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July 13, 2007

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APPROVAL OF RCRA CORRECTIVE MEASURES IMPLEMENTATION REPORT DATED APRIL 2007, FOR THE LAWRENCE BERKELEY NATIONAL LABORATORY, BERKELEY, CALIFORNIA, EPA ID No: CA4 890 008 986

Dear Dr. Javandel:

On August 31, 2005, the Department of Toxic Substances Control (DTSC) issued the "Notice of Final Decision for the Approval of Corrective Measures Study Report and Remedy Selection" for the Lawrence Berkeley National Laboratory (LBNL). The "Corrective Measures Study Report" which included soil and groundwater remedies was dated February 2005. The approval decision became effective on October 20, 2005.

On November 10, 2005, LBNL submitted the *RCRA Corrective Measures Implementation Workplan* dated November 2005 ("CMI Workplan"). On March 28, 2006, DTSC approved the CMI Workplan. On September 1, 2006, DTSC approved the *Soil Management Plan and Groundwater Management Plan* dated March 2006.

On January 29, 2007, DTSC received the *Corrective Measure Implementation Report*, ("CMI Report") dated January 2007. DTSC reviewed the CMI Report and provided comments on March 12, 2007. On April 2, 2007, LBNL submitted the *Revised Corrective Measure Implementation Report* ("April 2007 CMI Report")

The remedy for soil units included excavation and disposal of contaminated soils at an approved disposal site and taking verification soil samples to confirm achievement of approved media cleanup standards (MCSs). The MCSs are media and chemical-specific concentrations that corrective measures must achieve in order to meet the corrective action objectives and be considered complete (see Attachment 1 for details). The remedies for seven groundwater units included in-situ soil flushing, monitored natural attenuation (MNA) and enhanced biodegradation using hydrogen released compound (HRC).

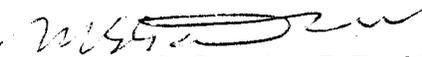
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Based on our review of the April 2007 CMI Report, DTSC finds that LBNL has implemented the approved remedies for the two soil units (see Attachment 2 for details). In addition, the approved remedies for the groundwater units have been constructed and are operating successfully (see Attachment 3 for details). DTSC hereby considers the "April 2007 CMI Report" to be technically complete and approves the document.

Until a site is cleaned up to unrestricted land use standards, DTSC generally imposes specific land use restrictions such as a moratorium on drilling drinking water wells where groundwater contamination exists above drinking water standards, or residual soil contaminations above residential risks levels. This site would qualify for such restrictions. However, based on a request from the City of Berkeley, DTSC has agreed to delay any imposition of land use restrictions at LBNL for the time being. LBNL operates within secured property boundaries and has internal procedures that control onsite subsurface construction activities such as drilling groundwater wells. Therefore, DTSC believes the onsite usage of groundwater as drinking water is very unlikely. DTSC reserves the right to review this decision within the next five years. Should future groundwater remediation reports show that it is not technically feasible to clean-up all contaminated groundwater to drinking water standards, DTSC will require entering into a Land Use Covenant (LUC) with LBNL and University of California that owns the real property. The LUC will restrict the land use to be commercial and industrial only.

If you have any questions, please call Waqar Ahmad of my staff at (510) 540-3932.

Sincerely,



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Attachment 1: Media Cleanup Standards (MCSs)

MCSs developed in the Corrective Measures Study (CMS) Report address both risk-based and regulatory-based Corrective Action Objectives. Risk-based MCSs were based on potential threats to human health associated with ongoing institutional land-use at LBNL. Regulatory-based MCS's were based on protection of beneficial uses of groundwater.

Two sets of risk-based MCSs were developed for volatile organic compounds (VOCs) in groundwater: 1) target risk-based MCSs, and 2) upper-limit risk-based MCSs. The target risk-based MCSs were based on theoretical Incremental Lifetime Cancer Risk (ILCR) of 10^{-6} (the lower bound of the risk management range) and a non-cancer Hazard Quotient (HQ) of 1.0. Regulatory-based MCSs for VOCs in groundwater were set at California Maximum Contaminant Levels (MCLs) for drinking water. For those areas where the groundwater is considered to be a potential drinking water source, the more stringent of either the risk-based MCSs or the regulatory-based MCSs (MCLs) are the required cleanup levels. For those areas where groundwater is not considered to be a potential drinking water source (well yields are less than 200 gallons per day based on short-term yield testing results), risk-based MCSs are the required cleanup levels.

