ENVIRONMENTAL SYNOPSIS

Evaluation of Environmental Impacts Submitted by Offerors for Privatization of the Tank Waste Remediation System at the Hanford Site, Richland, Washington

DECEMBER 1996

U.S. Department of Energy
Richland Operations Office
Tank Waste Remediation System

1.0 INTRODUCTION

The U. S. Department of Energy (DOE) received proposals to privatize certain portions of the Tank Waste Remediation System (TWRS) at the Hanford Site, Richland, Washington (Solicitation Number DE-RP06-96RL13308) from Lockheed Martin Advanced Environmental Systems and British Nuclear Fuels Limited. These proposals are to construct and operate demonstration-scale facilities to separate and immobilize selected tank waste from the TWRS program. This synopsis provides an assessment of the potential environmental impacts associated with the proposals based on an independent review of the representations and data contained within the proposals.

DOE prepared this synopsis in accordance with its National Environmental Policy Act (NEPA) regulations regarding procurement, financial assistance, and joint ventures (10 CFR §1021.216). The purpose of this section of DOE's NEPA regulations is to support the selection process for procurements, awards of financial assistance, and joint ventures by enabling DOE to obtain, evaluate and protect confidential environmental information regarding proposals from offerors and conduct appropriate procurement activities before the NEPA process is complete.

To support the contractor selection process for the TWRS program DOE took the following actions in accordance with 10 CFR § 1021.216: 1) required that the offerors submit environmental data and analyses as part of their proposals; and 2) independently verified the accuracy of the environmental data and analyses, and prepared and considered a confidential environmental critique of each offeror's proposal (the confidential environmental critique included a discussion of the purpose of the procurement, the salient characteristics of each offeror's proposal, permits, licenses and approvals needed, and a brief comparative evaluation of the potential environmental impacts of the offer). DOE then prepared this environmental synopsis, which will be made available to the public and filed with the Environmental Protection Agency.

The activities described in this synopsis are a part of DOE's overall Hanford Site TWRS program. In this particular case, DOE had issued a draft environmental impact statement (EIS) on the overall Hanford Site TWRS Program before offerors responded to the request for proposals, and offerors used information from the draft EIS in their proposals. The final EIS on the overall Hanford Site TWRS program contains the information in the synopsis.

2.0 ASSESSMENT METHODS

The data relative to potential environmental impacts submitted by the offerors are preliminary at this time because the design information is at the preconceptual stage. Following procurement, during Phase 1A of privatization the successful offeror(s) will prepare conceptual designs and submit an environmental report containing quantitative information relative to environmental impacts. The environmental report will allow DOE to independently evaluate and verify the accuracy of the preliminary data and analysis submitted by the offeror(s).

The environmental data and information submitted with the current proposals are based on:

1. Offeror statements that the applicable environmental regulatory requirements and standards and requirements of the request for proposals (RFP) will be met.
2. Extensive references and comparisons to the environmental impacts presented in the TWRS Draft EIS (DOE/EIS-0189D) and representations that the impacts of the activities contained in the proposal will be less than those presented in the Draft EIS.
3. References to comparable facilities that the offerer has built and/or operated.
4. Preconceptual design information and other technical data and analysis.

Because the engineering information in the proposals is at a preconceptual stage and the vast majority of the environmental data submitted are based on an analysis from the TWRS Draft EIS or representations by the offerers without accompanying engineering data, it is not possible to prepare a quantitative independent evaluation to verify the accuracy of the environmental data and analysis provided in the proposals. A quantitative analysis will be performed when conceptual design information is available during Phase 1A of privatization. However, by comparing the processes described in the proposals to the analysis performed for the TWRS EIS, it was possible to prepare a qualitative, and in some cases quantitative, analysis of the potential impacts in relationship to the analysis in the TWRS EIS and compare the potential impacts of the proposals.

The proposed construction and operational activities and their associated areas of potential environmental impacts were screened to determine those impacts that have the potential to be substantive. For each of these areas the reasonableness of the representations and data provided in the proposals were compared to similar processes analyzed in the TWRS EIS. Where data were not directly comparable between the proposal and the TWRS EIS, engineering judgment was used to assess the information provided or to develop appropriate scaling factors to approximate the impacts.

