



FINAL ENVIRONMENTAL IMPACT STATEMENT SAFE INTERIM STORAGE OF HANFORD TANK WASTES SUMMARY

The Safe Interim Storage of Hanford Tank Wastes Environmental Impact Statement has been prepared according to requirements of the National Environmental Policy Act and the Washington State Environmental Policy Act. In accordance with these Acts, a Draft Environmental Impact Statement was issued on August 5, 1994, (DOE 1994) and it was revised in response to public, agency, and tribal comments to produce this Final Environmental Impact Statement. This Environmental Impact Statement considers alternatives for maintaining safe storage of Hanford tank wastes during the interim period prior to making and implementing decisions which are the subject of analysis in the Tank Waste Remediation System Environmental Impact Statement.

This Environmental Impact Statement is prepared in response to the need, identified by the U.S. Department of Energy and Washington State Department of Ecology, to address near-term safety and management issues associated with tank wastes at the U.S. Department of Energy's Hanford Site near Richland, Washington. The Safe Interim Storage of Hanford Tank Wastes Environmental Impact Statement includes the need to bring Hanford's 200 Area cross-site waste transfer capability into compliance with regulatory requirements of the Resource Conservation and Recovery Act and the Washington State Dangerous Waste Regulations. All actions identified in the Environmental Impact Statement would take place at the Hanford Site.

The actions considered in this Final Environmental Impact Statement include alternative ways of transferring tank waste across the 200 Area and actions that could mitigate the generation of high concentrations of flammable gases in Tank 101-SY. The cross-site transfer actions can contribute to the interim stabilization of older single-shell tanks to help reduce the risk of leaks from those tanks. Many of the single-shell tanks have leaked and new leaks are developing in these tanks at a rate of more than one per year. Since issuing the Draft Environmental Impact Statement, operation of the mixer pump in Tank 101-SY has been proven to successfully mitigate the flammable gas safety issue in this tank. Providing new storage capacity for diluted waste from Tank 101-SY is also evaluated as an action in support of an alternative way of mitigating the safety issue in this tank. This document considers only interim actions that can be accomplished through the year 2000 to provide for the safe management of wastes stored in these tanks and does not address the ultimate disposal of these wastes. A separate Environmental Impact Statement is addressing the entirety of the Tank Waste Remediation System Program which includes the ultimate disposal of the waste over a longer time frame.

Because the Washington State Environmental Policy Act and the National Environmental Policy Act are similar in their purpose, intent, and procedures, the Washington State Department of Ecology and U.S. Department of Energy decided to prepare one Environmental Impact Statement addressing the requirements of both acts. On February 15, 1994 a Memorandum of Understanding was signed between the U.S. Department of Energy, Richland Operations Office, and the Washington State Department of Ecology. The Memorandum of Understanding calls for the joint preparation of this document to satisfy both Acts' requirements.

BACKGROUND OF THE HANFORD SITE

The Federal government created the Hanford Site, near Richland, Washington, in 1943, as part of the Manhattan Project, to produce plutonium for national defense. Production of plutonium at Hanford reactors and recovery of that plutonium no longer occur at the Hanford Site. The current Hanford Site mission is to clean up the site, provide scientific and technological excellence to meet global needs, and participate in the economic diversification of the region.

Processing reactor fuel for plutonium production and other waste management activities created a wide variety of radioactive and hazardous wastes, some of which have been stored in underground tanks on the Hanford Site. The radioactive wastes from various processes have been transferred among tanks so that chemical and physical characteristics of the wastes vary greatly among tanks and even within individual tanks. Typically, the tank wastes are highly radioactive and chemically hazardous.

