

United States Department of Energy

Savannah River Site

**Scoping Summary for the L-Area Southern
Groundwater Operable Unit (U)**

ERD-EN-2004-0113

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1.0 Project Phase

This scoping summary supports the development of the Statement of Basis/Proposed Plan (SB/PP), which will be submitted for comment and review by April 19, 2006.

2.0 Background

L Area lies between 1000 and 2000 feet north (up-gradient) of L Lake. The L-Area Southern Groundwater Operable Unit (LASG OU) encompasses all the groundwater south of the L Area groundwater divide to L Lake. This groundwater unit has been administratively separated from the surface units (L-Area Hot Shop, L-Area Oil and Chemical Basin, emergency retention basin, and L-Area Reactor Seepage Basin) located around L Reactor in order to provide a comprehensive evaluation of groundwater in this area, given the presence of multiple commingled contaminant plumes.

There are two distinct commingled plumes of volatile organic compounds (VOCs), specifically tetrachloroethylene (PCE) and trichloroethylene (TCE), and tritium extending south from the L-Reactor area and discharging into L-Lake. A separate tritium plume west of the L Reactor extends south towards the lower reach of L-Lake (Figures 1 and 2). The remedial investigation concluded that there were no continuing sources for groundwater contamination and that groundwater discharge to L-Lake does not adversely impact ecological receptors. A Corrective Measures Study/Feasibility Study (CMS/FS) was submitted in December 2005 (Redline Rev. 1).

L-Lake is not a part of the LASG OU. However, the LASG OU plumes are currently discharging into L-Lake (Figure 3).

L-Lake is part of the Steel Creek Integrator Operable Unit (IOU). Surface water quality is evaluated under the IOU program for early action potential. Without accounting for dilution, the maximum concentrations of PCE, TCE, and tritium in groundwater are less than the IOU early action benchmarks for surface water, as well as the ecological thresholds for aquatic organisms. Surface water monitoring will continue under the IOU program. Focused surface water sampling is also being conducted by the LASG OU project.

The technologies and alternatives developed in the CMS/FS were developed to address the following remedial action objectives (RAOs):

1. Prevent human exposure to groundwater above MCLs;
2. To the extent practicable, mitigate the discharge of groundwater with contaminants above MCLs to L-Lake and the discharge canal; and,
3. To the extent practicable, treat and/or mitigate groundwater contaminated above MCLs.

The following alternatives were developed for the commingled VOC/Tritium plumes:

- VT-1 No Action;
- VT-2 Institutional Controls, with monitoring;
- VT-3a Monitored Natural Attenuation (MNA) and Institutional Controls;
- VT-3b Permeable Reactive Barrier with monitoring and Institutional Controls;
- VT-3c Enhance Bioremediation with monitoring and Institutional Controls;
- VT-3d Chemical Oxidation with monitoring and Institutional Controls; and,
- VT-4 Spray Irrigation / Phytoremediation with monitoring and Institutional Controls.

The following alternatives were developed for the Tritium only plume:

- T-1 No Action;
- T-2 MNA and Institutional Controls; and,
- T-3 Spray Irrigation / Phytoremediation with monitoring and Institutional Controls.

Based upon an evaluation against the CERCLA nine criteria, each of the alternatives developed, with the exception of the No Action alternatives, are protective of human health and the environment. The time to achieve RAOs and present worth costs for each alternative are presented below:

Comparison of the Commingled Plume Alternatives

Criterion	VT-1	VT-2	VT-3a	VT-3b	VT-3c	VT-3d	VT-4
Time to Achieve RAOs	90 yrs	90 yrs	90 yrs	81 yrs	81 yrs	81 yrs	90 yrs
Present Worth Cost	\$0	\$2.19 million	\$2.24 million	\$29.0 million	\$5.51 million	\$7.26 million	\$14.3 million

Alternatives VT-2 and VT-3a do not include an active component to reduce discharge of VOCs to L-Lake. VOCs are actively treated with Alternatives VT-3b, VT-3c, VT-3d, and VT-4. However, these alternates do not necessarily prevent discharge to L-Lake, but minimally reduces the VOC mass being discharged. Tritium is actively treated with Alternative VT-4 only, but is reduced by radiological decay and other natural processes in each of the alternatives. None of the alternatives will prevent the discharge of tritium to L-Lake, although Alternative VT-4 does reduce the tritium activity discharging to L-Lake.