3.0 DESCRIPTION OF THE PROPOSALS

The proposals by the offerors contain confidential information and are therefore not available for review by the public and cannot be fully described in this synopsis. The proposals are to construct and operate demonstration-scale facilities to separate and immobilize selected waste from the TWRS program. The proposals include interim storage of the processed high-level and low-activity waste until such time as DOE verifies that the waste form meets performance specifications and accepts transfer of the waste. The proposals do not include tank farm operations activities or the retrieval and transfer of waste from the tanks to receiver tanks (existing double-shell tanks) that will be operated by the offerors. These activities will be performed by DOE. All waste processing for eventual disposal of low-activity waste onsite and high-level waste offsite at a geologic repository must meet waste form performance specifications provided in the RFP.

3.1 OVERVIEW

In mid-February 1996, DOE issued an RFP for privatization of waste remediation services for TWRS waste. The RFP was for the first phase of a two-phased approach to privatizing the processing of tank waste at the Hanford Site. The successful contractor(s) would be expected, by private financing, to design, and if further selected, to build, equip, and operate a demonstration-scale facility for the separation and immobilization of three waste feed streams (envelopes) of low-activity waste. All of the tank waste is classified as high-level waste and would be classified as low-activity waste only after undergoing separations processes to remove specific high-level constituents. The option to treat one waste feed stream (envelope) of high-level waste was also included in the RFP. The RFP includes provisions for the selection of two proposals for treatment of low-activity waste, either or both of which, as an option, could also include treatment of high-level waste.

The RFP covered only Phase 1 of the TWRS privatization strategy. Phase 1 is a proof-of-concept and commercial demonstration-scale effort. The objectives of Phase 1 are to:

- Demonstrate the technical and business viability of using privatized facilities to treat and immobilize Hanford Site tank waste;
- Define and maintain environmental protection and compliance; and
- Substantially reduce life-cycle cost and time required to remediate Hanford Site tank waste.

During this phase approximately 6 to 13 percent by volume of the 212 million liters (56 million gallons) of Hanford Site tank waste would be treated. The Phase 1 effort consists of Part A and Part B.

Part A is a 20-month development period to establish the technical, operational, regulatory, and financial elements required in privatized facilities that would provide tank waste treatment and immobilization services on a fixed-unit price basis.

Part B is a demonstration period in which tank waste treatment services would be provided at fixed-unit prices. Four different waste feed streams (envelopes) are identified for Part B: three waste feed streams for pretreatment and immobilization of the resulting waste stream as low-activity waste and one waste feed stream for vitrification as high-level waste. These waste feed streams are representative of the range of Hanford Site tank waste. The high-level constituents separated out during the separations processes would be vitrified with the high-level waste feed stream (envelope) or returned to DOE for treatment during Phase 2. Waste processing would take place during a 5 to 9 year operating period during Phase 1B. Following waste processing the demonstration plants would be deactivated during a 1 year period.

On May 10, 1996, DOE received two proposals in response to the RFP. Both proposals included treating the low-activity and high-level waste. At the time of contract award, DOE was free to select both proposals, select one vendor to treat both low-activity and high-level waste, or elect not to select either vendor to treat high-level waste. On September 25, 1996, DOE awarded two contracts for Phase 1A under the privatization initiative. The two prime contractors selected to establish the technical, operational, regulatory, and financial elements required in privatized facilities were Lockheed Martin Advanced Environmental Systems and British Nuclear Fuels Limited. Both companies were awarded fixed-price contracts ($27 million per contract) to proceed with the planning necessary to build both high-level and low-activity waste vitrification plants.

4.0 POTENTIAL ENVIRONMENTAL IMPACTS

Resource Requirements

In the TWRS EIS, Phase 1 of the Phased Implementation alternative includes resource requirements for constructing one low-activity waste vitrification facility and one low-activity and high-level waste combined vitrification facility. A comparison of the construction resource requirements was made by comparing facility footprints and facility types. Although each privatization proposal included facility footprints that are larger than the facilities assumed for Phase 1 of the Phased Implementation alternative, one of the proposals had approximately 210,000 ft^2 of main processing facility (55 percent less than Ex Situ Extensive Separations alternative) whereas the other proposal had approximately 185,000 ft^2 of main processing facility (60 percent less than Ex Situ Extensive Separations). The two proposals combined would result in approximately 85 percent of the main processing facility area of the Ex Situ Extensive Separations alternative. Insufficient detail is provided in the proposals to compare the construction resource requirements. However, based on facility footprints, the construction resource requirements are expected to be lower than those identified for the Ex Situ Extensive Separations alternative.

