EXPLANATION OF SIGNIFICANT DIFFERENCE
LOGISTICS CENTER NATIONAL PRIORITY LIST SITE
FORT LEWIS, WA
FEBRUARY 2007

1. PURPOSE

This Explanation of Significant Differences (ESD) describes the decision of how to implement the Sea Level Aquifer (SLA) contingent remedial component of the remedy selected in the 1990 Record of Decision (ROD) for the Fort Lewis Logistics Center. The implementation of this remedial component seeks to reduce the potential human health risks and hazards associated with potential future drinking water use of trichloroethylene (TCE) impacted groundwater in the SLA. The selected pump and treat alternative described in this ESD is one major component of a remedy selected under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) for this National Priority List (NPL) site. Other major components of the remedy (which were specified in a 1990 ROD, a 1998 ESD, and Decision Documents from 2000, 2002, and 2006) include 1) operation and maintenance of the East Gate Disposal Yard (EGDY) groundwater pump-and-treat (P&T) system, 2) operation and maintenance of the Interstate 5 groundwater P&T system, 3) source reduction within EGDY via drum removal activities and in-situ thermal treatment, 4) institutional controls on land use planning and groundwater use planning, 5) a boundary fence around EGDY, and 6) long-term groundwater and surface water monitoring.

The lead agency for the Logistics Center studies and cleanup is the United States Army (Army). Coordination of remedial documents is conducted in accordance with an installation-wide Federal Facilities Interagency Agreement (FFA) between the Army, United States Environmental Protection Agency (EPA), and Washington Department of Ecology (Ecology), which became effective in January 1990.

The remedy and its components are selected by the Fort Lewis Installation Restoration Program (IRP), which represents the lead agency, with support from EPA Region 10, United States Army Environmental Command (USAEC), and United States Army Center for Health Promotion and Preventative Medicine (USACHPPM). In accordance with a 2000 EPA/Ecology agreement, Ecology was provided with a milestone briefing by EPA on 14 December 2006 and supports the need for this ESD.

This ESD, prepared in accordance with Section 117(c) of CERCLA and 40 Code of Federal Regulations (CFR) 300.435(c)(2)(I), explains how the lead agency considered various remedial technologies as a means to implement the remedial component in regard to the SLA and details the selected technological alternative for implementation. This ESD will become part of the Administrative Record for the Ft. Lewis Logistics Center NPL site. The Administrative Record is located at Public Works-ED, IMNW-LEW-PWE, MS 17 (T Bussey), Box 339500, Fort Lewis, WA 98433-9500, (253) 966-1803. This ESD will also be available at the Information Repositories at Grandstaff

Library, Building 2109 Pendleton Avenue, Fort Lewis, WA 98433 (253) 967-5889 and Tillicum Library, 14916 Washington Avenue SW, Lakewood, WA 98498, (253) 588-1014.

2. SITE HISTORY AND BASIS FOR THE CHANGE

The Logistics Center ROD was signed September 1990. The nature and extent of TCE contamination in the SLA was not understood at the time that the ROD was signed. Thus, the ROD specified that the SLA should be investigated "to determine the presence of contamination and to evaluate the extent of contamination, if necessary. If contamination is found, a groundwater extraction system will be installed which is capable of capturing the contaminant plume with subsequent treatment of the extracted groundwater in the on-site treatment facility." The ROD also specified a remediation goal for TCE across the site of 5 ug/L, which is the maximum contaminant level in regulations promulgated under the Safe Drinking Water Act.

The September 1998 ESD did not explicitly alter the SLA P&T remedy specified in the ROD, but did allow for investigation of new and innovative remedial technologies that would reduce contaminant migration within the Vashon Aquifer and to the SLA. Thus, the 1998 ESD implies that remedial actions that significantly limit the migration of TCE from the Vashon Aquifer to the SLA could be used as a SLA remedy in lieu of installing a P&T system in the SLA. This change in focus on what might constitute an appropriate remedy mechanism for the SLA is what predicated consideration of all possible remedial alternatives during the SLA Feasibility Study (FS) and is the basis for this ESD.

