E.O. Lawrence Berkeley National Laboratory

United States Department of Energy

ENVIRONMENTAL RESTORATION PROGRAM

FINAL

INTERIM CORRECTIVE MEASURES WORKPLAN TO CONTROL THE MIGRATION OF CONTAMINATED GROUNDWATER AT THE BEVATRON DEMOLITION PROJECT SITE

for the
Lawrence Berkeley National Laboratory

July 2013

Final Workplan

The final *Interim Corrective Measures Workplan to Control the Migration of Contaminated Groundwater at the Bevatron Demolition Project Site* consists of the following three elements:

1. Draft Workplan submitted to the Department of Toxic Substances Control (DTSC) (August 2012)

2. DTSC Approval of Draft Workplan (Letter, April 23, 2013)

3. DTSC Approval of Final Workplan (Letter, July 2, 2013), which includes:

    a. DTSC Addendum to the Tiered Negative Declaration for the Corrective Measures Study Report – Lawrence Berkeley National Laboratory April 2013

    b. DTSC Responsiveness Summary

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Ernest Orlando Lawrence Berkeley National Laboratory

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LIST OF ABBREVIATIONS

Berkeley Lab	Lawrence Berkeley National Laboratory
Cal/EPA	California Environmental Protection Agency
CAP	Corrective Action Program
CHHSLs	California Human Health Screening Levels
DCA	Dichloroethane
DCE	Dichloroethene
DTSC	Cal-EPA Department of Toxic Substances Control
DWR	Department of Water Resources
DNAPL	Dense Non-Aqueous Phase Liquid
ERP	Environmental Restoration Program
ESL	Environmental Screening Level
GAC	Granular Activated Carbon
ICM	Interim Corrective Measure
MCS	Media Cleanup Standard
mg/kg	milligrams per kilogram
µg/L	micrograms per liter (10^{-6} grams per liter)
MIP	Membrane Interface Probe
msl	mean sea level
PCE	Tetrachloroethylene (Perchloroethene)
RCRA	Resource Conservation and Recovery Act
RPM	Remedial Project Manager (meeting)
TCA	Trichloroethane
TCE	Trichloroethylene
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
Water Board	San Francisco Bay Region of the Regional Water Quality Control Board

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this Work Plan is to provide the rationale and establish the requirements for constructing and operating an Interim Corrective Measure (ICM) in the Vacuum Pump Room area of the former Bevatron Complex at the Lawrence Berkeley National Laboratory (Berkeley Lab).

1.2 BACKGROUND

Berkeley Lab Building 51, which housed the Bevatron, occupied approximately 2.25 acres in the west-central part of Berkeley Lab. During its operation from 1954 until 1993, the Bevatron was among the world's leading particle accelerators. The Building 51 and Bevatron Demolition Project, which began in 2010, consisted of the demolition, deactivation, and disposal of the Building 51 structure and contents; including the shallow foundations, shield blocks, and the Bevatron accelerator housed within the building. Following demolition, the site was backfilled to grade with clean soil. These activities were completed in February 2012. The project area is primarily referred to as Building 51 in this workplan, but is also referred to as the Bevatron Complex or simply as the Bevatron. Building 51 included Building 51A, an integral addition. The former location of the Bevatron is shown on Figure 1. The project area is now in the process of being paved to provide parking, and will not be developed further until another use for the area is proposed, approved, and initiated. A photograph showing the status of the site on March 10, 2012 (post demolition and pre-paving) is provided on Figure 2.

Between September 2010 and April 2011, Berkeley Lab conducted a preliminary investigation of potential subsurface contamination beneath the Building 51 Demolition Project area. This investigation, although not required by a regulatory agency, was conducted in accordance with Berkeley Lab's standard practice of evaluating the potential presence of subsurface contamination at demolition/construction sites as part of a due diligence process. Requirements for the preliminary investigation were specified in the *Workplan for Initial Characterization of Subsurface Contamination - Demolition of Building 51 and the Bevatron*

(Berkeley Lab, 2010). This workplan was provided to the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC), the Regional Water Quality Control Board (Water Board), and the City of Berkeley at a Remedial Project Managers (RPM) meeting held at the DTSC's Berkeley office on November 5, 2010. At a second RPM meeting held on April 25, 2011, Berkeley Lab provided the regulatory agencies with an update on the status of the Building 51 investigations.

During this preliminary Bevatron investigation, relatively high concentrations of volatile organic compounds (VOCs) were detected in the soil and groundwater under the Building 51 Vacuum Pump Room (Room 10). In accordance with requirements specified in Berkeley Lab's Hazardous Waste Handling Facility Permit to notify the DTSC orally and in writing of an immediate or potential threat to human health or the environment, this finding was reported to the DTSC on June 6, 2011 by email and in a follow-up telephone conversation on June 7, 2011. The location of the Vacuum Pump Room is shown on Figure 3.

On August 16 2011, Berkeley Lab met with the DTSC at their Berkeley offices to provide an update on the status of the investigations and submitted a Workplan for Investigation and Interim Corrective Measure in the Vacuum Pump Room Area for the Building 51 and Bevatron Demolition Project to the DTSC for their review and approval. On August 25, 2011, the DTSC approved the proposed sampling methodology but stipulated that the ICM needed to be addressed in a separate document. All reference to an ICM was therefore removed from the workplan and the document *(Workplan for Investigation in the Vacuum Pump Room Area for the Building 51 and Bevatron Demolition Project*) was resubmitted to the DTSC on September 8, 2011. On September 22, 2011, another meeting was held at the DTSC Berkeley office, at which time DTSC provided additional comments on the workplan. The workplan was revised in accordance with the additional DTSC comments and resubmitted on October 6, 2011 (Berkeley Lab, 2011). DTSC approved the revised workplan on October 10, 2011 (DTSC, 2011). On October 14, 2011, DTSC representatives toured the Berkeley Lab site and attended a meeting that included a presentation on the status of the Building 51 investigations.

On March 14 2012, Berkeley Lab submitted a letter report to DTSC requesting approval for the extraction and treatment of groundwater from an observation well that was installed to

monitor the groundwater level in the backfill at the Former Bevatron site (Berkeley Lab, 2012a). On March 27 2012, Berkeley Lab met with the DTSC at their Berkeley office to discuss Berkeley Lab's March 14 request and to present a summary of the final results for the Bevatron investigations. At the meeting, the DTSC informed Berkeley Lab that a more detailed ICM workplan would be required to obtain approval for the extraction and treatment of contaminated groundwater at the former Bevatron site. The current Workplan has been prepared to comply with that requirement.

1.3 OBJECTIVE OF THE ICM

The objective of the ICM is to help control the downgradient migration of contaminated groundwater from the Former Vacuum Pump Room area of the Bevatron. As described in the following sections of this workplan, the groundwater level in the eastern end of the backfilled Bevatron Air Duct shafts has risen several feet (to within a few feet of the surface) since demolition of the Bevatron was completed. This groundwater is contaminated with the same suite of VOCs as has been detected in the adjacent Vacuum Pump Room and cooling tower areas. The results indicate that since demolition of the Bevatron and backfilling of the Air Duct shafts, contaminated groundwater has migrated from the former Vacuum Pump Room/cooling tower areas into the clean Air Duct backfill. Although the downgradient migration will likely be contained by a replacement subdrain that was installed in the former Bevatron Wind Tunnel area, this will not occur until a significant portion of the Bevatron backfill upgradient from the subdrain has become contaminated. The downgradient migration therefore poses an imminent threat to the environment that needs to be mitigated.

1.4 WORKPLAN ORGANIZATION

This Workplan is presented in several sections. Section 1.0 provides the purpose, background information, and objectives of the ICM. Section 2.0 presents a summary of existing conditions at the Site. The Site Conceptual Model for the proposed ICM area is presented in Section 3.0. Selection of the ICM is addressed in Section 4.0. A description of the proposed ICM is included as Section 5.0. ICM installation and operation considerations are presented in Section 6.0.

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2.0 SUMMARY OF EXISTING CONDITIONS

The description of existing conditions in the Vacuum Pump Room area is based on environmental investigations conducted between September 2010 and December 2011. The investigations included soil vapor, soil, and groundwater sampling and a Membrane Interface Probe (MIP) survey. The results of these investigations are reported in detail in the Report of Environmental Investigations in the Building 51A and Vacuum Pump Room Areas for the Building 51 and Bevatron Demolition Project (Berkeley Lab 2012b), and summarized in the following subsections. Results of the former Vacuum Pump Room area investigations have also been reported in the Berkeley Lab Environmental Restoration Program (ERP) Quarterly Progress Reports, which are submitted to the DTSC and provided to the Water Board and City of Berkeley. The Quarterly Progress reports are available on line at http://www.lbl.gov/ehs/erp/html/documents.shtml and at the main branch of the Berkeley Public Library.

2.1 PHYSICAL DESCRIPTION OF THE FACILITY

The Bevatron was constructed inside Building 51 in 1950 and ceased operation in 1993. It was a large, weak-focusing synchrotron accelerator used for conducting experiments in nuclear physics. The original Building 51 was expanded with two high-bay additions, 51A and 51B, in the late 1950s and 1960s. The Vacuum Pump Room was located on the main floor of Building 51 at the eastern end of several large air ducts and equipment tunnels (Figure 3).

2.2 SITE GEOLOGIC AND HYDROGEOLOGIC CONDITIONS

2.2.1 Physiography and Drainage

Prior to construction of the Bevatron, North Fork Strawberry Creek, which flows through Blackberry Canyon, passed between the current locations of Building 51 and Building 64. South of this area, a broader canyon containing an unnamed north-northwest-trending drainage passed through approximately the center of the present location of Building 51. Cut and fill activities

during development of the Bevatron site significantly transformed the topography and surface runoff patterns. The hillside along the south and east edges of Building 51 was excavated, including the upper reaches of the unnamed northwest-trending drainage. Storm drains were placed in the bottom of Blackberry Canyon northeast of Building 51 and along the unexcavated parts of the unnamed drainage prior to placing fill in the canyons. Since the hillside excavation intercepted the water table, various hillside drains, wells, and building subdrains were installed to convey intercepted groundwater to storm drains. The locations of the active subdrains that currently intercept groundwater are shown on Figure 3. The south perimeter subdrain lies adjacent to the retaining walls that formed the east and south walls of the Vacuum Pump Room. The Wind Tunnel subdrain lies approximately 60 feet west of the Vacuum Pump Room, and replaces a previously existing subdrain that was removed during demolition activities.

2.2.2 Geology

Two bedrock units (the Orinda Formation and the Great Valley Group) underlie the Bevatron Complex. Mudstones, sandstones, and shales of the Great Valley Group underlie the southwestern part of Building 51. The Orinda Formation, comprised primarily of clayey siltstones beneath the Bevatron Complex, overlies the Great Valley Group in the northeastern part of Building 51 including the Vacuum Pump Room area.

Colluvium several tens of feet thick is present in the former drainages that have been covered with artificial fill. The most extensive colluvial deposits lie along the former location of Blackberry Canyon. Colluvial deposits are also present within a former drainage course under the northwest portion of Building 51.

Artificial fill, consisting generally of gravelly, sandy, silty clay and clayey silt was used for cut and fill activities, including backfilling of the excavations surrounding the Air Ducts and Vacuum Pump Room retaining walls. Figure 4 is an historical photograph of the Bevatron construction site looking westwards from immediately southeast of the Vacuum Pump Room. The photograph shows the configuration of the bedrock surface prior to placement of backfill around the Air Duct shafts and behind the south perimeter wall and Vacuum Pump Room retaining walls.

