potentially leaking tanks from the present sites and away from water sources.
* Increase and update worker and community safety measures and standards.
* Reinstate the search for a second repository to store radioactive waste 2.1.8
* Actively seek citizen comments and participation and then use their findings and conclusions. 2.3.2.8

More than anything else I hope the DOE carefully review its Draft Environmental Impact Statement and be aware of the myriad complexities surrounding the issue. This entails listening to the citizens of the Northwest whose survival directly depends on clean air and the Columbia River system for water, food and micro ecosystems. If our air and water supplies are continually sacrificed for the production of radioactive waste, then the Northwest will perish. And eventually our society will perish because we lacked the respect for ourselves, our air, our rivers and our environment in general.

Thank you for your time,

Sincerely, Nick Arnis PO Box 604 PDX, OR 97207

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Aug. 6, 1986

To: Rich Holten, E.I.S.
U.S. Dept. of Energy, Richland Operation Office
P.O. Box 550, Richland, Wash. 99352

Input: re Hanford Radioactive Waste Disposal Site

"When in the Course of human Events, it becomes necessary for one People to dissolve the Political Bonds,.....a decent Respect to the Opinions of Mankind requires that they should declare the causes which impel them to the Separation.

We hold these Truths to be self-evident, that all Men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty, and the Pursuit of Happiness--That to secure these Rights, Governments are instituted among Men, deriving their just Powers from the Consent of the Governed, that whenever any Form of Government becomes destructive of these Ends, it is the Right of the People to alter or to abolish it, and to institute new Government, laying its Foundation on such Principles, and organizing its Powers in such Form, as to them shall seem most likely to effect their Safety and Happiness."

I sit at my kitchen table on this day--the anniversary of the United States killing of 80,000 Japanese. It is a painful coincidence that reinforces the fear that this government seems intent in repeating this criminal carnage.

I stare at your Draft Environmental Impact Statement, hundreds of technical pages--three inches thick--knowing that I am incapable of responding to it.

2.5.5 This kind of game-playing produces a population of frustrated and angry citizens. I seek a response to this folly and thankfully still have our Declaration of Independence as a path.

Sincerely Yours,

Audrey Moore

Audrey Moore (Mrs. R.D.)
53236 E. Marmot Rd.
Sandy, Ore. 97055

cc. Hatfield
Packwood
Weaver
McCain
Smith
Smith
Wyden

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STATEMENT OF PAMELA C. BEHRING
on behalf of
LEAGUE OF WOMEN VOTERS OF SPOKANE

The League of Women Voters of Spokane recognizes the need and realizes the responsibility for siting a safe repository for Hanford defense wastes. This is possible only with a full review by independent scientists and participation of the public. We thank you for this opportunity to comment on the DEIS. 2.3.2.8 2.3.2.9

In this document there are a few references to the safety and health of the public stated in environmental or socioeconomic discussions. No where, however, is it stated how this safety will be determined. It is merely assumed that if the material is stored appropriately that that will be sufficient to ensure the safety of the public. 4.1.14

The defense activities at Hanford have been on-going for over forty years. In that time not one epidemiological study has been initiated to study the health effects of low-level radiation on the populations within a two hundred mile radius of the site. These effects are poorly understood and, without an adequate base of information, will continue to elude us. 3.5.5.42

The League of Women Voters of Spokane believe that it is imperative that health studies - independent of USDOE and its contractors - be initiated immediately on the populations that may play host to tons of radioactive waste. 2.3.1.14

The DEIS does not give a comprehensive overview of all the waste on site and therefore does not address some of the other problems having to do with contamination. What, for example, will be done to curb or eliminate tritium contamination of the ground water? What are the projections of the amount of waste to be produced in the future?

We also wish to express our support for comments made by the Columbia River Task Force and the Leagues of Clark County and of the states of Washington and Oregon.

Pamela C. Behring
1418 E. 13th
Spokane, Wa. 99202

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2134 NE 51st St
Portland, OR 9721[illegible]
(503) 282-4132
August 6, 1986

RA Holten/EIS
US Dept of Energy
Richland Operations
PO Box 550
Richland, WA 99352

To whom It Concerns:

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the purpose of my letter to you today is to voice my vote and opinion of what the Dept of Energy should do with the nuclear waste presently being stored at the Hanford Site in the State of Washington.

Although Hanford is in Washington I feel its proximity to the Columbia River is reason enough, first of all, for Oregonians to participate in and be advised of planned actions and secondly, Hanford should be cleaned up!

Approximately 20% of Oregon's economy is based on the Columbia River. In difficult economic times, we cannot afford to jeopardize 20% of our economy on a site that already has flaws. 3.2.4.1

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The geology of this area is in question, as the basalt rock, which is found below the surface at Hanford, is basically layers of lava flow formed into fractured rocks as the lava cooled. This type of rock is known to easily crack + crumble. Not to mention earthquakes + volcanoes. 2.1.1

I am not a scientist or geologist, but given some of the information available, my feeling is that this waste has been stored in a volatile area for over 40 years, are we waiting for an "accident" to happen? OR are you people going to react at our requests to clean up this waste site?

As far as clean up is concerned, what do we do? Where do we begin?

In my opinion, which I trust will be regarded along with all others.... of the $1.02 billion dollars the US DOE plans to spend to STUDY the site for future waste disposal, route these moneys for STUDY and CLEAN UP in the safest way possible for not just Oregonians + Washingtonians but for ALL of mankind, the present waste at Hanford is not safe as it is stored now. 2.3.2.8 2.2.1

Our water sources must be considered irreplaceable and guarded. The Columbia is a major River in the U.S.

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RA Holten/EIS
US DOE

page 2

Ironically I write you this letter on the same day, only a different year ... when the "BOMB" was dropped on an island in the Pacific. A BOMB that I am told was created in my backyard before I was born. And even now the wastes generated are still active... not to mention the dark spot and death + destruction still obvious on Hiroshima and our history.

2.2.11 My vote is for Cleaning UP Hanford.

I will back my vote up with all supporters of clean up. Thank you in advance for your Considerations, Our future is in your hands + Gods You probably will hear from me again.

Sincerely
Christy A. Crandell

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WM DIVISION

Ms. Marilyn Couch
1705 NW 32nd
Portland, Oregon 97210

August 6, 1986

DOE Richland Operations Office
Waste Management Division
Richland, Washington 99352

ATTENTION: R. A. Holten/EIS

RE: Comments on Draft EIS: Disposal of Hanford Defense High-Level Transuranic and Tank Wastes

Gentlemen:

My name is Marilyn Couch. I am a citizen of Portland and was the co-chair of Hanford Awareness Week.

The difficulties we are facing at Hanford were created by 40 years of mismanagement of radioactive waste disposal. The problem of cleaning up Hanford is compounded by the perceived costs, lack of proven technology to solve these problems, and the deadly and destructive nature of the radioactive wastes themselves. DOE's concerns with its public image are another part of the problem.

It is important for the people living in the Columbia River Basin to recognize the magnitude of the problem and demand that the DOE clean up the area in the most thorough way possible. 2.2.11
Presently we are at a crossroads where we can "face the music" and pay the real price or put dirt and rocks on top of the problem in hopes that it won't leak too quickly into the surface aquifer 140' below.

I believe that we need to go with the Deep Geological Alternative. Although it is the most demanding of the alternatives in terms of cost, labor and technology, in light of the amount of money we spend on our weapons program to produce the waste -- spending 11 billion dollars over 20 years to begin to clean it up is insignificant. Until this time the DOE and the nation have not had to pay the true costs of this industry. It is one thing to environmentally destroy a place like Hanford, it is quite another to destroy the Columbia River Basin. 3.3.1.1

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3.3.1.1 The Northwest is known for its clean and relatively unspoiled environment, and it attracts people and industry as a result of this image. Tourism and agriculture are two of Oregon's largest industries. The failure to clean Hanford and the DOE proposed expansion of Hanford creates obvious risks to these economic bases. Nowhere does the DOE mention these risks in the EIS.

3.3.2.5 3.5.1.7 The In-Place Stabilization Alternative is not adequate because it does not isolate the wastes from the environment. The proposed barrier is both untested and unproven. In view of the volumn and level of radioactivity of the material as well as the period of time over which it must last, it is inadequate.

3.3.3.1 The Reference Alternative is good in that it classifies some of the liquid wastes. Yet, like the In-Place Stabilization Alternative, it leaves the highly radioactive, leaking single-shelled tanks in the ground. This is no solution. Rather, it is little more than acceptance of radioactive contamination of the adjacent ground and surface waters in the near future.

310

2.5.5 The DOE has proven itself to be neither qualified to protect or to represent the public interests. It is simply a public relations arm of the military. It sees its goal as justifying and prolonging indefensible mismanagement of a weapons facility without regard to the environment. The following examples support this statement.

3.5.3.6 1. The DOE chose to ignore a major established ground water channel going from the 200 area to the Columbia River in developing their computer model in 1976. SEARCH Technology, doing the only non-governmental study of ground water at Hanford, has found that ground water traveling from the PUREX plant along this channel is reaching the Columbia in 3-5 years rather than the DOE computer model's predicted 30-60 years. This same miscalculation of water flow was used in the computer's model for this EIS.

2.2.10 2. The DOE;s continual mismanagement of waste disposal at the PUREX plant speaks clearly of their major motivation -- the continued manufacture of weapons grade plutonium -- and their complete disregard for the environmental consequences of continual dumping of radioactive wastes into the ground.

3.5.6.33 3. Many of the DOE;s charts and graphs in the EIS omit the location of established earthquake faults and misrepresent

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the spatial relationship of the surface aquifers and the Columbia River to the proposed dumps.

3.2.6.1 4. The socio-economic section of the EIS covers whether there are enough sewers, houses, schools, etc. to accommodate population change for the neighboring counties depending on which alternative is chosen. It is extremely shortsighted (indeed, ignorant) not to consider the impact on the Oregon and Washington populations along the river, especially if there is an accident at Hanford, enroute to Hanford, or if the river becomes more contaminated. The health and socio-economic effects of such environmental degradation are significant and wholly ignored.

3.1.1.10 5. In 1980 when the DOE realized that it couldn't meet its own guidelines it rewrote them, reclassifying hugh quantities of radioactive waste without public comment or review.

2.3.2.9 Hanford needs an EIS that takes all past, present and proposed activities into consideration. This should be done by an independent group of public representatives adequately funded to enable them to do independent research -- including full access to classified information describing waste disposal activities at Hanford over the past 40 years. No one can expect the polluter to give an objective assessment of their past misdeeds.

As we saw with the Challenger and the setbacks to our space program, in this highly technical age to create an atmosphere that relies heavily on the "company" line and supresses free interchange between scientists and engineers is extremely dangerous, both for the nuclear industry and the Northwest region.

3.3.1.1 If we are going to continue to have a military and commercial nuclear industry we need to pay the TRUE costs of cleaning it up. At Hanford we need to start with the Deep Geological Alternative. If we are unwilling to develop the technology and pay for a real solution to the problem we should phase out the nuclear industry immediately.

Please respond to the following questions:

3.5.3.6 1. What do you believe the water flow to be from the 200 ares to the Columbia River? On what information do you base this? How do you respond to the water flow calculations done by SEARCH?

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2. Why were no hazardous chemicals considered in this EIS? 3.1.6.1

3. How do you justify a barrier of rock and sand protecting the tanks from possible flash floods and earthquakes over 10,000 years? 3.5.1.57

4. What will keep the tritium plume below the single-shelled tanks from leaking into the aquifer 140' below? 3.5.3.9

5. With tritium already leaking into the Columbia River how will you be able to identify subsequent sources of contamination in the future? 3.5.3.11

6. How can you justify even the remotest possibility of contaminating the nation's second largest river basin? 3.5.4.4

Very truly yours,

Marilyn Couch

MARILYN COUCH

MC:clb

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August 5, 1986

Rich Holten/EIS
U.S. Department of Energy
P.O. Box 550
Richland, WA 99352

RE: Comments on possible citing of Hanford as the nation's nuclear waste repository.

I am writing this to express my concerns over the proposed selection of Hanford as the nation's nuclear waste repository. I am submitting this as written testimony as I did not give oral testimony at the July 10, 1986 public hearing.

My first concern is that Oregon and more specifically Portland is my home. I love this area. I love the land. I feel very fortunate to have been born and raised in such a beautiful place. I am not alone in this as Portland has been rated more than once as one of the most liveable places in the country. I feel that the Hanford proposal represents a direct threat to that very liveability. It scares me. 3.2.4.1

If Hanford is to be selected, it should be because it is the best of all possible sites, economically, geologically and above all it should receive the highest marks possible in terms of safety; it should be the least likely site to present possible health risks to the public. 2.1.1

This being the case, my second concern is politics. Politics in the decision making process for Hanford appeared evident from the time Hanford was placed at the top of the list of site selections up to the most recent "finding" of the documents used in the overall decision making process and recently made public. The documents were used according to the DOE in consideration of a secondary repository site; the decision on a second site having been indefinitely postponed prior to release of the papers, yet mandated by the Nuclear Waste Policy Act to be made by 1989. The title of one of the documents was "Objective: Maximize reduction of political pressure while minimizing costs and not jeopardizing first repository EA's". That political concerns played a large part in the decision making process is now officially obvious. 2.2.14

I feel the politics of the DOE in this matter are inexcusable. However, the DOE seems only to be following historical precedent with regard to the managerial history of the Hanford reservation: 1949: Secret release of a highly radioactive cloud from Hanford over Oregon, Washington and Idaho. How many people living in those areas at that time are now, have or will be contracting cancer due to that release will probably never be fully known; 1959: Herbert Parker, Manager of Hanford Laboratories assures a congressional committee that the tanks storing plutonimum waste products have shown no evidence of leakage and are safe. In 1973 tank 106-T was found to have leaked over 115,000 gallons of radioactive waste over a 51 day period before being discovered. That leak led to a lawsuit by the Natural Resources Defense Council which forced an environmental impact statement on Hanford waste operations entitled ERDA 1538. The report showed that over 450,000 gallons of high level waste had already leaked from Parker's "safe" tanks. 2.5.5

1949, 1959, 1986, the credibility gap of the DOE just continues along. With such a record how can I or anyone else be expected to believe that the DOE is capable of their position of guardian of the the nation's nuclear waste, particularly at Hanford? 2.5.5

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Comment on Hanford repository 2

3.4.2.2 My third concern is the transportation factor involved if Hanford is selected as the nation's nuclear waste repository. Three-fourths of the nation's nuclear waste is produced east of the Mississippi, thus with a west coast site selection such as Hanford, this highly radioactive material must be transported across half the country thereby placing each state through which it must pass at risk.

3.5.3.6 My fourth concern involves geography and geology. Hanford not only lies four miles from the second largest river system in the continental United States, but is less than 25 miles upstream from a major metropolitan area. Underground river channels were known at Hanford in the 1960's. These channels could allow for fast transportation of nuclear contaminants to the Columbia.

3.5.3.6 The SEARCH Project has recently re-confirmed the existence of a fast flowing river channel at the 200 E area. The significance of this is the prediction of a faster travel time (3 - 5 years) than what the DOE computer model predicted (30 - 60 years) that it would take contaminated water to reach the Columbia. The shorter travel time would allow for less filtration of wastes meaning more harmful wastes could reach the river if an accident were to occur.

3.5.6.37 Hanford also lies within an active volcanic area as was recently demonstrated by the eruption of Mt. St. Helens. Mt. Hood to the south is also considered an active volcano. Many of the wastes both proposed for storage and created at Hanford have half lives of 25,000 years. Protecting any material for that length of time presents problems, but certainly some of those hazards could be reduced by not storing the nation's nuclear wastes in an unstable geological area to begin with.

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2.1.1 Basalt rock is the medium at Hanford under consideration for placement of much of the proposed wastes. Basalt rock is known for vertical fracturing, thus leaving an easy avenue of escape to ground water below should there be any problem with containers inside the basalt. Also, a geological disturbance such as an earthquake could lead to further spliting apart of the rock. Geologists consider granite a safer choice for a possible repository, yet interestingly enough crystalline rock formation sites considered in the preliminary study have been placed under consideration only for a possible second repository site if the DOE determines a second site is needed. Safety once again seems a "secondary" concern.

2.2.4 A fifth concern of mine is cost. Hanford was considered the most costly of the five finalist sites, yet it now heads the list and the DOE has announced plans to spend more than $1 billion over the next five years to further study the feasibility of Hanford. Apparently money means little to the DOE. Ironically, one of the main problems cited for the use of vitrification or the process of "glassifying" wastes for safer long term storage, one of the perhaps more promising technological methods come up with so far for dealing with high level radioactive wastes, is cost. It would be a far better investment of the taxpayer's money to spend that billion dollars on research for better technology to enable safe storage of nuclear waste since regrettably the problem is a reality that must be dealt with, than to continue spending to justify what appears in all regards to be a foregone conclusion.

2.2.1 My concerns can best be summarized in that they all seem to have been disregared in the Hanford selection process with the exception of politics. In my view the Hanford selection process has shown itself to be little more than a political hypocrisy ignoring all environmental, economical and public health concerns. I am scared. If this were your home, your backyard, would you allow it to happen? Seek the best possible solution.

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Comment on Hanford repository 3

For the sake of future generations, quit playing politics.

Sincerely,

Marilyn Lohr

Marilyn Lohr
5502 SE Firwood
Milwaukie, OR 97222

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WM DIVISION

Rich Holten/EIS
U.S. Department of Energy
Richland Operations Office
P.O. Bow 550
Richland, WA 99352

August 2, 1986

Concerning the Disposal of Nuclear Defense Waste At Hanford:

We have, all or in part, attended the Northwest Defense Waste Citizens Forum held June 12 in Seattle, read the applicable press releases and comments of Greenpeace, the Sierra Club, and Physicians for Social Responsibility. We trust the Department of Energy will respond to the detailed technical questions that have been raised concerning the accuracy and completeness of the government's draft environmental impact statement on the disposal of existing waste at Hanford Nuclear Reservation.

We wish to make the following personal comments on the disposal plans:

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2.2.11 1) We favor the most extensive cleanup possible to insure the safety of the envronment and population. We believe the scientific resources must be applied at whatever cost to clean up Hanford and monitor that effort once achieved.

2.4.1.10 2) The DOE must be held responsible for it's actions. Technology as applied to agricultural and consumer products has helped us live longer and more comfortable lives. What we are facing all over the world is how to deal with the wastes from the production of so many goods. Defense waste is so much more insidious: there are more nuclear weapons that can ever be deployed in the defense of life.

2.5.6 In conclusion, we ask the DOE in its struggle to dispose of radioactive and chemical defense waste to act with the highest morality: to act in a way which supports life. In addition all future production of nuclear devices must be halted until the citizens, the scientific community speaking for the health of the earth and a living body and the government can achieve consensus on the need or lack of need for commercial and defense nuclear devices.

Signatures follow on second page

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Citizens Concerned About the Disposal of Nuclear Waste at Hanford

david UBERWOLF / 1201 1st ave south / Seattle
Anna Elliott / 4080 Aikins SW. / Seattle / 98116
Robin Mercer 10217 14th S.E Renton WA 98056
Jon Vigil 3813-49 SW Seattle WA 98116
Carolyn Hempstead 24021 SE 374 St Enumclaw WA 98022
Bruce Dees 5462 Beach Drive S.W. Seattle Wa 98136
Adam Bergwall 746 Dodge Ave Evanston IL 60202.
Betsy Bridwell 14812 SE 368th Auburn, WA 98002
George D Hempstead 24021 S.E. 374, Enumclaw, WA. 98022

(no comment identified)

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JUL 28 1986 0904
WM DIVISION

U. S. Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington, 99352

Re: D.O.E. draft E.I.S. "Disposal of Hanford Defense High-Level, Transuranic, and Tank Wastes," DOE/EIS-0113

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Limiting comments to disposal of high level nuclear waste is difficult if not impossible. I only wish I had the time to expand on the many matters that deeply concern me — and many other people. That privilege I don't have — and you probably don't either so I'll be brief.

— This is an ongoing experiment on a global basis. You can't afford to screw up! 3.3.4.2

— We don't even like burning household garbage because of the potential contamination of ground water aquifers — Don't bury it!

3.3.4.2 — Technology will advance to better deal with waste disposal in the future. It always has - it always will - believe in it.

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P.S. — There will be plenty of jobs and a viable economy at Hanford if you would just clean up the mess - including chemicals - that already exists.

— Keep these wastes where they are — or in an M.R.S. Mode — or Glassification in place if and when this process has been developed safely and efficiently but not next to the Columbia River 3.3.4.2

— Don't waste billions of our dollars on foolish ideas like studying Hanford for a repository — you know this is all politics and greed — so do we! 3.3.1.1

Your credibility among those of us who know the truth about how you have operated and conducted yourselves is zero! 2.5.5

— I feel writting my comments is just total futility. You're not going to listen to us and just want us to vent our frustations. Why not try a common sense approach to solving these problems? 2.3.2.8

— Your ideas on how we should behave on this planet and how we should deal with waste disposal are antient and must be changed to a modern mode of intelligence. Let's work on it

P.S.? Quit producing the stuff (it's poisoning our bio-system!) (Don't laugh it's true.

Sincerely,
Gary Eckstatt
15105 Twin Fir Rd.
Lake Stevens, Wa. 98258 2.5.6

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704 SE 15th
Portland OR 97214
Aug 6, 1986

Mr Holten:

I am writing to comment on the draft Environmental Impact Statement on the selection of the Hanford site as a depository for defense nuclear wastes.

I cannot believe that the Department of Energy would propose siting these
2.1.1 wastes next to the Columbia River when, in the past, these wastes leaked into the river, making it the most radioactive river in the nation. While I appreciate efforts to keep radioactive waste from entering the Columbia, I am convinced there is no way to insure that the river will not become hopelessly
3.2.4.1 poisoned by these wastes in the future. I suggest that it is both immoral and suicidal to poison the river this way, and urge you to select a site which does not have a major river flowing through it.

While I am horrified that we have created these toxic wastes, I believe it is our responsibility to contain them in a way
2.2.1 which does not pose a threat to our river, the earth and its inhabitants. The real question is when and how do we clean up Hanford.

Thank you for your attention in this matter.

Peter Ford (Peter Ford)

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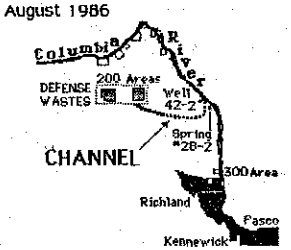
5 August 1986



SEARCH technical services
hcr 11 - box 17
davenport, wa 99122
(509) 725-6666

Hanford Reach Project

S.H. LeRoy
Public Affairs
Department of Energy
P.O. Box 550
Richland, WA 99352

Comment : Defense Waste DEIS

Dear Mr. LeRoy:

We provide the following comment on the Defense Waste DEIS to assure that the technical basis for future waste disposal at Hanford is adequate. Obviously, many of those wastes will be stored at Hanford. The question is, How much engineered protection must be provided to separate adequately those wastes from the environment?

Fortunately, DOE has 40 years of experience with radioactive wastes at Hanford, so a wealth of information about important radionuclide-soil-groundwater interactions exists. But this information has not been synthesized into concepts which assure realistic predictions of what will happen in the future. Therefore, we recommend that DOE withdraw the DEIS and formulate realistic models of interactions between waste, soil, and water before reissuing the DEIS.
2.3.2.10

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4.1.20

Technical Basis for Recommendation • The technical basis for this comment is that, "... models used for predicting the future must be shown to adequately reflect the past and the present data [DEIS, p. 0.8]."

4.1.20

Although the scenarios investigated in the DEIS describe a future 10,000 year period, the concepts involved must conform to present reality. That is, DOE must have a basic understanding of the present connection between the 200 Areas - which are the major waste disposal areas considered in the DEIS - and the Columbia River if DOE models are to be credited with adequate predictions for the period 2150 - 12,150 AD [p. 0.1]. We now demonstrate important misunderstanding of the present.

3.5.3.6

The conceptual basis of this demonstration is a cobble- and boulder-filled, old river channel which connects the 200 Areas to the Columbia River [see header for location]. The cobbles and boulders which fill this channel allow a short travel time, and they also provide so little surface area for sorption that many contaminants from 200 Areas might already be reaching the river from 200 Areas.

Strontium-90 (^{90}Sr) is a radionuclide which is discharged and stored at the 200 Areas and is considered to bind to the soils near 200 Areas. For example, ^{90}Sr discharges to the watertable at Reverse Well 216-B-5 between 1945 and 1947 resulted in measured concentration of ^{90}Sr which decreased by a factor of 100 within 20 feet of the well [DEIS, Fig. V.18]. Clearly, if concentration decreases this rapidly, no detectable ^{90}Sr can reach the river 40,000 feet away.

DOE's idea that ^{90}Sr is bound to Hanford soils and migrates very slowly can be tested by examining ^{90}Sr concentration at the channel mouth. According to the channel theory, Spring #28-2 discharges from the right side of this channel into the river. DOE measured the concentration of ^{90}Sr of Spring #28-2 water to be 2.8×10^{-13} Ci/L $\pm 3 \times 10^{-14}$ (one standard deviation) on 30 July 1986 [PNL-5817, Table A.58]. According to the channel theory, this spring sample represents a mixture of river water and channel water. The concentration of ^{90}Sr in river water at Mile 27.5 was measured to be 1.8×10^{-14} Ci/L $\pm 3 \times 10^{-14}$, which is 3 standard deviations below spring water.

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Using ^{3}H data for river, spring, and channel water, HRP calculated the Spring #28-2 sample to be 85% river water and 15% channel water [Technical basis of the channel theory, July 1986]. Undiluted ^{90}Sr concentration in channel water was then calculated to be 8.5×10^{-13} Ci/L.

In comparison, Well 42-2 located near the channel mouth had a ^{90}Sr concentration of 8.6×10^{-12} Ci/L in 1982 [PNL-4659, Table C.1] which just exceeded the drinking water standard. Later data suggest that this well water has largely flushed from the channel into the river.

These concentrations of ^{90}Sr in groundwater at the river are important because the only known source of ^{90}Sr entering the channel is the 200 Areas. In other words, the channel is the relevant pathway for both present Defense Wastes and DOE's models of future Defense Waste travel.

3.5.3.6

The DEIS predicts that if any disposal action is taken and there is no Disruptive Barrier failure, ^{90}Sr will arrive at the river at peak concentration below 1×10^{-14} Ci/L or at a rate less than 1×10^{-6} Ci/yr during the next 20,000 years [DEIS Tables Q.2 - Q.15]. The calculated concentration of ^{90}Sr in channel water entering the river in 1985 is 85 times the DEIS concentration reporting limit of 1×10^{-14} Ci/L. The rate of ^{90}Sr entry into the river from the channel is calculated from HRP's measurement of minimum channel flow (5.6×10^{9} L/yr) to be 4.8×10^{-3} Ci in 1985, which is 4800 times the cited reporting limit.

We conclude that present channel discharge of ^{90}Sr is significantly above the minimum levels of interest for the DEIS models. The requirement that "models used for predicting the future must be shown to adequately reflect the past and the present data," therefore, necessitates model accounting for present ^{90}Sr concentrations near the river. Our concern is not so much that the DEIS omits this accounting, but rather that it is unlikely that DOE's present models can be reconciled with present data.

The travel time between actual ^{90}Sr discharge at 200 Areas and arrival at the river cannot be reconciled with the model predictions. The importance of ^{90}Sr travel time on ^{90}Sr release to the river is spectacular: Even with the shortest model travel time - 250 year for

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the case of No Disposal Action - the DEIS takes credit for 9 half-lives of ^{90}Sr decay, reducing the predicted concentration of ^{90}Sr entering the river by a factor of about 500.

3.5.3.6

This travel time problem is compounded by the physical requirement for a mechanism to allow a very short travel time. That mechanism, according to the channel theory, is a conduit filled with cobbles and boulders, not only allowing rapid flow, but providing 1/1000 the surface area of Ringold sands to remove ^{90}Sr from the groundwater flow. These general considerations suggest that the DEIS may underestimate the release of a few radionuclides, such as ^{90}Sr, by a factor of a million. Such an underestimate would probably be most important for scenarios involving failure of engineered protection.

We believe that this potential impact is large enough - and enough larger than DOE credits - to warrant another look at the DEIS models and the reliability required of engineered protection.

Sincerely,
SEARCH Technical Services

Norm Buske Linda Josephson

xc: Tim Connor (HEAL)
Ron Gerton (USDOE)
Tom Buchanan/Eric Fersht/Sebia Hawkins (Greenpeace)
Sue Watkins (Port of Kennewick)

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SEARCH technical services
hcr 11 - box 17
davenport, wa 99122
(509) 725-6666

Hanford Reach Project

8 August 1986

S.H. LeRoy
Public Affairs
Department of Energy
P.O. Box 550
Richland, WA 99352

Comment : Defense Waste DEIS - Revision

Dear Steve:

There was an exponent typo on Page 2 of the **Comment : Defense Waste DEIS** submitted on 5 August. A corrected sheet is enclosed.

Sincerely,
SEARCH Technical Services

Norm Buske

enc.

(no comment identified)

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4.1.20

Technical Basis for Recommendation • The technical basis for this comment is that, ". . . models used for predicting the future must be shown to adequately reflect the past and the present data [DEIS, p. 0.8]."

4.1.20

Although the scenarios investigated in the DEIS describe a future 10,000 year period, the concepts involved must conform to present reality. That is, DOE must have a basic understanding of the present connection between the 200 Areas - which are the major waste disposal areas considered in the DEIS - and the Columbia River if DOE models are to be credited with adequate predictions for the period 2150 - 12,150 AD [p. Q.1]. We now demonstrate important misunderstanding of the present.

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The conceptual basis of this demonstration is a cobble- and boulder-filled, old river channel which connects the 200 Areas to the Columbia River [see header for location]. The cobbles and boulders which fill this channel allow a short travel time, and they also provide so little surface area for sorption that many contaminants from 200 Areas might already be reaching the river from 200 Areas.

Strontium-90 (^{90}Sr) is a radionuclide which is discharged and stored at the 200 Areas and is considered to bind to the soils near 200 Areas. For example, ^{90}Sr discharges to the watertable at Reverse Well 216-B-5 between 1945 and 1947 resulted in measured concentration of ^{90}Sr which decreased by a factor of 100 within 20 feet of the well [DEIS, Fig. V.18]. Clearly, if concentration decreases this rapidly, no detectable ^{90}Sr can reach the river 40,000 feet away.

DOE's idea that ^{90}Sr is bound to Hanford soils and migrates very slowly can be tested by examining ^{90}Sr concentration at the channel mouth. According to the channel theory, Spring #28-2 discharges from the right side of this channel into the river. DOE measured the concentration of ^{90}Sr of Spring #28-2 water to be 2.8×10^{-13} Ci/L $\pm 3 \times 10^{-14}$ (one standard deviation) on 30 July 1986 [PNL-5817, Table A.58]. According to the channel theory, this spring sample represents a mixture of river water and channel water. The concentration of ^{90}Sr in river water at Mile 27.5 was measured to be 1.8×10^{-13} Ci/L $\pm 3 \times 10^{-14}$, which is 3 standard deviations below spring water.

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SALEM AUDUBON SOCIETY
P. O. Box 17873
Salem, OR 97305

August 5, 1986

Dept. of Energy
Richland Operations Office
EIS Waste Management Div.
Richland, WA 99352

Re: Disposal of radioactive wastes

Dear Mr. Holten:

In connection with the proposals for disposal of radioactive wastes at Hanford, the Salem Audubon Society opposes the following:

1. Continued production of radioactive materials. 2.5.6
2. Storing additional wastes from other sources at Hanford. 2.1.1

We do support removing all radioactive wastes from the Hanford site and relocating them in deep geological depositories away from water supplies, i.e., rivers, lakes and underground aquifers. 3.3.1.1

In considering the alternatives, cost should not be the determining factor for disposal. The safety of all living organisms is the most important issue. 2.2.1

We urge you to use sound judgment in dealing with this complex issue, and to keep our goal of safety in a priority position.

We appreciate the opportunity to comment on this issue.

Sincerely,

Robbie Baron
Conservation Chair

P. O. BOX 2013 SALEM, OREGON 97308 A NON-PROFIT ORGANIZATION

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UNIVERSITY OF WASHINGTON
SEATTLE, WASHINGTON 98195

4 August 1986

R. A. Holten
Defense Waste EIS
U.S. Dept. of Energy
Richland Operations
P.O. Box 550
Richland, WA 99352

Dear Mr. Holton,

This letter is an expansion and supplementation of the testimony which I delivered to the Department at its hearing in Seattle on July 15th, 1986. Please include it in the record and deliberations of the Department as it works up a final Environmental Impact Statement.

I am on the faculty of the University of Washington, in the College of Engineering, and was appointed by Governor Booth Gardner as a member of the Nuclear Waste Advisory Council in October of 1985. Prior to coming to the University of Washington, I was on the faculty of Cornell University where I taught, among other things, environmental law and policy for five years. The initiation of my teaching corresponded roughly to the early days under the National Environmental Policy Act, and so I am intimately familiar with the environmental impact statement process, and in particular know that the goal of NEPA was to improve decision-making both substantively and procedurely.

A primary concern of the Department of Energy as it prepares the Defense Waste Environmental Impact Statement ought to be to reclaim the trust of the citizenry, particularly the people of the State of Washington. We know, without a doubt, that many important past decisions by the Department have been based on political motivations rather than technical reasoning. We are familiar with forty years of pacification by the Department and its predecessors regarding the safety record of operations at Hanford, and now know--through the evidence provided in 19,000 pages of documents disclosed under pressure--that over one million curies of radioactivity have been released into the air from that site (compared to the approximately 15 curies released at Three-Mile Island). We have seen the Department refuse to do an open, current, and specific EIS regarding its shipments of radioactive material through the ports and on the roadways of this State, resulting in a lawsuit against the Department, and we wonder whether DOE believes that this is a desirable pattern for public policymaking? We are angered by the Department of Energy abandoning the statutory requirement in the Federal Nuclear Waste Policy Act to search for a second repository while

2.5.5

2.1.8

characterization among first-round sites proceeds, and we have recently had confirmation of what we knew along--that this action was based on political rather than technical grounds. We are thus suspect of the Department's newly arrived at figures regarding the tonnage of various categories of nuclear waste, and where and how they will all fit for storage and/or disposal which seems to amount to a large-scale "shell game" rather than technical calculations.

2.5.5

Even if the Department had the trust of the people, and even if its processes were open, sensitive to citizen concerns, and based on technical factors rather than political expediency, I believe that DOE has structured the policy issues in such a way that desirable outcomes are minimized. Specifically, I believe that one large problem, with many interrelated facets, has been reduced into a number of supposedly "independent" problems, leading to decision-making processes which pose a real danger of suboptimization. This reductionistic approach can easily lead to what one of my mentors called "the tyranny of small decisions" in which several decisions, apparently worthwhile given their problem boundaries, force poor--if not bad--quality decisions later because of influences which extend across those supposed bounds. The DOE cannot and should not treat as separate the programs and decisions regarding commingling defense and civilian wastes, the selection and design of deep geological repositories for civilian wastes, whether a second repository is needed, the operation of the N-reactor and the possibilities that civilian waste will in fact be reprocessed into still additional warheads, and even the forty years of releases of radioactive materials from the Hanford site. These topics are not in fact separate, and they affect each other. I ask the Department to produce a holisitic decision-making document, which will reflect a commitment to a holistic decision-making process. Valuable criteria for proceeding on such a course have been suggested by the State of Washington, for example in its draft reaction to the draft Defense EIS, dated June 17th.

2.3.1.14

In line with a holistic approach, assumptions about future defense waste quantities must be assessed over a variety of scenarios, including the cessation of warhead production. Otherwise, defense planners can continue to ignore the waste aspects of their decisions.

2.5.6

Substantively, I wish to state clearly and forcefully that burial of defense wastes under thirty feet of dirt is totally unacceptable. It is somehow absurd to assume that such an approach will effectively isolate these wastes for thousands of years when similar wastes from civilian activities are to be handled in far more stringent fashion under the Nuclear Waste Policy Act. Thirty feet of dirt will give inadequate protection to the groundwater systems in the Hanford site, resulting in a high probability of the transport of radionucleides to the accessible environment. The vulnerability of the nearby Columbia River is particularly important. In addition, such an approach gives wholly insufficient attention to major geological and hydrological shifts which are likely over long time cycles, on the order of ten thousand years--i.e. glaciation, flooding, and earthquakes, all of which have occurred at this site in the past over longtime cycles.

3.3.2.1

2.2.7

3.2.4.1

3.5.2.54

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3.1.6.1 The failure of the draft EIS to deal with the enormous amounts of chemical waste associated with the radioactive residues is a substantial inadequacy of the document. The Department must analyze its responsibilities under RCRA and conform to requirements of Washington State Law, in accordance with court decisions.

3.3.4.2 Indeed, the draft "EIS" which the Department circulated is not actually in fact a draft of an environmental impact statement, because it does not adequately analyze all of the options and lay out their impacts to the environment. The preemptory rejection of waste storage, for perhaps fifty to a hundred years under conditions which are technologically safe and secure and which would allow time for research and development into new and perhaps preferable options, is merely conclusory, and not based on any objective evidence at all. The Statement is inadequate because it displays too much uncertainty. The Department has to do a great deal of necessary study and

2.3.2.3 analysis of this situation in order to lay the groundwork for an adequate environmental impact statement. Thus, I urge the Department to announce that it does not plan to issue the final statement for several years, during which time it will conduct relevant studies and allow time for the adequate consideration of the information such research generates.

3.3.4.2 The evaluation done by the Congressional Office of Technology Assessment, while admittedly focusing on civilian waste, presents considerations which are relevant to this problem as well. In particular, it suggests that storage for scores of years, perhaps serially followed by additional storage, is an option to the notion of "disposal;" the choice between these approaches is a complex mix of technical and policy factors, and the Department must make its choice and the rationale therefore abundantly clear in its final environmental document. At this stage, I personally am leaning towards multiple MRSs where wastes can be monitored and retrieved if problems develop.

It is presumptuous of us to pretend that we have the omnipotency to create, at this time, a final disposal mechanism for huge volumes and tonnages of radioactive waste which would be a threat to health and safety for tens, or even hundreds of thousands of years.

2.2.3 The final Environmental Impact Statement from the Department must make it clear that the overriding criterion for decision-making in this subject area is to maximize the protection of human health and safety and of the environment. There is absolutely no excuse whatsoever to skimp on protections here for a saving of money. The Defense programs which have produced these wastes cost the American Treasury hundreds of billions of dollars per year. The Department's estimates are that a one-time expenditure equivalent to approximately one percent of a year's outlay on the military would be sufficient to "solve" the problems of these wastes. Although as I have indicated above, I believe that more study and different approaches are probably necessary, and am willing to concede that my views might lead to increased expenditures, I wish to emphasize that the orders of magnitude we are talking about are still one out of a hundred, comparing a capital cost with an annual one.

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The Department must reclaim its trustworthiness and must do an environmental analyses which is far superior to what it has yet presented. These are good reasons for not rushing into a decision, no less an actual construction program. A "no disposal" option, with clean-up of the existing sloppy storage practices, coupled with new good management techniques, could give us many decades in which to consider this problem and reach more optimal solutions. I therefore urge the Department not to continue in the present decision processes, but to suspend them, clean-up the existing mess at Hanford, mount a vigorous research and development program to provide the necessary information to address these issues with intellectual honesty, and work on drafting a holistic assessment of all of its interrelated radiological programs and decisions which could be released for democratic discussion and input into the decision-making process. 3.3.4.1

Sincerely,

Philip L. Bereano
Associate Professor

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8/8/86

DOE/Richland Operations
Box 550
Attn: R.A. Holten/EIS Waste Mgt. Div
Richland, Wa 99352

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Enclosed are copies of oral comments given 7/17/86 in Spokane, Wa. and my written comments on the draft EIS for defense waste.

Al Mangan

AL MANGAN
W. 2122 Dean
Spokane, WA 99201
509-325-3475

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Oral Comments Presented 7/17/86 - Spokane, Wa

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APPENDIX I

THERE ARE 3 HYPOTHETICAL FACTORS LISTED IN APPENDIX I: THE REPOSITORY LOCATIONS, TRANSPORTATION ROUTES, AND ACCIDENT CONDITIONS.

ALL PROPOSED REPOSITORY SITES WERE KNOWN BY DOE, AT THE TIME THE DRAFT EIS WAS BEING PREPARED. THAT KNOWLEDGE COULD, AND SHOULD HAVE ENABLED DOE TO SELECT, LIST, AND CARRY OUT ROUTE SPECIFIC STUDIES, TO AND FROM ALL PROPOSED REPOSITORY LOCATIONS. 3.4.2.3

ONLY HYPOTHETICAL ACCIDENT CONDITIONS SHOULD HAVE BEEN PRESENTED AS UNKNOWNS. UNFORTUNATELY, THERE WILL BE ACTUAL TRANSPORTATION ACCIDENTS, NOT HYPOTHETICAL ONES.

PACKAGING

AS USED IN THE EIS, THE PACKAGE IS DEFINED AS THE SHIPPING CONTAINER FOR RADIOACTIVE MATERIAL. PROPERLY DESIGNED, MANUFACTURED AND PREPARED, IT IS THE PRIMARY MEANS FOR ENSURING THE SAFE TRANSPORT OF RADIOACTIVE MATERIALS. 3.4.2.12

PACKAGES WILL BE CARRYING HIGH LEVEL WASTES (HLW), TRANSURANIC WASTES (TRU) AND STRONTIUM & CESIUM CAPSULES, THE HOTTEST OF THE HIGH LEVEL WASTES.

CANISTERS AND CASKS

ON P I-7 ARE ILLUSTRATIONS OF THE RAILROAD CASK TO BE USED FOR HIGH LEVEL WASTE, AND THE TRUPACT MODEL 1 TO BE USED TO TRANSPORT TRANSURANIC WASTES. NEITHER ILLUSTRATION GIVES SUFFICIENT DETAILS, NOR DO THEY INFORM ABOUT SHIELDING, STRUCTURAL STRENGTH OR CANISTER ABILITY TO WITHSTAND CRUSH FORCES. 3.4.2.10

HOWEVER, FOR THE HOTTEST OF THE HIGH LEVEL WASTES, STRONTIUM & CESIUM, THERE IS NO ILLUSTRATION WHATSOEVER, OF THE CANISTER THAT IS TO TRANSPORT THEM. ONLY THE DIAMETER & LENGTH MEASUREMENTS ARE GIVEN ON P I-6. 3.4.2.10

SO MUCH FOR EIS INFORMATION ABOUT THE PRIMARY MEANS OF ENSURING THE SAFE TRANSPORT OF DEFENSE RADIOACTIVE WASTES. ABSENT THE WORD "STEEL" IN THE ILLUSTRATIONS, THE PACKAGES DEPICTED MIGHT HAVE BEEN KRAFT CHEESE BOXES WHEN ONE CONSIDERS THE LACK OF INFORMATION ACCOMPANYING THEM.

THE DRAFT EIS IS ALSO GROSSLY LACKING IN INFORMATION REGARDING TRANSPORTATION ACCIDENTS AND EMERGENCY RESPONSE. THE ATTITUDE 3.4.2.25

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SEEMS TO BE THAT ACCIDENTS CAN'T HAPPEN HERE, AND EVEN IF THEY DO OTHER FEDERAL, STATE AND LOCAL ENTITIES HAVE RESPONSIBILITY AND CAPABILITY TO RESPOND ADEQUATELY. THE SAD TRUTH IS, THAT IF A RADIOLOGICAL ACCIDENT WERE TO HAPPEN AT THIS MOMENT, THERE WOULD BE NO ADEQUATE RESPONSE.

3.4.2.25

SECTION I-8 COMPLETELY IGNORES FEDERAL RESPONSIBILITY FOR TRAINING STATE AND LOCAL FIRST RESPONDERS. IT GIVES NO ESTIMATE OF RESPONSE TIME FOR URBAN, SUBURBAN OR RURAL AREAS. SINCE A 'BOUNDING ANALYSIS' WAS USED, NO ROUTE SPECIFIC ESTIMATES ARE AVAILABLE. FEDERAL GOVERNMENT DECISION MAKERS MAY OR MAY NOT HAVE A LEGAL DUTY TO PROVIDE THE BEST EMERGENCY RESPONSE POSSIBLE, BUT THEY DO HAVE A MORAL ONE.

3.4.2.24

STRONTIUM & CESIUM

AS PREVIOUSLY MENTIONED, STRONTIUM & CESIUM ARE TWO OF THE HOTTEST OF THE HIGH LEVEL WASTES. BECAUSE OF THEIR HEAT PRODUCING AND CORROSIVE PROPERTIES, THEY ARE ROUTINELY SEPARATED FROM OTHER HIGH LEVEL WASTES STORED IN THE DOUBLE WALL TANKS.

THEIR DECAY PRODUCTS ARE THE MAJOR SOURCE OF HEAT IN HIGH LEVEL WASTE AFTER ABOUT 5 YEARS DECAY, AND ONLY AFTER A 20 to 40 YEAR DECAY PERIOD IS THEIR HEAT LOW ENOUGH TO BE COOLED BY PASSIVE COOLING. THIS OBSERVATION ABOUT HEAT IS TO EMPHASIZE THAT THESE HIGH LEVEL WASTES ARE DANGEROUS AND MUST BE HANDLED IN THE SAFEST MANNER POSSIBLE.

HOWEVER, BEFORE BEING TRANSPORTED TO THE FINAL REPOSITORY, CANISTERS OF THESE HIGH LEVEL WASTES WILL BE LEASED TO THE PRIVATE FOOD INDUSTRY AND TO HOSPITALS. THEY WILL BE USED TO IRRADIATE FOOD, THEREBY PROLONGING ITS SHELF LIFE, AND TO STERILIZE MEDICAL ISNTRUMENTS. THEY WILL ALSO BE SENT TO COMMERCIAL REPOSITORIES, PURPOSES NOT STATED IN THE EIS.

NOR DOES THE EIS STATE THE CONDITIONS FOR LEASING THESE CAPSULES TO PRIVATE INDUSTRY, OR SENDING THEM TO COMMERCIAL REPOSITORIES. ALSO NOT DISCUSSED IS THE SAFETY AND SECURITY OF THE CAPSULES DURING TRANSPORT, AND WHILE IN USE: OR THE TRANSPORTATION ROUTES OR MODES THAT WILL BE USED. WILL THERE BE PRE-NOTIFICATION TO STATE OFFICIALS AND LOCAL RESPONDERS? WILL THE PRICE-ANDERSON ACT APPLY EN ROUTE AND DURING APPLICATION PROCESSES?

3.4.2.14

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THESE ARE BUT A FEW OF THE QUESTIONS THAT SHOULD BE ANSWERED IN A SEPARATE EIS, BEFORE ONE MORE CANISTER IS LEASED TO PRIVATE INDUSTRY.

IN CONCLUSION, THERE IS A SURPLUS OF NUCLEAR WEAPONS AND PLUTONIUM FOR THE PRODUCTION OF MORE. UNLESS DOE CAN CONCLUSIVELY PROVE THE ABSOLUTE SAFETY OF WASTE CONTAINMENT TECHNOLOGY, NO MORE DEFENSE WASTE OUGHT TO BE PRODUCED, EVER.

2.5.6

THIS DRAFT EIS IS A VAST IMPROVEMENT OVER THE REFERENCE REPOSITORY EA, HOWEVER, THERE ARE STILL MANY REDUNDANCIES.

"WHEN I USE A WORD," HUMPTYDUMPTY SAID, IN RATHER A SCORNFUL TONE, "IT MEANS JUST WHAT I CHOOSE IT TO MEAN, NEITHER MORE NOR LESS."

"THE QUESTION IS," SAID ALICE, "WHETHER YOU CAN MAKE WORDS MEAN SO MANY DIFFERENT THINGS."

"THE QUESTION IS," SAID HUMPTY DUMPTY, "WHICH IS TO BE MASTER, THAT'S ALL."

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EIS Function of

What is the function of an EIS? Is it merely to assemble words, under logical categories, marshalled to serve the purposes of the assemblers?

INFORM OF DANGERS

Is the function to inform the public, the citizens, of potential dangers, if certain agency acts are approved? Or, is the function of the EIS that of a signpost, to point people in the direction of the information?

GATHER & DISSEMINATE

Perhaps the function is to gather all information, in a timely manner, disseminate it in the widest possible area, in understandable form, so that citizensmay have time to assimilate it and make valid comments.

EXAMPLE

In § I 1 1 1 a)2) is a statement that surface contamination is limited to specified levels. Instead of stating what the specified levels are, the EIS directs readers to 49 CFR 173.443 which gives the methods for determining amounts of surface cotamination.

FEDERAL REGS AT HAND

It seems obvious that all readers will not have a copy of the Federal Regulation at hand when reading the EIS. Perhaps that is why the answer was given. It should be equally obvious that many would prefer the answer directly, rather than having to calculate the method used to arrive at all the statements.

ACCESS TO SOURCE MATERIAL

Writers of the draft EIS have access to source material, not readily available to the general public. Source material is cited in the EIS, and the additional effort for the writer is minimal, but for the reading public, maximal. Applicable sections of source material should be both cited and quoted in the EIS.

4.1.10

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PURPOSE OF EIS

If the purpose of a draft EIS IS to inform, so that informed citizens may make an informed decision, through our representative form of government, DOE has fallen short of the goal.

2.3.2.10

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TRANSPORT LANGUAGE

4.1.18

In Appendix I alone, there are over 80 references to probable, likely, unlikely, hypothetical, assumed, and similar words having no fixed meaning or content. The overall effect is to invest Appendix I and related transportation references with a lack of specific detail whihc woule enable a citizen of ordinary intelligence, to read understaand, and form a judgement, render a competent critique, based on the information in the draft EIS

HYPOTHETICAL FACTORS

3.4.2.3

There are 3 hypothetical factors listed in the draft EIS: the repository locations, transportation routes and accident conditions. Two of the three are not, and were not hypothetical at the time the EIS was being prepared. All proposed repository sites were known, thus the routes from Hanford to other proposed repositories were known. From that information, route specific studies could and should have been initiated and completed for inclusion into the draft EIS. Since this was not done, there is no route specific information, and the public therefore is unable to analyze this non-existentinformation.

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PACKAGING

3.4.2.12

Packaging is defined as the shipping container for radioactive material. Properly designed, manufactured and prepared, the EIS states it is the primary means for ensuring the safe transport of radioactive material.

IMPORTANCE of

3.4.2.12

Given its importance, as stated in the draft EIS, one would expect at least as much information as was in the draft EA on the reference repository location, relative to casks.

ILLUSTRATIONS

3.4.2.10

However, only two illustrations of the containers are offered, both on p I 7, both elementary frawings, lacking detail. There are no illustrations of the Sr and Cs canisters, only their bare measurements are offered. Lacking the word "steel" the illustrations might well have been of Kraft cheese containers.

LACK of INFORMATION

3.4.2.12

In the section on packaging, as in other places, the sparse amount of information given is almost an insuperable impediment to intelligent analysis. My belief is that a draft EIS IS MANDATORY on the AGENCY, so that citizens may make an INFORMED judgement about the choices being considered. In this section, as in others, it is virtually impossible to make any decision on the basis of the lack of information contained therein.

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ROUTING

3.4.2.6

BOUNDING ANALYSIS

3.4.2.3

SILENT EIS

DOCKET HM-164

§ 1 1 1 3 Transportation of "highway route controlled quantities" of radioactive materials are required by Docket HM-164 to use the interstate highway system, except when moving from place of origin, to the interstate or from the intersstate to the place of destination.

Since DOE has done no 'route specific analysis' it is impossible for a member of the public to know what was considered in the bounding analysis. Was the infra structure of each unit of each possible route considered and analyzed? The condition of each roadbed? Extreme climactic conditions, etc? What was considered under routing? The EIS is silent, thus restricting the amount of material available for public comment.

The major part of the Routing section addresses Docket HM - 164 and the prohibition of conflicting regulations by local units of government, not with the specifics of routing.

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CO-MINGLING

ISOLATION STANDARDS

CASKS/CONTAINERS

3.4.2.12

RAIL/TRUCK MIX

3.4.2.3

TRU WASTE

The co-mingling of high-level commercial waste, principally in the form of spent fuel rods, and defense waste in the reference repository at Hanford is not addressed, specifically in regard to the transportation, preparation for disposal, and other key components of the operation so vital to the isolation of radioactive materials from the environment for thousands of years.

While the standard of isolation may be for thousands of years, the standard itself is woefully inadequate when the need is for isolation of long lived radionuclides for hundereds of thousands of years.

At the present time, DOE has not yet begun to plan for the new generation of casks to be used for transportation of spent fuel rods (conversation with Mgr Michael Lawrence, Feb 1986). Is the same situation true of other containers/canisters that will be used to transport defense high level waste? The questions are not answered in the EIS.

DOE at the present time is unsure of the 'mix' of truck and rail transport for commercial waste to a repository, which of course, has not yet been selected. Does the same uncertainty exist as regards the 'mix' for defense transport, or is the 90% rail figure set in concrete?

The EIS mentions transportation of TRU wastes to the WIPP project in New Mexico. It does not mention that WIPP is an experimental project that may require transport of the TRU wastes to other repositories, or perhaps even back to Hanford.

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STRONTIUM & CESIUM CAPSULES

3.1.2.6

ASSUMPTION

ACTUALITY

CANISTER SPECS

3.4.2.12

LACK of INFORMATION

3.4.2.14

The material relating toSr & Cs capsules is confusing and contradictory in places. In one place it it is stated the capsules will remain in water basins until 1995. § I 2 1 says the capsules would remain in water storage until a repository is built (assumed 1998). Another time estimate is 2010. No explanation is offered for the time variance.

For EIS and impact purposes it was assumed canisters of Sr & Cs would be placed in canisters and shipped to a repository.

However, in § 3 3 1 3, the EIS states: "In actuality most of the Cs and much of the Sr is already committed to "beneficial uses." It is planned though that this material will eventually be returned for disposal."

The above sentence is one of the most explicit in the EIS, relating to the transportation of capsules. However, no specifications of the capsules are given, not even in Table I 2, where it must be inferred the capsules are destined for shipment to a repository, not for commercial "beneficial uses."

Again, at the risk of redundancy, it must be stated that there is so little information relative to the transportation of these Sr & Cs capsules, that citizens are not being truly informed by the draft EIS. Thus, they are, in effect, deprived of their legal right to give an INFORMED opinion.

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ACCIDENTS

Impacts from accidents involving radioactive waste is similarly lacking in specific detail, excepting reference to the Radtran II computer code, which is cited, but not quoted. 3.4.2.23

In § I 3 1 1 it is noted that Radtran II figures will be adjusted by Radtran III figures, as yet unpublished. Hardly a complete, detailed explanation.

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AUG 8 1986
WM DIVISION

July 31. 1986

Comment directed to the Environmental Assessment Overview referring to the possible choice of Hanford as the High Level Waste Repository

The following paper is directed primarily toward the hazards of transporting high-level radioactive waste and spent fuel along the I-84 corridor to Hanford. The main body of this report was focused on the Proposed Division 120 Hazardous Waste Management Plan and presented at a hearing in Baker March 17, 1986. It has direct bearing on today's public information meeting. References to the EA regarding Hanford shall be outlined in red ink.

3.4.2.2

On page 31, under Transportation 7.3.2.1.3 the EA states " the first and most important major consideration is transportation safety." According to William T. Dixon, ODOE's Siting and Regulation Division spokesperson, " a major omission in the DEA was the lack of a thorough consideration of route and site-specific transportation risks." I fully agree and feel that these items need special consideration: weather conditions, road conditions especially at Cabbage Hill and Ladd Canyon; an adequate emergency response team; a clearing of legal impediments in case of any radioactive spill (the owner assumes full responsibility, and that means the federal government accepting unlimited liability in the event of a shipping accident).