Vertical and horizontal characterization of the SLA has identified an approximately 2-mile-long plume of TCE concentrations greater than 5 ug/L. The direction of groundwater flow in this location of the SLA is generally to the southwest. The maximum detected TCE concentration in the SLA is on the order of 120 ug/L in monitoring wells located immediately downgradient of the "window", which is the hydrogeologic preferential pathway for TCE to enter the SLA from the Vashon Aquifer. The TCE plume above 5 ug/L does not currently extend beyond the southern tip of American Lake and there has been no detection of TCE at the installation boundaries.

The risks and hazards associated with groundwater contamination in the SLA were not considered during the original 1990 baseline risk assessments by Ebasco Environmental and EPA Region 10 because the existence and extent of the SLA plume was not known at the time. However, potential risks and hazards associated with current and potential future use of groundwater in the SLA were considered in an October 2002 Risk Assessment Addendum by URS. Although Fort Lewis Water Well 13, Madigan Army Medical Center (MAMC) Well 4 (which is an emergency supply backup well in the event that Fort Lewis cannot provide drinking water to MAMC), and the City of DuPont's Bell Hill Wells 1 and 3 are existing SLA drinking water wells that are relatively close to the SLA TCE plume, none of these existing wells have TCE concentrations greater than 5 ug/L. Since there are no current drinking water receptors,

the 2002 Risk Assessment Addendum concluded that the exposure pathway for current drinking water use is not complete. However, the Risk Assessment Addendum concluded that there is a potentially unacceptable risk to human health if groundwater in the SLA within the area of the existing TCE plume was used as a drinking water source. In addition, a 2005 SLA report by the United States Geological Survey and numerical groundwater modeling by Pacific Northwest National Laboratory (PNNL) that is documented in the SLA FS predict that the TCE plume area will expand in the future if no additional physical action is taken for the SLA, even after accounting for the recent source reduction and source containment actions at EGDY. The numerical modeling by PNNL predicts that the concentration of TCE in Bell Hill Well 3 would slightly exceed 5 ug/L for a period of approximately 10 years beginning near the year 2030 if no additional remedial action was taken beyond the ongoing actions at EGDY.

3. REMEDIAL ALTERNATIVES AND DESCRIPTION OF THE SELECTED PUMP AND TREAT ALTERNATIVE

PNNL conducted a FS between 2004 and 2006 under the direction of Fort Lewis IRP and USAEC in order to recommend a remedy for TCE in the SLA. The remedial goals used to evaluate remedial alternatives in the FS were to: 1) prevent TCE concentrations in the SLA at the installation boundary from exceeding 5 ug/L and 2) prevent the aerial extent of the existing 5 ug/L plume from significantly expanding. Key assumptions used in the SLA FS were that potential exposure to TCE in on-post drinking water wells will continue to be controlled by existing institutional control mechanisms and that remedial actions being taken at EGDY will effectively contain the TCE source once the actions are completed.

An important factor in the SLA FS was a 2006 MAMC study that evaluated options to provide cooling water for the hospital since the production capacity of the four existing MAMC extraction wells is declining and will not meet future peak demand. The recommended alternative in the MAMC study is for the hospital to obtain water from a nearby Fort Lewis IRP P&T system.

As described in the February 2007 SLA FS, possible remedial technologies for the SLA TCE plume were screened in accordance with 40 CFR 300.430(e)(7) in order to develop detailed remedial alternatives. The nine detailed remedial alternatives developed in the SLA FS based on screening results are:

1) Alternative 1A - SLA P&T near MAMC with Infiltration Gallery. Under this alternative, groundwater would be extracted from the SLA with six new extraction wells installed northwest of MAMC, treated with a new air stripper system, and discharged into an infiltration gallery.

2) Alternative 1B - SLA P&T near MAMC with Treated Water Re-Use at MAMC. Under this alternative, groundwater would be extracted from the SLA with six new extraction wells installed northwest of MAMC, treated with a new air stripper

system, re-used for cooling water at MAMC, and discharged to the man-made MAMC creek at concentrations below 5 ug/L.