2.2.3 Hydrogeology

Groundwater in the Vacuum Pump Room and Building 51A areas appears to flow mainly within the artificial fill. The underlying Orinda Formation generally has very low permeability and in most cases Orinda Formation rocks encountered in drilling throughout the Bevatron area appear dry, even when located beneath saturated overburden. G eological reports prepared before construction of Building 51 and geotechnical reports prepared during filling and compacting parts of Blackberry Canyon describe several springs at this site (Dames and Moore, 1949).

Groundwater flow beneath Building 51 h ad been controlled by the Bevatron subdrain systems prior to the demolition of Building 51 and parts of its internal subdrain system. Flow is still controlled to some extent by the remaining exterior components of the system, including the South Perimeter subdrain and hillside drains, and by a subdrain that was installed to replace the demolished Wind Tunnel subdrain system. The locations of the subdrains are shown on Figure 3.

A groundwater elevation contour map for the former Bevatron Complex is shown on Figure 5. G roundwater in areas uphill from the former Building 51 area flows generally northwards and westwards towards Building 51, where shallow groundwater is intercepted by the perimeter subdrains. Downhill from the perimeter subdrain, groundwater is directed generally northwestwards towards the lower, unfilled portion of Blackberry Canyon to the northwest of the Building 51 area. As a result, groundwater is very shallow along the upslope perimeter of Building 51 and water frequently intruded into the basement area during the wet season particularly at the east end of the Air Ducts and in the southeast part of the Wind Tunnel, where it was captured by floor drains. Approximately 4,000 to 10,000 gallons of groundwater per day were captured by the drainage systems during the wet season.

2.3 SOIL CONTAMINATION

Numerous soil borings were drilled and sampled in and adjacent to the Vacuum Pump Room as part of the Bevatron Demolition Project investigations to evaluate the distribution of soil contamination in the Vacuum Pump Room area. This characterization work was supplemented by a MIP survey in the cooling tower area immediately to the south of the Vacuum Pump Room. The locations of soil sampling points in the Vacuum Pump Room area are shown on Figure 6. The

primary soil contaminant detected was trichloroethylene (TCE), which was detected at a maximum concentration of 230 mg/kg at a depth of approximately 12 feet below the Vacuum Pump Room floor in SB51-11-9. Other VOCs detected in the former Vacuum Pump Room area included tetrachloroethylene (PCE), cis-1,2-dichloroethene (DCE), trans-1,2-DCE, 1,1-DCE, 1,1,1-trichloroethane (TCA), 1,1-dichloroethane (DCA), and benzene. These other contaminants were detected at relatively low concentrations, except for boring SB51-11-20, where PCE (1.0 to 6.3 mg/kg) was detected at concentrations higher than TCE in three of the four samples collected. SB51-11-20 was located adjacent to the location of a former sump on the south side of the southern Vacuum Pump Room wall.

A map showing the maximum concentrations of TCE and PCE detected at each soil boring location is shown on Figure 7. The figure shows that soil contamination is confined to a relatively small area beneath the southwest end of the Vacuum Pump Room and in the former cooling tower area immediately south of the Vacuum Pump Room retaining wall. The lateral extent of contamination is well defined by the non-detectable to low concentrations of VOCs in borings drilled around the periphery of the area and by the insignificant MIP detector responses over most of the cooling tower area (Berkeley Lab, 2012b). Except for SB51-11-9, where the maximum concentrations of VOCs were detected, the soil contamination appears to have been primarily limited to the areas adjacent to the Air Duct walls and southern wall of the Vacuum Pump Room. The vertical extent of contamination is also well-defined, as indicated by the analytical results and MIP detector responses shown on cross sections A-A' (Figure 8), B-B' (Figure 9), and C-C' (Figure 10). The locations of the cross sections are shown on Figure 7.

2.4 SOIL VAPOR CONTAMINATION

Soil vapor sampling locations in the former Vacuum Pump Room area are shown on Figure 11. Elevated concentrations of VOCs were detected three probes installed in the south end of the Vacuum Pump Room and the former cooling tower area. The primary soil vapor contaminants detected consisted of TCE, vinyl chloride, cis-1,2-DCE, and 1,1-DCA with lesser concentrations of trans-1,2-DCE, 1,1-DCE, and 1,1,1-TCA. Saturated conditions in much of the cooling tower area made collection of additional soil vapor samples unfeasible.

2.5 GROUNDWATER CONTAMINATION

Isoconcentration contour maps of total VOCs detected in groundwater are shown on Figure 12 for the Building 51 area and in detail on Figure 13 for the former Vacuum Pump Room Area. The primary contaminant detected in groundwater in the former Vacuum Pump Room area has been TCE, with significantly lower concentrations of 1,1,1-TCA, 1,1-DCA, 1,1-DCE, cis-1,2-DCE, trans-1,2-DCE, and carbon tetrachloride detected in a few of the sampling locations (Berkeley Lab, 2012b). The maximum concentration of total VOCs detected was in the initial sample collected from temporary groundwater sampling point SB51-11-9 shortly after it was installed. A sheen and very high TCE concentration (126,000 µg/L) was observed in this sample, indicating that dense non-aqueous phase liquid (DNAPL) was likely present. Subsequent groundwater samples have had significantly lower TCE concentrations (32,900 µg/L in July 2011 and 17,500 µg/L in January 2012). Groundwater samples collected from boreholes within several feet of SB51-11-9 contained total VOC concentrations orders of magnitude lower (maximum of 482 µg/L in SB51-11-24). Except for SB51-11-9 where the maximum concentrations of VOCs were detected in both the soil and groundwater, the groundwater contamination appears to have been primarily limited to the areas adjacent to the Air Duct walls.

2.6 DATA QUALITY

All of the sampling data described above were collected in accordance with the Berkeley Lab ERP Quality Assurance Program Plan (Berkeley Lab 2009), which covers field and laboratory quality control. Data quality assessment was performed in accordance with Berkeley Lab EH&S Procedure 257 Data Quality Objectives and Assessment. Data quality checks (verification/validation) on the analytical data are performed by the Berkeley Lab Environmental Services Group (ESG) database to determine if a data set has achieved the required Data Quality Objectives (DQOs) for accuracy, precision, completeness, and comparability. Following the database review, representative data sets in the analytical laboratory hard copy reports are manually compared to the information in the database. As part of ERP reporting process, all sampling data and quality assurance/quality control findings are reported to the DTSC in the ERP quarterly progress reports. No findings that could affect data quality were noted for the data presented in this Workplan.

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3.0 SITE CONCEPTUAL MODEL

3.1 SOURCE AND LOCATION OF SOIL CONTAMINATION

There is substantial vertical relief across the Vacuum Pump Room area because the main floor and basement levels along the east and south sides of Building 51 were built into excavated portions of the adjacent hillside (Figure 4). The Vacuum Pump Room floor lies at an elevation of 710 feet above mean sea level (msl), while the floor of the adjacent Air Duct shafts (prior to backfilling) lay 10 feet lower at an elevation of 700 feet. The exterior cooling tower area to the south lies at an elevation of approximately 725 feet. The elevation of each area is indicated by shading on Figure 6, and is illustrated on the cross sections shown on Figures 8 and 9. This vertical relief, in combination with the configuration of the geologic contact between artificial fill and the Orinda Formation bedrock has constituted a significant control on the migration of soil contaminants from the initial release area to their current location, as described below.

Relatively high concentrations (i.e. exceeding 3 mg/kg) of total VOCs were detected in three contiguous zones of soil contamination: 1) from approximately 2 feet to 15 feet below ground surface (bgs) (elevation 710 to 723 feet) in the area where a sump was located immediately south of the Vacuum Pump Room south wall (Figure 10); 2) from 3 to 4.5 feet bgs (elevation 705.5 to 707 feet) in boring SB51-11-31 drilled in the Vacuum Pump Room immediately north of the southern wall (Figures 8 and 10); and 3) from 11 to 20 feet bgs (elevation 690 to 699 feet) beneath the Vacuum Pump Room itself (Figures 8 and 9). The contaminant suite in all three zones is similar (i.e. primarily TCE, with significantly lower concentrations of other constituents) except for the former sump area, which had higher PCE than TCE concentrations in some samples. The general absence of shallow contamination within the Vacuum Pump Room (except for boring SB51-11-31 adjacent to the south wall) indicates that the contamination probably did not originate from a release inside the Vacuum Pump Room.

The pattern of contamination as shown on the cross sections and the similarity of contaminants in the three zones suggests that the contamination in all three zones was derived from a single source, likely the former sump location. The fact that PCE was only detected in the soil samples collected near the former sump location and at relatively high concentrations (i.e. higher

than other VOCs including TCE) is further evidence that the former sump was a likely source of release of PCE.

The migration of contamination beneath the south wall of the Vacuum Pump Room from the former sump area likely occurred as the result of the downward movement of the contamination along the contact between the relatively permeable artificial fill and the underlying relatively impermeable Orinda Formation bedrock. This hypothesized migration pathway is illustrated on Figure 8. Figure 4 is a photograph showing the excavated bedrock surface during construction of the Bevatron and prior to backfilling with artificial fill, and indicates both the approximate location of the former sump and the likely migration pathway towards the area behind the Air Ducts. The absence of PCE and presence of less-chlorinated compounds (i.e. TCE, DCE, vinyl chloride, etc.) in the samples collected beneath the former Vacuum Pump Room could be the result of the reductive dechlorination of PCE as it migrated from the former sump area.

After migrating beneath the southern Vacuum Pump Room wall, the contamination appears to have spread laterally through the backfill of the Air Duct shaft walls. As described in Section 2, this interpretation is based on the relatively high concentrations of contaminants detected in samples collected in fill or immediately adjacent to the fill behind the walls (Figure 7 for soil and Figure 13 for groundwater). An exception is SB51-11-9, where the contamination appears to have migrated approximately 10 feet downwards into the underlying relatively impermeable Orinda Formation (Figure 9). The reason for the relatively deep penetration of contaminants into the Orinda formation is not known, but may be related to the presence of DNAPL.

As described above, the most likely sources of the soil and groundwater contamination detected in the Vacuum Pump Room area were releases from the sump in the former cooling tower area. An additional, though less likely hypothesis, is that the contamination detected beneath the Vacuum Pump Room is from a different source, possibly a release from the Air Duct drain system or a spill in the Air Duct area.

3.2 GROUNDWATER CONTAMINATION

As shown on Figure 12 and Figure 13, the extent of VOC-contaminated groundwater in the area downgradient (northwest) of the Vacuum Pump Room area has been limited. This is likely

due to the very low hydraulic conductivity of the bedrock, combined with the previous capture of contaminants by the Bevatron subdrain and floor drain systems. Prior to demolition of the Bevatron, there was approximately a 5 to 10 foot difference in the hydraulic head between the Vacuum Pump Room/cooling tower and Air Duct areas. Contaminated groundwater seeping through the concrete walls and floors of the Air Duct shafts and along the southeast edge of the Wind Tunnel was previously captured by the Air Duct and Wind Tunnel floor drain systems. The floor drain system was removed as part of the Bevatron Demolition Project. The effluent from the systems had been routed to the Building 51 Motor Generator Room treatment system from 1990 until 2011.