3.4.2.25

On page 29, under 7.3.2.1., it insists that " the public and the quality of the environment are adequately protected from the hazards posed by the disposal of radioactive wastes." If Hanford is chosen as the next high-level waste repository , the transportation of these wastes clearlydoesnot offer this protection especially for residents along the I 84 route. Until such protection is offered, I cannot accept Hanford as the nation's high level waste repository.

2.1.1

Sincerely,
Jo Broadwell

Jo Broadwell

member of
Students for nuclear awareness

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AUG 8 1986
WM DIVISION

March 21, 1986

Comment directed to the Proposed Division 120 Hazardous Waste Management Plan
Public Hearing, Baker, Oregon Monday, March 17, 1986

(Please include the following comments along with the spoken testimony.)

Although the present definition of "hazardous waste management" does not include the transportation and storage of radioactive materials, special recognition and precautionary measures should be taken to deal with future dangers. The storage and transportation of radioactive cargo should be included in the new siting and permitting requirements for hazardous materials.

3.4.2.2

Any industry that is manufacturing, transporting or storing hazardous materials (including radioactive) should be held accountable to state and local governments for injuries. We fully endorse the resolution set forth by the American Public Health Association. (Please see the final page of the enclosed HEAL Packet).

3.4.2.26

HANFORD

Should Hanford be chosen as the next high level waste repository 77,000 tons of spent fuel would be trucked from plants back East. This equals 173,229 truck/ trailor loads or 22, 465 trainloads. USDOE predicts one truckload of spent fuel arriving every 90 minutes. We presently have a half dozen shipments of spent fuel annually along I- 84, but may have to deal with 5800.

The Sierra Club estimates that at a rate of 1.5 accidents per million miles traveled, there will be an expected 400 to 800 accidents. According to ODOE " Oregon could assume a greater risk of accidents than Washington if fuel rods are delivered by truck." The 210 mile segment of Interstate between Ontario

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and Umatilla will have 1.1 million annual miles traveled by high level trucks. Compare this with only thirty miles in Washington, averaging 157,000 vehicle miles. As the travel route begins to funnel and narrow to Hanford, 7.9 million residents are found at the thinning end. 7.3.2.1.3, page 31

In the state of Oregon alone Baker has been chosen as the most likely site to have a serious radioactive materials spill. Of all radioactive shipments coming into Oregon 90% are I-84. According to William T. Dixon, ODOE's Siting and Regulation Division spokesperson, " a major omission in the DEA was the lack of a thorough consideration of route and site-specific transportation risks." In addition, EIA may have underestimated radiation doses to people during the cross-country delivery trips. When trucks are forced to pull over, radiation exposures are increased to bystanders. radiological risks, page 14

3.4.2.3

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Who is liable? All standard private insurance policies exclude coverage for damages from a nuclear incident. The federal government does not accept unlimited liability in the event of a shipping accident that would show faith in USDOE's claims of safety. Siting and permitting requirements for hazardous waste (including radioactive) should not be issued until an individual or company can prove they shall assume all liability for production, transportation, and storage of their specific hazardous material. 7.3.2.1.3, page 31

3.4.2.25

* * * *

Please include the following under Offsite Transportation Emergencies, p. 16

MIDNIGHT DUMPERS

Of the 8.4 million tons of hazardous waste that is transported every year, 8- 10,000 truckloads pass through Union and Baker counties. The Resource Conservation and Recovery Act has authorized a new tracking system to monitor hazardous waste shipments. According to William D. Ruckleshaus of EPA, " It will help

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ensure that hazardous waste shipments which may have been dumped or disposed of illegally or indescriminately are reported to EPA or state officials before they become a threat to the public or the environment."

It has been estimated that 20% of the 8.4 million tons of transported wastes is disposed of illegally by "midnight dumpers". There are 50,000 enterprises that generate wastes; 15,000 transporters and 10,000 facilities that treat, store and dispose of toxic chemicals. (These facts are about 3 or more years old). Any individual or company that is guilty of midnight dumping should be reported, penalized, and lose its priviledges for conducting any operation in the state of Oregon for __X__ years. (See "US to track wastes in effort to end dumping")

EFFECTIVE MONITORING PROGRAM and coordination of county, police, fire and emergency services

According to Rich Huggins, a previous Emergency Management Officer for Union County, "Loose state and federal monitoring of hazardous waste transport makes the problem serious in Union County." There is virtually no monitoring of substances carried by truck. Of the 4, 848 annual railroad loads only Class A Explosives are reported to local fire departments. "All other substances, including flammable solids, liquids, compressed gases, radioactive material and corrosive material go unreported to local authorities. "

We feel only when effective coordination of county, police, fire and emergency services is determined, can we then begin siting and permitting transportation through our state. (See "Staff Prepares for radioactivity," 1984 and "Hazardous Materials Poses Risks ")

3.4.2.25

In addition we would like to have the following concerns addressed: The cost of precautionary evacuations, cask supplier liability (relating to radioactive transport), coverage for sabotage or theft, state and local expenses for evacuation and emergency response, state and local liability for poorly maintained roads and bridges. 7.3.2.1.3, page 31

3.4.2.24

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Irradiation Plants and Transportation

If food irradiation becomes a viable industry, in 10 years there may be 1000 food irradiators operating near agricultural areas, cities, airports and seaports. That would be 20 times more facilities using radioactive sources than the current 50 nuclear plants. The Environmental Policy Institute has calculated that the amount of nuclear waste to go in and out of one typical plant every five years would be five times the total volume of low-level nuclear waste produced in the US in 1981.

3.4.2.14

So far 200 state and local communities have imposed bans or restrictions on nuclear cargo transport because of the growing concern over the federal government's apparent inability to protect communities from hazardous waste. 73.2.1.3, page 31

Since the Furex plant in Hanford is the only place that reprocesses waste into cesium capsules for irradiation facilities, there will be an increase of transportation from all plants to and from Hanford. We would like to ask that this be taken into account and included as a hazardous waste.

3.4.2.2

Sincerely,

Ms JO BROADWELL
705 DIVISION
LA GRANDE, OREGON
97850

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Accountability of the Nuclear Industry to State and Local Governments for Radiation Injuries

RESOLUTIONS OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

The American Public Health Association,

Noting that the objective of the federal government under the Atomic Energy Act as stated by the Supreme Court in *Silkwood v Kerr-McGee* is to promote nuclear power;[1] and

Recognizing that federal radiation protection standards have not been adequate to protect the public health and safety;[2-14] and

Recognizing that operators of nuclear facilities have a responsibility to prevent the escape of radioactive materials from the restricted areas of nuclear facilities; and

Recognizing that no adequate federal remedies exist under the Atomic Energy Act to deter operators of nuclear facilities from negligent handling of radioactive materials;[1] and

Noting that the Supreme Court held that state and local governments are preempted by the federal government from enforcing laws to protect the public health and safety from radiation hazards;[1] and

Understanding that radiation injuries to individuals are difficult to prove in court after the fact and that punitive damages may only be imposed if they do not frustrate the federal objective to promote nuclear power;[1] and

Believing that corporations which profit from nuclear technology should assume responsibility for the risk of injury to people or to their property in the surrounding communities; and

Recognizing that the mission of protection of the public health and safety is traditionally a responsibility of state and local governments;[14] and

Having previously addressed the issue of prevention of occupational disease and victim compensation in Policy Statement No. 8329(PP);[15] and

Having previously recognized that the nuclear industry since its inception has been noted for incidents with significant actual and potential adverse effect on the health of workers and surrounding populations as noted in Policy Statement No. 7909;[16] and

Strongly opposing any limitations on the liability of the nuclear industry, as stated in Policy Statement No. 8124;[17] and

Believing that the public health risk from nuclear power could be significantly reduced if the owners and operators of nuclear facilities are held accountable to state and local law; therefore

Be it resolved, 1. Actively supports federal legislation amending the Atomic Energy Act which will ensure the right of state and local governments to impose civil and criminal liabilities on owners and operators of nuclear facilities for violations of local laws that protect the public health and safety from radiation hazards;

2. Urges APHA affiliates to encourage state and local governments to establish state and local radiation protection standards in order to prevent radiation injury to their citizens; and

3. Supports such model resolutions as that of Dauphin County, Pennsylvania to establish radioactive air emission standards for the Three Mile Island Nuclear Power Station under Sections 122 and 116, the Clean Air Act Amendments of 1977, 42 USC 7401 *et seq.*

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Contact: *Carl J. Johnson, MD, MPH*
42 Hillside Drive
Denver, CO 80215
(303) 831-0267

Note:
- JPC returned to author recommending revision.
- Author resubmitted with revisions.
- Forwarded to Reference Committee B

*Johnson CJ: Local government involvement in the development of emergency preparedness plans and radiation protection guides for nuclear installations. Presented at the 107th Annual Meeting of the APHA. New York, 1979.

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(Footnote continued...see next page.

(Footnote continued...from last page)

_____: Contamination of municipal water supplies in the Denver metropolitan area by the Rocky Flats plutonium plant. Presented at the 146th National Meeting of the AAAS, 1980.

_____: Contamination of several public water districts with uranium by liquid waste discharges from a uranium mine, and development of a new permissible concentration limit for uranium in drinking water. Presented at the 109th Annual Meeting of the APHA. Los Angeles. 1981.

(no comment identified)

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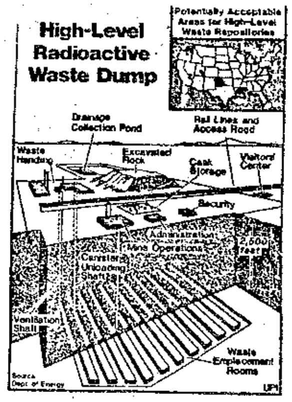

U.S. to track wastes in effort to end dumping

By KATHRYN KAHLER
Newhouse News Service

WASHINGTON — The federal government soon will begin tracking the 8.4 million tons of hazardous wastes being transported in the United States each year, in an effort to curb illegal dumping and locate drums of chemicals lost during shipment.

Under the new national tracking system, the federal Environmental Protection Agency and the Transportation Department will regularly audit the records of the 50,000 enterprises that generate hazardous wastes; the 15,000 transporters of such waste; and the 10,000 facilities that treat, store and dispose of the toxic chemicals.

Currently, there is no comprehensive system of monitoring hazardous waste shipments — which annually total 1.5 million individual loads transported by highway, air, rail or water. Twenty states now keep track of hazardous waste shipments on their own.

The new tracking system, which begins in September, "takes us a step closer to one of the goals of the Resource Conservation and Recovery Act — cradle-to-grave management of hazardous wastes," says EPA Administrator William D. Ruckelshaus. "It will help ensure that hazardous waste shipments which may have been dumped or disposed of illegally or indiscriminately are reported to EPA or state officials before they become a threat to the public or the environment."

'Midnight dumpers'

The Resource Conservation and Recovery Act of 1976 contains the nation's main hazardous waste disposal laws, designed to prevent pockets of contamination like those currently being cleaned up under the $1.6 billion Superfund program.

Federal and state environmental officials say they lack hard figures on how much hazardous waste is lost or illegally dumped. It has been estimated, however, that at least 20 percent is disposed of illegally by "midnight dumpers."

Companies that generate less that 1 ton of hazardous waste per month do not have to report it to EPA. The new system at least will require that any shipments of this material be reported.

The new procedures call for a search to be conducted for any waste shipment that doesn't arrive at its destination within 45 days and are expected to make it easier for EPA to prosecute offenders of the hazardous waste laws.

The main instrument of the new nationwide tracking system is a simple, single-page shipping order or manifest that details what waste is to be transported, its source and its destination. Beginning in September, all generators, transporters and disposers of hazardous waste throughout the nation will have to use the new federal manifest.

System to eliminate patchwork

In many instances, a single shipment of waste now bears several manifests because of the variety of state and local requirements. The federal system, which will pre-empt all other regulations, will eliminate this patchwork.

The EPA and the Transportation Department worked with industry representatives for three years to develop the manifest and tracking system.

"We argued over every minute point," says Julie Seibert, manager of the Hazardous Materials Advisory Council, a trade organization of generators and shippers of hazardous waste. "It was like cheerleaders arguing over whether they should wear blue or red.

"But we've come up with something that will cut costs, aid in compliance, give industry some uniformity . . . and help protect against midnight dumpers."

EPA spokeswoman Carol Lawson says, "This is important for EPA, because for the first time we'll be able to get consistent information and data on the amount and type of waste generated and where it's going."

But though the new system is expected to improve monitoring, Richard Shank, EPA enforcement chief in Ohio, notes that some people still will try to circumvent the law.

"It's not foolproof to the point that it can't be forged or tampered with," Shank says of the new manifest system. "But if a truck is stopped and searched, and the waste in the drums doesn't match the manifest, we'll know we've got a problem."

(no comment identified)

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OREGONIAN OCT. 5 1984

Files detail cancer toll among N-workers

By FERN SHEN
of The Oregonian staff

U.S. Department of Energy studies reveal that workers at U.S. defense plants have experienced unusually high rates of Hodgkin's disease and leukemia and lung, brain, digestive and other cancers as a result of radiation exposure on the job, according to internal federal reports.

"They've been saying all along that there are no health effects from radiation (at the federally set worker standards)," said Dr. Alice Stewart, an internationally known expert on radiation and human health and a senior research fellow at Birmingham University in England who currently is a visiting scholar at Portland State University.

"And here are these same people admitting that they've actually found something," Stewart said Wednesday.

The documents, obtained recently by Robert Alvarez of the Environmental Policy Institute in Washington, D.C., are progress reports on the epidemiological studies conducted by contractors for the Energy Department.

The researchers were studying workers at Energy Department defense facilities in Oak Ridge, Tenn.; Rocky Flats, Colo.; Savannah River, Ga.; St. Louis; Weldon Springs, Mo.; Fernald, Ohio; and elsewhere in the nation.

In most cases, the workers were receiving doses within the federally recognized standards for workers.

According to the internal reports:

— A study of 48,000 white men at Oak Ridge National Laboratory in Tennessee showed a leukemia rate 49 percent higher than the average rate for the rest of the population. The workers, who were followed from 1943 to 1977, had received external doses of gamma radiation.

— A study of 14,232 white men working at Oak Ridge Y-12 weapons plant in Tennessee found "excess deaths for cancer of the lungs, brain and CNS (central nervous system), Hodgkin's disease, other lymphatic tissue."

— In a study of 330 cases of lung disease among workers at the Y-12 Tennessee Eastman facility in Oak Ridge, "risk was found to increase with increasing of lung dose" even after allowing for age, smoking status and other workplace exposure.

That effect was noticed in workers who were older than 44 when first exposed. The workers had been exposed to alpha radiation from uranium dust and various processing chemicals.

— A study of 24,000 white men at the gaseous diffusion plant in Oak Ridge demonstrated "excess deaths due to lung and brain cancers and respiratory disease." Among 814 white men workers exposed to radiation from nickel dust at the same facility, researchers found "excess deaths from cancers of the buccal (mouth) cavity and pharynx."

— A study of 146,000 Energy Department employees at uranium processing facilities in Savannah River, Oak Ridge and the U.S. naval reactor program in Portsmouth, N.H., found that workers exposed to uranium dust and other radioactive substances showed "excess mortality due to site/ type specific cancers (leukemia, lung, brain, digestive tract, prostate, Hodgkin's disease)." The researchers also found higher rates of "non-malignant respiratory disease."

Since the reports are preliminary, they can not be considered significant, maintains Dr. Clarence C. Lushbaugh, the scientist who directed the studies for the Energy Department. He is acting chairman of the Medical Division of Oak Ridge Associated Universities in Oak Ridge.

"There is no causal association between exposure to uranium and untoward late effects," Lushbaugh said in a recent television interview.

But Stewart, who reviewed the documents this week, said they were meaningful.

"Even considering they used rather crude methods, there's none of them that can say there isn't anything there," said Stewart, one of a handful of researchers who has collected and studied comprehensive data on the effect of radiation on workers, atomic bomb survivors and X-rayed fetuses.

Stewart, like her colleagues, has concluded that the current standards for permissible dose of radiation are too lax — by her count 20 times too lax.

The newly released reports, she said Wednesday, "are a perfect vindication of our work."

Additional details on Page C6.

(no comment identified)

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(no comment identified)

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(Democrat-Herald Statesman)
Democrat-Herald Statesman

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December 5, 1984 to December 11, 1984 Page 4

St. Elizabeth Hospital

Staff prepares for radioactivity

By CHRIS COLLINS
Of the Democrat-Herald

"Two years ago, during a springtime blizzard, a truck carrying a payload of uranium overturned on Interstate 84 and three people were transported to St. Elizabeth Community Hospital for treatment.

Because of secrecy surrounding the incident, it wasn't until two days later that the hospital staff discovered that the patients possibly could have been contaminated by radiation.

"We were all furious to think we'd been endangered without being informed," says Judy Lengacher, the hospital's personnel director and risk manag-

ager is a potential for other accidents of this kind to occur daily as radioactive materials are transported through Eastern Oregon, Lengacher said. After two years of making phone calls and writing letters, the state Health Department finally agreed to help better prepare the area's health care professionals to deal with such emergencies, she said.

Bob Crosby and Nick Govel, radiation specialists for the state Health Division, offered a workshop on radiation control in Baker recently. The workshop was the first of its kind in the state, Lengacher said.

Baker was chosen as the site because it is believed to have the greatest exposure of any place in the state, Lengacher said.

According to state Department of Energy statistics, 1,787 shipments of radioactive materials traveled near Baker on Interstate 84 in 1983. That is 1 percent of all shipments made through the state, according to department statistics.

A breakdown of the types of radioactive materials shipped shows that 1,729 were low-level waste; 88, uranium; and 21 high-level waste.

Those are the shipments that are reported, Lengacher said. About an equal amount are untold, and no one knows how much is being hauled on the Union Pacific Railroad, she added.

The Baker workshop was attended by Lanny Ryals, the hospital's emergency room manager, emergency medical technicians from throughout the area, civil defense representatives, Baker police, Lengacher, and the hospital's engineering staff. Emergency room managers from the La Grande and Ontario hospitals also attended.

The workshop provided training on how to clean up radioactive contamination at an accident site. It also provided information on how to protect the hospital staff and other patients when victims of such an accident are admitted.

Ryals said that the floors must be protected and the emergency room staff must wear protective clothing, gloves, masks, hats and boots to treat the patients. Then the patient is surveyed with a geiger counter to find the most contaminated areas. Contamination is eliminated by washing the areas down. Internal agents are used if necessary.

The Baker hospital has five geiger counters to use in such instances, including one created especially for it. The survey meter is one of three developed, others were placed at the La Grande and Ontario hospitals.

The special meters measure all three kinds of radiation rays, Ryals said.

Lengacher said the hospital will be holding a drill in December to practice what was learned during the training session. It will be in December because accidents of these kind traditionally occur during bad weather, Lengacher said.

Photo by

Lanny Ryals, St. Elizabeth Community Hospital emergency manager, demonstrates the use of a highly-sensitive radiation meter developed for the Baker hospital staff.

Heath plans to provide a communication link between Eastern Oregon hospitals and Kadlec Hospital at Richland, Wash. The Washington hospital is equipped to treat industrial accidents that occur at the Hanford Plant at Richland.

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The Observer, La Grande, Oregon, Friday, June 3, 1983 Page 3

Surveys sent to area businesses

Hazardous materials planning in works

First of two parts

By BRIAN WHITE
Observer Staff Writer

Union County's battle plan against potentially hazardous materials continues.

The county's emergency services department this week mailed surveys to area businesses that may be involved with the handling, transport or processing of hazardous materials.

The department will use the surveys to obtain a more complete list of potentially harmful substances that could be involved in a major accident and cause mass evacuations.

"The more you look at the problem the more you get concerned," department director Rich Huggins told the county court Wednesday.

Huggins presented part of the fourth draft of a countywide emergency plan to handle hazardous materials. The plan will identify the locations of hazardous materials and persons to contact if an emergency occurs.

Currently the county has no organized system of handling a major hazardous substances accident, Huggins told the court. The county's hazardous materials committee estimated that about two spills per month are reported to agencies within Union County.

"And how many others there are, it's hard to say," Huggins said.

Huggins cited a railcar spill last summer in which the flammable vapor could have exploded at a temperature of 74 degrees Fahrenheit. The vapor and the potential hazard could not be readily identified.

Loose state and federal monitoring of hazardous waste transport makes the problem serious in Union County, particularly in La Grande, Huggins said. La Grande's location on a major interstate highway (I-84) and railroad line (Union Pacific) makes the city a potential accident site.

"The burden of handling the problem shouldn't fall on local governments, but local governments have got to handle it," Huggins said. "We just seem to be innocent bystanders."

Many of the hazardous materials shipped through La Grande are processed outside Oregon or are enroute to another part of the West, Huggins said. While there is monitoring of substances carried by railroad, there is virtually no information on the materials transported by trucks.

Statistics compiled from Union Pacific showed that 4,848 railroad cars of hazardous materials traveled through Union County in 1983. No figures are available for truck transport, but it is estimated that 8,000 to 10,000 truckloads of hazardous materials pass through Union County each year, Huggins said.

Also, of the 4,848 railcar loads, any class A explosives (56 carloads) were required to be reported to local fire departments. All other substances, including flammable solids, liquids, compressed gases, radioactive material and corrosive material typically go unreported to local authorities, Huggins said.

About 45 percent of all hazardous materials transported through the county in 1981 were corrosive materials and flammable liquids, according to the hazardous materials committee's findings.

Saturday: Funding may be pulled from Union County's emergency services department.

(no comment identified)

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(no comment identified)

Movement of hazardous materials poses risk

Final of two parts

By BRIAN WHITE
Observer Staff Writer

In Oregon, a major accident involving hazardous materials is more likely to occur in the northeast section than in any other part of the state.

Union County's ability to handle such an accident is unknown at present, even though the county's emergency services department is drawing up a comprehensive emergency management plan.

Figures recently supplied by the state Department of Energy show that from August to December 1982, 630 highway shipments of radioactive material passed through Oregon.

About 540 (86 percent) of them passed through Union County on Interstate 84. Another 11 percent came along U.S. Highway 97 through Klamath Falls and Bend. The remaining 3 percent traveled via Interstate 5 in Western Oregon.

The shipments are going to or coming from the Hanford nuclear site in south-central Washington. They are likely to increase in the future as Hanford becomes one of the nation's major radioactive materials storage sites, said Rich Huggins, emergency services department director.

Huggins told the county court Wednesday he doubts the county could even adequately handle a large-scale gasoline fire caused by an overturned tanker.

"There just isn't enough foam to put out a fire of that size," Huggins said.

In a "tabletop" run-through of a simulated chlorine gas spill, the county's hazardous materials committee determined that about 100 persons would die from such an accident "because we couldn't respond fast enough," Huggins said.

The 1983-84 county budget calls for elimination of the emergency services department. Under a new budget, to be voted on June 28, emergency service responsibilities would be given to the sheriff's department.

Coordination of county police, fire and emergency services would be incomplete if the department is cut.

Sheriff Bob Price told the county budget committee on May 17 that he does not have the manpower to effectively operate an emergency services program.

...Huggins thinks committee members acted with "bad information" when they voted 3-2 to eliminate the program.

Huggins said one budget member who voted against the department thought that firemen are notified each time a hazardous material passes through the area. In fact, only when class A explosives travel through are local fire officials contacted, Huggins said.

County Commissioner Mike Caldwell, who voted in favor of keeping the department, said emergency services is "a very volatile area that we've neglected budgetarily."

The emergency plan is like "buying insurance," Caldwell said.

County Judge Earle Misener said federal or state legislation is needed to deal with hazardous material shipments through local jurisdictions.

"I think we've got a legitimate interest here," Misener said. "It's something that's with us all the time."

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Jerry White
U.S. DOE
P.O. Box 550
Richland, Wa 99352

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Yakima Box 132
YAKIMA, WA 98907
August 5, 1986

In regard to Hanford defense Waste Management decisions, I attended the hearing in the Federal Bldg. Seattle, Wa., July 15, 1986.

3.1.4.1 ① I favor
2.2.1 ② getting rid of the single-walled storage tanks -- too old.
Continuing use the trenching of defense waste before bringing in more defense and/or Commercial waste. Make an effort.

2.1.3 ③ Sorting it out eventually. I do not favor comingling. This will complicate financial matters, among other things.

④ I think the state of Washington should fully compensated for extra costs to the state at all stages.

⑤ I do not think the fund is adequate, because of cracking fractures, and it is [illegible]

2.1.1 ⑥ adequate studies of the geological aspects has not been accomplished

2.1.1 ⑦ The public has not been told of the results to the people and the environment near the coast to State of Washington.

2.5.5 ⑧ I favor Multiple Retrievable Storage as MRS.

3.3.4.2 Sincerely,
Jerry Hamilton

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P.O. Box 95722
Seattle, WA
98145-2722

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Rich Holten/EIS
U.S. DOE
Richland Operations Office
P.O. Box 550
Richland, WA 99352

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Dear Mr. Holten:

I feel great anger at the DOE for not letting the public know what is really going on at Hanford. Everyone hates being lied to - The DOE hasn't been open nor honest with the general public. 2.5.5

Please, please, please curtail the production of nuclear waste! We don't know how to deal with it safely right now. 2.5.6

My mother in Eastern Washington has gotten cancer - part of the reason why it not all, is HANFORD. TOM HESTON

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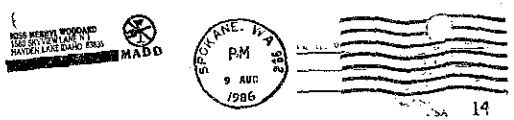

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Rich Holten /EIS
U.S Dept of Energy
Richland Operations Office
P.O. Box 550
Richland
WA 99352

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Dear Mr Holten

2.1.1 It is not right To have Hanford as the national dump. It is not safe. It is ridiculous To transport all the waste from the East To here, endangering everyone along the way, just because some people are To ignorant To say no. Facts show the country that Washington is not the most ignorant state.

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Sincerely,
Meryl Woodard

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3.4.2.2

CITY OF
PORTLAND, OREGON
COMMISSIONER OF PUBLIC UTILITIES

Margaret D. Strachan, Commissioner
1220 S.W. 5th
Portland, Oregon 97204
(503) 248-4151

August 8, 1986

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AUG 11 1986 0214
WM DIVISION

Jerry White
U.S. Department of Energy
Mail Stop FED/706
P.O. Box 550
Richland, WA 99352

Dear Mr. White:

As the Commissioner of Public Utilities for the City of Portland, I am very concerned about the Draft Environmental Impact Statement for the Disposal of Hanford Defense, Transuranic, and Tank Wastes, and its implications for the future disposal of wastes if Hanford is selected as the nation's repository. For your reference, please find enclosed my testimony from the recent public hearing held in Portland. I am also including a summary list of questions on the DEIS, and look forward to your response.

I feel it is imperative that the Environmental Impact Statement thoroughly address the potential environmental and economic impacts on the City of Portland. Therefore, I am requesting that the US Department of Energy fund a Peer Review Study coordinated with essential City Bureau staff. By implementing such an independent study, the public faith in the credibility of the political and technical studies would be restored.

3.2.4.1

We would be glad to meet with you and your staff to further discuss these issues.

Sincerely,

Margaret D. Strachan
Commissioner of Public Utilities

MDS:rh
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QUESTIONS FOR DOE

2.3.1.2 1. Why were no alternate site selection studies done to find whether more suitable sites exist with lower water contamination potential ?

2.1.1 2. Why should present and future waste continue to be stored at the Hanford site in spite of the history failure of the site to prevent radioactive and chemical water contamination?

3.2.2.6 3. Why were the "LaGrande-Chewaukin" fault structures which traverse the Hanford site not shown on the Structure Map, Figure 4.5? Why aren't these regional trends of faults reported in (other studies reported and evaluated in the DEIS"

3.5.1.90 4. What will prevent direct radioactive and chemical contamination of the Columbia River aquifers and water system if the 1.5 mater "fine soil" in the on site disposal plan were to be eroded and removed by wind, water, or other process?

3.5.1.90 5. What BACKUP PROTECTION is provided for on site disposal plans if the "fine soil" should be removed?

3.5.3.9 6. What is to prevent the spilled plumes of radioactive and chemical tank waste from entering the ground water by gravitational movement?

3.1.6.1 7. What is the chemical content of the contaminants associated with the radioactive waste and what are the potential risks to organisms if they are released to the environment?

3.3.5.2 8. Why are the more typical designs for waste disposal which utilize water barriers and control of potential leachate drainage not evaluated?

2.3.2.9 9. What independent agencies or other government agencies are providing technical review of the DEIS proposal? Could copies of their evaluations be provided to the Portland City Council?

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CITY OF
PORTLAND, OREGON
COMMISSIONER OF PUBLIC UTILITIES

Margaret D. Strachan, Commissioner
1220 S.W. 5th
Portland, Oregon 97204
(503) 248-4151

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TESTIMONY
USDOE PUBLIC HEARING
Thursday, July 10, 1986

Good-evening. My name is Margaret Strachan. I am a City Commissioner for the City of Portland. I speak to you this evening not only as a public official concerned with the health and welfare of this community but also as the mother of seven children and the grandmother of seven more. I would like to state for the record I am unequivocally opposed to the siting of the Nation's Repository at Hanford. I feel that it is essential citizens of Portland recognize the impact of this siting decision on the USDOE Draft Environmental Impact Statement for the existing wastes. I would like to concentrate my remarks on the economic effect which this issue has on Portland and the surrounding region. 2.1.1

Today, Oregon is recovering from one of the most severe economic recessions in this state's history. Our lumber industry is slowly waging a recovery. Agriculture, another mainstay, has been hard hit. Portland has not been immune. During the past several years, the public and private sectors have been working hard together to revitalize the economy, encourage new businesses to locate here, and to generate increased tourism.

We've developed projects to maintain our infrastructure and preserve our existing industrial and commercial base. We have spent millions of dollars on a new light rail system to downtown and are working hard to open new industrial land to provide more industry and jobs. Currently, Portland is engaged in the most ambitious planning effort in its history. The Central City plan we hope will generate over 20,000 new jobs and over a billion dollars in new investments. Together, we are building an even better community -- on where all of us can realize our dreams for the future.

How can we do that when only a short distance from where we live and work, a federal agency is storing and plans to store even more of the most lethal residue of the atomic era? How will we be able to convince new business and industry to locate here when our city is connected directly by the Columbia River to the largest nuclear waste dump ever created? The best public relations program will never be able to convince people that a nuclear dump site is safe when it isn't. People are not easily fooled. Companies looking at Portland as a location will think more than twice when they know what's just upstream from them. The people in other states and countries will think more than twice when they buy Oregon grains and fruits which have drawn their nutrients from radioactive water. 3.2.6.3

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Obviously, the economic impact of the issue is disastrous for Portland and this state. Yet, with such a monumental decision to be made, the DEIS fails to meet many of the EPA guidelines for an Environmental Impact Statement. 2.4.1.1

It does not recognize environmental values and the long term impacts upon the land, water, and air. A large body of scientific knowledge exists on hazardous waste technology. It is mainly ignored in the impact statement. As well as not recognizing this existing knowledge of procedures, the US Department of Energy has not realized the absolute necessity of meeting NRC (Nuclear Regulatory Commission) standards that are in effect now for commercial reactors. 2.3.1.2

Clearly, no one wants a nuclear garbage dump in their backyard, but just as clearly, a safe site has to be found--somewhere. I am not one who wants to give my troubles to someone else, but Hanford has not been proven to be a suitable site. 2.1.1

In fact it is a dangerous site, and I am profoundly disturbed by this fact and the fact that the impact statement did not consider alternative locations in Oregon and Washington. Ash and shale terrain is available in dry areas in both states--areas that pose no threat to the Columbia. Hanford does. Geologically, we can compare the ground below Hanford to channels filled with marbles through which groundwater flows directly to the Columbia. It takes as little as 3 years for this water to reach the river. We know that a great volume of extremely toxic radioactive and chemical materials--by intention and by accident--have already been spilled into the ground. 2.1.1 3.5.3.6 2.2.12

I am not an expert on nuclear waste disposal, but I do consider myself to be a reasonably intelligent human being. Frankly, the Department of Energy has not only insulted my intelligence but, has lost fore[illegible] what little credibility it had. For starters, recently declassified documents reveal that for the last forty years, the citizens of the Northwest have been nuclear guinea pigs for military tests. But that is nothing compared to what I find on page 3.40 of the impact statement prepared by the Department. It says, and I quote, "...with regard to future land use, and possible effects on tourism, ... the Hanford site has been dedicated to nuclear-related work ... and is expected to remain so dedicated." End quote. This statement strongly implies that Hanford has been written off as a "National Sacrificial Area". 2.5.5

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Evidently, the department doesn't want to clean up the over 500,000 cubic yards of defense waste that has been put into the ground. Given the existing plutonium that is in the groundwater (DEIS, figure V.17), why aren't any water barriers or impermeable seals planned to intercept more leaks? 3.5.3.11

I am even more astounded by the Departments budget for 1987. Hanford has been allocated 1.5% of the money set aside for environmental clean up, yet it holds 63% of the nation's nuclear waste. 2.2.9

Can you wonder why I worry when the Department of Energy states that over the last thirty years, it has an excellent safety record in transporting radioactive materials? The reports released this week by the Office of Technology Assessment, a non-partisan congressional agency, stated that federal rules are lax and enforcement lackadaisical on shipments of hazardous materials. The report also estimates that 62% of spills are caused by human error. 3.4.2.2

If Hanford is selected as the nation's repository, and all the waste is driven in over our freeways, one truck of nuclear waste will arrive there approximately every ninety minutes. The chances of one accident occuring with that many arrivals is extremely high. 3.4.2.2

And just one spill in Portland or in the Columbia could be a disaster--one that could claim many lives. Furthermore, those affected could never receive compensation because cancer develops after a long latency period and has many causes, making proof of negligence and pinpointing the exposure difficult. In the State of Oregon, citizens will not be able to sue as the Oregon Statute of Repose states that all claims based on negligence must be filed within 10 years after the incident, regardless of when the harm was discovered.

As the major population center to be impacted by Hanford, we must have sufficient and reliable data to make sound decisions--decisions which affect the lives of every citizen. For these reasons, I request that the City of Portland be allocated funds for technical assistance to undertake health and socioeconomic studies apart from the state. In addition, I request that Congress withhold funding from Hanford until it meets a strictly detailed schedule for isolation, containment and cleanup of existing waste. 2.2.9

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COMMENTS OF THE YAKIMA INDIAN NATION

ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

DISPOSAL OF HANFORD DEFENSE HIGH-LEVEL, TRANSURANIC AND TANK WASTES

August 8, 1986

In closing, let me reiterate that loss of the region's soil and water to nuclear contamination will result in permanent, irreversible destruction of the productivity and livability of this beautiful land for many generations. Truly, it will have become a sacrificial land. We who live here will not let that happen. 3.2.6.1

Thank you.

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COMMENTS OF THE YAKIMA INDIAN NATION

ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

DISPOSAL OF HANFORD DEFENSE HIGH-LEVEL, TRANSURANIC AND TANK WASTES

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August 6, 1986

EXECUTIVE SUMMARY

1. DOE is to be strongly commended for beginning remediation efforts concerning defense high-level waste management at Hanford. 2.3.2.12

2. One of the primary environmental effects of all the alternative actions--low-level waste generation and disposal--is not discussed. This omission makes compliance with the National Environmental Policy Act on the basis of this document impossible. 2.3.1.13

3. The "in-place stabilization and disposal" alternative is not legally available. DOE may not leave all high-level and transuranic defense wastes in shallow disposal under existing law. 2.4.1.6

4. The DEIS lacks a "clean-up" alternative. DOE must consider an alternative which comprehends an effective removal of all significant contamination from Hanford. Exercise of Treaty-guaranteed usage rights and traditional religious practices by the Yakima Indian Nation requires renewed access to uncontaminated Hanford lands and waters. 2.2.11 2.4.2.2

5. Current radioactive and chemical ground water contamination is not adequately considered in the DEIS. 3.5.3.11

6. The DEIS represents an unconscionable double standard of waste disposal. If deep geologic disposal is the national policy for high-level commercial radioactive wastes, the same level of protection should be implemented for defense high-level wastes. 2.2.7

7. Analyses in the DEIS are not sufficiently conservative. DOE is excessively optimistic about the effectiveness of artificial protective barriers and the stability of LLW and TRU waste forms. 3.5.1.57

8. DOE's analyses are flawed by poor knowledge about radionuclide inventories. 3.1.1.1

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GENERAL COMMENTS--LEGAL AND POLICY

2.3.2.12 DOE Is To Be Strongly Commended for Beginning Remediation Efforts Concerning Defense High-Level Waste Management at Hanford.

While the bulk of the comments that follow are critical of various aspects of the Hanford Defense Waste Draft EIS, the Yakima Indian Nation wishes to emphasize at the outset that we strongly commend the Department for beginning active consideration of the best means to deal with the defense wastes at Hanford. The YIN heartily concurs in the statement that "[t]he intent is to proceed with permanent disposal rather than continue to store the waste and defer responsibility for disposal to future generations." (DEIS p. 1.6.) The YIN and DOE have the same objective in this project--to insure that the Hanford defense wastes are disposed of safely.

Because of the Yakimas' culture and the close historical and spiritual connection of the Yakima people with the land in general and the Hanford area in particular, the Yakimas may have a very different perspective on what is "safe" than does DOE. Notwithstanding that, this is not a situation where the Department wants to do something and the YIN wants to prevent it. Quite the contrary, the Yakimas very sincerely want the Department to do succeed in safely disposing of the Hanford defense wastes. We sincerely want DOE to succeed in its commendable endeavor of permanently isolating those wastes from the environment. We hope that the Department will take the following comments--however critical--in that spirit.

2.2.11 There is No "Clean-Up" Alternative

All the alternatives considered in the DEIS rely on leaving enormous volumes of radioactive waste at Hanford, and on extensive fractionation to minimize the volume of materials to be treated as HLW, and maximize the volume of materials slated for on-site shallow disposal as LLW. Even the most ambitious alternative purportedly considered in detail in the DEIS, the "geologic disposal" alternative, would result in only a small fraction by volume of the tank wastes at Hanford being disposed of as HLW in a deep geologic repository. Even in that alternative, fractionation would be used to remove just enough highly concentrated waste to make the residue fall below DOE's new, less stringent 100 nCi/gm threshhold for low-level waste treatment. Enormous quantities of new low-level waste will be generated, and DOE simply assumes--with no discussion--that they will all be disposed of on-site by shallow burial in all of the alternatives. No other options for disposal of this LLW are even mentioned, let alone considered in detail. It is also presumed in all three options that all of the contaminated tanks and considerable residues, including substantial quantities of both high-level and TRU wastes, will be left in place.

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All of DOE's thinking about disposition of radioactive wastes at Hanford is grounded in the presumption that Hanford will permanently be a national sacrifice area. That presumption is not acceptable to the Yakima Indian Nation. The Hanford area is very important to the Yakima people as a location for finding certain natural foods and medicines, and as a location important in Yakima legends and religious practices. One of the alternatives which DOE should consider in detail in the DEIS is complete clean-up of the Hanford Site. It is not impossible that Hanford will be found to be unsuitable for either deep or shallow disposal of radioactive wastes. Recent revelations (Buske, 1986) of possible shallow groundwater channels with very rapid travel times between the 200 areas and the Columbia River--while far from conclusive at this point--certainly indicate the need for additional study of the issue. If such studies reveal significant migration of radionuclides and chemical wastes from the 200 areas to the River in the very short period (43 years) since nuclear activities commenced at Hanford, removal of all radioactive wastes--both low and high-level--may be necessary.

References:

Buske, N. and L. Josephson, 1986, Hanford Reach Project, Spring 1986 Data Report, Search Technical Services, Davenport, WA.

2.3.1.13 One of the Primary Environmental Effects of All the Alternative Actions--Low-Level Waste Generation and Disposal--is Not Discussed.

Incredibly, the DEIS includes no discussion of the environmental effects of the proposed large new low-level waste burden at Hanford, but rather declares low-level waste disposal to be beyond the scope of the DEIS. It is axiomatic in NEPA compliance that an agency may not escape consideration of unavoidable environmental consequences of its proposed actions by declaring those consequences beyond the scope of the NEPA document. Indeed, the entire purpose of the NEPA EIS process is to compel full and fair discussion of the environmental effects of alternatives in the decision-making process. NEPA Sec. 102(2)(C), 42 U.S.C. Sec. 4332(2)(C); 40 C.F.R. Sec. 1502.1 (Council on Environmental Quality NEPA regulations); Environmental Defense Fund v. Corp. of Engineers (Gillham Dam), 325 F. Supp. 728 (E.D. Ark. 1971), aff'd 470 F.2d 289 (8th Cir. 1972), cert. denied 412 U.S. 908 (1973). In light of the large volume of additional LLW to be generated in all of the options in this DEIS, LLW generation and disposal will undoubtedly constitute one of the most significant environmental effects in the Hanford defense waste disposal program. The DEIS's failure to discuss those effects is a fatal shortcoming in the document, and one which will clearly require circulation of a revised draft EIS for public comment.

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3.3.3.1 The DEIS Lacks a "Preferred Alternative" in Name Only.

The DEIS purports not to have a "preferred alternative", a customary if not mandatory component of an EIS. It is not clear why DOE does not simply own up to its long-standing preference--stated in the 1983 Notice of Intent for this DEIS, in the 1983 Defense Waste Management Plan, and revealed either explicitly or implicitly in numerous other Department documents and presentations--for what it now calls the "Reference" alternative. The overall tone and structure of the DEIS is little more than a baldly biased argument against the requirement of geologic disposal of wastes that DOE considers "not readily retrievable." Admitting DOE's real preference would not have detracted any more from what limited objectivity the document has, and it would have been considerably more forthcoming.

2.4.1.6 The "In-Place Stabilization and Disposal" Alternative is Not Legally Available.

One of the most egregious flaws of the DEIS is that the "In-Place Stabilization and Disposal" alternative, as framed by DOE, is a hoax. Because it would leave in place all existing and newly generated waste, it is quite obviously not an alternative which could ever be available to DOE under the present legal framework.

The Nuclear Waste Policy Act provides that high-level defense wastes may be disposed of in one of two ways, at the discretion of the President: either in a defense-only repository, or in a mixed repository with commercial wastes. The President has decided that the defense HLW should be comingled with commercial wastes. DOE, in the "Reference" alternative of this DEIS and other of its documents, has attempted to put a gloss on this NWPA requirement that limits the repository disposal requirement to only "readily retrievable" defense HLW. We can find no support for this distinction in the Nuclear Waste Policy Act of 1982, the Energy Reorganization Act of 1974, the Atomic Energy Act, as amended, or any other applicable law.

Assuming, for the sake of argument, that DOE's "readily retrievable" distinction were legally correct and supported by rigorous technical analyses, it might arguably be used to justify in-place stabilization of some portion of the Hanford defense wastes. However, DOE cannot point to the slightest legal or policy support for the proposition that it could leave all of the Hanford defense HLW--no matter how hazardous, how recently generated, or how "retrievable" it was--in place at Hanford. The Hanford double-shell tank wastes and other newly generated wastes are in no different posture than the defense HLW at Savannah River Plant or INEL, which DOE has never questioned the need to dispose of in a deep geologic repository.

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Indeed, if DOE had the legal and policy discretion not to dispose of even the "readily retrievable" Hanford wastes in a geologic repository, then it need not so dispose of any defense wastes. It should be apparent that this proposition is legally and logically absurd. Thus, the the "In-Place Stabilization and Disposal" alternative is also legally and logically absurd. Because the utter impracticability of that alternative is so inescapable, we cannot avoid the conclusion that it is not a serious one, but rather was "ginned up" simply to make DOE's still extreme "Reference" alternative artificially seem like more reasonable middle-ground. If that is indeed its purpose, it does not succeed.

Decision Timing

2.3.2.1

The suggested timing of the decision which alternative to select appears to be inappropriate. All of the alternatives, as presented in the DEIS, include multi-year research programs, including the protective barrier, vitrification, or aspects of dry-well storage. It is inappropriate and premature to select one or more of these alternatives prior to their demonstrated feasibility through the research. The DEIS fails to demonstrate through so-called "conservative" analyses that these alternatives will adequately protect the public.

Many of the specific technical decisions concerning final waste disposal at the Hanford Site have been deferred until additional research can be completed. As an affected Indian tribe, the Yakima Nation should be allowed to review and comment on any policy and engineering decisions related to the final disposal of Hanford Defense Wastes prior to issuance of a final EIS. Because of serious deficiencies in the DEIS, noted in these comments, it will be necessary for DOE to circulate a revised draft EIS for public comment.

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GENERAL COMMENTS--TECHNICAL

Comparability of Conservatism

The DEIS purports to account for the considerable uncertainty involved in predicting the performance of various disposal options by using conservative values for parameters. However, it cannot be determined from the data and analyses presented in the DEIS whether comparable degrees of conservatism were used for all the considered options. If the calculations for one alternative used parameters which were ten times more conservative than another alternative, the fact that the first alternative appears to have a greater impact on public health and safety may be misleading. Obviously, it would be inappropriate to draw conclusions without knowledge of the degree of conservatism used in the calculations for each alternative. In the DEIS, there is no way to tell if the projected differences in impacts are due to varying degrees of conservatism, or to actual, expected performance of the disposal technologies.

3.5.5.27

Current Ground Water Contamination

A major omission in the DEIS is the lack of characterization of current ground water contamination. Plume delination maps should have been included to show the extent and concentration of all the significant radionuclides and non-radiological constituents that have contaminated ground water at Hanford. This should include contamination in the confined system of the basalts and interflow sediments. At present, the only discussion of contamination is based on sediment sampling. While sediment sampling is a logical component of characterization, ground water quality monitoring is more important inasmuch as this contamination is more mobile and threatening to the public health and environment.

3.5.3.11

Once current levels of contamination are established, they should be discussed in light of federal and state ground water quality standards. For example, both the nitrate and tritium levels exceed allowable limits for public water supplies (40 CFR 141) as promulgated under the Safe Drinking Water Act. As previously mentioned, since these contaminants are defense wastes, consideration of their restoration should be a major portion of the DEIS.

3.5.3.11

The analyses of impacts presented in the DEIS should be redone taking into account current or predicted post-restoration levels of contamination. The present DEIS analyses assume current contamination will dissipate prior to the end of the 100 year institutional control period. However, there is absolutely no information presented in the DEIS to support this projection. Therefore, the analyses of impacts should assume contaminated

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ground water will still be present after the institutional control period has ended. If DOE wishes to assume lower levels of contamination will exist at that time compared to current levels, technically defensible solute transport modeling will have to be included as part of any analysis. Furthermore, predictions of long term releases from the stablized wastes should be calibrated using the past 40 years of monitoring data.

3.5.3.11

Intruder Scenario

The DEIS assumes less than one intrusion into the waste will occur in the 10,000-year regulatory period. This estimate is based on assumed failure probabilities of the various marker and barrier systems. In light of the high rate of archeological and other investigative intrusions into mounded burial sites of indigenous peoples, this is rather optimistic. A more realistic estimate of the number of intrusions into the waste should be used in the DEIS analyses.

3.5.1.98

Double Standard of Waste Disposal

All the disposal options proposed in the DEIS call for large volumes of low-level and varying volumes of high-level and TRU wastes to be disposed of in the vadose zone within 10 meters of the ground surface. Concurrently, at the same site, activities are under way to characterize the site as a potential geologic waste repository in which comparably hazardous high-level and TRU wastes will be buried at a depth of about 1,000 meters below the ground surface. This double standard for disposition of comparably hazardous radioactive wastes should be confrontly directly by DOE in this DEIS, as well as in documents connected with the repository program.

2.2.7

Significance of Radionuclide Transport in the Vadose Zone

In the DEIS, it is assumed (section 0.3) that there are two major transport mechanisms affecting the movement of radionuclides: diffusion in the vadose zone under the protective barrier, and convection-dispersion in the saturated zone beyond the protective barrier. This assumption implies that beyond the barrier possible movement of radionuclides in the vadose zone can be neglected. However, this assumption may not be valid for the following reasons. The thickness of the vadose zone at present, in some places in the vicinity of the 200 Areas, can be as little as 10 m. This thickness could be less or even nonexistent if future climatic changes result in increased annual precipitation.

3.5.2.48

With the phreatic surface close to the ground surface, the following transport mechanisms in the vadose zone are possible.

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(a) Movement in response to hydraulic head gradients in the vadose zone. If the thickness of the vadose zone is sufficiently small, the degree of saturation of the vadose zone could be sufficient to cause significant radionuclide transport in this zone.

(b) Plant root extraction. Radionuclides can enter the plant root system in both the vadose and saturated zones.

(c) Burrowing animals. Burrowing animals may come into contact with radionuclides in the vadose zone.

(d) Surface discharge of groundwater. Surface discharge is possible if the phreatic surface rises to the ground surface.

It can be further deduced that if the plants are consumed by humans or animals, or if the burrowing animals are consumed by other animals, and if the surface discharge of groundwater is ingested by humans or animals, the radionuclides could easily enter the food chain.

This issue is particularly important to the Yakima Indian Nation because, under the Treaty of 1855, the Yakima people have the right to hunt and gather natural foods in usual and accustomed places within their Ceded Lands. These places could be well inside the 10 km radius from the wastes where the food chain is affected by the entry of radionuclides. The situation could be exacerbated in the future when institutional control of the site no longer exists.

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-2.1.3 Calculation of Combined Release at 10,000 Years is not Comprehensive

Two classes of waste are considered for disposal at the Hanford Site: the defense wastes and civilian wastes. These two classes of waste share the same "affected environment". The criteria stipulated in 40 CFR 191 must therefore be applied to the "total" radionuclide release from both the defense and civilian wastes. The DEIS addresses only possible releases from the defense wastes.

3.5:1.57 Analyses in the DEIS Are Not Sufficiently Conservative

The DEIS is pervaded with the statement: "The authors tend to err on the side of conservatism". In the real world where field data are fraught with uncertainties, this approach is acceptable as long as the assumptions, theoretical analyses, and data are defensibly proven to be conservative (or to err on the side of conservatism).

In many instances, it is found that approaches or assumptions utilized in the DEIS are not conservative, for example:

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(1) Risk Reduction Analysis (Appendix M)

The analysis of risk reduction is based solely on "the authors' judgment." In addition to unsupported assertions, this analysis assumes that the risk reduction factors combine in a multiplicative way. It does not take very many measures using this method of comparing risk to result in an extremely low combined risk factor.

(2) Radionuclide Transport in the Vadose Zone

Beyond the protective barrier, it is assumed in the DEIS that the radionuclide transport in the vadose zone is negligible. This assumption is not conservative because in several places the vadose zone is so thin that radionuclides can enter the food chain via plant root extraction. Furthermore, if future climatic conditions are wetter, it is likely that the thickness of the vadose zone would be reduced by the rising groundwater table, thus allowing increased exposure of plant roots to the contaminated groundwater.

(3) Environmental Impact Analysis of Radionuclide Release to the Accessible Environment

In the DEIS (p. Q.10), the following locations are selected for analysis as points of release to the accessible environment: (a) the Columbia River (p. Q.7 and p. Q.10) ; and (b) a domestic well at 5 m from the 200 Area fence line. The former corresponds roughly to a receptor 30 km downstream from the wastes, and the latter presumably corresponds to a receptor 10 km downgradient from the wastes. It is noted here that the distance between the disposed waste and the accessible environment, according to 40 CFR 191, is 10 km.

Instead of assuming several domestic wells at the 10 km distance, the authors assumed only one well pumping contaminated water from the upper 5 m of the unconfined aquifer. At such a large distance from the source, it is likely that the contaminants will be mixed throughout the saturated thickness. As a conservative measure, several fully penetrating wells should be assumed downgradient to estimate the possible release rate.

A defensibly conservative approach is called for to supplant the lack of field data.

The Dilution Solution 3.5.4.8

All of the alternatives result in the continued storage of some or all of the high-level and transuranic wastes and all of the low-level wastes at the near-surface. Protection of the public health and general environment under these alternatives

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depends on the slow release and dilution of radionuclides in near-surface ground water and surface water (primarily the Columbia River). Many of the proposed components of these alternatives contain untested disposal technologies as applied to high-level waste (e.g. dry well storage of cesium and strontium). Furthermore, the likelihood of intrusion is clearly more probable in the cases of near-surface disposal versus the geologic disposal case.

3.1.1.1 Excessive Uncertainty in Radionuclide Inventories

The DOE has presented estimated radionuclide inventories in numerous tables throughout the DEIS, but no indication of the uncertainties associated with these values was given. However, in Volume 2, an uncertainty of -30%/+50% for inventory assessment was stated. The radionuclide inventory of existing wastes is the basis for all evaluations, risk analyses, and decision making concerning waste disposal alternatives and operations. Therefore, an accurate estimate is imperative.

3.5.1.57 Excessive Optimism About Effectiveness of the Protective Barrier

Two of the three action alternatives rely heavily on the potential isolation to be provided by a multi-layer protective barrier. Throughout the DEIS, the barrier is assumed to work perfectly (allowing no infiltration) under normal conditions. Given the extreme amount of uncertainty associated with predicting the performance of this barrier, the assumption of perfect performance is inappropriate.

The design of the multi-layer cover relies on an aspect of the soil-water outflow law which states water will not enter an open cavity unless the pressure in the water is atmospheric or greater. While this law is valid, it may not always apply to flow in layered systems. The DEIS assumes the simulated coarse grained soil (gravel) is comprised of a compilation of large, empty cavities. Course soils, however, are actually comprised of a distribution of pore-spaces of which some are small pores. It is certainly feasible some of the small pores will be saturated under field conditions, and would be able to transmit water from an overlying soil under unsaturated conditions. Furthermore, flow along grains, via a thin film of residual moisture, is possible as well. Current understanding of unsaturated flow under relatively dry conditions is very limited. Therefore the assumption there will be no flow into the underlying layer is premature and inappropriate when considering the relative hazard that high-level radioactive and transuranic wastes pose.

Another parameter crucial to assessing the barrier performance is the recharge rate occurring at Hanford. The DEIS estimates this rate between 0.5 and 5 cm/yr. However, other

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studies have estimated the rate to be 11 cm/yr in a year of 25 cm of precipitation. It is clear this important parameter involves considerable uncertainty (in excess of an order of magnitude).

Finally, the effect of lateral flow from outside the barrier towards the waste is unknown. The two-dimensional modeling presented in the DEIS never converged to a solution and is therefore meaningless. Lateral gradients directed towards the waste will be established as moisture contents decrease once the barrier is in-place if, in fact, the barrier works as envisioned. Therefore, some provision in the impact analyses should conservatively account for these unknown lateral-flow effects.

In light of the uncertainties discussed above, a reasonably conservative analysis of the barrier's expected performance should not assume complete prevention of infiltrates through the barrier under normal conditions - as is the case in the DEIS. Furthermore, the functional barrier failure scenario of 0.1 cm/yr recharge is not nearly adequate. This recharge rate should be assumed to be significantly higher. A more reasonable rate would be 5-10 cm/yr (approximately 1/2 of annual precipitation).

It is clear field-scale experiments using natural and engineered layered-systems should be demonstrated as being successful in preventing infiltration prior to the selection of either of the two alternatives that incorporate the multi-layer barrier. Previous field-scale experiments have not produced persuasive results, and modeling efforts are too uncertain to be relied upon.

