



**U.S. Department of Energy**  
**National Nuclear Security Administration**  
Livermore Field Office, Livermore, California 94551

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**Lawrence Livermore National Laboratory**



Lawrence Livermore National Security, LLC, Livermore, California 94551

LLNL-AR-640345-DRAFT

**Draft Explanation of Significant Differences for**  
**Institutional Controls**  
**Lawrence Livermore National Laboratory**  
**Livermore Site**

**July 2013**



**Environmental Restoration Department**



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## 1. Introduction

On August 5, 1992, the Record of Decision (ROD) (United States [U.S.] Department of Energy [DOE], 1992) was signed, documenting the final cleanup plan for the Lawrence Livermore National Laboratory (LLNL) Livermore Site in Livermore, California (Figure 1). Any significant changes to that plan must be publicly noticed through an Explanation of Significant Differences (ESD). As required under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendment and Reauthorization Act of 1986 (SARA), and pursuant to 40 Code of Federal Regulations (CFR) Section 300.435 (c)(2)(i) (Fed. Reg. Vol. 55, No. 46 [March 8, 1990]), an ESD is required because a significant, but not fundamental change is proposed to the final remedial action plan described in the ROD for the Livermore Site.

This ESD proposes the addition of Institutional Controls (ICs) to the Livermore Site Remedial Alternatives. The remedy selected in the ROD is described in Section 2. A discussion of the ICs and the reasoning for adding ICs to the remedial alternatives are presented in Section 3. The U.S. Environmental Protection Agency (EPA) is the lead regulatory agency for this ESD. The EPA, the San Francisco Bay Regional Water Quality Control Board (RWQCB) and the California Department of Toxic Substances Control (DTSC) oversee the LLNL Livermore Site and have commented on this ESD. All regulatory comments and DOE responses are presented in Section 4. Public participation is discussed in Section 5. This ESD was prepared according to EPA guidance (EPA, 1991; 1992).

The site history is described in the Livermore Site Remedial Investigation Report (Thorpe et al., 1990), the Feasibility Study (Isherwood et al., 1990), the ROD (DOE, 1992), the Remedial Action Implementation Plan (RAIP) (Dresen et al., 1993a), and Remedial Design Report No. 1 (Boegel et al., 1993).

## 2. Remedy Selected in the ROD

Based on the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, DOE, LLNL, EPA, DTSC, and the RWQCB selected Alternative No. 1 for ground water (pumping and surface treatment by ultraviolet [UV]/oxidation and air stripping), and Alternative No. 1 for the unsaturated zone (vacuum-induced venting and surface treatment of vapors by catalytic oxidation), as the LLNL remedies in the 1992 ROD (DOE, 1992). Treatment technologies have since been modified per previous ESD documents (see Section 2.3).

The selected remedies for this site protect human health and the environment, comply with Federal, State, and local Applicable or Relevant and Appropriate Requirements (ARARs), are implementable, and permanently and significantly reduce the toxicity, mobility, and volume of the contaminants.

### 2.1. Ground Water

The primary purpose of the selected ground water remedy is to contain volatile organic compounds (VOCs) and prevent further downgradient and offsite migration in ground water, and

to reduce the concentrations of contaminants in ground water after cleanup to levels below Maximum Contaminant Levels (MCLs), the designated cleanup levels. Existing conditions at the site may pose an excess lifetime cancer risk of  $2 \times 10^{-3}$  from domestic use of ground water contaminated with VOCs (primarily trichloroethene [TCE]) under health-conservative, no remediation assumptions. The selected alternative will address all ground water contaminated with VOCs in excess of MCLs and will assure that ARARs for individual VOCs, fuel hydrocarbons (FHCs), lead, chromium, and tritium will be achieved.

The selected ground water remedy involves pumping water at multiple locations within the ground water plume. Eighteen initial pumping locations were identified in the ROD (DOE, 1992) and six additional pumping locations were identified in the RAIP (Dresen et al., 1993a). Several other pumping locations have since been added to ensure complete hydraulic capture of the plume and/or to expedite cleanup. DOE/LLNS currently maintain 92 ground water pumping wells and 28 ground water treatment facilities (Buscheck et al., 2013).

## **2.2. Unsaturated Zone**

The selected remedy for the unsaturated zone involves using vacuum-induced venting to extract contaminant vapors from the unsaturated sediments. The purpose of this response action is to prevent migration of VOCs and FHCs to ground water in concentrations that would impact the ground water in concentrations above MCLs.

## **2.3. Prior ESDs**

In 1993, an ESD was approved to document a change to granular activated carbon (GAC) from catalytic oxidation for treatment of vapor extracted from the unsaturated zone by vacuum-induced venting (Dresen et al., 1993b). In 1997, an ESD was approved to document a change from an ultraviolet/hydrogen peroxide (UV/H<sub>2</sub>O<sub>2</sub>) and air stripping ground water treatment system to air stripping only at Treatment Facilities A and B (Berg et al., 1997a). Metals discharge limits were also approved in 1997 by the regulatory agencies through an ESD (Berg et al., 1997b). All ground water treatment facilities conform to these standards when discharging treated ground water. In 2000, an ESD for Trailer 5475 ground water remediation was approved to document a change to allow ground water containing VOCs and tritium above its MCL to be treated for VOCs at the surface, and then return the tritiated water to the subsurface to decay naturally (Berg, 2000).

# **3. Description of the Significant Differences and the Basis for the Differences**

The significant differences between the remedy presented in the ROD and the proposed remedy are described below.

## **3.1. Basis**

This ESD describes the addition of ICs as a component of the Livermore Site remedial alternatives. The 1990 Feasibility Study (Isherwood et al., 1990) and subsequent 1992 ROD (DOE, 1992) did not include an analysis and selection of ICs as part of the remedial alternatives.

During the Fourth Five-Year Review for the Livermore Site (McKereghan et al., 2012), the EPA identified the absence of ICs in the ROD. ICs are necessary to prevent onsite and offsite receptor exposure to contaminants in soil (onsite) and ground water (onsite and offsite) currently above the MCLs. DOE analyzed and selected the appropriate ICs to include as a component of the Livermore Site remedial alternatives (Attachment A). The selected ICs are described below.

### 3.2. Description

Land use controls are restrictions or controls that are implemented to protect human health and the environment, such as restricting access or limiting activities at a contaminated site. Types of land use controls include:

- ICs,
- Engineered controls, and
- Physical barriers.

The U.S. EPA (U.S. EPA, 2012) defines ICs as non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contamination and/or protect the integrity of a response action. ICs are typically designed to work by limiting land or resource use or by providing information that helps modify or guide human behavior at a site. ICs are a subset of land use controls. ICs are typically divided into four categories:

1. Proprietary controls
2. Governmental controls.
3. Enforcement and permit tools
4. Information devices

Proprietary controls are generally created pursuant to state law to prohibit activities that may compromise the effectiveness of a remedial action or restrict activities or future resource use that may result in unacceptable risk to human health or the environment. Governmental controls impose restrictions on land use or resource use, using the authority of a government entity. Federal landholding agencies, such as DOE, possess the authority to enforce institutional controls on their property. At active federal facilities, such as LLNL Livermore Site, land use restrictions may be addressed in master plans, facility construction review processes, and digging permit systems. Enforcement and permit tools are legal tools that limit certain site activities or require the performance of specific activities. Information devices provide information or notifications to local communities that residual or contained contamination remains onsite.

Land use controls also include engineering controls and physical barriers, such as fences and security guards, as means to protect human health by reducing or eliminating the hazard and/or the potential for exposure to contamination.

In this document, the term “land use controls” is used to encompass ICs, engineered controls, and physical barriers.

Section 3.2.1 describes the Livermore Site land use control objectives and the risk necessitating these controls. Section 3.2.2 discusses the specific Livermore Site land use controls to be incorporated in the remedial alternatives, responsible entities, and implementation mechanisms used to prevent exposure to contamination at the Livermore Site by objective. The

status of the Livermore Site land use controls and the necessary lifespan of these controls are summarized in Section 3.2.3. Table 1 presents a description of: (1) the Livermore Site institutional/land use control objective, and duration, (2) the risk necessitating land use controls, and (3) the specific institutional/land use controls and implementation mechanisms used to prevent exposure to contamination. Figure 2 depicts a map indicating the geographical location where the institutional/land use controls will be implemented and maintained.

### 3.2.1. Livermore Site Land Use Control Objectives

The Land Use Control Objectives and the risk driver for the Livermore Site include:

1. **Risk Driver** – Contaminant concentrations in ground water onsite and offsite exceed cleanup standards.

**Land Use Control objectives:**

- Prevent onsite water-supply use/consumption of contaminated ground water until ground water cleanup standards are met (Section 3.2.2.1).
- Prevent offsite water-supply use/consumption of contaminated ground water until ground water cleanup standards are met (Section 3.2.2.2).

2. **Risk Driver** – Potential exposure to contaminants at depth in subsurface soil.

**Land use control objective:**

- Control excavation activities to prevent onsite worker exposure to contaminants in subsurface soil until it can be verified that concentrations do not pose an exposure risk to onsite workers (Section 3.2.2.3).

3. **Risk Driver** – Potential exposure to contaminated environmental media.

**Land use control objective:**

- Prohibit transfer of lands with unmitigated contamination that could cause potential harm under residential or unrestricted land use (Section 3.2.2.4).