Although the Demolition Project scope included completely removing the concrete Air Duct Walls and floors, the easternmost sections (approximately 10 to 25 feet) were left in place to help limit potential post-demolition migration of contaminated groundwater from the Vacuum Pump Room/cooling tower areas into the Air Duct shaft and Wind Tunnel backfill. However, since the Air Duct shafts were backfilled and the Air Duct floor drain system was capped, the groundwater level in the backfill at the eastern end of the Air Duct shafts has risen several feet (to within a couple of feet of the surface), as shown by water level measurements in observation well OC51-11-1, which was installed to monitor the water level in the backfill. The locations of OC51-11-1 and the remaining concrete Air Duct walls are shown on Figure 14.

In December 2011, VOCs were detected at a total concentration of 264 µg/L in a groundwater sample collected from OC51-11-1. The primary VOCs detected were TCE (189 µg/L) and cis-1,2-DCE (52 µg/L). A second grab sample collected on March 9, 2012 contained VOCs at a total concentration of 194 µg/L, including 159 µg/L of TCE. The VOCs detected in the groundwater generally constituted the same suite of VOCs as has been detected in the adjacent Vacuum Pump Room and cooling tower areas. These results indicate that contaminated groundwater continues to seep through pores and joints in the concrete and possibly around the remaining concrete wall.

As described above, the Wind Tunnel subdrain system was removed to complete the Bevatron Demolition Project, but a replacement Wind Tunnel subdrain was installed at approximately the same location and elevation of the original system to control the groundwater

elevation in the former central Bevatron area. The location of the new subdrain system is shown on Figure 3. T he replacement Wind Tunnel subdrain system should help to limit migration of groundwater contamination from the Air Duct shaft backfill into the Wind Tunnel backfill.

3.3 POTENTIAL RISK TO HUMAN HEALTH AND THE ENVIRONMENT

To assess potential risks, detected concentrations of contaminants were compared to regulatory screening levels appropriate to an industrial land use scenario. Institutional (i.e. industrial) land use is the current and the reasonable and likely future land use at Berkeley Lab, and was therefore the land use scenario that has been approved by DTSC to establish cleanup requirements for the entire Berkeley Lab site (Berkeley Lab, 2005).

3.3.1 Regulatory Screening Levels

Screening levels for VOCs in soil, soil vapor, and groundwater are based on the potential risk to human health and the environment for three primary pathways: protection of groundwater; direct worker contact with the soil; and, potential vapor intrusion into indoor air (inhalation). The applicable screening criteria to assess potential risk from the first two pathways are the Water Board Environmental Screening Levels (ESLs) (http://www.swrcb.ca.gov/rwqcb2/esl.shtm). The applicable screening levels for the inhalation pathway for the Berkeley Lab site are Cal/EPA California Human Health Screening Levels (CHHSLs) (Cal/EPA, 2005) (or ESLs for VOCs that have no established CHHSLs). E SLs and CHHSLs are generic screening levels used to help identify areas, contaminants, and conditions that do not require further attention at a particular site. Generally, at sites where contaminant concentrations fall below these screening levels, no further action or study is warranted.

The regulatory screening levels are listed in Table 1 for the primary contaminants detected in soil, soil vapor, and groundwater beneath the former Vacuum Pump Room area.

Table 1

Screening Levels and Media Cleanup Standards for VOCs

Contaminant	Soil		Soil Vapor	Groundwater	
	Groundwater Protection (ESLs*) (mg/kg)	Human Health -Direct Contact (ESLs*) (mg/kg)	Human Health Inhalation (CHHSLs*) ($\mu g/m^3$)	Drinking Water Source Protection (ESLs*) (µg/L)	Human Health Inhalation (ESLs*) (µg/L)
Tetrachloroethene (PCE)	0.70	0.95	603	5	420
Trichloroethene (TCE)	0.46	4.1	1,770	5	1,800
Vinyl Chloride	0.085	0.047	44.8	0.5	13

* The presence of chemicals at concentrations in excess of the regulatory screening levels does not necessarily indicate the existence of present or future risks to human health or the environment, but suggests that further evaluation or continued monitoring may be warranted.

3.3.2 Potential Risk to Human Health

Currently, there is no significant risk to human health associated with VOC contamination detected in the former Vacuum Pump Room area. The potential exposure pathways relevant to human health risks are inhalation due to vapor intrusion into indoor air and/or direct contact with contaminated soil. VOCs have been detected in soil vapor and groundwater at concentrations well above CHHSLS and/or ESLs for potential risk to potential future indoor workers via the vapor intrusion pathway. However, there is no risk to current workers since this pathway is not complete because there are no buildings overlying the areas where the screening levels are exceeded. The closest occupied building (Building 64) is approximately 300 feet from the areas of elevated soil vapor concentrations.

The exposure pathway that is currently potentially complete is dermal contact with VOC-contaminated soil by outdoor workers. Concentrations of VOCs in the soil exceed the ESL for direct contact in the upper 10 feet of soil at two limited locations in the former Vacuum Pump Room area. The first (SB51-11-31) is in the former Vacuum Pump Room itself, where TCE was detected at a concentration of 32 mg/kg at a depth of 3 feet. The second (SB51-11-20) is in the

former cooling tower area to the south of the Vacuum Pump Room, where PCE was detected at a concentration of 5.3 mg/kg at a depth of 3 feet and 6.3 mg/kg at a depth of 6 feet. Both of these locations have been posted with warning signs requiring Hazardous Waste Operation (HAZWOPER) training for any worker handling soil in the posted area. Also, Berkeley Lab has an institutional process that requires a penetration permit for all soil disturbances. The permit process includes an assessment of potential subsurface contamination issues by the Berkeley Lab Environmental Services Group.

Since the exposure pathways for risks to human health are not complete or are mitigated by institutional controls, this ICM does not address contamination associated with these pathways.

3.3.3 Potential Risk to the Environment

The former Building 51 site is located within the developed area of Berkeley Lab. Potential exposure of wildlife to soil and groundwater contamination within the developed area was eliminated as a completed exposure pathway in the Berkeley Lab Ecological Risk Assessment (Berkeley Lab, 2002) because suitable habitat for wildlife, is restricted to the natural, perimeter areas of Berkeley Lab, and is not present in the central developed area.

As described above, the extent of groundwater contamination in the former Vacuum Pump Room area has been limited. However, since demolition of the Bevatron and backfilling of the Air Duct shafts, contaminated groundwater has been migrating from the Former Vacuum Pump Room/cooling tower areas into the clean Air Duct backfill. The replacement Wind Tunnel subdrain system is likely to limit the extent of migration through the backfill, but this will not occur until contaminated groundwater has migrated into areas where groundwater is currently clean, and until a significant portion of the Air Duct and Wind Tunnel backfill has been impacted by contaminated groundwater. These potential impacts are considered to be imminent threats to the environment, and are therefore the subject of the ICM described in the following sections.

In addition to the immediate threat of downgradient impacts described above, soil contaminant concentrations in the former Vacuum Pump Room area exceed ESLs for protection of groundwater, so constitute a continuing long-term threat to groundwater quality. Remediation of

the source area soil would likely reduce or eliminate this threat and may be considered as a long-term corrective action, but is not being proposed as part of the proposed ICM.

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4.0 SELECTION OF INTERIM CORRECTIVE MEASURES

4.1 PRESUMPTIVE RESPONSE STRATEGY

The United States Environmental Protection Agency (USEPA) has developed a presumptive response strategy to integrate site characterization, early actions, remedy selection, performance monitoring, remedial design, and remedy implementation activities into a comprehensive, overall response strategy for sites with contaminated groundwater (USEPA, 1996). The EPA strategy was originally developed for CERCLA sites, but the EPA guidance document specifies that the strategy should also be used at Resource Conservation and Recovery Act (RCRA) corrective action sites. In summarizing the presumptive response strategy, the guidance document notes that:

"In general, ground-water response actions especially those using extraction and treatment, should be implemented in more than one phase." In the two-separate-action approach "an early or interim ground-water action is followed by a later, more comprehensive action (the long-term remedy)." (USEPA, 1996)

The guidance includes the following early actions that should be considered:

- Contain the plume to prevent further migration of the contaminant plume.
- Prevent migration of contaminants from the source area

4.2 PREVENTION OF PLUME MIGRATION

As detailed in the preceding sections, the primary pathway for plume migration is seepage of contaminated groundwater through the remaining concrete Air Duct shaft walls and floor slab into the clean, relatively permeable fill within and downgradient from the Air Ducts. This seepage is driven by the significant hydraulic head difference between groundwater beneath the Vacuum Pump Room floor and groundwater within the former Air Ducts to the west. The EPA presumptive remedy guidance lists plume containment and plume "hot spot" containment or treatment as the early actions to be considered for prevention of plume migration. The proposed ICM will therefore focus on plume and "hot spot" containment by groundwater extraction and

treatment to the east of the remaining Air Duct walls. Extraction in this area should reduce the hydraulic head difference that drives seepage through the former Air Duct walls and floor slab.

4.3 PREVENTION OF MIGRATION OF CONTAMINANTS FROM THE SOURCE AREA

The original contaminant source for the site was apparently the former sump immediately south of the Vacuum Pump Room wall in the cooling tower area. However, the majority of the contaminant mass is now located in the zone that lies between 10 to 20 feet beneath the former Vacuum Pump Room floor, and this zone constitutes a secondary source area that is the main ongoing threat to groundwater quality.

The EPA presumptive remedy guidance lists source removal/treatment or source containment as the early actions to be considered for prevention of migration of contaminants from a source area. Although source removal/treatment may be an appropriate long-term remedy, it is considered to be inappropriate for an ICM at this site for the following reasons. The contaminated zone adjacent to and beneath the former sump location is located behind a retaining wall that is held in place with an engineered tie-back system that could potentially be impacted by any removal or in situ treatment actions conducted in that area. The secondary source area is located relatively deep beneath the Vacuum Pump Room floor. Excavation in this area could potentially undermine nearby retaining walls, and in situ treatment is probably unfeasible due to the presence of contaminants in very low permeability bedrock. Source removal or treatment in both of these areas would require a significant engineering effort to address site conditions that would be beyond the scope of an ICM. For this reason, the proposed ICM will focus on source containment for the secondary source zone beneath the Vacuum Pump Room Floor that constitutes the primary threat to groundwater quality. The proposed source containment will consist of the extraction and treatment of groundwater to prevent plume migration. Groundwater extraction will be implemented as close to the secondary source zone as feasible.

4.4 GROUNDWATER TREATMENT TECHNOLOGIES

The presumptive remedy guidance lists the following treatment technologies for treatment of extracted VOC-contaminated groundwater:

- Air stripping
- Granular activated carbon (GAC)
- Chemical/UV oxidation
- Aerobic biological reactors

Berkeley Lab previously installed the Building 51 Motor Generator Room GAC system to treat extracted groundwater derived from the Building 51 drain system as part of an approved remedy under the RCRA Corrective Action Program (CAP). This treatment system is located relatively close to the Vacuum Pump Room area and has sufficient capacity to treat contaminated groundwater that would be extracted as part of the ICM. Therefore, the ICM will include plumbing of the proposed groundwater extraction wells to the Building 51 Motor Generator Room GAC system. Clean effluent from the system is either reinjected as part of the approved soil flushing remedy for the Building 51/64 Groundwater Solvent Plume, or discharged under permit to the sanitary sewer, depending on the water needs of the soil flushing system.