Comparison of the Tritium Plume Alternatives

Criterion	T-1	T-2	T-3
Time to Achieve RAOs	50 yrs	50 yrs	30 yrs

Present Worth Cost	\$0	\$1.37 million	\$11.5 million
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Tritium is actively treated with Alternative T-3, but is reduced by radiological decay and other natural processes in each of the alternatives.. Neither of the alternatives will prevent the discharge of tritium to L-Lake, although Alternative T-3 does reduce the tritium activity being discharged.

3.0 Land Use

Future land use in each of the reactor areas and surrounding industrial zones has been identified as industrial land use. There is no current or projected future use of the groundwater or L-Lake as a drinking water source. L-Reactor currently has an anticipated active mission until 2016 and its facilities will be in use until then.

4.0 L-Area Southern Groundwater

Problems Warranting Action

- TCE (maximum monitoring well concentration of 0.009 mg/L) exceeds the maximum contaminant level (MCL) (0.005 mg/L)
- PCE (maximum monitoring well concentration of 0.058 mg/L) exceeds the MCL (0.005 mg/L)
- Tritium (maximum monitoring well concentration of 5,850,000 pCi/L in the commingled plumes and 126,000 pCi/L in the tritium plume west of the reactor) exceeds the MCL (20,000 pCi/L)

Remedial Action Objectives

- Prevent human exposure to groundwater above MCLs.
- Treat and/or mitigate groundwater contaminated above MCLs.
 - (sub-bullet) Mitigate the discharge of groundwater with contaminants above MCLs to L-Lake and the discharge canal.

Scope of Problem Warranting Action

- The extent of the two distinct commingled plumes of VOCs and tritium covers approximately 105 acres. Approximately 670 million gallons of groundwater are

contaminated above MCLs. The plumes contain approximately 40 kg of PCE, 4 kg of TCE, and 2250 Ci of tritium.

- The extent of the tritium plume west of the reactor area is approximately 320 acres. Approximately 1700 million gallons of groundwater are contaminated above MCLs. The plume contains approximately 650 Ci of tritium.

Likely Response Actions

The project team proposes MNA and Institutional Controls (Alternatives VT-3a and T-2) as the final action response.

Alternatives VT-3a and T-2 are selected as the final action response because (1) they meet the threshold criteria for being protective of human health and the environment (2) satisfy ARARs, and (3) provide the best balance of tradeoffs between alternatives for the following reasons.

- Natural attenuation processes (dispersion, dilution, radioactive decay) are at work at the LASG OU;
- Alternatives VT-3a and T-2 pose the least risk to remedial workers, the community and the environment during implementation;
- Alternatives VT-3a and T-2 are readily implementable;
- Alternatives VT-3a and T-2 are the least costly and most cost effective;
- Alternatives VT-3a and T-2 will achieve the LASG OU remedial objectives within a time frame that is reasonable compared to that offered by other methods (Figures 4 and 5);
- Groundwater discharge to surface water bodies (L-Lake) are not impacting ecological or human health receptors downgradient; and
- Surface water within most of L-Lake is not impacted above MCLs, and discharges from L-Lake to Steel Creek are less than MCLs.

Uncertainties

- Although there is no indication from groundwater monitoring that there is any contamination presently leaking from the disassembly basin, there is some uncertainty as to whether tritiated water stored in the disassembly basin could

provide a future source of tritium to the groundwater. Any potential future releases will be identified through continued groundwater monitoring.

- There is uncertainty related to the current configuration, future migration and attenuation timeframe of the plumes. This uncertainty will be managed by the groundwater monitoring network for the selected remedy.

