CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ORDER No. R2-2005-0022

RESCISSION of:
ORDER No. 85-88, WASTE DISCHARGE REQUIREMENTS
and
ADOPTION of:
SITE CLEANUP REQUIREMENTS for:

STANFORD UNIVERSITY and the
UNITED STATES DEPARTMENT OF ENERGY

for the property located at the:
STANFORD LINEAR ACCELERATOR CENTER
2575 SAND HILL ROAD
MENLO PARK, SAN MATEO COUNTY

FINDINGS:
The California Regional Water Quality Control Board, San Francisco Bay Region (Water Board) finds that:

1. Purpose of Order

This Order establishes Site Cleanup Requirements for the investigation and remediation of impacted soil and groundwater resulting from historical spills and leaks that have occurred during the course of operations of the Stanford Linear Accelerator Center (SLAC). This Order addresses numerous release sites at SLAC and consolidates the investigation and cleanup activities at the facility. Additionally this Order rescinds an earlier Board Order, Order No. 85-88, which only addressed contamination at the Former Solvent Underground Storage Tank site which is now incorporated into this Order.

2. Site Location and Ownership

SLAC is a 426-acre high-energy physics and synchrotron research facility located approximately two miles west of the main Stanford University campus adjacent to Menlo Park in an unincorporated portion of San Mateo County, California (Figure 1). The unusually shaped property boundary of the SLAC facility is due to the two-mile long, narrow, linear accelerator (LINAC) running east-west under Highway 280 and the larger rectangular target/research area at the eastern end of the LINAC (Figure 2).

SLAC is sited on property owned by Stanford University and leased to the U.S. Department of Energy (DOE). The most recent lease agreement was signed in 1962 between the Atomic Energy Commission, DOE's predecessor, and Stanford University for a period of 50 years, thus expiring in 2012. SLAC is operated by

Stanford University under a contract with DOE.

Land use at the facility is a combination of industrial, educational, and short-term residential. The facility is sited within an area consisting of properties that are residentially zoned by the County of San Mateo. SLAC is part of the original land grant that established Stanford University and the land cannot be sold; it must be held in perpetuity by the trustees of the University to support Stanford's educational mission.

The facility is located within the San Francisquito Creek watershed, which drains easterly into San Francisco Bay and is adjacent to the Santa Clara Valley Groundwater Basin (Figure 1).

3. Adjacent Land Use

As shown in Figure 2, SLAC is bordered to the north by Sand Hill Road, with the industrial and residential development of Sharon Heights across the road. SLAC is also bordered by residential development (Stanford Hills) and agricultural/equestrian facilities (Harry Cohn Ranch) to the east, agricultural (Webb Ranch, Harry Cohn) and equestrian facilities (Portola Valley Training Center) to the south, and by undeveloped areas, particularly the Jasper Ridge Biological Preserve, which is owned, monitored and protected by Stanford University to the west.

4. Site History

SLAC was constructed in 1963 and has been continuously operated by Stanford University for DOE. Source areas which contributed to pollutant releases include storage areas and areas where hazardous materials including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and radionuclides were used. The VOCs at SLAC were used as cleaning agents and the PCBs were used in electrical transformers. PCBs are no longer used at SLAC in transformers at concentrations above 500 parts per million (ppm). All transformers with PCB concentrations above 500 ppm have been drained, flushed, and refilled with non-PCB containing oil; however, some residual PCBs remain in the transformers. Generation of radionuclides is the result of operating the linear accelerator for high-energy research.

As part of SLAC's overall Environmental Restoration Program, SLAC has conducted numerous site investigations that included extensive soil and groundwater sampling and the installation of over 100 groundwater monitoring wells. Results of these investigations indicate that the constituents of concern for soil are VOCs, SVOCs, petroleum hydrocarbons, PCBs, and lead. The constituents of concern for groundwater are VOCs, SVOCs, petroleum hydrocarbons, and tritium.

Site cleanup activities to date involved several removal actions for VOCs and SVOCs in soil near groundwater plumes, extraction of the polluted groundwater within the plumes, and over ten soil removal actions for PCBs. Currently, evaluation of remedial alternatives addressing soil and groundwater

contamination at several impacted areas has been completed. This information may be utilized in meeting tasks required in this Order.

5. Named Dischargers

Stanford University
Stanford University is named as a discharger because it owns and ultimately controls the property upon which SLAC is located. As property owner, Stanford has the ability to control the long-term uses for which the property is utilized. During the operation of SLAC, activities occurred that resulted in discharges affecting soil and water quality.

The United States Department of Energy (DOE)
The DOE is named as a discharger because it is the owner/operator of SLAC's infrastructure, and because pollutant discharges occurred during the time of its ownership and operation of the facility. Further, it has control of the current use of its facility, operations of which could cause discharges now or in the future.

The results of investigations have confirmed the presence of releases of chemicals that have been used or are used by Stanford University and the DOE for operation of the facility into the soil and groundwater in several areas of the facility.

6. Regulatory Status
Since 1985, the Water Board has been actively overseeing investigation and cleanup of multiple sites at SLAC, funded through an oversight grant with DOE.

Water Board Order No. 85-88 is the only existing cleanup Order for SLAC; it specifically focused on the investigation and remediation of the Former Solvent Underground Storage Tank (FSUST) site. This new site-wide Order includes the FSUST site within it and rescinds Order No. 85-88.

Other Relevant Permits

Stormwater
General Industrial Activities Storm Water Permit Water Quality, State Water Resource Control Board, Order No. 97-03-DWQ, NPDES No. CAS000001: Storm water run-off and authorized discharges including unimpacted groundwater from LINAC and PEP tunnel subdrains. This groundwater does not come into contact with industrial processes.

Sanitary Sewer/Wastewater
Mandatory Wastewater Discharge Permit No. WB 020401-F South Bayside Systems Authority (SBSA)
This permit covers wastewater generated from non-categorical operations, sanitation, and treated wastewater from metal finishing operations. Groundwater from monitoring well purging is permitted for sanitary sewer discharge under this permit if total VOCs are below 2 ppm. Unimpacted groundwater that infiltrates tunnels within the experimental rings or below grade vaults is also discharged

under this permit.

Mandatory Wastewater Discharge Permit No. WB 020401-P (SBSA)
This permit covers treated wastewater from metal finishing operations.

Discretionary Groundwater Discharge Permit No. GW WB 082201 (SBSA):
This permit covers discharge of treated groundwater water from the Former Solvent Underground Storage Tank (FSUST) site.

Discretionary Groundwater Discharge Permit No. GW WB 041015 (SBSA):
This permit covers discharge of extracted groundwater from the interim dual phase extraction system at the Former Hazardous Waste Storage Area (FHWSA). Chemical concentrations in the extracted groundwater from the two-well system are low and acceptable for direct discharge to the sanitary sewer system without treatment.

Air
SLAC has two distinct facility-wide permits for the air quality program:

Under Title V of the Clean Air Act, SLAC has a Synthetic Minor Operating Permit (SMOP), which has been in place since 2002 and is updated annually. It stipulates conditions for how SLAC operates.

SLAC also has a Permit-To-Operate (PTO) from the Bay Area Air Quality Management District (BAAQMD). This permit has been in place for years and is also renewed annually. It itemizes emissions from each permitted source to establish annual fees for permittees.

New sources are issued individual permits for the first year of operation (including the interim DPE system at the FHWSA) and are then incorporated in the facility-wide permit to consolidate the information and facilitate the renewal process.

In addition, the required deliverables associated with air quality involve several different programs (deliverables are submitted to BAAQMD unless otherwise noted):
Title V SMOP Annual Emissions Report (as noted above) PTO Annual Update (as noted above);
Annual Adhesives Usage Report Annual Air Toxics Report (per AB2588);
Annual Source Test Report for the Gasoline Dispensing Facility (GDF);
National Emissions Standards for Hazardous Air Pollutants (NESHAPs) - one annual performance report and two semiannual exceedance reports sent to USEPA;
Toxics Release Inventory (TRI) Form Rs (annual) to USEPA EO13148; and
Annual Report on Greening the Government to USEPA Hazardous Materials Business Plan (annual).

Finally, SLAC is currently preparing a submittal under the California Accidental

Release Prevention (CalARP) program, administered by San Mateo County. This will likely require SLAC to prepare a Risk Management Plan for any subject chemicals.

Hazardous Waste

SLAC's hazardous waste is managed by the Hazardous Waste Management Group of the Environmental Protection Department. SLAC is not permitted to store hazardous waste for longer than 90 days, as SLAC is not a permitted Treatment, Storage, and Disposal Facility (TSDF). The central storage area for hazardous waste is located at SLAC's Hazardous Waste Storage Area (HWSA). The San Mateo County Department of Health Services is the agency responsible for inspecting SLAC as a generator of hazardous waste for compliance with federal, state, and local hazardous waste laws and regulations.