### 3.2.2. Livermore Site Land Use Controls

DOE is responsible for implementing, maintaining, reporting on, and enforcing the land use controls on the Livermore Site. Offsite land use controls are implemented, maintained, reported on, and enforced by DOE in conjunction with the Zone 7 Water Agency.

To ensure that human health is protected, access to the Livermore Site will continue to be restricted. The Livermore Site is enclosed within a security fence, posted with signs noting the restricted access, and manned by a full-time security force to prevent unauthorized intrusion. Building occupancy and land use is further controlled by the Livermore Site Management as consistent with the current Environmental Impact Statement/ Environmental Impact Report (EIS/EIR). Due diligence is given to environmental concerns, including environmental restoration and groundwater remediation, during planning.

All personnel working at the Livermore Site are required to take a safety briefing, which covers access requirements and areas of contamination and possible hazards. Operational Safety Plans, which include checks for hazardous materials and sensitive species, are required for all construction projects and trenching and shoring work. Prior to conducting work activities requiring an Operational Safety Plan, pre-job briefings are conducted to ensure that work, hazards, and controls are adequately understood by workers and first line supervisors.

Monitoring, inspection, and reporting of the Livermore Site ICs will be performed throughout the remediation period, and DOE will review facility and land use to evaluate changes in exposure pathway conditions that could affect the risk assessment assumptions and calculations during the Five-Year Review process. IC monitoring results conducted during the year will be submitted to the U.S. EPA and State regulatory agencies in the Annual Livermore Site Monitoring Reports. The Land Use Control Monitoring Checklist is presented in Table 2.

### **3.2.2.1. Prevent Onsite Water-Supply Use/Consumption Of Contaminated Ground Water Until Ground Water Cleanup Standards Are Met**

The Livermore Site land use controls selected to prevent onsite water-supply use/consumption of contaminated ground water until ground water cleanup standards are met include:

- *Governmental Institutional Control: LLNL Dig Permit Process*

There are no existing or planned onsite water-supply wells at the Livermore Site. Treated water from onsite wells at the Livermore Site may be used for irrigation and/or industrial uses (e.g. cooling towers). An LLNL soil excavation permit is required to drill and install any new onsite wells at the Livermore Site. As part of the permitting process, the affected jobsite must be evaluated by the LLNL Environment, Safety and Health (ES&H) Team Environmental Analyst (EA) for contamination.

In addition to a soil excavation permit, a preconstruction site evaluation is required for any soil or debris disturbing activities. As soon as it is determined that soil or debris are to be disturbed at a project site, the Responsible Individual/project manager is required to notify the LLNL ES&H Team EA to initiate a preconstruction site evaluation. To document the request, a Site Evaluation Request Form (see Appendix 1) is filled out and given to the LLNL ES&H Team EA with a description of the project attached, including project location, and excavation footprint and depth. The LLNL ES&H Team EA evaluates the proposed project location to determine whether sampling of the project location is required.

The evaluation includes:

- Review of LLNL Environmental Restoration Department (ERD) historical source investigation.
- Review of Environmental Functional Area site evaluation documents.
- Review of current and past operations, and pre-existing soil analytical data.
- Visual inspection to evaluate the project site for possible contamination.

If sampling of the project location is required, the LLNL ES&H Team EA and ES&H technician prepare and implement the sampling plan. The LLNL ES&H Team EA evaluates the results.

If a potential for contaminant exposure is identified, the ES&H Team, including the LLNL ES&H Team EA, representatives from health and safety disciplines, and LLNL Waste Management will work with the Responsible Individual/project manager proposing the project to relocate the well to ensure ground water contaminants would not be drawn into the well prior to issuing the excavation permit.

### 3.2.2.2. Prevent Offsite Water-Supply Use/Consumption Of Contaminated Ground Water Until Ground Water Cleanup Standards Are Met

The Livermore Site land use controls selected to prevent offsite water-supply use/consumption of contaminated ground water until ground water cleanup standards are met include:

- *Governmental Institutional Control: Alameda County Well Permitting Process*
- *Monitoring: Livermore Site Ground Water Monitoring Program*
- *Information Tool: Federal/State/County Site Registries*
- *Information Tool: Notification to Owners and Community Working Group Meetings*
- *Information Tool: Memorandum of Understanding (MOU)*

Groundwater in the Livermore Valley Groundwater Basin is managed by Zone 7 under authority from California Water Code Section 30000 (County Water District). Zone 7 interfaces with LLNL and state, county, and local agencies to assure the ground water basin is protected. The construction, repair, reconstruction, destruction or abandonment of wells within Zone 7 is currently regulated by Alameda County General Ordinance Code, Chapter 6.88. Zone 7 administers the associated well permit program within its service area. The Alameda County ordinance (6.88.040) prohibits the drilling or prohibits the drilling or alteration of a well in the City of Livermore without a permit from the Zone 7 Water Agency. Drilling a well in Alameda County without a permit is a criminal offense under ordinance section 6.88.070. As a result, any planned new well construction, soil-boring construction, or well destruction must be permitted by Zone 7 prior to starting the work. Well construction and destruction permit requirements are determined on a case-by-case basis, but generally follow the Department of Water Resources' (DWR's) California Well Standards (Bulletins 74-81 and 74-90). Under the DWR's California Well Standards, all water wells are required to be located an adequate horizontal distance from known or potential sources of pollution and contamination. Zone 7 maintains a Toxic Sites Surveillance (TSS) Program to document and track release sites within the basin that pose potential threat to drinking water.

As depth to groundwater is approximately 70 feet below ground surface, a licensed contractor would be required to drill/access the groundwater. All well construction, alteration, destruction, or abandonment must be performed by an individual with a C-57 Water Well Contractor's License. All well drillers are required to file a completion report (Well Completion Report Form - DWR 188) to the DWR (California Water Code 13750.5-13751). Alameda ordinance requires the completion report also be filed with Zone 7. Individuals with a C-57 Water Well Contractor's License must follow California DWR and local standards. Additionally, the completion report documents methods used for sealing off surface or contaminated waters and methods used for preventing contaminated waters of one aquifer from mixing with the waters of another aquifer.

The Livermore Site Environmental Restoration Program monitors over 600 ground water monitoring wells to track ground water cleanup progress. The results of the monitoring are published in the Livermore Site Annual Ground Water Project Report and Quarterly Self-Monitoring Reports.

A number of informational devices are implemented at the Livermore Site to prevent water-supply use or consumption of contaminated ground water. The Livermore Site Annual and

Quarterly Reports contain updates on the status of contaminant plumes, treatment facilities, and remediation progress at the Livermore Site. These reports, in addition to other environmental remediation documents, are available to the public and neighboring property owners through the environmental repositories and are available for viewing at the Livermore Public Library and the LLNL Discovery Center, as well as on the LLNL Public Affairs Office maintained website <https://www-envirinfo.llnl.gov/>. Near Neighbor Disclosure Letters, also found on the website, discuss the offsite ground water contamination and contact information. These letters will be periodically mailed to the residences shown on Figure 2. In addition, LLNL periodically holds Community Working Group meetings to discuss the status of contaminant plumes and remediation progress with community members.

DOE will establish an MOU between LLNL and the Sandia National Laboratory, California (SNL). While there are currently no VOCs above cleanup standards on SNL property, VOCs could potentially be pulled toward a well if SNL drilled and pumped on a well near the site boundary. Under the MOU, SNL will notify LLNL prior to drilling a water supply well.

### **3.2.2.3. Control Excavation Activities To Prevent Onsite Worker Exposure To Contaminants In Subsurface Soil Until It Can Be Verified That Concentrations Do Not Pose An Exposure Risk To Onsite Workers**

The Livermore Site land use controls selected to control excavation activities to prevent onsite worker exposure to contaminants in subsurface soil until it can be verified that concentrations do not pose an exposure risk to onsite workers include:

- *Governmental Institutional Control: Dig Permit Process*

A soil excavation permit is required prior to any excavation work. As part of the permitting process, the affected jobsite must be evaluated by the LLNL ES&H Team EA for soil contamination. If a potential for contaminant exposure is identified, the LLNL ES&H Team EA identifies the necessary controls through conditions to the soil excavation permit. Any permit conditions established by the LLNL ES&H Team EA are then communicated to the Responsible Individual/project manager.

In addition to a soil excavation permit, a preconstruction site evaluation is required for any soil or debris disturbing activities. As soon as it is determined that soil or debris are to be disturbed at a project site, the Responsible Individual/project manager is required to notify the LLNL ES&H Team EA to initiate a preconstruction site evaluation. To document the request, a Site Evaluation Request Form (see Appendix 1) is filled out and given to the LLNL ES&H Team EA with a description of the project attached, including project location, and excavation footprint and depth. The LLNL ES&H Team EA evaluates the proposed project location to determine whether sampling of the project location is required.

The evaluation includes:

- Review of LLNL ERD historical source investigation.
- Review of Environmental Functional Area site evaluation documents.
- Review of current and past operations, and pre-existing soil analytical data.
- Visual inspection to evaluate the project site for possible contamination.

If sampling of the project location is required, the LLNL ES&H Team EA and ES&H technician prepare and implement the sampling plan. The LLNL ES&H Team EA evaluates the

results and, if a potential for contaminant exposure is identified, recommends the appropriate management strategy which ensures that hazards are adequately evaluated and the necessary controls are identified and implemented prior to the start of work. The ES&H Team, including the LLNL ES&H Team EA, representatives from health and safety disciplines, and LLNL Waste Management will also work with the Responsible Individual/project manager proposing the project to determine if the work plans can be modified to move activities outside of areas of contamination. Figure 3 summarizes the responsibilities of the Responsible Individual/project manager, the LLNL ES&H Team EA, ERD, and other key individuals.