5.0 Operable Unit Strategy

The project team will submit the SB/PP by April 19, 2006. The project team proposes MNA and Institutional Controls (Alternatives VT-3a and T-2) as the final action response.

6.0 ATTACHMENTS

Attachment 1: Table of Key Changes to LASG OUSS.

Attachment 2: Record of Key Agreements for LASG OU

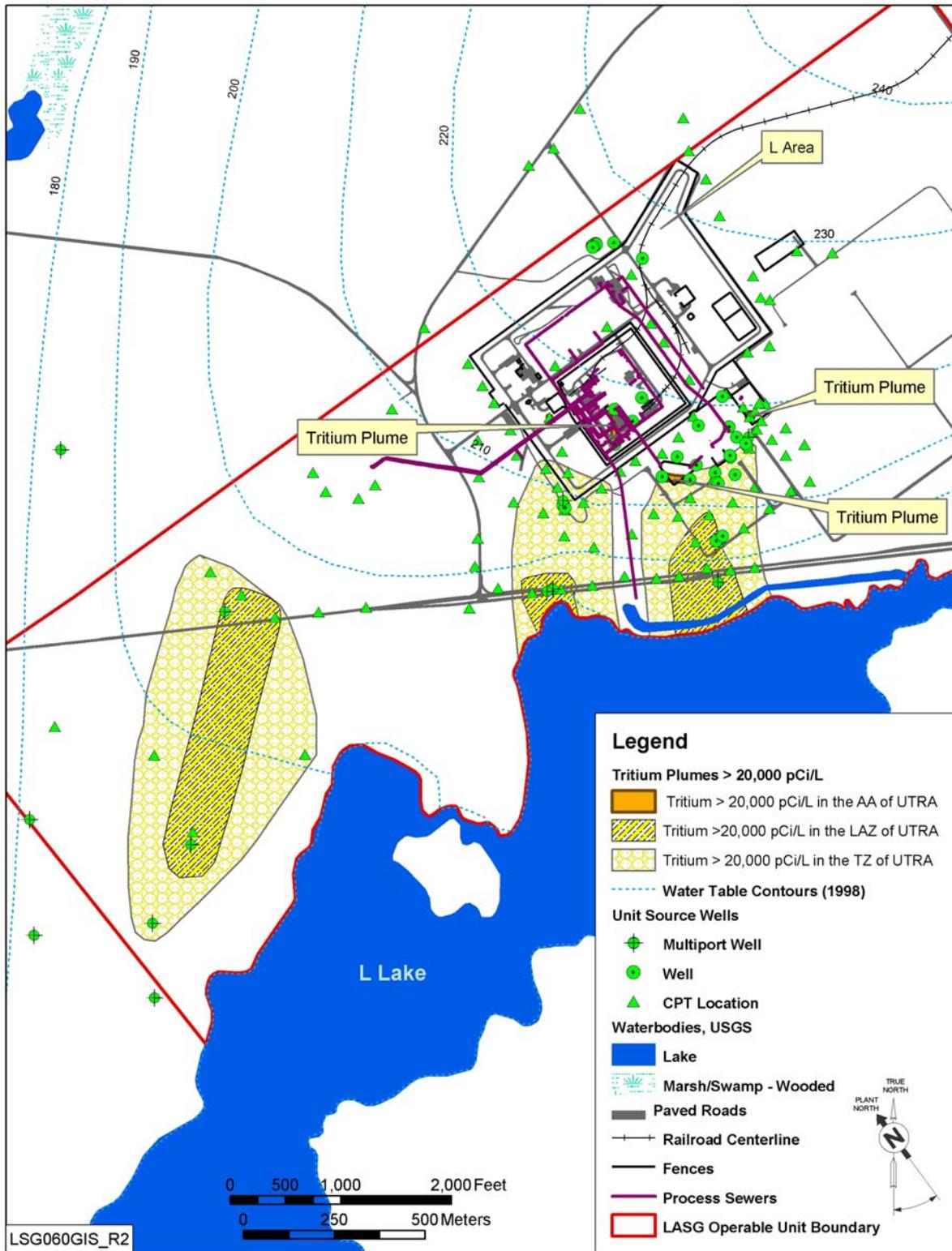


Figure 1: Tritium Plumes in the Upper Three Runs Aquifer

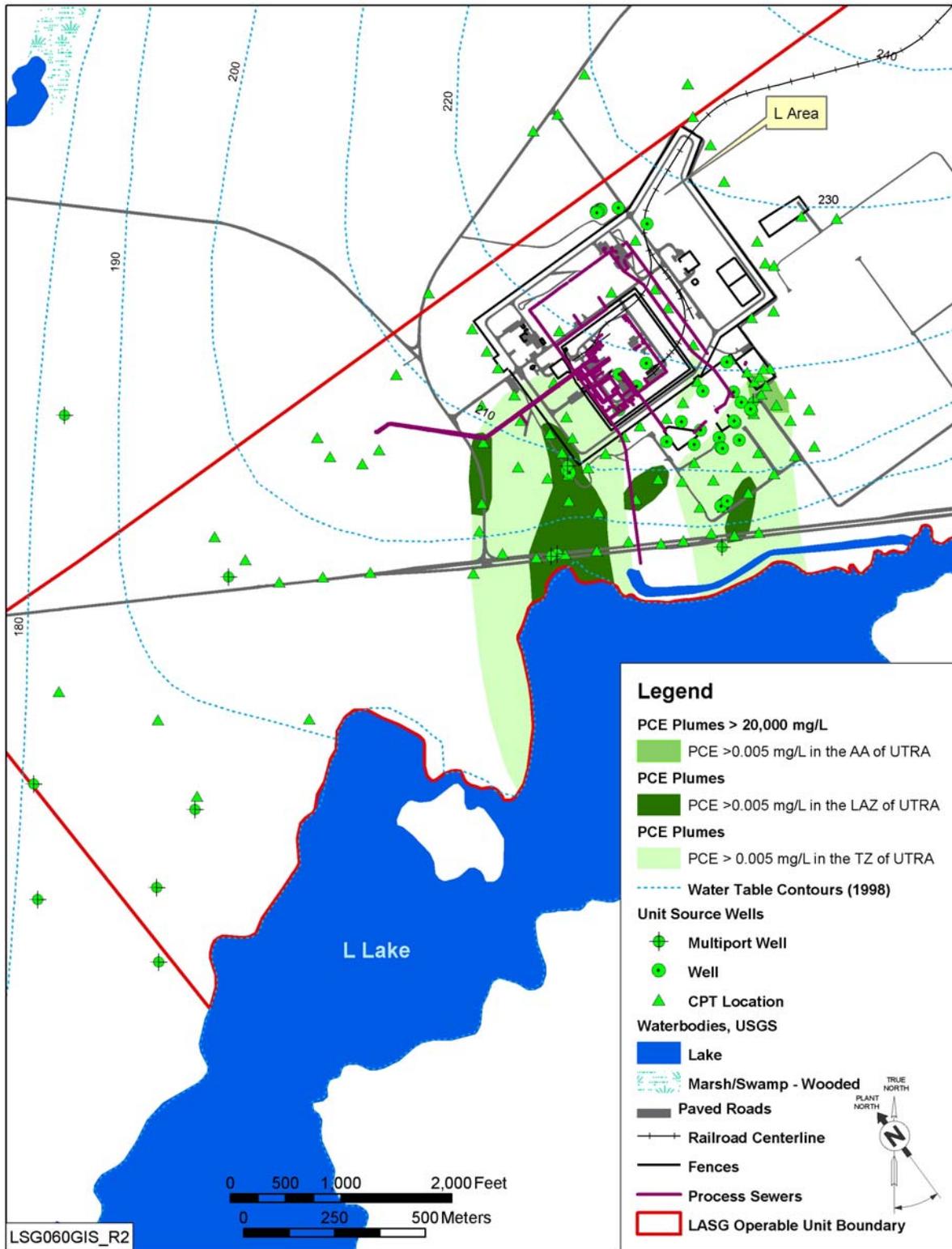