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5.0 DESCRIPTION OF PROPOSED INTERIM CORRECTIVE MEASURE

5.1 ICM OBJECTIVE

The objective of the ICM is to help control the downgradient migration of contaminated groundwater from the Vacuum Pump Room area into the clean backfill in the Air Duct shafts and Wind Tunnel. Downgradient migration of contaminated groundwater will be controlled by extracting groundwater from both the source area of the groundwater contamination and downgradient of the source area in the Air Duct backfill.

5.2 SYSTEM DESIGN

The ICM will comprise construction of an extraction well in the former Vacuum Pump Room area, extraction of groundwater from the new extraction well and existing observation well OC51-11-11, and treatment of the extracted groundwater at the existing Building 51 Motor Generator Room Treatment System.

5.2.1 Extraction Well

A 2-foot diameter groundwater extraction well (EW51VPR-12-1) will be drilled to a depth of 20 feet (approximately 10 feet beneath the Air Duct floor) inside the southern part of the former Vacuum Pump Room upgradient from the Air Duct shafts. Three contiguous 2-foot diameter borings will be drilled immediately adjacent to the extraction well and will be backfilled with drain rock to enhance the yield of the extraction well. The multiple large-diameter borings are required for groundwater extraction due to the low hydraulic conductivity of the artificial fill and bedrock beneath the former Vacuum Pump Room location.

The location of the proposed extraction well is shown on Figure 14 and Figure 15. The well will extract groundwater from the area where the maximum levels of soil and groundwater contamination were detected in well SB51-11-9 beneath the Vacuum Pump Room. SB51-11-9 will be overdrilled and removed as part of the groundwater extraction well installation process. A

schematic diagram of extraction well construction details is provided on Figure 16. Five-inch slotted PVC casing (15-foot screen and 5-foot riser) will be installed in the extraction well boring. The annulus of the extraction well will be backfilled with 3/4-inch (nominal) clean drain rock to an elevation approximately 1-foot above the screen. A 3-foot bentonite seal will be placed above the drain rock. The remainder of the annulus will be backfilled with a cement-bentonite grout seal. A submersible Grundfos pump equipped with level sensor switches will be installed for groundwater extraction. The other three borings will be backfilled with drain rock, bentonite, and grout to the same elevations as the extraction well.

In addition to extraction of groundwater from EW51VPR-12-1, a submersible Grundfos pump equipped with level sensor switches will be installed in the existing observation well OC51-11-1 to allow groundwater extraction. Construction details for OC51-11-1 are described below and shown on Figure 17:

1. Four-inch diameter Schedule 40 PVC casing (4 feet of screen and 8 feet of solid casing) was placed in a 2-foot deep sump that had previously been excavated beneath the Air Duct shaft floor. The sump had been installed to lower the water table in order to allow soil sampling in the Air Duct shaft.
2. The sump around the casing was filled with drain rock.
3. Filter fabric was wrapped around the screen portion of the casing that extended above the drain rock.
4. A 1.5-foot high containment berm was installed in the Air Duct shaft and the floor covered with drain rock to a depth of about 1.5 feet.
5. The Air Duct shafts were backfilled with clean soil and the soil compacted to 90 percent.

5.2.2 Piping

Copper piping will be installed to carry the water from the extraction locations to the existing Building 51 Motor Generator Room GAC Treatment System (Figure 14).

5.2.3 Treatment System

The Building 51 Motor Generator Room Treatment System consists of two 1000-pound GAC canisters installed in series to ensure that contamination will not be present at detectable concentrations in the post-treatment effluent. Ancillary equipment includes particulate filters;

pressure gauges; flow totalizers; flow control, pressure relief, and back flow control valves; sampling ports; and electric power controls. The treatment system treats water from a sump that was located in the Motor Generator Room Basement (the Building 51 MGR Basement Discharge Sump) and three existing groundwater extraction wells. The water in the discharge sump originates from a complex of hillside exterior relief wells/subdrains (to the east of the building) connected to the building's interior floor drainage system. Water in the discharge sump is directed by pumping with an automatic sump pump to the treatment system. The location of the system is shown on Figure 14 and a schematic diagram of water flow through the system is shown on Figure 18.

5.3 OPERATING STRATEGY

Groundwater will be pumped continuously from the submersible pump that will be installed in the groundwater extraction well described above. Groundwater will also be continuously pumped from observation well OC51-11-1, unless pumping groundwater from the extraction well in the former Vacuum Pump Room itself can lower the water table to the base of the backfill in the Air Duct shafts.

5.4 SHUTDOWN EVALUATION

The system will operate until DTSC approves a request to terminate operation. It is anticipated that this will not happen until an alternative remedial measure is implemented or it can be demonstrated that in the absence of system operation, the groundwater contamination will not migrate and contaminant concentrations in the groundwater will remain below risk-based levels.

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6.0 SYSTEM INSTALLATION AND OPERATION

6.1 PUBLIC INVOLVEMENT

Prior to DTSC making a final determination on the proposed ICM, DTSC will prepare a Fact Sheet/Public Notice, which will be distributed to interested parties on the site mailing list. The Fact Sheet will provide a description of the proposed ICM and will include an announcement of a period of at least 30 days for the public to review the document and provide comments to the DTSC. At the close of the comment period, DTSC will make a final decision after considering all comments. DTSC will then prepare a Responsiveness Summary, addressing comments, which will be placed in the administrative record.

6.2 PERMITTING

Well construction will comply with applicable requirements, including the DTSC Guidance manual for Groundwater Investigations (DTSC, 1994). Permits for well construction will be obtained from the City of Berkeley Toxics Management Division.

6.3 SOIL DISPOSAL

Soil samples will be collected from the soil generated from drilling of the extraction wells and other activities to determine the appropriate soil disposal alternatives. The soil will be analyzed for VOCs by EPA Method 8260 and any other analytes required by the prospective disposal facility for profiling purposes. Contaminated soil will be disposed of at a California Integrated Waste Management Board (CIWMB) permitted solid waste facility (landfill).

6.4 PERFORMANCE EVALUATION AND REPORTING

Within 60 days following completion of ICM construction, Berkeley Lab will submit an Interim Corrective Measures Completion Report to the DTSC. The report will include the following information:

- A summary of the nature of the threat.

- A description of the ICM as constructed, including as built drawings.
- Results of any operational testing and/or monitoring indicating the estimated effectiveness of the system.

Groundwater samples will be collected weekly (at a minimum) for eight weeks from the two extraction locations and then at least quarterly.. Samples will be analyzed for VOCs by EPA method 8260. All results will be reported in the Semiannual Progress Reports that are submitted to DTSC. Results available at the time of submission will be reported to the DTSC in the ICM Completion Report.

6.5 SCHEDULE

The schedule is contingent on the date of DTSC approval of the Workplan. Once approval is obtained, it is anticipated that it will require approximately 45 days to implement the ICM.

7.0 REFERENCES

Berkeley Lab, 2002. *Ecological Risk Assessment for Chemicals for Lawrence Berkeley National Laboratory*, Environmental Restoration Program, Lawrence Berkeley National Laboratory, Berkeley, California, December 2002.

Berkeley Lab, 2005. *Corrective Measures Study Report*, Environmental Restoration Program, Lawrence Berkeley National Laboratory, Berkeley, California.

Berkeley Lab, 2009. *Lawrence Berkeley National Laboratory Quality Assurance Program Plan*, Revision 5, Environmental Restoration Program, Lawrence Berkeley National Laboratory, Berkeley, California, September 2009.

Berkeley Lab, 2010. Environmental Restoration Program, *Workplan for Initial Characterization of Subsurface Contamination Demolition of Building 51 and the Bevatron for the Lawrence Berkeley National Laboratory*, Environmental Restoration Program, Lawrence Berkeley National Laboratory, Berkeley, California.

Berkeley Lab, 2011a. *Investigation Workplan for Supplemental Sampling for the Building 51 and Bevatron Demolition Project for the Lawrence Berkeley National Laboratory*, Environmental Restoration Program, Lawrence Berkeley National Laboratory, Berkeley, California, April 2011.

Berkeley Lab, 2011b. *Workplan for Further Investigation in the Vacuum Pump Room Area for the Building 51 and Bevatron Demolition Project for the Lawrence Berkeley National Laboratory*, Environmental Restoration Program, Lawrence Berkeley National Laboratory, Berkeley, California, October 2011.

Berkeley Lab, 2012a. *Proposal to Extract and Treat Groundwater to Mitigate the Migration of Contaminated Groundwater in the Former Bevatron Area,* ES-12-065, letter via e-mail from Ron Pauer (Berkeley Lab to Jacinto Soto (DTSC), March 14, 2012.

Berkeley Lab, 2012b. *Report of Environmental Investigations in the Building 51A and Vacuum Pump Room Areas for the Building 51 and Bevatron Demolition Project for the Lawrence Berkeley National Laboratory*, Environmental Restoration Program, Lawrence Berkeley National Laboratory, Berkeley, California, April 2012.

Cal/EPA, 2005, *Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties*, California Environmental Protection Agency, Department of Toxic Substances Control, January 2005.

Cal/EPA, 2010, *Advisory-Active Soil Gas Investigation (Draft for Review)*, California Environmental Protection Agency, Department of Toxic Substances Control, March 2010.

Dames and Moore, 1949. *Control of Compacted Fill Cyclodrome Development*, Radiation Laboratory, University of California, Berkeley, California, October 11, 1949.

DTSC, 1994. *Guidance Manual for Groundwater Investigations, Interim Final*, California Environmental Protection Agency Department of Toxic Substances Control, August.

DTSC, 2011. Letter from Jacinto Soto (DTSC) to Iraj Javandel (Berkeley Lab), October 10, 2011.

DWR, 1991. *California Well Standards*, Bulletin 74-90. California Department of Water Resources, June 1991.

EPA, 1996. *Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites, Final Guidance,* Environmental Protection Agency, EPA 540/R-96/023, PB96-963508, October 1996.

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Figure 18. Schematic Diagram of Building 51 Motor Generator Room Basement Treatment System.

MW51-96-16	Groundwater monitoring well
MW90-6	Properly destroyed monitoring well
T SB51-11-1	Temporary groundwater sampling point
T SB64-98-16	Properly destroyed sampling point
	Groundwater extraction well
	Soil boring
	Angled boring
	Membrane interface probe boring
	Groundwater extraction well
	Soil vapor sampling point
GAC	Groundwater treatment system

NOTES:
All other symbols used are explained on the □gures.

Key to Symbols Used on Figures.