Tanks are of two general types - single-shell tanks and double-shell tanks. Single-shell tanks have one steel wall, surrounded by reinforced concrete; they were constructed between 1944 and 1964 and received waste until 1980. The capacity of most single-shell tanks is approximately 2-million to 4-million liters (L) [500,000 to 1-million gallons (gal)]. The tanks are situated below grade and are covered with 2 to 3 meters (m) [6 to 10 feet (ft)] of earth. There are 149 single-shell tanks storing about 140-million L (36-million gal) of waste. Sixty-seven of the single-shell tanks have leaked or are assumed to have leaked. Approximately 2.3 million to 3.4 million L (600,000 to 900,000 gal) of waste has leaked or spilled into the nearby soil. Over the years, much of the liquid stored in single-shell tanks has evaporated or been pumped to double-shell tanks.

There are 28 double-shell tanks at the Hanford Site, each with a capacity of about 4-million L (1-million gal). The double-shell tanks were constructed between 1970 and 1986. Double-shell tanks consist of two concentric structures; a steel primary tank used to contain radioactive waste materials; and an outer reinforced concrete confinement structure lined with steel. The space between the two walls is monitored for leaks. These tanks are also situated 2 to 3 m (6 to 10 ft) below ground level. The U.S. Department of Energy has used double-shell tanks since 1970 and none of the double-shell tanks at the Hanford Site have been known to leak. They are used to store a variety of liquid radioactive wastes including wastes from the single-shell tanks interim stabilization program and from various Hanford Site processes. The wastes are stored in tanks based on composition, level of radioactivity, or origin. The 28 double-shell tanks now contain about 80-million L (21-million gal) of waste (WHC 1995).

On November 5, 1990, the U.S. Congress enacted Public Law 101-510, Section 3137, "Safety Measures for Waste Tanks at Hanford Nuclear Reservation," of the National Defense Authorization Act for Fiscal 1991, which addresses safety issues concerning the handling of waste in these tanks. In response to this legislation U.S. Department of Energy created the tank Watchlist which identified tanks with potential safety concerns which warranted special attention. Safety issues have been prioritized by the U.S. Department of Energy High-Level Waste Tank Task Force (WHC 1993a).

Fifty-four tanks (48 single-shell tanks and six double-shell tanks) on the Watchlist have safety issues that have been identified as the Priority 1 Hanford Site Tank Farm Safety Issues (WHC 1995, WHC 1993b). Priority 1 Hanford Site Tank Farm Safety Issues have been defined as: "Issues/situations that contain most necessary conditions that could lead to worker (on-site) or off-site radiation exposure through an uncontrolled release of fission products, e.g., Tank 101-SY" (WHC 1995). The Watchlist tanks contain waste that currently has a very low, but unacceptable, potential for release directly to the environment. For this reason they are considered Watchlist tanks. Priority 1 safety issues associated with the waste have been identified and include:

- . High flammable gas concentrations (for example, hydrogen)
- . Potentially explosive mixtures of ferrocyanide-containing wastes
- . Potential for runaway organic mixture reactions
- . Water additions needed to cool single-shell tanks (WHC 1993a).

While there are 54 tanks on the Watchlist, only high-level waste Storage Tank 241-SY-101, commonly known as Tank 101-SY, has been judged to require mitigation in the interim to deal with accumulation of flammable gas concentrations at levels in excess of the lower flammability limit. Twenty-five tanks are on the Watchlist due to generation of flammable gas. Monitoring to date has not indicated accumulation of flammable gas concentrations approaching the lower flammability limit in any other Watchlist tank.

Priority 2 safety issues include:

- . Potential for nuclear criticality in tanks
- . Storage of high-level waste in tanks that have leaked (only single-shell tanks have leaked)
- . Storage of high-level waste in tanks with no secondary containment (single-shell tanks)
- . Tank vapor release
- . Integrity of storage tanks, leak detection, and response to a leak (WHC 1993a).

As a result of these issues, a schedule for dealing with tank safety issues was placed into the Hanford Federal Facility Agreement and Consent Order, also

known as the Tri-Party Agreement. The Tri-Party Agreement identified specific actions and milestone schedule dates to cover these issues.