Hazardous Waste Treatment Units

SLAC currently has three hazardous waste treatment units that are operated under the State of California Tiered Permit Program using Permit-by-Rule (PBR) and Conditional Authorization permit tiers. The San Mateo County Department of Health Services is the agency responsible for inspecting these units for compliance with federal, state, and local hazardous waste laws and regulations. The units are:

Unit 1A B38 Metal Finishing Pretreatment Facility (formerly called the Rinse Water Treatment Plant) and the Unit 2 Sludge Dryer. Both operate under PBR.

Unit 4 FSUST Groundwater Treatment System. Operated under Conditional Authorization.

7. Regional Topography

SLAC is located in the foothills of the Santa Cruz Mountains, located above an alluvial plain that borders the western margin of San Francisco Bay. The foothills of the Santa Cruz Mountains are a series of rolling hills that attain a maximum elevation of approximately 375 feet above mean sea level (MSL) at SLAC. The local topographic high area is located adjacent to the SLAC's southwestern boundary at 600-foot high Jasper Ridge.

8. Regional Watershed

SLAC is located within the San Francisquito Creek Watershed. The watershed encompasses an area of approximately 40 square miles and extends from the ridge of the Santa Cruz Mountains to San Francisco Bay. Creeks that are part of the watershed include San Francisquito Creek, Bear Creek, Martin Creek, Corte Madera Creek, and Los Trancos Creek. The watershed traverses five municipalities (Palo Alto, East Palo Alto, Menlo Park, Portola Valley, and Woodside), and portions of both Santa Clara and San Mateo counties. The watershed overlies the northern boundary of the Santa Clara Valley groundwater basin and the southern boundary of the San Mateo Plain groundwater basin.

9. Surface Water

San Francisquito Creek is a perennial stream that flows eastward near the southern border of SLAC, and joins with Los Trancos Creek before turning northeast and eventually discharging into San Francisco Bay. The headwaters for San Francisquito Creek are found along the foothills of the Santa Cruz Mountains where several small streams coalesce. The primary source of stream flow is runoff from precipitation in the Santa Cruz Mountains.

Stream flow data has been measured since 1930 by the U.S. Geological Survey (USGS) at a gauging station on San Francisquito Creek a short distance downstream from SLAC. The mean monthly stream flow rate varies from 52,447,000 gallons per day (gpd) in the winter to 174,500 gpd in the summer.

10. Groundwater

Groundwater at the eastern end of SLAC occurs predominantly within the Ladera Sandstone, the thick sequence of marine siltstones that dominates SLAC's geology.

Groundwater well yields and natural water quality have been evaluated to determine potential beneficial uses of groundwater at SLAC. However, the results of the assessment indicate that groundwater in certain areas of the facility would still not be suitable as a drinking water source, as defined by the State Water Resources Control Board Resolution 88-63, based on well production rates lower than 200 gpd, and/or TDS concentrations above 3,000 ppm.

Over 100 monitoring wells have been installed on the eastern half of SLAC since the early 1960s. Groundwater depth and direction varies from area to area within SLAC. For example, depth to groundwater at the Former Hazardous Waste Storage Area (FHWSA) ranges from 11 to 24 feet below ground surface (bgs) with an easterly and southeasterly gradient. At the Plating Shop Area (PSA), depth to groundwater ranges from 3 to 30 feet bgs with a southeasterly gradient, while depth to groundwater at the Test Lab/ Central Lab (TL/CL) varies from 13 to 33 feet bgs with a southeasterly gradient.

Based on the topography of SLAC prior to development, the regional groundwater flow pattern is estimated to be generally to the south and southeast toward San Francisquito Creek, with a topographic groundwater divide along Sand Hill Road. Although this general trend continues to this day, groundwater gradients and elevations across the SLAC site have been modified locally by earthwork associated with grading and construction of the SLAC facility including the LINAC subdrainage system.

Groundwater flow has been strongly affected by the subdrainage system constructed at the base of the Linear Accelerator tunnel 35-40 feet bgs. Groundwater that infiltrates into the subdrainage system discharges into the storm drainage system at an estimated discharge rate of 2 gallons per minute (gpm).

In the area immediately north of the LINAC, the groundwater flow direction

changes from the regional southeast flow direction to south, toward the LINAC. Similarly, in the area south of the LINAC, the southeasterly groundwater flow is deflected to the north, toward the LINAC.
With respect to significant groundwater basins, SLAC is adjacent to the northern boundary of the Santa Clara Valley groundwater basin and straddles the western boundary of the San Mateo Plain groundwater basin. The facility is sited on the bedrock above these two alluvial groundwater basins.

Groundwater is not currently used on-site at SLAC; however, five offsite groundwater wells have been identified within a one-mile radius of SLAC, three of which are currently in use. The closest downgradient groundwater well is located approximately 500 feet south of SLAC along the stream margin of San Francisquito Creek. This well was formerly used for agricultural supply but is currently capped. The four other wells are all upgradient of the facility. Of these four upgradient wells, one is capped, one is used for watering livestock, and the other two are used for drinking water supply.

11. Stormwater

Stormwater runoff from the LINAC and other parts of SLAC and groundwater are intercepted at the subdrainage system and discharge into various engineered streams or channels. In one stream, referred to as IR-8, water flows year round due to groundwater discharge from the LINAC subdrainage system. In other channels, flow only occurs during the rainy season. In any event, when stormwater runoff occurs in much of the eastern portion of SLAC, it converges with the aforementioned IR-8 and drains into San Francisquito Creek. Discharge of this water into the creek is done under a general waste discharge permit issued by the State Water Board, (General Industrial Activities Storm Water Permit Water Quality, State Water Resource Control Board, Order No. 97-03-DWQ, NPDES No. CAS000001) which requires visual inspection and surface water sampling at the point of discharge.

12. Ecological Concerns

Special status ecological species identified in the area surrounding SLAC include the California red-legged frog, often found in fresh water ponds and slow flowing sections of the San Francisquito Creek; steelhead trout, found in San Francisquito Creek; the Western Pond Turtle, found in calm water throughout the San Francisquito Creek system; and the San Francisco garter snake, found near calm waters throughout the area.

13. Remedial Investigations Performed to Date

SLAC's past operations have released pollutants into soils and groundwater at four main areas at the facility (Figure 3). These areas are: 1) the Former Hazardous Waste Storage Area (FHWSA), 2) the Plating Shop Area (PSA), 3) the Test Laboratory/Central Laboratory Area (TL/CL), and 4) the Former Solvent Underground Storage Tank Area (FSUST). The primary pollutants of concern in these areas are VOCs, and SVOCs. As a result of these releases, four groundwater pollutant plumes have been created. Past operations have also released PCBs into soil at various locations throughout the facility and have been detected in

sediment within the stormwater drainage channels. The nature and extent contamination associated with each of the four areas and the PCBs are summarized below:

a. Former Hazardous Waste Storage Area (FHWSA)

The FHWSA at SLAC is located on approximately four acres immediately south of the linear accelerator (Figure 3). The FHWSA currently includes two buildings: Building 15 and Building 647. From the late 1960s to the early 1980s, the FHWSA was used as a storage site for materials including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and petroleum products.

Analytical results of soil and groundwater confirmed historical releases of VOCs and SVOCs, namely, 1,4-dioxane at the FHWSA. There appears to be two primary areas of release of 1,1,1- trichloroethane (1,1,1-TCA) and tetrachloroethene (PCE). The detection of 1,4-dioxane is believed to be associated with its use as a stabilizer for 1,1,1-TCA.

The presence of the LINAC subdrainage system north of the FHWSA affects groundwater flow. Based on the groundwater flow effects and the results of fate and transport modeling, it is not believed that the VOCs and 1,4-dioxane present in groundwater at the FHWSA are likely to impact downgradient off-site groundwater or surface water at detectable concentrations.

b. Plating Shop Area (PSA)

The PSA is a four-acre facility located in the central part of the SLAC campus and is upgradient of the LINAC. Volatile organic compounds (VOCs) are present in soil and groundwater in parts of the Plating Shop Area. The main VOCs present, in order of decreasing concentrations are TCE, 1,2-DCE, 1,1-DCE, freon 113, 1,4-dioxane, and 1,1-DCA. The maximum measured concentration of total VOCs in groundwater was detected at 24,100 µg/L. Detections of total VOC impacted soil at the site ranged from 0.2 mg/kg to 1.4 mg/kg and appear to be limited to two small areas, one of which was excavated and removed in 1998.

No VOC contamination has been detected to date at the downgradient LINAC. At an estimated VOC migration rate of 2 to 5 feet per year, it would take approximately 50 to 125 years for VOC contaminants in the PSA monitoring wells to reach the LINAC and another 500 years to reach the San Francisquito Creek.