A comparison of the operating resource requirements was made by comparing the amount of waste treated during Phase 1 of the Phased Implementation alternative to the amount of waste processed under each of the privatization proposals and identifying any unique resources not included in the analysis in the EIS for Phase 1 of the Phased Implementation alternative. The two low-activity facilities and the one

high-level waste facility that DOE presumes, for planning purposes, would be selected would require approximately the same level of resources to construct and operate as was estimated for facilities under Phase 1 of the Phased Implementation alternative. The amount of process chemicals and glass formers required to treat the waste that would be produced under Phase 1 (1,300 metric tons [mt] of high-level waste and 87,000 mt of low-activity waste) is larger than the combined amount of waste produced under the two proposals (1,000 mt of high-level waste and 40,000 mt of low-activity waste). One proposal would use propane as a process chemical and would not affect local supplies. Both proposals would use electricity as the energy source for high-level vitrification and low-activity immobilization. This results in higher electrical usage than estimated for Phase 1 of the Phased Implementation alternative, which assumed kerosene as the energy source for low-activity waste immobiliztion. Electrical demand for the two proposals combined would be approximately 60 percent of the demand estimated for the Ex Situ Intermediate Separations alternative.

Soil Disturbances

In the Final EIS, Phase 1 of the Phased Implementation alternative assumes a total soil disturbance of up to 33 hectares (ha) (82 acres [ac]). This would include facility footprints, trample zones around work areas, heavy equipment traffic areas, and material laydown areas. This area would include approximately 15 ha (37 ac) of previously disturbed area and 18 ha (45 ac) of area that has not been disturbed by prior Site construction and operations. Each of the privatization proposals assumes 6 ha (15 ac) of disturbance for a total of 12 ha (30 ac) of soil disturbance during Phase 1. The level of disturbance during construction and operations provided in each proposal is identical to the maximum total amount of land that is to be provided to each offeror under the RFP. For both proposals, the total soil disturbance would be approximately 64 percent less than the soil disturbances calculated for Phase 1 under the Phased Implementation alternative.

Air Quality

During construction of Phase 1 facilities under the privatization proposals, air emissions from dust would be no greater than those estimated for Phase 1 of the Phased Implementation alternative because dust emission calculations are based on the total area to be excavated and disturbed. Phase 1 of the Phased Implementation alternative estimates up to 33 ha (82 ac) of disturbed area while each of the privatization proposals estimates 6 ha (15 ac) of disturbance for a total of 12 ha (30 ac) of disturbance during Phase 1. The total disturbance would be approximately 64 percent less than the disturbances calculated for Phase 1 under the Phased Implementation alternative. Based on the amount of disturbed area, the maximum PM-10 concentrations are estimated to be 56 $\mu g/m^3$ during a 24-hour period.

During construction, air quality impacts under the privatization proposals, associated with particulates, sulfur dioxide, carbon monoxide, and nitrogen oxides from small engine operations, would be higher than calculated for Phase 1 of the Phased Implementation alternative (approximately 34 percent greater) because of higher peak construction employment. However, the total construction emissions resulting from small engine emissions for the combined proposals would be approximately the same as the construction-related emissions from small engines under Phase 1 of the Phased Implementation alternative because the total labor years under the two proposals would be approximately the same as the total labor years under Phase 1 of the Phased Implementation alternative.

Both proposals would use standard unit operations to treat offgases generated during waste immobilization processes similar to those described for Phase 1 of the Phased Implementation alternative process. Additional emissions control technologies and recycling processes have been proposed that

would result in operating emissions equal to or below those estimated for Phase 1 of the Phased Implementation alternative.