PURPOSE AND NEED FOR ACTION

In the Draft Safe Interim Storage of Hanford Tank Wastes Environmental Impact Statement, the U.S. Department of Energy and Washington State Department of Ecology identified a purpose and need to resolve near-term tank safety issues associated with hydrogen gas generation in Watchlist tanks while continuing to provide safe storage for other Hanford wastes. These Watchlist tanks were identified pursuant to Public Law 101-150, section 3137 "Safety Measures for Waste Tanks at Hanford Nuclear Reservation" of the National Defense Authorization Act 1991. Since the issuance of the Draft Safe Interim Storage of Hanford Tank Wastes Environmental Impact Statement, the mixer pump in Tank 101-SY has mitigated issues associated with hydrogen production, pressure generation, and unacceptably high concentrations of flammable gas. The U.S. Department of Energy now believes that through continued use of mixer pumps, waste exhibiting gas release activity may continue to be safely stored in existing tanks and may not need to be removed and diluted prior to final treatment for disposal.

Consistent with the Draft Environmental Impact Statement, the U.S. Department of Energy and the Washington State Department of Ecology identified the ongoing need to continue to provide safe storage of high-level radioactive tank wastes while supporting tank farm management and operations. The need for a regulatory-compliant replacement cross-site transfer system to move wastes between the 200 West and 200 East Area tank farms exists prior to implementing decisions that will be made based on the Tank Waste Remediation System Environmental Impact Statement. The need is reflected in the Tri-Party Agreement Milestone M-43-07A. A modern, safe, and reliable cross-site waste transfer capability is needed to expedite cleanup and minimize the risk associated with management of the tank waste. This is especially true in the 200 West Area where there is far less useable double-shell tank capacity than there is waste in single-shell tanks. The replacement waste transfer capability would provide the means needed to move waste to the available double-shell tank capacity located in the 200 East Area. For example, a specific risk reduction need that would be supported by providing a compliant cross-site waste transfer capability would include reducing the likelihood of liquid waste escaping from the corroded single-shell tanks into the environment by facilitating removal of salt well liquids from those tanks. Many of these tanks have leaked and new leaks are appearing at a rate of more than one per year.

DESCRIPTION OF ALTERNATIVES

A range of alternatives was considered and the following have been identified as reasonable alternatives to achieve the safe interim storage need described in the Purpose and Need for Action section.

Preferred Alternative - The preferred alternative of the U.S. Department of Energy and Washington State Department of Ecology consists of the following components:

- Construction of a replacement cross-site transfer pipeline system
- Construction of a waste retrieval system in Tank 241-SY-102, commonly known as Tank 102-SY
- Continued operation of the mixer pump in Tank 101-SY
- Cross-site transfer of waste from Tank 102-SY to double-shell tanks in the 200 East Area
- Cross-site transfer of wastes resulting from interim stabilization of single-shell tanks by salt well pumping
- Cross-site transfer of waste generated by 200 West Area facilities (S-Plant, T-Plant, Plutonium Finishing Plant, and tank farm operations).

Liquid waste from these sources, with the exception of some facility waste, would be retrieved and transferred through the existing cross-site transfer system until the proposed replacement cross-site transfer pipeline system becomes operational in 1998.

Transuranic solids from Tank 102-SY would be retrieved, transferred and

consolidated in 200 East Area tanks to minimize space allocation associated with storage of transuranic waste, and provide space for complexed salt well liquids. The consolidation of tank waste is an ongoing tank farm management action evaluated under prior Environmental Impact Statements and a supplement (DOE 1975, DOE 1980, DOE 1987). Such retrieval is allowed under the relevant Records of Decision. The retrieval of 102-SY sludge is being discussed in this Environmental Impact Statement for a comprehensive consideration of impacts.