Tritium has been detected in one groundwater monitoring well (MW-81) near the PSA at an activity of 1,976 picoCuries per liter (pCi/L), about one order of magnitude lower than the maximum contaminant level for drinking water of 20,000 piCi/L. Tritium has not been detected in groundwater samples collected from any other well at the PSA and is believed to be a result of a leaking sanitary sewer line.

c. Test Laboratory/Central Laboratory Area (TL/CL)

The TL/CL Area is located on approximately seven acres of land in the central part of the SLAC campus. There are three main buildings at this area: the Test Laboratory (Building 44), the Central Laboratory (Building 40), and the Central Lab Addition (Building 84). Most areas that are not occupied by buildings or storage sheds are used as parking and are covered with asphalt or concrete pavement. SLAC has conducted detailed investigations to determine the nature and extent of contamination at the TL/CL area. VOCs were primarily detected in soil from the area adjacent to the Test Laboratory machine shop and south of the Central Laboratory loading dock. The maximum total VOC concentration detected in soil samples was 0.64 mg/kg at a depth of 4 to 4.5 feet bgs. No SVOCs were detected. Based on available data, VOC concentrations appear to significantly decrease at depths greater than 5 feet.

Several removal action activities were conducted between 1988 and 2001. These actions included removal of six underground storage tanks and removal of petroleum and PCB impacted soil. Groundwater currently contains low concentrations of VOCs, primarily at monitoring wells MW-61 (i.e. the delivery area of the Test Laboratory) and MW-52 (i.e. the loading dock area south of the Central Laboratory).

d. Former Solvent Underground Storage Tank Area (FSUST)

The FSUST Area is located in the eastern portion of the facility, between the Plant Maintenance and Utilities Building (Building 35) and the General Services Building (Building 81). The 2,400-gallon underground storage tank was used to store paint shop wastes from 1967 until 1978, at which time it was abandoned in place.

In 1983, the tank, along with some impacted soil, was removed and site investigations were initiated to determine the extent of chemical contamination in soil and groundwater and to identify potential remedial alternatives. Since 1984, investigations and subsequent remediation have occurred. Later, in 1985, a Waste Discharge Requirements Order No. 85-88 was established to require investigation and remediation of discharges from the tank.

Despite two major excavations that were performed earlier to remove impacted soil, VOCs and SVOCs remain at concentrations greater than 1,000 mg/kg in soils and up to 600,000 ppb in groundwater. While the pollution appears to decrease laterally over a short distance, the highest concentrations of chemicals in soil appear to be located in the saturated zone at a depth of 8 to 18 feet below ground surface (bgs) but can go as deep as 30 feet in the immediate vicinity of the FSUST. Other constituents detected in the soil near the former tank include bis-2-ethylhexyl phthalate (92.6 mg/kg), acetone (9.3 mg/kg), and 2-butanone (15.3 mg/kg).

The chemicals appear to be migrating slowly in the groundwater. Without

hydraulic control, the chemical migration rate in groundwater appears to be less than 8 feet per year and has not yet entered the LINAC subdrainage system located approximately 350 feet south of the FSUST. In 2001, SLAC installed a groundwater extraction system to hydraulic control chemical migration.

e. Stormwater Drainage Channels (IR-6 and IR-8)

The IR-6 and IR-8 stormwater drainage channels carry storm water from much of the eastern portion of the SLAC facility, off-site and ultimately into San Francisquito Creek. (Figure 3) In 1988, preliminary investigations found PCBs and lead in sediments collected from the on-site portions of the storm water drainage channels at maximum concentrations of 690 ppm for PCBs and 157 ppm for lead. As interim removal actions of sediment in the channels has reduced the PCB and lead concentrations but redeposition of contaminated sediments has occurred. The most recent sediment sampling performed in March of 2004 detected maximum concentration of 7.2 ppm for PCBs and 121.7 ppm for lead. The primary source of the PCBs is believed to be leaking former electrical transformers; a secondary source maybe exfoliation of paint containing PCBs. The source of the lead is from lead plates used as shielding during operation of the LINAC and exfoliation of paint containing lead.

14. Remedial Actions Performed and Current Remedial Status

Past remedial action and the current status at SLAC are discussed below.

a. Former Hazardous Waste Storage Area (FHWSA)

The site characterization work for this site has been completed and the draft Site Characterization Report was submitted in November 2004. A draft Evaluation of Remedial Alternatives Report was completed in 2003 but has not been released by DOE for regulatory review due to disagreement between Stanford University and DOE regarding the proposed cleanup objectives. An interim pilot dual phase extraction (DPE) system has been operating at the site since December 2003 and a full scale DPE system will be constructed in April 2005.

b. Plating Shop Area

VOC impacted soil in one of at least three suspected source areas was removed in 1998. The site characterization work for this site has been completed and the draft Site Characterization Report was submitted in December 2003. A draft Evaluation of Remedial Alternatives Report was completed in 2003 but has not been released by DOE for regulatory review due to disagreement between Stanford University and DOE regarding the proposed cleanup objectives. A preliminary design report for a DPE system is currently being completed.

c. Test Laboratory/Central Laboratory Area (TL/CL)

SLAC has performed several removal actions at the TL/CL between 1988 and 2001, involving removal of underground storage tanks and diesel fuel and PCB impacted soils. The site characterization work for this site has been

completed and Water Board staff has concurred with the final Site Characterization Report. The Water Board staff has also approved SLAC's revised draft Evaluation of Remedial Alternatives Report provided the information presented in SLAC's response package is incorporated into the final document. A revision has been prepared and SLAC is awaiting DOE's approval to issue the document. The selected remedy for the TL/CL area is long term monitoring with natural attenuation.

d. Former Solvent Underground Storage Tank Area (FSUST)

In 1983, removal of a 2,400-gallon underground storage tank and excavation of a limited amount of impacted soil was completed. In 1986, a second excavation was completed to remove more impacted soil. Groundwater at the site has been monitored since 1985.

The site characterization work for this site has been completed and Water Board staff has concurred with the final Site Characterization Report. Water Board staff has also concurred with the Evaluation of Remedial Alternatives report and an Implementation Report and Monitoring Plan document. The selected remedy, a hydraulic control system, was installed in 2001. To date, the system has extracted and treated over 300,000 gallons of groundwater and removed approximately 245 pounds of VOCs and SVOCs and the plume has stabilized. The complete remedy also includes an institutional control program to prevent unauthorized digging in the area, an air monitoring program, and a periodic review of innovative technologies. The addition of dual phase extraction to the existing system is being evaluated to enhance chemical mass and source removal.

e. Stormwater Drainage Channels (IR-6 and IR-8)

Despite numerous interim removal actions including the removal of contaminated sediment in the IR-6 drainage channel in 1995, PCBs and lead impacted sediments from various upgradient locations continue to be deposited in the IR-6 and IR-8 drainage channels. Recent sediment sampling of the drainage downstream from SLAC, on property owned by Stanford and leased to the Portola Valley Training Center, has detected PCBs and metals but also identified the ground cover used by the Training Center in the horse paddocks as a source of PCBs and metals. Further investigation is required to fully characterize the extent of contamination associated with operations at SLAC and evaluate remedial action. This further investigation will require coordination with the Portola Valley Training Center.

15. Additional Sites Requiring Investigation and Potential Remediation.

Additional sites requiring preliminary assessment are summarized below (See Figures 3 and 4):

a. The Clean Landfill Site

The Clean Landfill Site was used to stockpile soil and asphalt during the 1960s until the 1980s. Preliminary investigations found low pH in groundwater and PCBs in soil. The groundwater investigation, which is

complete, indicates that the source of low pH is the natural oxidation of acid-forming minerals such as pyrite in the subsurface. Further investigation is required to fully characterize the extent of PCBs in soil and asphalt stockpiles and evaluate the necessity for further remedial action.

b. The Bone Yard

The Bone Yard, recently active, was used for long-term storage of shielding material, some of which is slightly radioactive. Lead fragments have been found in crevices of shielding material and as fragments on the ground surface. Preliminary investigations also show PCBs in soil. Cleanup of the Bone Yard has begun and further investigation may be needed as items are removed from the Bone Yard to evaluate the necessity for additional remedial action.

c. The Magnet Storage Yard

The Magnet Storage Yard is an active site used to store nonradioactive and low level radioactive shielding material for later use. Lead fragments are present both on the shielding material and as fragments on the asphalt-paved surface. In addition to the lead, preliminary investigations found PCBs in sediment on the asphalt pavement and associated with an oil-stained area of the asphalt. Power washing of paved areas has been conducted to reduce concentrations of PCBs and lead in this area. Further investigation is required to fully characterize the contamination and evaluate the necessity for remedial action. SLAC currently plans to be removing the stained asphalt area and any underlying impacted materials.

d. Lower Salvage Yard

The Lower Salvage Yard was historically used to store lead and oil-filled equipment. It is currently used for storage of equipment to be recycled. Preliminary investigations show the presence of petroleum hydrocarbons in groundwater and PCBs in soil. Approximately one-half of the yard was remediated by excavation in 1999. Further investigation is required to fully characterize the remainder of the contamination and evaluate the necessity for remedial action.

e. Beam Dump East

The Beam Dump East is currently an active site used as a subsurface high-energy dissipater for the operation of the linear accelerator. Some of the high-energy physics experiments cause tritium to form in soil and groundwater. Investigations show that a limited area is currently impacted with low concentrations of tritium in groundwater. The work to characterize the nature and extent of contamination and to define the process by which groundwater is tritiated needs to be completed in order to further evaluate the need for remedial action.

f. Miscellaneous Release Sites

The Miscellaneous Release Sites are generally sites that have been identified as having soil contamination at low concentrations or in areas of limited

extent. While the final number of Miscellaneous Release Sites is not known, preliminary investigations have identified at least 17 localized areas of PCB and lead contamination in soil.

