

ISSUES STALLING HANFORD WASTE MANAGEMENT AND CLEANUP ACTIVITIES

F. Robert Cook and Russell Jim
Yakima Indian Nation
P.O. Box 151
Toppenish, WA 98948

ABSTRACT

The Yakima Indian Nation has focused its attention on four key issues/actions requiring resolution for progress at Hanford to occur in the area of waste management and cleanup. Such progress is considered necessary by the Yakima Nation to assure continued funding by Congress. These actions are: 1. Establishment of a regulatory presence relative to long-term storage of high-level radioactive wastes, long-lived decontamination and decommissioning waste and commercial spent fuel at Hanford. 2. Resolution of outstanding safety concerns associated with explosion hazards in double and single-shell tanks. 3. Cost effective integration of Hanford high-level radioactive waste management system conceptual designs with the conceptual design of the Yucca Mountain repository project under the Office of Civilian Radioactive Waste Management. 4. Coordination of cleanup and disposal actions, justified by comprehensive performance assessments that project long-term environmental health over the entire site with time, considering any and all projected land. The paper will review these issues/actions and the Yakima Nation's concerns relative to the current direction of DOE, the State of Washington and other relevant parties.

INTRODUCTION

The Yakima Indian Nation (YIN) has actively participated in the activities at the Department of Energy's Hanford Site for many years: however, substantive results of these activities only began to be apparent about 15 years ago.

The most significant result was formal recognition of affected Tribal status by the United States of YIN participation in the management of nuclear wastes as provided in the Nuclear Waste Policy Act. Consistent with provisions in this Act, the Yakima Indian Nation reviewed the pre-decisional activities of the Department of Energy and its contractors at Hanford to characterize a proposed site for a high-level radioactive waste deep geologic repository. Because of the efforts of the Yakima Nation and others, this site was shown to be unacceptable for the disposal of the radioactive wastes designated for such repositories.

The Yakima Nation's basis for its position did not include a bias either for or against nuclear power. Its actions were based on assuring the integrity of the environment at Hanford and in assuring the future for the children still unborn. To the Yakimas, the Earth and the Tribe's Northwest is loaned to them by the future children.

Requirements on the geological portion of the proposed Hanford repository system--i.e., the ground water travel time--was shown to be likely unacceptable. In addition, the impracticality of constructing a repository in the proposed repository horizon as a result of ambient rock temperatures, adverse rock mechanics associated with the high in-situ rock stress and inferior rock quality, and ground water saturated in methane, was highlighted and revealed to decision makers in Washington. As a result, the project at Hanford was canceled by amendments to the Nuclear Waste Policy Act, thereby focussing future hopes for a repository on the candidate Yucca Mountain Site in Nevada.

Thus, the Yakima Nation's motivation was not that of being anti-nuclear, but rather that of a concern for the prospects of potential long-term environmental degradation of lands and waters for which it has reserved usage rights per the Treaty of 1855 with the United States.

REGULATORY PRESENCE REGARDING RADIOACTIVE WASTES

The same concerns regarding the long-term integrity of the Hanford environs, including the Columbia River, prompted the Yakima Nation to continue its oversight of waste management and environmental restoration activities at Hanford. Because of these concerns, about two years ago the YIN started to indicate to the Department of Energy that their plans to dispose of high-level radioactive waste in a near surface series of grout vaults at Hanford was not necessarily the best way to proceed. The Tribe pointed out that the United States policy for disposal, as spelled out in the Nuclear Waste Policy Act, was to use a deep geologic repository. Although DOE plans called for disposing of about 75% of double-shell tank wastes in the deep repository, 25% was slated for Hanford disposal in grout vaults.

The DOE considered this waste stream to be "incidental waste" even though it would have contained 32.3 million curies for all single shell and double shell tanks in about 270 grout vaults, including the daughters of cesium and strontium.

The Yakima Nation felt that the DOE decision regarding grout disposal was inconsistent with the policy of the Nuclear Waste Policy Act and, in any case, would not be "demonstrated" to meet pertinent long-term performance objectives. A solution for DOE is to dispose of all the tank wastes at Hanford in a licensed repository. This option is attractive since it would eliminate a potential long-term environmental threat, reduce total Hanford Tank Waste Remediation system costs, even when considering repository costs, and expedite Hanford tank remediation and tank farm cleanup. These conclusions stem from the fact that treatment systems for splitting tank wastes into two fractions would be unnecessary, and primary operations would be limited to those associated with retrieving, stabilizing and packaging the wastes.

CURRENT ACTIVITIES POSING ENVIRONMENTAL THREATS

As noted above, the Yakima Nation is also concerned about current activities and their effects in the short term on the environment at Hanford. The potential catastrophic failure of high-level radioactive waste storage facilities,

including the water cooled storage basins for N-Reactor fuel at the Hanford K-Reactor and the leaking and potentially explosive *underground* storage tanks, are prime examples of such issues.