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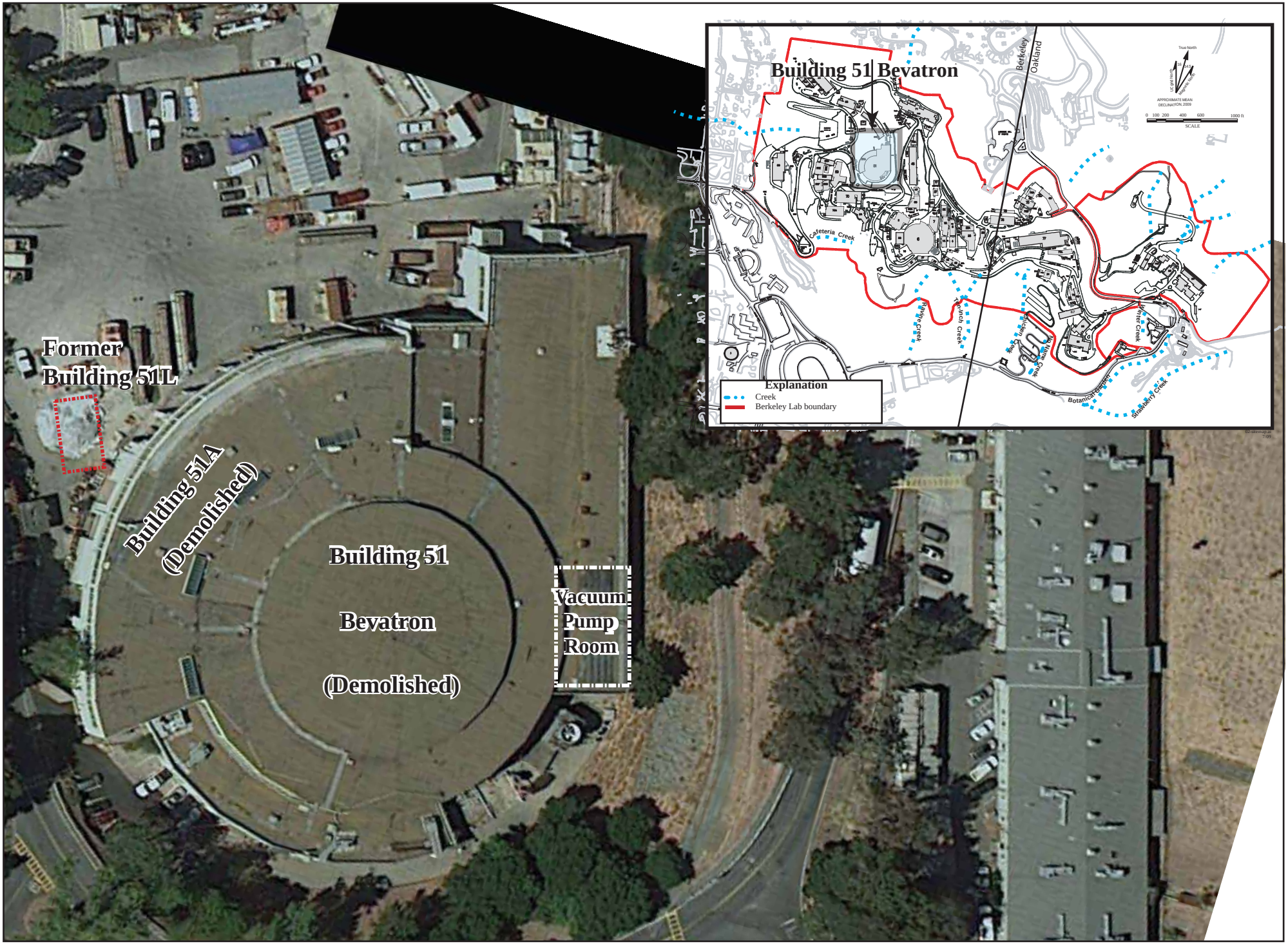

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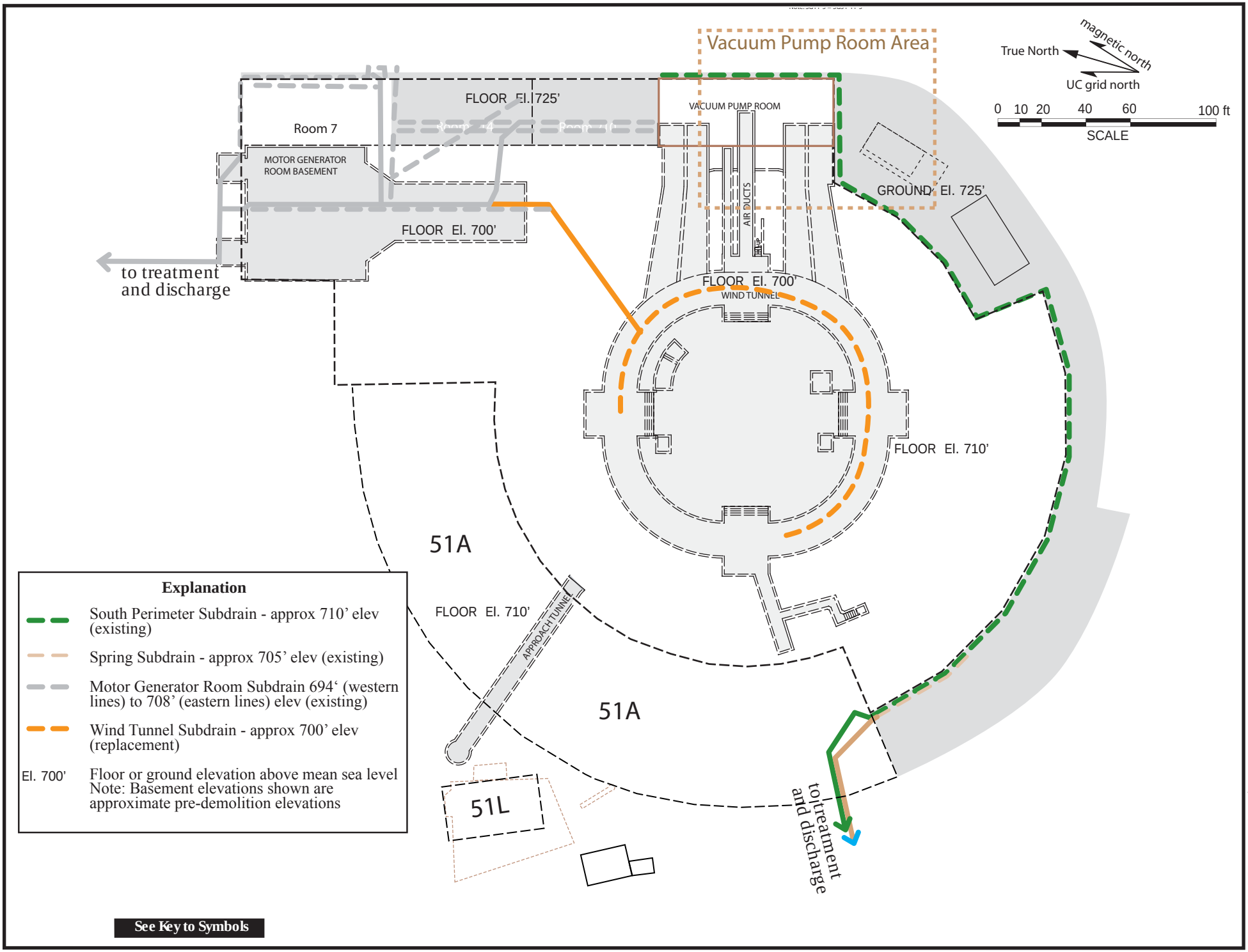

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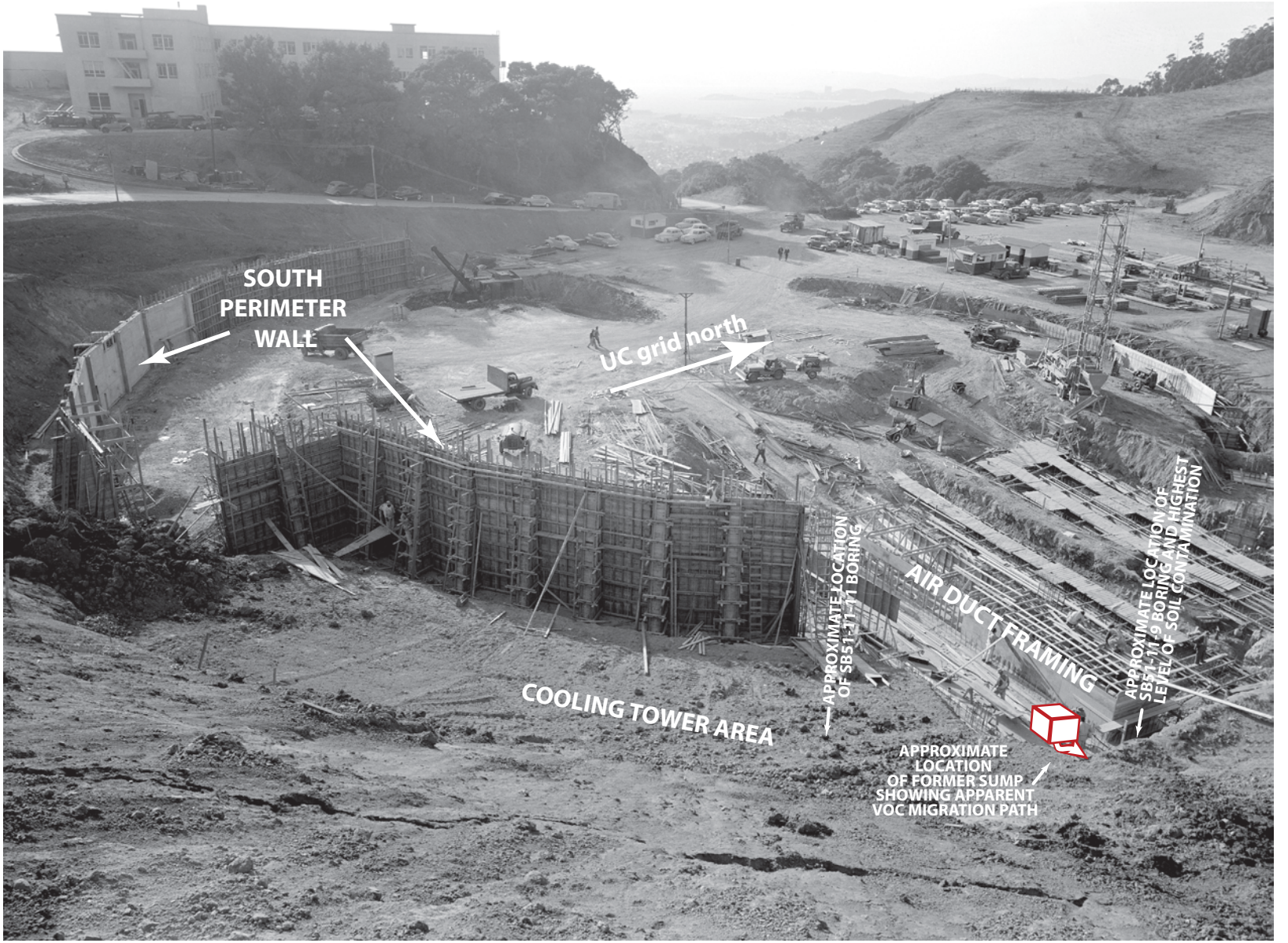

Figure 4. Bevatron Overview During Construction of Air Ducts and South Perimeter Wall.