During excavation or soil or debris disturbing activities, a Controlled Area (approximately 50 feet radius exclusion zone) is established with regulated access. If potentially contaminated soil or debris is unexpectedly discovered during excavation or soil or debris disturbing activities, the Responsible Individual/project manager stops work and immediately notifies the LLNL ES&H Team EA and the ERD so that the material can be evaluated. Samples are gathered to properly classify the soils and/or debris. After evaluating the results, the LLNL ES&H Team EA and ERD recommend the proper method of handling any contaminated material. Figure 4 summarizes the procedures that the Responsible Individual/project manager is required to follow during excavation, construction, or demolition to ensure that any contaminated soil or debris is properly managed.

#### **3.2.2.4. Prohibit Transfer Of Lands With Unmitigated Contamination That Could Cause Potential Harm Under Residential Or Unrestricted Land Use**

The Livermore Site land use controls selected to prohibit transfer of lands with unmitigated contamination that could cause potential harm under residential or unrestricted land use include:

- *Land Record Restrictions: Environmental Restrictive Covenants*
- *Land Record Restrictions: State Designation of Land as Hazardous Use Property*

The Livermore Site Federal Facilities Agreement (FFA) contains provisions that assure DOE will not transfer lands with unmitigated contamination that could cause potential harm. DOE will meet its commitments in the Livermore Site FFA, Sections 32 (Property Transfer) and 35 (Termination and Satisfaction), regarding its cleanup obligations if property ownership and/or land use changes in the future. In the event that the Livermore Site property is transferred in the future, DOE will comply with the requirements of CERCLA § 120(h), 42 U.S.C. § 9620(h), in effectuating that sale or transfer, including all notice requirements. No change in ownership of the Livermore Site will take effect without provision for continued maintenance of any contaminant system, treatment system, monitoring system, or other response action(s) installed or implemented.

Development at Livermore Site is restricted to industrial land usage. These restrictions will remain in place until and unless a risk assessment is performed in accordance with current U.S. EPA risk assessment guidance and is agreed by the DOE, U.S. EPA, DTSC, and RWQCB as adequately showing no unacceptable risk for residential or unrestricted land use.

Under California law (Health and Safety Code Sections 25222 and 25222.1) California can, with DOE's concurrence or through administrative process, designate land as hazardous waste property or border zone property. Local governments are then legally required to include all resultant land use restrictions in their property files. Violations of such restrictions are subject to

civil action. California can ease or eliminate covenants upon showing they have completed their purpose.

### **3.2.3. Livermore Site Land Use Controls Status**

The Livermore Site land use controls described above in Section 3.2.2 are currently implemented by DOE, LLNL, and Zone 7, except the MOU between LLNL and SNL that is in progress. Onsite and offsite water-supply use/consumption of contaminated ground water will continue to be prevented, with the exception of onsite industrial use post-treatment, until ground water cleanup standards are met. Excavation activities will continue to be controlled to prevent onsite worker exposure to contaminants in subsurface soil until it can be verified that concentrations do not pose an exposure risk to onsite workers. The transfer of lands with unmitigated contamination that could cause potential harm under residential or unrestricted land use will continue to be prohibited, unless the requirements of CERCLA § 120(h), 42 U.S.C. § 9620(h) are met.

Monitoring, inspection, and reporting of the Livermore Site ICs will be performed throughout the remediation period, and DOE will review facility and land use to evaluate changes in exposure pathway conditions that could affect the risk assessment assumptions and calculations during the Five-Year Review process.

## **4. Support Agency Comments**

To be added after the draft comment period.

## **5. Public Participation**

Pursuant to 40 CFR Section 300.435(c)(2)(i) and EPA (1999), a public comment period is not required for an ESD. However, a notice of availability and brief description are to be published in a major local newspaper. A notice of availability with a brief description of the ESD was published in *The Independent, Tri-Valley Herald*, and *Valley Times*.

This ESD is placed in the LLNL repositories for interested members of the public to review. One repository is located at the Livermore Public Library – Civic Center, 1188 South Livermore Avenue. Library hours are Monday through Thursday, 10:00 a.m. to 9:00 p.m.; Friday, 10:00 a.m. to 6:00 p.m., Saturday, 10:00 a.m. to 5:00 p.m.; and Sunday 12:00 to 6:00 p.m. The second repository is at the LLNL Discovery Center on Greenville Road. Discovery Center hours are Tuesday through Friday, 1:00 to 4:00 p.m., and Saturday 10:00 a.m. to 2:00 p.m. The Administrative Record, which contains all documents that form the basis for the Livermore Site cleanup plan, can be accessed at the LLNL.

## **6. Affirmation of the Statutory Determinations**

Considering the new information and the changes that will be made to the proposed remedy, the Environmental Protection Agency believes that the remedy remains protective of human health and the environment, complies with Federal and State requirements identified in the ROD as applicable or relevant or appropriate to this remedial action, and is cost effective. In addition, the revised remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practical for this site.

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TBD

Chief, Federal Facilities Cleanup Branch  
Superfund Division  
U. S. Environmental Protection Agency, Region IX

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Date

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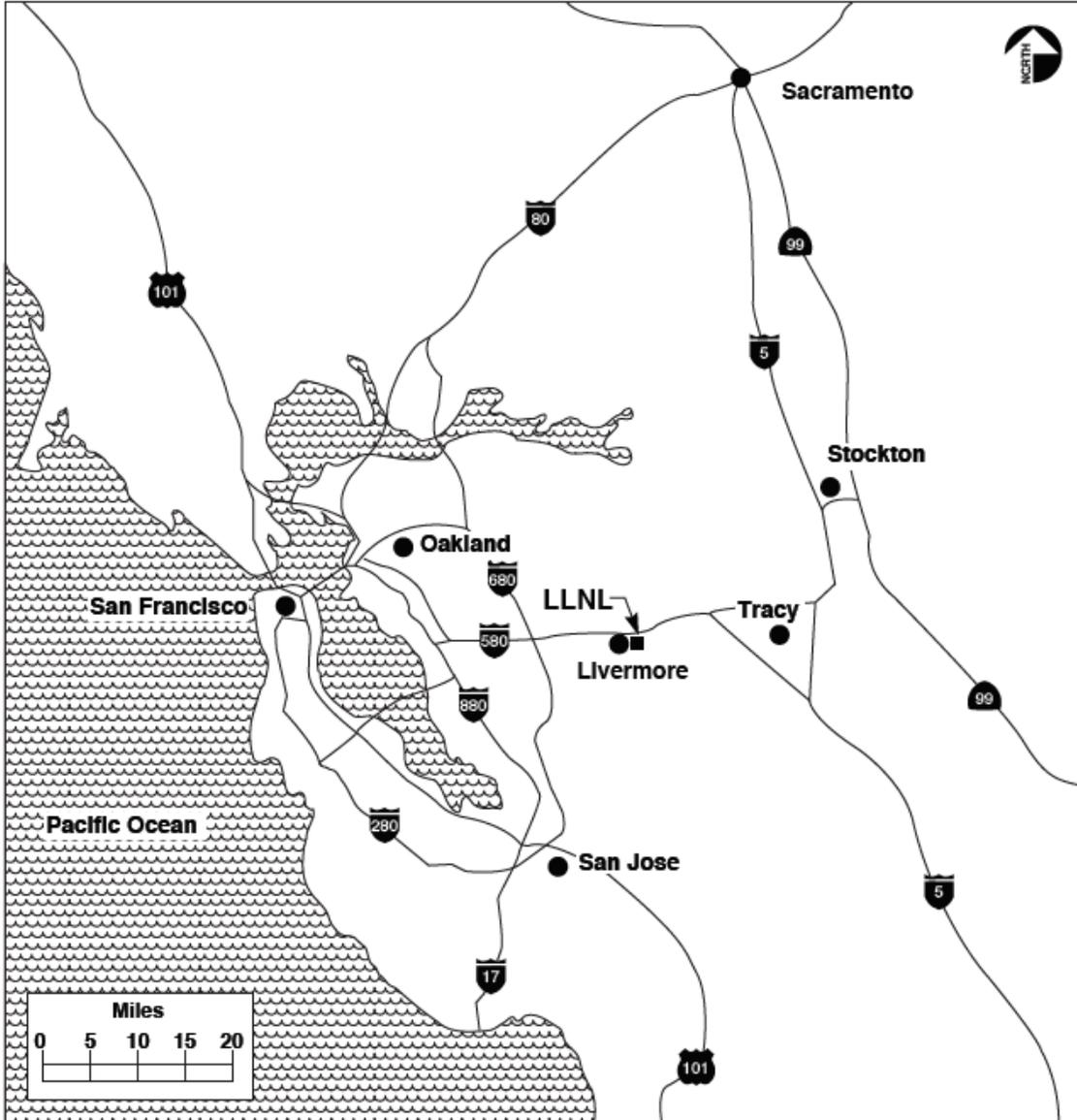
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## 8. Acronyms

ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
DOE	Department of Energy
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EA	Environmental Analyst
EIS/EIR	Environmental Impact Statement/ Environmental Impact Report
EPA	Environmental Protection Agency
ERD	Environmental Restoration Department
ESD	Explanation of Significant Differences
ES&H	Environment, Safety & Health
FAA	Federal Facilities Agreement
FHC	Fuel hydrocarbon
GAC	Granular activated carbon
gpm	Gallons per minute
H <sub>2</sub> O <sub>2</sub>	Hydrogen peroxide
HI	Hazard Index
ICs	Institutional Controls
LLNL	Lawrence Livermore National Laboratory
MCLs	Maximum Contaminant Levels
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendment and Reauthorization Act
TCE	Trichloroethene
TSS	Toxic Sites Surveillance (Program)
U.S.	United States
UV	Ultraviolet
VOCs	Volatile organic compounds

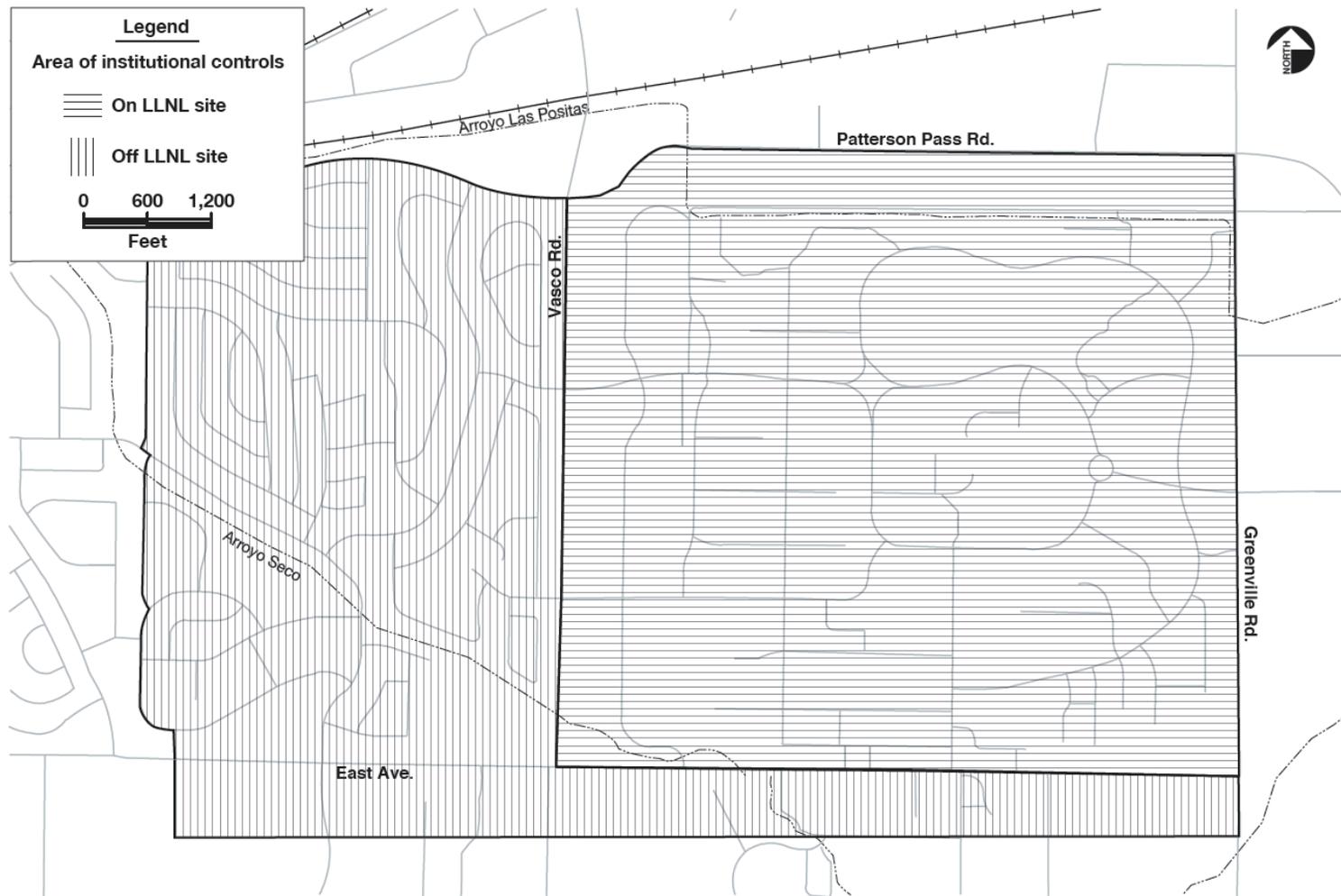
µg/L      Micrograms per liter



EPD-LSR-06-0055

Figure 1. Location of the LLNL Livermore Site.





ERD-S3R-13-0028

Figure 2. Map delineating areas of institutional controls.



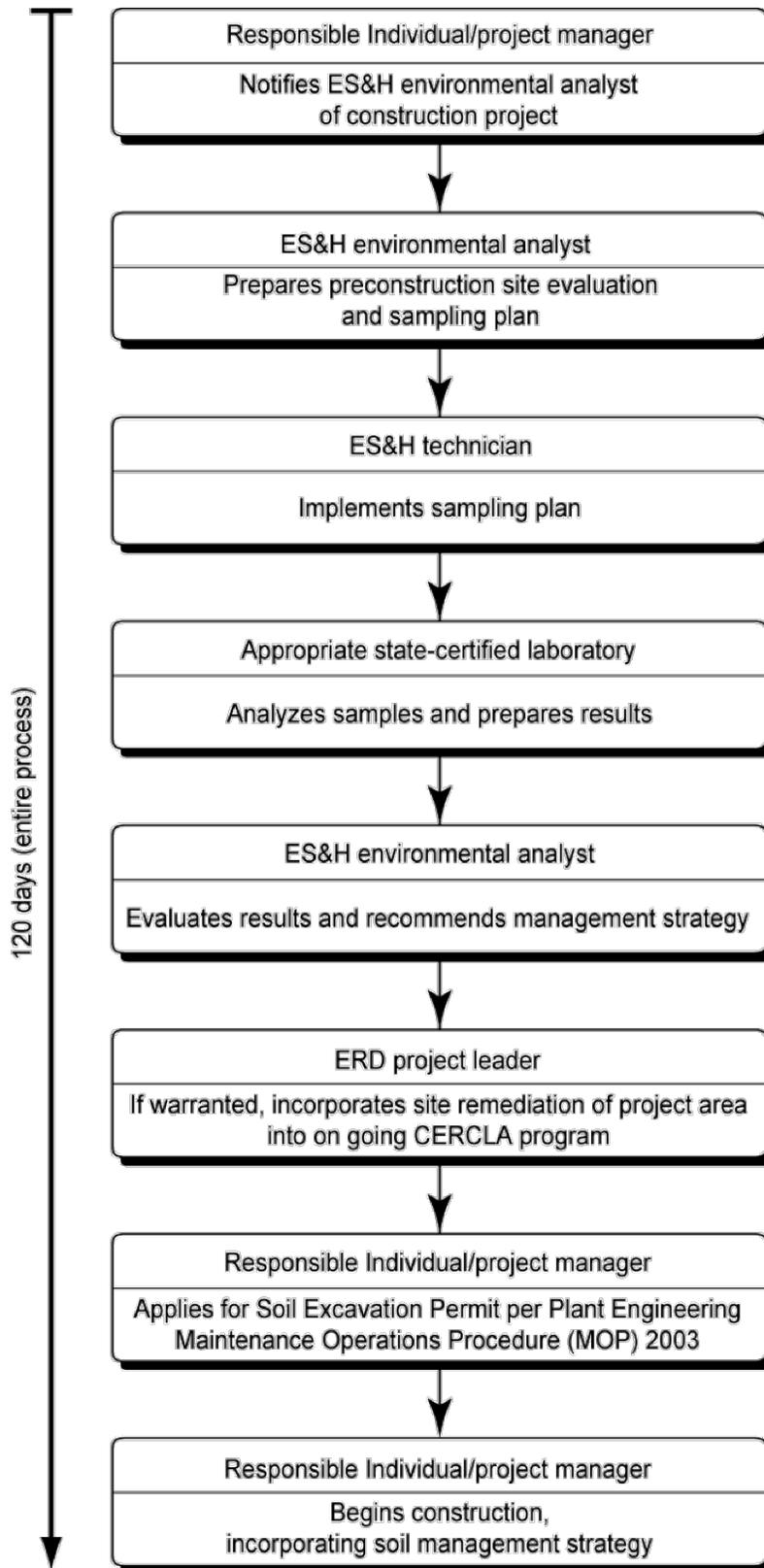
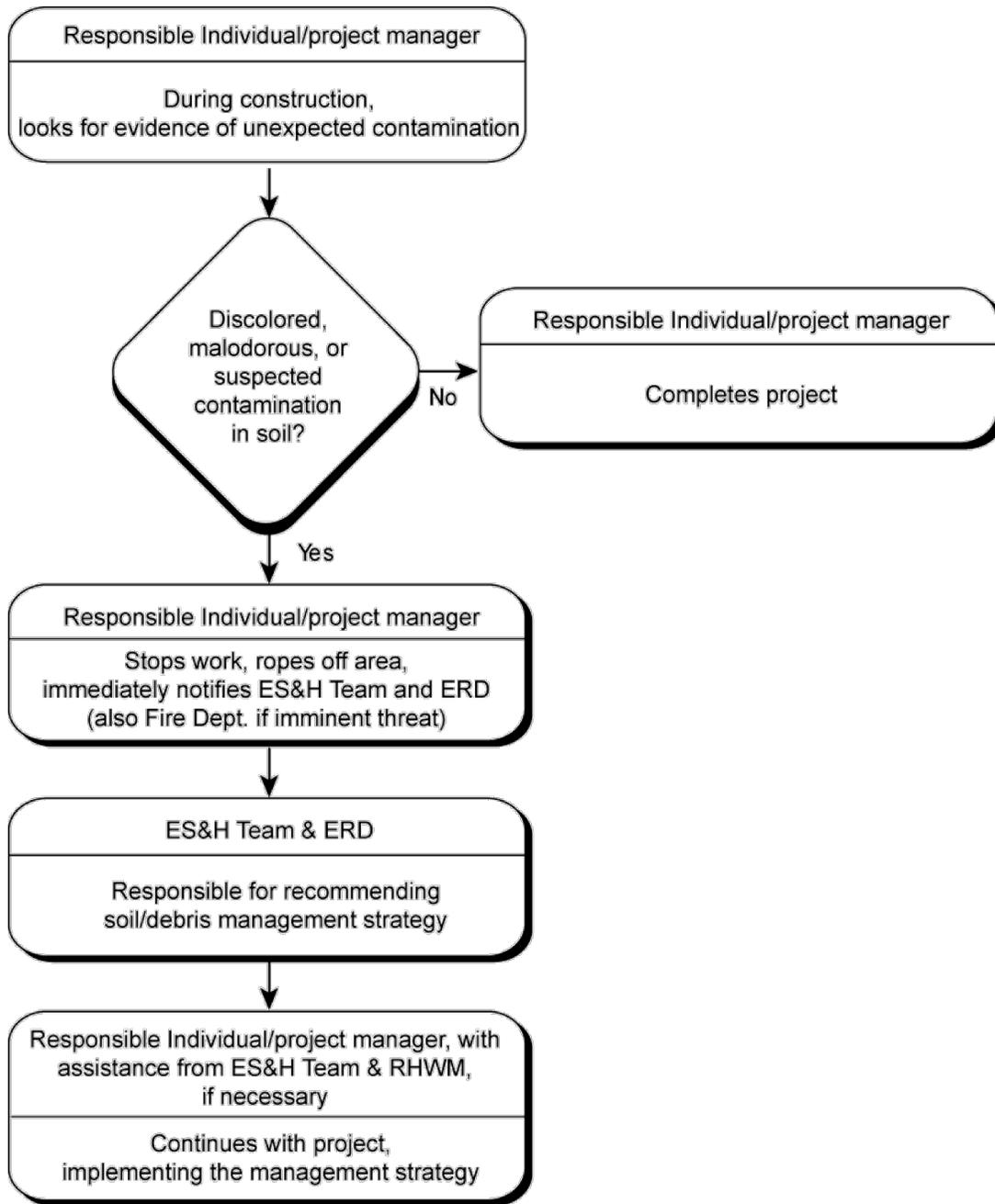