Further investigation of these sites and potentially others is required to fully characterize all miscellaneous contamination and evaluate the necessity for remedial action.

Other sites included as Miscellaneous Release Sites are areas where contamination is found during ongoing site activities such as the renovation or demolition of buildings, utilities or other infrastructure.

16. Basis for Cleanup Standards

Basin Plan

The Water Board adopted a revised Water Quality Control Plan for the San Francisco Bay Basin (Basin Plan) on January 21, 2004. This updated and consolidated Basin Plan represents the Water Board's master water quality control planning document. The revised Basin Plan was subsequently approved by the State Water Resources Control Board on July 22, 2004; by the Office of Administrative Law on October 4, 2004; and by the U.S. Environmental Protection Agency, Region IX on January 5, 2005, with the exception of the freshwater acute and chronic objectives for cadmium. A summary of regulatory provisions is contained in 23 CCR 3912. The Basin Plan defines beneficial uses and water quality objectives for waters of the State, including surface water and groundwater. This Order is in compliance with the Basin Plan.

State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California," applies to this discharge and requires attainment of background levels of water quality for chemicals of concern (COCs), or the highest level of water quality, which is reasonable if background levels of water quality for COCs cannot be restored. Cleanup levels other than background must be consistent with the maximum benefit to the people of the State, not unreasonably affect present and anticipated beneficial uses of such water, and not result in exceedance of applicable water quality objectives. This Order and its requirements are consistent with Resolution No. 68-16.

State Board Resolution No. 92-49, "Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304," applies to this discharge. This Order and its requirements are consistent with the provisions of Resolution No. 92-49, as amended.

State Board Resolution No. 88-63, "Sources of Drinking Water," defines potential sources of drinking water to include all groundwater in the Region, with limited exceptions for areas of high TDS, low yield, or naturally high contaminant levels.

17. Groundwater Beneficial Uses

The Basin Plan designates the following existing and potential beneficial uses of groundwater underlying and adjacent to SLAC:

a. Municipal and domestic water supply;
b. Industrial process water supply;
c. Industrial service water supply;
d. Agricultural water supply; and
e. Freshwater replenishment to surface water.

18. Surface Water Beneficial Uses

The Basin Plan designates the following existing and potential beneficial uses of San Francisquito Creek:

a. Fish migration;
b. Preservation of Rare and Endangered Species (proposed);
c. Water contact recreation;
d. Noncontact water recreation;
e. Fish spawning
f. Warm freshwater habitat; and
g. Wildlife habitat.

19. Basis for Groundwater Cleanup Standards

The cleanup strategy for contaminated sites at the facility will be based on site-specific groundwater quality objectives, the protection of human health and the environment, and risk management. The cleanup strategy considers current and future land usage, technical feasibility, and cost-effectiveness of the overall corrective action process.

20. Basis for Soil Cleanup Standards

The soil cleanup standards for the site are intended to address a full range of exposure pathways, including direct exposure, indoor air impacts, nuisance, and leaching to groundwater that will result in acceptable residual risk to humans and to the environment. Establishment of soil cleanup standards will take into account the current and future land use, technical feasibility and cost-effectiveness of the overall corrective action process.

21. Preliminary Cleanup Goals

The Discharger(s) will need to make assumptions about future cleanup standards for soil and groundwater, in order to determine the necessary extent of remedial investigation, interim remedial actions, and the draft remedial action plan. Pending the establishment of site-specific cleanup standards, the following preliminary cleanup goals shall be used for these purposes:

a. Groundwater: Applicable water quality objectives [e.g. lower of primary (toxicity) and secondary (taste and odor), maximum contaminant levels (MCLs)] or, in the absence of a chemical-specific objective, equivalent drinking water levels based on toxicity and taste and odor concerns. For

purposes of this subsection, the Discharger(s) shall consider groundwater a source of drinking water.

b. Soil: Applicable screening levels as compiled in the Water Board's Environmental Screening Levels (ESLs) document or its equivalent. Soil ESLs are intended to address a full range of exposure pathways, including direct exposure, indoor air impacts, nuisance, and leaching to groundwater.

22. Potential for Modification of Cleanup Standards

The goal of this remedial action is to restore the beneficial uses of groundwater underlying and adjacent to the site. Results from other sites suggest that full restoration of beneficial uses to groundwater as a result of active remediation at this site may not be possible. If full restoration of beneficial uses is not technologically nor economically achievable within a reasonable period of time, then the Discharger(s) may request modification to the cleanup standards or establishment of a containment zone, a limited groundwater pollution zone where water quality objectives are exceeded. Conversely, if new technical information indicates that cleanup standards can be surpassed, the Water Board may decide that further cleanup actions should be taken.

23. Reuse or Disposal of Extracted Groundwater

Water Board Resolution No. 88-160 allows discharges of extracted, treated groundwater from site cleanups to surface waters only if it has been demonstrated that neither reclamation nor discharge to the sanitary sewer is technically and economically feasible.

24. Basis for California Water Code Section 13304 Order

The Discharger(s) has caused or permitted waste to be discharged or deposited where it is or probably will be discharged into waters of the State and creates or threatens to create a condition of contamination or nuisance.

25. Cost Recovery

Pursuant to California Water Code Section 13304, the Discharger(s) are hereby notified that the Water Board is entitled to, and may seek reimbursement for all reasonable costs actually incurred by the Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this order.

26. California Environmental Quality Act (CEQA)

This action is an order to enforce the laws and regulations administered by the Water Board. As such, this action is categorically exempt from the provisions of the California Environmental Quality Act pursuant to Section 15321 of the Resources Agency Guidelines.

27. Notification

The Water Board has notified the Discharger(s) and all interested agencies and persons of its intent under California Water Code Section 13304 to prescribe site cleanup requirements for the discharge, and has provided them with an

opportunity to submit their written comments.

28. Public Hearing
The Water Board, at a public meeting, heard and considered all comments pertaining to this discharge.

IT IS HEREBY ORDERED, pursuant to Section 13304 of the California Water Code, that the Discharger(s) (or its agents, successors, or assigns) shall cleanup and abate the effects described in the above findings as follows:

A. PROHIBITIONS:

1. The discharge of wastes or hazardous substances in a manner that will degrade water quality or adversely affect beneficial uses of waters of the State is prohibited.

2. Further significant migration of wastes or hazardous substances through surface or subsurface transport to waters of the State is prohibited.

3. Activities associated with the subsurface investigation and cleanup that will cause significant adverse migration of wastes or hazardous substances are prohibited.

4. The storage, handling, treatment, or disposal of polluted soil or groundwater shall not create a nuisance as defined in California Water Code Section 13050(m).

B. TASKS

1. ENVIRONMENTAL BASELINE REPORT
COMPLIANCE DATE: February 1, 2006

The Discharger(s) shall submit a technical report containing an Environmental Baseline Report acceptable to the Executive Officer. The purpose of this report is to summarize the results of investigations and if applicable, any interim or final remediation activities occurring at the facility. The report shall include: 1) the facility operational history, 2) a summary of site characterization covering findings pertaining to geology, hydrogeology, groundwater and surface water, 3) an environmental assessment of all areas with known or potential contamination with designation of separate sites or operable units, and 4) the current environmental investigation/remediation status.

2. PROPOSED LAND USE AND DEVELOPMENT PLAN
COMPLIANCE DATE: September 1, 2005

Stanford University, as the property owner, has the ability to control the

long-term uses for which the property is utilized. Therefore, Stanford University shall submit a report, acceptable to the Executive Officer, detailing the proposed future use, with development plans and objectives for the facility. After review of the report and any other relevant evidence, the Executive Officer shall establish cleanup standards for the facility, taking into account all reasonably anticipated future land uses, the protection of human health and the environment, beneficial uses of water, ecological factors, and other relevant information. Site-specific decisions about remedial alternatives shall be made in accordance with the Feasibility Study (Task 7).

3. PUBLIC PARTICIPATION PLAN
COMPLIANCE DATE: February 1, 2006

The Discharger(s) shall submit a Public Participation Plan (PPP), acceptable to the Executive Officer. The PPP shall include a baseline community survey and detail how the public and adjoining community will be kept informed of activities conducted at the Facility, the establishment of a public repository of all relevant documents, and how Discharger(s) will be responding to inquiries from concerned citizens.

4. REMEDIAL INVESTIGATION / FEASIBILITY STUDY (RI/FS) WORKPLAN and IMPLEMENTATION SCHEDULE
COMPLIANCE DATE: 60 days from Approval of Task 1

The Discharger(s) shall prepare and submit a workplan and implementation schedule acceptable to the Executive Officer, that covers all the activities necessary to conduct the RI/FS for the facility and, if applicable, each operable unit. The approved time schedule shall become part of this Order.