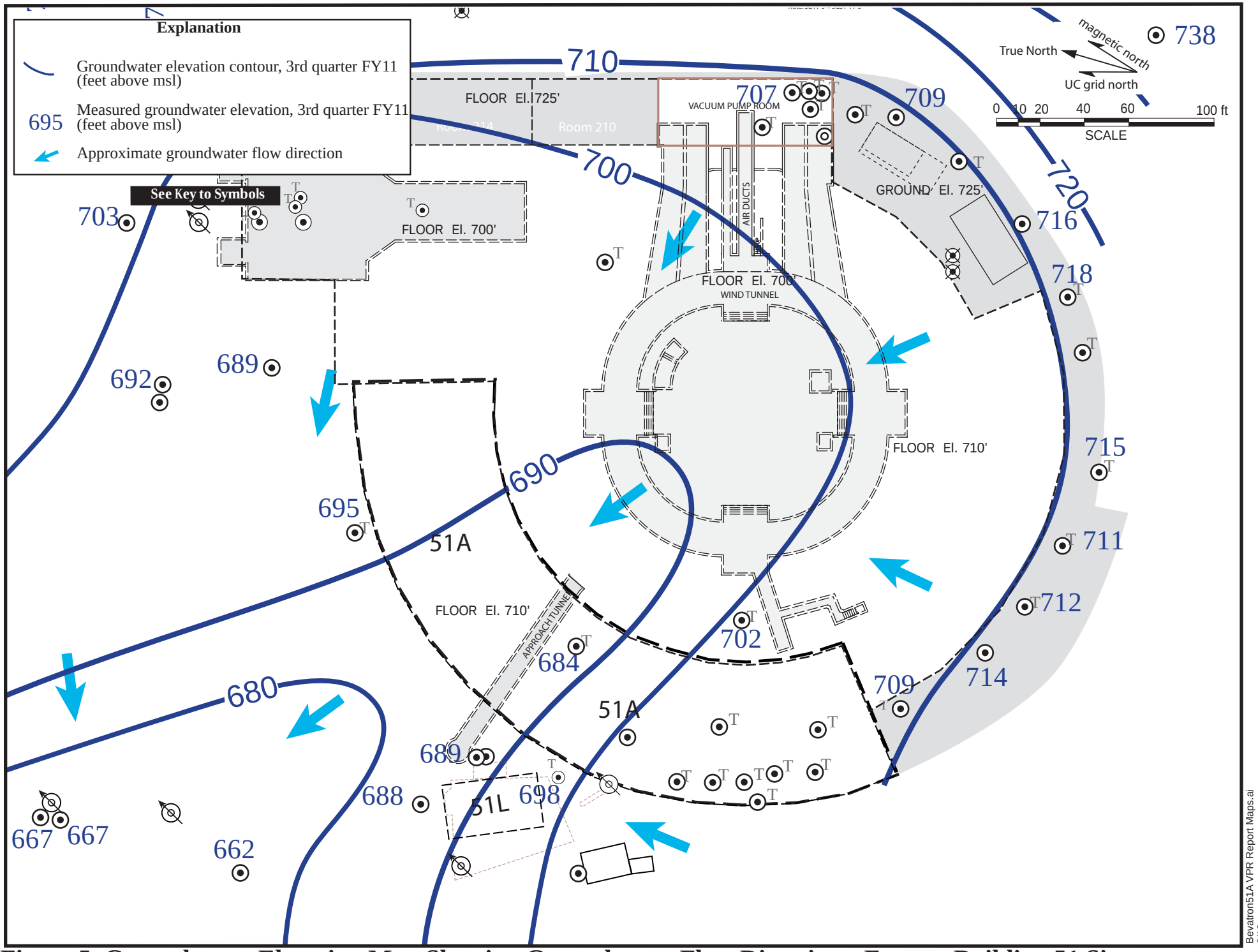

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Figure 5. Groundwater Elevation Map Showing Groundwater Flow Directions, Former Building 51 Site

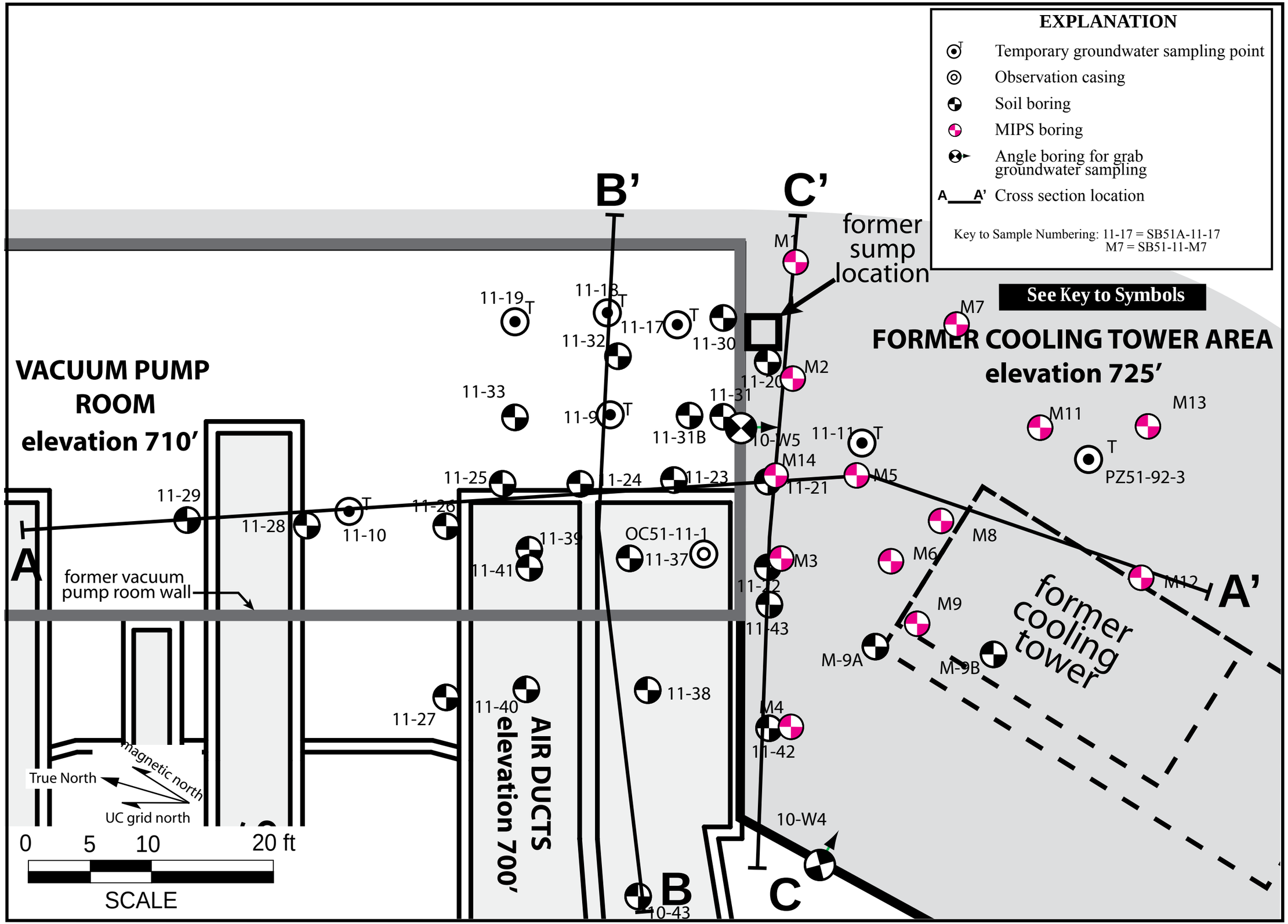


Figure 6. Boring, Well and Cross Section Location Map, Vacuum Pump Room Area.

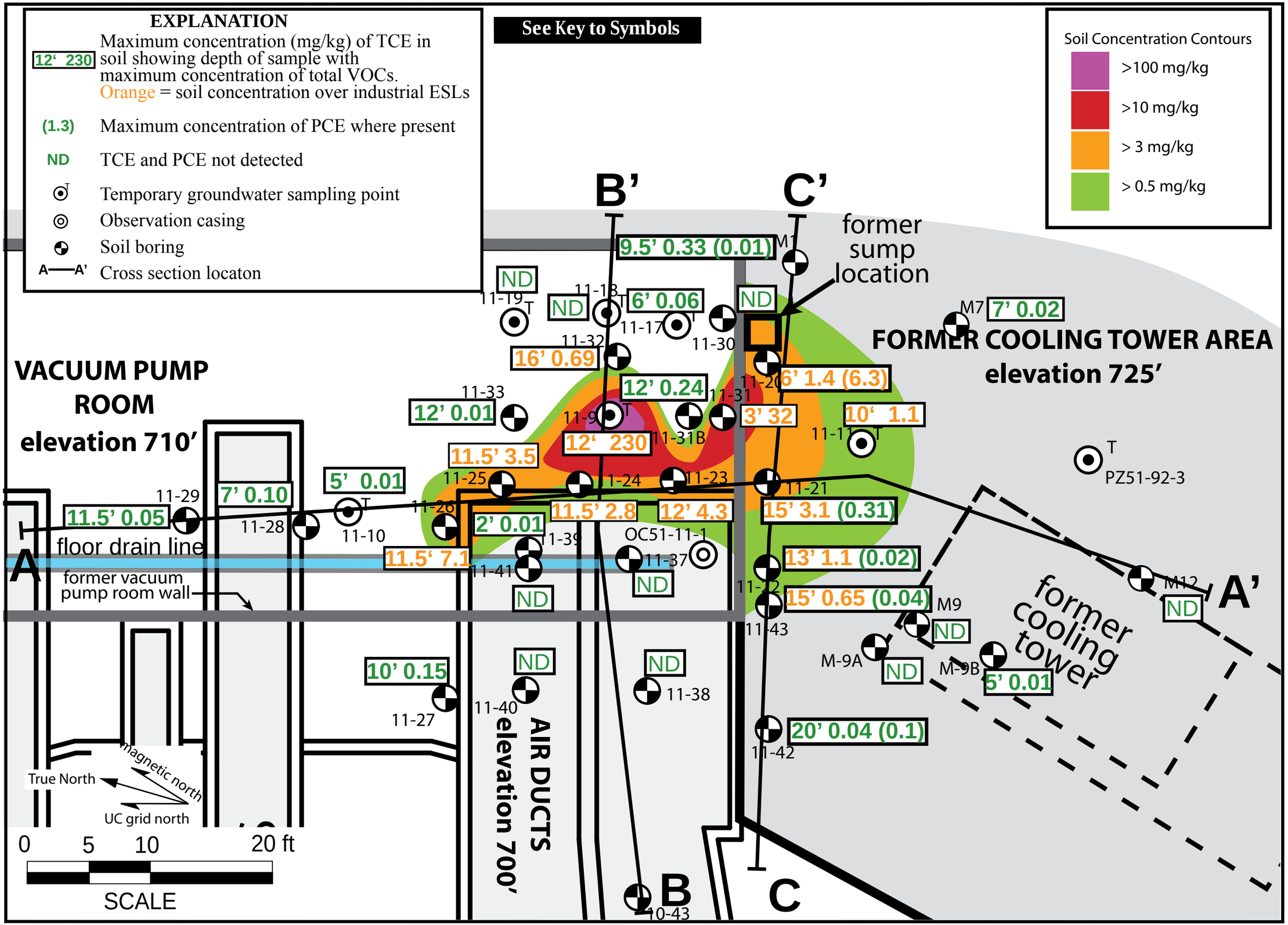
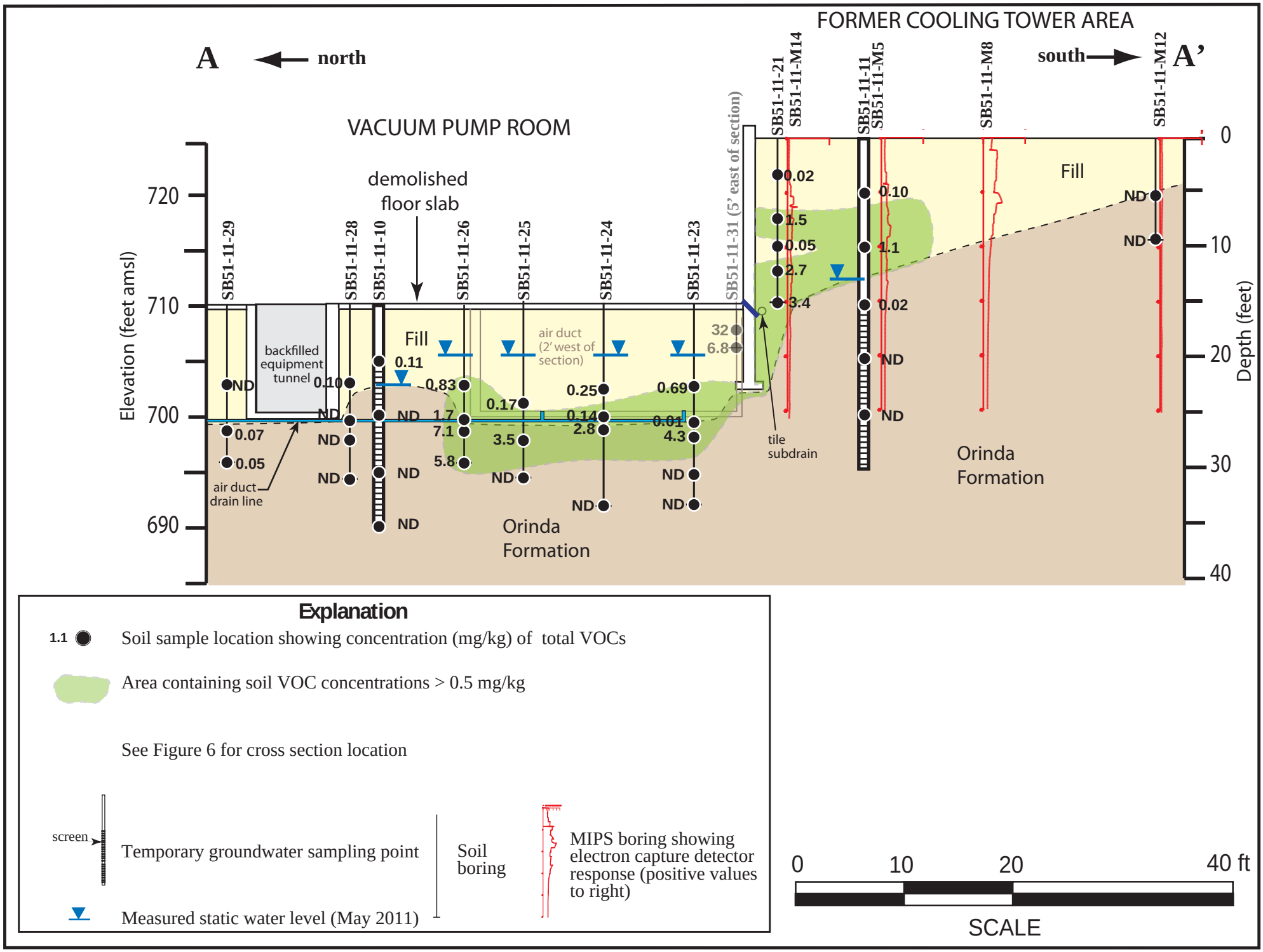