Excessive Optimism About Stability of LLW & TRU Waste Forms 2.3.1.13

Some of the TRU and low-level wastes discussed in the DEIS are currently disposed of in cardboard boxes, steel drums, and other unspecified waste containers. The alternatives proposed for stabilization of these waste forms include grouting in place, pile driving to eliminate void space, and normal backfilling, among others. However, it is not evident in the DEIS that these techniques will be adequate to prevent failure of the waste forms and subsequent subsidence of the overlying material. Inasmuch as subsidence leads to increased infiltration and leaching of radionuclides, the long-term stability of these wastes should be clearly demonstrated. In the case of grouting in place, there does not seem to be any mechanism by which voids inside the containers would be eliminated. Failure to eliminate these voids will promote instability and subsidence. 3.1.3.12

The success of the pile-driving method appears very doubtful because the wastes being compacted can not be observed due to the existing overlying material. This technique would require a large amount of speculation to locate exactly where to do the pile-driving, and the extent to which it is adequate. Simply 3.1.3.12

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3.1.3.12 backfilling the low-level wastes in trenches is no longer perceived as an acceptable method of disposal when the wastes are not in a stable form. Until stable performance of the TRU and low-level waste forms can be demonstrated using these technologies, selection of alternatives that include them would be premature.

4.1.10 Not All Relevant References are Included in the DEIS

The DEIS comprises three volumes. Volumes 2 and 3 contain technical appendices in which conclusions and technical evidence leading to these conclusions are given. The details of technical evidence, however, are too sketchy to enable reviewers to evaluate meaningfully the technical analyses reported or cited in the DEIS. In most appendices, only summaries of analytical results are given. References giving details of work leading to these results may or may not be given in the DEIS.

To enable reviewers to independently evaluate DOE's work, it is imperative that all the relevant documents be referenced in the DEIS and made available to reviewers so that every component of DOE's work can be traced and spot checked.

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SPECIFIC COMMENTS

FORWARD

YIN Comment 1

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Comment: The DEIS states: "The Hanford wastes are ... about 1/100th the activity and ten times the waste volume of a commercial repository containing 70,000 tonnes of spent fuel elements". The volume of Hanford wastes is actually fourteen times that of a commercial repository, according to the figures given in the DEIS (410,000 cubic meters for Hanford defense waste and 29,000 cubic meters for commercial spent fuel in a geologic repository). Also, according to page 1.7 of the DEIS, commercial spent fuel is eighty times more radioactive than Hanford wastes. 4.2.55

YIN Comment 2

Page(s) vii

Comment: The DOE has presented the DEIS for final waste disposal options at the Hanford Site before many of the final designs for procedures have been formulated. The engineering techniques chosen for waste retrieval, treatment, handling, immobilization and/or disposal processes could have a significant impact on potential environmental releases and future isolation of these wastes. The present and future environmental effects of these disposal techniques are of great concern to the Yakima Indian Nation, as the Hanford Site is within Yakima Ceded Lands under the Treaty of 1855, and and these activities have potentially adverse effects on the Columbia and Yakima Rivers, wherein the YIN retains Treaty fishing rights. The DEIS should explicitly state that future refinements to the options discussed therein will be the subject of additional draft EIS's which will be circulated for public comment. 3.3.5.4

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EXECUTIVE SUMMARY

YIN Comment 3

Executive Summary

Page(s) ix - x

Comment: The Executive Summary states that low-level wastes are excluded from the scope of the DEIS. However, owing to their transuranic (TRU) waste content, two classes of waste, previously disposed of as low level, are included. The two classes are: (1) TRU-contaminated soil sites--soil contaminated by disposal of liquid wastes in cribs, ditches, trenches, settling tanks, French drains, and reverse wells, and (2) Pre-1970 buried, suspect TRU-contaminated solid wastes. 2.3.1.13

On p. V.29 it is stated that large volumes of low-level waste water and occasional releases of considerably higher-level discharges to ponds and ditches have resulted in the accumulation of transuranic, fission product, and activation product inventories. A total of 1.3 billion L of liquid was discharged through 1982, and it was estimated to include 8.2 kg plutonium, 1500 kg uranium, 15.3 Ci 137Cs, and 22.6 Ci 90Sr. Concentrated in one of the ditches, in addition to plutonium, was americium (p. V.31). As noted on p. 4.12, effluents discharged to ponds and ditches constitute an artificial source of groundwater recharge. Specifically, erosion of the confining beds of the Saddle Mountains Basalt north of the 200 East Area has created the means for a direct connection between the unconfined shallow aquifers and the uppermost confined aquifers in the basalt, the Rattlesnake Ridge aquifers (DEIS, p.4.16; Graham and others, 1984, p. 91). In addition, Graham and others concluded that there were two zones where a downward hydraulic head gradient permitted contaminants to move from the unconfined aquifer to the Rattlesnake Ridge aquifer. 2.3.1.13

An analysis recently was made by GeoTrans, Inc. on behalf of the Yakima Indian Nation, of available data on potentiometric levels in the Columbia River Basalt Group and the basal Ringold Formation. There is a downward head gradient from the basal Ringold to the Wanapum. South of Gable Mountain and in the vicinity of the 200 West Area, mounds have developed locally on the potentiometric surface of the Wanapum, suggesting that wastes from the ponds have infiltrated (or at least have the potential to infiltrate) to that formation. More comprehensive flow and transport models may be warranted. 2.3.1.13

In view of the potential environmental effects of TRU wastes (including plutonium and americium), it is totally inconsistent to include in the DEIS the two classes of waste mentioned above, which were originally discharged as low-level wastes, and to exclude the liquid wastes which are discharged to ponds and 2.3.1.13

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ditches. It should be noted also that Graham (1981, p. VI) estimated the shallow groundwater travel time from the 200 West Area eastward to the Columbia River as 80 years, and from the 200 East Area to the River as 30 years. 3.5.3.6

References:

Graham, M.J., 1981. Hydrology of the Separations Area. RHO-ST-42, Rockwell Hanford Operations, Richland, Washington.

Graham, M.J., G.V. Last, and K.R. Fecht, 1984. An Assessment of Aquifer Intercommunication in the B Pond-Gable Mountain Pond Area of the Hanford Site. RHO-RE-ST-12P, Rockwell Hanford Operations, Richland, Washington.

YIN Comment 4

Executive Summary

Page(s) xi

Comments: The differences in the risks associated with on- and off-site transportation for the geologic disposal alternative and reference combination alternative are not clear. In both Table 1 and Table 2, the on-site transportation risks for the geologic disposal and reference combination alternative are shown to be approximately equal even though the amount of waste to be transported is significantly greater for the geologic disposal alternative. When considering off-site transportation risks, the risk levels do not change for the reference combination alternative, whereas for the geologic disposal alternative, the risks double. One would expect the risks for the reference combination alternative to increase as well. It would appear from these tables that the risks associated with the reference combination alternative are downplayed. 3.4.2.18

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CHAPTER 1

YIN Comment 5

Section 1.0--What is the Issue?

Page 1.1

Comment: The DEIS states that "The challenge is to obtain the necessary level of health and safety in the most cost-effective way." In fact, the entire comparative analysis in the DEIS is overwhelmingly driven by cost considerations. In the Recommendation By The Secretary of Energy of Candidate Sites for Site Characterization For the First Radioactive Waste Repository, DOE/S-0048, cost considerations are completely discounted in order to rationalize the agency's selection of Hanford, which is projected to be by far (by over $5 billion) the most costly candidate site. This diametrically opposite treatment of cost considerations depending on whether the high-level waste is from commercial or military operations cannot be rationalized. The Department's analyses would be more credible if they were less opportunistic in their selective use of cost arguments. DOE seems to have very strict cost standards when dealing with federal treasury funds for health and safety protection, but a more cavalier attitude about spending from the Nuclear Waste Trust Fund, which is supplied by a direct tax on nuclear electricity.

2.2.7

YIN Comment 6

Section 1.0--General Summary

Page(s) 1.4

Comments: The DEIS states: "There are large volumes of waste, but they have a relatively low concentration of radioactive material". The DEIS does not provide any basis for comparison. Thus, this statement may be misleading to the layperson. Hanford defense wastes are less concentrated than high-level commercial waste in the form of spent fuel rods (U.S. House of Representatives, 1984). However, many of Hanford defense wastes, particularly those in the double-shell tanks, are quite concentrated and extremely hazardous. This point should be stressed in the DEIS.

3.1.1.2

References:

U.S. House of Representatives, 1984, Achieving Performance Objectives for the Engineered Barrier System, Subcommittee on Energy Conservation and Power of the Committee on Energy and Commerce, 98th Congress, 2nd Session.

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YIN Comment 7

Section 1.0--General Summary

Page 1.5

Comment: The DEIS states, "...nearly all of the wastes that leaked from single-wall tanks...were absorbed by the arid soil next to the tanks." This statement implies the waste not absorbed on the soil is inconsequential. That portion of the leaked waste not absorbed by the soil should be quantified, and its environmental consequences discussed in the DEIS.

3.1.4.26

YIN Comment 8

Section 1.0--General Summary

Page 1.11

Comment: The DEIS states numerous alternatives were considered and the ones chosen for detailed analysis were selected so as to bound the range of potential impacts. In fact, the three alternatives considered in detail do not adequately bound those which should be considered. At the "do as little as possible" end of the spectrum, the "In-Place Stabilization and Disposal" alternative falls far short of what DOE must legally do by way of defense HLW disposal, as discussed above. Even the "Reference" alternative as framed by the DEIS is very extreme in the extent to which it would leave high-level defense wastes "disposed of" by shallow burial, an option not legally available to DOE under the NWPA and the Energy Reorganization Act.

3.3.5.1

3.5.6.39

3.3.5.2

In sharp contrast, at the ambitious end of the spectrum, DOE's most ambitious alternative would still leave enormous volumes of new low-level wastes in shallow disposal at Hanford, and a considerable quantity of high-level residues, contaminated soil, and contaminated storage tanks, as well. At this end, DOE's "range of options" does not go nearly far enough. The Hanford Site may prove to be unsuitable for either shallow or deep disposal of radioactive wastes. Also, the Yakima Indian Nation looks forward to the time when the Hanford area is once again accessible to tribal members for the exercise of tribal religious observances and treaty-guaranteed natural food-gathering rights. The most ambitious option should contemplate an effective clean-up of the Hanford Site, leaving it in the approximate condition in which the military found it in 1943.

3.5.6.39

YIN Comment 9

Section 1.0--General Summary

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Page 1.13

3.4.2.8 Comment: Calculations of transportation related costs may be artificially elevated due to the selection of 3,000 miles as the distance to a repository. These calculations should be revised to reflect recent choices of repository sites for characterization.

YIN Comment 10

Section 1.0--General Summary

Page 1.13

4.2.2 Comment: The discussion of the "geologic disposal" alternative is internally inconsistent. One sentence states: "The geologic disposal alternative would dispose of most waste in deep geologic repositories and the remainder near surface at Hanford." (Emphasis added.) Three sentences later, it states: "The bulk of the waste, containing small quantitites of carbon-14, iodine-129, and other residual radionuclides, is low-level waste and would be made into a cement-based grount and disposed of near surface on the Hanford Site." (Emphasis added.) Both of these statements cannot be correct.

YIN Comment 11

Section 1.0--General Summary

Page 1.14

3.5.6.6 Comment: The DEIS states that, "The waste is at an elevation that would not be reached by any reasonably postulated surface flood." The flood potential from Cold Creek does exist. Additionally, since near surface disposal is permanent, future flood protection relies on the continued maintenance of existing dams. It is reasonable to postulate that during the hazardous lifetime of the wastes upstream dams may fail due to lack of maintenance, natural calamity, or war. Also another glacially-related flood is certainly possible within the period of interest. DOE is reminded this site was flooded during the last ice age and significant topological modification to the geology resulted. An eight foot soil barrier may be insignificant when faced with this type of flood recurrence.

YIN Comment 12

Section 1.0--General Summary

Page 1.14

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3.5.6.2 Comment: The statement that "little or no water is available to infiltrate waste sites and move the waste materials" is contrary to DOE's own published research findings. The on-site data suggest significant amounts of water can drain through arid sites where soils are coarse textured and precipitation occurs during fall and winter months, as is the case at Hanford.

Reference:

Gee, G.W. and R.R. Kirkham, 1984, "Transport Assessment - Arid: Measurement and Prediction of Water Movement Below the Root Zone," in Proceedings of the Sixth Annual Participants Informational Meeting, DOE Low Level Waste Management Program, CONE-8409115. National Low Level Radioactive Waste Management Program, Idaho Falls, Idaho.

YIN Comment 13

Section 1.0--General Summary

Page 1.14

3.5.3.9 Comment: While the waste is located above the water table, this is no guarantee that contamination will not be transmitted to the water table aquifer. One need only look at the current contamination problems at Hanford to realize that the unsaturated zone does not provide adequate protection from contaminant migration.

YIN Comment 14

Section 1.0--General Summary

Page 1.14

3.5.1.30 Comment: Archaeologists have typically looked for mounds as sites for investigation. Specific examples are Indian burial mounds. Thus, mounded burial sites may attract intruders, as has been historically the case.

YIN Comment 15

Section 1.0--General Summary

Page(s) 1.23

2.4.1.6 Comments: The DEIS states: "The reference alternative has intermediate costs, low releases and exposures, and accords with the current policy of disposing of all new and readily retriev-

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able defense wastes in a geologic repository." This statement of "current policy" is correct insofar as it reflects the legal requirement for repository disposal of defense high-level wastes, but it is quite misleading in its suggestion that that requirement applies only to "new and readily retrievable" wastes. DOE has yet to point to the slightest legal authority for a policy of disposing of defense HLW other than in a repository. 2.4.1.6

CHAPTER 2

YIN Comment 16

Section 2.0--Purpose and Need

Page 2.2

Comment: A major premise of DOE's plan to leave most of the single-shell tank wastes in place is that those wastes are "not readily retrievable, i.e., pumpable." However, the DEIS provides no support for this fundamental assumption in its analysis, other than to allege that reliquifying those wastes would cause additional leakage. As this allegation is the cornerstone of DOE's rationale for leaving high-level wastes just below the ground surface, it must be rigorously demonstrated that there is no technological means of removing those wastes from the tanks other than by the expensive and difficult mechanical means discussed here. DOE has not even attempted to show why there is no means to make the single-shell tank wastes into a slurry and pump them out without causing substantial additional leakage into the soil. Even if some additional soil contamination is unavoidable, DOE has not made the case that soil so contaminated is unusually difficult or expensive to remove and dispose of safely. 3.3.2.5

When deep geologic disposal is the accepted national policy for high-level radioactive wastes, DOE cannot hope to justify this vastly less protective scheme for comparably hazardous defense wastes on the basis of unsupported allegations about the difficulty and expense of comparable treatment. Rather than simply assuming that the expense and difficulty of removing those wastes for repository disposal would be too great, DOE should be undertaking comprehensive analyses to determine whether the technological means exist to do so. 2.2.14

YIN Comment 17

Section 2.0--Purpose and Need

Page(s) 2.3

Comments: The DEIS states: "The DOE may decide to proceed with implementing certain parts of the strategy while delaying final decision on other parts pending further research and development." DOE should make it explicit that there will be additional public participation in this delayed decision-making process. As research reveals new facts concerning optimum waste disposal strategies, the public and scientific community should be allowed the opportunity to interact with the DOE. 3.3.5.3

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YIN Comment 18

Section 2.0--Purpose and Need

Page 2.3

2.3.1.13 Comment: The DEIS states disposal of low-level DOE wastes are outside the scope of the investigation. This omission is not acceptable since generation and disposal of vast quantities of additional low-level waste is a very large part of each of the alternatives considered in this document. Many of these low-level wastes are to be disposed of as relatively unstable waste forms and will therefore be susceptible to leaching of radionuclides, and potentially large environmental impacts.

2.3.1.13 It should be obvious that DOE may not exclude from consideration in this EIS the necessary consequences of the actions it proposes to take. An analogous situation would be an EIS for a proposed hazardous waste incinerator which declared that the solid waste output from the incinerator was outside the scope of the EIS. Since extensive fractionation of wastes and generation of new low-level wastes are necessary components of all the options DOE considers, the environmental consequences resulting from those low-level wastes must be discussed in this EIS.

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CHAPTER 3

YIN Comment 19

Section 3.0--Description and Comparison of Alternatives

Page 3.1

3.5.3.2 Comment: The impacts generated are highly sensitive to the amount of water recharged into the system. This quantity is currently unknown at Hanford. DOE has based its entire consequence analysis on a range of flux that covers only one order of magnitude. Given the importance of this parameter, consequences should have been calculated on wide ranges of flux-- ranges covering more than an order of magnitude (possibly up to 15-20 cm/yr).

YIN Comment 20

Section 3.1--Background of Waste Generation

Page(s) 3.2

3.1.7.6 Comments: The DEIS does not take into account proposed changes in plutonium and uranium processing and waste treatments. One
3.2.3.5 such proposed change is the Process Facility Modifications to the PUREX Plant. This front-end modification could potentially alter the environmental impacts of the PUREX Plant. Therefore, mention of proposed changes to processing procedures should be made in the DEIS.

References:

DOE, April 1986, Draft Environmental Impact Statement: Process Facility Modifications Project, Hanford Site, Richland, Washington, DOE/EIS-0115 D, Richland, WA.

YIN Comment 21

Section 3.1.4--PUREX Process (A Plant)

Page(s) 3.3

3.1.7.2 Comments: The DEIS states: "The PUREX Plant was built between April 1953 and October 1955 and then operated until 1972. It began operating again in November 1983, and is expected to continue operating until the year 1996." The Draft Environmental Impact Statement for the Process Facility Modifications to the PUREX Plant, however, is based on a 20-year operating lifetime for the PFM/PUREX Plant, with a start-up date in 1993. This

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would mean an operating lifetime for the PUREX Plant that would last until 2013. This large discrepancy in the assumed final date for PUREX Plant operation is unacceptable. The Draft Environmental Impact Statement for the Process Facility Modifications Project and the Draft Environmental Impact Statement for the Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes were released within 2 months of each other and should be consistent. The Draft Environmental Impact Statement for Hanford Wastes should adequately address the predicted lifetime of the PUREX Plant and any proposals to prolong its lifetime. 3.1.7.2

References:

DOE, 1986, Draft Environmental Impact Statement: Process Facilities Modifications Project, Hanford Site, Richland, Washington, DOE/EIS-0115 D, Richland, WA.

YIN Comment 22

Section 3.2--Waste Classes, Sites and Inventories

Page 3.5

Comment: The locations of the different types of wastes are not adequately described/delineated in the DEIS. A comprehensive map of exactly where the subject wastes are located should be included in the DEIS. This map should have insets for those areas that need detail. This map could be comprised of several maps, each with an appropriate scale to adequately locate the particular waste units (i.e. tanks, cribs, etc.). These maps should be in sequence and adequately cross-referenced. 3.1.1.3

YIN Comment 23

Section 3.2.1--Existing Tank Waste

Page Number(s): 3.5-3.6

Comments: The DEIS states that there are fourteen double-shell tanks used to contain waste. This figure contradicts a 1983 EPA Site Visit Report which stated that a total of 11 million gallons were kept in eighteen double-shell tanks. Considering that the PUREX Plant has been operating since 1983 and generating additional liquid wastes, one would expect that more than eighteen tanks would be in use today. The DEIS should resolve this discrepancy. 3.1.4.22

References:

EPA, 1983, Site Visit and Briefing on Waste Disposal Activities at Department of Energy (DOE) Hanford Washington Facility, October 18-19, 1983, R-82-3, II-E-10, Environmental Protection Agency, Washington D.C.

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YIN Comment 24

Section 3.2.1--Existing Tank Waste

Page(s) 3.5

Comment: The occurrence of fractionation and mixing in single-shell tanks may lead to difficulties in identifying existing inventories in tanks. The DEIS states: "Because of fractionation and mixing, neither the single-shell nor the double-shell tanks contain waste typical of HLW as initially produced by the PUREX plant." Identification of the HLW contained in tanks is crucial to assess the potential environmental impacts for each proposed alternative. Impacts related to worker and public health concerns cannot adequately be determined without accurate identification of inventories stored in tanks. 3.1.1.8

YIN Comment 25

Section 3.2.1--Existing Tank Waste

Page(s) 3.5

Comments: The DEIS discusses efforts to remove moisture from the tanks and states that "The need for drying of the residual solids is being considered as part of disposal operations." Such drying operations, although they may enhance the ease of disposal, should be viewed with great caution. Due to the presence of organic compounds and certain inorganic salts in the tanks, failure to maintain an aqueous, alkaline environment with temperatures under 300 degress Celsius could lead to the formation of a hazardous, explosive substance by the nitration or nitroesterification of organic compounds. This is potentially an extremely hazardous situation. Although sufficient moisture may be contained in the salt cake to prevent the occurrence of explosion, the DEIS should address this issue and provide evidence demonstrating that the potential for explosion is minimal. 3.1.4.32

References:

Martin, E.C., 1985, Complexant Stability Investigation Task 2 - Organic Complexants, PNL-5453, Pacific Northwest Laboratories, Richland, WA.

YIN Comment 26

Section 3.2.1--Existing Tank Waste

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Page(s) 3.6

3.1.4.1 Comments: The DEIS lists the quantities of TRU wastes and fission products contained in each particular waste class. No data concerning the physical characteristics of these wastes or concentrations of radionuclides within these wastes are given. Such information is crucial for assessing the hazards of different waste classes, and should be included in this section of the DEIS.

Also, no data concerning the types, physical characteristics, and quantities of potentially hazardous nonradioactive wastes in particular waste classes have been provided in this section. There are a number of hazardous inorganic substances such as lead, mercury, and cadmium in the wastes (Martin, 1985). These exist in large quantities.

3.1.4.32 Another danger is the potential for explosions within the tanks. Nitrate salts could react with the organic compounds in the wastes to form explosive substances. There are over 160,000 tons of nitrate compounds in the tanks (RHO, 1980). Organic compounds occur in the tanks as a result of different processing procedures. It has been estimated that there are 70 tons of organic carbon in the interstitial liquid of single-shell tanks (RHO, 1980), 220-550 tons of organic carbon in double-shell tank slurry and an additional 800-1100 tons of organic carbon in the complex concentrates in double-shell tanks (DOE, 1980). Although to date these wastes have been stable, it is not clear what hazards may exist as a result of mixing caused by retrieval procedures.

3.1.4.1 The DOE should provide the most complete characterization possible of the contents of existing tanks to ensure the safety of retrieval operations.

References:

DOE, 1980, Final Environmental Impact Statement, Waste Management Operations, Hanford Site Double-Shell Tanks for Defense High-Level Radioactive Waste Storage, DOE/EIS-0063, U.S. Department of Energy, Richland, WA.

ERDA, 1975, Final Environmental Statement (December) ERDA-1538, Waste Management Operations, Hanford Reservation, Vol. 2, Energy Research and Development Administration, Richland, WA.

Martin, E.C., 1985, Complexant Stability Investigation Task 2 - Organic Complexants, PNL-5453, Pacific Northwest Laboratory, Richland, WA.

RHO, 1980, Technical Aspects of Long-Term Management Alternatives for High-Level Defense Waste at the Hanford Site, RHO-LD-141, Rockwell Hanford Operations, Richland, WA.

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YIN Comment 27

Section 3.2.3--Strontium and Cesium Capsules

Page(s) 3.8

Comments: In the past, the DOE has separated strontium and cesium from wastes to reduce heat generation in the tanks. The DEIS, however states that there are no plans at present to separate strontium or cesium from future Purex wastes and that, in the case of in-place stabilization and disposal, only cesium would be removed from future wastes. The rationale for such an action is not explained in the DEIS. 3.1.2.3

It is not clear why the high temperatures induced by strontium and cesium would be any less of a problem in the future. It is likely that current storage practices will continue for a number of years, regardless of the alternative chosen, until the necessary research is completed. In this interim period of time, it is important that safe storage be achieved. An increase in tank storage temperatures to above 300 degrees Celsius would result in extremely hazardous, potentially explosive reactions of waste components (Martin, 1985). Also, the effects of high temperatures on tank performance are not known. The DEIS should address this issue in light of the possibility that current methods of storage may continue for some time. 3.1.2.3

Also, the DEIS fails to justify why the removal of only cesium, under the in-place stabilization alternative, would be sufficient to keep temperatures within the tanks at safe levels. The DEIS should provide calculations of the tank temperatures for both the no disposal and in-place stabilization alternatives in light of the cessation of cesium and strontium byproduct removal. The effects of temperature on tank performance should be discussed and subsequent actions justified. 3.1.2.3

References:

Martin, E.C., 1985, Complexant Stability Investigation Task 2- Organic Complexants, PNL-5453, Pacific Northwest Laboratory, Richland, WA.

YIN Comment 28

Section 3.2.4--Retrievably Stored and Newly Generated TRU Solid Waste

Page(s) 3.8

Comment: The classification for segregation and storage of TRU solid waste was established as 10 nCi TRU/g in 1973. However, 2.4.1.8

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2.4.1.8 that classification was changed to 100 nCi TRU/g in 1984. The justification for the new, less stringent classification should be presented in the DEIS.

YIN Comment 29

Sections 3.2.5--TRU-Contaminated Soil Sites
3.2.6--Pre-1970 TRU Buried Solid Waste

Page(s) 3.9

Comment: The definition for TRU-contaminated soil and buried waste is unclear. It was noted in an earlier comment that the criteria to judge TRU waste has been changed from 10 nCi TRU/g to 2.4.1.8 100 nCi TRU/g for solid waste; however, it is unclear whether the criteria has also been changed for TRU-contaminated soil and buried solid wastes.

Furthermore, TRU-wastes in the above noted categories are "...considered to have been disposed of but are being reviewed to determine whether further action is warranted in terms of environmental protection." Due to the paucity of record keeping in 2.4.1.8 terms of waste disposal activities, it would be imprudent to give these sites a lesser priority than other waste classes in regards to permanent disposal.

YIN Comment 30

Section 3.2.5--TRU-Contaminated Soil Sites

Page(s) 3.9

Comment: The DEIS does not provide sufficient information to allow assessment of the classification of TRU-contaminated soil sites. For example, it is stated that the definition of a TRU-contaminated soil site is based on characterization data that 3.1.3.9 shows the TRU concentration to decrease rapidly with increasing depth. It is not clear what is meant by "characterization data" or how quantitative these data are. The definition for TRU-contaminated soil sites should be clarified.

YIN Comment 31

Section 3.2.5--TRU Contaminated Soil Sites

Page 3.9

3.1.4.26 Comment: The DEIS states the TRU contaminated soils are "being reviewed in this EIS to determine whether further action is warranted in terms of environmental protection." Sketchy data and

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no evaluation is given here or in Appendix A (Waste Site Descriptions & Inventories) regarding the long-term migration of the radionuclides and accompanying chemical wastes. Soil porosities, soil chemistry, retardation factors and adsorption properties of 3.1.4.26 the soil/radionuclide interactions should all be included as basic data. A remedial investigation should be performed to delineate present and potential migration. Only in this way can a proper judgment be made whether to clean-up these sites or leave them and consider them "disposed of" (p. 3.9).

YIN Comment 32

Section 3.2.6--Pre-1970 TRU Buried Solid Waste

Page 3.9

Comment: Some of the waste forms of the Pre-1970 TRU Buried Solid Wastes are not stable and will likely fail over the long term. The alternatives proposed for preventing failure and subsidence of the overlying material include injecting grout (in-place and reference alternatives) or backfilling and covering (geologic alternative). The reliability of the grouting method 3.1.3.11 is not demonstrated in the DEIS. It is not apparent that the grouting will effectively fill void space (crucial to stabilizing the waste in terms of subsidence) within the cardboard boxes, steel drums, or some of the other unspecified containers. If these interior void spaces are not filled, the drums, boxes, and other containers will most likely fail, promoting subsidence of the overlying material.

YIN Comment 33

Section 3.2.6--Pre-1970 TRU Buried Solid Waste

Page 3.9-3.10

Comment: As commented in section 3.2.5, the TRU Buried Solid Wastes should also undergo a remedial investigation to determine present and future ground water contamination. The DEIS states these sites are "being reviewed to determine whether further action is warranted in terms of environmental protection." The 3.1.4.26 DEIS should explain the specifics of this review and what criteria are used to "warrant" environmental protection.

YIN Comment 34

Section 3.3--Disposal or Management Alternatives

Page(s) 3.11

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3.5.1.36

Comment: The DEIS indicates that riprap-filled trenches will control intrusion by burrowing animals. Animals indigenous to this area may burrow under such a trench and may, in fact, be attracted to the site because the riprap would offer support and protection for their underground dwellings.

Furthermore, the 1.5-m-thick layer of fine-textured soil that will cover the trench can be burrowed into by animals such as those described above (Cline et al., 1980). These burrows would then provide conduits for infiltrating water to enter the underlying riprap, which will offer little resistance to infiltration.

References:

Cline, J.F., K.A. Gano, and L.E. Roger, 1980, "Loose Rock as Biobarriers in Shallow Land Burial," Health Physics, Vol. 39, pp. 497-504.

YIN Comment 35

Section 3.3.1--The Geologic Disposal Alternative

Page 3.12

3.3.1.4

Comment: In discussing Disposal or Management Alternatives, it is stated that the objective of the geologic disposal alternative is to retrieve and process most of the waste within the scope of the DEIS, to package some, and transport it for disposal either in an onsite or offsite deep geologic repository for high-level waste or in the WIPP site for transuranic (TRU) waste. The postulated onsite repository would be a mined basalt cavern about 900 m beneath the site. In a technical review of the radionuclide wastes at Hanford, the National Research Council of the National Academy of Sciences (1978) recommended that the possibilities for onsite waste isolation be studied. The council discussed two alternative methods for the study: (1) a vault system in basalt under the 200 Area, and (2) a vault system in basalt in the Rattlesnake Hills. The first alternative is the one considered in the DEIS. The second would consist of a system of vaults at the end of a tunnel into the Rattlesnake Hills, the system being above, rather than below, the regional water table (National Research Council, National Academy of Sciences, 1978, p. 108-110). If this alternative disposal or waste management method was ever investigated, it should have been discussed in the DEIS, including a detailed comparison with the deep geologic repository scheme that was selected.

References:

National Research Council, National Academy of Sciences, 1978. Radioactive Wastes at the Hanford Reservation: A Technical Review. Washington, D.C.

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YIN Comment 36

Section 3.3.1--The Geologic Disposal Alternative

Page(s) 3.12

3.3.1.9

Comment: The DEIS states that essentially all (98% by activity) of the high-activity/low-volume and TRU wastes (to the extent practicable) will be removed and stored in repositories. However, the DEIS does not clearly define what is meant by the terminology "to the extent practicable" and what possible constraints (i.e., worker safety, economics) will be considered. Furthermore, it is unclear which agencies (i.e., DOE, EPA, NRC) will define the extent to which TRU and high-level wastes will be removed.

YIN Comment 37

Section 3.3.1.1--Geologic Disposal of Existing Tank Waste

Page(s) 3.13

3.1.1.11

Comment: The DEIS states that, in the "geologic disposal" alternative, "The tanks and their residual contents would be disposed of in place by filling with crushed rock, sand, soil, or a grout containing the decontaminated salt, and covered with a protective barrier." The DEIS does not cite or refer to any analysis showing that the tanks and their residual contents are not high-level waste, requiring geologic disposal. The alternatives considered would more adequately bound the possibilities if the most ambitious one, the "geologic disposal" alternative, contemplated a more genuine clean-up of the site. If further analysis shows that the site cannot provide sufficient isolation, complete removal of all significant contamination may be necessary.

YIN Comment 38

Section 3.3.1.1--Geologic Disposal of Existing Tank Waste

Page(s) 3.13

3.1.4.21

Comment: The DEIS implies that only waste retrieved from double-shell tanks would be treated, as required, to destroy organic compounds. It is not specified whether waste retrieved from single-shell tanks would be treated to destroy organic compounds. A discussion should be presented to explain the rationale for differing treatments of wastes from one type of tank as opposed to another type of tank.

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YIN Comment 39

Section 3.3.1.1--Geologic Disposal of Existing Tank Waste

Page 3.13

3.1.4.31 Comment: The DEIS states that the contents of single shell tanks (metal compounds) reduces the efficiency of waste loading in borosilicate glass. However, there is no justification for this statement nor are any references listed. The DEIS should state the specifics regarding quantification of "reduced" efficiency and costs involved.

YIN Comment 40

Section 3.3.1.1--Geologic Disposal of Existing Tank Waste

Page(s) 3.13

3.1.4.21 Comment: The DEIS states that double-shell tank waste will be treated as required to destroy organic compounds, but does not give any indication of the treatment method. It is, therefore, impossible to assess the efficiency of organic complexant removal from the waste. It is unlikely that any treatment method would be capable of removing 100% of the organic component from the wastes. The importance of removing the maximum possible amount of complexants using the best available technology should be emphasized.

Hanford wastes contain large quantities of these organic compounds from various processing techniques. Allen (1976) estimates that between 1944 and 1975 over 160,000 kg EDTA and 750,000 kg HEDTA, two strong complexants, were discharged with Hanford tank wastes. EDTA can complex cobalt-60, plutonium, and uranium and is known to be extremely persistent in the natural environment (Means, 1978). EDTA and similar complexants have

3.1.4.21 been observed to enhance radionuclide migration at concentrations as low as 10-6 M and less. Thus, it is essential that the method of organic complexant removal is assessed to ensure the safety of high-level waste in the geologic repository or stabilized in-place in near-surface trenches.

References:

Allen, G.K., 1976, Estimated Inventory of Chemicals Added to Underground Waste Tanks, 1944-1975, ARH-CD-6108, Atlantic Richfield Company, Richland, WA.

Martin, E.C., 1985, Complexant Stability Investigation Task 2 - Organic Complexants, PNL-5453, Pacific Northwest Laboratory, Richland, WA.

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Means, J.L., D.A. Crerar, and J.O. Duguid, 1978, "Migration of Radioactive Wastes: Radionuclide Mobilization by Complexing Agents," Science, June 30, 1978, Vol. 200, pp. 1477-1481.

YIN Comment 41

Section 3.3.1.1--Geologic Disposal of Existing Tank Waste

Page(s) 3.13

Comment: The DEIS claims that borosilicate glass provides a waste form with properties of low dispersibility, low leachability, and relatively high thermal stability. Although 3.1.8.11
borosilicate glass has been chosen by the DOE as the waste form to solidify liquid wastes, it has not been conclusively shown to be the best possible form (U.S. House of Representatives, 1984). Further studies that evaluate the leachability, stability, and waste loading should be performed and referenced to fully assess possible environmental impacts.

For example, the DEIS states that insoluble metal compounds in single-shell tank waste reduce efficiency of waste loading. Therefore, these wastes will not be solidified in the reference alternative, but will be solidified in the geologic alternative. Additional detail is necessary to assess the effects upon waste isolation that these insoluble metal compounds will have in the geologic alternative. A brief description should be supplied to explain what will be done with these compounds in the reference alternative.

References:

U.S. House of Representatives, 1984, Achieving Performance Objectives for the Engineered Barrier System, Subcommittee on Energy Conservation and Power of the Committee on Energy and Commerce, 98th Congress, 2nd Session, Washington, D.C.

YIN Comment 42

Section 3.3.1.1--Geologic Disposal of Existing Tank Waste

Page(s) 3.15

Comment: The DEIS states that, under the geologic disposal alternative, residual tank waste and tanks themselves would be disposed of in-place. The DEIS projects that this residual waste 3.1.4.1
will be less than 5% of the initial inventory of single-shell tanks and less than 0.5% of the initial inventory of double-shell 3.1.4.8
tanks. Specific amounts of radionuclides or radioactivity remaining in residual wastes and tanks have not been discussed in

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the DEIS; thus, it is unclear whether this policy of in-place stabilization of tanks is consistent with TRU and HLW waste disposal policies and existing law.

Considering the huge quantities of defense high-level waste stored in Hanford tanks (according to 1983 EPA figures, 488,600 gallons of waste in single-shell tanks and 11 million gallons in double-shell tanks), even small percentages of these volumes would result in large amounts of highly toxic waste. Conceivably, there may be residual wastes or tanks that have radioactivity exceeding the definition of a TRU solid waste site: 100 nCi/g. Plans to test residual waste and tanks should be formulated by the DOE. Consistent disposal measures should be implemented for both tanks/residual wastes and TRU solid waste sites.

3.1.4.1

3.1.4.8

References:

EPA, 1983, Site Visit and Briefing on Waste Disposal Activities at Department of Energy (DOE) Hanford Washington Facility, October 18-19, 1983, R-82-3, II-E-10, Washington, D.C.

YIN Comment 43

Section 3.3.1.1--Geologic Disposal of Existing Tank Waste

Page(s) 3.15

Comment: The DEIS states: "Contaminated soil around and under tanks resulting from tank leaks in the past (ERDA, 1975) would be left in place. The residues from leaks are a small fraction of the 5% residual waste in single-shell tanks (ERDA 1975 Sections II.1.1.4.5 and III.2.2.2), and do not contain sufficient TRU to qualify as TRU-contaminated soil sites as defined in Section 3.2.5." The DEIS cannot adequately characterize the potential hazards of contaminated soil from tank leaks based upon dated, unreliable information and failure to consider the effects of various tank waste components.

3.1.4.26

The DEIS, by only referencing a 1975 ERDA report, does not appear to be using up-to-date information concerning tank leaks at the Hanford Site. In 1975, there were eighteen tank leaks, releasing 500,000 gallons of waste to the soil (McIntosh, 1984). By 1983, twenty-seven of the single-shell tanks were leaking (EPA, 1983), with an additional thirty-one tanks suspected as having questionable integrity (Murthy, 1983). Although it is essential that the most current information be used, it is not certain that using this information regarding tank leaks will lead to adequate characterization due to the unreliability of tank leak assessment methods. For a majority of the single-shell tanks, the leak detection system consists of a manual tank liquid level measurer and a number of dry wells surrounding the tank. In many cases, the liquid level measurer has failed due to

3.1.4.26

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encrusted salt cake. It is possible that as much as 117,000 gallons of waste could escape from a tank before the leak is detected (Isaacson, 1981). The largest known tank leak to date was 115,000 gallons from the 241-T-105 tank (Murthy, 1983). Thus, the DOE cannot reliably determine whether soil contaminated from tank leaks can be classified as TRU-contaminated soil sites until further testing is conducted.

In addition, the chemical components in high-level waste tanks are not typical of TRU-contaminated soil sites and should be judged by different criteria. These tanks contain organic complexants that could enhance the migration of certain radionuclides. For example, the tanks in the BX farm hold First Cycle Bismuth Phosphate Process wastes which contain tributyl phosphate (Jungfleisch, 1980). A number of tanks from this farm have been noted as leakers (102BX, 108BX) or as having questionable integrity (111BX) (EPA, 1983). In the presence of tributyl phosphate, radionuclides can travel distances exceeding 10 feet in only twenty years (Makhijani, 1985). Instances of plutonium migration have already been noted on the Hanford Site (Price, 1976). As a result, assessing soil contaminated by tank waste solely by TRU concentrations may not be legitimate.

3.1.4.26

References:

EPA, 1983, Site Visit and Briefing on Waste Disposal Activities at Department of Energy (DOE) Hanford, Washington Facility, October 18-19, 1983, R-82-3, II-E-10, Washington, D.C.

ERDA, 1975, Final Environmental Impact Statement on Waste Management Operations, Hanford Reservation, 2 vols., Energy Research and Development Administration, ERDA-1538, Washington, D.C.

Isaacson, R.E., and K.A. Gasper, 1981, A Scientific Basis for Establishing Dry Well Monitoring Frequencies, RHO-ST-34, Rockwell Hanford Operations, Richland, WA.

Jungfleisch, F.M., 1980, Hanford High-level Defense Waste Characterization, A Status Report, RHO-CD-1019, Rockwell Hanford Operations, Richland, WA.

Makhijani, A., and K.M. Tucker, 1985, Heat, High Water, and Rock Instability at Hanford, Health and Energy Institute, Washington, D.C.

McIntosh, W.W., 1984, Radioactive Waste Disposal History and Current Status, Nuclear Waste Information Report, Washington Institute for Public Policy, Olympia, WA.

Murthy, K.S., L.A. Stout, B.A. Napier, A.E. Reisenauer and D.K. Landstrom, 1983, Assessment of Single-Shell Tank Residual Liquid Issues at Hanford Site, Washington, PNL-4688, Pacific Northwest Laboratory, Richland, WA.

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Price, S.M., and L.L. Ames, 1976, Transuranium Nuclides in the Environment, International Atomic Energy Agency, Vienna, Austria.

YIN Comment 44

Section 3.3.1.2--Geologic Disposal of Future Tank Waste

Page(s) 3.15

3.5.5.15 Comment: The DEIS does not provide adequate data to assess the long-term effects of carbon-14 and iodine-129. Carbon-14 and iodine-129 would not be separated from the liquid phase, but would be converted into grout and disposed of in shallow trenches. Since iodine-129 has an overall hazard ranking of two (Barney and Wood, 1980), it is crucial that every precaution be taken to permanently isolate this radionuclide from the biosphere. Therefore, the DEIS should demonstrate that the conversion of liquid wastes containing iodine-129 into grout will provide a long-term solution. Studies should be included that evaluate the long-term stability of grout disposed of in shallow trenches.

References:

Barney, G.S., and B.J. Wood, 1980, Identification of Key Radionuclides in a Nuclear Repository in Basalt, RHO-BWI-ST-9, Rockwell Hanford Operations, Richland, WA.

YIN Comment 45

Section 3.3.2--In-Place Stabilization and Disposal

Page 3.19

2.4.1.6 Comment: As noted in our Major Comments, DOE does not legally have the option to "permanently dispose" of high-level defense wastes other than in a repository. Therefore, this option is not one which the agency may seriously consider.

YIN Comment 46

Section 3.3.2--In-Place Stabilization and Disposal

Page(s) 3.19

3.1.4.21 Comment: The DEIS states that there will be very little processing or treatment of wastes kept in single-shell tanks. This would mean that organic complexants existing in the wastes would be left in the tanks. Organic complexants can greatly enhance

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the migration of certain radionuclides (Means, 1978). Many single-shell tanks are known to be leaking waste into the surrounding soil (EPA, 1983) and it is likely that additional leaks will develop in the future. 3.1.4.21

References:

EPA, 1983, Site Visit and Briefing on Waste Disposal Activities at Department of Energy (DOE) Hanford Washington Facility, October 18-19, 1983, R-82-3, II-E-10, Washington, D.C.

Means, J.L., D.A. Crerar, and J.O. Duguid, 1978, "Migration of Radioactive Wastes: Radionuclide Mobilization by Complexing Agents," Science, June 30, 1978, Vol. 200, pp. 1477-1481.

YIN Comment 47

Section 3.3.2.1--In-Place Stabilization and Disposal of Existing Tank Waste

Page 3.20

2.4.1.6 Comment: As noted in our Major Comments, DOE does not legally have the option to "permanently dispose" of high-level defense wastes other than in a repository. Therefore, this option is not one which the agency may seriously consider.

YIN Comment 48

Section 3.3.2.1--In-Place Stabilization and Disposal of Existing Tank Waste

Page(s) 3.20

3.1.4.21 Comment: The DEIS states that residual liquor and other liquid waste from double-shell tanks would be retrieved and treated if required to destroy organic compounds. The DEIS should provide additional information concerning the basis for determining if treatment is required and the methodology for such treatment. Also, the rationale for treating double-shell tanks to remove organic complexants, but not single-shell tanks, should be explained.

YIN Comment 49

Section 3.3.2.1--In-Place Stabilization and Disposal of Existing Tank Waste

Page(s) 3.21

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3.1.4.23 Comment: The DEIS should explain the basis for providing only twelve tanks with passive heat pipes to disperse heat generated by radioactive decay.

YIN Comment 50

Section 3.3.2.1--In-Place Stabilization and Disposal of Existing Tank Waste

Page(s) 3.21

3.1.8.5 Comment: It is not clear that grout will provide a long-term barrier for contaminants from the accessible environment. The DEIS states that all pipes and other entries to tanks (except heat pipes and some inaccessible horizontal connections between tanks) would be filled with nonradioactive grout or other material, isolating the tanks and their contents from external liquids. The purpose of the grout would appear to be twofold: to retard contaminants from reaching the biosphere and to impede liquids from coming into contact with the waste. However, questions arise as to the ability of the grout to achieve both of these requirements. For example, what is the long-term stability of the grout, especially when subjected to high temperatures, and how easily is the waste incorporated into the structure of the grout?

It is also noted that "inaccessible horizontal connections between tanks" will not be filled with grout. Since these connections are probably contaminated, it is imprudent to leave them untreated. 3.1.8.5

YIN Comment 51

Section 3.3.2.2--In-Place Stabilization and Disposal of Future Tank Waste

Page 3.21

2.4.1.6 Comment: As noted in our Major Comments, DOE does not legally have the option to "permanently dispose" of high-level defense wastes other than in a repository. Even if the agency could legally choose such an option for wastes which are not "readily retrievable"--which it cannot--it certainly could not choose such an option for "readily retrievable" or future HLW. If DOE need not dispose of such wastes in a repository, then there is no requirement for repository disposal of any defense wastes at all. Even the most cursory reading of the NWPA and the Energy Reorganization Act of 1974 reveals the absurdity of this proposition. Therefore, this option is not one which the agency may seriously consider.

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YIN Comment 52

Section 3.3.2.3--In-Place Stabilization and Disposal of Strontium and Cesium Capsules

Page 3.23

2.4.1.6 Comment: As noted in our Major Comments, DOE does not legally have the option to "permanently dispose" of high-level defense wastes other than in a repository. Therefore, this option is not one which the agency may seriously consider.

YIN Comment 53

Section 3.3.2.3--In-Place Stabilization and Disposal of Strontium and Cesium Capsules

Page 3.23

3.1.2.1 Comment: This section discusses (and references in Appendix B) potential use of drywell storage for cesium and strontium capsules. In neither section is adequate supporting discussion provided as to the technical feasibility of or legal authority for such disposal. For instance, where and how were the guidelines listed on page B.19 developed? Also, temperature, pressure, and activity monitoring are proposed. However, the DEIS does not state what type of conditions (temperature, activity levels, etc.), as indicated by the monitoring, would require mitigative measures. Nor is it stated what those measures might be. If such plans are not detailed, making arrangements for monitoring does not appear to be worthwhile.

YIN Comment 54

Section 3.3.2.4--In-Place Stabilization and Disposal of Retrievably Stored and Newly Generated TRU Solid Waste

Page 3.23

3.1.3.12 Comment: The DEIS proposes pile-driving as a measure to adequately stabilize TRU burial grounds with significant potential for subsidence. However, there is no support provided in this section or in Appendix B for the proposition that this method will be successful. Inasmuch as avoiding subsidence is crucial to preventing infiltration of precipitation into the waste, this technique of waste stabilization should be demonstrated as being reliable. Furthermore, the DEIS does not state under what criteria or circumstances a particular waste would be considered to have "significant potential for subsidence." These criteria

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should be developed prior to consideration of this stabilization method.

YIN Comment 55

Section 3.3.2.4--In-Place Stabilization and Disposal of Retrievably Stored and Newly Generated TRU Solid Waste

Page(s) 3.23

3.1.3.12 Comment: The methodology to control subsidence of TRU solid waste is questionable. The DEIS states that "suspected" TRU solid waste burial grounds would be stabilized as required to control or correct potential subsidence. One potential method for stabilization would use a vibratory hammer. Although use of a vibratory hammer may control subsidence, it is not certain that this method will prove to be safe. The hammer may rupture or damage buried drums and containers and allow waste to escape, especially since the exact locations of the sites are not known (i.e., "suspected" sites). In addition, it is noted in the DEIS that contaminated rods, used during stabilization, would merely be redriven for in-place disposal without any safety precautions. It would appear that use of a vibratory hammer to control subsidence may be imprudent.

YIN Comment 56

Section 3.3.3--Reference Alternative

Page 3.24

2.4.1.6 Comment: As noted in our Major Comments, DOE does not legally have the option to "permanently dispose" of high-level defense wastes other than in a repository. A key aspect of this option is to "stabilize" the majority of Hanford HLW, which resides in single-shell tanks, in place just a few feet below the ground surface. Therefore, this option is not one which the agency may seriously consider.

YIN Comment 57

Section 3.3.3--Reference Alternative

Page(s) 3.24

4.1.12 Comment: The DEIS defines the potential for dispersion as the principal basis to determine whether waste will be retrieved or not. This definition is far too vague and qualitative. In light of the vast difference in isolation strategies which DOE proposes

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to implement between commercial HLW and comparably risky Hanford defense wastes, the DEIS should provide a much more detailed and quantitative description of the rationale used to determine whether wastes are "readily retrievable."

YIN Comment 58

Section 3.3.4.1--Continued Storage of Existing Tank Waste

Page(s) 3.29

3.1.4.22 Comments: The DEIS does not discuss plans and specifications for double-shell tank construction at 50 year intervals. The continued transfer of double-shell tank waste to new tanks every 50 years would necessitate construction of new double-shell tanks at periodic intervals. This construction would prove costly and enhance the possibility of contamination to the environment. In addition, procedures to deal with the used contaminated tanks and associated residual wastes should be discussed.

A discussion pertaining to construction, transfer, monitoring, and mitigation measures should be included in this section.

YIN Comment 59

Section 3.3.4.2--Continued Storage of Future Tank Waste

Page(s) 3.30

3.1.4.23 Comment: The DEIS states that strontium and cesium will not be separated from future tank wastes. The radioactive heat would be such that circulators would be required for several decades to prevent excessive boiling of wastes. The DEIS fails to address the possible failure of these circulators or other circumstances that could lead to dangerously high temperatures in the double-shell tanks. Martin (1985) states that the possibility of explosive reactions between the organic and inorganic components of tank wastes increases with failure to maintain an alkaline, aqueous environment with temperatures below 300oC. The DEIS should discuss expected tank temperatures, and mitigative actions.

References:

Martin, E.C., 1985, Complexant Stability Investigation Task 2 - Organic Complexants, PNL-5453, Pacific Northwest Laboratory, Richland, WA.

YIN Comment 60

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Section 3.3.5--Disposal Alternatives Considered But Dismissed from Detailed Consideration

Page(s) 3.31

Comments: The DEIS does not provide sufficient information concerning the rationale for eliminating "other disposal options" from investigation. Other alternatives (e.g., seabed disposal, space disposal, deep hole disposal, ice sheet disposal, and island disposal) have been considered, analyzed, and excluded from further consideration by the DOE. The DEIS states that 27 plans have been examined and reduced to the three disposal alternatives described. The rationale for elimination of these options should be provided. 3.3.5.2

YIN Comment 61

Section 3.3.5--Disposal Alternatives Considered But Dismissed from Detailed Consideration

Page 3.32

Comment: The DEIS explains that the alternative of geologic repository disposal of entire tank contents was eliminated from detailed consideration entirely on the basis of costs and additional risk (which manifests itself as added cost). This is in sharp contrast to the same Department's treatment of cost considerations in recommending sites for characterization for the first commercial waste repository (DOE, 1986). In that analysis, cost considerations were ignored entirely in order to justify the recommendation of the Hanford Site for characterization in spite of its projected $5.45 billion disadvantage relative to all the other sites. DOE should explain why costs are so important when considering defense waste disposal options, but not important at all when considering commercial waste disposal options. Moreover, the basis for DOE's $22 billion estimate of the cost of this option is absent from the DEIS. 3.3.1.5 2.2.7

References:

DOE, 1986, Recommendation By the Secretary of Energy of Candidate Sites for Site Characterization for the First Radioactive-Waste Repository, DOE/S-0048.

YIN Comment 62

Section 3.4--Comparison of Impacts from Alternatives

Page 3.33

Comment: The analyses to assess environmental impacts do not take into consideration the contamination that has already taken 3.5.3.11

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place. (Price et al, 1985) The impacts may be more significant than any predicted impacts from the proposed disposal alternatives. Of particular importance is the existing ground water contamination. Consideration should be given to restoration of the contaminated, unconfined aquifer. 3.5.3.11

References:

Price, K.R., et al., 1985, Environmental Monitoring at Hanford for 1984, PNL-5407, UC-41-11.

YIN Comment 63

Section 3.4.1.1--Radiological Impacts from Routine Operations

Page 3.34

Comment: The DEIS states the 1990 population in the Hanford Environs would be 420,000. The DOE should provide the basis for this estimate. 4.1.15

YIN Comment 64

Section 3.4.1.1--Radiological Impacts from Routine Operations

Page 3.34

Comment: The 2,500,000 man-rem figure calculated from naturally occurring radioactive sources can be duplicated by making the following assumptions: 1) Disposal period runs from 1990 to 2050. (60 years). 2) Population estimate equals a constant over this time frame (420,000). 3) Annual dose to each person from naturally occurring sources is about 0.1 rem. This number could change drastically if population estimates are not accurate. DOE should provide justification for population estimates over time remaining constant. 3.5.5.19 4.1.15

YIN Comment 65

Section 3.4.1.6--Socioeconomics

Page 3.38

Comment: There is no mention of socioeconomic impact to the Yakima Indian Nation or other affected Indian tribes in this section. The socioeconomics section only deals with impacts to the Tri-Cities area and on tourism. Impacts on all segments of the surrounding population should be evaluated. 2.4.2.2

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YIN Comment 66

Section 3.4.1.7--Costs

Page 3.41

4.1.22 Comment: There is no documentation supporting the cost figures displayed in Table 3.6. This is a major oversight in the DEIS.

YIN Comment 67

Section 3.4.2--Comparison of Long-Term Impacts Among the Disposal Alternatives and No Disposal Action

Page 3.43

3.5.1.73 Comment: The range of average annual recharge to the system is from 0.5 cm/yr to 5 cm/yr. These rates appear to be low based on work done by Gee and Kirkham, 1984. Since precipitation at Hanford is approximately 15 cm/yr and is predominantly accumulated in the winter months as snowfall, the analyses of impacts based on these estimates should be revised to handle a larger range of recharge values.

YIN Comment 68

Section 3.4.2.1--Comparison of Long-Term Impacts of Alternatives Where Conditions Remain Unchanged

Page(s) 3.44

Comment: The DEIS compares EPA standards to calculated concentrations of chemicals in radioactive waste even though "...the standard is not applicable since Hanford groundwater is not used as a source of public drinking water". Despite this statement from the DEIS, Hanford groundwater is currently used as a drinking water source. Water from the unconfined aquifer is used for drinking purposes at the Fast Flux Test Facility (FFTF), the Patrol Training Center and the Yakima Guardhouse. Based on
3.5.3.11 estimating a limited exposure to this water, it has been calculated that Hanford workers receive a dose of 4 mrem/yr (DOE, 1986). It is certainly possible that usage of water from the unconfined aquifer may continue on the Hanford Site, and as in-
3.5.6.18 stitutional controls cease, usage of this water by the general public may ensue.

References:

DOE, 1986, Draft Environmental Impact Statement: Process Facility Modifications Project, Hanford Site, Washington, April 1986, DOE/EIS-0115 D, Richland, WA.

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YIN Comment 69

Section 3.4.2.1--Comparison of Long-Term Impacts of the Alternatives Where Conditions Remain Unchanged

Page 3.44

Comment: The DEIS references Title 40 CFR 141.11 as containing a nitrate standard for drinking water of 45 mg/l. This is incorrect as the value is 10 mg/l. It should be noted large areas of 2.4.1.16
the Hanford reservation exhibit concentrations above this standard. This is true for tritium concentrations as well. The tritium standard for drinking water is 20,000 pico-curies. Samples in Hanford ground water commonly exceed 300,000 pico- 3.5.3.23
curies. (Price et al, 1985)

Reference:

Price, K.R., and others, 1985, Environmental Monitoring at Hanford for 1984, PNL-5407, UC-41-11.