Figure 3. Responsibilities prior to construction or soil and debris disturbing activities





**Figure 4. Procedures upon discovery of contaminated soil and debris during excavation, construction, or demolition projects**



**Table 1. Description of land use (institutional and engineered) controls for the Lawrence Livermore National Laboratory Livermore Site.**

Land use control performance objective and duration	Risk necessitating Land use control	Land use controls and implementation mechanism
Prevent onsite water-supply use/consumption of contaminated ground water until ground water cleanup standards are met.	VOC concentrations in ground water onsite exceed cleanup standards.	<p><b>Governmental Institutional Control: Dig Permit Process</b></p> <p>There are no existing or planned onsite water-supply wells at the Livermore Site. Treated water from onsite wells at the Livermore Site may be used for irrigation and/or industrial uses (e.g. cooling towers). An LLNL Excavation Permit is required to drill and install any new onsite wells at the Livermore Site. The permit process includes an evaluation of the proposed well location by the LLNL Environmental Analyst to determine if the proposed new water-supply well is located in an area of ground water contamination. If it is determined that the proposed water-supply well location is in a ground water contamination area, the Environmental Analyst works with the LLNL entity proposing the well installation and the LLNL Environmental Restoration Department to relocate the well to ensure ground water contaminants would not be drawn into the well before the Excavation Permit is issued.</p>
Prevent offsite water-supply use/consumption of contaminated ground water until ground water cleanup standards are met.	VOC concentrations in ground water offsite exceed cleanup standards.	<p><b>Governmental Institutional Control: City Ordinances (Title 12 and 13)</b></p> <p>The City of Livermore ordinances specify that any excavation activities in public areas require permits. Permit applications must be approved by the city engineer or authorized representative prior to such activities taking place. The City of Livermore also requires that backflow prevention assembly be installed on auxiliary water supplies that are not or may not be of safe bacteriological or chemical quality and that are not approved as an additional source by the city water resources manager.</p> <p><b>Governmental Institutional Control: Well Permitting Process (Zone 7 Water Agency, Alameda County General Ordinance Code, Chapter 6.88)</b></p> <p>Groundwater in the Livermore Valley Groundwater Basin is managed by Zone 7 under authority from California Water Code Section 30000 (County Water District). The Zone 7 Groundwater Protection Ordinance requires that any planned new well, soil boring, or well destruction must be permitted by Zone 7 prior to starting the work.</p>

**Table 1. Description of land use (institutional and engineered) controls for the Lawrence Livermore National Laboratory Livermore Site (continued).**

Land use control performance objective and duration	Risk necessitating Land use control	Land use controls and implementation mechanism
<p>Prevent offsite water-supply use/consumption of contaminated ground water until ground water cleanup standards are met. (continued)</p>	<p>VOC concentrations in ground water offsite exceed cleanup standards. (continued)</p>	<p><b>Governmental Institutional Control: Well Water Contractor's License and Completion Report (California Water Code, sections 13750.5-13755)</b></p> <p>As depth to groundwater is approximately 70 feet below ground surface, a licensed contractor would be required to drill/access the groundwater. All well construction, alteration, destruction, or abandonment must be performed by an individual with a C-57 Water Well Contractor's License. A completion report (Well Completion Report Form - DWR 188) must then be submitted to the DWR. Individuals with a C-57 Water Well Contractor's License must follow California DWR and local standards. Additionally, the completion report documents methods used for sealing off surface or contaminated waters and methods used for preventing contaminated waters of one aquifer from mixing with the waters of another aquifer.</p> <p><b>Monitoring: Livermore Site Ground Water Monitoring Program</b></p> <p>The Livermore Site Environmental Restoration Program monitors over 600 ground water monitoring wells to track ground water cleanup progress. The results of the monitoring are published in the Livermore Site Annual and Quarterly Self-Monitoring Reports.</p> <p><b>Information Tool: Well Prohibition-Exclusion-Consultation Zone Ordinance (Zone 7, Toxic Sites Surveillance Program)</b></p> <p>Zone 7 interfaces with LLNL and state, county, and local agencies to assure the ground water basin is protected, and maintains a Toxic Sites Surveillance (TSS) Program to document and track release sites within the basin that pose potential threat to drinking water.</p> <p><b>Information Tool: LLNL Community Outreach Website and Repositories</b></p> <p>A number of informational devices are implemented at the Livermore Site to prevent water-supply use or consumption of contaminated ground water if a well were to be drilled within the footprint of the VOC plume emanating from the Livermore Site. The Livermore Site Annual and Quarterly Self-Monitoring Reports contain updates on the status of contaminant plumes and remediation progress at the Livermore Site and data collected</p>

		<p>from on- and offsite monitor wells. These reports, in addition to other environmental remediation documents, are available to the public and neighboring property owners through the environmental repositories and are available for viewing at the Livermore Public Library and the LLNL Discovery Center, as well as on the LLNL Public Affairs Office maintained website <a href="https://www-envirinfo.llnl.gov/">https://www-envirinfo.llnl.gov/</a>.</p>
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**Table 1. Description of land use (institutional and engineered) controls for the Lawrence Livermore National Laboratory Livermore Site (continued).**

Land use control performance objective and duration	Risk necessitating Land use control	Land use controls and implementation mechanism
Prevent offsite water-supply use/consumption of contaminated ground water until ground water cleanup standards are met. (continued)	VOC concentrations in ground water offsite exceed cleanup standards. (continued)	<p><b>Information Tool: Near Neighbor Letters and Community Working Group Meetings</b></p> <p>Near Neighbor Disclosure Letters, also found on the community outreach website, discuss the offsite ground water contamination and contact information. In addition, LLNL periodically holds Community Working Group meetings to discuss the status of contaminant plumes and remediation progress with community members.</p> <p><b>Information Tool: Memorandum of Understanding (MOU)</b></p> <p>DOE will establish an MOU between LLNL and the Sandia National Laboratory, California. Under the MOU, Sandia will notify LLNL prior to drilling a water supply well.</p>
Control excavation activities to prevent onsite worker exposure to VOCs in subsurface soil until it can be verified that concentrations do not pose an exposure risk to onsite workers.	Potential exposure to VOCs at depth in subsurface soil.	<p><b>Governmental Institutional Control: Dig Permit Process</b></p> <p>All proposed excavation activities at Livermore Site require an Excavation Permit. In addition, a Site Evaluation Request Form is required for all soil disturbing projects. These processes include an evaluation of the proposed project location by the LLNL Environmental Analyst to determine if the proposed project site is located in an area of contamination. If a potential for contaminant exposure is identified, LLNL Environmental Health &amp; Safety (ES&amp;H) personnel ensures that hazards are adequately evaluated and the necessary controls are identified and implemented prior to the start of work. The ES&amp;H Team, including the LLNL Environmental Analyst, representatives from health and safety disciplines, and the Waste Management Division will also work with the Program proposing the project to determine if the work plans can be modified to move activities outside of areas of contamination.</p>