Truck Transfer Alternative - This alternative includes truck transfer of most of the wastes listed under the preferred alternative and mitigation of the Tank 101-SY safety issue by continued operation of the mixer pump. The alternative would transfer salt well liquids from interim stabilization of single-shell tanks, and 200 West Area facility wastes to double-shell tanks in the 200 East Area by truck. The trucks would be either the 3,800 L (1,000 gal) LR56(H) truck or a 19,000 L (5,000 gal) tanker truck. The alternative would include use of existing roadways and construction and operation of a new load facility in 200 West Area and an unload facility in 200 East Area and some additional roadway segments.

Rail Transfer Alternative - This alternative includes rail transfer of most of the wastes listed under the preferred alternative and mitigation of the Tank 101-SY safety issue by continued mixer pump operation. The alternative would transfer salt well liquids from interim stabilization of single-shell tanks, and 200 West Area facility wastes by 38,000 L (10,000 gal) rail car. The alternative includes use of existing rail lines, construction and operation of some additional rail line segments, as well as construction and operation of a new load facility in 200 West Area and a new unload facility in 200 East Area.

New Storage Alternative - This alternative includes mitigation of the Tank 101-SY flammable gas safety issue by dilution and retrieval of the waste. Facilities constructed and operated to accomplish this action would include a new tank facility, including two new double-shell tanks and associated facilities, a waste retrieval system in Tank 101-SY, a waste retrieval system in Tank 102-SY, and the replacement cross-site transfer pipeline system. This alternative also includes transfer of waste from Tank 102-SY, salt well liquids from interim stabilization of single-shell tanks in the 200 West Area, and transfer of facility wastes as described for the preferred alternative. This alternative would provide additional storage capacity that could be used for other future waste management needs.

No Action Alternative - This alternative would not construct any new tanks, tank retrieval systems, or the cross-site transfer systems. The flammable gas safety issue in Watchlist Tank 101-SY would be managed through continued operation of the existing mixer pump. The remaining supernatant in Tank 102-SY, salt well liquids from interim stabilization of single-shell tanks, and liquid waste from West Area facilities would be transported from the 200 West Area to the 200 East Area via the existing cross-site transfer system.

The decisions resulting from this Environmental Impact Statement will be presented in a Record of Decision, following publication of the Final Environmental Impact Statement. The Record of Decision may also include reasonable actions to mitigate potential health, safety, and environmental impacts associated with the decision. Mitigation measures and plans for implementing them would be included in a Mitigation Action Plan that will be published after the Record of Decision. Construction-related decisions that could be made based on this Environmental Impact Statement include:

- . Build the replacement cross-site transfer pipeline system
- . Build a tank retrieval system and install it in Tank 101-SY
- . Build a tank retrieval system and install it in Tank 102-SY
- . Build two new double-shell tanks in either the 200 West Area or the 200 East Area
- . Build rail transfer facilities
- . Build truck transfer facilities
- . Use existing facilities such as the existing cross-site transfer system to the extent possible and not build any of these new facilities.

AFFECTED ENVIRONMENT

This section describes the Hanford Site and the existing environment. The U.S. Department of Energy Hanford Site lies within the semiarid Pasco Basin of the Columbia Plateau in southeastern Washington State (Figure S-1). The Hanford Site occupies an area of about 1,450 square kilometers (km²) [560 square miles (mi²)] northwest of the confluence of the Yakima River with the Columbia River. The Hanford Site is about 50 km (31 mi) north to south and 39 km (24 mi) east to west. This land, with restricted public access, provides a buffer for the smaller areas formerly used for production of nuclear materials, and currently used for waste storage and waste disposal (PNL 1994).

The Columbia River flows through the northern part of the Hanford Site, and turning south, it forms part of the site's eastern boundary. The Yakima River runs along part of the southern boundary and joins the Columbia River below the City of Richland, which bounds the Hanford Site on the southeast. The cities of Richland, Kennewick, and Pasco known as the Tri-Cities, constitute the nearest population centers and are located southeast of the Hanford Site (PNL 1994).