YIN Comment 70

Section 3.4.2.1--Comparison of Long-Term Impacts of the Alternatives Where Conditions Remain Unchanged

Page(s) 3.44

Comments: The DEIS does not discuss health effects related to organic complexants. It is not clear how possible health effects resulting from chemicals associated with radioactive wastes are 3.5.5.16
assessed in the DEIS.

Also, Hanford groundwater may be used for irrigation purposes, which may result in additional health hazards. Therefore, the DEIS should assess the impacts of chemicals associated with radioactive wastes in a detailed and complete manner.

YIN Comment 71

Section 3.4.2.1--Comparison of Long-Term Impacts of the Alternatives Where Conditions Remain Unchanged

Page 3.44

Comment: No supporting rationale is provided in the DEIS for selecting nitrate, cadmium, chromium, mercury, and fluoride as representative of chemicals associated with the single-shell tank 3.1.6.1
wastes at Hanford. How these constituents were selected should be documented and discussed in relation to Table U.1.

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YIN Comment 72

Section 3.4.2.2--Comparison of Long-Term Impacts of the Alternatives Where Disposal Systems are Disrupted by Postulated Natural Events

Page(s) 3.45

3.5.6.36 Comments: The DEIS does not provide a complete listing of all postulated natural events that may impact waste disposal. Future impacts from three naturally occurring events were considered in the DEIS, although the DOE claims that "numerous postulated events were reviewed." A complete listing of all possible postulated events should be included, with a brief explanation for exclusion from consideration.

YIN Comment 73

Section 3.4.2.2--Comparison of Long-Term Impacts of the Alternatives Where Disposal Systems are Disrupted by Postulated Natural Events

Page 3.45

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3.5.1.74 Comment: The second type of postulated barrier failure (functional failure) is not adequately conservative. Inasmuch as 0.1 cm/yr infiltration is only 1/300th of the assumed 30 cm/yr rainfall, this scenario represents a rather insignificant failure. It would be more appropriate to assume a larger percentage of the rainfall, perhaps 10%, infiltrates through the barrier. In light of the current uncertainty concerning quantification of recharge in arid climates, an assumption of recharge equal to say 10-30% of annual rainfall under functional barrier failure is more appropriate.

YIN Comment 74

Section 3.4.2.2--Comparison of Long-Term Impacts of the Alternatives Where Disposal Systems are Disrupted by Postulated Natural Events

Page 3.46

3.5.3.3 Comment: Other than for the no-action alternative or when there is barrier failure, it is not clear what insight is gained by varying the amount of recharge when it is assumed that the barrier completely prevents any infiltration from contacting the waste.

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YIN Comment 75

Section 3.4.2.2--Comparison of Long-Term Impacts of the Alternatives Where Disposal Systems are Disrupted by Postulated Natural Events

Page 3.48

Comment: The climate change scenario is neither realistic nor conservative. If glacial floods excavate stored wastes, some of the waste would conceivably be carried through Wallula Gap. To assume all contamination would be reworked in the Pasco Basin is not realistic. The assumption that all the waste would be reworked in the upper four meters in the 6x13 km disposal area is also not a conservative assumption. This scenario should expect waste to be distributed over the Tri-Cities areas as well as down stream. Impacts may be greater under these assumptions rather than isolating the waste in the 200 area plateau. 3.5.6.8

YIN Comment 76

Section 3.4.2.2--Comparison of Long-Term Impacts of the Alternatives Where Disposal Systems are Disrupted by Postulated Natural Events

Page 3.49

Comment: It is not clear why the analysis of chemical contaminant migration was not performed under the scenario(s) of barrier failure (i.e. higher recharge flux). Without this analysis, the assessment of impacts under this scenario is incomplete. It would be appropriate to list the predicted resultant concentrations in ground water in areas downgradient of the wastes, rather than listing concentrations in the Columbia River which would greatly dilute such contaminants. A reasonably conservative approach should assume that ground water at Hanford may be used for drinking water in the future. 3.5.6.16

YIN Comment 77

Section 3.4.2.3--Impacts in the Long-Term from Postulated Human Intrusion into Waste Sites

Page 3.51-3.52

Comment: Doses calculated here do not identify major assumptions in the transport equation, i.e., ground water velocities, retardation values, or values of effective porosity used. A review of the Appendices failed to explicitly identify these parameters. These major assumptions should be explicitly stated or referenced so their validity can be assessed. 3.5.5.30

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YIN Comment 78

Section 3.4.2.3--Impacts in the Long-Term from Postulated Human Intrusion into Waste Sites

Page 3.60

3.5.3.17

Comment: The DEIS states peak arrival times for chemicals are about 300 and 1,200 years for the no disposal action alternative under high and low flux scenarios, respectively. If these predictions are valid, the DOE should explain how the current contamination--nitrate in excess of 20-45 mg/l (Price, et al., 1985)--has reached the Columbia River from the 200 E area in less than the 40 years of disposal at Hanford.

Reference:

Price, K.R., and others, 1985, Environmental Monitoring at Hanford for 1984, PNL-5407, UC-41-11.

YIN Comment 79

Section 3.4.2.3--Impacts in the Long-Term from Postulated Human Intrusion into Waste Sites

Page 3.60

3.5.6.16

Comment: The evaluation of chemical contamination was done only for a very low range of recharge flux. The calculation should be done over a wider range of recharge values. Existing background concentrations should also be considered in the prediction of ground water contamination. An analysis to determine the recharge flux necessary to create the present extent of contamination in the unconfined aquifer should be undertaken to refine the recharge estimate. It is probable a much higher flux would be required to transport contaminants to their current distribution than has been estimated by DOE.

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CHAPTER 4

YIN Comment 80

Section 4.0--Affected Environment

Page(s) 4.1

2.1.6

Comment: The introduction to Chapter 4 (Affected Environment) provides information regarding the location and use of the Hanford Site. However, there is no mention of the high-level nuclear waste repository for which the Hanford Site is one of three sites proposed for detailed study. Site characterization activities connected with the possible repository have been scheduled and will affect the Hanford environment.

YIN Comment 81

Section 4.1--Background Radiation

Page(s) 4.1

3.2.3.5

Comment: The DEIS states: "Specific airborne radionuclide concentrations were similar among the onsite sampling locations, except that the levels of 85Kr, 129I, 3H, and 239,240Pu were higher very near the PUREX facility, located in the 200 West Area (Price et al., 1985)." The DEIS should list these radionuclide concentrations. Also, the DEIS should mention the possibility that these airborne concentrations are likely to significantly increase should the addition of the Process Facility Modifications to the PUREX Plant be implemented (DOE, 1986).

References:

DOE, 1986, Draft Environmental Impact Statement; Process Facility Modifications Project, Hanford Site, Washington, DOE/EIS-0115 D, Richland, WA.

YIN Comment 82

Section Figure 4.2--Features of the Hanford Site

Page(s) 4.2

2.1.6

Comment: Figure 4.1 shows the close proximity of the 200 West and East Areas to the BWIP Exploratory Shaft. Although the DEIS is not meant to provide input to repository siting procedures, the possibility that excavation of the exploratory shaft may affect final disposal operations at the Hanford Site should not be ignored. Nowhere in the DEIS is this fact addressed, although it

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2.1.6 is of great importance to the safety of the general population surrounding the Hanford Site. The DOE should take responsibility for the parallel schedules of these two major projects, and should acknowledge and address their effects on one another.

Radioactivity may be enhanced in airborne particles (Sutter, 1980); thus, the possiblity of major excavation in close proximity to clean up procedures should be addressed.

References:

Sutter, S.L., 1980, Potential Airborne Releases From Soil-Working Operations in a Contaminated Area, PNL-3498, Pacific Northwest Laboratory, Richland, WA.

YIN Comment 83

Section 4.1--Background Radiation

Page 4.3

3.5.3.22 Comment: A major deficiency of the DEIS is the absence of plume-delineation maps of ground water contamination on the scale of Figure 4.1. It is evident from references such as Price, 1985 that such data are available. Inasmuch as a large portion of this contamination is from defense activities, these contaminants are therefore, defense wastes and the impacts of not restoring the ground water site should be assessed.

Reference:

Price, K.R., and others, 1985, Environmental Monitoring at Hanford for 1984, PNL-5407, UC-41-11.

YIN Comment 84

Section 4.2--Geology and Physiography

Page(s) 4.5

3.2.1.5 Comment: The DEIS states that the "...200 Areas plateau has undergone minimal erosion since formation by floodwaters about 13,000 years ago." The plateau was not "formed" but was eroded by floodwaters.

Also the term "floodwaters" is vague and does not provide information regarding source. This event, obviously important to the surface morphology of the site, should be elaborated.

YIN Comment 85

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Section 4.3--Seismicity

Page(s) 4.8

3.2.2.4 Comment: The DEIS states that "Shallow earthquake swarm activity in the central Columbia Plateau is concentrated principally north and east of the Hanford Site." Swarm activity has also occurred within the Hanford Site and has been particularly active in the "Wooded Island" portion of the Columbia River (DOE, 1984). Information regarding swarm activity within and adjacent to the Hanford site should be included in the DEIS.

References:

DOE, 1984, Draft Environmental Assessment, Reference Repository Location, Hanford Site, Washington, Vol. I, May 1986, U.S. Department of Energy, DOE/RW-0070.

YIN Comment 86

Section 4.3--Seismicity

Page(s) 4.10

3.2.1.7 Comment: The DEIS states that most structures "generally die out" near the center of the Columbia Plateau (i.e., the Pasco Basin). Gravity and aeromagnetic surveys indicate that structures continue eastward through the Pasco Basin to the Columbia River where they appear to be refracted southward (Deju and Richard, 1975). Thus, structures do not "die out" in the center of the Columbia Plateau.

Reference:

Deju, R.A. and B.H. Richard, 1975, A Regional Gravity Investigation of the Hanford Reservation, RAD-6, RAD Associates, Kennewick, WA.

YIN Comment 87

Section 4.3--Seismicity

Page(s) 4.10

3.2.2.5 Comment: The DEIS states that faults most likely developed concurrently with the folding event in the Pasco Basin (Price, 1982). There are many models to explain the relationship between faults and folds in the Pasco Basin; not all agree that faulting and folding took place concurrently (Caggiano and Duncan, 1983). The statement should be clarified to read that the relationship between faulting and folding is uncertain.

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References:

Price, E.H., 1982, Structural Geometry, Strain Distribution, and Mechanical Evolution of Eastern Umtanum Ridge and a Comparison with other Selected Localities within Yakima Fold Structures, South-Central Washington, Ph.D. Dissertation, Washington State University, Pullman, WA.

Caggiano, J.A. and D.W. Duncan, 1983, Preliminary Interpretations of the Tectonic Stability at the Reference Repository Location, Cold Creek Syncline, Hanford Site, RHO-BW-ST-19 P, Rockwell Hanford Operations, Richland, WA.

YIN Comment 88

Section 4.3—Seismicity

Page(s) 4.10

3.2.2.8 Comment: The DEIS states that the Pasco Basin is deforming at a "low to average rate of strain." This wording is vague and meaningless since no quantitative definition of "low" or "average" is presented.

YIN Comment 89

Section 4.4.1--Surface Waters

Page 4.12

3.5.4.1 Comment: The DEIS states the Yakima River recharges the unconfined aquifer in the southeastern portion of the site. A comparison of maps from RHO-BWI-ST-5 does not support this statement. It is thought the lower reaches of the Yakima, i.e., southeast of Two Bridges, is a discharge zone for the unconfined system. Benchmarks near the river show elevations of 386 and 380 feet compared to water table elevations of 390 feet. This discharge may have been induced due to increased water levels in the unconfined aquifer caused by human activities.

YIN Comment 90

Section 4.4.1--Surface Waters

Page(s) 4.10-4.16

3.5.4.9 Comment: Nowhere in this section on surface water hydrology (or elsewhere in the DEIS) are the geomorphological and hydrological ramifications of meander migrations and channel avulsions by the

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Columbia River addressed. Leopold et al. (1964) indicate that channel avulsions, "particularly in semiarid regions", occur regularly during major flood events. Figure 4.6 shows that flooded areas from the hypothetical breach of the Grand Coulee Dam cover vast areas of the major meander region, possibly allowing for a major channel avulsion. Even if avulsion did not occur, natural, non-catastrophic processes of erosion might eventually cause meander pinch-off and abandonment. Either of these possibilities might create: (1) a shortening of the distance between stored wastes and the river, (2) steepening of the groundwater hydraulic gradient, and (3) steepening of ephemeral-stream gradients. This could lead to shorter radionuclide migration pathways, and greater susceptibility for surface erosion. Thus, considering that the Hanford Site sits in a major river meander, meander migration and avulsion and their ramifications should be addressed. 3.5.4.9

References:

Leopold, L.B., M.G. Wolman, and J.P. Miller, 1964, Fluvial Processes in Geomorphology, W.H. Freeman and Company, San Francisco, CA.

YIN Comment 91

Section 4.4.1--Surface Waters

Page(s) 4.12

Comment: The DEIS states that flood estimates were made based on destruction of 25% and 50% of the Grand Coulee Dam as a result of possible nuclear detonation. If a direct nuclear detonation were to occur, 100% failure could be possible. Therefore, flood impacts should be analyzed for 100% failure of the Grand Coulee Dam. 3.5.6.6

YIN Comment 92

Section 4.4.1--Surface Waters

Page(s) 4.14-4.15

Comment: The DEIS states that the results shown in Table 4.5 indicate that water quality values at the Vernita Bridge (upstream of the Hanford Site) and Richland (downstream of the Hanford Site) are similar. For the most part, this appears to be correct, but there are several parameters that are not similar and should be noted or explained. For example, the maximum fecal coliform value at Richland is 2,500 times as great as the maximum value at the Vernita Bridge. A statistical analysis of these data should be made. 3.5.4.7

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YIN Comment 93

Section 4.4.1--Surface Waters

Page(s) 4.12

3.5.4.10

Comment: The DEIS states: "The 200 Areas plateau has numerous ponds and ditches (Figure 4.7), mostly wasteways for process and cooling water. Effluents discharged to them sometimes contain small quantities of radionuclides, both fission products and TRU, and constitute an artificial source of groundwater recharge."

3.5.4.10

The DEIS should provide a more accurate indication of effluent contamination than "small quantities of radionuclides". During 1982, 3.0 x 1011 liters of waste water were discharged by Hanford facilities. Radionuclide concentration values exceeded guidelines for worker exposure in four of the effluent streams and exceeded the guidelines for exposure to the general public in two of the waste streams. The B-Plant condensate stream, for example, discharged radionuclide effluents at levels as much as 15 times above recommended concentrations (McNair et al., 1983). Characterization of waste ponds and measures to deal with these ponds should be addressed by the DEIS. Dismissing the existence of these ponds by stating that the levels of radionuclides are low is unacceptable.

References:

McNair, V.M., R.C. Aldrich, G.R. Cox, M.H. Litzinger, G.G. Meade, and G.J. Sliger, 1983, Rockwell Operations Effluents and Solid Waste Burials During CY 1982, RHO-HS-SR-82-1 P, Rockwell Hanford Operations, Richland, WA.

YIN Comment 94

Section 4.4.1 — Surface Waters

Page(s) 4.14

3.5.4.10

Comment: The DEIS does not show all past and present waste ponds on the Hanford Reservation in Figure 4.7. This information should be given in the DEIS to ensure complete disclosure of contaminated areas. A number of waste ponds, including the 222-S Pond, Redox Pond and others, have not been illustrated in the DEIS figure (NRC, 1985; ERDA, 1975). These additional ponds are shown on page 64 of the NRC Comments on the Draft Environmental Assessment of the Reference Repository Location, Hanford Site, Washington.

References:

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ERDA, 1975, Final Environmental Impact Statement on Waste Management Operations, Hanford Reservation, 2 vols., ERDA-1538, Washington, D.C.

NRC, 1985, NRC Comments on the DOE Draft Environmental Assessment, Reference Repository Location, Hanford Site, Washington, Nuclear Regulatory Commission, Washington, D.C.

YIN Comment 95

Section 4.4.2--Groundwater

Page(s) 4.20

3.5.3.6

Comment: In the discussion concerning artificial recharge and the unconfined aquifer, the DEIS does not address groundwater flow velocities or travel times from the 200 Areas. These should be discussed. In the 200 West Area, groundwater velocity is approximately 1 m/day, corresponding to an estimated travel time to the Columbia River of 80-120 years. In contrast, groundwater velocity in the 200 East Area is approximately 27 m/day, corresponding to an estimated travel time to the Columbia River of 30 years (Graham, 1981). These facts should be noted in the DEIS and differences in groundwater velocity considered.

References:

Graham, M.J., 1981, Hydrology of the Separations Area, RHO-ST-42, Rockwell Hanford Operations, Richland, WA.

YIN Comment 96

Section 4.4.2--Ground Water

Page 4.21

3.5.3.14

Comment: The DEIS speaks of studies which determined that the upper confined system has been contaminated to the south and east of Gable Mountain pond. It fails to mention the contamination located in the confined system near the horn of the Yakima River.

YIN Comment 97

Section 4.4.2-- Ground Water

Page 4.21

3.5.2.33

Comment: The DEIS states that the present contamination in the unconfined aquifer is expected to decay or dissipate prior to

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waste-related contamination from the proposed alternatives. It is acknowledged that radioactive decay will significantly reduce some contaminants. However, there is no information in the DEIS that supports this expectation in a quantifiable way. It is very difficult to predict with any certainty how contaminants will dissipate in an aquifer once they have polluted it. This is also true for the contamination in the upper, confined aquifer that is briefly discussed in this section of the DEIS.

3.5.2.33

EWA: 55

Section 4.5--Meteorological Conditions and Air Quality

Page(s) 4.21-4.26

Comment: Average annual pan evaporation rates should be included as a separate section or with the section concerning precipitation. Water budgets cannot be assessed without them.

3.5.1.66

YIN Comment 98

Section 4.5.5--Air Quality

Page(s) 4.25

Comment: The DEIS states: "Air quality in the vicinity of the Hanford Site is generally classified as quite good." No criteria or data are forwarded to support this assessment. No quantitative definition of "quite good" is presented. The National and Washington State Ambient Air Quality Standards are presented in Table 4.11, but no data concerning air quality is presented with respect to the Hanford Area.

3.2.3.1

YIN Comment 99

Section 4.5.5--Air Quality

Page 4.26

Comment: The description of nitrogen oxide levels is incomplete since only average annual levels are discussed. This approach does not portray maximum-minimum level data nor describe the number of days that PUREX was shut down.

3.2.3.2

YIN Comment 100

Section 4.7--Land Use
Section 4.8--Socioeconomics

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Page(s) 4.30 - 4.35

Comment: The DEIS states that the nearest historical places are the Franklin County Courthouse, the Pasco Carnegie Library, and the Pasco-Kennewick Bridge. In fact, the nearest historical place is the Hanford area itself.

3.2.5.1

Hanford is the site of the Yakima creation legend, and Gable Mountain is the place where young Yakima boys were sent alone for countless generations to experience revelations about their destiny in serving their people, sometimes referred to as their "vision quest." These areas are sacred to Yakima peoples, and their desecration by nuclear activities and investigations at Hanford and inaccessibility to Yakimas as a result of those activities is a source of ongoing injury to the religious beliefs and practices of the Yakima people, in probable violation of the American Indian Religious Freedom Act, 42 U.S.C. Sec. 1996.

3.2.5.1

Totally absent from the discussions of either Land Use or Socioeconomics are the effects on traditional/religious practices of the Yakima people resulting from continuing exclusion from Hanford lands. Because of its low elevation and location at the confluence of the Columbia, Snake, and Yakima Rivers, some of the native plants in the Pasco Basin, used in traditional religious and medical practices as well as in the subsistence lifestyle of many Yakima people, are unique in the Columbia Plateau.

3.2.5.1

2.4.2.2

Prior to 1943, the Yakima people had considerable access to those areas for the exercise of their Treaty Rights to hunt, gather natural foods, and graze animals in open areas within their Ceded Lands, which include most of the Hanford Site. When Tribal elders patriotically gave tacit consent to the establishment of the Hanford Works during World War II, they did not contemplate that the area would be perpetually inaccessible to them, or that it would be made a national environmental sacrifice area. They also did not contemplate that the fish which they have the perpetual right to take from usual and accustomed places would be contaminated by radioactivity from Hanford.

2.4.2.2

3.2.5.1

The Yakima people have lived in the same area for over 10,000 years. They have the right to and intend to remain in that same area forever. As a people, they do not accept the pervasive DOE ethos which holds that Hanford is a perpetual national environmental sacrifice area. They look forward to the time when their Treaty Usage Rights are restored, and the ecologically distinct and sacred Hanford area is no longer contaminated or inaccessible to them.

3.2.5.1

For these reasons, the Yakima Indian Nation insists that DOE should consider an alternative for defense waste disposal which comprehends an effective clean-up of the Hanford site, to restore it to the approximate conditions in which the military found it in 1943. The DEIS's failure to consider such an alternative, or

2.2.11

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2.4.2.2 to even mention the distinct rights and interests of affected Indians in its discussion of land use and socioeconomics, is a violation of the United States' trust responsibility to Indian tribes, and a fatal flaw in the document.

References:

Discussions with Yakima Tribal Elders.

Discussions with Morris Uebelacher and Gregg Cleaveland, archeologists.

CHAPTER 5

YIN Comment 101

Section 5.0--Postulated Impacts and Potential Environmental Consequences

Page(s) 5.1-5.62

3.5.5.19 Comment: The DEIS compares radiation doses to the population to calculated naturally-occurring radiation doses over the same period of time. The methodology for determining the radiation dose due to naturally occurring sources, and any inherent assumptions, have not been discussed. This information is vital and should be included in the DEIS.

YIN Comment 102

Section 5.1.4--Cumulative Impacts

Page 5.4

3.5.3.11 Comment: There is no mention of the extensive radionuclide contamination of ground water that is present at Hanford. This contamination and potential impacts from any future utilization of the ground water should definitely be included in this section of the DEIS.

YIN Comment 103

Section 5.2.2.2--Radiological Consequences from Postulated Accidents

Page(s) 5.8

3.4.3.2 Comment: The DEIS states that the first-year dose to any individual does not exceed the DOE standards for annual dose. However, the DEIS does not specify how stringent these guidelines

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are relative to other guidelines, such as NRC and EPA guidelines. First year and cumulative doses to individuals should be compared to the most stringent guidelines available. 3.4.3.2

YIN Comment 104

Section 5.2.2.3--Nonradiological Consequences

Page(s) 5.8

Comment: The DEIS classifies the generation of dust from waste retrieval practices as a nonradiological consequence. Many of the soils surrounding waste sites are presently contaminated (EPA, 1983), and disturbance of these soils as a result of waste retrieval may lead to generation of airborne radioactive particles. Radioactivity may be enhanced in airborne particles (Sutter, 1980). 3.5.6.21

References:

EPA, 1983, Site Visit and Briefing on Waste Disposal Activities at Department of Energy (DOE) Hanford Washington Facility, October 18-19, 1983, R-82-3, II-E-10, Washington, D.C.

Sutter, S.L., 1980, Potential Airborne Releases from Soil-Working Operations in a Contaminated Area, PNL-3498, Pacific Northwest Laboratory, Richland, WA.

YIN Comment 105

Section 5.2.4--Assessment of Long-Term Impacts

Page(s) 5.17

Comment: The DEIS concludes that the only important pathway for radionuclides and complexants to the affected environment is via groundwater. The DEIS does not indicate that radionuclides could also be transported to the affected environment through disturbance of contaminated soils as a result of waste retrieval activities or possible repository construction/operation. This potential hazard should not be underestimated. 3.5.6.21

YIN Comment 106

Section 5.2.4.1--Long-Term Impacts Where Present Conditions Remain Unchanged

Page(s) 5.18

Comment: Table 5.8 in the DEIS shows the estimated inventories of key radionuclides for disposal in the geologic alternative. No 3.1.1.7

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3.1.1.7 indication is given as to the accuracy of these values. Therefore, a range should be given for each radionuclide to show the amount of uncertainty.

On page xxvii of Volume 2 of the DEIS, it is stated that inventory values have an uncertainty of +50/-30%. This is a very large uncertainty and should be explicitly stated in any table that uses these values.

YIN Comment 107

Section 5.2.4.1--Long-Term Impacts Where Present Conditions Remain Unchanged

Page 5.19

3.5.5.27 Comment: The DEIS states calculations of transport to the biosphere were made using conservative bounding values of parameters. As has been commented upon previously, the parameters cannot be accepted as conservative unless they are explicitly discussed and supported. This has not been done in the DEIS for the vast majority of the input parameters.

YIN Comment 108

Section 5.2.4.2--Long-Term Impacts Following Postulated Disruptive Events

Page(s) 5.21

3.5.6.24 Comment: The DEIS considers two possible barrier failure scenarios and calculates the additional dose to the downstream population as a result of failure of a barrier for a single waste burial site for each scenario. These two calculations are then combined to determine the overall impact. It is possible that more than one waste burial site may fail over 10,000 years, thus resulting in a larger radiation dose than calculated.

YIN Comment 109

Section 5.3--In-Place Stabilization and Disposal

Page(s) 5.26

2.3.1.9 Comment: Active institutional controls cannot be relied upon for more than 100 years for the in-place stabilization alternative. However, the DEIS does not discuss monitoring or mitigation plans to be used during the 100 year period of active institutional control or following the cessation of active control. Such plans are essential to ensure the safe isolation of wastes.

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YIN Comment 110

Section 5.3.2.4--Ecological Impacts

Page 5.30

3.2.5.1 Comment: Mining for fill material (6-9 million cubic meters) may impact archeological sites in the Gable Butte vicinity. Especially damaging is the quarrying operation itself and the construction of roads to the quarry. Maps should be provided showing location of quarry and road in relation to archeological sites.

YIN Comment 111

Section 5.3.4.1--Long-Term Impacts Where Present Conditions Remain Unchanged

Page(s) 5.34

3.1.1.7 Comment: Table 5.17 is entitled "Inventory of Key Radionuclides Disposed of in the In-Place Stabilization and Disposal Alternative, Ci". The source of this data is not given in the DEIS. In addition, the uncertainty associated with these data is not presented. This information is essential in assessing short- and long-term health risks and environmental impacts and should be presented.

YIN Comment 112

Section 5.3.4.1--Long-Term Impacts Where Present Conditions Remain Unchanged

Page(s) 5.34

3.5.5.31 Comment: The DEIS states that diffusion and transport of waste through soils will result in a dose of about 10 man-rem over 10,000 years for the population downstream from the Hanford Site. This dose was projected to peak in the year 12000 as a result of technetium-99 and carbon-14 effects. The DEIS claims that this peak dosage would not be expected to produce any health effects; however, it should be taken into account in calculation of radiation doses to the general public.

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CHAPTER 6

YIN Comment 113

Section 6.6

Page 6.10

2.4.1.9

Comment: The DEIS states that "[DOE] believes the wastes addressed in this EIS constitute byproduct material as defined by the Atomic Energy Act of 1954, as amended...." Consequently, DOE believes these wastes "are not subject to the requirements of subtitle C of the Resource Conservation and Recovery Act (RCRA) as amended." The Yakima Indian Nation believes that much of these wastes, with their combined radiotoxicity and chemical toxicity, constitute "mixed wastes" subject to subtitle C of RCRA. Significantly, the Environmental Protection Agency and Nuclear Regulatory Commission apparently also hold this view, and the State of Washington has applied for EPA authorization to regulate mixed wastes at Hanford under RCRA.

YIN Comment 114

Section 6.7

Page 6.11

369

Comment: In its discussion of licensing by the NRC, the DEIS appears to be intentionally cryptic. It states:

> [T]o the extent that any decision based on a final [EIS] requires defense [HLW] to be placed in a repository constructed under the [NWPA], or placed in other facilities, which are authorized for the express purpose of subsequent long-term storage of such waste (within the meaning of Section 202 of the Energy Reorganization Act), such a repository or other facilities would comply with subsequent applicable licensing requirements of the Commission.

3.1.4.30

The Yakima Indian Nation is convinced that the NWPA requires all defense HLW to be disposed of in a deep geologic repository. Section 8 of the Act contemplates no other options. As the DEIS notes, all geologic repositories--whether for defense wastes only or for commingled defense and commercial wastes--must be licensed by the NRC. This should dispense with the issue.

The excessive use of qualifiers and otherwise "squirmy" language in this passage of the DEIS--which DOE attorneys undoubtedly toiled many hours drafting--suggests that the agency may harbor active notions of avoiding NRC licensing in "disposing" of its Hanford defense wastes. Even if the agency supposes that it

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somehow has legal authority to dispose of these wastes without NRC licensing, the Yakima Indian Nation strongly urges DOE not to pursue that notion, and to submit to NRC licensing for whatever disposition for these wastes it ultimately chooses.

3.1.4.30

If DOE's choice is safe, as the agency claims all of its options are, then it will have no trouble obtaining a license from NRC. At the same time, the public accountability and scrutiny that licensing would entail would serve DOE very well in improving the agency's miserable reputation with respect to past management of Hanford wastes. On the other hand, if the agency goes through extraordinary legal gymnastics to avoid NRC licensing and public scrutiny in this endeavor, the public will be well justified in concluding that the Department is simply trying to cover up its past mistakes.

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VOLUME 2--INTRODUCTION

YIN Comment 115

Volume II--Analytical Methodology

Page(s) xxv

Comment: The purpose of an environmental impact statement is to aid in making a decision. Therefore, the information that such a document provides needs to be as accurate and useful as possible. For the most part, the information in this case is predicted environmental impacts. However, because the impacts are products of compounded conservatisms in the analyses, the "relative" impacts between the alternatives may not be realistic. For example, predicted health effects under a best-estimate analysis may be two (2) health effects for Alternative A and three (3) health effects for Alternative B. However, in a conservative analysis, predicted health effects for Alternative A might be 100, and 50 for Alternative B. Clearly, deciding on which alternative is safest would best be done by selecting A since the best-estimate would reflect the expected impacts. However, using the hypothetical conservative analysis, Alternative B would be selected. In this case, this would be the wrong decision. The only certain way to avoid such a scenario from occurring when using conservative analyses to make decisions, is to insure the amount of conservatism is equal in the analysis of each alternative. Inasmuch as the impacts predicted in the DEIS are calculated using conservative analyses, the amount of conservatism between alternatives needs to be demonstrated as being equal. This has not been done in the DEIS.

3.5.5.20

YIN Comment 116

Volume II--Analytical Methodology-Waste Release Parameters

Page(s) xxviii-xxix

Comment: The DEIS states, "It seems likely that this range represents a drier (than present) recharge rate 0.5 cm/yr and a wetter climate at the 5.0 cm/yr value. This is a conservative value to represent unperturbed soil/plant conditions for the future recharge conditions on the 200 Area plateau". It is unclear what value the second sentence refers to as being conservative. Chapter 4 of the DEIS suggests that the amount of recharge is unknown but is estimated to be between 0 and 5 cm/yr. Therefore, 5 cm/yr is not truly conservative, but may be very near the actual value.

3.5.6.1

The DEIS also states that "engineering judgement" was used to establish a maximum (wet climate) infiltration rate of 5

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cm/yr. This "engineering judgement" was stated to be forwarded by "nationally recognized consultants". The DEIS does not adequately reference these consultants, nor does it explain the methodology by which these consultants arrived at such a value. Due to the possibility of renewed glaciation and the return to wetter conditions, it is important that a conservative, yet realistic, maximum infiltration rate be used in the DEIS. Criteria for selecting 5 cm/yr as the maximum expected infiltration rate should be included in this discussion.

3.5.6.1

YIN Comment 117

Volume 2--Analytical Methodology

Page(s) xxix

Comment: The DEIS states: "No future 200 Area onsite systematic irrigation effects such as sprinkling, leaky pipes and canals are assumed. Although to assume no onsite artificial recharge is not conservative, it is consistent with the assumptions made regarding systematic intrusion within the boundary system with its warning markers." This assumption is certainly not conservative and should not be made.

3.5.3.1

In the future, there will be artificial recharge in the 200 areas. Hanford waste management activities are predicted to continue until at least 2013 (DOE, 1986). Currently, there are four large ponds on the Hanford Site that receive discharges from the processing facilities: U-pond, B-pond, Gable pond, and West pond. There are also a number of streams and ditches which contain wastewater (Emery and McShane, 1980). It is likely that discharges to these ponds, streams, and ditches will continue for many years. Artificial recharge from these ponds have had a significant effect on the unconfined aquifer on the Hanford Site. Over 6 x 1011 liters of wastewater have been discharged as of 1979, causing the formation of large groundwater mounds (Graham, 1981). Considering the profound effect artificial recharge has had to date at the Hanford Reservation and the fact that such waste disposal practices are likely to continue for some time, it seems unreasonable to use the assumption that there will be no onsite artificial recharge.

3.5.3.1

In addition, site characterization activities for BWIP, such as excavation of the exploratory shaft will use large quantities of water. This should be taken into account since Hanford has been chosen for characterization.

3.5.3.1

Reference(s):

DOE, 1986, Draft Environmental Impact Statement; Process Facility Modifications Project, Hanford Site, Washington, DOE/EIS-0115 D, Washington, D.C.

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Emery, R.M. and M.C. McShane, 1980, "Nuclear Waste Ponds and Streams on the Hanford Site: An Ecological Search for Radiation Effects", Health Physics, Vol. 38 (May), pp. 787-809.

Graham, M.J., 1981, Hydrology of the Separations Area, RHO-ST-42, Rockwell Hanford Operations, Richland, WA.

YIN Comment 118

Volume II--Analytical Methodology-Waste Release Parameters

Page(s) xxx

Comment: The DEIS states layered barrier covers have been used for uranium mill tailings covers in the past. While this is true, the coarse rip-rap layer was used in those cases to prevent erosion and not necessarily to prevent infiltration. The success of layered covers in terms of preventing infiltration has not been demonstrated in the field. Only modeling has been used to predict their performance. Unfortunately, the models require input of some parameters that cannot yet be determined with reasonable accuracy. An example of such is the unsaturated hydraulic conductivity of very coarse material such as rip-rap. What is commonly done is that the hydraulic conductivity of such layers is assumed to be very low under relatively dry conditions. The models are then run and water does not move into the coarse layer, but rather is evaporated back to the surface. This result is practically guaranteed because the assigned conductivity of the coarse layer is so low. In other words, by assuming the coarse layer is practically impermeable, the successful performance (in the simulations) is created artificially, and therefore guaranteed. 3.5.1.58

What should be done is to monitor engineered and natural layered systems with highly sensitive methods such as tracers (currently available neutron-probes are not precise enough to quantify small moisture content changes in arid climates). Until these types of field experiments are completed, these covers cannot be considered to be completely successful. 3.5.1.58

YIN Comment 119

Volume II--Analytical Methodology

Page(s) xxxii

Comment: Although the DEIS admits that "use of single-value distribution coefficients (lumping complex chemistry into a single constant) has come under severe criticism recently", it still utilizes this approach due to "the limited data base". This 3.5.2.6

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statement does not excuse the use of an approach which the DEIS points out is probably invalid. Further, the DEIS states: "It would strengthen the analysis considerably if data were available on the status of organic and inorganic complexation since this affects the effective Kd..." As noted in other comments, organic complexants can greatly influence radionuclide migration. Thus, such information must be compiled and uncertainty analysis performed before an adequate assessment of radionuclide travel times and the performance of the system can be made. 3.5.2.6

YIN Comment 120

Volume II--Analytical Methodology

Page(s) xxxiv

Comment: The DEIS states: "There are...no data to suggest that significant releases from the solid waste form are currently occurring." This statement is certainly not based on conclusive evidence considering the unreliability of the tank leak assessment methods utilized for the single-shell tanks. The limited number of drywells surrounding each single-shell tank may not record the release of contaminants from liquid supernatant or from salt cake (Isaacson, 1981). 3.1.4.27

Reference(s):

Isaacson, R.E., and K.A. Gasper, 1981, A Scientific Basis for Establishing Dry Well Monitoring Frequencies, RHO-ST-34, Rockwell Hanford Operations, Richland, WA.

YIN Comment 121

Volume II--Analytical Methodology

Page(s) xxxv

Comment: Whereas many clay minerals are negatively charged at normal pH, it is highly doubtful that the DEIS statement concluding that "Hanford sediments are negatively charged..." is all encompassing. The charge on a sediment surface is dependent on the nature of the substrate and the pH of the solution (primarily the pH of the isoelectric point with respect to solution pH). Iron oxides/hydroxides and aluminum hydroxides are characterized by high isoelectric points and would be expected to have positive charges that would repell cations (Drever, 1982). Considering the large amount of available iron hydroxide in single-shell tank wastes (Table U.1), it is misleading to assume sediments will be negatively charged. 3.5.2.22

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In addition, whereas many radionuclides are cations, some may form anionic complexes under certain conditions as governed by pH, Eh, and organic-acid content.

3.5.2.17 The discussion of transport in the vadose zone is poorly referenced in regards to diffusion coefficients. The DEIS states that the value used is approximately twice the cited values and the partial saturation correction is realistic. Documentation of what the cited values are and how the partial saturation correction was determined should be included in the DEIS.

Reference(s):

Drever, J.I., 1982, The Geochemistry of Natural Waters, Prentice-Hall, Inc., Englewood Cliffs, NJ.

YIN Comment 122

Volume II--Analytical Methodology-Geohydrologic Transport

Page(s) xxxvii

3.5.2.19 Comment: The DEIS states transmissivity values were, "adjusted through model calibration to reproduce the water table under transient modeling conditions". The term "transient modeling conditions" is ambiguous. Perhaps what was meant was "current conditions" or "post transient conditions", or possibly "transient conditions". An aquifer can not be under any kind of "modeling conditions". Furthermore, the statement of good correlation between actual and predicted travel time in the unconfined aquifer should be supported by some quantitative validation.

3.5.2.29

APPENDIX A

YIN Comment 123

Appendix A--Waste Site Descriptions And Inventories

Page(s) A.1

3.1.1.1 Comment: The DEIS states that "The existing waste inventories are based on historical records and are believed to be adequate for the generic waste class descriptions". The radionuclide inventory of the existing wastes is the basis for all evaluations, risk analyses, and decision making concerning waste disposal alternatives and operations. A database using historical records with no specification of the time, frequency, or quality control of data collection is inadequate to base objective decisions concerning long-term waste management. A reliable estimate of various radionuclides in the waste tanks is necessary before any waste class description can be made.

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YIN Comment 124

Section A.2.1.2--High-Level Waste (HLW)

Page(s) A.11

Comment: The DEIS describes plans to wash sludge waste to remove sulfate and aluminate in an effort to reduce the amount of glass needed to solidify the sludge. The DEIS, however, does not state what will be done with this sulfate/aluminate wash. The DEIS should state plans to deal with these secondary wastes. 3.1.4.13

YIN Comment 125

Section A.4--TRU-Contaminated Soil Sites
and A.5--Pre-1970 TRU Solid Waste Burial Grounds

Page(s) A.19 and A.22

Comment: Tables A.10 and A.12 showing radionuclide inventories for TRU-contaminated soil sites and pre-1970 TRU solid waste sites do not indicate the uncertainty associated with the levels listed. Documentation must be made concerning the accuracy of these values. 3.1.1.7 3.1.3.3

APPENDIX B

YIN Comment 126

Section B.1.1.1--Mechanical Retrieval from Single-Shell Tanks

Page(s) B.1

Comment: The DEIS describes plans to mechanically retrieve the contents of poor integrity single-shell tanks. This process would avoid the addition of liquid that could cause tank leaks. The DEIS cites Murthy et al. (1983) as stating that 26 of the 149 single-shell tanks are leakers. The DEIS, however, does not mention that Murthy et al. (1983) also state that an additional 31 tanks are suspected as having poor integrity. The implications of the contents of these tanks being retrieved if they are of poor integrity should be stated in the DEIS. 3.1.4.5 3.1.4.20

Reference(s):

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Murthy, K.S., L.A. Stout, B.A. Napier, A.E. Reisenauer, and D.K. Landstrom, 1983, Assessment of Single-Shell Tank Residual Liquid Issues at Hanford Site, Washington, PNL-4688, Pacific Northwest Laboratory, Richland, WA.

YIN Comment 127

Section B.1.1.3--Mechanical Retrieval of TRU-Contaminated Soil and Solid Waste Sites

Page(s) B.7

3.1.3.24

Comment: The DEIS states: "Dust within the pit would be controlled by spraying the working face of the pit with a dust suppressant.." It is not clear what this dust suppressant is. In Figure B.6, a water truck is shown with the label "For Dust Suppression". The chemical constituents of the suppressant, as well as an estimate of the volume of suppresant to be used in this capacity, should be made in order to evaluate the effect on TRU-contaminated soil.

YIN Comment 128

Section B.1.2.1--Radionuclide Concentration for Geologic Disposal

Page(s) B.12

3.1.6.1

Comment: The DEIS states that the wastes will be recycled through the treatment process until "satisfactory destruction" of organic complexants is accomplished. The DEIS should state: 1) what remaining concentration of organics would be considered "satisfactory destruction"; and 2) what methodology will be used confirm whether "satisfactory destruction" has taken place.

APPENDIX F

YIN Comment 129

Section F.1--Doses During the Operational Period

Page(s) F.1-F.2

3.4.1.1

Comment: The report bases future occupational radiation exposure levels on historical averages. While this approach may be appropriate in some instances, it would not be in this case because of the very real possibility of future activity, primarily geologic disposal, introducing an additional source of radiation which may not have been encountered in past work at Hanford. Natural radioactivity from basalt mining, such as radon gas and

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thorium, could significantly increase exposure doses to repository workers. In addition, radon releases could increase public doses through chronic release to the atmosphere.

YIN Comment 130

Section F.1.1.1--Occupational Dose-Methods for Calculating Radiation Dose

Page(s) F.1

3.5.5.47

Comment: The term "radiation work" is ambiguous when describing the types of activities performed at Hanford. It is not clear whether this term relates only to work in direct contact with radioactive materials such as waste reprocessing, treatment, handling, etc. or whether this term is used to describe all activities related to disposal operations.

YIN Comment 131

Section F.1.1.1--Occupational Dose

Page(s) F.1

3.4.1.1

Comment: In calculating occupational radiation doses, the DEIS uses a historical average annual dose for Hanford workers. Since this value is an average, it is apparently the cumulative sum of all worker radiation doses, both large and small, divided by the number of man-years.

The average dose measurement, as used here, masks the high exposure occupations by averaging them with many low exposure occupations. In this case the average may not be a helpful statistic to the decisionmaker. A more useful approach might include a description of the high and low baseline conditions or a description of the entire distribution of doses (a cumulative frequency distribution). This approach would show the range of exposure levels to individual Hanford workers, not just the group average.

YIN Comment 132

Section F.1.1.1--Occupational Dose

Page(s) F.1

3.4.1.3

Comment: The DEIS states the future disposal alternatives are at a "conceptual stage of development" and therefore cannot be used to develop" estimates of exposure times and dose rate (p. F.1). Yet throughout Chapter 5, each alternative lists an estimated

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3.4.1.3 time of radiation work. For example, p. 5.8 estimates "28,000 worker-years of radiation work" would be required for geologic disposal and p. 5.27 lists "4,800 man-years of radiation work" for in-place stabilization. If the alternatives are still in their conceptual stage and cannot be used to project exposure times, how were the values for worker-years of radiation work in Chapter 5 determined, and why can these values not be applied to Appendix F?

YIN Comment 133

Section F.1.1.1--Occupational Dose

Page(s) F.1

3.4.1.6 Comment: Workers at Hanford are considered in the report as being exposed only to occupational doses of radiation. Since most of the Hanford workers live in the general vicinity of the Hanford facilities, they may also be exposed to the accidental and routine radiation releases described in Section F.1.1.2, Public Dose. The full radiation dose for Hanford workers will be the accumulated total of occupational exposure and environmental exposure.

YIN Comment 134

Section F.3.2.1--Population Distributions Table F.4

Page(s) F.19-F.20

3.5.5.19 Comment: Table F.4 does not seem to accurately represent the probable distribution of population in the year 1990. Current population of the Tri-Cities falls to the S, SSE, and SE and should exceed 40,000 people. This table shows the maximum population appears to the W, WSW, and SW directions. This is basically in the upwind direction. These estimates do not appear to realistic. The 1980 combined population for Richland, West Richland, Kennewich and Pasco is approximately 89,000 and is not shown in the table. It appears that the SE estimate been accidentally omitted from this table. If the Tri-Cities area population has been underestimated, then the credibility of these modeling predictions is in question.

YIN Comment 135

Section F.3.2.2--Terrestrial and Aquatic Pathway Parameters

Page(s) F.19

3.5.5.1 Comment: It should be pointed out that organisms at the top of the food chain (including beef, pork, and fish) can contain ac-

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cumulated doses of radiation from lower members, such as grass and water. For instance, beef can contain the accumulated dose of 90 days of grazing slightly radioactive grasses. Although the grasses may not be at a hazardous level themselves, the accumulated doses within the upper food chain members could be signficant. 3.5.5.1

YIN Comment 136

Section F.3.3.2--Comparison of Intruder Scenario Model to NRC's 10 CFR 61 Models

Page(s) F.32

Comment: The DEIS attributes the higher concentration of cesium in the MAXI code to "some additional considerations incorporated by NRC." It appears that this discrepancy actually means that the MAXI code is less conservative with respect to cesium. This should be explicitly stated in the DEIS. 3.5.6.48

YIN Comment 137

Section F.3.3.8--Comparison of DITTY and EPA Long-Term Environmental Dosimetry Models

Page(s) F.39

Comment: Site specific information regarding average ingestion rate of fish may be much too low to be representative of the Yakima Nation. Because the Yakima commonly consume more fish in their diet than the local non-Indian population references should be provided that indicate some understanding relative to the diet of the affected people. 3.5.5.38

APPENDIX G

YIN Comment 138

Section G--Method for Calculating Nonradiological Injuries and Illnesses

Page(s) G.2

Comment: Postulated incidence rates include transportation accidents for Hanford workers. Neither Appendix G, nor Appendix I (Transportation Impacts) mentions transportation accidents involving civilians, nor any injuries or fatalities civilians may incur through these accidents. Considering that Hanford workers transporting waste will be in large trucks and trains, and 3.4.2.1

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civilians involved in transport accidents will most likely be in smaller automobiles, the chances of injury/fatality are much greater for the civilians.

YIN Comment 139

Section G--Method for Calculating Nonradiological Injuries and Illnesses

Page(s) G.2

3.4.1.10 Comment: Table G.1 uses DOE and contractor incidence rates for the five (5) year period of 1976-1980. What evidence is there that this period is long enough to be statistically representative of future potential incidence rates?

YIN Comment 140

Section G--Method for Calculating Nonradiological Injuries and Illnesses

Page(s) G.3

3.4.1.8 Comment: Table G.2 lists manpower requirements for repository construction and operation from DOE references dated 1979 and 1980. More recent estimates for repositories in basalt can be found in the draft Environmental Assessment (DOE/RW-0017) p. 5-58, 5-59 and for repositories in general in the Record of Responses to Public Comments on the Draft Mission Plan (DOE/RW-0005) Vol. 2, p. 79-80. Appendix K also gives more recent figures for manpower requirements.

APPENDIX L

YIN Comment 141

Section L.2.4--Costs

Page(s) L.5

3.3.1.12 Comment: Estimates for the off-site repository (granite) are believed higher than basalt because the vertical emplacement scheme is assumed. This assumption is not appropriate for the following reasons: (1) The preliminary repository design is not complete for crystalline repositories. (2) The crystalline project has been suspended. Therefore, a salt or tuff off-site repository would have been more appropriate.

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APPENDIX M

YIN Comment 142

Section M.1--Preliminary Analysis of the Performance of the Protective Barrier and Marker System

Page(s) M.1

Comment: The DEIS references several field studies that have been performed to evaluate multi-layer cover systems. Unfortunately, the DEIS does not include any discussion of the results of these studies in terms of how well these covers performed. The DEIS seems to imply that these covers work flawlessly, however, without the supporting documentation this can not be confirmed. 3.5.1.57

YIN Comment 143

Section M.1.1--Multilayer Concepts

Page(s) M.3

Comments: The DEIS states according to the outflow law, water cannot enter an open cavity unless that water is under atmospheric pressure or greater. While true, this principle may not always prohibit the flow of water from a fine-textured into a coarse soil under unsaturated conditions. Coarse soil is not made up of large, perfectly dry cavities, but rather it contains a distribution of pore-sizes, most of which are relatively large--however, some pores are small. Furthermore, films of water may be present along the surfaces of grains which may be capable of transmitting water. Understanding water flow along this type of thin film is still in the early stages of research. 3.5.1.79

Taking into consideration these types of partial saturation conditions, situations can result where water can move under unsaturated conditions from a fine-textured soil, to a coarse-textured soil. An example of such a situation would be a steady-state system where the annual deep recharge rate is perhaps 5 cm/year, and the downward hydraulic gradient in the vadose zone is unity. Under this scenario, a fine-textured soil with a saturated hydraulic conductivity of greater than 5 cm/year would remain unsaturated with a uniform (with respect to depth) moisture content. An underlying coarse layer (with a saturated hydraulic conductivity greater than the fine-textured soil) would also be unsaturated with a uniform moisture content dependent on unsaturated hydraulic conductivity function. This situation would not violate the outflow law since the large pores in the coarse soil would not be taking on water (i.e., moisture contact would not charge) since the system would be under steady-state conditions. 3.5.1.79

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What is an issue is whether this unit-gradient, steady-state situation could establish itself over time after emplacement of the cover. Processes such as vapor transport, flow along thin films of water, and intense, episodic precipitation events might all contribute to the establishment of such a system. 3.5.1.79

Understanding highly episodic precipitation events (e.g. snowmelt, thunderstorms) and their contribution to recharge also is of critical to predicting the performance of the barrier. It is not apparent such events were included in the DEIS assessment.

YIN Comment 144

Section M.3.1--Water Infiltration Control

Page(s) M.9

Comment: The DEIS states, "A multilayer cover consisting of fine soil overlying coarse materials...can be designed to prevent water transmission below the root zone even for present or future wet-year conditions if the materials are properly chosen". The presentation of such verbage implies this statement is a well-known fact. This is not the case. The DEIS or any other study has not demonstrated, particularly in the field, that these covers absolutely prevent any downward percolation, especially during extreme precipitation events. 3.5.1.22

YIN Comment 145

Section M.3.2--Biointrusion Control

Page(s) M.10

YIN Comment 146

Section M.4--Reduction in Risk of Inadvertent Intrusion Through Passive Institutional Controls

Page(s) M.14

Comment: The final estimate of the number of intrusions into the barrier-covered single-shell tanks is less than one in 10,000 years. This was arrived at by making assumptions of the probability of certain components of the protective barrier system. One other type of estimate could have been included in the DEIS concerns the historical record of unearthing burial grounds of one type or another. It would appear that curiosity over the long term would lead to eventual disturbance of the waste. This possibility may be enhanced if the language (English) incorporated into the barrier changes or is replaced over time. 3.5.1.98 3.5.1.31

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YIN Comment 147

Section M.5.1.1--Input Data Requirements

Page(s) M.17

Comment: The modeling discussion presents the types of input data necessary for the modeling. However, a list of the actual values used in the simulations is not presented. This is a serious omission and prevents the reader from gaining insight into the modeling. 3.5.1.61

For example, the discussion of precipitation input into the model does not state if actual hourly values were used or if seasonally averaged values were used. The specifics of boundary conditions, time steps, grid spacing, and particularly, initial conditions should have been clearly presented in the DEIS.

YIN Comment 148

Section M.5.2--Simulation Results

Page(s) M.19

Comment: The DEIS discusses the questions still remaining concerning some of the crucial input parameters such as initial conditions, hydraulic properties and evapotranspiration. Because these questions will not be answered until after a multi-year field research study, the performance of the barrier should not be assumed to be 100% successful. 3.5.1.57

YIN Comment 149

Section M.5.2.1--Test Cases

Page(s) M.21

Comment: In the discussion of the test cases, equilibrium was assumed to occur when evapotranspiration nearly equaled rainfall averaged over a year. Any small difference was assumed to be mass-balance errors. It appears however, in some cases (2, 3, and 6 Table M.7) that the difference between rainfall and evapotranspiration at the end of the simulation time (8 years) is due in part to increasing storage. This indicates that equilibrium has not occurred and that the possibility of drainage into the gravel layer could occur at a later time in the simulation. Therefore, these cases should be rerun for longer periods--until storage is constant such as in cases 4 and 5. 3.5.1.64

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YIN Comment 150

Section M.5.2.1--Test Cases

Page(s) M.21

3.5.1.62 Comment: Table M.7 does not list mass balance errors associated with each simulation. Mass balance errors for the first year simulation appear to be high (1.2cm out of 30.1cm total). Grid spacing, storage, or transmissivities assigned to adjacent grid cells may be responsible for this error, but since this information was not provided, it could not be assessed. The Final EIS should list the input parameters and grid information used in the simulations and also should specifically list mass balance errors.

YIN Comment 151

Section M.5.2.2--Precipitation

Page(s) M.21

3.5.1.75 Comment: It is not clear why potential evapotranspiration was assumed to be higher during the fall rainfall condition. This difference should be explained in the text of the final EIS. By using this convention, another variable has been incorporated and thereby makes the interpretation of the results that much more difficult.

YIN Comment 152

Section M.5.2.2--Precipitation

Page(s) M.22

3.5.1.75 Comment: The DEIS states, "In some way, distribution of the spring rain was more conducive to the removal from the profile by evaporation." This statement is an example of why parameters such as rainfall distribution should have been clearly documented in the DEIS. A comparison of this input and the actual rainfall records from the site should also have been presented in order to better demonstrate the fact that such as extreme precipitation events have been adequately incorporated into the modeling.

YIN Comment 153

Section M.5.2.3--Soil Texture

Page(s) M.22

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Comment: In the comparison of case 4 and case 8 (with and without the gravel layer), the gravel layer obviously prohibits any movement of water out of the overlying, fine soil. The performance of this gravel layer may be very dependent on the initial condition and hydraulic conductivity versus pressure-head relationship assigned to the gravel layer. If the gravel was assumed to be an assemblage of large pores that remain perfectly dry after emplacement, then it would act as a barrier to flow up until near saturation in the overlying soil. On the other hand, if the initial conditions in the gravel were assumed to have a finite moisture content and a unit downward gradient (uniform moisture content with depth), then flow would occur upon the beginning of the simulation. The magnitude of this flow would initially be equal to the hydraulic conductivity of the gravel at the initial pressure-head condition. Therefore, it is evident that the initial condition and unsaturated hydraulic conductivity of the gravel are very important to the performance of the cover system. Both of these variables are very difficult to determine and unless they can be determined adequately, preferably in the field, a sensitivity analysis covering a range of conditions and properties of the gravel should be performed. 3.5.1.19

YIN Comment 154

Section M.5.2.4--Plant Cover

Page(s) M.23

Comment: Some discussion is warranted in the DEIS regarding the two-dimensional aspects of plant/root uptake of moisture. This type of multi-dimensional flow is lost in a one-dimensional model such as UNSATiD. Depending on the spacing of cheat grass and its rooting pattern, there may be areas between plants where water would not be affected by roots under fairly extreme precipitation events. It is acknowledged that the no-plant scenario would conservatively encompass this situation. 3.5.1.63

YIN Comment 155

Section M.5.3--Model Simulation Summary

Page(s) M.24

Comment: The DEIS states, "A proper cover can be designed using onsite materials, layered so as to maximize evapotranspiration and minimize drainage". Because of the appreciable amount of uncertainty in the modeling pointed out above, the performance and feasibility of proper construction of this type of barrier should be demonstrated in a pilot project that is instrumented to monitor moisture movement. 3.5.1.66

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YIN Comment 156

Section M.5.4--Cover Disturbance Considerations

Page(s) M.24

3.5.1.23 Comment: The DEIS discusses the presence of some glacial-fluvial sediments comprised of coarse gravels overlain by fine-textured sediments. These sediments would appear to be a reasonably good analog to the multi-layer system. Instrumentation and other types of water-movement investigations should be pursued at these locations in addition to geotechnical stability studies.