The Discharger(s) shall conduct a RI/FS for the Facility. This RI/FS shall be prepared in a format, to the extent practical, that parallels the U.S. Environmental Protection Agency's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," October 1988. The purpose of the RI/FS is to assess site conditions, designation of operable units, and to evaluate alternatives to the extent necessary to select an appropriate remedy.

The Discharger(s) shall not be required to duplicate any work already performed to the Water Board's satisfaction. Where appropriate, existing studies, remedial reports, risk assessments and work plans may be summarized and cross referenced in preparing the various reports required under this Order.

5. REMEDIAL INVESTIGATION (RI) REPORT
COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall be prepare and submit an RI Report acceptable to the Executive Officer in accordance with the approved RI/FS Workplan schedule. The RI shall be prepared in a format, to the extent practical, that parallels the U.S. Environmental Protection Agency's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," October 1988. The primary purpose of the RI is to assess site conditions, designation of operable units, and to facilitate the human health and ecological risk assessment.

6. BASELINE HUMAN HEALTH and ECOLOGICAL RISK ASSESSMENT

COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall submit a human health and ecological risk assessments for the Facility acceptable to the Executive Officer. The Discharger(s) shall perform health and ecological risk assessments for the Facility that meet the requirements of Health and Safety Code Sections 25356.1.5, subdivision (b). The Discharger(s) shall submit a Baseline Health and Ecological Risk Assessment Report within thirty (30) days from the approval of the RI Report. The report shall be prepared consistent with U.S. EPA and California Environmental Protection Agency guidance and regulations, including as a minimum: Risk Assessment Guidance for Superfund, Volume 1; Human Health Evaluation Manual, December 1989; Superfund Exposure Assessment Manual, April 1988; Risk Assessment Guidance for Superfund, Volume 2, Environmental Manual, March 1989; and all other related or relevant policies, practices and guidelines of the California Environmental Protection Agency and policies, practices and guidelines developed by U.S. EPA pursuant to CFR 300.4000 et seq.

7. FEASIBILITY STUDY (FS) REPORT

COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall prepare and submit the FS Report acceptable to the Executive Officer. The FS Report shall be prepared in a format, to the extent practical, that parallels the U.S. Environmental Protection Agency's "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," October 1988. The primary purpose of the FS is to evaluate remedial alternatives for multiple land use scenarios to the extent necessary to select an appropriate remedy.

The Discharger(s) may request that the Executive Officer waive the requirement for a feasibility study for time-critical remedial actions for which funding is available and for small areas of incidental contamination identified during site maintenance and development activities where soil removal is the appropriate remedial action. These sites will be handled under SLAC's Excavation Support Program.

8. REMEDIAL ACTION PLAN (RAP)
COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall prepare and submit a draft RAP acceptable to the Executive Officer. Discharger(s) shall implement a public review process. Within thirty (30) days after closure of the public comment period, Discharger(s) shall submit a written Responsiveness Summary of all written and oral comments presented and received during the public comment period. Within thirty (30) days following approval of the Responsiveness Summary, Discharger(s) shall modify the RAP in accordance with the Responsiveness Summary and submit a final RAP.

9. REMEDIAL DESIGN (RD)
COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall propose a time schedule, acceptable to the Executive Officer, for the preparation and submission of a RD describing in detail the technical and operational plans for implementation of the final RAP.

10. IMPLEMENTATION OF THE FINAL RAP
COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall implement the final RAP in accordance with the approved schedule in the RD. Discharger(s) shall submit an Implementation Report acceptable to the Executive Officer documenting the implementation of the final RAP and RD.

11. OPERATION AND MAINTENANACE (O&M)
COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall comply with all O&M requirements in accordance with the final RAP and approved RD. The Discharger(s) shall prepare and submit an O&M Plan acceptable to the Executive Officer that includes an implementation schedule and the funding mechanism for O&M. Discharger(s) shall implement the plan in accordance with the approved schedule.

12. RISK MANAGEMENT PLAN
COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall submit a risk management plan acceptable to the Executive Officer detailing all institutional controls necessary to be protective of accepted land use and the funding mechanisms necessary to implement the institutional controls.

13. FIVE-YEAR REVIEW REPORT
COMPLIANCE DATE: In Accordance with Approved Task 4

The Discharger(s) shall submit a technical report acceptable to the Executive Officer reviewing and reevaluating the remedial action after a period of five (5) years from the completion of construction and startup, and every 5 years thereafter as long as the waste remains in place at a level above that for unrestricted use.

The report should include at a minimum:

a. A demonstration of the effectiveness in controlling contaminant migration and protecting human health and the environment.

b. Comparison of contaminant concentration trends with cleanup standards.

c. Comparison of anticipated versus actual costs of cleanup activities.

d. Performance data (e.g. groundwater volume extracted, chemical mass removed, mass removed per million gallons extracted).

e. Cost effectiveness data (e.g. cost per pound of contaminant removed).

f. Summary of additional investigations (including results) and significant modifications to remediation system.

g. Additional remedial actions (including those based on new or innovative technologies) proposed to meet cleanup standards (if applicable) including time schedule.

h. If cleanup standards have not been met and are not projected to be met within a reasonable time, the report should assess the technical practicability of meeting cleanup standards and may propose an alternative cleanup strategy.

14. INVESTIGATION, REMEDIATION, AND CLOSURE PROTOCOL FOR NEWLY DISCOVERED SITES AND FOR LAND USE CHANGES

COMPLIANCE DATE: 60 Days Prior to Proposed Site Action(s)

The Discharger(s) shall investigate and remediate any contamination discovered in the course of site use, including renovation and demolition of site structures or excavation in connection with ongoing site operations. This work shall be accomplished by appropriate revisions to the RI/FS and RAP. In the event of closure of all or portions of the existing installations or partial or full redevelopment of the site and conversion to different land use(s), the Discharger(s) shall perform any additional investigation and necessary remediation of contamination by appropriate revisions to the RI/FS and RAP and shall submit a technical report containing a Case

Closure Summary Document, acceptable to the Executive Officer, documenting the results of investigations and if applicable, remediation of any site contamination encountered at facility closure and/or redevelopment.

15. PROPOSED CURTAILMENT OR CLOSURE
COMPLIANCE DATE: 60 Days Prior to Proposed Curtailment or Closure

The Discharger(s)(s) shall submit a technical report acceptable to the Executive Officer containing a proposal to curtail remediation or obtain Water Board closure for remaining impacted sites. Curtailment includes system closure (e.g., well abandonment), system suspension (e.g., cease extraction but wells retained), and significant system modification (e.g., major reduction in extraction rates, closure of individual extraction wells within extraction network). The report should include the rationale for curtailment or closure. Proposals for final closure should demonstrate that cleanup standards have been met, residual contaminant concentrations are stable, and residual contaminant migration potential is minimal.

16. IMPLEMENTATION OF CURTAILMENT OR CLOSURE
COMPLIANCE DATE: 60 Days After Completion of Task 15

The Discharger(s) shall submit a technical report acceptable to the Executive Officer documenting completion of the tasks identified in Task 15.

17. EVALUATION OF NEW HEALTH CRITERIA
COMPLIANCE DATE: 90 Days After Request by Executive Officer

The Discharger(s) shall submit a technical report acceptable to the Executive Officer evaluating the effect on the approved remedial action plan of revising one or more cleanup standards in response to revision of drinking water standards, maximum contaminant levels, or other health-based criteria.

18. EVALUATION OF NEW TECHNICAL INFORMATION
COMPLIANCE DATE: 90 days After Request by Executive Officer

The Discharger(s) shall submit a technical report acceptable to the Executive Officer evaluating new technical information, which bears upon the approved remedial action plan and cleanup standards for this site. In the case of a new cleanup technology, the report should evaluate the technology using the same criteria used in RAP. Such technical reports shall not be requested unless the Executive Officer determines that the new information is reasonably likely to warrant a revision in the approved remedial action plan or cleanup standards.

19. DELAYED COMPLIANCE

If the Discharger(s) are delayed, interrupted, or prevented from meeting one or more of the completion dates specified for the above tasks, the Discharger(s) shall promptly notify the Executive Officer and the Water Board may consider revision to this Order.

C. PROVISIONS

1. **Good O&M**: The Discharger(s) shall maintain in good working order and operate as efficiently as possible any facility or control system installed to achieve compliance with the requirements of this Order.

2. **Cost Recovery**: The Discharger(s) shall be liable, pursuant to California Water Code Section 13304, to the Water Board for all reasonable costs actually incurred by the Water Board to investigate unauthorized discharges of waste and to oversee cleanup of such waste, abatement of the effects thereof, or other remedial action, required by this Order. If the site addressed by this Order is enrolled in a State Board-managed reimbursement program, reimbursement shall be made pursuant to this Order and according to the procedures established in that program. Any disputes raised by the Discharger(s) over reimbursement amounts or methods used in that program shall be consistent with the dispute resolution procedures for that program.