Figure 2: PCE Plumes in the Upper Three Runs Aquifer

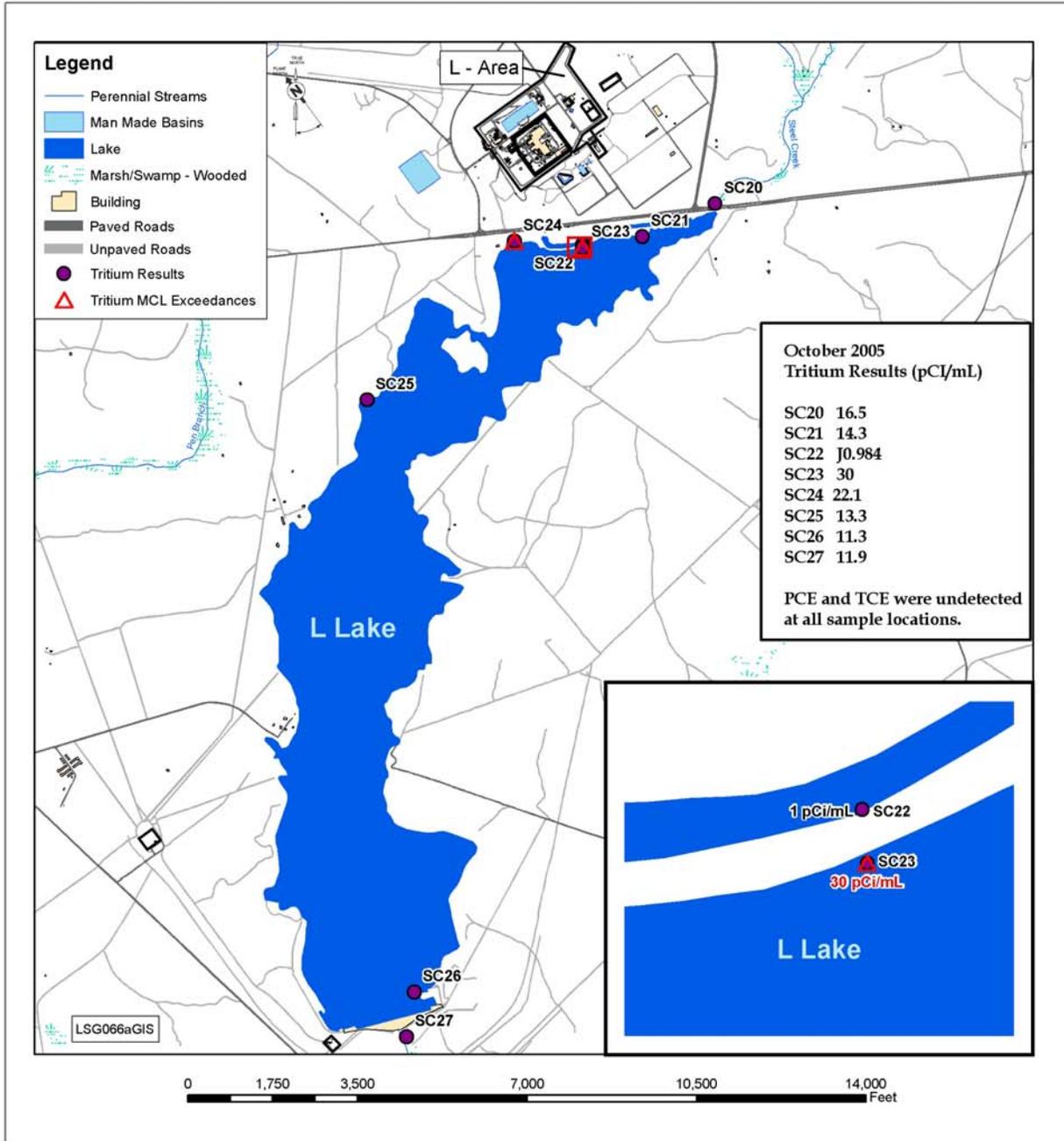


Figure 3: L-Lake Surface Water Samples

**Figure 4. LASG Maximum Tritium