[Figure \(Page S-10\)](#)
Figure S-1. Location of the Hanford Site

The Hanford Site is a relatively large, predominantly undisturbed area of shrub-steppe that contains numerous plant and animal species adapted to the region's semiarid environment. The site consists of mostly undeveloped land with widely spaced clusters of industrial buildings located along the western shoreline of the Columbia River and at several locations in the interior of the site. The industrial buildings are interconnected by roads, railroads, and electrical transmission lines. The major facilities and activities occupy about 6 percent of the total available land area. The proposed actions would be located on a plateau in the central portion of the site which includes major industrial areas known as the 200 Areas. Presently, existing facilities are placed in two concentrations on the plateau - 200 East and 200 West Areas.

The dominant plants on the Central Plateau are sagebrush, rabbitbrush, cheatgrass, and Sandberg's bluegrass, with cheatgrass providing half of the total plant cover. No plants or mammals on the Federal list of Endangered or Threatened Wildlife and Plants are known to occur on areas that would be affected by the alternatives considered. There are, however, several species of both plants and animals that are under consideration for formal listing by the Federal government and Washington State (PNL 1994).

Benton and Franklin Counties in Washington State experience most of the economic and social consequences of activities at the Hanford Site. The counties, which contain the Tri-Cities, are very dependent upon the Hanford Site operations for employment and revenue. Population growth in the counties is strongly influenced by actions on or at the Hanford Site. The two main economic sectors are Hanford Site activities, and agriculture.

Measured and calculated radiation doses to the general public from Hanford operations are maintained at levels well below applicable regulatory limits. The current U.S. Department of Energy radiation limit from all pathways for an individual member of the public is 100 millirem/year (mrem/yr), and the U.S. Environmental Protection Agency limit for the air pathway is 10 mrem/yr. The average dose from natural sources is 300 mrem/yr (PNL 1995). The potential effective dose equivalent received by a hypothetical maximally exposed individual from 1994 operations was calculated to be 0.05 mrem. The population effective dose to the local population of 380,000 persons was 0.6 person-rem in 1994 (PNL 1995). The 1994 average dose to the population was 0.002 mrem. These doses are much less than regulatory limits and doses potentially received by the general public from other common sources of radiation.

COMPARISON OF ENVIRONMENTAL IMPACTS

All elements of the environment were evaluated for each alternative in this Environmental Impact Statement. A summary of the comparison of impacts follows.

- . There would be no significant removal of important mineral resources or soil resources from public use for any alternative.
- . There would be no releases of effluents to surface waters or groundwaters for any alternative.
- . Air and noise emissions generated by construction and operational activities would be within applicable permit limits for all

alternatives.

. Socioeconomic effects would be too small to influence the Benton County and Franklin County economies for any alternative. There would be no new socioeconomic effects due to the no action alternative. No low-income or minority populations would experience disproportionately high, health or environmental effects under any alternative.

. The preferred alternative would reduce sagebrush habitat for a number of wildlife species of special concern including candidate endangered species, by 9 hectares (ha) (23 acres). This represents 0.01 percent of the total sagebrush habitat on the Hanford Site. The new storage alternative would reduce priority habitat by 30 ha (73 acres). This represents 0.03 percent of the total sagebrush habitat on the Hanford Site. No reduction in habitat would result under the no action, the truck transfer or rail transfer alternatives. The impacts for the preferred alternative or the new storage alternative would be mitigated by revegetation of disturbed areas.

. Although waste management activities are characteristic of the 200 East and West Areas, construction of proposed facilities under the preferred alternative would represent an additional commitment of land to radioactive waste management. The total area of new land committed to this land use under the preferred alternative would be 30 ha (74 acres). No additional land use commitment is required for the no action alternative. Fifty ha (124 acres) of land would be used for the new storage alternative. No change in land use commitment would be associated with either the truck transfer or rail transfer alternatives.

. No known cultural resources would be directly affected by any alternative. Potentially significant cultural resource sites have been identified in a survey of a 530 ha (1,300 acre) area being considered for revegetation as described above to mitigate impacts of the preferred or new storage alternatives. The Mitigation Action Plan will assure avoidance of these sites during mitigation.