3. **Access to Site and Records**: In accordance with California Water Code Section 13267(c), the Discharger(s) shall permit the Water Board or its authorized representative:

a. Entry upon premises in which any pollution source exists, or may potentially exist, or in which any required records are kept, which are relevant to this Order.

b. Access to copy any records as required to be kept under this Order.

c. Inspection of any monitoring or remediation facilities installed in response to this Order.

d. Sampling of any groundwater or soil which is accessible, or may become accessible, as part of any investigation or remedial action program undertaken by the Discharger(s).

4. **Self-Monitoring Program**: Self-Monitoring Program: The Discharger(s) (as applicable) shall comply with the Self-Monitoring Program as attached to this Order and as may be amended by the Executive Officer.

5. **Contractor / Consultant Qualifications**: All technical documents shall be signed by and stamped with the seal of a California professional

geologist, a California certified engineering geologist, or a California professional registered civil engineer.

6. **Lab Qualifications**: All samples shall be analyzed by State-certified laboratories or laboratories accepted by the Water Board using approved EPA methods for the type of analysis to be performed. All laboratories shall maintain quality assurance/quality control (QA/QC) records for Water Board review. This provision does not apply to analyses that can only reasonably be performed on-site (e.g., temperature).

7. **Electronic Reporting:**
The State Water Resources Control Board (State Board) has recently adopted and gained approval from the Office of Administrative Law (OAL) for regulations that require the Electronic Submittal of Information (ESI) for groundwater cleanup programs. For several years, parties responsible for cleanup of leaks from underground storage tanks (LUST) have been required to submit groundwater analytical data, the surveyed locations of monitoring wells, and certain other data to the State Board's Geotracker database over the internet. Beginning January 1, 2005, electronic Submittal of these items and a portable data format (PDF) copy of the full report is being extended to include all State Board groundwater cleanup programs including LUST, non-LUST (SLIC), Department of Defense (DOD), Department of Energy (DOE), and landfill programs. The Geotracker system is already capable of accepting this electronic information and currently has information submitted by responsible parties for over 10,000 LUST sites statewide. This information is available to the public at http://www.geotracker.swrcb.ca.gov/.

Beginning July 1, 2005, a paper copy of these reports will no longer be required *unless the regulatory agency specifically requires the paper copy to be submitted*. The electronic copy is intended to replace the need for a paper copy and is expected to be relied upon for all public information requests, regulatory review, and compliance/enforcement activities.

8. **Document Distribution**: Copies of all correspondence, technical reports, and other documents pertaining to compliance with this Order shall be provided to the following agencies:
   a. County of San Mateo Health Department, Attn: Mr. Charles Ice
   b. Cal-EPA: Department of Toxics Substances Control, Attn: Ms. Nirupma Suryavanshi
   c. Cal EPA: Department of Fish and Game, Attn: Mr. Serge Glushoff
   d. U.S. Environmental Protection Agency, Region 9, San Francisco, Attn: Mr. Max Weintraub

The Executive Officer may modify this distribution list as needed.

9. **Reporting of Changed Owner or Operator**: The Discharger(s) shall file a technical report on any changes in site occupancy or ownership associated with the property described in this Order.

10. **Reporting of Hazardous Substance Release**: If any hazardous substance is discharged in or on any waters of the State, or discharged or deposited where it is, or probably will be, discharged in or on any waters of the State, the Discharger(s) shall report such discharge to the Water Board by calling (510) 622-2300 during regular office hours (Monday through Friday, 8:00 to 5:00).

    A written report shall be filed with the Water Board within five working days. The report shall describe: the nature of the hazardous substance, estimated quantity involved, duration of incident, cause of release, estimated size of affected area, nature of effect, corrective actions taken or planned, schedule of corrective actions planned, and persons/agencies notified.

    This reporting is in addition to any reporting to the Office of Emergency Services required pursuant to the Health and Safety Code.

11. **Periodic Order Review**: The Water Board will review this Order periodically and may revise it when necessary. The Discharger(s) (as applicable) may request revisions and upon review, the Executive Officer may recommend that the Water Board revise these requirements.

I, Bruce H. Wolfe, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on May 18, 2005.

_____

Bruce H. Wolfe
Executive Officer

FAILURE TO COMPLY WITH THE REQUIREMENTS OF THIS ORDER MAY SUBJECT YOU TO ENFORCEMENT ACTION, INCLUDING BUT NOT LIMITED TO: IMPOSITION OF ADMINISTRATIVE CIVIL LIABILITY UNDER WATER CODE SECTIONS 13268 OR 13350, OR REFERRAL TO THE ATTORNEY GENERAL FOR INJUNCTIVE RELIEF OR CIVIL OR CRIMINAL LIABILITY

Attachments: Figure 1. SLAC Location Map
Figure 2. SLAC Site Boundary Map
Figure 3. Map of Major Source Area
Figure 4. Map of Additional Sites
Self-Monitoring and Reporting Program