YIN Comment 157

Section M.5.4--Cover Disturbance Considerations

Page(s) M.24

3.5.1.93 Comment: Earthquake activity may be an important element to the preservation of the protective cover. Vibration and shaking could cause a mixing of the fine soil into the rip-rap. No evaluation was made of the vibratory effects of repository construction, surface building and blasting at depth. All these factors may weaken the barrier if the first repository is constructed at Hanford in close proximity to the 200 areas.

YIN Comment 158

Section M.5.4--Cover Disturbance Considerations

Page(s) M.25

3.5.1.88 Comment: The subsidence of the cover system due to collapse of waste containers is only discussed in terms of the tanks. It would appear however, that the Pre-1970 buried TRU wastes in cardboard boxes, steel drums, and other containers, would be the most susceptible to failure and subsidence. The proposed grouting solution to this problem should be investigated over the next few years along with tank stability research.

YIN Comment 159

Section M.6.1--Disruptive Failure Scenario

Page(s) M.25

3.5.1.71 Comment: The assertion that 15 cm/yr of recharge is conservative should be explained since earlier in Appendix M, modeling results

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are reported where two-thirds of the yearly precipitation infiltrated through course soils (Case 1 - Table M.7). This would amount to approximately 20 cm/year of recharge. This value of 20 cm/year should have been used as a realistic value for the disruptive barrier failure, rather than 15 cm/year. 3.5.1.71

YIN Comment 160

Section M.6.2--Functional Barrier Failure Scenario

Page(s) M.26

Comment: To assess the impact resulting from disturbance of the protective barrier, two barrier failure scenarios were hypothesized: the disruptive barrier failure scenario and the functional barrier failure scenario. In the latter, an attempt has been made to test failure of a large barrier area. The functional barrier failure scenario has been defined such that 50% of the barrier area allows 0.1 cm/yr to infiltrate the underlying wastes with precipitation conditions of 30 cm/yr. However, this value of 0.1 cm/yr has been chosen arbitrarily. The simulations conducted to test the multilayer barrier efficiency demonstrate, for all cases where protection is effective, a total infiltration rate of less than 0.1 cm/yr. The value of 0.1 cm/yr, as the DEIS stated, refers to the terminal mass balance error in the simulation (page M-21). Hence, a value of 0.1 cm/yr may occur, even if the barriers perform as expected. In that case, the choice of a value that may occur under normal conditions is inadequate for use in simulation of a barrier failure scenario. 3.5.1.87

YIN Comment 161

Section M.7--Summary

Page(s) M.26

Comment: The summary discussion of the protective barrier makes no mention of any uncertainty in the infiltration simulation, but rater implies that the barrier will work perfectly. This is simply not demonstrated in the DEIS and this uncertainty should be acknowledged in this summary section. 3.5.1.57

APPENDIX O

YIN Comment 162

Section O.1--Stratigraphy Beneath the Hanford 200 Areas

Page(s) O.4

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4.2.40 Comment: The text states the sediments of the Ringold formation approach a thickness of 365 meters (1200 feet) in the Pasco Basin. This statement is not supported by maps published in RHO-BWI-ST-5, plates III-2 and III-3. Maximum thickness over the 200 areas could approach 400 feet. The authors must have meant 365 feet; not meters.

YIN Comment 163

Section 0.1--Stratigraphy Beneath the Hanford 200 Areas

Page(s) 0.5

3.5.2.4 Comment: A basic piece of information to hydrogeologic descriptions is a geologic cross-section tied to wells from which logging data has been extracted. Other than Figure 4.3, which is too generalized and exaggerated to allow the reader to gain a
3.5.2.23 proper perspective of the subsurface, such a cross-section is missing from the DEIS.

YIN Comment 164

Section 0.2--Physics and Chemistry of the Aquifer System

Page(s) 0.6

Comment: The assumption of hydraulic isolation is determined to be not totally valid by Dove, et al 1982. We agree with Dove on this point. We do not agree with the statement that aquifer intercommunication effect is negligible from the standpoint of contaminant transport. There are citations of contamination in the confined system as far away as the horn of the Yakima River which are currently unexplained. Because of this, the statement:
3.5.3.14 "... the aquifer intercommunication effect, if any, seems negligible from the standpoint of contaminant transport" needs to be substantiated. This is especially necessary in light of the possibility of erosional windows where upper basalt units have been removed and the unconfined aquifer is hydraulically connected to lower confining aquifers (Dove et al., 1982).

YIN Comment 165

Section 0.2--Physics and Chemistry of the Aquifer System

Page(s) 0.7

3.5.2.28 Comment: In view of the fact that chemical/radiation processes that are triggered by the introduction of radionuclides in the geochemical environment are not adequately understood in the

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laboratory, the assumption of steady state instantaneous equilibrium reactions cannot be justified. The DEIS analyses of geochemical interactions of contaminants in ground water are 3.5.2.28
based on the assumption that equilibrium occurs instantaneously in retardation processes. This is not a conservative assumption in many cases, and in the case of adsorption reactions, commonly leads to underestimation of resulting concentrations in ground water. The rationale of the long period of interest in the DEIS analyses is, for the most part, irrelevant to the issue of geochemical equilibrium. Long residence times (very slow-moving ground water) in some cases could justify equilibrium assumptions but this is not what the DEIS is referring to in this section of the document. Furthermore, other processes (e.g., colloidal transport, radiolysis) which are important in the prediction of radionuclide migration are not taken into account.

The DEIS assumes equilibrium conditions based on the long time period (i.e., thousands of years) involved. Even though many reactions do go to equilibrium in a short period of time, a 3.5.2.28
few reactions, important in modeling an aquifer system, may require as long as ten thousand years to reach equilibrium. An example is the reaction between calcite and dolomite in a regional aquifer in South Dakota (Back et al., 1983). Using carbon-14 to date the water, it was found that the reaction between calcite and dolomite (in the presence of gypsum) had not reached equilibrium after 10,000 years. Therefore, the DEIS should include an assessment of possible conditions and reactions that may not reach equilibrium rapidly.

Reference(s):

Back, W., B.B. Hanshaw, N. Plummer, P.H. Rahn, C.T. Rightmire, and M. Rubin, 1983, "Process and Rate of Dedolomitization: Mass Transfer and Carbon-14 Dating in a Regional Carbonate Aquifer," G.S.A. Bull., vol. 94, p. 1415-1429.

Dove, F.H., et al., 1982, AEGIS Technology Demonstration for a Nuclear Waste Repository in Basalt, PNL-3632, Pacific Northwest Laboratory, Richland, WA, p. 3.1- 3.46.

YIN Comment 166

Section 0.2--Physics And Chemistry Of The Aquifer System

Page(s) 0.8

Comment: The DEIS states that "... too little quantitative data have been derived to incorporate microbiological effects in transport equations." Whereas empirical data is lacking on the 3.5.2.43
role of microbes in trace-element and nuclide partitioning and attenuation, studies have indicated their importance in the role of controlling partitioning. Thiobacillus ferrooxidans can

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3.5.2.43

catalyze the oxidation of Fe(II) and subsequent precipitation of ferric hydroxide, which can act as an adsorbing substrate and co-precipitate (Singer and Stumm, 1969; Forstner and Wittmann, 1979). Furthermore, methylated trace-element metabolites are often much more mobile than their inorganic counterparts (Jenne, 1977; Holm et al., 1979). Therefore, the role of bacteria in nuclide partitioning and attenuation cannot be ignored.

Reference(s):

Forstner, U. and G.T.W. Wittmann, 1979, Metal Pollution in the Aquatic Environment, Springer-Verlag, New York, NY.

Holm, T.R., Anderson, M.A., Iverson, D.G., and R.S. Stanforth, 1979, "Heterogeneous Interactions of Arsenic in Aquatic Systems", in Chemical Modeling in Aqueous Systems, E.A. Jenne, ed., American Chemical Society Symposium Series 93, p.711-735.

Jenne, E.A., 1977, "Trace Element Sorption by Sediments and Soils- Sites and Processes", in Symposium on Molybdenum in the Environment, Vol. 2, W. Chappel and K. Peterson, eds., M. Dekker, Inc., New York, NY.

Singer, P.C. and W. Stumm, 1969, Oxygenation of Ferrous Iron: The Rate Determining Step in the Formation of Acid Mine Drainage -- Final Progress Report, Federal Water Pollution Control Administration, U.S. Department of Interior Water Pollution Control Research Series PB 189 233.

YIN Comment 167

Section 0.3.1.1--Functioning Protective Barrier Implace

Page(s) 0.9

3.5.1.30

Comment: The protective barrier performance is not reliably demonstrated. The DEIS assumes that wastes at Hanford can be effectively isolated with a properly engineered and undisturbed protective barrier based on preliminary assessment modeling and field experience at other sites. As it is stated, a performance assessment of the protective barrier will require an accurate model of water balance within the barrier, including source release and migration through the vadose zone to the water table. Due to limitations of data, modeling assessment is highly questionable. The DEIS states the conceptual model of the flow in the unsaturated zone contains appreciable uncertainty, but this is compensated for by erring on the side of conservatism. The following page however, goes on to assume absolutely no water infiltrates the wastes and underlying vadose zone. This does not appear to err on the conservative side.

The fact that the same type of barrier design has protected the Silla Dynasty Tomb in Korea for 1500 years from water in-

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3.5.1.30

filtration (page 1.14) does not prove that the example can be transposed to the Hanford Site, especially for 10,000 years. Performance of the engineered barrier is too important to travel time calculations and radionuclide releases to the environment to use an assumption based on a preliminary assessment.

YIN Comment 168

Section 0.3.1.1--Water Movement in the Vadose Zone-Functioning Protective Barrier Inplace

Page(s) 0.9

Comment: No supporting information is presented in the DEIS that confirms the lack of lateral movement under the sides of the barrier or delineates the flow paths indicated in Figure 0.2. Of particular note is the possibility of lateral spreading of percolating infiltration due to anisotropic conditions that may be present in the Hanford sediments. The DEIS states that the flow path labelled (a) in Figure 0.2 is "essentially vertical". However, as shown, it appears to be the most curved of all paths illustated. Eventhough some of the flow paths appear reasonable, others (b and c) appear somewhat questionable as presented in the figure. The discussion is confusing.

3.5.2.48

YIN Comment 169

Section 0.3.1.1--Functioning Protective Barrier Implace

Page(s) 0.10

Comment: The DEIS states that, after emplacement of the protective barrier, "... existing soil moisture will drain from the soil profile more slowly as the new cover moisture equilibrium is approached". The opposite is likely to occur. In section 4.5.3 of the DEIS, it is stated that precipitation is 16 cm/yr, on the average. High evaporation rates, combined with this low precipitation rate, should cause a net upward flux of water in the soil. The protective barrier should seal off the avenue for evaporation, thus increasing or stabilizing the moisture content of the soil underneath the barrier. The resulting condition would not be one of slower draining but faster draining. Therefore, the explanation of decreased drainage underneath the barrier should be re-assessed.

3.5.1.20
3.5.1.65

YIN Comment 170

Section 0.3.1.2--No Barrier or Less-than-Optimal Barrier Performance

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Page(s) 0.10

3.5.2.53 Comment: By timing the wetter climate-barrier removal scenario to start 500 years after the loss of institutional control, the "bad actors", i.e., cesium and strontium, have essentially decayed to low levels. This scenario run earlier than 2650 could have more serious consequences.

YIN Comment 171

Section 0.3.1.2--No Barrier or Less-than-Optimal Barrier Performance

Page(s) 0.10

Comment: The DEIS states that the vadose zone is "relatively thick." This statement is too qualitative.

YIN Comment 172

4.2.41 Section 0.3.1.2--No Barrier or Less-than-Optimal Barrier Performance

Page(s) 0.11

3.5.1.89 Comment: The basis for the DEIS assumption that 50% of incipient precipitation would infiltrate the basalt riprap and that this infiltrating water would directly contact 10% of the waste stored beneath the barrier is not stated. The rationale for choosing these figures should be included in the DEIS.

YIN Comment 173

Section 0.3.2--Water Movement in the Saturated Unconfined Aquifer

Page(s) 0.12

Comment: The DEIS misinterprets findings of Kirkham and Gee, 1984. The previous authors state, "significant" drainage (recharge) can occur through the root zone to the unconfined system. The DEIS interprets this to mean "small" quantities of recharge to the unconfined system during wet years. This is a very narrow and biased interpretation. For non-vegetated soils Kirkham & Gee found that nearly half of all the annual precipitation is recharged. This is not a "small" quantity during wet years. The DEIS should use more conservative estimates for coarse-grained soil recharge.

3.5.1.78

YIN Comment 174

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Section 0.3.3--Contaminant Transport in the Total System

Page(s) 0.12

Comment: The DEIS states many natural and chemical mechanisms act along flow paths to radically delay travel times and decrease concentrations of radionuclides and chemicals. These statements are purely speculation and have not been substantiated by the behavior of current contaminant plumes, i.e. specifically tritium and nitrates. If these processes are so effective, why are current contaminant plumes entering the Columbia from the 200 areas in less than 40 years? 3.5.2.31

YIN Comment 175

Section 0.3.4--Geochemical Interactions-Retardation

Page(s) 0.15

Comment: The DEIS states conservative values of K_d have been used whenever a range exists. These ranges should be listed in the text or at least referenced in the document so that the degree of conservatism can be evaluated. 3.5.2.35

YIN Comment 176

Section 0.4--Mathematical and Numerical Models

Page(s) 0.16

Comment: The DEIS states the results of running numerical models generate the conceptual model of a site. This is fundamentally backwards. The numerical model is set up based on the modeler's conceptual idea of the flow field. The results should confirm the conceptual model, not create it. 3.5.2.18

YIN Comment 177

Section 0.4.1--Moisture Movement And Diffusive Contaminant Release In The Vadose Zone

Page(s) 0.16

Comment: The procedure described to estimate travel time in the vadose zone is not correct. A unit hydraulic gradient model is used to describe the infiltration mechanism in the vadose zone. The basic assumption is that the hydraulic gradient of the steady- state solution is equal to 1. This indicates that the water content must be uniform everywhere. No such infiltration 3.5.2.16

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3.5.2.16 process has been reported in the literature. This assumption is far from conservative since the only driving force considered is the gravitational potential, and all other driving forces having been neglected. For example, according to the suction head versus water content soil characteristic curve, suction forces corresponding to water content of 7% to 8% are greater than the gravitational force. Thus, water will not infiltrate downward, as the DEIS assumes.

The procedure to evaluate travel time in the vadose zone uses an infiltration rate equal to the annual recharge rate (i.e., 0.5 cm/yr). The actual intensity of precipitation can have expected values as high as 1.3 cm/hr, persisting 1 hour once every 10 years (page 4.26). Even if 0.5 cm/yr of annual average recharge rate can be used in a groundwater model to simulate a water-table map, the validity of using such a value to estimate

3.5.2.16 travel times in the vadose zone has not been demonstrated. Since travel time in the vadose zone is the major component of the total travel time (page 0.9), the overall procedure to estimate the potential impact of waste release is unreliable due to uncertainties in the travel time estimates for the vadose zone. A long travel time in the vadose zone will allow significant radionuclide decay to occur, thus reducing the concentration of radionuclides reaching the accessible environment. Therefore, it is crucial that travel time in the vadose zone be accurately determined due to its importance in the overall performance of the in-place stabilization and disposal alternative.

The steady state solution to the Richard's equation may not

3.5.2.16 be the most conservative approach to estimating water movement in the vadose zone. It has been shown transient pulses may transmit significant quantities of water. This is especially relevant at Hanford during the winter where snow melt can provide significant recharge in the presence of extended cloud cover; (common winter conditions) or during periodic short-duration, high-intensity storm events.

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YIN Comment 178

Section 0.4.1.1--Unit Hydraulic Gradient Model

Page(s) 0.16

3.5.2.16 Comment: The relationships assigned for the soil moisture characteristic curve and the unsaturated hyraulic conductivity curve are not properly referenced. They are presented in such a way to imply that equations 0.2 and 0.3 are absolute, universally accepted relationships similar to Richards' equation (equation 0.1). This is clearly not the case and their use in this analysis should be justified.

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YIN Comment 179

Section 0.4.1.2--Description of the Simplified Approach to Release Beneath a Protective Barrier

Page(s) 0.19

Comment: It should be noted in the discussion of the two vadose regions (advection-controlled and diffusion-controlled) that as moisture contents decrease under the barriers, gradients will be established with lateral components directed towards the waste from outside the protected waste. An analysis needs to be performed to evaluate whether these gradients could induce flow enough to contact infiltrating water with the waste form. 3.5.2.48

YIN Comment 180

Section 0.4.1.3--Diffusion-Controlled Release Model

Page(s) 0.20

Comment: The DOE has unsuccessfully attempted to characterize moisture movement beneath the protective barrier. The moisture movement in the vicinity of waste disposal is not understood at the present time. This does not allow the DOE to assume that advection transport is negligible under the "protective" barrier. Assuming the diffusion process as the only alternative to transport overestimates the travel time. A simple calculation for the travel time of a particle moving from the waste to the edge of the barrier, assuming the molecular diffusive process and using data from Tables P.3 and 0.9 and formula 0.13, results in a value of 136,000 yrs. This assumption of the mechanism controlling the transport in the vadose zone is far from being conservative. 3.5.2.17

YIN Comment 181

Section 0.4.1.3--Diffusion Controlled Release Model

Page(s) 0.21

Comment: The derivation of time to source depletion does not define M_o. This omission hinders the verification of the mathematical treatment of the problem. 3.5.2.17

YIN Comment 182

Section 0.4.1.4--Moisture Movement Beneath a Protective Barrier

Page(s) 0.23

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3.5.2.5

Comment: After the discussion of the problems and failure of the two-dimensional unsaturated flow modeling along the edge of the protective barrier, the DEIS states, "the solutions obtained (from the 2-D modeling), albeit flawed, reinforce the intuition that isolation is achievable if the waste is positioned sufficiently far from the barrier edge." Such statements are inappropriate since the modeling results are obviously not reliable and probably only reflect the built-in assumptions that represented the investigator's intuitions prior to modeling (see above comment on section 0.4, page 0.16). The DEIS should be revised to simply state unsaturated flow along the edge of the protective barrier is not presently understood. Further, this uncertainty should be factored conservatively into the analyses.

YIN Comment 183

Section 0.4.1.4--Moisture Movement Beneath a Protective Barrier

Page(s) 0.23

3.5.2.5

Comment: The DEIS does not present the results of the 5 cm/yr infiltration rate condition and regarding redistribution of antecedent soil moisture following placement of the cover. Clearly in this case, relative to the 0.5 cm/yr case, there will be more soil moisture for this redistribution. This case (not the 0.5 cm/yr case) should be the basis for judging whether moisture originally in contact with the waste might significantly migrate downward towards the water table.

YIN Comment 184

Section 0.4.1.4--Moisture Movement Beneath a Protective Barrier

Page(s) 0.23

3.5.2.5

Comment: Since the model of the Protective Barrier failed to converge on a solution in the steady state case and numerical anomalies occurred in the transient simulation, no confidence can be had in any predictions made from these simulations. It is clear DOE needs to re-evaluate their approach to analyzing moisture movement beneath the barrier. Until this is done, the DEIS is unconvincing as to the amount of protection which can be supplied by the barrier.

YIN Comment 185

Section 0.4.2--Water Movement in the Unconfined Aquifer

Page(s) 0.24

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Comment: The applicability of the present calibrated version of the mathematical model for the unconfined aquifer has not been demonstrated. The movement of groundwater in the unconfined aquifer is considered part of the transport mechanism for wastes. To estimate the travel time in the unconfined aquifer, the DOE uses a mathematical model: the VTT model. The VTT model takes into account the spatial variability in the hydraulic conductivity. Since the spatial variation in hydraulic conductivity is not known due to lack of experimentation, hydraulic conductivities are artificially calibrated in such a way that the calculated head values match the actual observed values. This process, called the calibration of the model, has been performed using a routine transmissivity iterative calculation and is a continuing process as stated in the DEIS (page 0.25). The VTT model used by the DOE has been calibrated to a water table perturbed by past water disposal practices which have created artificial recharge. There are two problems associated with this methodology: 3.5.3.25

First, the DOE did not assess the reliability of such a calibration. A reliable calibration procedure is based on a thorough understanding of all disturbances in the aquifer (e.g., artificial recharge, pumping, infiltration). The DEIS stated that the calibration has been performed for a water table aquifer which has been perturbed by liquid waste disposal practices. The calibration of a model depends upon the number of calibrated parameters one introduces into the model. The main problem is whether this calibration has been validated against real data. Based on the statement: "An effort to improve detailed understanding ... and modeling capability ... is currently under way..." (page 0.25), and therefore it does not appear that the calibration has been validated. 3.5.3.25

Secondly, to assess the long-term effects, the aquifer is assumed to eventually resume pre-1960 conditions (i.e., negligible withdrawal of groundwater by pumping). In other words, the previously calibrated model will be used for an aquifer-stressed state with pumping conditions different from those used in the calibration process for which the numerical model has been developed. This theoretically can be done, however, with some restrictions: 3.5.3.25

(a) The calibration process must be performed in an *absolute* fashion (e.g., no dependence of the parameters on the aquifer condition used to perform the calibrations). This must be demonstrated through screening and testing procedures. 3.5.3.25

(b) Even if the general equation presented (page 0.25) is shown to be time dependent, the DOE seems to use a steady state analysis. This is valid only if equilibrium of the aquifer can be assumed throughout the whole simulated period. In the present case, two questions arise:

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(i) can equilibrium of the aquifer be assumed for a 10,000 year period?

(ii) Was the pre-1960 aquifer in equilibrium?

3.5.3.25 Unless the above concerns are addressed, the DOE modeling efforts remain highly questionable.

It would seem the best approach to predicting the configuration of the water table would be to take the existing VTT model of the Hanford site and eliminate the source (mounding) terms that are attributable to current operations. This transient simulation would also allow evaluation of the length of time needed for these man-made effects on the water table to dissipate.

YIN Comment 186

3.5.3.24 Section D.4.2--Water Movement in the Unconfined Aquifer

Page(s) D.25

Comment: Should Hanford be chosen for a geologic repository, surface support facilities must be constructed and operated. This possibility was not taken into account in the DEIS and may refute the "key assumption" that "after closure the aquifer reverts to pre-1940 conditions". If the geologic repository is located at Hanford, the construction may require water withdrawals that could significantly alter the water table and severely stress the applicability of the present model. The key assumption that no withdrawal takes place from the aquifer is not conservative. Most of the scenarios envisioned in the future contain some pumping from wells. The model should incorporate these scenarios.

YIN Comment 187

Section D.4.2--Water Movement in the Unconfined Aquifer

Page(s) D.26

3.5.2.14 Comment: The DEIS discusses the travel time (water particle) results of the VTT code in terms of longitudinal disperson and transverce mixing. Dispersion and mixing have nothing to do with the calculation of average travel times. Consideration of dispersion is part of the transport analyses, not the determination of hydraulic head which is what the VTT model was used for.

YIN Comment 188

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Section D.4.3--Transport in the Vadose Zone and the Unconfined Aquifer

Page(s) D.27

Comment: The DEIS states long-term transport models cannot be validated since only 40 years of monitoring data are available. 40 years of data is actually an excellent data base compared to most hydrogeologic data bases. Clearly a long-term (on the order of thousands of years) model cannot be proven to be accurate, however the existing contamination affords an opportunity to refine and bound the modeling effort. 3.5.2.21

More importantly concerning the existing contamination is the lack of discussion concerning any prospects for restoration. It is by no means obvious this contamination will be reduced to below EPA standards by the time 100 years after closure has arrived. It must be assumed at that time use of ground water is possible and therefore a prediction of concentrations at the year 2150 and beyond should be included in the DEIS. 3.5.2.21

YIN Comment 189

Section D.4.3.6--Application to the Hanford Site

Page(s) D.33

Comment: More discussion is needed in the DEIS regarding establishment of a constant dispersion coefficient over the entire flow system based on dispersion in the unsaturated zone. It would appear dispersion coefficients could possibly be calculated from existing contamination. It is not clear how the dispersion coefficient was calculated from the unsaturated zone. Some aspects or cases of dispersion in unsaturated media may lead to overestimation of dispersion components (e.g. tortuosity) relative to saturated conditions. 3.5.2.13

YIN Comment 190

Section D.4.3.6--Application to the Hanford Site

Page(s) D.33

Comment: Retardation factors are not listed in Appendix P as stated in the DEIS; rather K_{ds} are listed. The wording should be changed to reflect this. 4.2.55

YIN Comment 191

Section D.4.4--Geochemical Interactions--Retardation

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Page(s) Q.36

Comment: The use of the Langmuir Isotherm instead of the Freundlich Isotherm, which is used in the DEIS, would provide a more realistic representation of sorption. The Freundlich Isotherm is limited because: (1) it predicts infinite adsorption at infinite concentration (i.e., no maximum), and (2) it does not pass through the origin (i.e., no "zero" adsorption). The Langmuir Isotherm, on the other hand, is a quadratic expression that: (1) provides for a maximum, and (2) passes through the origin. Rubin and Mercer (1981) indicate that the Langmuir Isotherm is much more preferable to the Freundlich Isotherm where sufficient data exists. Therefore, the adsorption data should be reconsidered with respect to the Langmuir model. 3.5.2.49

Reference(s):

Rubin, A.J. and D.L. Mercer, 1981, "Adsorption of Free and Complexed Metals from Solution by Activated Carbon", in Adsorption of Inorganics at Solid-Liquid Interfaces, M.A. Anderson and A.J. Rubin, ed., Ann Arbor Science Publishers, Inc., Ann Arbor, MI, p. 295-325.

YIN Comment 192

Section Q.4.4--Geochemical Interactions--Retardation

Page(s) Q.38

Comment: The DEIS states that pH effects on adsorption are "another way to refer to competing H+ ions". This incorrectly implies that H+ competition is the only way pH manifests itself on adsorption. The DEIS does indicate that pH can affect the stability of the adsorbing medium (especially metal hydroxides). However, pH affects the surface charge rather than competes with ions for adsorption sites. It is the relationship between the pH of the solution and the pH of the isoelectric point (a characteristic of the adsorbing medium) that determines the charge on the surface and, in part, the degree of adsorption. The nature and charge of ions in solution are also affected by pH (Drever, 1982; Stumm and Morgan, 1981). 3.5.2.49

Reference(s):

Drever, J.I., 1982, The Geochemistry of Natural Waters, Prentice-Hall, Inc., Englewood Cliffs, NJ.

Stumm, W. and J.J. Morgan, 1981, Aquatic Chemistry, An Introduction Emphasizing Chemical Equilibria in Natural Waters, 2nd ed., Wiley-Interscience, New York, NY.

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APPENDIX Q

YIN Comment 193

Section Q.1--Introduction

Page(s) Q.1

Comment: The scenarios used are not worst-case scenarios. The choice of scenarios greatly influences the outcome and associated impacts. DOE should study more realistic scenarios. For example, farm irrigation wells within 5 km of the site would be more realistic and probable. 3.5.3.13 3.5.6.29

YIN Comment 194

Section Q.2--Scenarios and Assumptions

Page(s) Q.2

Comment: The functional barrier failure assumption of 0.1 cm/yr infiltration in the case of 30 cm/yr precipitation not appropriate. This failure should have been perhaps 10-20% of annual precipitation as in the case for the 0.5 cm/yr precipitation case (see above comments). 3.5.1.74

YIN Comment 195

Section Q.4--Aquifer Modeling

Page(s) Q.5

Comment: Figure Q.1 indicates flow going around to the south of the Gable Mountain structure, yet water table contours indicate flow could diverge and move northward between Gable Mountain and Gable Butte and enter the Columbia sooner than is shown on the figure. The reason this pathway was not considered should be made clear. 3.5.3.24

YIN Comment 196

Section Q.4--Aquifer Modeling

Page(s) Q.9

Comment: The results of the modeling are presented in this section of the DEIS, however, they are not very meaningful since many of the input parameters are unknown to the reader. Soil- 3.5.3.25

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3.5.3.25 water characteristics curves, hydraulic conductivity, effective porosity, and boundary conditions, and their justification, are all necessary pieces of information that belong in the DEIS.

Rather than reproducing Appendices M and O, which is basically what much of this appendix is, the specifics of the input parameters should have been thoroughly discussed.

YIN Comment 197

Section Q.6.1--Results of the "Dry Climate" Simulations

Page(s) Q.14

3.5.3.11 Comment: There is no discussion of resulting ground water contamination in terms of applicable EPA standards for drinking water (40 CFR 141.16). For example, the concentrations in the 5 km-well under the 0.5 cm/yr in-place scenario results in a yearly dose of over 13 mrem/yr (Table R.8) to an individual in the year 7150 (5000 years after disposal). This dose exceeds 10 CFR 141.16. Another example is the disruptive barrier failure for the in-place stabilization and disposal alternative under 5 cm/yr recharge. In this case, the standard of 15 pCi/l for gross alpha (40 CFR 141.15) is exceeded by a factor of approximately 600. By not acknowledging these non-compliance situations, the DEIS is incomplete.

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YIN Comment 198

Section Q.7--300 Area TRU Burial Grounds

Page(s) Q.31

3.1.3.10 Comment: The discussion and presentation of the results of the 618 Burial Ground Sites is inadequate since only the results of the no-barrier situation are presented (Table Q.16). Results should have been produced for the case of an operative barrier if that is planned for these sites. It is apparent the predicted ground water contamination without a barrier is well above EPA water quality standards (40 CFR 141.16 - e.g. the strontium standard is exceeded by a factor of 300).

YIN Comment 199

Section Q.8--Water Table Changes Resulting from Potential Irrigation Scenarios

Page(s) Q.31

3.5.3.1 Comment: The irrigation scenarios do not assume irrigation on the 200 or 300 areas. This is not a conservative approach, nor

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is it realistic in light of the increase in irrigated farming over the past 10 years surrounding Hanford. There is no reason why the 200 areas would not be selected for irrigation in the future. Past irrigation practices, i.e. before 1950's should not determine the location of future irrigated areas. Original settlements were probably irrigated by wells in these regions because of shallower water tables near the river. Current and future technology allows for the construction of deeper wells and should be incorporated into the scenario development. 3.5.3.1

YIN Comment 200

Section Q.9—Conclusions from Irrigation Modeling

Page(s) Q.33

Comment: The predicted effects of irrigation on the level of the water table relative to the Wye and 300 areas should be assessed in the DEIS. Because the depth to water in these areas is relatively shallow, this could be an important issue. Furthermore, the resulting concentrations and travel-times of radionuclides in ground water should be calculated. Because the travel-times would be shortened by the predicted higher water table, this scenario may prove to cause unacceptable impacts. By not recalculating environmental impacts, consideration of the irrigation scenario is meaningless. 3.5.3.1

APPENDIX R

YIN Comment 201

Section R--Assessment of Long-Term Performance of Waste Disposal Systems

Page(s) R.1

Comment: The DEIS states under "all" scenarios for the disposal alternatives that consequences to off-site populations would be negligible compared with the consequences from naturally occurring radiation sources. The DEIS has not demonstrated this to be the case since worst-case scenarios have not be considered (see above comments). Rather it appears that non-conservative and unrealistic scenarios have been used in the consequence analyses. 3.5.5.20

YIN Comment 202

Section R.1.1--Climatic Considerations

Page(s) R.4

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3.5.6.2

Comment: The DEIS states that a change to more arid conditions would not be expected to disturb waste sites. Although the DEIS recognizes that a dryer and windier climate could increase wind erosion, it fails to address how this climatic change could actually increase infiltration. A dryer climate (and the pre-existing dry conditions) result in sparse vegetation. The combination of wind and poor vegetation can lead to erosion of cohesionless top soil. As the top soil erodes, vegetation roots are undermined, leaving infiltration avenues for precipitation.

3.5.6.2

It is important to recognize that precipitation in dry climates occurs as a few brief but intense events that saturate the top soil. The intensity of these storms result in strong erosive forces on barren, cohesionless soil (Wischmeier and Smith, 1978). Sheet erosion can further promote soil and vegetation loss. The resulting conditions due to climate may be: (1) decrease in vegetation, and (2) increase in soil erosion. The final result may induce greater infiltration during periods of precipitation, as well as erosion of the protective soil cap.

Reference(s):

Wischmeier, W.H. and D.D. Smith, 1978, Predicting Rainfall Erosion Losses--A Guide to Conservation Planning, U.S. Department of Agriculture, Agricultural Handbook, no. 537.

YIN Comment 203

Section R.1.3--Migration Analysis

Page(s) R.4

3.5.2.51

Comments: The DEIS states that 6 samples were taken from each soil layer for soil-parameter analysis. Six samples are insufficient to delineate the characteristics of a population. At least 30 samples from each unit are necessary to establish the variability within a sample population. Little inference to the characteristics of the population can be drawn from 6 samples. Furthermore, the sampling scheme was not presented (i.e., the samples may have been taken randomly, stratified, systematically, or multi-stage). Considering that the results are the basis for the determination of downward radionuclide migration, this sampling scheme is inadequate.

Reference(s):

Koch, Jr., G.S. and R.F. Link, 1971, Statistical Analysis of Geologic Data, Vol. 1, Dover Publications, Inc. New York, NY.

YIN Comment 204

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Section R.1.4--Dosimetric Analysis

Page(s) R.5

3.5.3.10

Comment: The DEIS states calculated water contaminant concentrations change relatively little from the point of contaminant entry to downstream locations. This sentence is in contrast to previous discussions which suggest considerable retardation of radionuclides takes place during transport. This contradiction should be resolved in the DEIS.

YIN Comment 205

Section R.3--Drilling

Page(s) R.65

3.5.6.23

Comment: The drilling scenarios do not include opening a direct recharge pathway from the surface through the wastes and more rapid movement of contaminants to the water table. This should be considered in the impacts.

YIN Comment 206

Section R.3--Drilling

Page(s) R.67

3.5.6.22

Comments: The DEIS assumes that a driller will spend 40 working hours at the site, drilling through the wastes. To average that exposure over one year (as described in Table R.51 of the DEIS for occupational accidents) is very misleading. A large exposure over a short time period (sub-acute to acute exposure) has markedly more severe physiological impacts than that same exposure averaged over 1 year (sub-acute to chronic). This is especially misleading due to the almost-instantaneous absorption resulting from inhalation.

YIN Comment 207

Section R.4--Major Excavaton

Page(s) R.71

3.5.6.20

Comment: Assumed mass loading rates are not referenced. The basis for these loadings should either be discussed or referenced.

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Section R.5.3--Postdrilling/Excavation Habitation

Page(s) R.81

3.5.6.20 Comment: The basis for the resuspension rates as well as mass loading rates should either be referenced or discussed.

YIN Comment 209

Section R.5.4--Multiple Small Farms

Page(s) R.81

3.5.3.13 Comment: The text states the quantity of available ground water can be estimated by integrating the flow across a north-south line connecting Gable Mountain and Rattlesnake Mountain. This approach would be fine if most of the flow is crossing this line.

4.2.55 However, the map referenced is Figure Q.3, which is the map for the 5 cm/yr recharge rate. Flow from the 200 areas is to the north with a ground water divide located in this region of the north south cross section. Figure Q.2 should be referenced here, if in fact eastward flux across this line is considered. It should be noted under the 0.5 cm/yr recharge rate that some flow still occurs to the north. By taking a north-south cross section, the amount of available water may be underestimated.

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4.2.55 Comment: The 5 cm/yr scenario incorrectly references Figure Q.2. This should be Figure Q.3.

Comment: The affected population of 260 people does not consider the farmer selling any of his crops. This an unreasonable assumption.

3.5.6.29 Comment: Intrusion scenarios are not conservative individual farm scenarios. The water drawn for irrigation purposes could come from areas closer than 5 km from the waste. Further produce could be shipped out to contact many people, as is presently the case with crops grown locally. Therefore impacts have very likely been underestimated.

YIN Comment 210

Section R.6--Glacial Flooding

Page(s) R.89

Comment: The DEIS states: "Studies conducted in support of this EIS effort suggest that recurrence of the advance and retreat of ice flows sufficient to result in catastrophic floods of this

3.5.6.8 magnitude might arise 40,000 to 50,000 years from now." No reference is provided in the DEIS. It is impossible to assess

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the adequacy of the conclusions of a study if the study parameters, methods, and conditions are not provided. Therefore, the 3.5.6.8
information should be provided or reference sources cited that will provide details of potential catastrophic flooding at the Hanford site.

YIN Comment 211

Section R.10--Seismic Events

Page(s) R.94

Comment: The DEIS states "... underground motion will be one- 3.2.2.8
half to two-thirds that of the surface in an undisturbed medium". The DEIS does not state at what depths these numbers have been calculated.

APPENDIX U

YIN Comment 212

Section U.1--Introduction

Page(s) U.1

Comments: The DEIS states that organic compounds were not ana- 3.1.4.26
lyzed in the study of non-radioactive contaminants. Organic compounds may have an adverse environmental impact. In addition, their reaction with toxic trace metals such as chromium, cadmium, and mercury must be examined. Jenne (1977) notes that organic 3.1.6.1
acids tend to almost always make trace metals more mobile by the formation of less-reactive organic complexes. He further indicates that this process must be considered as important as adsorption in the fate of trace metals in natural waters. It is clear a thorough investigation of the organic-type and related wastes in "all" waste classes, in terms of their quantities and hazards, must be adequately carried out "prior" to any decisions being made concerning alternatives.

Reference(s):

Jenne, E.A., 1977, "Trace Element Sorption by Sediments and Soils--Sites and Processes", in Symposium on Molybdenum in the Environment, Vol. 2, W. Chappel and K. Peterson, eds., M. Dekker, Inc., New York, NY.

YIN Comment 213

Section U.4--Results

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Page(s) U.4

3.5.5.17 Comment: The results of the non-barrier scenario include predicted well concentrations that exceed water quality standards (40 CFR 141.11) for chromium, mercury, and nitrate. These standards are not exceeded for the 100% effective protective barrier case. Because this latter case is, by definition not conservative, analyses of partial failure of the barrier is necessary to determine at which point, compliance with federal regulations is attained. At that point, the degree of conservatism can be taken into consideration in the decision of selecting an alternative.

APPENDIX V

YIN Comment 214

Section V.2--Cribs

Page(s) V.6

3.5.3.21 Comment: The DEIS states, based on results from monitoring ground water below Crib 216-Z-12, plutonium did not reach the water table. However, since this crib was last operated in 1973, the ground water beneath the crib now may not show significant effects from the overlying crib. It might be more appropriate to monitor areas downgradient for radionuclides released from the crib in question.

YIN Comment 215

Section V.2--Cribs

Page(s) V.14

3.5.3.5 Comment: The DEIS states dus to caliche layer (the thickness of which is not specified), acidic uranium contamination could not have reached the ground water without some type of man-made disturbance. No information is provided to support this claim that this contamination could not have infiltrated by conventional means (not along well bores). The fact the waste fluid was probably acidic would allow for possible dissolution of the caliche layer.

YIN Comment 216

Section V.5--Reverse Wells

Page(s) V.29

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3.5.3.4 Comment: The DEIS claims radionuclide contamination of the ground water from Reverse Well 216-B-5 has resulted in little migration. This claim is not adequately supported in the DEIS since only sediment samples were analyzed for specific radionuclides (Pu,Cs,Sr). Ground water was not analyzed for specific radionuclides and therefore the claim that migration has not occurred is inappropriate. Some discussion of the other reverse wells and the likely contamination that has resulted from their use would be appropriate.

YIN Comment 217

Section V.6--Disposal Ponds

Page(s) V.32

3.5.2.45 Comment: The DEIS implies in the summary of the disposal pond discussion that the cesium, plutonium, and strontium levels in sediment samples fully delineate the extent of contamination caused by these ponds. This is simply not the case and should be clearly stated otherwise since these three (3) radionuclides tend to be retarded. Other constituents, such as tritium, ruthenium and uranium are more mobile and have migrated substantially in the unconfined aquifer (Price et al, 1985 and Braver and McFadden, 1975).

Reference(s):

Braver, F.P. and McFadden, K.M. 1975. Iodine-129, Cobalt-60 and Ruthenium-106 Measurement on Water Samples from the Hanford Project Environs, Draft Report, Pacific Northwest Laboratories.

Price, K.R. and others, 1985. Environmental Monitoring at Hanford for 1984, Pacific Northwest Laboratories, for U.S. DOE.

YIN Comment 218

Section V.7--241-T-106 Tank Leak

Page(s) V.32

3.5.3.4 Comment: It would have been instructive to show both the 1973 and 1979 distribution of contaminants. It would then be possible to assess the distance travelled in that six (6) year period. It would also be of interest to see current distributions, if any have been measured. Plans to continue monitoring movement of these tank leaks should be discussed.

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Section V.8--Summary and Conclusions

Page(s) V.33

3.5.3.11 Comment: A major oversight in the Site Monitoring Appendix (V), and the DEIS in general, is the lack of discussion concerning present ground water contamination levels. Sediment samples are the focus of Appendix V and while these are important, the contamination in ground water should be of primary concern since it poses a more serious and far-reaching environmental problem.

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Save the Resources Committee (SRC)
Page 1 of 9 pages

Comments concerning DOE's Draft Environmental Impact Statement (DEIS) DISPOSAL OF HANFORD DEFENSE HIGH-LEVEL, TRANSURANIC AND TANK WASTES [DOE/ EIS 0113].

Save the Resources Committee (SRC) is an environmental organization on the Olympic Peninsula located in Port Townsend, Washington. We are concerned that there are numerous flaws in the DEIS, enough to warrant a total reassessment of the process by which this document was drafted.

The scope of the DEIS is inadequate. The document does not give a full inventory of all on-site radioactive and toxic defense waste at Hanford. It does not outline a program for permanent disposal of chemical wastes which are a result of defense activities, nor does it address permanent disposal of all wastes in the 100 areas of Hanford which are a result of defense activities. The wastes included in the Surplus Facilities Management Program should be addressed in the EIS. The DOE should open all records concerning the entire inventory of wastes at Hanford to public review and analysis by independent scientific teams. The scoping process should then be reopened which would include scoping hearings with full public participation. Notification of the scoping hearings should appear in every mailbox in the states of Washington and Oregon as well as the major news media, giving adequate time for full public participation.

2.3.1.14
2.2.13
2.3.2.8

Because the DOE waived the scoping hearings, we at SRC cannot believe that the DOE seriously wanted full public participation in the process of safely handling nuclear wastes at Hanford.

2.3.1.1

We are disturbed by reports that the DOE routinely destroyed key decisional documents pertaining to the selection of Hanford as one of three finalists for a high-level commercial radwaste repository. All such documents should have been and must be placed before the public to allow an informed public to participate in the decision-making processes concerning the handling of high-level nuclear wastes. It is for the public to decide whether or not these documents are relevant to the issue of handling high-level defense wastes at Hanford.

2.3.2.8

Likewise, all current and historical documents pertaining to the handling of all defense wastes at Hanford should be placed before the public and adequate time should be given the public to analyse these documents. This would not compromise national security interests since these documents deal with the back-end of the weapons production cycle, and it is clearly in the national interest to safely dispose of all of Hanford's high-level nuclear wastes.

2.3.2.8

Linkage of the issue of handling defense wastes at Hanford and the handling of commercial wastes including commercial waste repository characterization and construction is lacking in the DEIS. The issue of comingling defense and commercial wastes is not addressed by the DEIS. The DOE should state clearly and thoroughly its intentions within the EIS, including any plans for comingling wastes and any plans or objectives for reprocessing civilian nuclear wastes for defense plutonium production which would result in production of more defense wastes.

2.1.3

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SRC Comments
Page 2

The principal flaw in the DEIS is the fact that the DOE has ignored as one of its options the only empirically proven method of safely handling nuclear wastes: namely, to not produce nuclear wastes in the first place. As a result, it is clear that the DOE's primary objective is to continue producing nuclear weapons and that public health and environmental safety issues are of much less importance to the DOE.

2.5.6

Because of their fundamental importance to national security and the obvious high human stakes involved, public health and environmental safety must always be of primary importance.

2.2.1

Further production of new defense related high level nuclear wastes should not commence until it is proven empirically that there is a truly safe way to permanently handle all existing high level nuclear wastes. Simply reclassifying the waste does not solve the problem of permanent disposal.

2.4.1.8

The DEIS requests us to choose among three options for permanent disposal, none of which have been technologically proven. The sheer volume, toxicity and radioactivity of existing high level wastes warrants a solution to the permanent disposal problem before this inventory is added to via further weapons material production. There is clearly enough plutonium 239 and highly enriched uranium 235 in the United States' inventory of special nuclear materials to produce the number of nuclear weapons needed to deter a nuclear war. Further reprocessing for new weapons grade plutonium is not needed and in fact poses a serious and unnecessary hazard. At present it appears that with the DEIS the DOE is simply satisfying its minimum legal requirements to enable further production of plutonium for nuclear weapons. This leaves us to wonder if the DOE is paying any serious attention at all to criticisms from the public in the DEIS process. In the DEIS there does not appear to be any major change in existing approaches to the nuclear waste problem, and major changes in attitude and approach are needed if full protection of the environment is to occur.

3.3.5.1
2.5.6
2.5.5

We seriously question the competence and integrity of the people who drafted and edited this DEIS document. Anyone who does not know, remember or acknowledge that the isotopic and chemical composition and concentration of defense wastes differs from naturally occuring radiation sources (ie. background radiation) should not be placed in a position to determine policy concerning nuclear production and nuclear waste matters. For example: when calculating the health effects of radioactive sources, one can not make a direct correlation between naturally occuring uranium ore and defense waste, or cosmic rays and defense waste.

3.5.5.11

It is appalling to us at SRC that the United States Department of Energy (DOE) must be reminded that the government of the United States of America was founded as a government of, by and for the people, and not as a government of, by and for nuclear weapons. It is the responsibility and duty of the DOE as a tax supported and public entity to fully participate in public meetings and debates sponsored by citizen groups, to be accountable to the citizens it should be serving, and to use these meetings and debates as opportunities to inform the public about DOE's policies, programs and activities. Instead, we have seen that the DOE has

2.3.2.8

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failed to accept invitations by organizers of public forums on nuclear waste issues when the DOE subjectively judged these meetings to be "adversarial", and has in other instances provided to such meetings speakers who are not thoroughly familiar with the issues covered in the meetings.

The public must be involved in each part of the EIS process. This must include full access to information, full public discussion, and full scope scientific review by independent scientific teams.

2.3.2.8 It is unfortunate that in the DEIS the DOE has relied primarily on in-house data and DOE subcontracted data as a basis for its assumptions. Because the DOE has been given the mandate to build nuclear weapons as its top priority, we cannot expect or assume that the DOE will be objective in analysis of safety and environmental issues as they pertain to the permanent storage of nuclear wastes. When searching for a solution to a problem

2.3.2.9 as technologically complex as the permanent storage of nuclear wastes, it is imperative that the research and analysis of data be conducted by a variety of institutions and organizations concerned with the issue. Federal funding should provide for participation by a spectrum of public and private organizations.

2.3.2.10 What we find in the DEIS are conclusions which seem to be designed to promote the further funding of DOE operations at Hanford. In the DEIS the DOE is ludicrously optimistic in its bounding criteria. The DOE relies on assumptions which are clearly unfounded. Valid scientific studies by independent groups have been ignored.

The DEIS leaves open-ended the question of exactly how much and what high level nuclear waste will be created by defense activities in the future. In fact, the DEIS seems to give the DOE carte blanche

3.1.7.2 to produce as much new defense related high level nuclear waste as it may wish. The DEIS does not specify anything beyond 1995 in terms of production, repository size,need,amount and character of new wastes to be produced. If plans for a second national commercial radwaste repository are being delayed or terminated, this leaves a serious question as to the size and capacity of the repository needed under either the reference alternative or the deep geological repository alternative.

3.3.2.2 The DEIS does not place enough emphasis on stabilizing the existing wastes at Hanford, which clearly should be a priority. Waste calcining should be done immediately as an emergency measure.

3.1.1.1 Statements such as, "While what was introduced to the (single shell) tanks is largely known, reactions within the tanks and transfers of contents cause some doubt as to their actual contents and their present chemical speciation," (xxxv) tell us that the DOE does not even know what it is dealing with now with existing nuclear wastes. This confirms our belief that the DOE does not have enough knowledge of the nuclear waste problem to continue generating more new nuclear wastes. The In Place Stabilization and Disposal alternative is another way of saying "We don't know what to so with these wastes, let's sweep them under the rug for a few generations."

3.5.1.30 The statement concerning the barrier system: "The barrier employs the same basic engineering design that has protected the Silla Dynasty tombs in Korea for more than 1,500 years" (1.14) needs qualification. The DOE should provide detailed documentation

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of the Silla Dynasty's nuclear operations before we can accept this as a valid precedent or comparison. Likewise for the statement:"The natural examples, gravel (or Cobble) layers on the Columbia Basin plateau, are of special interest since distinct silt/cobble interfaces have persisted at Hanford for more than 12,000 years," (1.14). The DOE should provide clear documentation of natural nuclear reactions on the Columbia Basin plateau, clearly illustrating the geological characteristics and containment of the resulting nuclear products and byproducts. (It should be clearly noted here that the natural nuclear reactions which took place under Gabon, West Africa occured 1.7 billion years ago, and thus they offer no precedent or comparison for current nuclear waste storage practices.) 3.5.1.30

Concerning the barrier system: The DOE must conduct a separate public process to allow full citizen participation in the process of making any decision concerning the selection of land for condemnation. 2.5.7

No lands should immediately be written off as "actual disposal sites".Technologies may someday be developed which can effectively clean up areas now thought to be "irretrievably contaminated". Developing such technologies should have been and should be a priority for the DOE superceding any drive to produce more weapons grade plutonium. 2.5.7

There is no way to illustrate or prove the effectiveness of the proposed basic barrier design in relation to the storage of nuclear waste. The marker system is not a viable concept. 3.5.1.2

Many archaeological sites which are less than a few thousand years old remain an enigma to modern archaeologists. In fact, archaeologists in the future would likely wish to excavate a markered area to see what is there. 3.5.1.30

Appendix "M" is inadequately documented by references cited. It is unduly optimistic regarding performance of engineered barriers. The technical references in DEIS appendix "M" are in more than twenty cases misapplied. The references do not support the conclusions drawn. In all examples the effect was to make the engineered barrier appear more effective or more highly developed than the references stated, or to drop qualifiers in the text. 3.5.1.3

Another major issue not addressed throughout the DEIS concerns the affected Indian tribes, in particular, the Yakima Indian Nation. The Hanford site is included in the ceded lands agreed to in a Treaty of 1855. The Yakima Nation still holds certain inalienable rights within the terms of the treaty. Permanent disposal scenarios directly impact the rights of the Yakima Nation. It is imperative that the issues of possessory and useage rights, and issues concerning cultural heritage be fully addressed in the EIS. This must also be done for other affected tribes. 2.4.2.1

Before the DEIS was written, twenty-seven disposal methods were considered and all but four were dismissed. There should be in the EIS a complete listing of all twenty-three alternatives that were dismissed, with a detailed explanation for their dismissal. 3.3.5.2

In the DEIS the DOE does not state a preferred alternative.If the DOE had a preferred alternative before the draft EIS was issued, this alternative should be identified, and a detailed explanation 2.3.2.2

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given for the reason for preference.

The range of options have not been sufficiently discussed in terms of their applicatioin to specific sites. The EIS should be site specific.

2.3.2.2 Reasonable alternatives have not been discussed sufficiently. This is a particularly important issue in light of the fact that the four alternatives addressed in the EIS are not technologically proven. All alternatives should be thoroughly assessed and evaluated.

3.5.5.29 With a half-life of approximately 24,000 years, plutonium 239 remains a health hazard for up to 240,000 years. The DEIS does not address this issue. Permanent waste storage practices must take into account the total time that the radioisotopes and chemicals will be hazardous. It appears that the DOE needs to be reminded that only a microgram of plutonium can cause cancer or genetic damage. Again, anyone who does not acknowledge this should not be placed in a position to make policy on the nuclear waste storage issue, nor should they be given the assignment of producing plutonium.

3.2.6.8 Appendix "J" reads: "Total costs for repository disposal of Hanford wastes are the sum of costs for three activities: retrieval and processing, transportation, and repositroy emplacement." Ommitted from this appendix is any detailed consideration of costs of monitoring wastes, emergencies, accidents and resulting clean-up operations. Costs of evacuations of populations have not been addressed.Costs of clean-up operations resulting from design failure of selected disposal alternatives have not been addressed.

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3.4.3.7 The EIS should assess the impact of a nuclear war and susceptibility of disposal alternatives to nuclear blasts.

In appendix "H", the question of possible terrorist activities has not been considered. The EIS should give great consideration to the possible effects of terrorist activities on all stages of retrieving, processing, transportation and disposal of nuclear wastes.

2.3.1.14 Defense high level wastes should be considered within the context of all chemical and nuclear waste disposal operations at Hanford. Defense waste disposal operations are not an isolated activity at Hanford within the context of environmental safety. It is necessary in the EIS to address the total synergistic effect of all chemical and nuclear waste activities and all nuclear production operations at Hanford before a clear picture can be drawn of all environmental impacts.

4.1.20 DOE must define the limitations of the models used as a basis for making its assumptions and conclusions.The EIS should include a discussion of modeling limitations, address the range of uncertainties associated with key parameters, and the sensitivity of risk estimates to change in parameter values.

2.3.2.11 Statements such as: "Wastes in repositories approach zero risk in terms of drilling and near-surface excavation, whereas there might be 2 fatalities over 10,000 yr for the in-place stabilization and disposal alternative and 18 fatalities where no monuments, records or markers warn of potential hazard" (pg 3.65) are simply inept. Unfortunately, the entire DEIS is

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full of such inept statements, assumptions and conclusions.

2.3.2.11 The DEIS does not detail a precise funding structure and mechanism for funding. This is a major flaw in the document since without adequate funding for the projects involved with the storage of high level defense wastes, there can be no way of doing the work that is needed. If the DOE does not detail the funding amounts and funding process, we cannot be assured that the DOE is serious about doing the task.

2.2.9 Likewise, there is no precise timeline for the operations outlined. This is irresponsible.

4.1.23 It is not clear in the DEIS as to exactly what regulatory process the DOE will adhere to. The DOE's own statements in this regard within the DEIS are imprecise and inaccurate. SRC requests that the DOE adhere to the following laws and set forth all applicable laws in the EIS: The Federal Water Pollution Control Act; The Clean Air Act; The Safe Drinking Water Act; The Atomic Energy Act; The Comprehenaive Environmental Response, Compensation and Liability Act; applicable state water rights laws; The Mine Health and Safety Act of 1977; The Hazardous Wastes - Resource Conservation and Recovery Act; Nuclear Waste Policy Act, Section 8; the state water pollution control laws; The National Environmental Policy Act; and in addition, the treaties between the Federal Government and Affected Indian Tribes, including but not limited to the Treaty of 1855 with the Yakima Indian Nation.