3) Alternative 1C - SLA P&T near MAMC with Untreated Water Re-use at MAMC. Under this alternative, groundwater would be extracted from the SLA with six new extraction wells installed northwest of MAMC and re-used for cooling water at MAMC without treatment.

4) Alternative 1D - SLA P&T near Sequalitchew Lake. Under this alternative, groundwater would be extracted from the SLA with six new extraction wells installed southeast of Sequalitchew Lake, treated with a new air stripper system, and discharged into an infiltration gallery.

5) Alternative 1E - SLA P&T near MAMC and Vashon Aquifer P&T Upgradient of Window. Under this alternative, groundwater would be extracted from the SLA with six new extraction wells installed northwest of MAMC, treated with a new air stripper system, and discharged into an infiltration gallery. In addition, groundwater would be extracted from the Vashon Aquifer with nine new extraction wells installed northeast of MAMC, treated with a new air stripper system, and discharged to the MAMC infiltration pond.

6) Alternative 2 - SLA In-Well Air Stripping near MAMC. Under this alternative, 13 dual-screened SLA recirculation wells installed northwest of MAMC would treat TCE in-situ via in-well air stripping.

7) Alternative 3 - SLA In-Situ Biobarrier near MAMC. Under this alternative, vegetable oil would be injected into 83 SLA injection wells installed northwest of MAMC in order to treat TCE in-situ via anaerobic bioremediation.

8) Alternative 4 - Institutional Controls with Contingency for Point-of-Use Treatment at Bell Hill Wells. Under this alternative, institutional controls would be used to prevent installation of new wells within the SLA TCE plume. If TCE concentrations in a Bell Hill Well exceeded 5 ug/L, then a treatment system would be installed for the Bell Hill Well(s).

9) Alternative 5 - No Additional Action. Under this alternative, no additional remedial action would be taken beyond the other six existing major components of the Logistics Center remedy.

The nine detailed remedial alternatives were quantitatively evaluated using the nine CERCLA detailed evaluation criteria in accordance with 40 CFR 300.430(e)(9). Alternative 1B (SLA P&T near MAMC with Treated Water Re-Use at MAMC) was rated as the best alternative based on the quantitative evaluation. In addition, qualitative advantages of Alternative 1B include:

- Alternative 1B enables beneficial re-use of pumped water for cooling at MAMC.

- Alternative 1B enables the Army to optimize costs for groundwater remediation since Army will continue to pump groundwater for MAMC cooling.
- Alternative 1B reduces MAMC pumping in the Vashon Aquifer, which is expected to have a positive impact on stream flow in Murray Creek.
- Alternative 1B assists installation sustainability goals of reducing groundwater production and completing groundwater remediation within a reasonable timeframe.
- Alternative 1B provides a strong return on investment in terms of removing TCE mass from the SLA by focusing on the center of the TCE plume in the SLA.
- Alternative 1B satisfies the SLA remedy component specified in the 1990 ROD.

As a result of the quantitative and qualitative evaluation, Alternative 1B (SLA P&T near MAMC with Treated Water Re-Use at MAMC) was recommended as the preferred alternative in the SLA FS. The conceptual design used in Alternative 1B included installation of a line of six new extraction wells, a new 2,700-gallon per minute (gpm) capacity packed-tower aeration treatment unit, and up to 20 new monitoring locations in the SLA by Fort Lewis IRP. The on-post location for the extraction wells and treatment system used in the FS was approximately three miles northeast (upgradient) of the DuPont-Steilacoom Road installation boundary and approximately 2500 feet northwest of MAMC. Alternative 1B assumed the six extraction wells would be 12-inch diameter wells with a production capacity of 300 gpm each and would be screened to depths between 175 feet and 265 feet. Alternative 1B also assumed MAMC would construct a transfer pump station and approximately 2200 feet of pipeline to deliver the treated water to the existing MAMC cooling system. The SLA FS predicted the SLA P&T system described in Alternative 1B would need to operate for 25 years to achieve the FS remedial goals. Based on a 25-year life, the SLA FS estimated the total cost for Alternative 1B to be $7.5 million ($3.5 million capital cost and $4.0 million net present value in long-term operation and maintenance [O&M] costs).