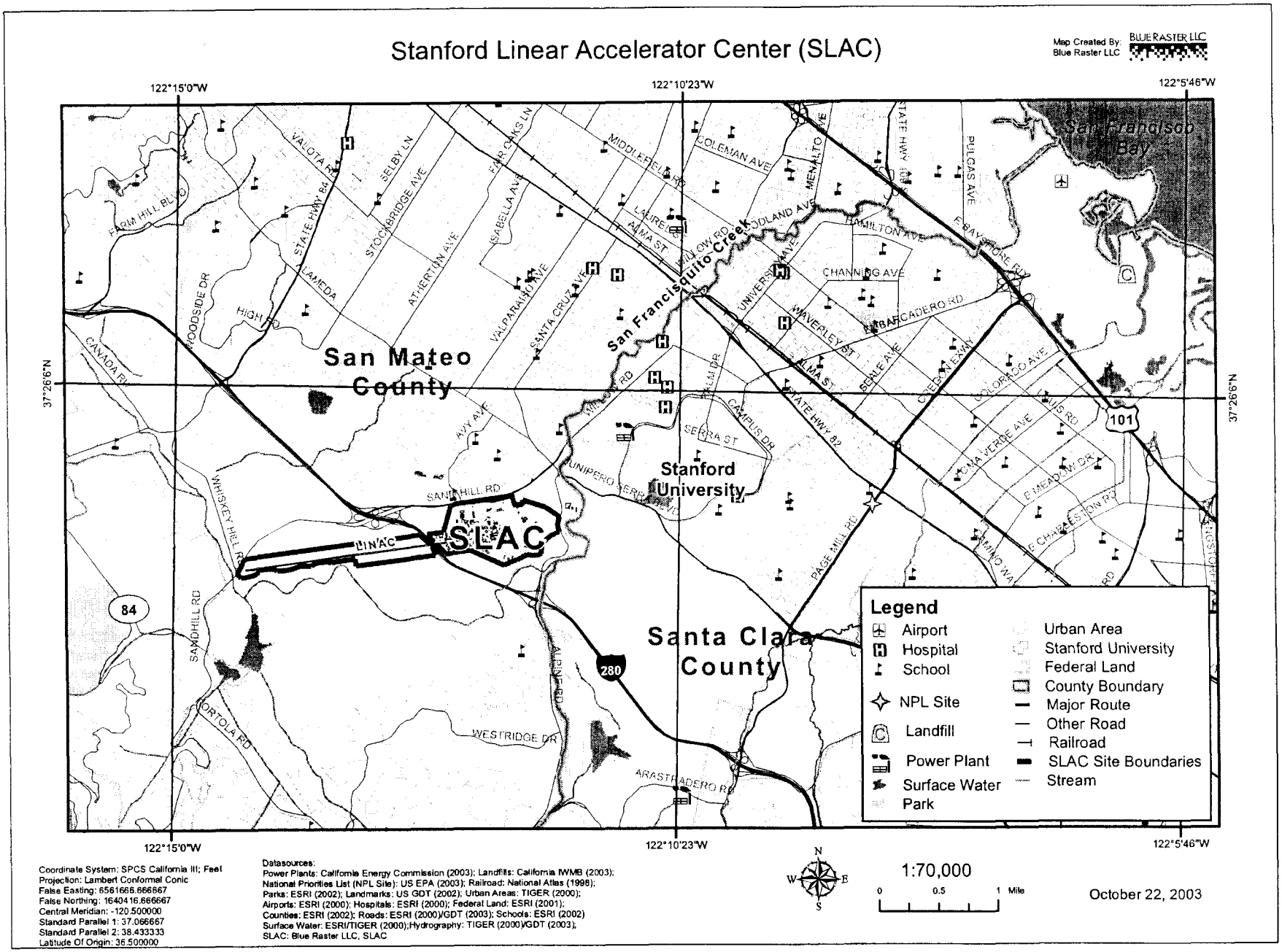

Figure 1. SLAC Location Map

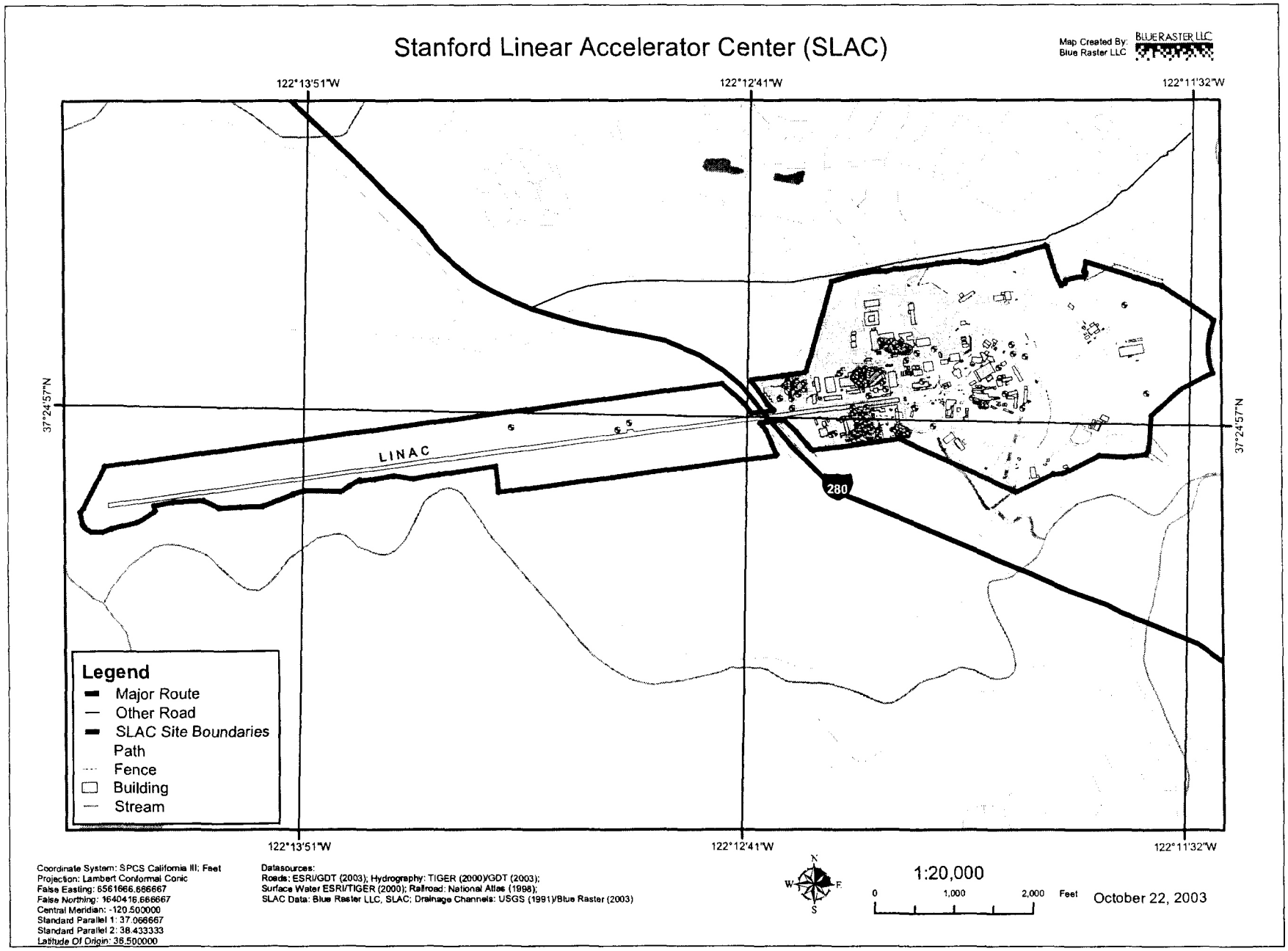

Figure 2. SLAC Site Boundary Map

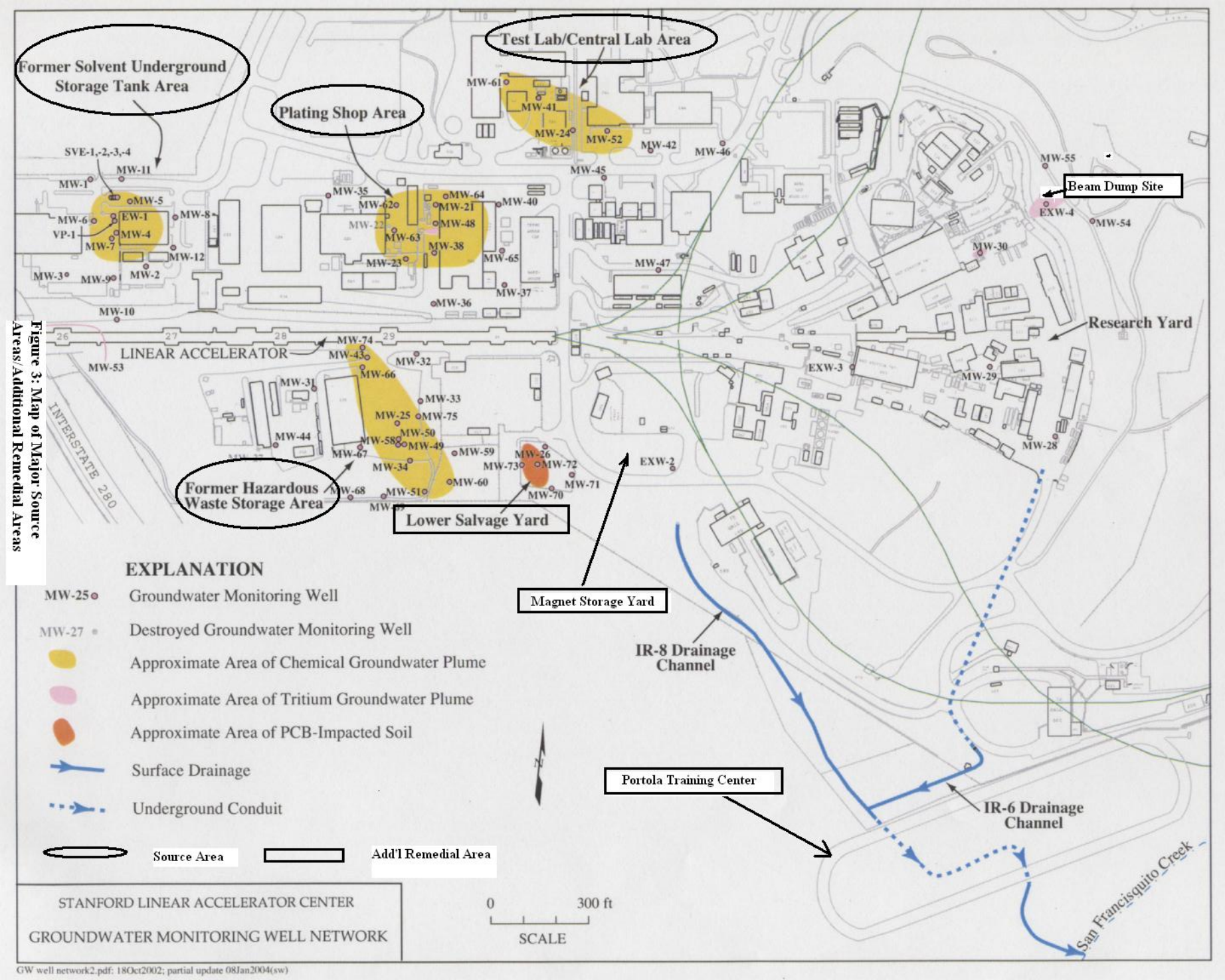

Figure 3: Map of Major Source Areas/Additional Remedial Areas

GW well network2.pdf: 18Oct2002; partial update 08Jan2004(sw)