**Table 1. Description of land use (institutional and engineered) controls for the Lawrence Livermore National Laboratory Livermore Site (continued).**

Land use control performance objective and duration	Risk necessitating Land use control	Land use controls and implementation mechanism
Prohibit transfer of lands with unmitigated contamination that could cause potential harm under residential or unrestricted land use.	Potential exposure to contaminated environmental media.	<p><b><i>Proprietary Controls: Land Use Covenant</i></b></p> <p>The Livermore Site Federal Facilities Agreement contains provisions that assure DOE will not transfer lands with unmitigated contamination that could cause potential harm. In the event that the Livermore Site property is transferred in the future, DOE will comply with the requirements of CERCLA § 120(h), 42 U.S.C. § 9620(h), in effectuating that sale or transfer, including all notice requirements. No change in ownership of the Livermore Site will take effect without provision for continued maintenance of any contaminant system, treatment system, monitoring system, or other response action(s) installed or implemented.</p> <p>Development at Livermore Site is restricted to industrial land usage. These restrictions will remain in place until and unless a risk assessment is performed in accordance with current U.S. EPA risk assessment guidance and is agreed by the DOE, U.S. EPA, DTSC, and RWQCB as adequately showing no unacceptable risk for residential or unrestricted land use.</p>

**Notes:**

**CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act**  
**DOE = United States Department of Energy.**  
**DTSC = California Department of Toxic Substances Control.**  
**DWR = California Department of Water Resources**  
**ES&H = Environmental Health & Safety**

**LLNL = Lawrence Livermore National Laboratory.**  
**MOU = Memorandum of Understanding**  
**RWQCB = California Regional Water Quality Control Board.**  
**U.S. EPA = United States Environmental Protection Agency.**  
**VOCs = Volatile organic compounds.**



**Table 2. Land Use Control Monitoring Checklist for the Livermore Site**

This checklist will be used to conduct monitoring of institutional and engineered controls that are used to prevent exposure to contamination. The checklist will be completed at least annually and the results will be reported in the Annual Monitoring Reports.

Institutional Control	Status <sup>a</sup>	Explanation/Observation of Corrective Action
Verify facility and land use has not changed.		
Verify that the fences and warning signs at the site boundary and control entry are in proper condition. <sup>b</sup>		
Verify that LLNL excavation permit and site evaluation processes are in place and followed.		
Verify that the Zone 7 well permitting process is in place and that communication between LLNL and Zone 7 is still in place.		
Review annual Zone 7 Toxic Site Surveillance report.		
Verify that applicable Alameda County Ordinance 6.88.040 has not changed.		
Verify that the environmental repositories at the Livermore Public Library and the LLNL Discovery Center, as well as the website <a href="https://www-envirinfo.llnl.gov/">https://www-envirinfo.llnl.gov/</a> , are maintained and updated as appropriate.		
Verify that the "Near Neighbor" notifications are in place.		
Verify that monitoring is being performed.		

## Notes:

<sup>a</sup> Satisfactory status indicated by "Yes". Unsatisfactory status indicated by "No". Unsatisfactory status requires explanation. The Inspector shall immediately notify the Environmental Restoration Project Leader of any unsatisfactory status.

<sup>b</sup> Perimeter fences are inspected by LLNL Security annually.

Inspected by:

Date:

\_\_\_\_\_  
(Print Name)\_\_\_\_\_  
(Signature)



## Appendix 1 SITE EVALUATION REQUEST FORM (Soil/Asphalt/Concrete)

DATE: \_\_\_\_\_

TO: \_\_\_\_\_ DIG PERMIT NUMBER: \_\_\_\_\_

FROM: \_\_\_\_\_ PHONE: \_\_\_\_\_ L-CODE: \_\_\_\_\_

PROJECT TITLE & LOCATION: \_\_\_\_\_

PFN: \_\_\_\_\_ DISPOSAL SITE: \_\_\_\_\_

SIGNATURE AUTHORITY FOR PROJECT/TASK NUMBER: \_\_\_\_\_

PROJECT/TASK NO: \_\_\_\_\_ EMPLOYEE NO: \_\_\_\_\_

Please evaluate this project for (circle one or more) soil/asphalt/concrete/sampling/surveying needs. A description of the project is attached including project locations, excavation footprint, and depths of excavations. The material (circle one or both) **will/will not** be reused onsite. The planned excavation start date is \_\_\_\_\_.

The Environmental Functional Area is authorized to use the project/task number above to pay for the costs associated with sampling and analyzing the material to be excavated from the project area. Project/Task charges are not to exceed \$\_\_\_\_\_ based on your cost estimate, without prior approval.

**When sampling/rad surveying is complete, the WAMA Tech will complete the bottom portion of this form and return a copy of the entire form to the originator.**

.....

DATE: \_\_\_\_\_

FROM: \_\_\_\_\_ PHONE: \_\_\_\_\_ -CODE: \_\_\_\_\_

Date rad survey requested: \_\_\_\_\_ Date rad survey completed: \_\_\_\_\_

Number of samples taken: \_\_\_\_\_

Date Samples Submitted for Analyses	Type of Analyses Requested	Lab Performing Analyses	Est. Date Analytical Data Due Back from Lab

Estimated date determination memo provided to Project Manager: \_\_\_\_\_

cc: \_\_\_\_\_



## ATTACHMENT A

# Identification and Screening of Institutional Controls for the Lawrence Livermore National Laboratory Livermore Site

The United States (U.S.) Environmental Protection Agency (EPA) (2012) defines Institutional Controls (ICs) as non-engineered instruments, such as administrative and legal controls, that help to minimize the potential for human exposure to contamination and/or protect the integrity of a response action. ICs are typically designed to work by limiting land or resource use or by providing information that helps modify or guide human behavior at a site. ICs are a subset of land use controls that also include engineering controls and physical barriers. ICs are typically divided into four categories:

1. Proprietary controls.
2. Governmental controls.
3. Enforcement tools.
4. Information devices.

Proprietary controls are generally created pursuant to state law to prohibit activities that may compromise the effectiveness of a remedial action or restrict activities or future resource use that may result in unacceptable risk to human health or the environment. Governmental controls impose restrictions on land use or resource use, using the authority of a government entity. Federal landholding agencies, such as Department of Energy (DOE), possess the authority to enforce ICs on their property. At active federal facilities, such as Lawrence Livermore National Laboratory (LLNL), land use restrictions may be addressed in master plans, facility construction review processes, and digging permit systems. Enforcement tools are legal tools that limit certain site activities or require the performance of specific activities. Information devices provide information or notifications to local communities that residual or contained contamination remains onsite.

This section summarizes the remedial action objectives (RAOs) and Applicable or Relevant and Appropriate Requirements (ARARs) described in the LLNL Livermore Site Record of Decision (ROD) (U.S. DOE, 1992), and the identification and screening of ICs.

### A.1. Remedial Action Objectives

As listed in the LLNL Livermore Site ROD (U.S. DOE, 1992), the cleanup objectives for all contaminants originating at the LLNL Livermore Site are to:

- Prevent future human exposure to contaminated ground water and soil.
- Prevent further migration of contaminants in ground water.
- Reduce contaminant concentrations/activities in ground water to levels below Maximum Contaminant Levels (MCLs).

- Prevent migration in the unsaturated zone of those contaminants that would result in concentrations in ground water above an MCL.
- Meet all discharge standards of existing permits for treated water, and to treat vapor so that there are no measurable atmospheric releases from treatment facilities.

## **A.2. Applicable or Relevant and Appropriate Requirements (ARARs)**

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires that response actions attain ARARs, unless the decision document justifies a waiver. ARARs include environmental regulations, standards, or criteria promulgated under federal or more stringent state laws. ARARs are chemical-specific, location-specific, or action-specific. ARARs for the Livermore Site are identified in the ROD (U.S. DOE, 1992).

## **A.3. Identification and Screening of Institutional Controls**

This section identifies ICs capable of achieving the RAOs and screens the ICs based on applicability, effectiveness, implementability, and cost. Table A-1 presents the ICs that were identified as being applicable to the Livermore Site. The ICs evaluated in the screening process included governmental and proprietary controls, informational and enforcement tools, and monitoring. Table A-1 presents the criteria against which each IC was evaluated. ICs were either retained or not retained based on judgment of their applicability, effectiveness, implementability, and cost (see Table A-1). The ICs that passed the screening were retained and combined to form the offsite IC component of the Livermore Site Remedial Alternatives selected in ROD (Section A.4).

## **A.4. Institutional Controls Component of the Remedial Alternatives**

The following ICs passed the screening process and were retained as components of the LLNL Livermore Site Remedial Alternative:

- Governmental Controls:
  - Alameda County Well Permitting Process
  - Access Control
  - LLNL Dig Permit Process
- Land Record Restrictions:
  - Environmental Restrictive Covenants
  - State Designation of Land as Hazardous Use Property
- Informational Tools:
  - Federal/State/County Site Registries
  - Community Working Group meetings
  - Notification to owners (Near Neighbor Letters)
  - Memorandum of Understanding (Sandia National Laboratory)
  - Worker Safety Briefings and Plans
- Enforcement Tools:

- Existing Federal Facility Agreement
- Monitoring:
  - Groundwater Monitoring

These ICs offer sufficient layering to be protective in the long-term and have been documented in an Explanation of Significant Differences. Table A-2 summarizes the IC layers.