Plume Activity
Comparison of Differences between MNA and Spray Irrigation**

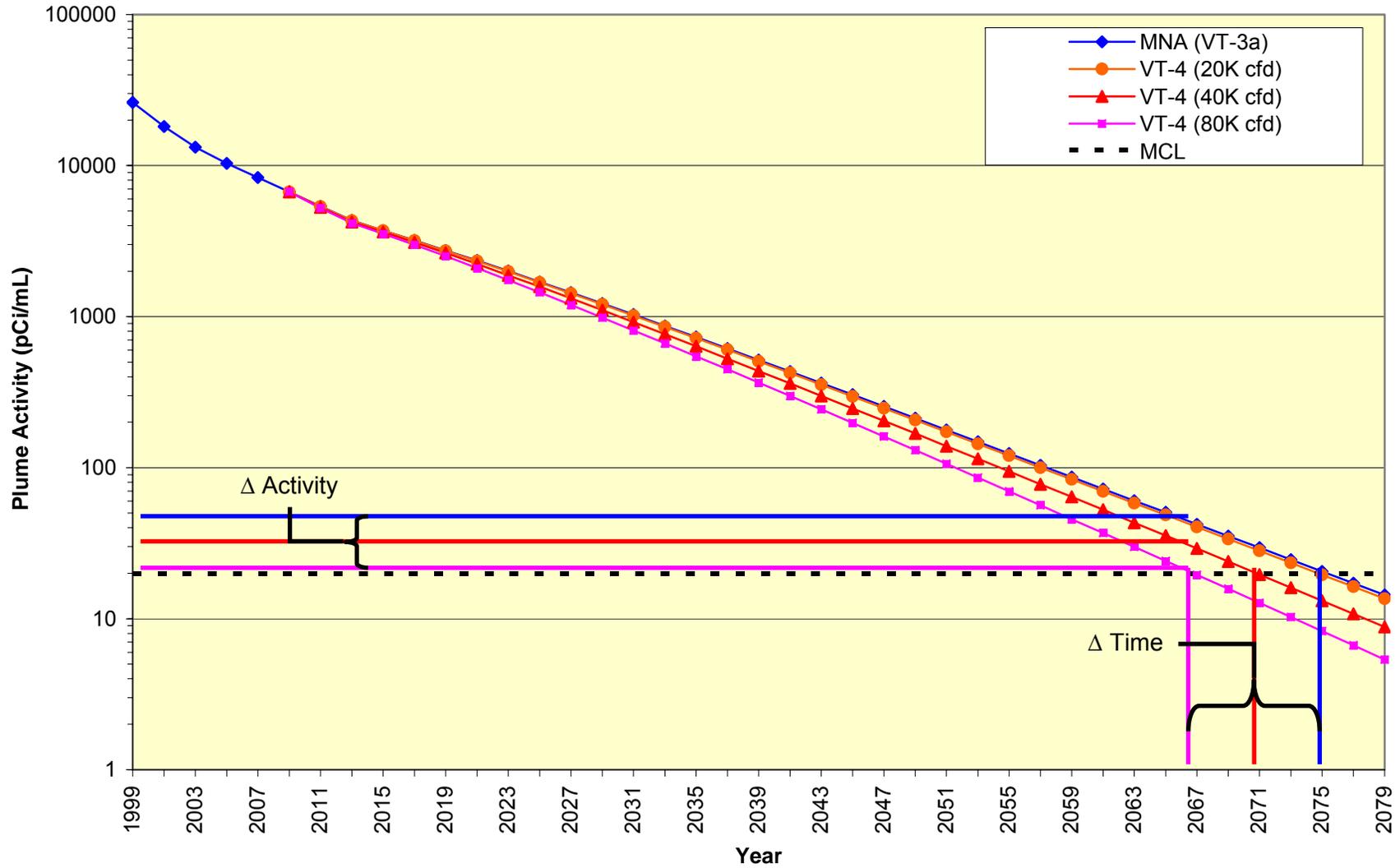
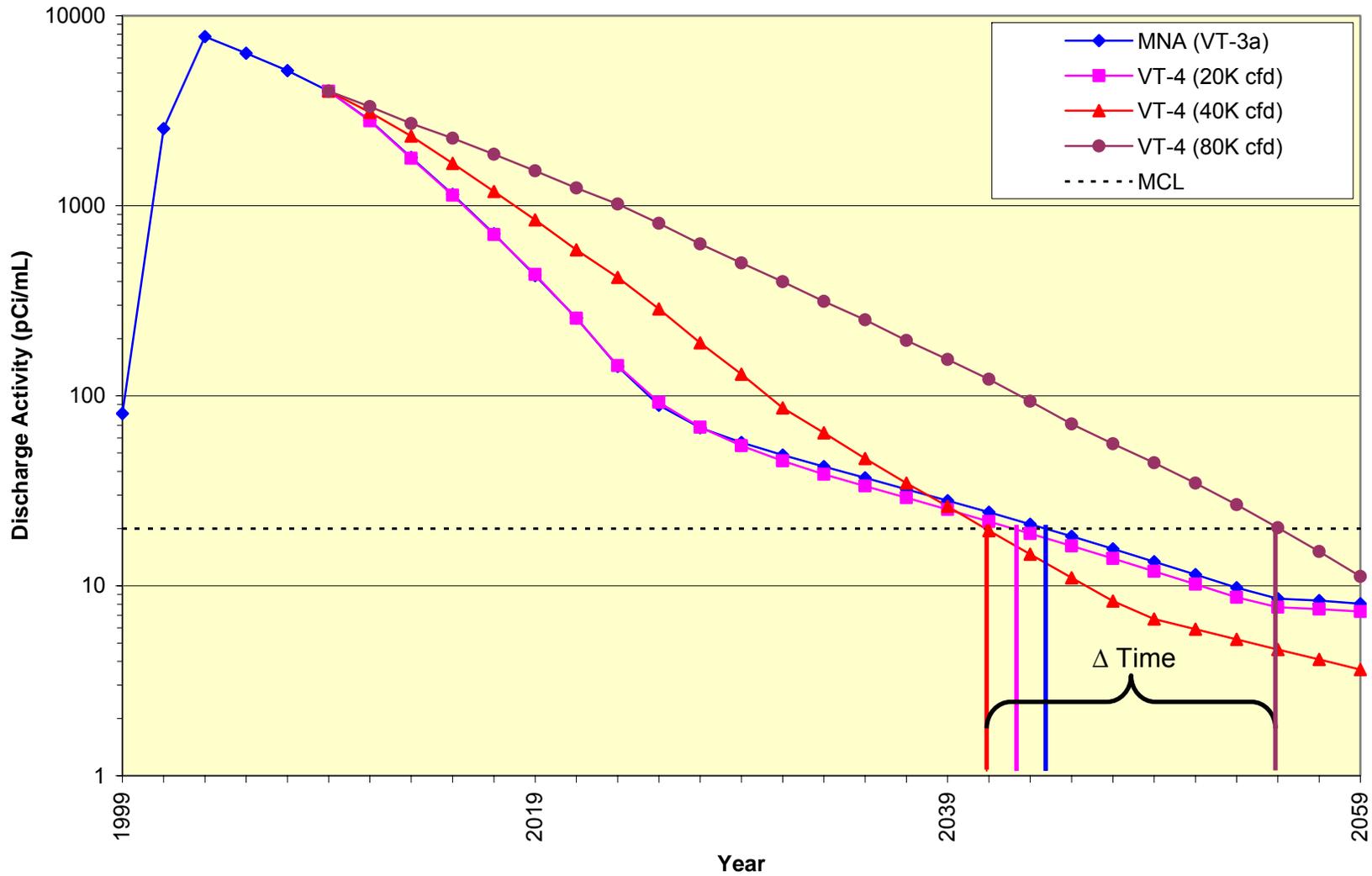