2.4.1.1 Concerning the statement on page xlii: "Radiation doses to special subgroups, such as children, are not calculated, nor are specialized pathways such as direct ingestion of soil by children". Children are more susceptible to exposure to radiation than adults, therefore this issue must be addressed in detail within the EIS. Likewise, the radiological impact on the food chain must be addressed in detail when discussing long term exposure scenarios. The DEIS does not adequately address the issue of long term genetic effects on human populations, flora and fauna. This must be done in a responsible EIS, and it must include detailed consideration of long term cumulative and synergistic impacts.The EIS must also cover spontaneous abortions.

3.5.5.3

3.5.5.1

3.5.5.32

2.4.1.8 SRC disapproves of the DOE's reclassification of transuranics containing less than 100nCi/g to "Low Level" wastes. There must be a clear, concise, and uniform method of classifying nuclear wastes that applies across the board for civilian and defense wastes.

3.5.5.37 SRC is concerned with the DOE's choice of a linear-quadratic model for determining health risks of low level radiation exposures. The use of this model leads to erroneous conclusions concerning radiation related health hazards. This system seems to have been chosen by the DOE to justify the DOE's operations while masking the real hazards involved. In any issue concerning public health, if there is doubt as to the effects on populations, one must err on the side of safety. While the DOE leads one to believe that this has been done in the DEIS, in fact the case is to the contrary. The ALARA model was set up for technical and

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3.5.5.37 economic convenience, and not for real safety. The basic assumptions the DOE uses in calculating health risks are subject to question. In the DEIS the DOE has been so negligent in regard to the health issue, SRC is seriously concerned that the DOE is not competent enough to handle the problem of safely disposing high level nuclear waste.

The In-Place Stabilization and Disposal alternative as it is outlined in the DEIS is slovenly.

The so-called Reference alternative relies on the same slovenly concept as the In-Place Stabilization and Disposal Alternative in handling some of the wastes. (Presumably the single shell tank waste will be kept in place at the Hanford site in this alternative.)

To rely on the Geologic Disposal alternative, a massive transportation effort will be necessary. It is imperative

3.4.2.2 that any geologic repository site be selected upon purely scientific principles, and that ecomonic and political factors

3.3.1.1 do not act as a controlling motive for site selection. This would necessarily rule out Hanford as a site for deep geologic disposal.Credible scientific research has ruled out Hanford as a viable site for such a repository due to geologic and hydrologic conditions.

This would necessitate a massive transportation effort which

3.4.3.7 should be fully addressed in the EIS. Transportation of nuclear waste is perhaps the most vunerable activity in the waste cycle. The EIS should fully cover potential terrorist threats to nuclear waste shipments.

3.3.5.1 In short, there is a dilemma. Even the geologic repository alternative pushes technology beyond the state of the art. There is no safe way to handle nuclear wastes for the long duration necessary. This necessitates a halt in production of new defense wastes,for obvious safety reasons.

It may be necessary to have interim storage of existing waste until technological problems are worked out. Monitored Retrievable Storage may also have to be considered as an option,

3.3.4.2 however, this should not allow the DOE to continue putting off the real need at hand, which is a permanent solution to the nuclear waste disposal problem. The main focus of nuclear operations from here on should be the nuclear waste problem. If a permanent geologic repository turns out to be the chosen route for high level commercial waste, then all defense wastes at Hanford should follow the same path. Any interim or Monitored Retrievable storage option must involve state of the art technology.

Due to the poor track record of the DOE in handling nuclear wastes, including poor and irresponsible management of nuclear wastes, the firing of principal investigators from research

2.5.5 projects when resulting data proved unfavorable to the DOE, and the withholding of very important information from the public, SRC seriously questions the ability of the DOE to perform the task of safely disposing of nuclear wastes. Perhaps a new government agency should be set to accomplish this task. DOE should

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no longer be allowed to produce new weapons grade plutonium.

There is clearly a need for another draft EIS before we can be assured of a reasonably sound final EIS. There should again be a time allowed for public response to the new draft 2.3.2.3 EIS before the final EIS be drafted.

Each process, program and facility developed for handling nuclear wastes at Hanford must have a separate EIS. SRC requests that prior to the draft EIS there be scoping 2.3.2.3 hearings, and that these scoping hearings be fully publicized in the news media and that notification of the scoping hearings be sent out to each mailbox in the states of Oregon and Washington.

Any disposal option finally selected for the permanent 3.3.4.2 storage of high level defense wastes at Hanford must accommodate future technologies which may be better then the present ones, while maintaining a maximum level of safety and efficiency.

The EIS must fully address the cumulative regional impacts 3.2.6.5 of concurrent projects at Hanford. This has not been done in the draft EIS.

The Yakima Indian Nation has commissioned reports pertaining to the DEIS, and SRC requests that these comments provided by the Yakima Nation be given full consideration and that the content of the contents be incorporated into the planning process for handling defense wastes at Hanford.

The studies by Donald E. White, Ph.D., U.S. Geological Survey, on the basalt lava flows at Hanford,and the contents thereof must be incorporated into the decision making process.

SRC endorses the following statement from the testimony of Representative Dick Nelson and incorporates it into our comments on the DEIS:

"The final EIS must address the need for more plutonium by taking into account weapons systems that are under development or are candidates for development, and which cannot be armed by either our current plutonium stockpile or by recycling plutonium in obsolete warheads. This must be addressed for two 2.5.6 reasons important to citizens of Washington:(1) The total volume of waste will determine the need for a second geologic repository for commingled military and commercial waste. (2)We have a right to know what military purposes require that we assume the risk and the responsibility for the generation and storage of a significantly increased quantity of high level waste."

SRC also feels that the inventory of highly enriched uranium be considered and that this consideration be incorporated into the considerations stated by Hon. Dick Nelson in the above.

SRC would like to point out that in the DEIS, the DOE gives the following as the reason for not considering the impact of nuclear war on the proposed high level waste storage plans. The DOE states on page(xlii): " while extreme scenarios like 3.4.3.7 meteorites or nuclear war have not been analyzed, the more realistic scenarios that are used still give conservative results" (Emphasis added.) If nuclear war is not "realistic", SRC 3.5.6.34 would like clarfication on why DOE is producing more weapons grade plutonium. SRC feels that nuclear war is very much a

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possibility and that the production of nuclear weapons grade material, ie. plutonium and highly enriched uranium, contributes to the probability of a nuclear war.

3.5.6.1 SRC is concerned that in the DEIS the range and variability of future climates and precipitation is superficially treated, and that the DOE ignores records and projections which are pertinent and available. The final EIS must use a more complete and informed estimate of precipitation events.

SRC feels that a board of independent scientific groups and public advocate organizations be established to review the credentials of the persons involved in the drafting of the DEIS, and that determination be made as to the ability of those

2.3.2.9 persons to perform the necessary tasks in a responsible way, so that the final EIS will reflect the most reasonable and scientifically sound approach to the solution of the high level nuclear wastes problem at Hanford. Funding should be provided by the Federal government to these independent groups to perform the task of overseeing the selection of a competant body of people to develop the final EIS.

2.2.9 Whatever disposal method or methods are chosen, funding for the operations involved in the permanent storage of nuclear wastes should come from the Federal defense budget. The Federal government should place a solution to the waste problems at Hanford as a higher priority than the production of nuclear materials for weaponry.

ΔΔΔ

Comments submitted by David Burroughs, President, Save the Resources Committee, P.O.Box 692, Port Townsend, WA 98368.

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GONZAGA UNIVERSITY
OFFICE OF THE PRESIDENT

August 5, 1986

Dear Mr. Lawrence:

On February 24, 1986, you established the Northwest Citizens Forum on Defense Waste. Our charge was to conduct an independent citizens' review of the Hanford defense waste management program, with special emphasis on the Draft Environmental Impact Statement and the related public process.

For the past four months, we have analyzed the issues and heard more than two dozen witnesses representing a wide variety of interests and views.

As you know, members of the Forum also represent a broad range of perspectives on this issue. Nevertheless, the attached report, which we submit as official comments under the National Environmental Policy Act, represents the unanimous consensus of all Forum members.

We hope the agreement we have reached will help form a basis for the regional consensus needed to move ahead with the cleanup of Hanford's defense waste.

We all believe the cleanup can and should begin now.

One final note. On July 19, 1986, Don Pugnetti, one of our Forum members, died of cancer. The members of the Forum would like to dedicate this report to Don and hope it lives up to the high standards of inquiry and communication that he represented throughout his career.

Sincerely,

Bernard J. Coughlin, SJ
Chairman, Northwest Citizens
Forum on Defense Waste

Mr. Mike Lawrence
Manager, DOE-Richland
Richland, Washington

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NORTHWEST CITIZENS FORUM
ON DEFENSE WASTE REPORT ON THE
U.S. DEPARTMENT OF ENERGY
DRAFT ENVIRONMENTAL IMPACT
STATEMENT ON DEFENSE WASTE

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EXECUTIVE SUMMARY

In recent months, a great deal of attention has been focused on the possible selection of Hanford as the nation's first nuclear waste repository.

But many citizens do not realize that Hanford already stores a large volume of nuclear waste -- the by-product of 43 years of nuclear defense production.

The cleanup of this existing waste is the subject of a Draft Environmental Impact Statement (DEIS) released in April by the U.S. Department of Energy (DOE). As a part of its public decision-making process, the Energy Department asked Oregon and Washington citizens to join a Citizens Forum and conduct a detailed review of the DEIS. The members of the Forum represent a broad range of interests and philosophies. Our efforts are intended to enhance the public involvement process, not replace it.

After hearing dozens of hours of testimony, participating in two extensive tours of the Hanford facilities and completing four months of study, the Forum has reached a consensus on the next steps the U.S. Department of Energy should take in the disposal of Hanford's defense waste.

First and foremost, the Forum believes we must begin a program for permanent disposal of Hanford defense wastes now. Current temporary near-surface burial of wastes should not be continued. Where disposal technology has been demonstrated, it should be implemented. In areas where uncertainty remains, a focused research and development program should be continued. 3.3.5.3

The Citizens Forum's Report includes six major findings and recommendations which are described in more detail in Section 3.

1. THE DOE SHOULD MOVE AHEAD WITH THE DISPOSAL OF DOUBLE-WALL TANK WASTES, POST-1970 TRANSURANIC WASTES (TRU) AND CESIUM AND STRONTIUM CAPSULES. 3.3.5.3

Double-Wall Tank Wastes, Strontium and Cesium Capsules, Retrievable TRU. The DEIS provides sufficient documentation to proceed with disposal of these three classes of waste. High-level waste currently stored in double-wall tanks would be vitrified and ultimately placed in a repository, low-level waste from double-wall tanks would be grouted; strontium & cesium capsules would be disposed of underground; and retrievable TRU wastes would be processed and disposed of at the Waste Isolation Pilot Plant (WIPP) in New Mexico.

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3.3.5.3 2. THE DOE NEEDS FURTHER STUDY BEFORE PROCEEDING WITH DISPOSAL OF SINGLE WALL TANK WASTES, PRE-1970 TRU WASTES AND TRU-CONTAMINATED SOIL SITES.

Single Wall Tank Wastes, Pre-1970 TRU and TRU-Contaminated Soils. Techniques for disposing of single-wall tank wastes, pre-1970 (and hard to retrieve) TRU wastes and TRU-contaminated soils are not sufficiently documented in the DEIS to go forward with permanent disposal. Further research and testing is urgently needed before actual disposal is implemented. Of particular importance is testing of techniques for preventing surface water from reaching wastes and examining alternate removal techniques. Disposal actions by DOE for these wastes should comply with safety standards applicable to the geologic repository under
2.2.9 EPA regulations, 40 CFR 191 and any other applicable regulations.

3. DOE AND CONGRESS SHOULD GIVE IMMEDIATE PRIORITY TO PROVIDING ADEQUATE FUNDING TO DEFENSE WASTE DISPOSAL EFFORTS.

Adequate Funding for Waste Disposal. DOE should recommend and the Congress should adopt a "pay as you go" approach to funding defense waste disposal. A percentage of the annual defense nuclear production budget should be dedicatad to a defense waste disposal trust fund to assure adequate funding for waste disposal activities.

Funding for disposal actions and for research and testing recommended by the Forum should be included in the FY 87 appropriations legislation for DOE.

A consensus of Northwest citizens and their state governments in support of a disposal program is essential for our Congressional delegation to obtain the necessary funding.

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2.3.2.3 4. THE DOE SHOULD CONTINUE TO CONDUCT AN OPEN PUBLIC PROCESS AND MAKE A COMMITMENT TO DEVELOP A SUPPLEMENTAL EIS FOR DEFENSE WASTE.

Supplemental EIS needed. The DOE should do a Supplemental EIS to document disposal proposals and their impacts which result from further research and testing. The results of research and actual disposal activities should be shared with the public on an ongoing basis.

3.1.6.1 5. THE DOE SHOULD EXPAND THE ANALYSIS OF NON-RADIOACTIVE CHEMICAL WASTES.

Chemical Waste Disposal. A comprehensive analysis of chemical hazards at Hanford must be accomplished in a timely fashion. DOE should be committed to substantial compliance with prevailing environmental laws and hazardous waste disposal and other pollution control regulations. Informal self-regulation by DOE is not adequate.

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2.1.10 6. THE DOE MUST DEMONSTRATE THAT DECISIONS MADE ABOUT THE COMMERCIAL REPOSITORY DO NOT CONSTRAIN OPTIONS CONSIDERED IN THE DEFENSE WASTE EIS.

Relation of Repository and Defense Waste Issues. The siting of the nation's geologic repository for high-level nuclear wastes is a separate issue from defense waste disposal. The Hanford defense wastes must be cleaned up regardless of what happens in the repository siting process. However, DOE must demonstrate that the geologic alternative for disposing of defense waste is compatible with the waste volume limits applicable to the repository given DOE's decision to indefinitely delay siting a second repository. DOE's decision to delay siting a second repository is inconsistent with the risk sharing policy of the Nuclear Waste Policy Act of 1982 (NWPA).

In addition to these general findings and recommendations, the Forum has adoptad specific comments dealing with particulars of the DEIS. These comments are contained in Section 4.

Finally, comments amplifying the views of individual Forum members are contained in the Appendix.

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INTRODUCTION

Ten years ago, the Department of Energy began to study how to permanently dispose of radioactive defense wastes. In April of 1986, DOE released its Draft Environmental Impact Statement on the Disposal of Hanford Defense Wastes (DEIS), listing alternatives for storing the waste.

The alternatives

Principal options addressed in the DEIS ranged from stabilization of all wastes on site at Hanford to removal of 98 percent of the waste for eventual permanent storage in a federal deep-underground repository.

The DEIS studies the environmental impacts of four disposal alternatives:

1. In a Geologic Disposal alternative, 98 percent of the wastes would be retrieved and turned into glass-like substances so they could be transported to a deep burial site whose location has yet to be determined. Estimated cost of this option is $11.3 billion.

2. An In-Place Stabilization and Disposal alternative would involve stabilization of all of the wastes and permanent disposal of them near the surface at Hanford. Cost of this option estimated at $1.9 billion.

3. A Reference (Combination) alternative combines some of the features of the two other alternatives. Wastes now in newer, double-walled tanks would be solidified and moved, along with retrievable TRU waste, strontium and cesium, to the yet-to-be-determined deep-burial site. Other wastes would be stabilized on-site. Estimated cost of this option is $2.6 billion.

4. The No Disposal alternative, which must be considered in accordance with federal regulations, calls for continued storage of all wastes as they are now on the Hanford site.

Public process

The DOE held public hearings on the DEIS during the 120-day comment period under the National Environmental Policy Act (NEPA). In addition, DOE held informational open houses, and informal workshops throughout the region, open to the general public.

A major part of this public process was the formation by DOE RL Manager Mike Lawrence of the Northwest Citizens Forum on Defense Waste. In doing so, Lawrence brought together a wide

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variety of citizens from all over the region to take part in this innovative process.

The members include university professors, politicians, environmentalists, Indians, business and labor leaders and former members of the media from all parts of the Pacific Northwest.

The Forum is not a substitute for public involvement, but rather an enhancement to it. Although there have been many reports on the DEIS by various groups in the region, the Forum is unique in that it represents so many of the differing and sometimes conflicting concerns of people throughout the Pacific Northwest.

The Forum's role

Lawrence appointed the Forum to solicit opinions and conduct an independent review of the DEIS.

Since the group was formed, they have held five meetings at locations throughout the Pacific Northwest.

The Forum met on April 8 and 9. On the 8th, the Forum toured the Hanford Reservation. On the 9th, we were briefed on the DEIS.

In Spokane on May 5 at Cavanaugh's Inn at the Park, Forum members heard testimony from Tim Connor of the Hanford Education League; Norman Buske of SEARCH Technical Services; and Robert Alvarez of the Environmental Policy Institute, along with members of the general public. The Forum also heard from DOE about the risks of the transportation of high-level and transuranic wastes.

In Portland on May 27 at the Lloyd Center Red Lion, the Forum heard testimony from the Oregon Hanford Review Committee and the Oregon Hanford Advisory Board, among others. We were briefed on the technology used in the DEIS and asked questions of DOE representatives about hydrology issues. Subcommittees as described below were formed to study the different aspects of the DEIS.

In Seattle on June 12, there was a panel discussion on hydrogeology issues by Dr. William Brewer of the Washington state Department of Ecology, Tom Buchanan of Greenpeace, and a scientist from Battelle Northwest.

The Washington Nuclear Waste Board gave the group a preview of the state's position on the DEIS followed by a panel discussion of the health impacts of the alternatives by a scientist from Battelle, UW professor Dr. Kenneth Jackson, and Dr. David Tauben from Physicians For Social Responsibility.

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In Richland on July 10 and 11, the Forum discussed and asked Dr. William Brewer questions about Washington State's position on the EIS. David Stewart Smith with the Oregon Hanford Review Committee was asked about Oregon's position. Both were available for questions along with Jerry White of the DOE. The Forum then discussed the individual reports of its subcommittees and the Forum's draft report.

Three subcommittees were formed to take a close look at different aspects of the DEIS.

The Subcommittee on Alternatives, chaired by Joel Merkel analyzed the different alternatives proposed in the DEIS.

The Health Impacts Subcommittee, chaired by Phil Williams, looked at the long-term and short-term risks and health impacts on workers and residents of each alternative.

The Public Process Subcommittee, chaired by Joan Smith, is reviewing the effectiveness of the public process that DOE has utilized to review the DEIS.

The Alternatives and Health Impacts Subcommittees, together with the rest of the Forum members, have developed the following Findings, Comments and Recommendations on the DEIS. The Public Process Subcommittee will issue a report on DOE's public involvement program after the NEPA comment period is over (after August 9).

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GENERAL FINDINGS, COMMENTS AND RECOMMENDATIONS
BY THE NORTHWEST CITIZENS FORUM
ON DEFENSE WASTE CONCERNING
THE DEFENSE WASTE DRAFT EIS

OVERVIEW

For the past 43 years defense nuclear production activities have been conducted at the Hanford Reservation in Eastern Washington. As a result of these activities, large amounts of radioactive wastes have been generated and "temporarily" stored at Hanford.

The quantity of these wastes makes Hanford the nation's largest storage site for radioactive waste.

The Hanford wastes are not only large in volume, they are also quite varied. Some are liquid, some are solid and some are a sludge which is somewhere in between. Some wastes will decay in a few hundred years, others will remain radioactive for millions of years. Most of the defense waste put in storage since 1970 is easily retrievable, but the wastes disposed of prior to 1970, some of which has leaked into the desert soil, present difficult clean-up challenges. The Department of Energy's Draft Environmental Impact Statement on the Disposal of Hanford Defense High-Level, Transuranic and Tank Wastes (DEIS) considers the environmental impact of various methods of disposing of this enormous inventory of radioactive waste.

The subject of defense waste disposal is complex and highly technical. Unfortunately, it is not easy for the public to obtain the necessary information or to devote the time necessary to study this subject in detail. The Citizens Forum was asked to analyze this DEIS from the diverse perspective of its members who are broadly representative of the general public, and to make comments and to give advice to DOE on public opinion and concerns about defense waste disposal.

The Citizens Forum is composed of 26 individuals from throughout the Northwest. See Exhibit A, Appendix, for a Forum Membership List. We bring diversity of opinion and experience to this task: we have devoted considerable time to our evaluation of the DEIS; we have attempted to ask the questions, obtain the information and apply the standards to the proposed disposal alternatives which we believe are appropriate to protect the public interest.

The Forum's principal purpose is to give DOE public input on the DEIS and to assure that DOE responds to public concerns. However, we hope that our comments and recommendations will also help the public to sort out the often conflicting expert opinions on this subject and come to a conclusion about what actions

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should be taken toward permanent disposal of the defense wastes at Hanford.

It is important to understand the history and background of the Hanford site. In particular, we do not start with a clean slate. We are not dealing with a start-up operation which could easily be required to meet current environmental standards. Health hazards of removing existing wastes, cost, and physical impossibility probably prevent the total and complete removal of all wastes from the Hanford site. Past practices have made it virtually impossible to bring the site into total compliance with currently applicable environmental laws and regulations.

Nevertheless, the status quo is unacceptable. Disposal of the waste at the Hanford site to the extent feasible and cost effective will improve the environment and reduce long term health hazards. For these reasons, a waste disposal program must begin now. The Citizens Forum or individual members thereof may disagree with the Department of Energy regarding particular aspects of the DEIS; however, we generally agree that DOE should move forward now with those permanent waste disposal proposals which have been demonstrated to work.

2.5.2 The central purpose of the DEIS is to evaluate the options for disposing of Hanford's defense waste. In reality, the DEIS includes many levels of decision and numerous "major federal actions" as that term is used in the National Environmental Policy Act (NEPA).

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Some of the decisions can be made independently. Many others are interrelated, and must await further study and testing before final decisions can be made.

Rather than viewing any of these decisions as "permanent disposal actions" (10,000 years or longer), the Citizens Forum feels they should be viewed as the next logical steps in waste disposal at Hanford. In other words, actions should only be taken if they can meet two key tests:

(1) The DEIS analysis and documentation is sufficient to give a high degree of confidence that the proposed disposal action is demonstrated to work.

(2) The proposed actions taken will not foreclose potential options for decisions that will not be made until after further studies have been completed.

For example, the decision to retrieve wastes from double-wall tanks and vitrify them for ultimate geologic disposal seems to be justified based on the DEIS analysis. Furthermore, this decision can be taken without foreclosing any options regarding the location or timing of a permanent repository or a Monitored Retrievable Storage (MRS) facility. Under any reasonable

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scenario, removing the waste from those in-ground tanks and immobilizing it makes sense.

On the other hand, the concept of grouting the single-wall tank wastes in place, while still an option for further study, has not yet been proven. Since this action would, for all intents and purposes, foreclose the option of retrieving the single-wall waste, no immediate action should be taken.

The DEIS is uneven and inconsistent in the level of detail of discussion and in the technical confidence limits it affords. Therefore, the Citizens' Forum feels justified and fully within the parameters for comment established by the DEIS, when we offer recommendations which are intermediate to those specifically discussed in the DEIS.

FINDINGS AND RECOMMENDATIONS.

Based on our evaluation of the DEIS and public comments received to date, the Citizens Forum makes the following findings and recommendations to DOE:

1. FINDING NUMBER ONE: THE DOE SHOULD PROCEED WITH THE DISPOSAL OF THREE OF THE SIX CLASSES OF WASTE: DOUBLE-WALL TANK WASTE, RETRIEVABLE (POST-1970) TRANSURANIC WASTE, AND CESIUM AND STRONTIUM CAPSULES. Disposal alternatives for the cesium and strontium, retrievable transuranic wastes (TRU) and double-wall tank wastes are analyzed in the DEIS with a quality and depth of analysis sufficient to support the disposal actions proposed in the reference alternative and the geologic alternative. These alternatives both provide for geologic disposal of the cesium and strontium capsules, retrieval and vitrification of the double-wall tank wastes for ultimate disposal in the deep geologic repository, and geologic disposal of TRU wastes at the Waste Isolation Pilot Plant (WIPP) repository in New Mexico. Low level wastes from double-wall tank wastes would be grouted. The technologies for retrieval and processing of these wastes are relatively well known. Liquid wastes would be removed from the ground, transformed into a more stable form (borosilicate glass) and stored at Hanford until the repository facility is operating. This would be safer than the present mode of storage for these wastes. 3.3.5.3

2. FINDING NUMBER TWO: THE DOE NEEDS FURTHER STUDY BEFORE PROCEEDING WITH THE DISPOSAL OF THE OTHER THREE CLASSES OF WASTE: SINGLE-WALL TANK WASTE, PRE-1970 TRANSURANIC WASTE, AND TRU-CONTAMINATED SOIL SITES. Disposal alternatives for other categories of waste, including single-wall tank wastes, pre-1970 (and not easily retrievable) TRU wastes and TRU-contaminated soil sites are not adequately analyzed to support a permanent waste disposal decision at this time. The analysis in the DEIS is inadequate because it fails to demonstrate key technologies, to characterize waste sites and to fully evaluate health impacts, 3.3.5.3

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technological options, costs and modeling assumptions. In particular, the barrier technology, which is designed to keep surface water from reaching underground wastes and carrying them into the environment, has not been demonstrated. Cost estimates and comparisons for the disposal alternatives and alternate technologies for removal of these wastes have not been adequately explained or documented. Waste sites have not been adequately characterized and proposed in-place stabilization techniques have not been demonstrated. Finally, additional research and testing must demonstrate that any proposed disposal action will comply with 40 CFR 191, the EPA standard for safety applicable to disposal of wastes in a geologic repository, and any other applicable regulations.

The Citizens Forum believes that these inadequacies point to a need for additional research, testing and experimentation and we find that the DEIS fails to adequately identify the hard data, modeling and similar bases necessary to justify or support a permanent disposal decision for these waste forms. The alternatives proposed in the DEIS may, in the final analysis be chosen, but extensive work must be done before the DEIS would support such decisions.

2.2.9

3. FINDING NUMBER THREE: THE DOE AND CONGRESS SHOULD GIVE IMMEDIATE PRIORITY TO PROVIDING ADEQUATE FUNDING TO DEFENSE WASTE DISPOSAL EFFORTS. The availability of adequate funding for defense waste disposal efforts is crucial to their success. We strongly urge that funding be included in FY 87 appropriations legislation for disposal of strontium and cesium, double-wall tank wastes and post-1970 (retrievably stored) TRU wastes. Funding should also be available in FY 87 to begin the recommended research and demonstration projects for disposal of other waste forms.

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The Department of Energy alone cannot assure that the Congress will appropriate the billions of dollars which are necessary to carry out a disposal program; however, DOE can make recommendations to the Congress. We believe DOE should recommend and the Congress should establish a separate defense waste disposal fund to be funded annually as a fixed percentage of DOE Defense Nuclear Production Budget. "Pay as you go" funding for defense nuclear waste disposal will help to remove this issue from the vagaries of the annual Congressional authorization and appropriations process. The Final EIS should indicate how funding of the State's monitoring responsibility will be addressed.

The Citizens Forum believes that a regional consensus in support of a defense wastes disposal program is essential if this objective is to be achieved. The people of the Northwest and their state governments must send a strong and unified signal to the Northwest Congressional delegation. This will enable them to work together more effectively with their colleagues from other

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regions to obtain the necessary funding for waste disposal activities.

2.3.2.3

4. FINDING NUMBER FOUR: THE DOE SHOULD CONTINUE TO CONDUCT AN OPEN PUBLIC PROCESS AND MAKE A COMMITMENT TO DEVELOP A SUPPLEMENTAL EIS FOR DEFENSE WASTE. Under NEPA, new or changed information triggers a Supplemental EIS. The Citizens Forum believes that DOE should make a commitment in the Record of Decision on this DEIS that a Supplemental EIS will be developed after appropriate re-evaluation and research, as recommended herein, including, but not limited to, waste characterization, testing of barrier performance, groundwater monitoring, alternative techniques for retrieval of wastes, and the costs of long term disposal alternatives. In addition, the application of risk assessment techniques is of variable quality and must be improved in the Supplemental EIS. In particular, a reassessment of occupational health risks is needed. We envision that this process of reevaluation may take approximately 5 to 7 years to complete. Some specific events triggering that Supplemental EIS should be defined and included in the Final EIS.

Consistent with these findings, the Department of Energy should not prematurely commit to any technology or method of waste disposal prior to completion of the Supplemental EIS. As new technologies and new information becomes available through further research and reanalysis, the Department should incorporate it into their decisions.

The Forum believes that it will be necessary for DOE to have a continuing public involvement program during the defense waste disposal process so that future information and future decisions will be subject to public review at important decision points in the future.

3.1.6.1

5. FINDING NUMBER FIVE: THE DOE SHOULD EXPAND THE ANALYSIS OF NON-RADIOACTIVE CHEMICAL WASTES IN THE DEIS. The subject of this DEIS is disposal of high-level defense waste. These are highly radioactive wastes. Nonetheless, the wastes contain many hazardous chemical components. The Citizens Forum finds little information in the DEIS on the environmental impacts of hazardous wastes. Further, while recognizing the scope of the DEIS, the Citizens Forum believes that a comprehensive analysis of hazardous wastes at Hanford must be accomplished in a timely fashion.

Closely related to this conclusion is the subject of DOE compliance with environmental laws. The status of self regulation must be clarified and full and meaningful assurance of protection against chemical hazards for health and the environment are imperative. We look to DOE for an innovative approach to this issue. We do not believe the full subject of environmental compliance can be resolved in the Final EIS on Defense Wastes; however, inasmuch as the high-level radioactive wastes are also chemical wastes, the issue should be addressed in the Final EIS.

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DOE should be committed to substantial compliance with prevailing environmental laws and hazardous waste disposal standards and other pollution control laws. Informal self regulation by DOE is not adequate.

2.1.10 6. FINDING NUMBER SIX: THE DOE MUST DEMONSTRATE THAT DECISIONS MADE ABOUT THE COMMERCIAL WASTE REPOSITORY DO NOT CONSTRAIN OPTIONS CONSIDERED IN THE DEFENSE WASTE DEIS. Finally, there is a great deal of confusion between the issue of defense waste disposal and the siting of a geologic repository for high-level nuclear wastes. The Citizens Forum believes that it is in the interest of Northwest citizens to keep these two issues separate. Defense waste disposal should go forward independent of the repository siting process. The reason for this is simple. The principle purpose and effect of defense waste disposal is to convert existing wastes at Hanford into more stable forms which are less likely to leak into the environment and to store these wastes under conditions which are safer than the present near surface burial.

Regardless of what happens in the repository siting process, the defense wastes already at Hanford must be cleaned up. The status quo is unacceptable and there is no advantage in delaying the start of disposal efforts by reason of dissatisfaction with the repository siting procedure. To do so merely perpetuates the status quo on defense waste storage.

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3.3.5.3 Where defense waste disposal technology has been demonstrated, the disposal program should begin; where more research and demonstrations of disposal techniques are needed, research and testing should go forward with due speed.

Nevertheless, there are relationships between the repository issue and defense wastes which we feel constrained to discuss. On May 28, 1986, DOE announced that Hanford is one of three final sites to be studied for siting the first geologic repository. DOE further announced that siting of a second repository is indefinitely delayed because the anticipated volumes of defense and commercial waste would not exceed the capacity of the first repository for the foreseeable future. Under the Nuclear Waste Policy Act of 1982 (NWPA), the first repository cannot accept more than 70,000 metric tons of waste until the second repository is operational.

3.3.5.7 There is considerable apprehension that DOE's decision not to proceed with the second repository may have pre-empted the geologic disposal alternative for defense wastes because the amount of vitrified defense waste thus generated, when added to the commercial waste, would exceed the repository capacity.

DOE has provided the Citizens Forum with an estimate of the volume of defense wastes which would go to the repository under the geologic disposal alternative, see Appendix, exhibits B and

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According to these estimates, the first repository could accommodate the geologic disposal alternative; however, DOE's estimate allows for only a 10% error in their calculations of defense waste volume.

In the Final EIS, DOE must demonstrate that the volume of defense waste which would go to the first repository under the geologic disposal alternative could be accommodated along with known volumes of commercial wastes. DOE must also clarify its assumptions concerning the volume of defense wastes which were used in the repository siting decision to assure that DOE has not prejudged and discarded the geologic disposal alternative as proposed in this DEIS.

2.1.8 Finally, the decision to delay siting the second repository runs counter to the intent of the NWPA which is to provide for an equitable sharing of the risks associated with nuclear waste disposal. Under any alternative in this DEIS, large volumes of defense waste will remain at Hanford. This is especially so under the in-place stabilization and reference alternatives. If they can be demonstrated to be as safe as geologic disposal, these alternatives may ultimately be chosen. However, it would be inequitable to ask the people of the Northwest accept the risks for both defense and commercial wastes, and to allow the rest of the nation to avoid these risks altogether. DOE should resume work on the second repository siting process immediately.

What follows in the next section are the specific comments and recommendations of the Citizens Forum concerning this DEIS. The Forum does not intend that this be our "final word", on this DEIS but the beginning of an iterative process between the Forum and DOE.

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SPECIFIC FINDINGS, COMMENTS AND RECOMMENDATIONS

3.3.5.9 A. COST ESTIMATES AND FUNDING

3.2.6.8 1. ISSUE: DEIS FAILS TO ADEQUATELY EXPLAIN COST ESTIMATES.

4.1.22 CONCERN ABOUT DEIS:

Informed comparisons can be made only on the basis of adequate information on techniques of disposal, costs, and comparative risks. The information given on in-place stabilization techniques is inadequate for informed comparison. Cost analysis in the DEIS is not adequate for anything; Appendices I and J address costs only for repository emplacement and transportation, respectively. (Vol. 2, Appendix J, Pages J.1-3 and Appendix I, Pages I.30-31). It is possible that in-place stabilization techniques cannot be costed out any more precisely with the information available at present. In this case, the cost of these methods must be included in a Supplemental EIS along with descriptions of actual testing of some of the methods.

The only conclusion which can be drawn about cost from the DEIS is that vitrification seems to be the most expensive waste treatment option. The magnitude of the difference in cost between vitrification and in-place stabilization cannot be estimated until an adequate cost analysis is done.

PROPOSED RESPONSE:

The DEIS should give detailed cost estimates for each proposed method of handling each waste form. In particular, a breakdown of the costs of each alternative method of disposal is needed and the Final EIS should clearly identify the factors which drive the differences in cost estimates among the proposed disposal alternatives by waste form.

2.2.9 2. ISSUE: ASSURANCE OF OBTAINING ADEQUATE FUNDING FOR WASTE DISPOSAL.

CONCERN ABOUT DEIS:

The availability of funding for defense waste disposal efforts is crucial to their success. However, the Department of Energy alone cannot assure that the Congress will appropriate funds necessary to carry out a Hanford defense waste disposal program. The uncertainty of the annual authorization and appropriations process in Congress threatens the viability of the defense waste disposal program.

PROPOSED RESPONSE:

DOE should consider recommending that Congress establish a defense waste disposal trust fund to be funded in an amount equal to a percentage of the annual DOE Defense Nuclear Production Budget. In this way, funds would be paid into a trust fund each year to assure the availability of adequate funds to complete disposal activities in a timely manner. "Pay as you go" funding of waste clean up is required of the commercial nuclear industry under the Nuclear Waste Policy Act of 1982 NWPA and of the chemical industry under CERCLA ("Superfund" Act). We believe it is appropriate to apply the same concept to nuclear and chemical wastes generated by DOE in its defense production activities. The Fund would be used for disposal activities not only at Hanford but at other DOE facilities.

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B. TRANSPORTATION

3.4.2.2

1. ISSUE: TRANSPORTATION SAFETY.

CONCERN ABOUT DEIS:

The DEIS does not consider or provide for a working agreement with the Northwest states regarding the transportation of defense wastes to and from Hanford. (Vol. 2, Appendix I)

PROPOSED RESPONSE:

DOE should consider entering into a transportation working agreement with the Northwest states which would address such issues as: liability for accidents, providing the states with information about the timing, routes and contents of shipments and contact persons for the states to call at the shipper (waste source) and at the carrier. A similar agreement was entered into between DOE and the state of South Carolina in 1980, a copy of which may be found in the Appendix, Exhibit D.

3.4.2.13

2. ISSUE: PACKAGING STANDARDS FOR TRANSPORTATION OF DEFENSE WASTE.

CONCERN ABOUT DEIS:

DOE has the authority to design and certify its own packaging to be used by government shippers. (Vol. 2, Appendix I, Page I.5) Type B packaging design must be certified by either DOE or NRC. (Vol. 2, Appendix I, Page 1.2)

This raises the question as to whether there is different criteria used by DOE and NRC for design certification of packagings.

PROPOSED RESPONSE:

The Final EIS should clarify that the packagings certified by DOE must meet the NRC packaging standards.

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C. GEOLOGY, HYDROLOGY AND CLIMATE

3.2.1.3

1. ISSUE: EFFECTS OF CLIMATIC CHANGE.

CONCERN ABOUT DEIS:

Although Appendices Q and R in Volume 3 discuss a range of climate from dry to wet, it is not clear that this range encompasses the possible climate changes attendant on either another period of glaciation or large scale effects of atmospheric CO_2 or SO_2 accumulation.

PROPOSED RESPONSE:

The macro-scale climate changes which would yield the 0.5 cm/yr and the 5.0 cm/yr recharge scenarios should be made explicit. If these scenarios do not include either massive glaciation or the effects of any atmospheric pollutant accumulation which would result in more than a 3.0 degree Celsius change in the average ambient temperature, scenarios should be included which cover these contingencies. The published work of Dr. Estella Leopold and her colleagues on climate as reflected in fossil pollens should, at the very least, be referred to.

3.5.1.7

2. ISSUE: BARRIER PERFORMANCE.

CONCERN ABOUT DEIS:

There is apparently a scientific controversy over the theory that the soil cover will promote evaporation rather than downward drainage of rainwater and that water will not enter the capillary barrier. (Vol. 3, Appendix M). The success of in-place stabilization as an isolation technique depends on the performance of the soil overburden and capillary barrier. At present, there has been no actual testing of adequately loamy or silty soils for this barrier, although such testing will apparently begin during the next fiscal year; soils which have been tested to date on the Hanford reservation are too coarse and gravelly to serve as the layer above the capillary barrier, and are thus not suitable. Thus, no decision can be made on the adequacy of the proposed barrier for isolation.

PROPOSED RESPONSE:

(a) Charges made by the State of Washington that references in Appendix M were misused must be adequately refuted.

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(b) Testing must be begun on soils having a loam or silt content adequate for the proposed barrier, and such soil must exist on the Hanford reservation (it is unlikely that enough soil for the barrier could be purchased from off-site). At least three full years of testing is necessary, and the results should be part of a Supplemental EIS. Testing of the barrier performance should be the highest research priority, since the entire in-place stabilization alternative depends on it. Testing should include, among other subjects, the effects of biointrusion and barrier disruption due to earthquakes.

3.5.1.59

3.5.3.1 3. ISSUE: IRRIGATION SCENARIOS.

CONCERN ABOUT DEIS:

In Appendix Q (Vol. 3, Sections Q.8 & .9) the DEIS assumes that the 200 and 300 Areas would never be irrigated. Such an assumption may not be not warranted for the far distant future if extreme climate changes are presumed.

3.5.6.27

PROPOSED RESPONSE:

Include analysis of future irrigation of the 200 and 300 Areas.

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3.5.3.25 4. ISSUE: WATER TRAVEL THROUGH THE UNSATURATED SOIL.

CONCERN ABOUT DEIS:

The times for water to travel to the unconfined aquifer are given on Page Q.3 et seq. in Volume 3 as "representative" times; the meaning of "representative" is not clear, and the use of such times is inappropriate.

PROPOSED RESPONSE:

Use a range of water travel times rather than "representative" times and analyze the results appropriately

The current status of hydrologic and geochemical models used to simulate subsurface contaminate migration necessitates making certain assumptions due to technical and data limitations. Calibration of computer models to actual field data is an issue to be closed prior to making a final disposal decision.

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D. RELATION TO GEOLOGIC REPOSITORY

2.1.8

1. ISSUE: DOE DECISION TO INDEFINITELY SUSPEND SITING OF A SECOND DEEP GEOLOGIC REPOSITORY FOR HIGH LEVEL NUCLEAR WASTE.

CONCERN ABOUT DEIS:

On May 28, 1986 DOE announced that sites in Washington (Hanford), Nevada and Texas were the three sites which would be reviewed by DOE for siting of a deep geologic repository for high-level nuclear wastes (HLW). At the same time DOE indefinitely postponed consideration of siting a second repository. A second repository is required by the NWPA before wastes stored in the first repository may exceed 70,000 metric tons.

The deep geologic repository is designed primarily for wastes from commercial nuclear power plants; however, it would also be the site for disposal of defense wastes under the waste disposal alternatives described in this DEIS. The "geologic disposal" alternative, appropriately, does not concern itself with repository location. There is, however, considerable apprehension that DOE's decision not to proceed with the second HLW repository has pre-emptad geologic disposal, because the amount of vitrified defense waste thus generated, when added to the commercial waste, would exceed the repository capacity. There is no analysis in the DEIS itself of the volume of defense waste which would be disposed of in the repository under the geologic disposal or reference alternatives so it is impossible to determine the effect of the second repository decision on the DEIS.

The DEIS does indicate that geologic disposal of Hanford waste would yield 23,819 canisters of waste. DOE initially informed the Forum that this converts to 11,910 MTHM of waste. More recent DOE calculations indicate 22,000 canisters, or 11,000 MTHM. An additional 7250 MTHM of defense HLW is anticipated from other sources. See Appendix, Exhibits B and C for DOE calculations of defense waste volumes.

If commercial spent fuel requires 50,000 MTHM repository capacity, the first repository would be just adequate to handle estimated volumes of defense waste; however, DOE's calculations allow for only a 10% error (approximately).

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PROPOSED RESPONSE:

The Final EIS must recognize that either work on the second repository must resume in a timely manner, or an amendment to the NWPA to expand the size of the first repository would be required. Such an amendment would have considerable and complex repercussions; e.g., changes in 40 CFR 191, rewriting the guidelines and rewriting the Mission Plan.

More importantly, such an amendment would represent a reversal of fundamental policy objectives of the NWPA, i.e., that the risk of nuclear waste disposal should not fall entirely on one state or region but should be equitably distributed and that regions which generate most of the nation's nuclear waste should share in the responsibility for waste disposal.

In the Final EIS, DOE must provide a detailed analysis of volumes of defense waste which would go to the geologic repository under each disposal alternative. It must be demonstrated that the geologic disposal alternative has not been precluded by the second repository decision. DOE should also explain what disposal alternative was used in making the waste volume estimates used by DOE to determine the second repository could be indefinitely delayed. DOE must provide assurances that no disposal alternative has been preselected or this DEIS has no purpose.

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3.3.5.5

2. ISSUE: TIMING OF DEFENSE GEOLOGIC DISPOSAL ACTIONS AND OPERATIONAL DATE FOR REPOSITORY.

CONCERN ABOUT DEIS:

There are several statements in the DEIS that indicate defense waste will be processed and ready for geologic disposal before the operational date of the repository.

a. "The molten glass product is transferred into canisters that will be temporarily stored at the HWVP [Hanford Waste Vitrification Plant] site. The waste canisters will be transferred from the HVWP to a geologic repository when such a repository can receive these defense HLW and TRU [transuranic] waste forms." (Vol. 2, Section C.1, Page C.2)

   This raises the question as to whether there is need for interim storage. The DEIS does not include the anticipated environmental impacts resulting from this temporary storage.

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b. DOE's time line for the commencement of operations for the first repository is 1998. However, the DEIS states that strontium and cesium capsules are to be stored in the Waste Encapsulation and Storage Facility until 1995 and then removed for geologic disposal. (Vol. 1, Section 3.3.1.3 and Vol. 2, Section H.3.3). The HDW time line does not appear to be compatible with the beginning operational date for a repository.

c. An additional consideration that may affect the defense waste time line for geologic disposal is whether the development of a Monitored Retrievable Storage (MRS) facility will be used to extend the beginning operational date for the repository.

PROPOSED RESPONSE:

The Final EIS should include contingency approaches that would be pursued in the event that a repository has not commenced operations when defense wastes are scheduled for deposit. The time line for disposal activities should be compatible with the geologic repository alternative.

3. ISSUE: WASTE PACKAGES FOR GEOLOGICAL DISPOSAL.

3.1.8.16

CONCERN ABOUT DEIS:

Waste package conceptual designs for geologic disposal have been developed and prototype testing is in process. (Vol. 1, Section 3.3.1 and Vol. 2, Appendix B)

PROPOSED RESPONSE:

The Final EIS should include a statement as to whether the final waste package design will need to be site-specific depending on the geochemical (and other) conditions of the selected repository.

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3.1.6.1 E. CHEMICAL AND MIXED WASTES AND REGULATORY REQUIREMENTS

1. ISSUE: HAZARDOUS CHEMICAL DISPOSAL/RCRA COMPLIANCE.

CONCERN ABOUT DEIS:

The DEIS does not propose a definite schedule and standards for compliance with regulatory standards for disposal of dangerous and hazardous chemical wastes. (Vol. 1, Section 6.6, Pages 6.10-11)

The DEIS does not contain a satisfactory discussion of the handling and treatment of current chemical (as distinct from radiological) wastes from the PUREX process, let alone an adequate discussion or analysis of process wastes from vitrification itself. (Vol. 2, Appendix A and Vol. 1, Sections 3.1 & .2). The geologic disposal alternative would include a considerably larger waste stream than the reference alternative; much of the waste contains compounds (sulfates, hydroxides, etc.) which cannot readily be incorporated into glass. Methods other than those proposed for removal of waste from the single-wall tanks would also result in considerable volumes of waste solutions. In particular, discussion and evaluation of the environmental impacts and disposition of nitrates, organic complexing agents and chelating agents is needed. Methods of chemically stabilizing wastes to eliminate soluble chemicals in tanks or soil sites should be considered.

PROPOSED RESPONSE:

DOE should commit itself to a definite schedule for timely compliance with Washington State standards for the disposal of dangerous and hazardous nonradiological chemical wastes or for compliance with equivalent standards. Standards should be in the form of regulations rather than the informal guidelines which now exist. Defense wastes are mixed chemical and radiological wastes, the chemical waste component should comply with the Resource Conservation and Recovery Act (RCRA).

There should be a thorough discussion in the Final EIS of nonradioactive chemical wastes. Chemical treatment of processing wastes, removal of chelates and other interfering compounds from solutions designated for vitrification, and other handling of non-radiological chemical wastes should be discussed in detail in the Final EIS. Complete chemistry should be included, at least in an appendix, as was done in the PUREX EIS. A Supplemental EIS may be necessary.

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2. ISSUE: REGULATORY COMPLIANCE WITH FEDERAL/STATE LICENSING REQUIREMENTS FOR A WASTE DISPOSAL SITE. 2.4.1.1

CONCERN ABOUT DEIS:

To the extent in-place stabilization is employed as a disposal technique, the DEIS should discuss the legal requirements applicable by reason of Federal or State laws which require licensing of waste disposal sites. (Vol. 1, Chapter 6)

PROPOSED RESPONSE:

The Final EIS should discuss Federal/State disposal site licensing requirements. Without limiting the discussion of applicable licensing requirements, the applicability of NRC licensing should be discussed and a comparison between NRC standards and proposed DOE operations should be discussed.

3. ISSUE: TREATMENT OF WASTE WATER AND AIR EMISSIONS CREATED BY DISPOSAL ALTERNATIVES. 3.4.1.3

CONCERN ABOUT DEIS:

The DEIS does not adequately describe techniques to be used to treat the waste water streams which will result from proposed disposal alternatives and to treat the air emissions which will result from pyrolysis (slagging). (Vol. 1, Section 3.3 and Vol. 2, Appendix B)

PROPOSED RESPONSE:

Waste water and air emission treatment techniques should be described and discussed in detail.

4. ISSUE: CONTINUED USE OF CRIBS, SEEPAGE PONDS AND OTHER METHODS OF DISPOSAL OF LIQUIDS INTO THE SOIL. 2.2.10

CONCERN ABOUT DEIS:

DOE Order 5820.2 establishes the policy of eliminating ground disposal of radioactive waste and chemical waste into the soil. DOE plans a separate study on this policy.

PROPOSED RESPONSE:

The Final EIS should include the scope and anticipated time frame to implement DOE Order 5820.20.

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3.3.4.2

5. ISSUE: MONITORED RETRIEVABLE STORAGE.

CONCERN ABOUT DEIS:

Will there be a de facto MRS facility for defense waste at Hanford?

The recent DOE press release (May 28, 1986) indicated the expectation by DOE "of receiving Congressional authorization to proceed with the development of a Monitored Retrievable Storage Facility."

PROPOSED RESPONSE:

The Final EIS should be refined to include the role of the MRS facility for Hanford defense high-level waste and recognize the possibility of a de facto MRS for defense waste at Hanford.

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F. UNRESOLVED TECHNOLOGIES

1. ISSUE: DEIS FAILS TO DESCRIBE WHETHER PROPOSED TECHNOLOGIES FOR DISPOSING OF DEFENSE WASTES ARE DEMONSTRATED, PARTIALLY TESTED OR CONCEPTUAL. 3.3.5.4

CONCERN ABOUT DEIS:

The DEIS describes a number of technologies which are proposed for the treatment and retrieval of a particular type of waste, but the degree of demonstration or testing of these techniques is not at all clear. For example, the method proposed for digging solidified waste out of the single-wall tanks does not appear to have been tested on any scale. (Vol. 2, Section B.1.1.1). A dry method might appear preferable to any sort of hydraulic sluicing of the single-wall tanks, given their aged and partly corroded state, but other methods should be discussed and compared. Sluicing methods exist which are relatively modern and fine-tuned. Any method which has actually been used for such a process must be included in the EIS. 3.1.4.5

The discussion of in-place stabilization in the DEIS makes it clear that actual experimental work done in support of this alternative is grossly insufficient. It is unclear from the discussions in Appendices A, B, D and M whether descriptions are of conceptualizations or of actual experimental data Vols. 2 & 3); most of the methods described appear to be conceptual. Gravel and rock fill is the only method proposed for stabilizing the single-wall tanks. (Vol. 2, Appendix B, Section B.1.4). It is proposed to fill the space in the tank above the dewatered solid waste with gravel or rock, which would stabilize the shape of the tank and [redacted] fails [redacted] is conceptualized by DOE, grout or cement might not be appropriate fill material in the single-wall tanks because the waste in the tanks might be squeezed out rather than incorporated into the grout mixture. However, other fill types should be considered which do not depend on drying the waste in the tanks. Clay (bentonite or kaolin) or a clay and sand mixture might not only fill the tank but absorb remaining moisture in the waste and adsorb any wet waste. Clay fill might also penetrate the waste layers in the tank and provide a more complete fill. This sort of method needs to be investigated and tested. Complete chemical and radiological characterization of tank contents is also needed. 3.3.2.4 3.1.4.35

There is an ongoing in situ vitrification project at Hanford, yet this method was not suggested for stabilizing contaminated soil sites. In-place vitrifi- 3.1.8.18

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cation might be the best method for stabilizing TRU-contaminated soil, and should be included in any EIS. (Vol. 1, Section 3.2.5 and Section 3.3)

3.1.4.14

The proposed grouting process and Waste Receiving and Processing Facility (WRAP) facility are also only conceptual as yet; the WRAP process needs to be tested. Different grout formulas need testing for consistency, setup time, drying rate, etc., before any decision can be made on grouting. (Vol. 2, Appendices D & E). In sum, all aspects of the in-place stabilization proposal need actual experimental testing and a Supplemental EIS before any decision on in-place stabilization can be made or recommended.

See Exhibit E, Appendix, which summarizes the apparent gaps in the testing and demonstration of particular waste disposal technologies.

PROPOSED RESPONSE:

The Final EIS should describe the extent to which disposal technologies have been tested. DOE should not become committed to any particular technology or method of waste disposal to the exclusion of the ability to incorporate knowledge and technological improvements which are developed during the disposal process. Except where technologies are proven, disposal should begin with experimental projects. The results of those experiments should then be discussed in a public document updating the EIS. Public comment on that document should be sought and future decisions guided by the results of experimental work and lessons learned from the implementation of earlier efforts.

Vitrification of HLW appears to be an adequately tested technology; there is an operating plant at Marcoule in France. Moreover, the proposed dissolving of waste in glass has considerable advantages over glass production from a calcine (as is done in Idaho). Calcining requires exceedingly high temperatures, and the calcine produced is a difficult substance to handle, isolate, and manipulate.

Although the behavior of radioactively-doped glass over periods of thousands of years cannot be predicted with any certainty, it is safe to assume that the glass is more stable and safer to store than the existing liquid wastes. Even though there is the probability that glass devitrifies (since radiation damages the glass structure) and can then be leached by water, the rate of leaching of radioactive materials in the glass would be less than the leaching rate from existing liquid waste, if only because the radioactive material would be considerably more dilute in glass.

Synthetic ceramics, like "synroc," might prove preferable to glass, but synroc technology is not as well understood, nor is there evidence that the difference in suitability would be very great. Vitrification and geologic disposal have been recommended for radioactive waste since 1979, when a study of these processes was published by the U.S. Geologic Survey (Circular #779: "Geologic Disposal of Radioactive Waste").

3.3.1.1

With all of the uncertainties attendant on very long term predictions, vitrification and geologic disposal appear to provide the most assured isolation of radioactive waste from the accessible environment.

The major drawbacks to vitrification appear to be: extensive handling of the material is necessary, considerable volumes of process waste are produced, and the costs in both dollars and energy are extremely high. Both the cost and the occupational radiation exposure attendant on the geologic disposal alternative are almost an order of magnitude higher than for the other alternatives. Occupational exposure may be decreased by increasing remote handling, but this markedly increases cost.

Present technology as documented in the EIS appears adequate to support decisions on some classes of waste, namely 1) double-wall tank waste 2) retrievably stored transuranic waste 3) strontium and cesium capsules. However, a Supplemental EIS should be required prior to a final decision on 1) single-wall tank waste; 2) pre-1970 buried solid waste and 3) transuranic-contaminated soil sites. Commitment to a Supplemental EIS should be in the Record of Decision associated with the Final EIS and some specific events triggering that Supplemental EIS should be included.

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G. WASTE CHARACTERIZATION

3.1.1.1

1. ISSUE: DOE DOES NOT HAVE ADEQUATE DATA CHARACTERIZING SINGLE WALL TANK WASTES AND TRU-CONTAMINATED SOILS.

CONCERN ABOUT DEIS:

DOE apparently acknowledges that not enough is known about the contents of the single-wall tanks and contaminated soil sites -- particularly those containing TRU wastes -- to make a final decision concerning the disposal method of these wastes. In addition, the DEIS fails to describe the criteria which will be applied to the disposal of single-wall tank wastes and TRU-contaminated soils sites after waste characterization has been completed. (Vol. 1, Section 2.0, page 2.3)

PROPOSED RESPONSE:

The method of disposing of single-wall tank wastes and TRU-contaminated soil sites is quite possibly the most important unresolved matter in the DEIS. Because there is a lack of information about the contents of these waste sites, it would be premature for DOE to decide upon in place stabilization for these wastes. It may be necessary that these wastes be mechanically retrieved and disposed of in a deep geologic depository. Criteria for deciding whether to stabilize such wastes in place or remove them to a deep geologic repository should be described in the EIS. The Forum believes that the appropriate standard for isolation of high-level defense wastes from the environment is the EPA standard applicable to disposal of non-defense high-level waste, i.e., 40 CFR 191. By this we mean that any disposal of wastes in place should provide the same degree of waste isolation as is required under the regulation. The Forum recognizes that the EPA regulation addresses waste isolation in a geologic disposal site while the in-place stabilization alternative represents a near surface disposal method; however, where high-level wastes are involved, the same standard of protection against such wastes reaching the outside environment should be provided.