DOE is responsible for implementing, maintaining, reporting on, and enforcing the land use controls on the Livermore Site. Offsite land use controls are implemented, maintained, reported on, and enforced by DOE in conjunction with the Zone 7 Water Agency.

Monitoring, inspection, and reporting of the Livermore Site ICs will be performed throughout the remediation period, and DOE will review facility and land use to evaluate changes in exposure pathway conditions that could affect the risk assessment assumptions and calculations during the Five Year Review process. IC monitoring results conducted during the year will be submitted to the U.S. EPA and State regulatory agencies in the Annual Livermore Site Monitoring Reports and Five-Year Reviews.



**TABLE  
SCREENING OF INSTITUTIONAL CONTROLS AND MONITORING**

**Table A-1. Identification and Screening of Institutional Controls for the Lawrence Livermore National Laboratory Livermore Site**

	DESCRIPTION	APPLICABLE EXPOSURE MEDIA/ CONTAMINANT	EFFECTIVENESS	IMPLEMENTABILITY	COST	SCREENING COMMENTS
<b>GOVERNMENTAL CONTROLS</b>	Controls using the regulatory authority of a governmental entity to impose restrictions on citizens or sites under its jurisdiction. Generally, the Department of Energy (DOE) must turn to state or local governments to establish and enforce controls of this type. Governmental controls include zoning restrictions, ordinances, statutes, building permits or other provisions to restrict land use.					
Alameda County Well Permitting Process	Alameda County Ordinance 6.88.040 prohibits the drilling or alteration of a well in the unincorporated areas in Alameda County, as well as the City of Livermore, without a permit from the Zone 7 Water Agency. Zone 7's mission statement requires it preserve and enhance the environment while complying with regulations. These regulations include California Department of Water Resource's (DWR) California Well Standards (Bulletins 74-81 and 74-90). Those standards require all water wells be located an adequate horizontal distance from known or potential sources of pollution and contamination. All well drillers are required to be licensed and file a report of completion (California Water Code 13750.5-13751) with the state. Alameda ordinance requires filing with Zone 7 as well.	Groundwater/ VOC	Excellent. Drilling a well in Alameda County without a permit is a criminal offense under ordinance section 6.88.070. Alameda County ordinance has been adopted by the City of Livermore, so it applies to all adjoining property owners who could conceivably impact or be impacted by LLNL's groundwater contamination. Zone 7 has excellent awareness of LLNL's contamination issues in relation to other landowners, as reflected in its Toxic Site Surveillance (TSS) Program (latest annual report online at <a href="http://www.zone7water.com/images/pdf_docs/water_quality/2012_tss_report.pdf">http://www.zone7water.com/images/pdf_docs/water_quality/2012_tss_report.pdf</a> )	Excellent. LLNL intends to review the ordinance annually, to ensure it continues to provide protection as it has for over 30 years. LLNL will also request Zone 7 to share any information they accrue regarding well drilling with the area tied to LLNL groundwater, and review TSS reports as they are released.	Low. Process exists and is funded already.	Retained.
LLNL Dig Permit Process	LLNL procedures require a soil excavation permit prior to any onsite well drilling or soil excavation work.	Groundwater/VOC Soil/VOC	Good to excellent. As part of the permitting process, the affected jobsite is evaluated by the LLNL Environment, Safety and Health (ES&H) Team Environmental Analyst (EA) for ground water or soil contamination. If a potential for contaminant exposure is identified, the LLNL ES&H Team EA identifies the necessary controls through conditions to the soil excavation permit. Any permit conditions established by the LLNL ES&H Team EA are then communicated to the Responsible Individual/project manager.	Excellent as the Dig Permit Process is already in place at the LLNL Livermore Site.	Low. There are no costs to establish this existing program. The costs to maintain the program are part of the LLNL operations.	Retained.
Access Control	The Livermore Site is enclosed within a security fence, posted with signs noting the restricted access, and manned by a full-time security force to prevent unauthorized intrusion. Building occupancy and land use is further controlled by the Livermore Site Management as consistent with the current environmental impact statement/report (EIS/EIR).	Groundwater/VOC Soil/VOC	Good to excellent. Access to the Livermore Site is restricted, limiting potential access to onsite contamination. Building occupancy and land use is further controlled by the Livermore Site Management. Due diligence is given to environmental concerns, including environmental restoration and groundwater remediation, during planning.	Excellent as access controls are already in place.	Low. There are no costs to establish these controls. The costs to maintain the controls are part of the LLNL operations.	Retained.
<b>LAND RECORD RESTRICTIONS</b>	Controls imposed on future use of individual parcels of land.					
Environmental Restrictive Covenants (ERCs)	DOE has the responsibility under the LLNL Federal Facility Agreement and CERCLA §120(h), 42 U.S.C. §9620(h) to impose the conditions on transfer of its real property that are necessary to complete its remediation work and ensure safe future use of the land. ERCs may preclude installation of wells, except by LLNL for ground water monitoring or remediation. If properly prepared and recorded, such ERCs "run with the land." ERCs are inserted directly into the DOE quitclaim deed and made binding upon the property recipient through their acceptance of the property by deed. ERCs and associated provisions in a federal deed must be enforced by the federal government in federal court.	Groundwater/ VOC	Moderate to good and potentially provides adequate protection from exposure to groundwater plumes over both the long and short-terms. ERCs "run with the land." ERCs to protect LLNL's cleanup would also be appropriate in the case DOE ever disposed of SNL-CA	Good. ERCs are easily and routinely imposed by insertion into federal quitclaim deeds that must be prepared anyway in order to transfer the property. Ensuring proper compliance with ERCs can be difficult once the DOE ceases to have a presence at a former lab. Control can only be imposed over property transferred by DOE; no utility for adjoining property owners.	Low. Imposition of ERCs by inserting them in quitclaim deeds generates almost no incremental costs. Long-term implementation would entail some costs. If violations are discovered, enforcement could be costly.	Retained. (applicability limited to DOE property)
State Designation of Land as Hazardous Use Property	Under California law (Health and Safety Code Sections 25222 and 25222.1) California can, with DOE's concurrence or through administrative process, designate land as hazardous waste property or border zone property. Local governments are then legally required to include all resultant land use restrictions in their property files. Violation of such restrictions are subject to civil action.	Groundwater/ VOC Soil/VOC	Moderate to good and potentially provides adequate protection from exposure to residual contamination. Allows state to create or remove restrictive covenants as it sees fit to accommodate changing circumstances, both on former DOE land and adjoining land. State can ease or eliminate covenants upon showing they have completed their purpose.	Good. DOE's existing obligations under CERCLA and the FFA mean there would be no reason for it to fail to give appropriate concurrences as to its land. In the remote circumstance that adjoining lands are impacted, California can take appropriate action regarding those lands as well.	Administrative costs for DOE land would be minimal. Cost to California for action to restrict adjoining landowners could be substantial.	Retained.
Negotiated Restrictive Covenant (RCs) or "Negative Easements" with adjoining property owners	Through negotiations with adjoining property owners, DOE would secure their legally binding agreement to accept certain land use restrictions or to refrain from specified activities, where such uses or activities are anticipated to adversely affect protectiveness, hinder cleanup, or open exposure pathways. The RCs in such agreements may preclude installation of wells, except by LLNL for ground water monitoring or remediation. If properly prepared and recorded, such RCs "run with the land."	Groundwater/ VOC	Moderate to good and potentially provides adequate protection from exposure to groundwater plumes over both the long and short-terms. Refusal of some landowners to agree to terms for restrictions could diminish the value restrictive covenants for nearby parcels.	Prohibitive as to adjoining private land owners because DOE would have to reach agreement with the owners of approximately 2000 parcels. Cost and transactional burden of establishing value and securing consent would be huge.	Impossible to forecast, but certainly high.	Not Retained