Attachment 2: Remedies for Soil Units

1. Building 51L Groundwater Solvent Plume Source Area: Approximately 2,600 tons of contaminated soil was excavated from the main site. In addition, approximately 70 cubic yards of contaminated soil were excavated from the abandoned Building 51A catch basin area. The excavated contaminated soil was shipped offsite for disposal at a Class 2 landfill. The maximum residual soil concentrations of all Volatile Organic Compounds (VOCs) soil are less than the target risk-based MCSs.
2. Former Building 7 Sump – Area of Concern 2-5: Approximately 550 cubic yards of contaminated soil were excavated and shipped offsite for disposal at a Class 2 landfill. The maximum residual soil concentrations of all VOCs detected in the excavation delineation sampling are less than the target risk-based MCSs.

Attachment 3: Remedies for Groundwater Units

1. Building 51/64 Groundwater Solvent Plume:
 - a. Continue operating Building 51/64 Plume In-situ Soil –Flushing System
 - b. Implement monitored natural attenuation (MNA) for contaminants in the groundwater
 - c. Continue collecting and treating water from the Building 51 Subdrain System.

The concentrations of all volatile organic compounds (VOCs) have been reduced to levels below target risk-based MCSs in all groundwater monitoring wells in the source area. However, concentrations of vinyl chloride and/or 1,1-dichloroethane (DCA) exceed the target risk-based MCS in the two multi-port wells.

2. Building 51L Groundwater Solvent Plume:
 - a. Excavate and dispose offsite of contaminated soil
 - b. Reconstruct Building 51L Storm drain to prevent inflow of contaminated groundwater into storm drain system
 - c. Extract and treat groundwater
 - d. Implement MNA for remaining groundwater contaminants.

The long-term effectiveness of the corrective measure (excavation of contaminated source soil area) for achieving the required target risk-based MCSs has not yet been determined since the corrective measure has only recently been completed. Building 51L storm drain system was reconstructed. The new system is now located above the historical water table.

3. Building 71B Lobe of the Building 71 Groundwater Solvent Plume
 - a. Continue operating in-situ Soil-Flushing System with addition of hydrogen released compound (HRC)
 - b. Treat VOCs in soil Adjacent to the Building 71B Foundation with an in-situ chemical oxidation process, if HRC is not effective
 - c. Continue collecting and treating water from the Hydraugers in the hillside beneath Building 46A

Soil flushing and HRC injection have reduced the concentration of total VOCs from over 6,000 µg/L to approximately 60 µg/L in the groundwater in the source area. Collection and treating water from the hydraugers have been continued.

4. Building 7 Lobe of the Old Town Groundwater Solvent Plume
 - a. Excavate and dispose of contaminated soil offsite
 - b. Continue operating Building 7 Lobe In-situ Soil-Flushing Systems
 - c. Implement MNA for contaminants in groundwater

Although concentrations of chemicals of concern (COCs) have shown significant declines, perchloroethylene (PCE), trichloroethene (TCE), carbon tetrachloride, and vinyl chloride still exceed target risk-based MCSs at some groundwater monitoring well locations. Proposed operation and maintenance of In-situ Soil-Flushing Systems have been continued.

5. Building 52 Lobe of the Old Town Groundwater Solvent Plume
 - a. In-situ Soil Flushing
 - b. Monitored Natural Attenuation and Enhanced Bioremediation
 - c. Migration Control at the Building 46 Subdrain

Although there have been significant declines in the downgradient wells since the start of soil flushing, concentrations of PCE, TCE, and/or carbon tetrachloride still exceed the required MCSs (MCLs) in some of the wells.

6. Building 25A Lobe of the Old Town Groundwater Solvent Plume
 - a. In-situ Soil Flushing
 - b. MNA and Enhanced Bioremediation
 - c. Extraction of Groundwater from Utility Manhole East of Building 6

TCE exceeds the required regulatory-based MCS (MCL) in most source area and some downgradient area wells and 1,1-dichloroethene (DCE) exceeds the MCL in a well. However, concentrations of all VOCs are substantially less than target risk-based MCSs throughout the plume area.

7. Building 69A Area of Groundwater Contamination - Implement MNA for contaminants in the groundwater plume.

The only VOC in the Building 69A area that has exceeded the required (target risk-based) MCS is vinyl chloride. Both vinyl chloride and cis-1,2-DCE have been present at concentrations exceeding MCLs.