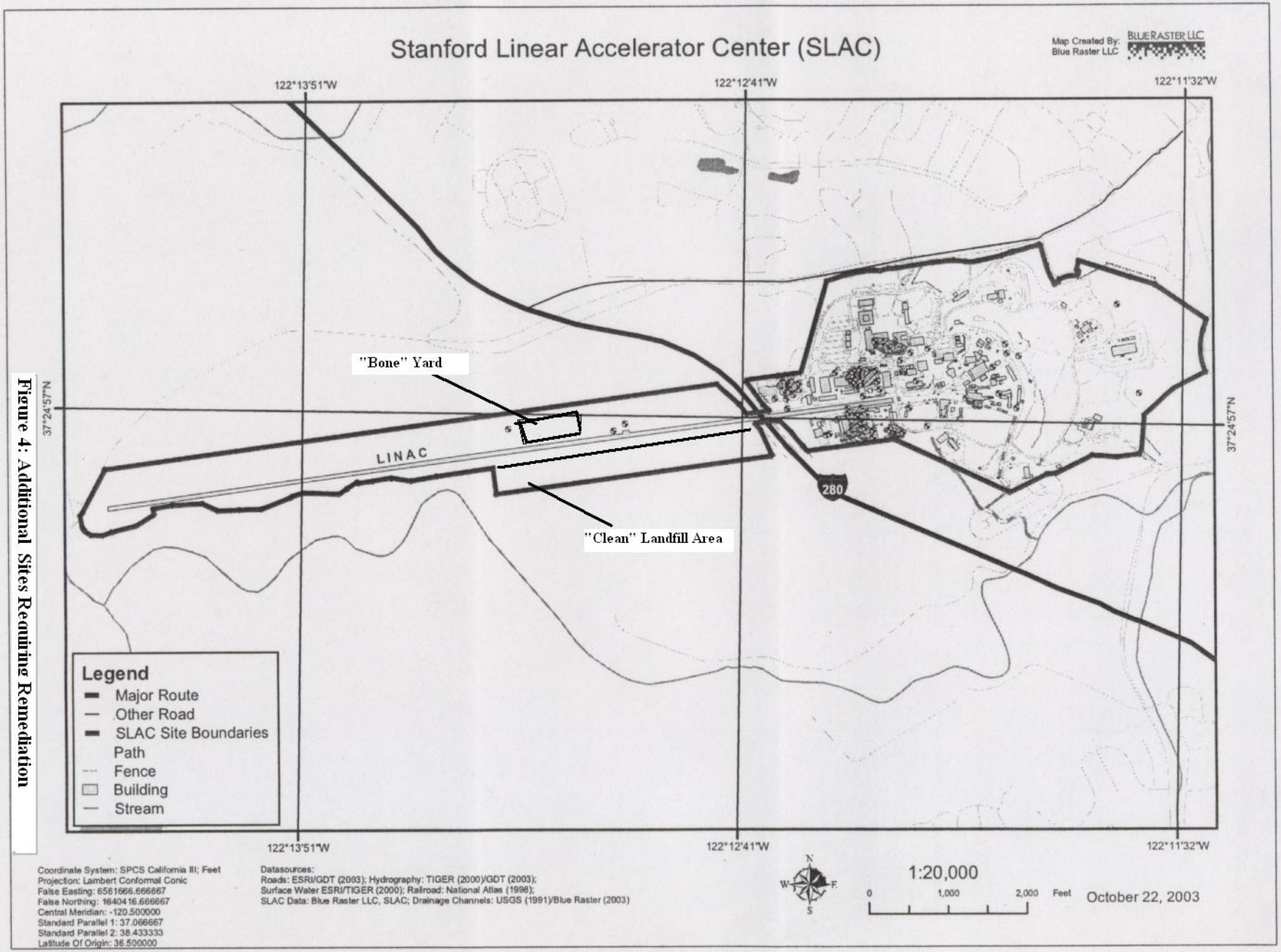

Figure 4: Additional Sites Requiring Remediation

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

SELF-MONITORING PROGRAM FOR:

STANFORD LINEAR ACCELERATOR CENTER

for the property located at:
STANFORD LINEAR ACCELERATOR CENTER
2575 SAND HILL ROAD
MENLO PARK, SAN MATEO COUNTY

1. **Responsible Party Identification:** The U.S. Department of Energy and Stanford University are identified as the responsible parties and named Discharger(s).

2. **Authority and Purpose:** The Water Board requests the technical reports required in this Self-Monitoring Program pursuant to Water Code Sections 13267 and 13304. This Self-Monitoring Program is intended to document compliance with Water Board Order No. R2-2005-0022 (Site Cleanup Requirements).

3. **Electronic Reporting:** The State Water Resources Control Board (State Board) has recently adopted and gained approval from the Office of Administrative Law (OAL) for regulations that require the Electronic Submittal of Information (ESI) for groundwater cleanup programs. For several years, parties responsible for cleanup of leaks from underground storage tanks (LUST) have been required to submit groundwater analytical data, the surveyed locations of monitoring wells, and certain other data to the State Board's Geotracker database over the internet. Beginning January 1, 2005, electronic Submittal of these items and a portable data format (PDF) copy of the full report is being extended to include all State Board groundwater cleanup programs including LUST, non-LUST (SLIC), Department of Defense (DOD), Department of Energy (DOE), and landfill programs. The Geotracker system is already capable of accepting this electronic information and currently has information submitted by responsible parties for over 10,000 LUST sites statewide. This information is available to the public at http://www.geotracker.swrcb.ca.gov/.

   Beginning July 1, 2005, a paper copy of these reports will no longer be required *unless the regulatory agency specifically requires the paper copy to be submitted*. The electronic copy is intended to replace the need for a paper copy and is expected to be relied upon for all public information requests, regulatory review, and compliance/enforcement activities.

4. **Monitoring:** The Discharger(s) shall develop, for approval by the Executive Officer, a sampling and analysis plan to collect and analyze representative sediment samples, groundwater samples and surface water samples within the storm drains. Constituents of concern, well locations, and sampling frequency shall, at a minimum, be identified in the plan.

The Discharger(s) shall sample any new monitoring or extraction wells quarterly and analyze groundwater samples for the appropriate constituents of concern for a minimum of one year after installation. The Discharger(s) may propose changes in the sampling frequency or analyzed constituents of concern; any proposed changes are subject to Executive Officer approval.

5. **Semi-Annual Monitoring Reports**: The Semi-Annual Monitoring shall be scheduled to best monitor the maximum variation between the dry season and wet season. For the purposes of this monitoring, the wet season is defined as the period between first day of October and the first day of April. Monitoring should attempt to record the conditions just at the end of the dry season and at the end of the wet season. The Discharger(s) shall submit semi-annual monitoring reports to the Water Board no later than 60 days following the wet season and dry season monitoring event. The reports shall include:

   a. **Transmittal Letter:** The transmittal letter shall discuss any violations during the reporting period and actions taken or planned to correct the problem. The letter shall be signed by the Discharger(s)'s principal executive officer or his/her duly authorized representative, and shall include a statement by the official, under penalty of perjury, that the report is true and correct to the best of the official's knowledge.

   b. **Groundwater Elevations:** Groundwater elevation data shall be presented in tabular form, and a groundwater elevation map should be prepared for each monitored water-bearing zone. Historical groundwater elevations shall be included in the second semi-annual report each year.

   c. **Groundwater Analyses:** Groundwater sampling data shall be presented in tabular form, and an isoconcentration map should be prepared for one or more key contaminants for each monitored water-bearing zone, as appropriate. The report shall indicate the analytical method used, detection limits obtained for each reported constituent, and a summary of QA/QC data. The second semi-annual report each year shall include specific historical groundwater sampling data proposed by the Discharger(s) and acceptable to the Executive Officer as appropriate in order to evaluate contaminant trends. The report shall describe any significant increases in contaminant concentrations since the last report, and any measures proposed to address the increases.

   d. **Groundwater Extraction:** If applicable, the report shall include groundwater extraction results in tabular form, for each extraction well and for the site as a whole, expressed in gallons per minute and total groundwater volume for the semi-annual monitoring period. . The report shall also include contaminant removal results, from groundwater extraction wells and from other remediation systems (e.g. soil vapor extraction), expressed in units of chemical mass per day and mass for the month. Historical mass removal results shall be included in the second semi-annual report each year.

e. **Surface Water Analysis:** Surface water sampling data shall be presented in tabular form, and a sample location map shall be prepared for one or more key contaminants, as appropriate. The report shall indicate the analytical method used, detection limits obtained for each reported constituent, and a summary of QA/QC data. All previous surface water sampling results, as appropriate, shall be included in the second semi-annual report each year. The report shall describe any significant increases in contaminant concentrations since the last report, and any measures proposed to address the increases.

f. **Status Report:** The Semi-Annual Monitoring report shall summarize all relevant work completed during the reporting period (e.g. site investigation, interim remedial measures) and work planned for the upcoming six months.

6. **Violation Reports**: If the Discharger(s) violate requirements in the Site Cleanup Requirements, then the Discharger(s) shall notify the Water Board office by telephone as soon as practicable once the Discharger(s) have knowledge of the violation. The Water Board may, depending on violation severity, require the Discharger(s) to submit a separate technical report on the violation within five working days of telephone notification.

7. **Other Reports**: The Discharger(s) shall notify the Water Board in writing prior to any site activities, such as construction or underground tank removal, which have the potential to cause further migration of contaminants or which would provide new opportunities for site investigation.

8. **Record Keeping**: The Discharger(s) or their agent shall retain data generated for the above reports, including lab results and QA/QC data, for a minimum of six years after origination and shall make them available to the Water Board upon request.

9. **SMP Revisions**: Revisions to the Self-Monitoring Program may be ordered by the Executive Officer, either on his own initiative or at the request of the Discharger(s). Prior to making SMP revisions, the Executive Officer will consider the burden, including costs, of associated self-monitoring reports relative to the benefits to be obtained from these reports.

I, Bruce H. Wolfe, Executive Officer, hereby certify that this Self-Monitoring Program

was adopted by the Water Board on May 18, 2005.

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Bruce H. Wolfe
Executive Officer