**TABLE  
SCREENING OF INSTITUTIONAL CONTROLS AND MONITORING**

<b>INFORMATIONAL TOOLS</b>						
<b>Federal/State/County Site Registries (DOE)</b>	Several federal and State data bases exist that contain environmental condition information about parcels of land. Typically, the information is provided to populate the data base through existing requirements and mechanisms. The public can generally access such data bases. The following links are examples of online registry databases that provide cleanup information, including groundwater, based on location entered into the search engine: EPA's CERCLIS: <a href="http://www.epa.gov/enviro/facts/cerclis/search.html">http://www.epa.gov/enviro/facts/cerclis/search.html</a> DTSC's Envirostor: <a href="http://www.envirostor.dtsc.ca.gov/public/">http://www.envirostor.dtsc.ca.gov/public/</a> RWQCB's GeoTracker: <a href="http://geotracker.waterboards.ca.gov/">http://geotracker.waterboards.ca.gov/</a> LLNL's Administrative Record: <a href="https://www-envirinfo.llnl.gov/">https://www-envirinfo.llnl.gov/</a>	Groundwater/ VOC	Good to excellent. The DOE and other regulatory agencies provide information to populate the data base(s) in a variety of formats that would allow any individual to identify potential groundwater plume issues for the impacted parcels.	Good. Owner notification only; no agreement or consent. LLNL's environmental document repositories are available for viewing at the Livermore Public Library and the LLNL Discovery Center.	Low. No cost to the landowner and minimal cost to list and populate the data base. No long term monitoring costs. The existing databases already established support the low cost to implement this control mechanism.	Retained.
<b>Community Working Group (DOE)</b>	Community Working Group (CWG) meetings are held with the general public periodically to discuss current and proposed remediation/cleanup efforts of historic groundwater contamination at the lab.	Groundwater/ VOC	Good but limited. CWG meetings provide two-way communication between DOE and the community. The focus of discussions are on the environmental restoration work and related concerns as identified by the community. However, a limited number of property owners choose to get involved with the process.	Good to excellent. CWG meetings are included in the Community Relations Plan for LLNL Site and are held every 12-18 months. Press releases are sent to the local newspapers (The Independent and Valley Times) and are posted on the LLNL website. Invite letters are also mailed to a core group of stakeholders.	Low. No cost to the landowner and minimal cost to announce and hold the meetings.	Retained.
<b>Notification to owners (DOE)</b>	DOE provides notice of groundwater contamination using form letters known as "Near Neighbor Disclosure Letters." These letters are available on the LLNL website ( <a href="https://www-envirinfo.llnl.gov/neighbor.php">https://www-envirinfo.llnl.gov/neighbor.php</a> ) and physical copies are provided upon request. Periodic letters (biannual, for example) to property owners and Alameda County real estate brokers can highlight these resources and bring property owners up to date.	Groundwater/ VOC	Good to excellent because it provides information on both the groundwater contamination and DOE's cleanup with regulatory oversight, as well as provides contact information. Redundancy is provided by California real estate disclosure requirements/laws.	Good to excellent. Near Neighbor Disclosure Letters are already in place and have proven effective over time. Notifications satisfy aspects of the Community Relations Plan for LLNL Site that is dedicated to keeping the public informed on all issues regarding the environmental restoration work.	Moderate to low cost for sending over 2000 notices out every other year.	Retained.
<b>Worker Safety Briefings and Plans</b>	All personnel working at the Livermore Site are required to take a safety briefing, which covers access requirements and areas of contamination and possible hazards. Operational Safety Plans, which include checks for hazardous materials and sensitive species, are required for all construction projects and trenching and shoring work. Prior to conducting work activities requiring an Operational Safety Plan, pre-job briefings are conducted to ensure that work, hazards, and controls are adequately understood by workers and first line supervisors.	Groundwater/ VOC Soil/ VOC	Good to excellent because it provides information on both the hazards as well as appropriate work controls to mitigate those hazards.	Good to excellent. General worker safety briefings and plans are already in place. Job specific briefings and plans are required under LLNL procedures.	Low. There are no costs to establish these existing briefings and plans. The costs to develop project specific ones are part of the LLNL operations.	Retained.
<b>Memorandum of Understanding (MOU) (DOE)</b>	DOE will establish an MOU between LLNL and the Sandia National Laboratory, California. Under the MOU, Sandia will notify LLNL prior to drilling a water supply well.	Groundwater/ VOC	Good to excellent. Under an MOU, Sandia would notify LLNL prior to drilling a water supply well. LLNL would evaluate the proposed well location to determine if the proposed new water supply well is located in an area of ground water contamination. If it is determined that the proposed water supply well location is in a ground water contamination area, LLNL would work with Sandia to relocate the well to ensure ground water contaminants would not be drawn into the well.	Good to excellent. Both LLNL and Sandia are DOE-owned laboratories and have other MOUs in place establishing a precedence for a new MOU between the two laboratories	Low. Little to no cost for the DOE to establish the MOU and for LLNL to review well locations.	Retained.
<b>ENFORCEMENT TOOLS</b>						
<b>Existing Federal Facility Agreement (FFA)</b>	The existing FFA spells out DOE's obligations in detail and provides comprehensive enforcement mechanisms.	Groundwater/VOC	Excellent. Agreement remains in place and enforceable until LLNL cleanup is complete. Transfer of the land does not relieve DOE of its responsibilities.	Excellent. Agreement is in place and working.	No additional costs.	Retained.
<b>MONITORING</b>						
<b>Groundwater Monitoring (DOE)</b>	DOE maintains a Long-term Monitoring Program for its optimized network of monitoring wells as an integral aspect of the remedy. Groundwater data is periodically collected and evaluated to ensure the continued protectiveness of the remedy.	Groundwater/ VOC	Good. A network of both on- and off-site monitoring wells is already in place to detect potential changes in water quality from LLNL. Data collected is used to confirm site conditions and update modeling. Able to detect any adverse changing conditions, which would include any physical destruction/damage to DOE infrastructure and/or improper private conduct that adversely impacts or uses the groundwater. Annual and quarterly groundwater monitoring reports are incorporated in the required 5 year reviews.	Good; however, access to privately owned parcels may have to be maintained.	Moderate, especially for the lengths of time involved. Cost to DOE to acquire easements for installation of infrastructure & access.	Retained.

Notes:

- CEQA = California Environmental Quality Act
- CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
- CWG = Community Working Group
- DOE = Department of Energy
- DTSC = Department of Toxic Substances Control
- DWR = Department of Water Resource
- EA = Environmental Analyst
- EPA = Environmental Protection Agency
- ERC = Environmental Restrictive Covenants
- ES&H = Environment, Safety and Health
- LLNL = Lawrence Livermore National Laboratory
- RC = Restrictive Covenant
- RWQCB = Regional Water Quality Control Board
- SLUC = State Land Use Covenant
- VOC = Volatile organic compounds



Table A-2. Institutional Controls (ICs) Component of the Remedial Alternative.

Layer #1a – Well Permitting Process (Zone 7 Water Agency, Alameda County)
<ul style="list-style-type: none"> <li>• Any planned new well construction, soil-boring construction, or well destruction must be permitted by Zone 7.               <ul style="list-style-type: none"> <li>- Zone 7 would not approve a water-supply well within the impacted area.</li> <li>- Zone 7 maintains a Toxic Sites Surveillance (TSS) Program to track potential threats to drinking water.</li> <li>- All well drillers are required to be licensed and file a report of completion with the state and Zone 7.</li> </ul> </li> </ul>
Layer #1b – LLNL Dig Permit Process
<ul style="list-style-type: none"> <li>• LLNL procedures require dig permits for well drilling and excavation activities.               <ul style="list-style-type: none"> <li>- The area must be evaluated by the LLNL Environment, Safety and Health (ES&amp;H) Team Environmental Analyst (EA) for contamination.</li> </ul> </li> </ul>
Layer #2 – Ground Water Monitoring
<ul style="list-style-type: none"> <li>• The Livermore Site Environmental Restoration Program monitors over 600 ground water monitoring wells to track ground water cleanup progress.               <ul style="list-style-type: none"> <li>- The Livermore Site Annual and Quarterly Self-Monitoring Reports contain updates on the status of contaminant plumes and remediation progress at the Livermore Site and data collected from on- and offsite monitor wells.</li> </ul> </li> </ul>
Layer #3 – Land Record Restrictions
<ul style="list-style-type: none"> <li>• Environmental Restrictive Covenant provides land use restrictions.               <ul style="list-style-type: none"> <li>- Livermore Site is restricted to industrial land usage.</li> <li>- DOE will comply with the requirements of CERCLA § 120(h), 42 U.S.C. § 9620(h), in effectuating sale or transfer to impose the conditions on transfer of its real property that are necessary to complete its remediation work and ensure safe future use of the land.</li> <li>- No change in ownership of the Livermore Site will take effect without provision for continued maintenance of any contaminant system, treatment system, monitoring system, or other response action(s) installed or implemented.</li> </ul> </li> <li>• State Designation of Land as Hazardous Use Property provides land use restrictions.               <ul style="list-style-type: none"> <li>- Allows state to create or remove restrictive covenants as it sees fit to accommodate changing circumstances, both on former DOE land and adjoining land. State can ease or eliminate covenants upon showing they have completed their purpose.</li> <li>- Local governments are legally required to include all resultant land use restrictions in their property files.</li> </ul> </li> </ul>
Layer #4 – Informational Tools
<ul style="list-style-type: none"> <li>• Federal/State/County Site Registries available to the public and containing environmental condition information about parcels of land.               <ul style="list-style-type: none"> <li>- LLNL environmental remediation documents are available to the public through the environmental repositories.</li> <li>- Multiple online registries provide cleanup information, including groundwater, based on the location entered into the search engine.</li> </ul> </li> </ul>

Table A-2. Institutional Controls (ICs) Component of the Remedial Alternative (continued).

Layer #4 – Informational Tools (continued)
<ul style="list-style-type: none"> <li>• Notification to Owners and Community Working Group Meetings (CWG) <ul style="list-style-type: none"> <li>- DOE periodically holds CWG meetings to discuss the status of contaminant plumes and remediation progress with community members.</li> <li>- Near Neighbor Disclosure Letters discuss the offsite ground water contamination and contact information.</li> </ul> </li> <li>• Memorandum of Understanding with Sandia National Laboratory <ul style="list-style-type: none"> <li>- Under the MOU, Sandia will notify LLNL prior to drilling a water supply well.</li> </ul> </li> </ul>
Layer #5 – Existing Federal Facility Agreement (FFA)
<ul style="list-style-type: none"> <li>• Existing FFA spells out DOE's obligations in detail and provides comprehensive enforcement mechanisms <ul style="list-style-type: none"> <li>- Agreement remains in place and enforceable until LLNL cleanup is complete.</li> <li>- Transfer of the land does not relieve DOE of its responsibilities.</li> </ul> </li> </ul>

Note: Due to the potential for the consumption of offsite ground water contaminated with volatile organic compounds above the Maximum Contaminant Levels, the Department of Energy proposes several layered measures (ICs) to preclude the completion of a pathway by preventing the installation of a water-supply well.





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