Figure 7. Concentrations of TCE and (PCE) Detected in Soil, Vacuum Pump Room Area.



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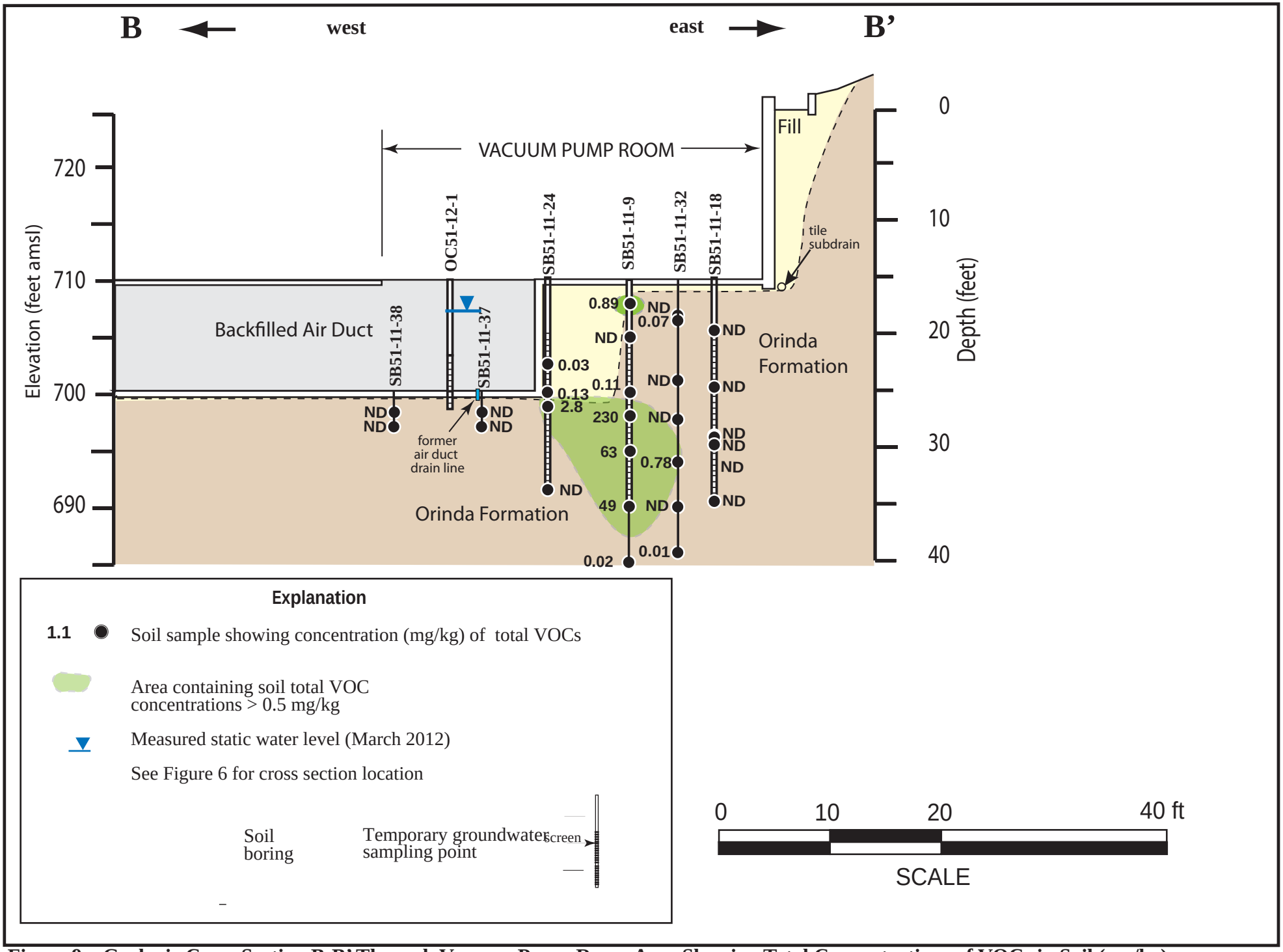


Figure 9. Geologic Cross Section B-B' Through Vacuum Pump Room Area Showing Total Concentrations of VOCs in Soil (mg/kg) and MIP ECD Responses.

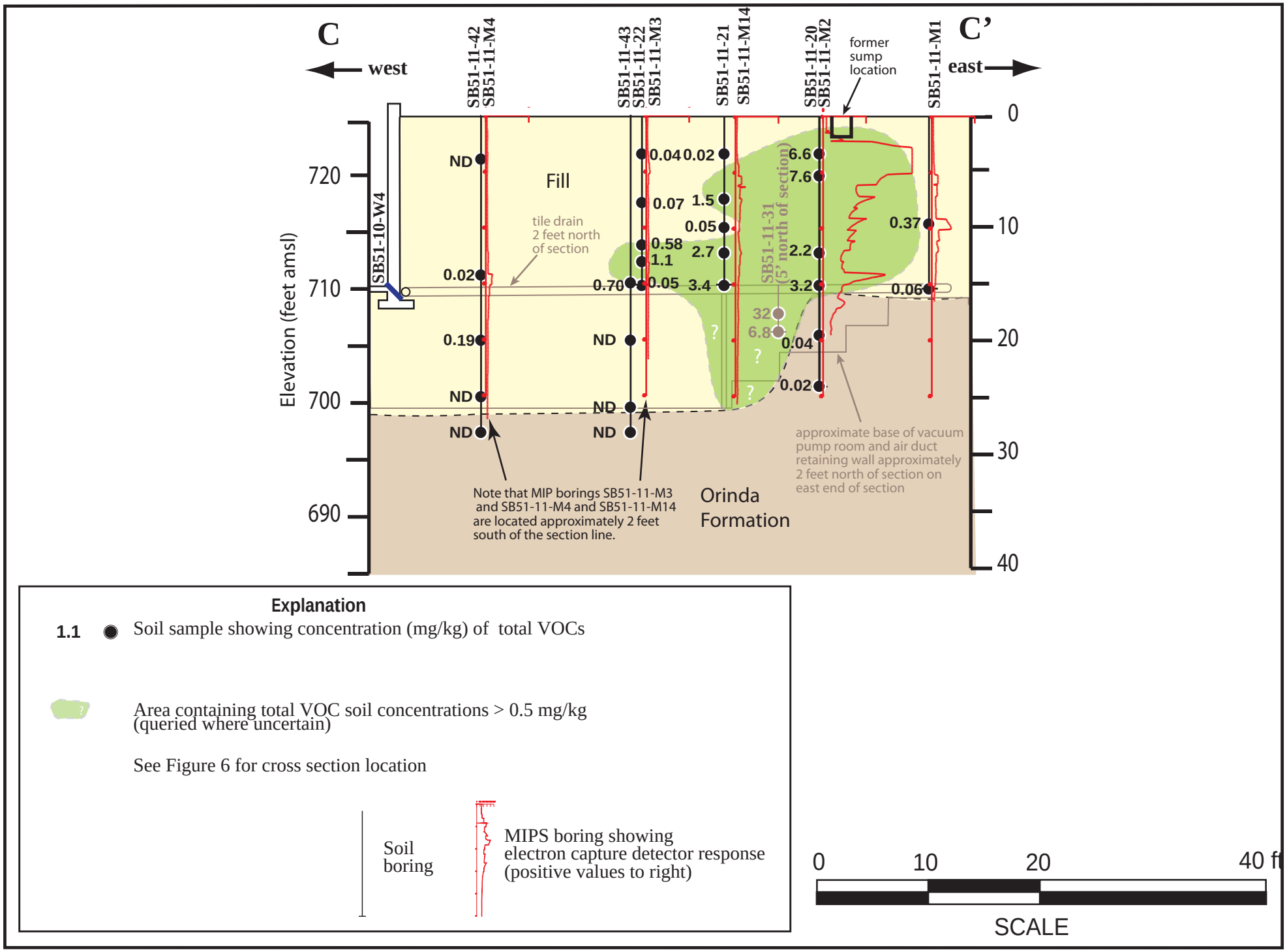
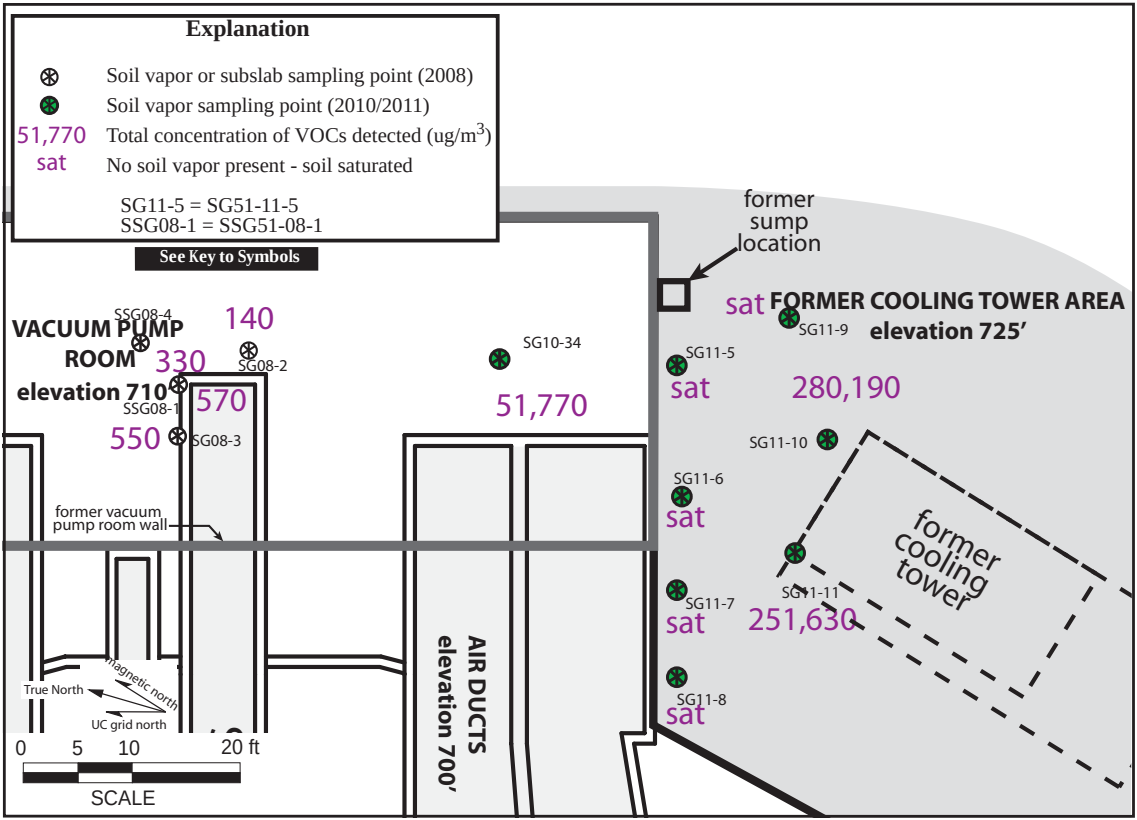