. Transportation impacts would be small to negligible for the preferred alternative, the new storage alternative, the truck transfer alternative, and the rail transfer alternative. No change in transportation requirements would be generated by the no action alternative.

. Emissions of nonradiological toxic chemicals under normal operational conditions from any of the facilities evaluated would be well below concentrations that would be expected to produce adverse health effects in the off-site population for each alternative. Normal operational exposures to radiation for tank farm workers would be expected to continue to average approximately 14 mrem/yr for each alternative. Worker exposure to radiation for workers directly involved in the proposed actions would be minimized using engineered systems and administrative procedures to keep exposure As Low as Reasonably Achievable. Under the truck transfer alternative there is a need for further design work to protect drivers. Normal operational exposures to radiation for the off-site population would be negligible for all alternatives. Construction-related exposures to radiation would be within all applicable limits for construction workers, the off-site population, and uninvolved workers.

. The accident scenarios considered in this analysis were selected based on U.S. Department of Energy guidance and recommendations (DOE 1993). The accident scenarios evaluated determine whether the alternatives have the potential for significant impacts and provide information to make reasonable choices. In accord with U.S. Department of Energy guidance, reasonably foreseeable accidents involving a range of consequences and frequencies of occurrence were selected for analysis.

The accident scenarios selected for analysis included:

- Accidents that are anticipated or unlikely to occur but have minimal consequences
- Accidents initiated by natural events that are beyond the design basis and have moderate consequences
- Accidents that are extremely unlikely or incredible, but have potentially high consequences.

For the alternative actions considered in this Environmental Impact Statement, serious health consequences to uninvolved workers and the general population due to accidents are not expected provided that engineered safety systems (for

example, double containment and leak detection systems) are in place and operational safety procedures are followed. For wastes anticipated to be transferred cross-site during this interim timeframe, the only accidents with a reasonably foreseeable potential to cause adverse health effects to the uninvolved workers or the off-site public would be the following:

- . Unmitigated spray release from the existing cross-site transfer system
- . Unmitigated spray release from the Initial Tank Retrieval System
- . Unmitigated spray release from past practice sluicing
- . Breach of a truck trailer at a load/unload facility
- . Breach of a rail car at a load/unload facility.

These systems would be used under the preferred, truck transfer, rail transfer, new storage, or no action alternatives. The probability of an unmitigated spray release from the existing cross-site transfer system is extremely unlikely. The probabilities of an unmitigated spray release from the Initial Tank Retrieval System or past practice sluicing are each estimated to be extremely unlikely to incredible. Spray leaks in all systems would be easily mitigated by assuring that cover blocks are in place during transfer. The probabilities of rail car or truck trailer breaches at a load/unload facility are each estimated to be unlikely. The analysis shows the importance of safety systems and procedures in protecting worker and public health and safety during waste transfer operations.

CUMULATIVE EFFECTS

The cumulative environmental effects of all alternatives would be small in addition to those of other projects which have occurred or are likely to occur at the Hanford Site. The addition of these impacts to other projects' effects would not cause larger impacts. The preferred alternative's environmental impacts would occur in an area of the Hanford Site considered for waste management activities by the Hanford Future Site Uses Working Group (FSUWG 1992).

STATUTORY AND REGULATORY REQUIREMENTS

The preferred alternative, truck transfer alternative, rail transfer alternative, and new storage alternative would be able to meet all Federal and Washington State statutory and regulatory requirements. If either rail or truck transfer alternatives were selected in place of the replacement cross-site transfer pipeline system, the Tri-Party Agreement milestones associated with constructing and operating the replacement cross-site transfer system would not be met. The no action alternative would not be able to meet all Federal and Washington State statutory requirements, and would violate the Tri-Party Agreement scheduled construction activities for the replacement cross-site transfer pipeline system.

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