Figure 5. LASG Maximum Tritium Discharge Activity Comparison of Differences between MNA and Spray Irrigation



Attachment 1: Table of Key Changes to the LASG Operable Unit Scoping Summary

1.0 Project Phase	This scoping summary supports the development of the SB/PP, which will be submitted for comment and review by January 18, 2006.
2.0 Background	Updated to reflect the development and results of the CMS/FS Redline Rev. 1.
3.0 Land Use	No significant changes
4.0 L-Area Southern Groundwater	<ul style="list-style-type: none"> • Identified “MNA and Institutional Controls” as the preferred response action. • Revised Scope of the Problem Warranting Action to reflect plume size, volume, and mass of contaminants.
5.0 Operable Unit Strategy	Identified MNA and Institutional Controls as the preferred response action.

Attachment 2: Record of Key Agreements for LASG OU

DATE	DESCRIPTION OF AGREEMENT
2/24/03	<p>From Scoping Summary for January 28, 2003 meeting:</p> <p>The core team agreed to submit the rev. 0 RFI/RI on February 6, 2004. The submittal data has been subsequently revised to July 29, 2004.</p> <ul style="list-style-type: none"> • The core team agreed that a risk assessment for groundwater will not be included for this project. • The core team agreed to use MCLs as a point of comparison for the definition of problems. • The core team agreed to address ecological risks in L Lake sediments by performing risk screening calculations based on observed concentrations in the plumes and including this information in the RFI/RI report.
1/14/04	<p>Decisions from January 14, 2004 scoping meeting:</p> <ul style="list-style-type: none"> • The core team agrees adequate characterization data exists to define the nature and extent of groundwater contamination at the LASG OU. • The core team agrees that preparation of the RFI/RI report can continue. • The core team agrees to hold a Problem Identification meeting prior to submittal of the RFI/RI report. • The core team agrees replacement wells for LSW 1DL and LSW 1C should be installed because multi-level groundwater monitoring well LSW 1A appears to be leaking. Monitoring well LSW 24A will suffice as a replacement well for LSW 1A in the Gordon Aquifer. Groundwater monitoring well LSW 1 may be abandoned depending on analytical results from the replacement wells.
June 2, 2004	<p>Decisions from June 2, 2004 scoping meeting:</p> <ul style="list-style-type: none"> • Title changed to L-Area Southern Groundwater. • L Lake is being addressed as part of the Steel Creek Integrator OU and will not be addressed as part of the LASG OU. • Wetlands deleted as a sub-unit. • Added “To the extent practicable” to the last two remedial action objectives. <p>Text deletions and some text additions to Scope of Problem Warranting Action</p>

	section. Modification to Likely Response Actions text. Added text describing three uncertainties.
February 9, 2005	Decisions from February 9, 2005 scoping meeting: <ul style="list-style-type: none">• Added estimated impact of Tritium and VOCs from LASG on L-Lake to <i>Scope of Problem Warranting Action</i>.• Determined that the older wells were the source for Lead and Copper in the groundwater samples and deleted them as RCOCs and from the Uncertainty section.• Added likely response actions for Commingled VOCs and Tritium Plumes (Table 1) and Tritium Plume West of Reactor (Table 2)• Deleted uncertainty related to the source(s) of the relatively low concentration tritium plume based on groundwater monitoring data that indicates that there are no continuing sources of contamination at this time. Any potential future releases will be identified through continued groundwater monitoring.
March 28, 2006	Decisions from March 28, 2006 Proposed Plan Scoping Meeting <ul style="list-style-type: none">• Modified RAOs to remove “to the extent practicable”