Better cost information concerning the deep geologic disposal alternative must be provided and disposal technologies which might reduce the cost of geologic disposal of single-wall tank wastes and TRU-contaminated soil sites should be studied.

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2.3.1.14

2. ISSUE: WASTES NOT CONSIDERED.

CONCERN ABOUT DEIS:

Not all radioactive wastes from the PUREX and other defense processes at Hanford are considered in the DEIS. (Vol. 1, Sections 3.1 & .2). For example, three TRU-contaminted solid waste burial sites are located very near to the Columbia River and to Richland, in an area subject to flooding (the 300 area). In the reference alternative, these wastes are to be removed. Other similar sites may not be identified in the DEIS.

PROPOSED RESPONSE:

The Final EIS should summarize what wastes and waste sites were not discussed in the DEIS. Such summary should include a table, and references, if some of these wastes are discussed elsewhere (e.g. in another EIS). A total Hanford waste inventory should be included in the EIS which should include a complete listing of: all TRU waste disposal sites, wastes in the 100 and 300 areas encompassing the decontamination and decommissioning of old production facilities and all other defense wastes at Hanford not described in this DEIS. Other sites which may require removal of wastes because of the potential for flooding, or the application of similar criteria, should be clearly identified.

2.3.1.13

3. ISSUE: LOW-LEVEL WASTE

CONCERN ABOUT DEIS:

The disposal of low-level waste (LLW) is generally excluded from the DEIS. The main purpose of the DEIS is to focus on high-level waste as recommended by the National Research Council. LLW and the resultant impacts were addressed in ERDA-1538. Although DOE believes that the environmental impacts of LLW are small and pose no significant jeopardy to the environment, DOE has initiated a study to determine whether any additional action should be taken; in other words, the adequacy of ERDA-1538 with respect to LLW impacts is being reconsidered.

PROPOSED RESPONSE:

The fragmentation of LLW and HLW makes it difficult to ascertain the total defense waste disposal program. The Final EIS should include in summary form: 1) the main points in ERDA-1538 applicable to LLW; 2) an inventory of these wastes; and 3) the options

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available that will be taken should the study determine that additional action must be taken.

3.1.3.26 4. ISSUE: TRU-CONTAMINATED SOIL SITES AND PRE-1970 TRU BURIED SOLID WASTES.

CONCERN ABOUT DEIS:

TRU-contaminated soil sites and pre-1970 TRU buried solid waste sites have been previously closed but are being reviewed to determine whether further action is warranted in terms of environmental protection. (Vol. 1, Sections 3.2, 3.5 & 3.6, Pages 3.9-.10). These wastes reportedly contain 540 kilograms of plutonium. The reference alternative does not call for retrieval and processing of the soil sites nor most of the buried solid waste.

PROPOSED RESPONSE:

Since the sites are being looked into to determine whether additional environmental protection is needed, it is proper in the interest of long-term safety to include in the Final EIS a commitment that disposal decisions will be made on a site-by-site basis, and sites found to be too hazardous (even with the additional protection) will be retrieved and processed for geologic disposal.

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2.4.1.8 5. ISSUE: RECLASSIFICATION OF TRU WASTE AS LOW-LEVEL WASTE.

CONCERN ABOUT DEIS:

Recently the basis for classification of waste as TRU waste was changed by a factor of ten from 10 nCi TRU/g of waste to 100 nCi/g of waste. Although this change was agreed to by EPA and NRC as well as DOE, the Citizens Forum has heard public comment that this reclassification was not appropriate.

PROPOSED RESPONSE:

The Final EIS should explain the basis for the reclassification and by comparison describe the applicable definition of TRU waste which is used in other industrial nations (e.g. Great Britain, France, West Germany, Italy, and Japan).

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H. FUTURE WASTE REDUCTION

1. ISSUE: REDUCTION OF FUTURE WASTE VOLUMES. 3.1.7.2

CONCERN ABOUT DEIS:

Process changes to reduce future waste volumes are discussed in a separate DEIS on a proposed process change at PUREX. The consequences of DOE's decision on that issue will affect DOE's waste disposal requirements under the present DEIS. 3.1.7.6

PROPOSED RESPONSE:

The Final EIS should discuss the impacts of the proposed process change on future waste disposal programs. In particular, the Final EIS should discuss whether the proposed process change would create greater capacity to process spent fuel through PUREX, what effect, if any, the process change would have on future operations at PUREX and on the volumes of waste generated by PUREX. If the process change would create greater capacity to process spent fuel, how and by whom would a decision be made to utilize such capacity. If greater processing capacity were available, would N reactor provide a sufficient quantity of spent fuel to utilize such additional capacity; if not, where would the spent fuel to utilize such capacity come from.

In addition, will the Process Facility Modification Project at PUREX produce more concentrated liquid wastes to be stored in the double-wall tanks? If so, DOE should explain what studies have been done on how these higher concentrations will affect the tanks and the results of those studies.

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I. HEALTH RISKS

3.5.5.6

1. ISSUE: AIR DISPERSION OF RADIONUCLIDES.

CONCERN ABOUT DEIS:

Tables F.11 - F.14 wind velocities and stability classes used for the calculations are not explicit. (Vol. 2, Appendix F, Pages F.26-29). Unless these are made explicit, there is no way to judge the accuracy of the air dispersion modeling done in the DEIS. Moreover, DOE surely has enough meteorological data to have adequately calibrated air dispersion models, yet calibration is not indicated.

PROPOSED RESPONSE:

State wind velocities and stability classes used explicitly. State the manner in which the horizontal and vertical dispersion coefficients were calculated explicitly. Indicate how the model was calibrated with actual data.

3.4.1.7

2. ISSUE: OCCUPATIONAL RISKS.

CONCERN ABOUT DEIS:

The nonradiological injury/illness and fatality estimates are based on both DOE and contractor 1976-1980 historical safety performance. This performance has been excellent judging from the low case rates cited and comparing them to rates typically found in industry. Their use, however, to predict case rates for new activities would not seem to be a conservative approach. The potential for accidents in a new process, particularly one as complex as the proposed waste vitrification plant, is presumably much higher than that of long established processes for which the start-up bugs have been worked out. It would seem more appropriate and more in keeping with a conservative analysis to use average heavy industrial incidence rates when predicting accidents at a facility such as the HWVP.

Sections 5.2 and 5.3 of Volume 1 tabulate occupational and public radiologic risk. The calculation of occupational risk is not clearly differentiated from public risk in any of the Appendices. The tables in Chapter 5 of Volume 1 simply give doses below 0.01 rem as "less than .01 rem." The avarage annual background dose in the United States is 102 millirem, or 0.102 rem. Surely it is possible to ascertain dose to a more precise figure than 10% of the annual average, and to differentiate between 5%, 10%, 15%, etc.

PROPOSED RESPONSE:

Include a complete discussion of all occupational risks associated with each alternative, both radiological and non-radiological, and compare these by fatal injuries, non-fatal injuries, cancer incidence, other long-term effects of chemical exposure, and workdays lost. Provide clear and precise calculations of all radiation doses in such a way that occupational and public doses may be differentiated readily. Use heavy industrial incidence rates for new processing technologies when predicting accident rates.

3. ISSUE: DOSE-RESPONSE RELATIONSHIP FOR RADIATION. 3.5.5.37

CONCERN ABOUT DEIS:

The first paragraph of Page N.3 in Volume 3 misstates the linear and liner-quadratic dose response relationships discussed in BEIR III. Moreover, the "supra-linear" dose-response theory of John Gofmann is not mentioned at all, although it provides a more conservative dose estimate than the linear or linear-quadratic models.

Appendix F in Volume 2 uses five different types of doses in assessing the risks from different scenarios. Although this is understandable in terms of the dose appropriate to the scenario, there should be, in addition, at least one common basis of comparison. It is also not clear that the most conservative dose-to-risk estimate was used. 3.4.1.5

PROPOSED RESPONSE:

1. Quote BEIR III accurately.

2. Since the DEIS claims to make conservative projections throughout, the "supra-linear" dose-response model of Gofmann should be included in the discussion, even though it has been rejected by a number of investigators. Comparisons like those made by EPA might serve as a model.

3. In addition to Table F.1, the maximum annual dose and the integrated population dose could be applied across all scenarios. (Vol. 2, Page F.5)

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4. Use risk/Curie (fatal cancer/Curie) estimates from EPA throughout, rather than DITTY estimates. (Cf. Vol. 2, Table F-20, Page F.41)

3.5.5.8 4. ISSUE: WHAT ARE CONSIDERED HEALTH EFFECTS?

CONCERN ABOUT DEIS:

The term "health effects" is used extensively in the risk assessment sections of the EIS. Although common phraseology for risk assessment experts this is not a term to which the lay public can easily relate. What is meant by "health effects" is actually a combination of projected cancer deaths and specific genetic effects. This should be clearly noted in the summary since this is the section most readers will focus on.

Although difficult to quantify with precision an attempt should be made to project the non-fatal cancer incidence, stillborns, and spontaneous abortions from each alternative. It is likely these results would be multiples or ratios of the numbers provided and would not change the comparison between alternatives. It would, however, be useful information when assessing the absolute nature of projected health impacts. This data should appear in the summary as well as in Appendix N.

PROPOSED RESPONSE:

Identify health effects clearly in the risk tabulations as fatal cancers and specific genetic effects. If non-fatal cancers and genetic effects, stillbirths and spontaneous abortions cannot be included in tables, at least include them in the text. The Summary should also include the definition of health effects.

3.5.5.19 5. ISSUE: COMPARISON OF NATURALLY OCCURRING RADIOACTIVE SUBSTANCES AND RADIATION RELEASES FROM HANFORD DEFENSE WASTE DISPOSAL OPTIONS.

CONCERN ABOUT DEIS:

The DEIS provides little information about the naturally occurring radioactive materials at Hanford and around the State. What are the health risks of these and how do they compare with risks of the DEIS alternatives over the same increments of time?

PROPOSED RESPONSE:

DOE should provide information on the types, amounts and risks represented by naturally occurring

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radioactivity in the air, soil and water from various parts of the State and region. This would aid in assessing the relative risks associated with the DEIS alternatives.

6. ISSUE: COMPARISON OF MAN-MADE RADIOACTIVITY TO RADIATION RELEASES FROM HANFORD DEFENSE WASTE DISPOSAL OPTIONS. 3.2.3.4

CONCERN ABOUT DEIS:

The DEIS does not contain a suitable discussion of the relative amounts of tritium, cesium, strontium and plutonium in the air, water, soil, milk, etc. from locations around the region. Without this perspective, the impacts discussed in the DEIS do not give the public and the decision makers the satisfactory benchmarks with which to compare the releases and relative risks.

PROPOSED RESPONSE:

DOE should consider undertaking a region-wide monitoring program in cooperation with the States of Oregon, Washington and Idaho. This program should strive for measuring both man-made and natural radioactive material. Monitoring naturally occurring leads, arsenic, cadmium and other toxic materials in soil, water and air should also be seriously considered. 2.4.1.22

7. ISSUE: FORECLOSING FUTURE CHANGES IN LAND USE. 3.2.6.7

CONCERN ABOUT DEIS:

All of the alternatives contemplate leaving certain areas of the Hanford reservation contaminated with low levels of radionuclides. This may be the only practical approach given the effort required for complete removal. This decision, however, should be highlighted in the Final EIS by clearly stating that certain parts of the reservation will forever be dedicated as disposal sites and remain unavailable for other, more productive uses. An estimate of what this land use decision is worth to future generations should be included.

PROPOSED RESPONSE:

Provide an estimate of the amount of land considered lost to future generations for farming and other uses and project the costs of that decision for each alternative.

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J. MANAGEMENT STRATEGY/SUPPLEMENTAL DOCUMENTATION

2.3.2.3

1. ISSUE: NEED FOR SUPPLEMENTAL REVIEW OF DOE DECISIONS ON DISPOSAL.

CONCERN ABOUT DEIS:

EIS fails to describe a management system which will assure that at key decision points in the future there will be public review of the results of ongoing waste disposal activities.

PROPOSED RESPONSE:

The DEIS covers numerous "major federal actions" with a "significant" affect on the environment. Thus, the "alternatives" in the NEPA sense are really programmatic. Under the tiering concept of the National Environmental Policy Act (NEPA) Regulations, project or site specific EIS's should be prepared for subsequent major federal actions, which are not fully evaluated in this EIS.

Modifications resulting from resolved technologies should be made public by means of written reports or, in the case of modifications beyond the bounds of the DEIS, Supplemental EISs should be issued.

It is inadvisable at this stage of our knowledge, to select a preferred alternative of disposing of all types of defense waste at the Hanford site. As information concerning the characterizations of specific waste sites becomes available, as new technologies are developed and tested, as information concerning the effectiveness of existing technology becomes available, the implementation of waste disposal activity may need to change. A flexible management approach should be adopted by DOE so that future decisions will be guided by experience and lessons learned from the preceding clean up and not by a preconceived clean up plan.

A commitment by DOE to do a Supplemental EIS and to maintain an ongoing public involvement process would provide independent checks on management decisions.

2.3.2.8

2. ISSUE: NEED FOR CONTINUED PUBLIC EDUCATION

CONCERN ABOUT THE DEIS:

While DOE's communication efforts are sincere, there remains a great deal of public confusion about nuclear waste issues.

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PROPOSED RESPONSE:

DOE needs to continue and improve its efforts for public involvement and recognize the need for public education. DOE's public education programs have been minimal and too small, too centralized and often too technical. Obviously, public hearings play an role in the public education process but DOE should develop a balanced general public education program to help foster public understanding among citizens whose knowledge of the issues may be limited to media reports about the hearings.

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K. MISCELLANEOUS AND METHODOLOGY

1. ISSUE: NUMERICAL APPROXIMATIONS.

CONCERN ABOUT DEIS:

4.1.3 All numerical approximations should be rounded off the same way; e.g. if 4.6 becomes 5 (because there is only one significant figure), then 1.6 becomes 2 and not 1. Otherwise, considerable errors are introduced: 4.6/1.6 is much closer to 5/2 than to 5/1.

2. ISSUE: FAILURE TO PROVIDE MEANINGFUL QUANTIFICATION OF THE ASSUMPTIONS AND UNCERTAINTIES.

CONCERN ABOUT DEIS:

4.1.9 In the identification and quantification of uncertainty, the DEIS employs both empirical data and modeling information and generally fails to distinguish between the two. Further, the assumptions involved in both types of data are rarely quantified. This issue applies with specificity to groundwater modeling, climate projections especially rainfall, rate of dispersion through the soil, extent of protection offered by the protective barrier and so on. (For example, see Vol. 3, Section Q.1, Page 1.1 ["average annual recharge of 5 cm/yr . . ."] and Vol. 3, Section Q.3, Page Q.3 [water travel time of 925 yr. was chosen as most representative . . ."].)

PROPOSED RESPONSE:

The Final EIS should distinguish between empirical data and modeling information.

3. ISSUE: REFERENCES TO RELATED PLANS OR PROGRAMS.

CONCERN ABOUT DEIS:

The DEIS frequently incorporates within the text a future activity or study, e.g., the Hanford Defense Waste Management Technology Program or the Hanford Waste Management Plan.

4.1.13 PROPOSED RESPONSE:

When these programs/plans are incorporated into the text, the Final EIS should be more specific, explain the activity, and expand on its scope and relevance.

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4. ISSUE: LOGIC DIAGRAMS.

CONCERN ABOUT DEIS:

4.1.11 The DEIS has of necessity been prepared before final optimized designs are available for all processes, and certain research and demonstration projects are necessary to be completed for the disposal options. What approach will be selected if any of these designs or technologies fail? Are there alternatives that can be considered?

In some cases, several alternatives were identified in case of failure; for example:

Failure	Possible Alternative
Barrier System (Vol. 3, Appendix M)	In Situ Vitrification
Grout (Vol. 2, Appendix D)	Bitumin, ureaformaldehyde, or vinyl ester styrene waste forms.

Closed-loop cooling is being examined as an alternative in eliminating the use of cribs.

PROPOSED RESPONSE:

4.1.11 Logic diagrams identifying the next best variable or alternative to be considered would increase confidence of disposal solutions. The fact that: there are so many technical issues that must be closed, the DEIS does not include all defense waste, some work is underway or planned under the Hanford Waste Management Plan, and these disposal actions are in many ways interrelated and dependent upon the success of other actions, the Final EIS should include a logic diagram to show the sequence of events in the event planned disposal scenarios do not work out. Alternative technologies should be described. The logic diagrams would show the role of integration in the process.

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RECOMMENDATIONS FOR RESEARCH AND TESTING

The following are recommendations for areas of further research:

3.5.1.56 ° Overall performance of the entire in-place stabilization system, including actual barrier performance under extreme climate conditions, water travel time through the unsaturated soil to the unconfined aquifer, all possible intrusive mechanisms including biointrusion, and leach rates of radioactive materials from grouted materials and stabilized tanks.

3.5.1.56 The in-place stabilization system would be considered to "work" if it could meet the same environmental standards for waste isolation as apply to wastes in a deep geologic repository, the EPA standards set in 40 CFR 191. Research should identify the extent to which wastes stored in place could be projected to be prevented from reaching the outside environment in comparison to the extent to which such wastes would be prevented from reaching the environment if placed in a repository.

3.1.8.21 ° Actual testing, on some scale, of the transportable grout facility and the WRAP facility, as well as testing of in situ vitrification for TRU-contaminated soil.

3.1.4.35 ° Research into methods for stabilizing the single-wall tanks and their contents. Other materials, such as clay and sand, should be tested in addition to rock fill.

3.1.4.5 ° Safe removal of material from the single-wall tanks, and vitrification of this material. Other methods for removal of material than that given in the DEIS must be investigated, and any suggested method must be tested. These methods could include limited and specific sluicing of single-wall tanks or ultrasonic removal of such material.

3.1.1.1 ° Waste characterization is needed, particularly with regard to single-wall tank wastes, pre-1970 difficult to retrieve TRU-contaminated wastes, and TRU-contaminated soil sites. Other wastes may also need characterization and this recommendation is not intended to limit additional waste characterization as needed.

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APPENDIX

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Northwest Defense Waste Citizens Forum

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EXHIBIT A

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Environmental Director for Spokane and former Staff Representative for the Washington State Department of Ecology.

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Mr. Donald Pugnetti died July 19, 1986, of cancer. Until 1985, Pugnetti was editor of the Tacoma News Tribune, a position he held for over 20 years.

Two other members of the Forum, Senator Alan Thompson (D-Kelso) and Rep. Larry Campbell (R-Eugene), resigned due to schedule conflicts.

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Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

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MERKEL, CAINE, JORDONOHUE & DUVALL
2/10/86
Date & Time

JUL 8 1986

Father Bernard J. Coughlin, Chairman
Northwest Defense Waste Citizens Forum
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Spokane, WA 99258-0001

Dear Father Coughlin:

DECISION TO DELAY THE SECOND GEOLOGIC REPOSITORY FOR DISPOSAL OF HIGH LEVEL RADIOACTIVE WASTES -

Enclosure 1 provides the agenda for the July 11, 1986, meeting of the Citizens Forum in Richland. Enclosure 2 provides further information on the disposal quantities of defense wastes that might be sent to a geological repository and comments on the disposal issue. As Mike Lawrence and I stated in the most recent Citizens Forum meeting in Seattle, Washington, on June 12, 1986, the decision to delay the second repository was not based on any decision related to the disposal of single shell tank wastes. I will be prepared to discuss this issue further at the next meeting of the Forum in Richland on July 11, 1986.

Sincerely,

Jerry D. White, Director
Waste Management Division

WMD:JDW

Enclosures

cc w/encls:
NW Citizens Forum Members

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REPOSITORY CAPACITY NEEDED FOR HANFORD DEFENSE WASTE CANISTERS

Issue: Washington State staff and others have raised an issue that DOE has already made a decision to leave single-shell tank waste in-place evidenced by the DOE-RW decision to defer the second repository.

Background:

Comparison of Defense Waste Production (Canisters/MTU)

	Reference Case[1,4]		Maximum Hanford Case[2]	
	Canisters	MTU Eq.[3]	Canisters	MTU Eq.[3]
Hanford	(DST) 1,500	750	(DST/SST) 22,000	11,000
Savannah River	7,000	3,500	7,000	3,500
Idaho	6,000	3,000	6,000	3,000
Other	1,500	750	1,500	750
Total	16,000[2]	8,000	36,500	18,250

Assumptions:

- Repository loading rate is 400 MTU per year each for DHLW.
- Repository limit of 70,000 MTU is reached at year 2022[5].
- Hanford Defense Waste-EIS/Record of Decision is decision mechanism being followed by RL for disposal of single-shell tank waste.
- Canistered vitrified wastes will be stored on the Hanford Site until repository space is available.

DOE Position:

- Defense High-Level Waste will be commingled in the repository based upon the President's decision required by Section 8 of the NWPA.
- Hanford (Double-Shell Tanks), Savannah River Plant, Idaho, and other high-level waste equates to approximately 8,000 MTUs of spent fuel equivalent.
- If the waste currently stored in the 149 single-shell tanks at Hanford is disposed of in a repository, that would add an additional 10,250 MTU equivalent of disposal requirements for a total of approximately 18,250 MTUs (equivalent) of defense waste.
- The first repository is limited to 70,000 MTU capacity until a second repository is in operation.

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- By the year 2000, 40,000-50,000 MTUs of commercial fuel will require disposal.
- Repository capacities and schedules will be established to accommodate all defense waste requiring geologic disposal.
- The indefinite deferral of the second repository does not foreclose the option of geologic disposal for Hanford single-shell tank waste.

(1) Hanford Reference Alternative

(2) Hanford Deep Geologic Alternative

(3) DHLW: 1 can equals 0.5 MTU; SF: 1 can equals 1.7 MTU.

(4) June 1986 FR Notice "Proposed Policy Ruling on Fees.

(5) Office of Civilian Radioactive Waste Management Mission Plan DOE/RW-005, July 1985.

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DEFENSE HIGH-LEVEL WASTE EQUIVALENCY TO MTU OF CIVILIAN SPENT FUEL

Issue:
The NWPA limits the amount of waste that can be placed in the first geologic repository to 70,000 metric tonnes of heavy metal (MTHM) until the second repository is in operation. How many MTHM of defense waste could go to the repository and how is it determined?

Background:
The EPA has established repository release limits in curies per MTHM charged to a light water reactor. When commercial spent fuel is disposed in a repository, the MTHM can be easily determined as the MTHM in the spent fuel is well documented. Unlike a commercial reactor which is designed to optimize power production, a defense reactor is designed to most efficiently produce plutonium or tritium for nuclear weapons, or to power a naval ship. A MTHM of spent fuel from a defense reactor contains a greatly different number of curies than a MTHM of spent fuel from a commercial reactor. In addition, spent fuel from a defense reactor is processed to recover the special nuclear materials and uranium, and the remaining radionuclides are packaged for disposal in the repository. It is therefore necessary to determine MTHM equivalents for defense high-level waste using a curies basis.

A "curies equivalent MTHM" for defense waste was first determined in the DOE Study (Ref. 1) which evaluated the commercial repository capacity for the disposal of defense high-level waste. This was done by ratioing the curie content of a typical DHLW canister to the curie content and MTHM in a typical commercial high-level waste canister as follows:

	DHLW Canister	CHLW Canister
Total radioactivity of waste (curies)	1.5×10^5	6.58×10^5
Initial weight of spent fuel (MTHM)	X	2.28

$$X = \frac{2.28 \times 1.5 \times 10^5}{6.58 \times 10^5} \approx 0.5 \text{ equivalent MTHM per canister of DHLW}$$

This value of 0.5 equivalent MTHM per DHLW canister has been widely used.

Ref. 1 - DOE/DP/0020/1, An Evaluation of Commercial Repository Capacity for the Disposal of Defense High-Level Waste, June 1985.

EXHIBIT C

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The Ref. 1 study estimated the total defense waste going to geologic repository disposal would be up to 20,000 canisters, or a maximum of 10,000 MTHM equivalent. While 0.5 MTHM per canister is a good estimate for a typical canister, it overestimates the amount of waste when applied to the potentially higher number of DHLW canisters which would result if Hanford single-shell tank waste is sent to the repository and Idaho is unable to achieve waste volume reduction. These many additional canisters would contain more dilute waste and would be equivalent to less than 0.5 MTHM.

Current Assessment:
The amount of defense waste generated through 2020 and expected to be disposal in geologic repositories is 8,000 MTHM equivalent in 16,000 canisters. This includes all of the waste at Savannah River and Idaho and all but the single-shell tank waste at Hanford. If the Hanford single-shell tank waste is sent to a geologic repository, it will add an estimated 20,500 canisters of waste. Using the same 0.5 MTHM per canister value as applied to the other DHLW canisters, the SST waste estimate is 10,250 MTHM. A very conservative estimate for this dilute waste. More accurate estimates of Hanford waste are as follows:

Baseline - A canister of PWR spent fuel 10 years out of reactor contains 7×10^5 curies and 1.8 MTHM, or 3.9×10^5 curies/MTHM.

Double-Shell Tank Waste:
Average canister contains 1.8×10^5 curies (10 years out of reactor)
therefore one canister is equivalent to $\frac{1.8 \times 10^5 \text{ curies}}{3.9 \times 10^5 \text{ curies/MTHM}} = 0.46$ MTHM Round to 0.5 MTHM
1,500 canisters of DST waste x 0.5 MTHM = 750 MTHM

Single-Shell Tank Waste:
Average canister contains 0.36×10^5 curies (10 years out of reactor)
therefore one canister is equivalent to $\frac{0.36 \times 10^5 \text{ curies}}{3.9 \times 10^5 \text{ curies/MTHM}} = 0.09$ MTHM
The estimated 20,500 canister of SST waste x 0.09 MTHM = 1,845 MTHM

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^{90}Sr and ^{137}Cs Capsules:
Average canister contains 1.1×10^5 curies (at 10 years out of reactor)
therefore one canister is equivalent to $\frac{1.1 \times 10^5 \text{ curies}}{3.9 \times 10^5 \text{ curies/MTHM}} = 0.28$ MTHM
The estimated 500 canisters of capsules x 0.28 MTHM = 140 MTHM

Future Production (2000-2020)
Assume 1/2 of estimated future production is at Hanford (one reactor).
Assuming 0.5 MTHM/canister x 750 canisters = 375 MTHM

Conclusion
The total amount of DHLW in the nation through the year 2020 will be less than 10,000 MTHM. Of this amount Hanford will contribute less than 4,000 MTHM, of which less than 2,000 MTHM is in SST's. As the commercial waste is expected to total 126,000 MTHM by the year 2000, defense waste will be less than 10% of the total MTHM with Hanford single-shell tank waste being less than 2%.

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DOE/DP/00201

An Evaluation of Commercial Repository Capacity for the Disposal of Defense High-Level Waste

June 1985

U.S. Department of Energy
Assistant Secretary for Defense Programs
Deputy Assistant Secretary for Nuclear Materials
Director of Defense Waste & Byproducts

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10,000 MTHM.* This is based on the radioactivity (Curie) equivalence of commercial and defense high-level waste.** If 20,000 packages of defense high-level waste are emplaced in a commercial repository, defense high-level waste is expected to require approximately 10 percent of the underground area. Although for purposes of analysis it was assumed that the defense high level waste was placed in a single repository, no policy decision to that effect has been made. If a defense-only repository is not required, the Nuclear Waste Policy Act (Section 8b(2)) directs the use of "one or more" of the commercial repositories for the disposal of defense high-level waste. However, the use of more than one commercial repository for the disposal of defense waste would not be expected to materially alter the qualitative results of this evaluation.

At the end of 1982, approximately 15 percent of the radioactivity in spent fuel and high-level waste in this country originated from atomic energy defense activities. Most of the remainder is contained in commercial spent nuclear fuel. By the year 2000, it is expected that the radioactivity in defense high-level waste will be three percent of the total.

* It is recognized that under the Nuclear Waste Policy Act of 1982 the combined quantity of commercial waste and defense high level waste in the repository cannot exceed 70,000 MTHM equivalent until after a second repository is placed in operation and the requisite NRC authorization to expand the capacity of the repository is obtained.

** Since EPA has proposed Curie release limits per MTHM charged to a light water reactor, Curie releases and repository loadings in MTHM equivalents were calculated for defense high level waste on a Curie basis.

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(no comment identified)

TABLE 1-1

HIGH-LEVEL WASTE PACKAGE CHARACTERISTICS

Characteristic	DHLW[a]	CHLW	Spent Fuel (SF) (Typical)
Waste Form	Borosilicate Glass	Borosilicate Glass	Consolidated Spent Fuel Assemblies 6 PWR or 18 BWR Per Waste Package
Canister Size: Diameter x Length (meters)	.61 x 3.0	.324 x 3.0	PWR - .43 x 3.85 BWR - .49 x 4.11
Limiting Temperature During Package Design Life	500°C	500°C	375°C
Limiting Temperature Thereafter	100°C	100°C	TBD
Total Weight of Waste Form (kg)	1470	595	PWR - 3243 BWR - 3737
Total Weight of Canister (kg)	1940	845	N/A
Heat Output (kw)	.423	2.21	PWR - 3.3 BWR - 3.4
Total Radioactivity of Waste (Curies)	1.5×10^5	6.58×10^5	PWR - 2.4×10^6 BWR - 2.5×10^6
Metric Tons of Heavy Metal	0.5[b]	2.28	PWR - 2.77 BWR - 3.4

[a]DHLW varies in characteristics. Table entries are reference values for design purposes.

[b]"Curie Equivalent MTHM" based on the ratio of DHLW to CHLW package radioactivities in curies.

DHLW - Defense High-Level Waste
CHLW - Commercial High-Level Waste
PWR - Pressurized Water Reactor
BWR - Boiling Water Reactor
TBD - To Be Determined
N/A - Not Available

Source: Varadarajan and Dippold, 1984.

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These assumptions define a set of reference conditions developed from information available at the time this report was prepared. Detailed information such as repository and waste package design concepts, and repository capacities are subject to continuing study and evaluation. Thus, the concepts used in this report may differ from current and final concepts. It should be noted, however, that these differences are not expected to materially alter the qualitative results of this study.

(1) The study is consistent with data presented in the Defense Waste Management Plan.

(2) The commercial and defense-only repositories are to be located in either salt or hard rock.

(3) A commercial repository will have an inventory of 70,000 metric tons of heavy metal (MTHM), of which 35,000 MTHM is spent nuclear fuel and 35,000 MTHM is commercial high-level waste.*

(4) Up to 20,000 defense waste packages, approximately equivalent to 10,000 MTHM of commercial high-level waste, are to be emplaced in the repository. An additional disposal area for the defense waste will be constructed at the commercial repository site, so that the quantity of defense waste emplaced in the repository will be in addition to the 70,000 MTHM of commercial waste.**

(5) The characteristics of the commercial spent nuclear fuel and high-level waste packages and the defense high-level

*Although it is recognized that a commercial repository may ultimately accept more than 70,000 MTHM of commercial waste, for purposes of this study, a 70,000 MTHM limit for commercial waste was used as a bounding assumption. MTHM refers to the quantity of fuel before irradiation in a commercial nuclear power plant.

**It is assumed for this report that a second repository will be in operation before the first repository reaches the 70,000 MTHM limit (considering all waste) as specified in Section 114(d)(2) of the Nuclear Waste Policy Act of 1982.

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Principles of Understanding

WHEREAS, the Department of Energy (DOE)[1] and the State of South Carolina (State) acknowledge the existence of complex constitutional and legal issues relative to the applicability of the South Carolina Radioactive Waste Transportation and Disposal Act of 1980[2] to the DOE; and

WHEREAS, each recognize and acknowledge responsibility for the safe transportation of radioactive waste.[3]

NOW, THEREFORE, in recognition of this responsibility and in the spirit of a mutual cooperative desire to avoid, if possible, a legal confrontation which would be costly and time consuming, the DOE and the State consider the following voluntary principles meet both parties' interests in ensuring the safe transportation of radioactive waste:

A. GENERAL PRINCIPLES

The following provisions apply to all shipments of radioactive waste by or for the DOE to or from any radioactive waste disposal or storage site located in South Carolina:

1. Subject to the provision herein, these Principles are in lieu of the requirement for DOE to obtain a permit from the State, or otherwise directly comply with or be subject to Act 429 of 1930.

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1. The term Department of Energy includes contractors whose activities in handling radioactive material are controlled by the DOE and are not licensed by the Nuclear Regulatory Commission (NRC).

2. Act 429.

3. For the purposes of these Principles the term radioactive waste shall include spent nuclear fuel.

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2. DOE recognizes its responsibility for shipments of radioactive waste transported by or for it and will take appropriate action, as provided by law, in response to claims, actions or proceedings brought against it, or in which it is joined as a party, due to radiological injury or damage to persons or property in the State resulting from such shipments of radioactive waste. DOE agrees to seek or to assist in seeking Congressional or other appropriate authority ~~to reimburse the State for~~ any loss sustained or cost incurred arising out of any such shipment of radioactive waste ~~for~~ which ~~the State~~ is not ~~legally liable~~ adequately compensated.

3. DOE shall provide to the State the name and address of each Federal contractor covered by these Principles who will be making shipments to the State disposal site in Barnwell, South Carolina or the DOE's Savannah River Plant in Aiken, South Carolina. No shipment will be made by any DOE shipper to a disposal or storage site in the State under these Principles unless and until the DOE and State each agree to adopt these Principles.

4. DOE and the State agree to notify each other regarding any change in policy affecting these Principles.

5. These Principles shall not apply to shipments under escort for the purpose of national security or defense.

6. Except as provided herein, these Principles do not abrogate, modify, or change any right or responsibility existing under or by virtue of law.

7. This voluntary understanding may be terminated by the State or DOE for any reason whatsoever. Advance notice of intent to terminate is not required.

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4. Under present policy, the DOE does not ship radioactive waste to the State disposal site.

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B. PRINCIPLES APPLICABLE TO SHIPMENTS BY THE UNITED STATES DEPARTMENT OF ENERGY TO THE STATE DISPOSAL SITE OPERATED BY CHEM-NUCLEAR SYSTEMS, INC.

The following Principles apply to shipments of radioactive waste by or for DOE to the State radioactive waste disposal site in Barnwell, South Carolina, operated by Chem-Nuclear Systems, Inc. (State disposal site).

1. DOE shall transmit prior to the first shipment following the signing of these Principles and annually by January 1 to the Commissioner of the South Carolina Department of Health and Environmental Control (DHEC) the following information:
   (1) The name and address of each DOE shipper to the State disposal site.
   (2) The name, title, address and telephone number of the individual responsible for radioactive waste at each DOE shipper to the State disposal site.
   (3) The name, title, address and telephone number of an individual within DOE who can effect action regarding shipment deficiencies which cannot be resolved with the individuals identified under paragraph (2) above.
   (4) Written certification that each DOE shipper to the State disposal site has current copies of the disposal site license and amendments thereto, the disposal site waste acceptance criteria, requirements of the disposal site, and applicable Federal regulations.
   (5) Written certification justifying that all radioactive waste shipped under these Principles to the State disposal site will be generated from its national security or defense functions.

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2. DOE shall be exempt from compliance with Act 429 of 1980 for shipments of radioactive waste generated from the Department's national security or defense functions, but shall comply with all on-site requirements of the the State disposal site.

   These shall include:
   (1) Advance notice to the State of the estimated date of arrival at the site, name of the carrier and route the carrier intends to follow in the State for each shipment.
   (2) Certification that the shipment has been inspected and is in compliance with requirements and acceptance criteria of the disposal site, and applicable Federal regulations.

3. In the event of a violation of applicable packaging and transport regulations and requirements, the State may take reasonable corrective action, including the suspension or revocation of disposal privileges at the State disposal site under appropriate authority granted to DHEC in Sections 13-7-50 or 13-7-180, S.C. Code of Laws, 1976, as amended. Should a serious enough violation or series of violations occur that the State suspends or revokes disposal privileges at the State disposal site, DOE will not permit the DOE shipper involved to transport or have transported any shipment of radioactive waste into or within the State until appropriate corrective action has been taken and the suspension or revocation terminated.

C. PRINCIPLES APPLICABLE TO SHIPMENTS OF RADIOACTIVE WASTE TO THE SAVANNAH RIVER PLANT

The following Principles apply to shipments of radioactive waste to the United States Department of Energy's Savannah River Plant, Aiken,

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South Carolina (SRP).[5]

1. DOE is responsible for the safety of shipments made by or for it or its Federal contractors to the SRP. DOE represents that, to the extent not covered by the nuclear hazards insurance and indemnity afforded by a licensee of NRC, the Nuclear Hazards Indemnity Article of Contract DE-AC09-76SR00001 between DOE and E.I. du Pont de Nemours and Company provides indemnity for public liability arising out of a nuclear incident or extraordinary nuclear occurrence during the course of transportation of source, special nuclear and by-product materials to or from the SRP.

2. The Savannah River Operations Office (SROO) shall continue a system for monitoring radioactive waste shipments to SRP. These shall include:

(1) Advance notice of the estimated date of arrival at SRP, name of carrier and route the carrier intends to follow in the State for each shipment.

(2) Certification that the shipment has been inspected and is in compliance with applicable laws and regulations of the Federal Government.

(3) The Manager, SROO, or other appropriate DOE officials, shall notify the Governor of South Carolina or his designated representative in advance of each shipment of liquid low level radioactive waste and spent nuclear fuel. Such notification shall include the name and address of the shipper, the name and address of the carrier, and the route the carrier intends to follow in the State.

3. Each shipment of radioactive waste shall be inspected promptly upon arrival at the SRP to ensure that any radioactive waste shipment damage, contamination, excessive radiation levels, or other packaging or loading irregularities are identified. In the event such an irregularity

5. The DOE and the Department of Defense (DOD) are the only United States shippers to SRP

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is noted or otherwise reported to SROO, an immediate report will be made to the cognizant shipper and appropriate corrective action taken. SROO shall advise the Commissioner, DHEC, immediately of all violations of applicable laws and regulations, and the corrective action taken. If the Commissioner considers that a recurring violation exists or that adequate corrective action has not been taken, he will so advise the Manager, SROO. If the Manager is unable to resolve the matter to the satisfaction of the Commissioner, the Governor may then notify the Under Secretary of Energy who will review the matter and advise him.

4. The Manager, SROO, shall transmit to the Commissioner of DHEC prior to the first shipment following the signing of these Principles and annually by January 1 the following information:

(1) The name and address of each facility shipping radioactive waste to the SRP.

(2) The name, title, address and telephone number of the individual responsible for radioactive waste at each facility shipping radioactive waste to the SRP.

(3) The projected number of shipments by each such facility.

5. Each Federal Department other than DOE making shipments to SRP shall designate an individual within such Department of equivalent level to the Under Secretary of Energy who shall be available to review matters reported to him by the Governor.

6. The DOE and the State agree to notify each other of emergency situations which may occur incident to waste shipments and to cooperate

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(no comment identified)

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(no comment identified)

in responding to radiological incidents that may arise during the transportation of radioactive waste into and within the State.

7. The Principles contained in Parts A and C also shall apply to shipments of non-commercial and foreign spent nuclear fuel to SRP.

IN WITNESS WHEREOF the parties have hereunto subscribed their names.

Richard W. Riley Oct. 29 1988
Richard W. Riley Date
Governor
State of South Carolina

Worth Bateman October 28, 1988
Worth Bateman Date
Acting Under Secretary
United States Department of Energy

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EXHIBIT E

ALTERNATIVES FOR TREATMENT AND RETRIEVAL	REFERENCE FROM DEIS (Pages)	DEMONSTRATED OR CONCEPTUAL TECHNOLOGY?	RADIONUCLIDE INVENTORY TABLE	CHEMICAL WASTE PROBLEMS	ULTIMATE DISPOSAL	COMMENTS
STABLE SHELL TANKS:						
Retrieval of tank contents:						Any method involves relatively high worker exposure to radiation and
mechanical retrieval	A.2, B.1-3	conceptual	A.4, A.6	very little	geologic repository	industrial hazard
hydraulic sluicing	B.3-5	not discussed	A.4, A.6	contaminated solutions	geologic repository	
Retrieval of entire tank	not included	not discussed	A.4, A.6	?	?	An alternative; feasibility unknown
Vitrification	B.10-15,C	demonstrated	A.4, A.6	waste from concentration	geologic repository	Expensive; relatively high worker exposure
In-place stabilization			A.4, A.6			
grouting of remainder	B.21-27, 32-33 and D	conceptual	B.3	waste from grouting	soil barrier soil, clay barrier	Added clay barrier might slow travel to the unconfined aquifer.
grouting of entire tank	same	conceptual	B.3	waste from grouting	soil barrier	
clay or sand fill	not included	not discussed			soil, clay barrier	
DOUBLE SHELL TANKS:						
Vitrification of readily removable waste	B.10-15, C	demonstrated	A.3-5	contaminated solutions	geologic repository	Preferred alternative for this waste type
Grouting of removable waste	B.24-33, D	conceptual	A.3-5	?	soil (& clay) barrier	
Vitrification of residue	B.10-15, C	demonstrated	A.3-5	contaminated solutions	geologic repository	Possible, but sulfate and hydroxide residues are difficult and costly to vitrify
Grouting of residue	B.24-33, D	conceptual	A.3-5	?	soil (& clay) barrier	See comment on clay above
Tank shell removal	B.10-15, C	not discussed	A.3-5		geologic repository	Probably unwise
Tank shell stabilization	B.24-33, D	conceptual	A.3-5		soil (& clay) barrier	See comment on clay above
Future HLW, solid sludge	B.10-15, C	demonstrated	A.3-5	contaminated solutions	geologic repository	Sulfate removal needed; volume reduction?
Future HLW, supernatant	B.24-33, D	conceptual	A.3-5		soil (& clay) barrier	Difficult to vitrify
Future acid waste	B.10-15, C	demonstrated	A.3-5	contaminated solutions	geologic repository	Sulfate removal needed, reduce volume? Eliminate by process modification?
Cladding removal waste	A.11-12	conceptual?	?		?	
..TRU removal? tank storage?						
SR AND CS CAPSULES	A.14-15, B.18	demonstrated	A.8	process waste?	Drywell storage, geologic repository	
SOLID NEW & STORED TRU WASTE						
Shredding, packaging of CHTRU	A.21-22, B.5-8	conceptual	A.14	?	geologic repository,WIPP	Possible high worker exposure
slagging of RHTRU	B.18	conceptual	A.14	toxic air pollutants	geologic repository,WIPP	
TRU-CONTAMINATED SOIL						
Retrieval and containment	A.21-22, B.5-8	conceptual	A.9-10		WIPP? on-site burial?	Is the in-place vitrification feasible?
In-place stabilization	not considered	conceptual	A.9-10		soil (& clay) barrier	
In-place vitrification	not considered	not discussed	A.9-10		soil (& clay) barrier	
Pre-1970 buried CHTRU	A.17-19, B.5-8	conceptual	A.11-12		WIPP? on-site burial?	
Pre-1970 buried RHTRU	A.17-19, B.5-8	conceptual	A.13		WIPP? on-site burial?	

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COMMENTS ON WASHINGTON CONSULTANTS
REPORT AND OREGON DEPARTMENT OF ENERGY
POSITION PAPER

The Northwest Citizens Forum believes that it is essential for the people of the region and their state governments to come to a consensus on disposal of defense wastes at Hanford. Such a consensus would aid immeasurably in obtaining the necessary political support to fund and implement a waste disposal program. With this in mind, the Forum has consulted with the appropriate state agencies of Washington and Oregon in an effort to identify areas of common concern. We have reviewed the preliminary draft of the Technical Review done for the State of Washington by the URS Corporation and we have identified a number of comments, on matters which we were able to analyze, with which our recommendations are in agreement.

4.1.1 We recognize that these are not the state's official NEPA comments which will be submitted separately by the Washington Nuclear Waste Board. We note that URS found a number of deficiencies in, and problems with, the DEIS which we did not find. The reverse is also true; the URS document fails to identify several weaknesses which we found, notably in discussions of both radiologic and non-radiologic health effects, and in analysis of costs. We also agree that parts of the DEIS are awkwardly written. DOE should produce a final document clear enough so that the most skeptical reader will not be misled.

The comments in the URS report on which we are able to comment and with which we are in general agreement, are summarized below; references are to the appropriate pages in the URS Report. We have included comments that have a considerable impact; there are other comments with which we may agree but which it did not seem necessary to include in this summary.

4.1.1 Chapter 2: There are no specific references (in the sense of footnotes) in Volume 1 of the DEIS; these are reserved for the Appendices. The URS Report comments on this in many specific instances. Although this is clearly a stylistic choice made by DOE, it may be an unwise one and should be rethought.

4.2.3 Page 2-3: "Health effects" in Table 3 should be defined. These are understood to mean cancer, but whether cancer incidence or fatalities is not clear. An index to the document would indeed be helpful. The exclusion of wastes from decontamination and decommissioning, and low-level wastes, should be justified.

3.1.4.5 Pages 2-6, 2-7, 3-4, 3-5, 3-12, 3-18: Only one method of removing material from the single-wall tanks is discussed in the DEIS; sluicing and other dry methods are not considered. Biointrusion
3.5.1.83 into the soil barrier is ignored, and must be included in the Final EIS.

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Page 2-14: RCRA applicability and compliance are unclear. 2.4.1.9

Pages 3-6, 3-7: The URS Report's comments on the transportable grout and WRAP facilities are complementary to the Forum's comments on the need for actual experimental and scaled testing and evaluation. 3.1.8.21

Pages 3-11 to 3-22: The URS Report's detailed discussion of the barrier and the hydrology model complements the Forum's call for actual testing of the barrier system and measurement of water travel time through the unsaturated soil over a period of years. Biointrusion should certainly be included in such testing; indeed, it is difficult to see how it could be avoided in full scale tests on the Hanford reservation. 3.5.1.56

The Northwest Citizens Forum is in general agreement with the "Oregon Position on Disposal of Hanford Defense Wastes" prepared by the Oregon Department of Energy, dated July 10, 1986 and attached hereto as part of this exhibit.

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OREGON POSITION
ON
DISPOSAL OF THE
HANFORD DEFENSE WASTES

July 10, 1986

Prepared by:

The Oregon Department of Energy

625 Marion Street NE, Salem, OR 97310

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OREGON POSITION
ON
DISPOSAL OF THE HANFORD DEFENSE WASTES

In April 1986 the U.S. Department of Energy issued a draft environmental impact statement (EIS) on Hanford defense waste disposal. The draft EIS sets forth disposal options for radioactive wastes accumulated during four decades of weapons production at Hanford.

The ODOE Hanford Advisory Committee sponsored two public workshops to discuss and comment on EIS issues. The Hanford Review committee reviewed the draft EIS and also provided technical comments. These reviews and comments were used to develop the Oregon position.

The comments reflected the need for Oregon to take a strong position on deciding the permanent disposal of Hanford defense wastes. Our challenge is to obtain the necessary level of health and safety in the most cost effective way. Then, we must work to gain support for our position.

Basis for Oregon's Position

We must eliminate the long-term risks to public health and safety of defense wastes temporarily stored at Hanford. We should make decisions now that can be made now. Those wastes that are easily cleaned up should be. For those wastes for which we have the retrieval and disposal technology, and where current practices eventually will lead to leaks, we should take all reasonable actions to process and dispose of the waste. 3.3.5.3

Some wastes are difficult to deal with, but current storage poses no immediate problem. For those, we must develop greater confidence in our options. This process should be designed to take no more than the next five years. Our priority should be to avoid long term risks to ground water and the river. Research should be focused on ways to dispose of wastes by looking for innovative waste treatment techniques. 3.3.5.3

Based on these criteria, the Governor has taken this position on Hanford defense wastes.

1) Transform existing and future high-level liquid wastes into glass. Dispose of these wastes in a future geological repository. 3.1.8.9 3.3.1.1

2) Treat and ship post-1970 plutonium wastes (called transuranic (TRU) wastes) to the defense repository for plutonium wastes in New Mexico. 3.1.3.25

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3) All other wastes must be better understood in terms of the trade-offs. Reasonable decisions must be made, but in light of the priorities mentioned above.

The various wastes are discussed below.

Double Shell Tanks contain high level liquids and suspended solids.

Option 1. Waste in these tanks could be retrieved, glassified and disposed in a future geologic repository. The plant to glassify these wastes could be completed by 1994. The cost of this option is about $877 million for existing waste, and $1.1 billion for future waste.

Option 2. Dried and stabilized waste could be disposed near ground surface. The waste could be covered with a rock and soil barrier to prevent flow of rainwater through the waste.

Oregon's Position

3.3.5.3 Oregon recommends option 1. This material is liquid high-level waste. If left in liquid form, these wastes eventually will leak. These wastes also are easily retrievable. They should be disposed in a geologic repository. This approach is consistent with standards for the commercial industry.

Single Shell Tanks contain solids in the form of sludge or salt cake. The radioactivity in this material is similar to the wastes in the double shell tanks. But, it is older and more dilute.

Option 1. The waste could be retrieved and separated into high-level and low-level waste. High-level waste could be converted to glass for future repository disposal. The low-level waste could be converted to a cement-like material and disposed on site.

Option 2. The waste could be stabilized in place. This treatment would include filling the empty space in tanks with crushed rock. The rainflow barrier described earlier would also be used.

Option 3. There is not enough information to choose now. We need a better understanding of the trade-offs and more confidence in the options before we decide.

Oregon's Position

3.3.5.3 Oregon recommends Option 3. The material in single shell tanks should be processed no matter what option is chosen. The best method is to retrieve and glassify it. But, this option involves tremendous

should investigate other cost effective means of retrieval. We believe this can be and should be achieved within five years.

The wastes in single shell tanks have been processed to reduce the water in them. This has reduced the possibility of leakage from deteriorating tanks. Thus, time spent to research disposal options will not significantly impact the environment in the near future.

If studies show that in-place stabilization is the best option for single shell tank wastes, engineered barriers should not be the only means of protecting public health and safety. Multiple barriers are needed. An example would be to mix the wastes within the tank with grout. Thus, they would not easily be dissolved in water if it entered the tank. Engineered barriers should be relied upon as a secondary level of protection. 3.5.1.8

Post-1970 Plutonium Contaminated Wastes consist of contaminated equipment and laboratory wastes. This waste has been stored for retrieval since 1970.

Option 1. Removal and treatment of the waste at Hanford. Eventual disposal at the defense repository for plutonium wastes in New Mexico. This would require a processing facility to be completed by 1990-1993. The cost of this option is $180 million.

Option 2. Near surface stabilization with a cement-like material. A barrier identical to that described in the second option for double shell tank waste will also be used.

Oregon's Position

Oregon recommends option 1. The storage of these wastes was designed for retrieval. These wastes pose an extremely long-term radiation hazard. They have been put in wooden boxes and steel drums and buried. The deterioration of these containers eventually will release contamination into the soil. They should be retrieved and disposed in the New Mexico repository. 3.3.5.3

Pre-1970 Plutonium Contaminated Waste consists of general trash, failed equipment, and 24 soil sites contaminated by releases directly to the ground. These wastes are not readily retrievable.

Option 1. Removal and treatment of buried solid waste and soil sites which exceed US DOE's classification for low-level plutonium contaminated waste. Treated waste could be shipped to the defense repository for plutonium wastes in New Mexico.

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Option 2. Immobilization of the waste burial grounds by filling with a cement-like mixture. The area is to be covered with a rainflow barrier as previously described.

Option 3. There is not enough information to choose now. We need a better understanding of the trade-offs and more confidence in the options before we decide.

Oregon's Position

3.3.5.3 Oregon recommends Option 3. The wastes should be removed and treated if reasonably achievable. These wastes pose the same hazard as post-1970 contaminated waste and should be treated the same. If this goal cannot be achieved, more confidence in stabilizing the waste and confirmation of barrier protection must be accomplished. Again, this should be completed within five years.

These wastes have been buried for many years. Spending more time to research proper retrieval and disposal methods will not increase the the hazard within five years.

Strontium and Cesium wastes are double encapsulated in stainless steel cylinders. These wastes are stored in water basins.

Option 1. The capsules could continue to be stored in water basins. Capsules could then be packaged and shipped to a future geologic repository when a respository is available.

Option 2. Capsules could continue to be stored in water basins until 2010. Beginning in 2010, the capsules could be placed in a dry storage vault. A protective barrier as described earlier could be constructed over the site in the years 2013 to 2015.

Oregon's Position

3.3.5.3 Oregon recommends Option 1. Many of the capsules have been leased to industry for sterilization facilities and process control. The remainder is stored in water pools and is under constant attention. There is no immediate hazard from short-term storage of this waste. But, these capsules are highly radioactive and will remain so for hundreds of years. Eventual geologic disposal will provide safe long-term disposal.

Other Concerns

3.1.6.1 Oregon also has serious concerns about chemical waste and low level radioactive wastes from defense activities. USDOE's proposal does not deal effectively with these issues. But, they are potentially serious risks to public health and safety and the environment. Oregon supports

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Congressional initiatives to direct US DOE to comply with current federal and state requirements on waste handling and disposal. A schedule of compliance should be drawn up and enforced. Congress must provide funding to achieve clean-up of these wastes as well. This funding should be provided before any of these actions are required by Congress. 2.2.2 2.2.9

Forty years of defense materials production has resulted in an enormous amount of radioactive wastes at Hanford. So much waste poses difficult and complex retrieval, processing, and disposal problems. Funding has been ample for the production of the defense materials but not for waste disposal. Oregon believes that funding policy is not acceptable. Congress requires the commercial nuclear industry to concurrently set aside funds for the disposal of radioactive wastes as they are generated. USDOE also should be subject to this requirement. Plutonium production should not be allowed without concurrently providing funding to dispose of generated wastes. 2.2.9

Governor Atiyeh will be working with Oregon's Congressional delegation to see that these actions are carried out.

NOTE: This paper will be the executive summary for the State of Oregon's technical and public comments on the Draft EIS. These formal comments will be submitted to US DOE on or before August 9, 1986.

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COMMENTS ON THE DEIS FOR DISPOSAL OF HANFORD DEFENSE HIGH-LEVEL, TRU AND TANK WASTES
Seattle, Washington, July 15, 1986

Ruth F. Weiner
Western Washington University
Bellingham, WA 98225

(no comment identified)

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PRELIMINARY STATEMENT

These comments refer only to the Draft Environmental Impact Statement (DEIS) in question, and relate only tangentially to any decisions on the commercial high-level radioactive waste (HLW) repository. Moreover, deficiencies and discrepancies in the DEIS beyond the major ones are not identified; I intend to submit more detailed comments on the Appendices before the end of the comment period. Finally, these comments reflect my own views; they are not, to my knowledge, representative of the views of any agency, organization, institution, or public interest group, although I have submitted them to the Northwest Citizens' Forum on Defense Waste, of which I am a member. I have received no financial or logistical assistance in preparing these comments.