Water Quality
In the Final EIS, all of the ex situ alternatives included generating radioactive effluent that would be treated at the Effluent Treatment Facility prior to discharge. Both of the privatization proposals included generating radioactive liquid effluent that would require treatment at the Effluent Treatment Facility. The generation of radioactive effluent for both proposals combined would not exceed the capacity of the Effluent Treatment Facility. There would be no liquid effluent discharged to surface waters, and thus there would be no direct impacts to any surface waters under the privatization proposals.

Ecological and Biological Impacts
In the Final EIS, Phase 1 of the Phased Implementation alternative estimates that 65 percent of the area that would be used for construction and operation of Phase 1 facilities would disturb previously undisturbed shrub-steppe habitat. The total disturbance in the Final EIS for Phase 1 activities was estimated to be 21 ha (52 ac). In comparison, each of the privatization proposals would result in approximately 4 ha (10 ac) of habitat disturbance, or 20 percent of the total disturbance calculated for Phase 1 of the Phased Implementation alternative. The total disturbance for the two privatization proposals would be 8 ha (20 ac) during Phase 1 or approximately 40 percent of the total disturbance calculated for Phase 1 of the Phased Implementation alternative.

Total Impacts to wildlife would be expected to be less under the two proposals than the impacts estimated in the Final EIS for the Phased Implementation alternative because impacts to wildlife are largely a function of the total disturbance to previously undisturbed habitat.

Cultural Resources
In the Final EIS, cultural resources surveys of the potential site locations for facilities during Phase 1 of the Phased Implementation alternative revealed no prehistoric material or sites. Therefore, neither proposal would be expected to result in impacts to cultural resources. However, to the extent that potential cultural resources exist at the location, they would be no greater than what would exist under the Phased Implementation alternative in undisturbed areas that would be disturbed during facility construction and operation. Because the total area to be disturbed under both privatization proposals is 40 percent of the total area that would be disturbed under Phase 1 of the Phased Implementation alternative, the likelihood of impact to cultural resources would be less. Visual impacts to Native American sacred sites (e.g., Gable Mountain, Gable Butte) would be less under the two proposals than under the TWRS Phased Implementation alternative because, while the proposed structures would be somewhat larger, the total area to be disturbed would be much smaller (40 percent less than under Phased Implementation).

Socioeconomic Impacts
In the Final EIS, socioeconomic impacts for Phase 1 of the Phased Implementation alternative were calculated to peak in 1999 based on a construction workforce of 3,300. All other impacts (e.g., area employment increase of 5,900 jobs, a housing price increase of 12.9 percent, and increases in demand for public services that would require additional police and fire personnel and school capacity) are a function of the size of the workforce employed under the alternative, the projected size of the Hanford Site workforce, and the size of the total nonfarm workforce in the Tri-Cities area. Individually, neither privatization proposal would have peak construction employment greater than that of Phase 1 of the

Phased Implementation alternative. Taken together, the two proposals would have total labor years that would be approximately the same as the total labor years for Phase 1 of the Phased Implementation alternative. Therefore, when size of the construction workforce and duration of construction activities are considered, the two privatization proposals would have impacts on the local economy that are similar to Phase 1 of the Phased Implementation alternative.

For socioeconomic impacts during operations under Phase 1 of the Phased Implementation alternative, the TWRS EIS estimated a total workforce of 578. Adjusting for the fact that at most only one high-level waste facility would be constructed and operated, the total operations workforce would be in the same range as those calculated in the TWRS EIS.

Land Use

Under the two privatization proposals, there are no new land uses different from those analyzed in the TWRS EIS. All activities would be in areas designated for waste management and disposal under existing and planned Site land-use plans. However, the total area that would be dedicated to waste management and treatment under the two proposals (6 ha [15 ac] each) would be approximately 64 percent less than the area that would be dedicated to these land uses under Phase 1 of the Phased Implementation alternative (33 ha [82 ac]).

Visual Resources

In the Final EIS, Phase 1 of the Phased Implementation alternative would have visual impacts primarily from one stack on each vitrification facility. The stacks would be visible from State Route 240 and elevated locations that include sacred sites (e.g., Gable Mountain), and the plumes would be visible under some conditions from Site boundaries. Under the two privatization proposals, visual impacts would be similar those analyzed in the TWRS EIS for Phase 1 of the Phased Implementation alternative because each proposal would result in one stack per facility during operations. Neither of the two proposals provided total stack heights; therefore, it is not possible to compare the relative impacts of the two proposals or compare the two proposals to the Phased Implementation alternative in terms of all potential visual impacts.