Other operational policies that provide for the continued contamination of the soils, air and ground water are also problematic. The Department of Energy Order that allows contractors to continue to discharge gaseous I-129 and C-14 to the atmosphere after dilution with large quantities of facility *ventilation* exhausts and/or the atmosphere at the top of the stacks, and the discharge of tritium to the ground water (allowed by DOE Order 5400.5) or the Columbia River after dilution has occurred, are examples of such policies. In addition the discharge of nitrates, technetium and uranium to the soil column and ground water, such as is planned for operation of U-Plant at Hanford, also falls into the category of continued contamination.

The Yakima Indian Nation has proposed that such operations cease. We believe that until the culture changes at Hanford, real progress toward cleanup and public acceptance will not occur. Legal challenges will increase along with delays and cost increases. (The issue associated with the U-Plant is currently being litigated.)

Some of the YIN's recent attention has focused on the safety issues associated with the double-shell storage tank, 101-SY. This tank is considered by DOE to be its most serious safety hazard. It generates a burnable mixture (some people refer to the mixture as explosive) of nitrous oxide and hydrogen. Straightforward schemes for mitigating this tank (for example, by diluting the sludge layer with caustic) have been identified by the Hanford contractors for many years. However, the DOE has been unable to decide to utilize some of the 5 million gallons of excess double-shell tank capacity at Hanford to help accomplish this mitigation. Instead the DOE continues to hold spare double-shell tanks empty awaiting the treatment of other wastes currently in tank storage or for emergency uses. These non-actions are a way of assuring compliance with Tri-Party milestones (for which DOE has requested relaxation) for the treatment and disposal of high-level radioactive wastes slated for the grout vaults previously noted. The YIN believes that the regulators are affecting safety at Hanford by their refusal to relax the grout schedule and to thereby free up spare tankage.

In addition to the utilization of spare double-shell tank space, the Yakima Nation has also suggested utilizing readily available railroad tank cars for the interim storage of the alpha emitting wastes in 102-SY, freeing up this tank for treatment of the nearby 101-SY wastes.

Nevertheless, in lieu of expediting the chemical treatment of the 101-SY wastes, the DOE has decided to embark upon a program with no promise of eliminating the generation of the burnable gaseous mixture. This current scheme is to "test" a 150 horsepower, electrically driven, 450 volt submersible motor pump to agitate a small volume (a 5- to 10-foot radius *from the pump*) of the tank sludge which is expected to cause the continuous evolution of the burnable mixture. It is hoped that this agitation may affect the whole tank and eliminate the episodic large releases of the burnable mixture. It is recognized that treatment of the 101-SY wastes to eliminate the gas generation problem will not be accomplished by the pump mixing plan.

The YIN has clearly stated its concern about the lack of caution in the plan to introduce the high-voltage electrical gear into the highly energetic and dangerous environment of

the 101-SY tank. This concern is heightened by the fact that there is no planned simulation testing for expected episodic tank conditions utilizing sludge like materials that simulate the 101-SY tank wastes. DOE has argued that the pump operation in 101-SY is considered a test for which there is no requirement to consider other low risk alternative actions (the pump operation is part of an R&D program). Thus, DOE has not considered safer alternatives for ultimate mitigation with less potential environmental impact. This is expressed in their environmental assessment of the "test" program. Based on a safety analysis report, DOE claims that the pump operation is safe enough.

Again, the YIN has concluded that until the current practices of soil, water and air contamination are stopped, and meaningful safe mitigation of safety hazards is accomplished with meaningful and responsive environmental assessments, public acceptance will not be achieved and real progress will not be made in environmental restoration at Hanford.

INTEGRATING HANFORD WASTE MANAGEMENT WITH DEEP GEOLOGIC REPOSITORY/MONITORED RETRIEVABLE STORAGE FACILITY PLANNING

In discussion of the grout program, repository costs were mentioned in considering the overall Tank Waste Remediation System at Hanford. Indeed, repository costs as reflected by the system designed to accept Hanford wastes should be considered in the selection of Hanford's remediation. In this regard the Yakima Nation has been urging this coordination between the civilian and defense waste management entities at DOE.

Although concepts at Hanford have evolved to include consideration of large shielded packages (up to 11 cubic meters net capacity) for the waste, compatible with monitored retrievable storage facility concepts, the repository design being considered for Yucca Mountain does not include enough room in the drifts for the large number of stabilized waste casks that could be produced at Hanford. It would appear that this lack of space in the repository is influenced by the limited space available between fault zones at the Yucca Mountain Site and the related design initiative by DOE to pursue a "hot" repository concept. (The "hot" repository concept is necessary to provide room for 70,000 metric tons of spent fuel within the fault boundaries at Yucca Mountain.)