INTRODUCTION

When U-238 in a plutonium production reactor is irradiated, both fission products and neutron activation products are present after irradiation. The process of isolating and purifying plutonium and fissile uranium from this irradiated fuel yields a considerable quantity of chemical waste, in solution form, which also contains a variety of radionuclides and which is, in part, highly radioactive. The process of plutonium production and purification was begun more than 40 years ago, when the chemistry of radioactive materials was in its infancy, as was knowledge of groundwater pollution mechanisms and the radiochemistry of soils. In the absence of any appropriate disposal means, very radioactive plutonium production waste was partially dewatered and stored in tanks, radiocesium and radiostrontium were purified and encapsulated, less radioactive liquid was dispersed in the soil from cribs, and low-level transuranic (TRU) waste was stored or buried. Today, high-level waste is still stored in tanks, though these are now double-walled, adequately monitored tanks, and much low-level liquid waste is, unfortunately, still dispersed from cribs into the soil or stored in ponds. None of these disposal methods, with the possible exception of ponds, has ever been considered permanent.

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SCOPE OF THE DEIS

The DEIS under consideration addresses the permanent disposal of this waste. It is a bit odd that the issuance of the DEIS coincides with the issuance of the final environmental assessments for characterization of the first commercial HLW repository. This schedule brings the DEIS to the public at the height of the controversy over siting the repository and has resulted in understandable public confusion over the two issues. It would be prudent for DOE to address the timing of this document in the Final EIS on Defense Waste. In fact, this DEIS is independent of the repository siting decision (except in one aspect, which will be discussed below); the tank waste, TRU waste and contaminated soil at Hanford must eventually be treated for permanent disposal no matter where the commercial repository is put or when the commercial repository begins to accept waste. 2.3.2.1

There is also some confusion about the relationship of this DEIS to the recently released General Accounting Office (GAO) report entitled - "Nuclear Waste: Department of Energy's Transuranic Waste Disposal Plan Needs Revision" (GAO/RCED-86-90) which states (p. 18) that the DOE has not fully addressed 81% of the defense TRU waste. Since this GAO report was issued at the same time as this DEIS, and this DEIS is not cited in the report, one might assume that the DEIS was not included in the documents reviewed by GAO. The impression remains, however, that the DEIS does not include a substantial fraction of the TRU defense waste at Hanford. Is all defense waste included in the DEIS? If any is not included, it should be incorporated into the final EIS. Since there were no scoping hearings at which this point could be raised, it must be addressed at some point. 3.1.3.7

The absence of scoping hearings also seems to preclude considering the question of continuing to produce plutonium at Hanford, and thus continuing to produce this waste. It would make no sense to discontinue plutonium production at Hanford permanently while continuing production elsewhere in the United States. Whether or not to continue plutonium warhead production at all is a question that DOE cannot answer unilaterally; this is a decision for Congress. 2.3.1.1

THE ALTERNATIVES FOR THE HANFORD DEFENSE-RELATED WASTE

The wastes included in the DEIS are: HLW from the PUREX process stored in double-shell and single-shell tanks, current stored TRU waste, pre-1970 TRU waste, Sr and Cs capsules, TRU-contaminated soil, current acid waste, waste from cladding removal, organic wash wastes, finishing plant waste, and miscellaneous customer and N-reactor waste. The options presented, in addition to a "no action" option, are: (1) vitrification and geologic disposal of most of the waste, with in-place stabilization of the remainder; (2) in-place stabilization of all defense waste; (3) a "reference alternative" in which HLW in double-shell tanks is vitrified for geologic disposal and the remainder of the defense waste is stabilized in place. Unfortunately, reduction of the waste stream is only alluded to in the DEIS, and not adequately analyzed. The DEIS does not indicate a preferred disposal alternative, but asks for public comment on preferences, so that appropriate further research directions are indicated. 2.3.2.2

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VITRIFICATION AND GEOLOGIC DISPOSAL

3.3.5.7 The "geologic disposal" alternative, appropriately, does not concern itself with repository location. There is, however, considerable apprehension that the DOE decision not to proceed with the second HLW repository has pre-empted geologic disposal, because the amount of vitrified defense waste thus generated, when added to the commercial waste, would exceed the repository capacity. The DEIS indicates that geologic disposal of Hanford waste would yield 23,819 canisters of waste, which by DOE calculations converts to 11,910 MTHM (more recent DOE calculations indicate 22,000 canisters, or 11,000 MTHM). An additional 7250 MTHM of defense HLW is anticipated from other sources. If commercial spent fuel requires 50,000 MTHM repository capacity, and since the Nuclear Waste Policy Act limits the first repository to 70,000 MTHM, the first repository would be just adequate if DOE's calculations are correct, but allows for only a 10% error (approximately) in those calculations. The final EIS must thus assure that work on the second repository will resume in a timely manner, or an amendment to the Nuclear Waste Policy Act to expand the size of the first repository would be required. Such an amendment would have considerable and complex repercussions.

3.3.2.3 Vitrification of HLW appears to be an adequately tested technology; there is an operating plant at Marcoule in France. Moreover, the proposed dissolving of waste in glass has considerable advantages over glass production from a calcine (as is done in Idaho). Calcining requires exceedingly high temperatures, and the calcine produced is a difficult substance to handle, isolate, and manipulate (I make these comments from personal experience with making doped glass from calcines). Although the behavior of radioactively-doped glass over periods of thousands of years cannot be predicted with any certainty, it is safe to assume that the glass is more stable than spent fuel itself. Even though there is the probability that glass devitrifies (since radiation damages the glass structure) and can then be leached by water, the rate of leaching of radioactive materials in the glass would be less than the leaching rate from spent fuel, if only because the radioactive material is considerably more dilute in glass than in spent fuel. Synthetic ceramics, like "synroc", might prove preferable to glass, but synroc technology is not as well understood, nor would the difference in suitability be very great. However, vitrification and geologic disposal have been recommended for radioactive waste since 1979, when a study of these processes was published by the U. S. Geologic Survey (Circular #779: "Geologic Disposal of Radioactive Waste"). With all of the uncertainties attendant on very long term predictions, vitrification and geologic disposal appear to provide the most assured isolation of radioactive waste from the accessible environment.

The major drawbacks to vitrification are three: extensive handling of the material is necessary, considerable volumes of process waste are produced, and the costs in both dollars and energy are extremely high. Both the cost and the occupational radiation exposure attendant on the geologic disposal alternative are almost an order of magnitude higher than for the other alternatives. Occupational exposure may be decreased by increasing remote handling, but this markedly increases cost.

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3.1.4.5 It is not clear that the method proposed for digging solidified waste out of the single-shell tanks has ever been tested on any scale. A dry method might appear preferable to any sort of hydraulic sluicing of the single-shell tanks, given their aged and partly corroded state, but other methods should be discussed and compared. In particular, any method actually used for such a process must be included in the EIS.

3.1.6.1 The DEIS does not contain a satisfactory discussion of the handling and treatment of current chemical (as distinct from radiological) wastes from the PUREX process, let alone an adequate discussion or analysis of process wastes from vitrification itself. The geologic disposal alternative would include a considerably larger waste stream than the reference alternative; much of the waste contains compounds (sulfates, hydroxides, etc.) which cannot be incorporated into glass. Any final EIS should include a detailed discussion and analysis; a supplemental EIS should be considered.

IN-PLACE STABILIZATION

3.3.2.4 The discussion of in-place stabilization in the DEIS makes it clear that actual experimental work done in support of this alternative is grossly insufficient. It is unclear from the discussions in Appendices A, B, D and M whether descriptions are of conceptualizations or of actual experimental data; most of the methods described appear to be conceptual. Appendices M, O and Q, which deal with hydrologic models, do not indicate clearly how these models have been calibrated and reveal insufficient experimental testing of models.

3.5.1.21 The success of in-place stabilization as an isolation technique depends on the performance of the soil overburden and capillary barrier. At present, there has been no actual testing of adequately loamy or silty soils for this barrier, although such testing will apparently begin during the next fiscal year; soils tested to date are not suitable for the barrier. Thus, no decision at all can be made now on the adequacy of the proposed barrier for isolation from rain and weather.

3.5.1.1 Gravel and rock fill is the only method proposed for stabilizing the single-shell tanks (Appendix B): it is proposed to fill the space in the tank above the dewatered solid waste with gravel or rock, which would stabilize the shape of the tank and contain the waste. This method is conceptual at present, and is certainly not the only method which could be conceptualized by DOE. While pouring grout or cement into the tank poses considerable problems of waste migration, other fill types should be considered which do not depend so heavily on drying the waste. Clay (bentonite or kaolin) or a clay and sand mixture might not only fill the tank but absorb remaining moisture in the waste and adsorb any wet waste. Clay fill might also penetrate the waste layers in the tank and provide a more complete fill. This sort of method needs to be investigated and tested. Complete chemical and radiological characterization of tank contents is also needed.

3.1.1.1

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3.1.8.18 There is an ongoing in situ vitrification project at Hanford, yet this method was not suggested for stabilizing contaminated soil sites. In-place vitrification might be the best method for stabilizing TRU-contaminated soil, and should be included in any EIS. In any case, deliberate contamination of the soil with TRU waste is unnecessarily risky, and the use of cribs and unlined ponds should be discontinued. Methods for reducing water volumes need to be investigated and substituted for simple absorption of contaminated solutions by soil.

3.1.4.14 The proposed grouting process and WRAP facility are also only conceptualized as yet; the WRAP process needs to be tested to some extent. Different grout formulas need testing for consistency, setup time, drying rate, etc., before any decision can be made on grouting. In sum, all aspects of the in-place stabilization proposal need actual experimental testing and a supplemental EIS before any decision on in-place stabilization can be made or recommended.

COMPARISON OF ALTERNATIVES

3.2.6.8 Informed comparisons can be made only on the basis of adequate information on techniques of disposal, costs, and comparative risks. As has been pointed out above, the information given on in-place stabilization techniques is inadequate for informed comparison. Cost analysis in the DEIS is not adequate for anything; Appendices J and K address costs without sufficient detail. The only conclusion which can be drawn is that vitrification seems to be the most expensive waste treatment option. The magnitude of the difference in cost between vitrification and in-place stabilization cannot be estimated until an adequate cost analysis is done, however.

3.3.2.4

3.3.5.9

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3.4.1.11 Non-radiologic occupational risks, except for those associated with transportation, are not enumerated or analyzed in sufficient detail. Operation of the vitrification, grouting, and WRAP facilities is hazardous in that large quantities of material, massive machinery, and, in the case of vitrification, very high temperatures, are involved. Removal of material from the tanks involves handling high-pressure water streams. In the absence of adequate information, one may assume that each alternative is very hazardous to workers. Qualitatively, removal of material from tanks and vitrification appear to include greater non-radiological occupational hazard than the various methods given for in-place stabilization.

3.4.1.7 Radiological risks among alternatives are amenable to some comparison. The long term risks from geologic disposal (assessable from the EPA risk assessment for 40 CFR 191) can be compared to the results of the two scenarios for failure of the barriers in the in-place stabilization alternative (Appendices R and S). Both the radionuclide release-to-dose conversion and the dose-to-risk conversion used by DOE have been questioned, but comparisons can still be made since the same conversion factors are used for all scenarios. Similarly, non-fatal cancers are excluded from health effects, but they are excluded in every case (an adequate risk analysis would be based on cancer incidence rather than cancer fatalities, and this should be done in the final EIS).

3.5.5.8

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Although the research in the DEIS is inadequate for any conclusion, the impression given by the DEIS is that vitrification and geologic disposal provide more secure isolation of the waste for the future, especially the distant future, than in-place stabilization, at the expense of considerably greater present radiologic hazard both to workers and to the general public. This suggests that much more research is needed into the in-place stabilization options and the barrier before a real decision can be made. It is also true, however, that a decision should be made in the foreseeable future - in a few years - and even then there will be objections on the grounds of insufficient information. 2.3.2.2

RECOMMENDATIONS

The following recommendations are for priorities for further research. At this time there is not sufficient knowledge about in-place stabilization to either include it in some combination with vitrification, like the reference alternative, or rule it out. Vitrification and geologic disposal, on the other hand, appear to provide sufficiently superior isolation that they should not be ruled out for the high-level tank waste and the encapsulated Sr and Cs. Further research will materially assist in a decision on the single-shell tank wastes, which simply cannot be made at present, and indicate the need for a supplemental EIS. 2.3.2.3

1. The highest research priority should be into actual barrier performance under extreme climate conditions. If the barriers don't behave as anticipated, the geologic disposal alternative would be superior. 3.5.1.56

2. The second research priority is actual testing, on some scale, of the transportable grout facility and the WRAP facility, as well as testing of in situ vitrification for TRU-contaminated soil. Even with the geologic disposal alternative, some material will have to be stabilized in place. 3.1.8.21

3. If the barrier performance is not as predicted, safe removal of material from the single-shell tanks assumes a high priority. Other methods than that given in the DEIS must be investigated, and any suggested method must be tested. Perhaps limited testing could be done one one or two tanks, in any case, for both this priority and the following one. 3.1.4.5

4. If the barriers appear to perform as predicted, methods for stabilizing the single-shell tanks and their contents would assume a higher priority than methods of removing material from these tanks. Other materials should be tested in addition to rock fill. 3.1.4.35

The following recommendations are directed toward the final EIS, and relate to other aspects of the DEIS than further research.

1. The vitrification facility should be fully tested with hot feed; vitrification appears to be the best option for at least some double-shell high-level tank waste and newly generated HLW from the PUREX process. 3.1.8.9

2. A thorough and detailed cost analysis of all options is needed. 3.2.6.8

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3.4.1.7 3. A thorough analysis of non-radiological occupational hazards is needed.

4. A thorough analysis of the relationship between each alternative, the decision to delay the second repository, and the rate of generation of commercial spent fuel is needed.

5. Options for reducing the defense waste stream, such as the process modification facility, should be included.

3.1.6.1 6. A thorough analysis of the process waste streams and management of hazardous chemical waste, including regulatory overlap and uncertainties following on the Resource Conservation and Recovery Act and the mixed waste issue, is needed.

3.1.2.5 7. Since the Sr and Cs capsules require minimal, if any, treatment before storage in a geologic repository, the geologic repository appears to be the best alternative for these, at least. Costs and advantages and disadvantages of this option should be explicit.

2.2.9 8. Adequate funding for the management of wastes from defense activities should be assured.

2.4.1.1 9. Waste-producing defense activities should either be regulated directly by the Nuclear Regulatory Commission and the Environmental Protection Agency, or DOE should abide by the regulations promulgated by these agencies by explicit written agreement.

3.1.3.7 10. Differences between the DEIS and the GAO report on TRU waste should be reconciled.

2.2.10 11. Use of cribs for radioactive liquid disposal should be discontinued.

3.3.5.8 13. Cancer incidence rather than cancer fatalities should be the measure of radiologic risk.

A FINAL STATEMENT

The ultimate choice of which wastes to vitrify and which to stabilize in place will involve a balance between current public and occupational radiologic risks and potential future radiologic risks; e. g., vitrification entails the greatest occupational and public health risks but appears to provide the best long-term isolation. The choice must be made carefully and knowledgeably and, if possible, such that all risks are minimized.

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COMMENTS OF CLARENCE BARNETT
ON HDW-DEIS, DOE/EIS - 0113 (7/30/86)

TIMING OF DEFENSE GEOLOGIC DISPOSAL ACTIONS AND OPERATIONAL DATE FOR REPOSITORY:

1. There are several statements in the DEIS that indicate defense waste will be processed and ready for geologic disposal before the operational date of the repository. 3.3.5.5

   A. "The molten glass product is transferred into canisters that will be temporarily stored at the HWVP site. The waste canisters will be transferred from the HVWP to a geologic repository when such a repository can receive these defense HLW and TRU waste forms." (Vol. 2, Section C.1, Page C.2)

      This raises the question as to whether there is need for interim storage. The HDW-DEIS does not include the anticipated inventory or environmental impacts resulting from this temporary storage.

   B. The DOE time line for the commencement of operations for the first repository is 1998. However, the DEIS states that strontium and cesium capsules are to be stored in the Waste Encapsulation and Storage Facility until 1995 and then removed for geologic disposal. (Vol. 1, Section 3.3.1.3 and Vol. 2, Section H.3.3) The HDW time line does not appear to be compatible with the beginning operational date for a respository.

   C. An additional consideration that may affect the HDW time line for geologic disposal is whether the development of a Monitored Retrievable Storage Facility will be used to extend the beginning operational date for the repository.

      The final EIS should include contingency approaches that would be pursued in the event that a repository has not commenced operations or the role of an MRS facility for Hanford defense waste.

2. Several ambiguities for acceptance of defense waste in a geologic repository are found in USDOE "Record of Responses to Public Comments on the Draft Mission Plan for the Civilian Radioactive Waste Management Program", June, 1985. (DOE/RW-0005) 3.3.5.5

   A. The schedule for the acceptance of defense waste is not tied to the 1998 date. (Vol. 2, Page 98)

   B. Commercial waste will be the first waste emplaced in the first phase of the first repository. (Vol. 2, Page 183)

   The final EIS should include a time line for the processing of HDW for geologic disposal in relation to the acceptance schedule in the geologic repository.

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3.5.2.6

HYDROLOGIC AND GEOCHEMICAL MODELS

The current status of hydrologic and geochemical models used to simulate subsurface contaminate migration necessitates making certain assumptions due to technical and data limitations. Calibration of computer models to actual field data is an issue to be closed prior to making a final disposal decision.

Statements made in the DEIS (rather than a technical analysis) leaves reasonable doubt as to the adequacy of some of the preliminary analyses at this time. Testimony indicates that there are several interpretations as to the adequacy of the models used in the preliminary analyses.

This is an area of major concern. It is recognized that additional research and peer review will be required before a consensus can be obtained.

3.1.8.16

WASTE PACKAGES FOR GEOLOGICAL DISPOSAL

Waste package conceptual designs for geologic disposal have been developed and prototype testing is in process.

The final EIS should include a statement as to whether the final waste package design will need to be site-specific depending on the geochemical (and other) conditions of the selected repository.

2.4.1.19

REDUCTION OF WASTE INTO SOIL

DOE Order 5820.2 establishes the policy of eliminating ground disposal of radioactive waste and chemical waste into the soil. DOE plans a separate study on this policy.

The final EIS should include the scope and anticipated time frame to implement DOE Order 5820.2.

3.4.2.12

PACKAGING STANDARDS FOR TRANSPORTATION OF DEFENSE WASTE

The DOE has the authority to design and certify its own packaging to be used by government shippers. (Vol. 1, Page 1.5) Type B packaging design must be certified by either the DOE or NRC. (Vol. 2, Page 1.2)

3.4.2.13

This raises the question as to whether there is different criteria used by the DOE and the NRC for design certification of packagings.

The final EIS should clarify that packagings certified by the DOE must meet the NRC packaging standards.

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CLARIFICATION IN VOLUME 2, PAGE E.6, RH-TRU

4.2.18

The first sentence in Volume 2, Page E.6 reads: "The RH-TRU waste is expected to be processed and stored with RH-TRU waste from the decontamination and decommissioning of facilities." (Underscore added) This sentence implies that RH-TRU does not go to the WIPP before the decommissioning of facilities.

The final EIS should clarify that RH-TRU is sent to WIPP if that alternative is selected.

MANAGEMENT PLANS

4.1.13

The DEIS frequently incorporates within the text a future activity or study such as under the Hanford Defense Waste Management Technology Program or the Hanford Waste Management Plan.

When these programs/plans are incorporated into the text, the final EIS should be more specific and expand on the scope and degree of confidence placed on the activity.

COMMINGLING OF COMMERCIAL AND DEFENSE WASTES

2.1.3

The decision to commingle commercial and defense wastes in the same repository has raised public concern as to the impacts of defense waste to the civilian repository program.

The final EIS should include an appropriate statement that once a repository is chosen, DOE will be required to write an EIS for the repository that will include defense waste impacts, including monitoring.

MIXED HAZARDOUS CHEMICAL/RADIOACTIVE WASTE

3.1.6.1

The impact of mixed hazardous chemical/radioactive wastes is not included in the EIS. The disposal of mixed waste material is of special interest due to the uncertainties associated with these waste forms at this time. Testimony before the Forum indicated that DOE is just getting started on the mixed waste issue and that these wastes may present significant problems.

Further, the DEIS wording in Section 6.6 (Volume 1) Resource Conservation and Recovery Act (RCRA) is not conducive to public confidence.

The final EIS should include a statement of commitment that disposal of mixed wastes will comply with State and Federal standards in force at the time these wastes are disposed. Further, the commitment should apply to all hazardous waste.

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3.5.1.1 PROTECTIVE BARRIER

3.5.1.56 The successful performance of a protective barrier to cover large volumes of waste is a major consideration applicable to all disposal alternatives. The multi-layer earthen cover design was chosen for the DEIS as a preliminary evaluation of a protective barrier to stop water infiltration into the waste (Appendix M). Engineered barrier effectiveness is one of the issues that must be closed. DOE will conduct a research and demonstration project focused on barrier performance.

3.5.1.3 Representatives from the Washington State Nuclear Waste Board appeared before the Forum and raised a number of issues on the preliminary analysis of the protective barrier (Appendix M). On July 17, 1986, the Board issued its draft "Interim Reports on Policy and Technical Issues" of the HDW-DEIS. Technical Issue 1, "Performance of Engineered Barriers and Shallow-Barrier Sites" alleges "there is a systematic misuse of references, which requires a complete reevaluation of all assertions made regarding anticipated high performance of the barriers." (Refer to the Board's document for the complete text). The Washington State Department of Ecology, Office of High-Level Nuclear Management, Preliminary Draft Technical Review of the HDW-DEIS (prepared by URS Corporation) has detailed comments on Appendix M.

The issues raised by the Washington State Nuclear Waste Board on the DOE preliminary analysis of the performance of the protective barrier should be considered and evaluated before issuance of the final EIS.

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2.3.1.13 LOW-LEVEL WASTE

The disposal of low-level defense waste is excluded from the DEIS. The main purpose of the EIS is to focus on high-level waste as recommended by the National Research Council: LLW and the resultant impacts were addressed in ERDA-1538. Although DOE believes that the environmental impacts of LLW are small and pose no significant jeopardy to the environment, DOE has initiated a study to determine whether any additional action should be taken; the adequacy of ERDA-1538 with respect to LLW impacts are being reconsidered.

The fragmentation of LLW and HLW makes it difficult to ascertain the total defense waste disposal program. The final EIS should include in summary form: 1) the main points in ERDA-1538 applicable to LLW; 2) an inventory of these wastes; and 3) the options available that will be taken should the study determine that additional action must be taken.

ANNOUNCEMENT TO POSTPONE WORK FOR A SECOND REPOSITORY

3.3.5.7 The DOE announcement (May 28, 1986) to postpone indefinitely site-specific work for a second repository has heightened public concerns on disposal of commercial and defense waste to an extent that has seriously overshadowed discussion limited to the HDW-DEIS. Many citizens now want assurances with specific information that demonstrates whether a single repository has the capacity to receive both commercial and defense waste, including a separate break-out showing Hanford's defense waste contribution.

2.1.8 DOE should give serious consideration to include this information in the final EIS.

ERROR IN TABLE H.13, WASTE PROCESSING STEPS FOR THE REFERENCE ALTERNATIVE

Table H.13, Waste Processing Steps for the Reference Alternative (Vol. 2, Page H.24) in the second block under existing Tank Waste should read that the high-level (rather than low-level) of existing tank waste is immobilized as glass. 4.2.55

SINGLE-SHELL TANK WASTE

1. Testimony against in-place stabilization of single-shell tank waste covers a broad spectrum ranging from being premature to selection would result in an irrevocable decision. In-place stabilization of these wastes is an area of uncertainty and there is need for focused research. DOE indicated that the intention for in-place stabilization of single-shell tank waste is to make disposal decisions on a tank-by-tank basis and that waste found to be too hazardous for in-place stabilization will be processed for geologic disposal. 3.1.4.1

   This should be developed and included in the final EIS.

2. The NRC has proposed that 3000 NCi/gm would identify material that qualifies as high-level waste. This standard would apply to some single-shell tanks.

   The final EIS should include the impacts of this proposed change in standards and its effect on the in-place stabilization alternative.

3. The final EIS should include a statement that high-level wastes stabilized in-place for single-shell tanks will meet the regulatory requirements of a repository. 2.4.1.7

4. Testimony indicated the need to focus research on other alternatives for single-shell tank waste. In view of the public concern on disposal of these wastes, the final EIS should include the scope of research that will be considered prior to making a final disposal decision.

TRU-CONTAMINATED SOIL SITES AND PRE-1970 TRU BURIED SOLID WASTES

TRU-contaminated soil sites and pre-1970 TRU buried solid waste sites have been previously closed but are being reviewed to determine whether further action is warranted in terms of environmental protection (Vol. 1, Page 3.9). These wastes contain 540 kilograms of plutonium. The reference alternative does not call for retrieval and processing of the soil sites nor most of the buried solid waste. 3.1.3.26

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3.1.3.26 Since the sites are being looked into to determine whether additional environmental protection is needed, it is proper in the interest of long-term safety to include in the final EIS that disposal decisions will be made on a site-by-site basis, and sites found to be too hazardous (even with the additional protection) will be retrieved and processed for geologic disposal.

REFERENCE VOL. 1, SECTION 3.3.5, PAGE 3.33, PARAGRAPH CAPTIONED "GEOLOGIC REPOSITORY DISPOSAL OF SELECTED SINGLE-SHELL TANKS"

3.1.4.33 The sentence that reads as follows is not clear as to its relationship to other sections in the DEIS: "That does not foreclose the option, after the completion of the tank characterization program, of developing a strategy of removing certain high-activity tanks and leaving the rest." (Underscore added) Other sections of the DEIS discuss removal of the high-activity contents from these tanks and not the removal of the tanks. This paragraph requires clarification in the final EIS.

REVISION OF RADIATION STANDARDS

3.5.5.5 The DOE is in the process of revising its radiation standards in the vicinity of DOE facilities (Vol. 1, Page 4.1 and Vol. 1, Page 6.1, Footnote "a"). Pending development of a revised order, concentration guides presented in the current order (DOE 1981) are used in the DEIS. In response to my inquiry on the effect of these revisions, DOE responded: "The overall radiation standards (radiation dose to people) will in effect be lowered. Changing methods of relating concentrations of nuclides to dose equivalent from those of ICRP2 to ICRP26/30 are expected to result in permissible derived air concentrations for a few nuclides that are larger than previously used."

This additional information should be included in the final EIS and cross-referenced to Vol. 2, Page xxxix on the planned adaptation of the HDW models to use the newer dosimetric data.

PARAMETER VALUES FOR STRONTIUM FLOURIDE

3.5.5.7 The DEIS states that additional research is needed to determine more realistic values for strontium flouride. (Vol. 2, Pages I.20 and I.33) In answer to my inquiry on the time frame for resolution of parameter values, the DOE response was that they have learned that strontium flouride is in different form than that used in the DEIS making the accident risk estimates in the DEIS significantly overstated. "As a result, more reasonable estimates are that 1% of the strontium flouride is in the form of dispersible particles and 5% of the dispersible fraction is also respirable" (rather than 100% respirable particles). The final EIS should be changed to reflect this new data.

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LOGIC DIAGRAMS

1. The HDW-DEIS has of necessity been prepared before final optimized designs are available for all processes, and certain research and demonstration projects are necessary to be completed for the disposal options. The question that keeps rising is what is the next step or approach that will be selected if any of these designs or technologies fail? Are there alternatives or variables that can be considered? What are the implications of failure?

   For example, in response to my questions, several alternatives were identified: 4.1.11

Failure	Possible Alternative
Barrier System	In Situ Vitrification.
Grout	Bitumin, ureaformaldehyde, or vinyl ester styrene waste forms.

   Closed-loop cooling is being examined as an alternative in eliminating the use of cribs.

   Logic diagrams identifying the next best variable or alternative to be considered would increase confidence of disposal solutions.

2. Due to: 1) the fact that there are so many technical issues that must be closed; 2) that the DEIS does not include all defense waste; 3) that some work is underway or planned under the Hanford Waste Management Plan; and 4) these actions are in many ways interrelated and dependent upon the success of another action, the final EIS should include a logic diagram for the sequence of events of performance that would be taken for confidence of not being "locked-in" to some particular course. These alternative technologies should be described. The logic diagrams would show the role of integration in the process and the schedules for testing. 4.1.11

GLOSSARY

There are a number of Acronyms used in the DEIS that do not appear in the glossary. For example: BNL, AGNS, ENC, EGG, FBR, NFS, RLFCM, SRL, RHO, WCF, etc. The final EIS should include these ommissions to enhance readership. 4.2.55

TRANSVERSE DISPERSION:

The DEIS states that present acquifer characterization permits a complicated conceptual model on transverse dispersion effects, but the necessary computer software is not presently available for application to the Hanford site. (Vol. 3, page 0.32). 3.5.2.9

DOE has responded that incorporation of transverse dispersion effects into a model would not improve the analysis of radiological impacts and it is not planned that the more complicated conceptual model will be employed in the decision-making process.

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The final EIS should include the reasons DOE does not plan to develop the computer software for the additional analysis on transverse dispersion effects.

3.4.2.24 EMERGENCY RESPONSE

The primary responsibility for emergency response planning and capability lies with State and local governments. The DEIS names federal agencies that provide planning assistance and emergency support to cope with radiological hazards (Vol. 2, Section 1.8).

3.3.5.6 The final EIS should expand Section 1.8 to include the scope of direct support provided by these agencies.

SLAGGING PYROLYSIS INCINERATOR:

The geologic alternative uses the Slagging Pyrolysis Incinerator (SPI) process to reduce volume. SPI is not used in the Reference Alternative.

The final EIS should include the reasons SPI is not used in the Reference Alternative.

CONCLUSIONS

1. Several reasons exist that make it inadvisable at this time to support one of the specific alternatives stated in the DEIS;

3.3.5.3 a. the many areas that require additional research and development for needed technology to support a given alternative; and

2.3.1.14 b. the interrelationship of separate programs that exist to deal with the different types of defense waste on the Hanford site.

2. In my judgement, the DEIS supports disposal strategies and implementation decisions for the following waste types:

3.3.5.3 a. Double-Shell Tank Waste (geologic);
b. Retrievably Stored and Newly Generated Transuranic Waste (WIPP);
c. Strontium and Cesium Capulses (geologic).

3. The DEIS supports the need to fund further research and data collection for the following waste types:

a. Single Shell Tank Waste;
3.3.5.3 b. Pre-1970 Buried TRU-Contaminated Solid Waste;
c. TRU-Contaminated Soil Sites.

No alternative for these waste types should be finalized until the effectiveness of an engineered barrier is demonstrated, the calibration of computer models with field data manifests a high degree of confidence, and applicable waste retrieval methods receive additional review. (Although TRU-Contaminated Soil Sites and Pre-1970 TRU Buried Solid
3.1.3.26 Waste Sites are considered to have been disposed of, but are being reviewed to determine whether further action is warranted in terms of environmental protection, they should be revisited considering the development from actions enumerated in the preceeding sentence). 3.1.3.26

4. Single-Shell Tank Waste may warrant additional NEPA review for either In-Place Stabilization or Geologic disposal.

5. The protection of the acquifers and the Columbia River should be paramount in disposal decisions. 3.2.4.1

6. In the interest of public health and safety:

a. The final EIS should be completed on a timely basis; and 2.2.1

b. Funding for defense waste clean-up at the Hanford site should receive high priority. 2.2.9

COMMENTS MADE BY THE PUBLIC TO CLARENCE BARNETT AS A MEMBER OF THE NORTHWEST CITIZENS' FORUM ON DEFENSE WASTE:

(Comments are abbreviated and bring out only the salient points.)

Open House in Yakima informative. 2.3.2.8
Workshop in Yakima helped to understand problems associated with Defense Waste. 3.2.4.1
A Public Hearing on the DEIS should have been held in Yakima. 2.3.1.3
Columbia River contamination is major concern. 2.3.1.14
Repository issue is more important than Defense Waste. 3.5.5.42
All Defense Waste should be in DEIS. 2.3.2.7
Need independent epidemiological study. 3.4.3.7
Insufficient time to comment on DEIS. Short comment period builds up emotions. 2.2.13
Sabbotage not addressed in DEIS. 3.3.4.2
State should monitor cleanup. 3.4.2.24
Keep waste above ground so can be monitored. 2.3.2.9
Put all waste in Monitored Retrievable Storage. 2.2.1
Need strict regulations for truckers.
DOE should assume more emergency response responsibility.
Have panel of scientists make independent review of FEIS before it is issued.
Economic risk analysis needed.
Safety over long-term, not cost, should be the major consideration.

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7/21/86
Date & Time

The Washington State Senate

13019 99th Ave. S.E.
Snohomish, WA 98290
568-6494

SENATOR CLIFF BAILEY
Thirty-Ninth District

Institutions Building
Olympia, WA 98504
786-7676

July 18, 1986

MINORITY REPORT
NORTHWEST CITIZENS FORUM
HIGH LEVEL DEFENSE WASTE D.E.I.S.

The state of Washington is the host of many defense projects located at the Hanford site near Richland, Washington. The Hanford site is 570 square miles in size and has the major water conveyer in the Northwest - the Columbia River - traversing its borders.

Because of the importance of the Columbia River to the western United States -- it supplies power generation, irrigation waters for several states and has tremendous fisheries capacities for all peoples of the Northwest region --, and

Because the state of Washington, as host, is supplying the ground area (called Hanford) for the defense projects of the United States government, it is only right and fair that the host state ask for and receive the best possible husbandry and maintenance of our soil, air and water resources, and

Because in the D.E.I.S. we are talking about the containment of high level nuclear wastes that have a detrimental effect on soil, air and water resources of the state of Washington for over 10,000 years, and

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Because on May 28, 1986 the Department of Energy announced an indefinite postponement of site-specific work for a second repository, and

Because present law limits emplacing more than 70,000 metric tons of high-level nuclear waste in the first repository, and

Because of the conflicting information presented in the D.E.I.S. document and oral and written testimony presented by the Department of Energy there are serious questions whether the high-level defense wastes presently at Hanford and future production of high-level nuclear defense wastes will, together with civilian high-level commercial nuclear wastes, fit under the first repository limitation of both weight and volume, and, therefore, in my opinion, the D.E.I.S. is irrevocably flawed, and

3.3.5.7

Because the high-level nuclear and chemical wastes stored in the 149 single-wall tanks are more detrimental to the contamination of the soil, air and water resources of the state of Washington than the high-level wastes stored in the double-wall tanks, and

Because the proposed in-place stabilization method for the single-wall tanks is unproven, and

Because in the next 10,000 or more years the water table could change dramatically and subsequently adversely affect the in-place stabilization of the single-wall tanks, and

Because since 1943 when the first single-wall tank was built until 1986, approximately 500,000 gallons of high-level

2.2.12

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(no comment identified)

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nuclear waste has leaked into the soil, air and aquifer, it is reasonable to expect the single-wall tanks to totally disintegrate within the next 100 years or so, leaving no protected barrier from contaminating the soil, air and water except the proposed in-place stabilization barriers.

The only way to protect the soil, air and water of the state of Washington is glassification and disposal of the high-level nuclear wastes of the 149 single-wall tanks and the double-wall tanks in a Monitored Retrieval Storage (MRS) facility with final disposition in a proven scientifically safe geologic repository.

3.3.4.2

Further, Congress is strongly urged to initiate legislation to direct the United States Department of Energy to comply with current federal and state requirements on waste handling and disposal within a specific time schedule. The legislation should also include establishment of a permanent dedicated funding source to achieve clean-up of present and future chemical and nuclear wastes.

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2.4.1.1

2.2.9

I appreciate the opportunity the Department of Energy has given me to comment on the D.E.I.S.

By Cliff Bailey
CLIFF BAILEY
Senator

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J. RICHARD NOKES 14650 S.W. 103rd AVE. TIGARD, OREGON 97224

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citizens forum report

From J. Richard Nokes
Member NW Citizens Forum on Defense Nuclear Waste Disposal

To: Rev. Bernard Coughlin
Chairman, Northwest Citizens Forum

U.S. Department of Energy

Subject: Personal critique, DOE DEIS Defense Nuclear Waste Disposal

Because the Northwest Citizens Forum was invited to critique the DOE draft environmental impact statement on disposal of Hanford defense high-level, transuranic and tank wastes, and because DOE will issue subsequent draft EIS on disposal of wastes from commercial reactors and on selection of a site for permanent disposal of nuclear wastes, I confine my remarks to the draft environmental impact statement concerning methods of disposal of defense nuclear wastes.

General Statement

Defense nuclear waste has been accumulating at Hanford for more than 40 years, and while it has caused minimum hazard to the environment, Congress and the people generally agree a process should be started looking toward permanent safe disposal. Other nations, notably France, are ahead of the United States in selecting permanent disposal techniques. Even China, with ten reactors and two more being constructed, has begun a process to select a system of permanent disposition and has been in consultation with French engineers in Beijing on this subject.

The challenge to the Northwest Citizens Forum has been to advance this process by analyzing and criticizing the draft environmental impact statement issued by DOE last April 1, and to insure that northwest residents generally have opportunity to do the same.

2.2.14

A major complication has been the timing of the announcement of the selection of three finalist locations for the first permanent site for a nuclear waste repository, one of the three being Hanford, Washington. This announcement came close on the heels of the first meetings of the Citizens Forum and has caused such an adverse political and public reaction in Washington and Oregon that the DOE's statement on military nuclear waste has been almost completely obscured. Public hearings on the subject have on occasion developed into virtual public hangings of the DOE, focusing little on the specifics of the DEIS on military nuclear waste. This has been most unfortunate.

In my view, any plan for disposition of the accumulated and

2.2.3

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2.2.3 future defense nuclear and chemical waste should focus entirely on public safety for generations to come. Financial cost should be secondary to environmental and health costs. Ten billion dollars in expenditure if it provides maximum long-term safety is preferable to a two million dollar expenditure that might provide lesser assurance of long-term safety. When we are talking of 10,000 years or more, ten billion dollars would be a small price.

Specific Considerations

With exceptions, I agree with the Oregon position released by Gov. Vic Atiyeh and presented by David Stewart-Smith to the recent meeting of the Citizens Forum in Hanford, and with the draft concensus position of the alternatives sub-committee of the Forum at the same meeting. The two are compatible.

3.3.1.1 A. I agree that Option 1 (vitrification and geologic disposal) in the DOE DEIS should be the preferred method of disposition. All high level waste (HLW) should be retrieved, glassified, packaged in stainless steel cases surrounded by concrete and permanently deposited in a deep repository wherever that may be. DOE estimates this would be 98 percent (by activity) of the waste.

3.1.3.25 B. Transuranic waste should go to the waste isolation pilot plant in New Mexico. This includes pre- and post-1970 TRU waste.

3.3.1.1 C. I am not convinced after reading the report, listening to testimony and observing on-site testing of engineered barriers that shallow burial will ever be feasible. All single shell tank waste, even though it is in cake or sludge form, should be retrieved and disposed of in deep geologic repositories. The DOE draft EIS indicates safe retrieval technology does not exist, so additional research should go forward as Oregon recommends. It 3.3.5.3 should be noted that Washington's draft statement (page 2-7, July, 1986) suggests a possible solution. Mike Lawrence in his statement to the forum via Father Coughlin July 3 also suggests a possible method and mentions the final EIS will address the various possibilities of complete clearing of single-shell tanks.

3.5.1.8 Lawrence suggests that adding a sealant around and under the single-shell tanks is not feasible at present.

3.5.1.7 In general, the barrier development program has not yet provided assurance that shallow burial would over the long term be a safe technique. Intrusion by man, animal species, plant rooting and decay, and natural disasters such as earthquake and climatologic change over the thousands of years are dangers that come to mind. Markers on the site over such a long period could be obscured, removed or become incomprehensible to man in millenia to come.

D. Strontium and cesium wastes double encapsulated in stainless steel cylinders should continue to be stored in water basins until a repository is available after which they should be packaged and shipped to a future geologic repository. 3.1.2.5

Two other Oregon suggestions should be heeded: 1--DOE should comply with federal and state requirements on chemical and low-level waste handling; 2. Congress should be reguested to establish funding on a perpetual basis for the disposal of military waste either in the Defense Department or Department of Energy budget. 3.1.6.1 2.2.9

Summary

While the in-place stabilization and disposal alternative and the reference alternative provide cheaper means of disposal of defense nuclear waste than the geologic disposal alternative, I am of the opinion that dollars don't count; safety does. Thus the geologic disposal alternative should be preferred. 2.2.3

Additional comments:

The specific criticism of the DEIS by Washington State should be answered forthrightly in the final EIS.

The question raised by Robert Alvarez in May and discussed in various letters since concerning criticism of the French vitrification technique should be answered in the final EIS. While DOE has indicated in a communication of June 5 from R.D. Prosser to Alvarez that the complete packaging of vitrified HLW would eliminate any danger of breakdown of glassified HLW, this does not appear to be the final word.

DOE also should deal in the final EIS (as it did in a communication received by Forum members) with questions raised by Washington State Senator Bailey concerning the capacity of the first repository for all the Hanford nuclear waste.

I compliment Jerry White and all the other DOE staff members who have met with the Citizens Forum and have patiently responded to all the questions, some of them quite barbed, from Forum members or the public. I am afraid that on occasion DOE has been treated as public enemy no. 1 instead of as a responsible agency doing its best to solve a problem that began in wartime 43 years ago.

This personal report is written prior to the August meeting of the Citizens Forum in Seattle. I reserve the right to amend it if subsequent information seems to require it.

J. Richard Nokes

July 21 1986

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Leonard Palmer
Geology Department
Portland State University

QUESTIONS FOR DOE

2.3.1.2 1. Why were no alternate site selection studies done to find whether more suitable sites exist with lower water contamination potential?

2.1.1 2. Why should present and future waste continue to be stored at the Hanford site in spite of the history failure of the site to prevent radioactive and chemical soil and water contamination?

3.2.2.6 3. Why were the "LeGrande-Chewaukin" fault structures which traverse the Hanford site not shown on the Structure Map, Figure 4.5? Why aren't the thrust faults on the Hanford site shown on the DEIS fault map?

3.5.1.90 4. What will prevent direct radioactive and chemical contamination of the Columbia River aquifers and water system if the 5 foot (1.5 meter) "fine soil" of the on site disposal plan were to be eroded and removed by existing wind, water, or other process?

3.5.1.90 5. What BACKUP PROTECTION is provided for on site disposal plans if the "fine soil" barrier should be removed?

3.5.3.9 6. What is to prevent the existing spilled radioactive and chemical tank and trench waste from entering the ground water by gravitational downward movement? What other direction could they go? What alternate removal options exist?

3.1.6.1 7. What is the chemical content of the contaminants associated with the radioactive waste and what are the potential risks to organisms if they leak to the environment?

3.3.5.2 8. Why were the more typical designs for waste disposal which utilize water containment and control of potential leachate drainage not evaluated?

2.3.2.9 9. What independent state, federal or private agencies are providing technical review of the DEIS proposal? Could copies of their evaluations be provided?

3.3.5.2 10. What intermediate alternate solutions can be presented? Those alternatives presented are extreme high cost and low cost possibilities with none of the type of solutions normal for hazardous waste disposal site selection.

4.1.10 11. Geological references cited in the DEIS were not available to the Forum. On request they were not able to provide copies within one month - some were not available for two months, (a date after the close of the review period).

4.1.10 12. Much public confusion and non-information exists between:

repository decisions
defense waste decisions
weapons production
private power production

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STATEMENT OF RAY E. OLNEY

YAKIMA INDIAN NATION

concerning the

U.S. DEPARTMENT OF ENERGY

DRAFT ENVIRONMENTAL IMPACT STATEMENT

July 9, 1986

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CONFEDERATED TRIBES AND BANDS
Yakima Indian Nation

July 25, 1986

Copy Received
MERKEL, CAINE, JORY, DONOHUE & DUVALL
8/1/86
Date & Time

Mr. Bernard J. Coughlin
Office of the President
Gonzaga University
Spokane, Washington 99258-0001

Dear Mr. Coughlin:

I received a copy of the Draft Environment Impact Statement which I have reviewed.

I would like to include a statement as a member of the Citizen's Forum on Defense Waste and as a member of the Yakima Indian Nation.

This is an issue that is very important to the people of the Yakima Indian Nation and throughout the Yakima Valley.

If you should have any questions concerning my statement please feel free to call me at 509-865-5121 ext. 337 or you can write me in care of the Yakima Nation Tribal Council.

Thank you very much.

Sincerely,

Ray E. Olney

Ray E. Olney, M.Ed.
Tribal Council
Yakima Indian Nation

Enclosure

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EXHIBIT L

(no comment identified)

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STATEMENT OF RAY E. OLNEY
YAKIMA INDIAN NATION
concerning the
U.S. DEPARTMENT OF ENERGY
DRAFT ENVIRONMENTAL IMPACT STATEMENT
July 9, 1986

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The U.S. Department of Energy has issued a Draft Environmental Impact Statement on the Disposal of Hanford Defense Wastes accumulated over the past several decades and for those continuing to be created. There is much in the document that has been released that is helpful in better understanding the nature of the wastes that have been produced. We are also somewhat encouraged that DOE has finally presented some preliminary information on the defense waste issue which is of such consequence to Indian Tribes in the Northwest, and indeed, all peoples in this region.

However, there are substantial concerns that we have with the defense waste disposal program, only a portion of which, appears to have been considered in the draft EIS.

1. We are concerned that the Department of Energy has made a determination that the preponderance of wastes that exist at Hanford will be permanently emplaced where they are in "mini" repositories that do not afford the protection of the contemplated deep geologic disposal facilities. This concern results from previous statements of DOE which clearly indicated that their preference was to keep of the wastes where they were, in single-walled tanks, or in the ground where a substantial amount of the wastes have leaked. This appears to be confirmed by the

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alternatives that have been presented in the DEIS, i.e. moving all of the wastes, moving none of the wastes, or moving "readily retrievable" wastes which DOE defines as those that do not constitute a safety risk and which are cost effective.

The Affiliated Tribes feel strongly that the clear intent of the Nuclear Waste Policy Act is to permanently contain all high-level waste and spent fuel in geologic repositories. Since the President made the decision to commingle commercial and defense wastes, the requirement for geologic disposal covers defense wastes as well and attempts to minimize the amount of wastes going to repositories on the basis of short-term over long-term risks is short-sighted and is not supportable. We would like assurances by the DOE that they truly are looking for the best alternative and are not merely setting forth approaches that may be unachievable or are unrealistic in order to foster their long-held views.

2.4.1.6

2. We do not feel that the relationship between the defense waste program and the commercial disposal program are adequately described in the DEIS. With the commingling requirement, DOE should have recognized several impacts in the DEIS concerning the repository program, including design, schedule acceptance, operation, transportation, and others.

2.1.3

3. We are concerned that the Department of Energy may be considering only an minimum level of safety rather than the maximum level required to fully protect all of the citizens of he region. The DEIS indicated that Hanford defense wastes must be disposed of in such a way that an "appropriate level of protection of public health and safety can reasonably be expected." We expect DOE to do better than talk about

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an "appropriate level of protection" and reasonable expectations. We 2.2.1 expect that the wastes should be disposed of with full safety and with conviction and assurances that all our people will be protected.

4. We are concerned that DOE may wish to select an alternative that may fulfill the definition of "cost-effective" rather than solving 2.2.1 the disposal issue from an overall safety and health perspective. We do not suggest that DOE is not interested in health and safety, but we are concerned that safety decisions may be, in part, driven by economic arguments rather than by the safe and secure isolation of the waste as the motivating force. A portion of our concern is with the potential implications of budget reductions under the Gramm-Rudman Act, as well as the several month delay in determining cost allocations between the commercial and defense programs as a result of the commingling decision. The primary consideration must be safety, not cost.

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5. We are concerned that DOE has implied the use of in place stabilization of defense wastes, since it has indefinitely suspended its search for a second site. Since there is a ceiling on wastes for the 3.3.5.7 first site, it would appear that one way to expand the life of the first repository would be to lessen the amount of wastes from defense activities to be included.

While we are encouraged by the information that DOE has included in the draft EIS, we are not encouraged by some of the key questions which must be dealt with before final decisions on any preferred alternative are made. DOE must continue its efforts to 2.3.2.8 provide all relevant information well in advance of its decision-making. In the case of Hanford defense wastes, no final decision on an alternative should be made without the inclusion of expanded material on the points we have raised above.

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Stafford Hansell
9 Eastregaard
Boardman, OR 97818

July 29, 1986

Copy Received
MERKEL, CAINE, JORY, DONOHUE & DUVALL
5/4/36
Date & Time

Nothing in this statement in response to the DOE Environmental Impact Statement concerning the disposal of the Hanford defense waste should be construed as supporting the DOE decision concerning geologic depository siting. Others have done a far better job than I can to express the position of those of us who live in the Northwest. There are many other decisions concerning defense waste that need to be decided.

PUBLIC PARTICIPATION

I believe that DOE did an adequate job in seeking public participation. The issues are so complex that before an intelligent answer can be given a great deal of education needs to take place. This coupled with irreversible prejudices do not make for a great deal of useable public input. But, at least, DOE made an honest attempt. 2.3.2.8

THE PUBLIC FORUM

As a member of the Public Forum, I would have benefited from a better understanding of the total nuclear waste situation. In addition, a look at the total waste problem at Hanford would have been helpful. As it is, I fear we may have only been exposed to part of the problems. 2.3.1.14

In looking back at DOE's various option approach, I believe I would have preferred DOE to state their preference up front. Some lay people I talked to did not testify because of this. 2.3.2.2

WHAT TO DO WITH THE HANFORD DEFENSE WASTE

After the second hearing my mind was made up, that all of the medium and high level waste should be placed in a deep geological site. I was adamant that Hanford should be cleaned up --- hang the cost and effort necessary. I was not necessarily unhappy with the proposals for in place stabilization but felt the safest long term solution was the deep burial. 3.3.1.1 2.2.1

It is ironic that the United States is making this tremendous effort to make defense nuclear waste safe for thousands of years while the cause of this waste, nuclear weaponry is continuously being made more terrifying and capable of destroying large portions of the world in the matter of minutes. No EIS or citizen input on this part of the process. One way of controlling future waste is the control of the need of the product and to limit production to necessity. I would feel better if there was a mechanism to determine this need other than the military. 2.5.6

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Stafford Hansell
9 Eastregaard
Boardman, OR 97818

While it would be more inspirational to be engaged in that process, it is time to get back to the military waste at Hanford. My thinking has changed since the start of the Forum. It has been influenced by a number of factors:

1 - Inability to quickly determine a geologic depository site.

2 - Filing of law suits that will prolong the determination of such a site.

3 - Statements of former Washington Govenor Dixie Ray Lee in a Tacoma speech.

4 - Transportation problems seem to becoming more difficult.

5 - Huge cost of the geologic depository and the problem of getting it funded.

6 - A visit to the site. This is a waste area that has contributed little to man's survival since the ice age.

7 - Having farmed in a similar climate area, within 50 miles for a number of years, I am convinced what is proposed is doable.

8 - In addition it does not seem reasonable to require, as the EPA in 40 CFR191 does, that government control cannot be relied on after 100 years. I can think of no scenario that would eliminate all forms of government. If by some chance civilization is obliterated, what is the reason for us to devise a plan that is forever safe against any eventuality. It seems to me that any plan has some kind of a risk factor.

9 - Waste disposal is not a high priority of many congressmen. After all, it is located many miles from their state, has never caused a lot of expense or trouble and compared to some local project, is simply not important. I am afraid there will be continued slippage on the most expensive plans for defense waste disposal.

I have now come to the conclusion that while geological disposal is the preferred route, in place stabilization disposal of waste under certain conditions would be acceptable.

ACTION NEEDED

1 - Prompt funding of vitrification plant and grout plant

3.1.8.20

2 - Systematic cleaning of the single wall tanks. Removal of all nuclear waste. I agree with those who propose allowing 5 years of research to find the best way to accomplish this. No longer time should be allowed.

3 - I would propose the empty tank be filled with gravel and covered by

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Stafford Hansell
9 Eastregaard
Boardman, OR 97818

a protective barrier.

4 - The remaining nuclear waste should go through the vitrification process ready for stablilizing by protective barrier.

5 - In a timely fashion, the same thing should be done with the double walled tanks.

6 - I would recommend a system of monitoring for checking waste penetration and waste movement. This should be on a continuous basis but every 25 years, an evaluation should be made and a public report issued.

3.1.8.20

7 - The waste site should all be on the plateau in the 200 area.

8 - As a hedge against any miscalculation concerning the protective barrier system, all waste should be packaged in such a manner that retreaval for geological burial is not an impossibility.

9 - In proper order TRU waste should be handled in the same manner.

10 - No waste disposal plan of any kind should rely on the Columbia River for dilution. This is just not acceptable.

CONCULSION

There will be efforts to continue research and investigations delaying action for years. I strongly support rapid action. It is doubtful if the perfect solution will ever be found. Doing nothing until everybody agrees on a solution, just will not get the job done.

2.2.1

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JANE HARDY CEASE
MULTNOMAH COUNTY
DISTRICT 19

REPLY TO ADDRESS INDICATED:
☐ Senate Chamber
Salem, Oregon 97310-1347
☐ 2675 NE Hancock
Portland, Oregon 97212

OREGON STATE SENATE
SALEM, OREGON
97310-1347

COMMITTEES
Chair:
Transportation
Co-Chair:
Joint Subcommittee on
Motor Vehicle Code Revision
Vice-Chair:
Consumer Protection
Member:
Revenue and School Finance
Legislative Administration

August 5, 1986

Comments of Senator Jane Hardy Cease
For Attachment to Appendix of
Northwest Citizens Forum on Defense Waste
Report to the USDOE
DEIS on Defense Waste

I wholeheartedly support the work of the Citizens Forum and our recommendations in the Executive Summary, the Introduction, and the General Comments and Recommendations of our report.

2.2.1 2.2.14 However, I continue to have grave reservations about any continued permanent disposal of high level nuclear waste -- defense or commercial -- at Hanford. There are six better sites for repository selection. Hanford has been put to the top illegally, thus needlessly disturbing and confusing what might have been an orderly process.

Jane Hardy Cease

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RECEIVED BY DOE/RL
AUG 8 1986
WASHINGTON 021

July 29, 1986

Father Bernard J. Coughlin
President
Gonzaga University
Spokane, WA 99258-0001

JUL 29 1986

Dear Bernie:

Since I will not be in attandance at the next Public Forum meeting, and its schedule calls for a report to be written in early August, permit me this letter as an individual member's recommendation for the Hanford Defense Waste Disposal issue.

2.3.2.12 The Department of Energy is to be commended for creating this Public Forum as a stage for airing and debating the problem of Hanford Nuclear Waste Disposal. It is unfortunate that an inordinate amount of time, as well as written material, was devoted to topics only remotely connected with nuclear waste disposal.

3.3.1.1 It is my opinion that the best method to dispose of existing Hanford Defense Nuclear Waste is the Geological Disposal Method. However, reality would dictate a second and third choice, meaning the Reference Alternative and, at the least, In-Place Stabilization.

I am concerned that all debate and projections were directed toward a "walk away" condition - that no further care, treatment, or concern would be applied to whatever method of disposal once it was completed. A parallel should have been considered whereim new science and technologies would be developed that, when applied to whatever disposal method, would improve the guarantee of safety immeasurably. No one has walked away from the Hanford problem for the last 40 years and I would suggest that whatever method of disposal used would nor be ignored in future years.

3.3.4.1 It is my belief that we need not be too concerned with any of the three alternatives presented by the DOE. Our only concern would be with the fourth alternative, which would be to do nothing.

Parenthetically, it should be observed that I have never suffered through so much deliberate redundancy and obfuscation as from the "anti" testimony during the hearings.

Sincerely,

Fred

Fred L. Esvelt
President

EXHIBIT O

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