Noise

In the Final EIS, Phase 1 of the Phased Implementation alternative would have noise impacts primarily during the construction phase of the alternative. Impacts would affect nearby animal populations resulting in displacement of wildlife within a maximum radius from the construction sites of approximately 800 m (2,600 ft) and workers in the immediate vicinity of the construction activities. Under the two privatization proposals, noise impacts would be similar or less than those analyzed in the TWRS EIS for Phase 1 of the Phased Implementation alternative because the total construction period under Phase 1 of Phased Implementation was estimated to be approximately 40 percent longer (48 months) than either of the two privatization proposals (29 months). During operations, both proposals estimated that noise during operations would be within applicable regulatory standards for workplace conditions.

Anticipated Health Effects

Occupational radiation exposures are routine exposures received from working in proximity to radioactive sources. Exposures are closely monitored and the radiation dose a worker may receive is limited by law and Hanford Site and contractor administrative controls. The total number of potential latent cancer fatalities for Phase 1 of the Phased Implementation alternative (excluding tank farm

operations) would be 0.3. This was based on 3,400 person-years and 2.00E-01 rem/person-year. The 2.00E-01 rem/person-year was the average whole body deep exposure to operational personnel at the Plutonium-Uranium Extraction (PUREX) Plant during 1986. The latent cancer fatalities were based on a dose-to-risk conversion factor of 4.0E-04 latent cancer fatalities/rem. The two proposals would each require 2,000 person-years for radiation workers. Assuming the same exposure rates and dose to risk conversion factors, there would be an expected 1.6E-01 latent cancer fatalities for each proposal, which combined would be approximately the same as estimated under Phase 1 of the Phased Implementation alternative. There would be no offsite health affects resulting from routine operation from either Phase 1 of the Phased Implementation alternative or either of the proposals.

Accidents

Occupational Accidents -- Occupational accidents cause injuries or fatalities to project workers from events such as falls from ladders or twisted ankles that occur at estimatable rates. The number and severity of accidents depend on the type of activity and the number of labor hours spent performing the activities. Construction activities have the highest accident rates. The number of occupational fatalities calculated to occur for Phase 1 of the Phased Implementation alternative (not including tank farm operations) would be less than one and the two proposals individually and combined would result in less than one fatality. The potential fatalities from tank farm operations are excluded from the Phased Implementation alternative to provide a direct comparison with the proposals because neither proposal would involve management of tank farm operations by the offerors.

Operational Accidents -- The bounding operational accident during pretreatment/treatment for the two proposals would be a pretreatment filter inadvertently dropped from an overhead crane. This operation is assumed to take place remotely in a cell and it is assumed the cell ventilation system has a two-stage high-efficiency particulate air filter. The respirable radiological release would be approximately two orders of magnitude greater than that shown in the crushed canister scenario evaluated in Phase 1 of the Phased Implementation alternative. The point estimate latent cancer fatality risk would be 0.02 for the worker population, 8.3E-07 for the noninvolved worker population, and 2.6E-07 for the general public population. The cumulative acute hazard ratios for Emergency Response Planning Guidelines for both toxic or corrosive/irritant health effects for the worker, noninvolved worker, and the general public are less than one, indicating than no transient health effects would be expected for these three receptors.

5.0 COMPARATIVE EVALUATION OF THE PROPOSALS

One proposal offers the potential for recycling a portion of the low-activity waste, and some of the raw material used in low-activity waste processing might be suitable for other beneficial uses within DOE or the nuclear industry. This proposal has the potential to substantially reduce the volume of low-activity waste requiring disposal and would result in less disposal-related land disturbance. There is uncertainty about whether markets for these materials will be available. If such markets were not available then the potential benefits of low-activity waste volume reduction would not occur and these materials would need to be disposed of. For both proposals, the total amount of radioactivity in the low-activity waste would be about the same, and the associated impacts on groundwater would be the same (i.e., small). Differences between the proposals in environmental impacts associated with the use of resources such as fuel and from air emissions such as NO_x, would be small.