If the repository design concept were to embrace a more traditional "cold" design, additional space would be available in drift waste emplacement schemes to accommodate the Hanford shielded packages, estimated to number about 13,000, if all the Hanford tank wastes were stabilized without pretreatment. The "hot" repository concept hinges on several key issues regarding the current NRC design requirements for the geologic portion of the waste isolation system. In particular, the relation of the repository disturbed zone to the accessible environment and the ground water travel time (required to be 1000 years) between the edge of the disturbed zone and the accessible environment are key design parameters at issue. It will be difficult to prove that the disturbed zone would not extend to the surface, considering the thermo-mechanical expansion the geologic system would suffer in the "hot" scenario.

Since the Hanford Tank Waste Remediation System costs are comparable to the entire projected repository cost, it warrants close coordination between the conceptual design efforts of the two DOE entities involved in the respective

conceptual designs to assure a cost effective and environmentally sound outcome.

COORDINATION OF DISPOSAL AND CLEANUP ACTIONS

There is much talk about cleaning up Hanford. However many of the proposed actions merely shift wastes from one location to another creating new disposal facilities on undisturbed lands. Thus, long-term environmental problems are only being moved around. This has been our concern with the proposed grouting of high-level radioactive waste discussed earlier. In addition, there are several different disposal areas either planned or operating at Hanford. These include the Navy reactor plant, in-hull disposal, the U.S. Ecology low level radioactive waste site, various cribs and ditches, and defense low-level radioactive waste burial grounds. In addition, a mixed low level/hazardous waste site is being discussed.

All these disposal sites are inconsistent with future site use goals at Hanford since they establish long-term environmental hazards and contamination that are incompatible with unrestricted general usage of the site. The sites require long-term performance assessments to demonstrate their compatibility with general usage by people in the distant future, including usage by the Yakima Indian Nation.

Such general usage of the site has been identified by a citizens group that recently assessed and identified the potential future uses for Hanford. It was recognized by this group that land usage should establish the design basis for clean-up as well as disposal actions. Most requirements for performance assessments concerning radioactive waste disposal sites include the necessary consideration of general usage by people following some period after disposal facility closure. For example, the NRC's requirements in 10 CFR 61, Sub-part C, specifies such consideration of possible usages and specifies that institutional controls shall not be assumed to exist beyond 100 years past closure. Further, engineered barriers are in general not considered able to function after 500 years past closure.

To be sure, deep geologic isolation is considered necessary to achieve long-term isolation of long-lived wastes by the NRC and is United States policy as specified in the Nuclear Waste Policy Act.

It is the Yakima Nation's position that these criteria should not only apply to the U.S. Ecology disposal site that is subject to 10 CFR 61 requirements, but also to all other radioactive and hazardous waste sites at Hanford. Since the Yakima Nation has reserved usage rights on the site, including rights that involve common agricultural practices of pasturing stock, DOE or any other entity should not create permanent

disposal facilities or avoid clean-up actions that would be inconsistent with the exercise of this right.

In this regard, the YIN has raised questions about the disposal of any materials that do not degrade or decay within the 100 year time frame following closure of a disposal site. In particular the current design practice for hazardous waste disposal facilities that provide containment for the period of time the facility is operated and for 30 years beyond, as verified by monitoring programs, is inadequate in assuring the long-term integrity of the environment. The long-term issue is not addressed by the current RCRA requirements. Likewise designers of disposal facilities for materials resulting from CERCLA clean-up do not adequately take into account long-term environmental effects of the disposal facility.

Finally, the cumulative effects of several disposal facilities in a given locale are not considered in evaluating the long-term integrity of the environment. In this regard the regulators at Hanford seem to take a position that, since they are not

responsible for other disposal facilities, they do not have to consider the effects of nearby disposal facilities on conditions of the ground water and soils in the respective performance assessments to which their cognizance extends. The YIN is concerned that EPA officials at Hanford may be taking the position that the general use criteria recommended by the citizens group should not apply to the Hanford areas where disposal facilities are planned. This suggests a conclusion by EPA that parts of the Hanford Site should be dedicated for permanent restrictions on use.

Until a firm commitment is made to clean-up and restore the entire Hanford Site, contamination of the soils, water and air will continue. It is evident that the long-sought culture change talked about by DOE has still not become a reality at Hanford. The regulators participating in the Hanford Tri-Party Agreement continue to follow the old DOE culture. They use the argument that actions to avoid further contamination are not economically practical. This was the same argument that was used on Hanford in the 1960's to justify not resolving single-shell tank leaks and waste instability problems by calcination. We now have a multi-billion dollar clean-up task on our hands as a result.

Until long-term perspectives come to control decisions at Hanford (particularly long-term perspectives with respect to environmental integrity), public acceptance and meaningful clean-up will still not occur.

The long-term view of the Earth, and its inhabitants, is interwoven into the Yakima Indian Nation and its culture. It is true that this land, air, and water are borrowed from our children, and that this cycle of life is unending. The responsibility to restore the Hanford land has been placed upon those now living; it must be restored as nearly as possible to its original condition, for all time.