The conceptual P&T design described in Alternative 1B of the SLA FS allows both Fort Lewis and MAMC to realize significant capital cost savings by working together. Fort Lewis IRP will avoid significant capital costs associated with transmission and injection of water downstream of the treatment system as well as in system control costs. MAMC will avoid significant capital costs associated with installing new extraction wells and/or upgrading the existing MAMC cooling system. Likewise, O&M costs that would be incurred by both Fort Lewis IRP and MAMC will be reduced by sharing O&M responsibilities.

The selected alternative described in this ESD is expected to satisfy the remedial goals used in the FS by capturing the majority of TCE mass in the SLA. As shown in the SLA FS, the portion of the TCE plume above 5 ug/L that is downgradient of the extraction wells is expected to 1) remain on-post and 2) collapse back to near the extraction wells within 20 years of operation of the selected alternative. The groundwater modeling in the FS does predict that the portion of the on-post TCE plume above 5 ug/L located downgradient of the extraction wells will become temporarily longer by approximately 3000 feet. However, this short-term lengthening is sufficiently offset by the long-term

effectiveness, volume reduction, implementability, and cost of the selected alternative. Furthermore, the selected alternative decreases the on-post plume aerial extent faster than any of the remedial alternatives that could be applied further downgradient.

Because of the uncertainties involved with the predictions from any groundwater model, the possibility exists that the 5 ug/L plume could migrate or expand beyond current predictions in the SLA FS. Data collected as part of ongoing long-term groundwater monitoring activities from existing SLA monitoring wells and monitoring wells to be installed during the implementation of this remedial component will be used to evaluate the entire SLA plume during the remedy review process referenced in Section 6. In the event that groundwater monitoring data indicates the plume is not behaving as expected or if SLA P&T performance data indicates the P&T system is not performing as expected, the need for additional action will be re-evaluated during the remedy review process referenced in Section 6.

4. STATE AGENCY COMMENT

Ecology has reviewed this ESD and supports these changes to the selected remedy.

5. PUBLIC/COMMUNITY INVOLVEMENT

Fort Lewis IRP completed public comment requirements for this ESD in accordance with 40 CFR 300.435(c)(2)(i). Completed actions include presenting a brief of the selected remedy to the City of DuPont, publishing a notice of availability and a brief description of this ESD in the Tacoma News Tribune, providing a 30-day opportunity for public comment, and adding the ESD to the local repository.

6. STATUTORY DETERMINATION

Considering the new information that has been developed and the implementation changes that have been made to the selected remedy component, Fort Lewis IRP and EPA believe that the site remedy remains protective of human health and the environment, complies with federal and state requirements that were identified in the ROD as applicable or relevant and appropriate to the remedial action at the time of the original ROD, and is cost-effective. This remedial action satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element, utilizes permanent solutions to the maximum extent practicable, and is cost-effective.

Because the selected remedy will result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, the selected remedy will be reviewed no less than every five years (along with other components of the Logistics Center remedy) to ensure that the selected remedy continues to provide adequate protection of human health and the environment.

7. APPROVAL AND SIGNATURE

This ESD explains that the remedial action selected for the Logistics Center Sea Level Aquifer is installation and operation of a groundwater pump-and-treat system in the Sea Level Aquifer near Madigan Army Medical Center with re-use of treated water at Madigan Army Medical Center. The total estimated cost for this selected remedy is $7.5 million ($3.5 million capital cost and $4.0 million net present value in long-term operation costs).

MICHAEL P. O'KEEFE
Colonel, CM
USAEC Commander

Date 9 Apr 2007

EPA concurrence with the February 2007 Explanation of Significant Difference for the Fort Lewis Logistics Center National Priority List site.

Daniel D. Opalski, Director
Office of Environmental Cleanup
U. S. EPA, Region 10

8/16/2007
Date