Because the proposals would not differ significantly with regard to their overall environmental impacts, they would not differ with respect to their potential for disproportionately high and adverse human health or environmental effects. See Executive Order 12898, 59 FR 7829 (February 11, 1994).

The environmental justice impacts from the two proposals would be less than or approximately the same as the potential impacts described in the final TWRS EIS for the Phased Implementation alternative.

6.0 LONG-TERM ENVIRONMENTAL IMPACTS

The proposals do not include disposal of either low-activity waste or high-level waste, which DOE would dispose of. The following discussion provides a general assessment of the potential long-term impacts (i.e., of disposal) if each of the proposals were implemented through Phase 1 and 2.

Both proposals would generate stabilized low-activity waste to be disposed of onsite by DOE in low-activity waste vaults. The total volume of low-activity waste to be disposed of onsite would be less than or similar to the volume estimated for Phase 1 of the Phased Implementation alternative. The waste forms for each of the proposals would be at least of comparable quality to that of the glass used for analysis in the TWRS EIS and would meet or exceed the leachability requirements of the RFP. The leachabiliity requirements of the RFP for the low-activity waste were designed to ensure that all groundwater protection standards would be met.

The TWRS EIS bounding analysis showed very small contributions of contaminants to the groundwater from the low-activity waste vaults. All releases would meet groundwater standards and would result in long-term heath risks of two orders of magnitude less than the releases of tank residuals (the one percent of the waste assumed to remain in the tanks following retrieval). The maximum long-term risk from the vaults calculated for the low-activity waste in the TWRS EIS was approximately 3 in 1 million for an onsite residential farmer. The two proposals would result in risks of less than 3 in 1 million. With the information available, the two proposals would result in similar long-term risks from the low-activity waste vaults and these risks would be very small.

Under both proposals, the high-level waste would be a borosilicate glass. Both proposals would produce the same amount of glass for disposal by DOE. The TWRS EIS analysis showed that less than one latent cancer fatality from routine exposures and potential transportation accidents to workers and the public would result from transporting all high-level waste to a geologic repository. Both proposals would result in the same impacts from the disposal of high-level waste and they would be the same as those presented in the TWRS EIS -- less than one latent cancer fatality.

7.0 PHASE 2 IMPACTS

The proposals do not contain information relative to Phase 2, full-scale production, so it is not possible to calculate potential impacts for Phase 2. Based on engineering judgment and information provided in the proposals for Phase 1, DOE expects that both of the proposals would result in similar environmental impacts and these impacts would be less than or approximately the same as the impacts presented in the TWRS EIS for Phase 2 of the Phased Implementation alternative.

8.0 PERMITS, LICENSES, AND APPROVALS

Each of the proposals would require the same permits, licenses, and approvals as Phase 1 of the Phased Implementation alternative. These include:

- Modifications to the Hanford Site Dangerous Waste Permit (Washington Administrative Code [WAC] 173-303).
- Modification to the Sitewide Air Operating Permit (WAC 173-400, 173-460, 246-247, and 173-480, and 40 CFR Part 61).

- Modification to the Site National Pollution Discharge Elimination System Permit (WAC 173-303 and 40 CFR Part 122-136).
- A Sanitary Waste Discharge Permit (WAC 173-226).
- Notice of Construction (WAC 173-400, 173-460, and 246-247, and 40 CFR Part 61).
- Erosion and Sediment Control Plan (WAC 173-226).

9.0 SUMMARY

Based on the preconceptual engineering and the representations in the proposals, each of the proposals would result in approximately the same environmental and human health impacts as Phase 1 of the Phased Implementation alternative. The similarity in impacts is due in large measure to the following factors:

- Each operation must meet waste form performance specifications provided in the request for proposals.
- Each facility must meet air emission and workplace exposure standards.
- Each operation would disturb approximately the same amount of land surface.
- Each operation would employ roughly the same number of construction and operations personnel.

When environmental and conceptual design information is submitted by the offerers, DOE will complete a more detailed evaluation of the proposals' environmental impacts.