Figure 10. Geologic Cross Section C-C' Through Vacuum Pump Room Area Showing Total Concentrations of VOCs in Soil (mg/kg) and MIP ECD Responses.



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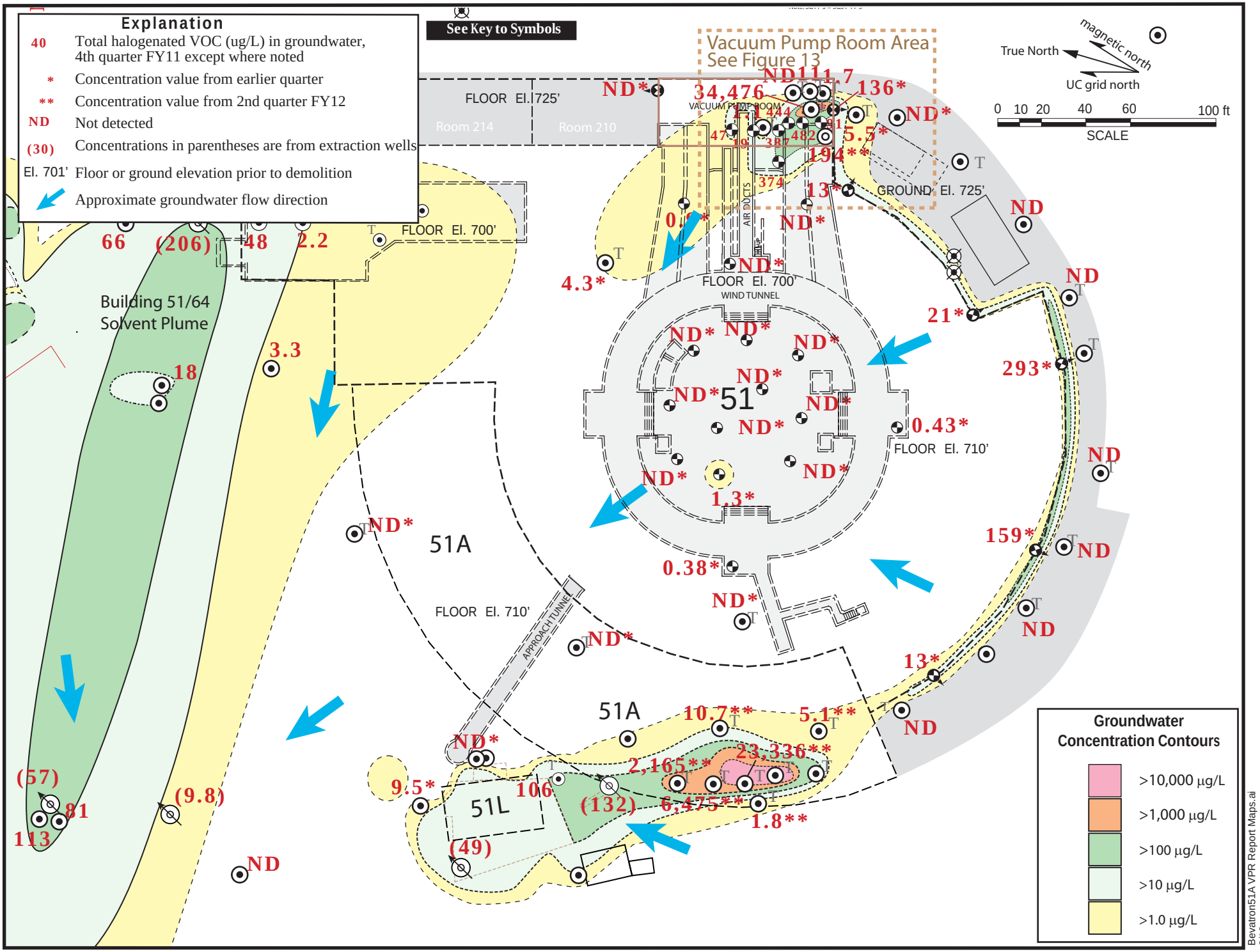

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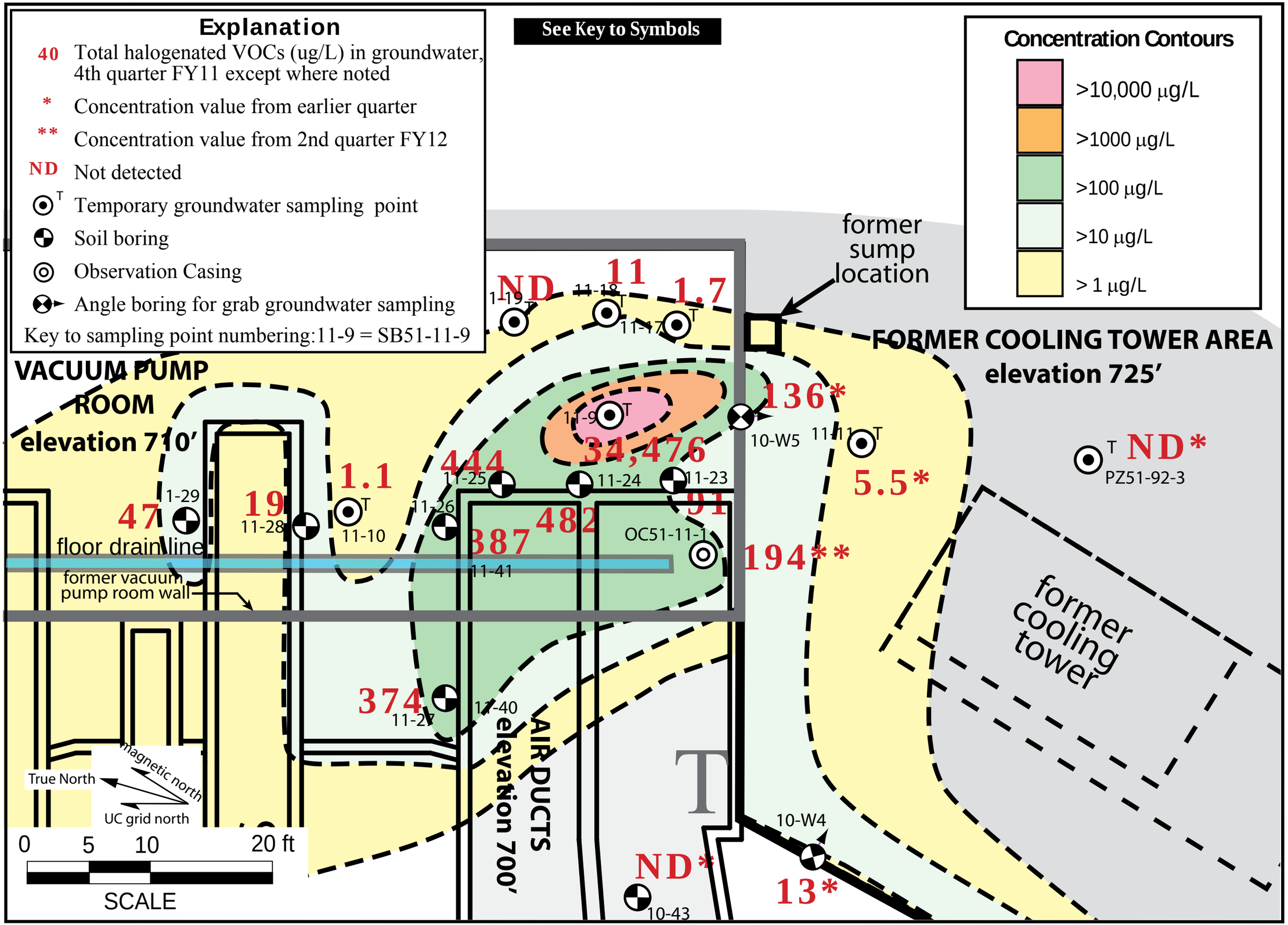


Figure 13. Concentrations of Total Halogenated VOCs Detected in Groundwater, Vacuum Pump Room Area

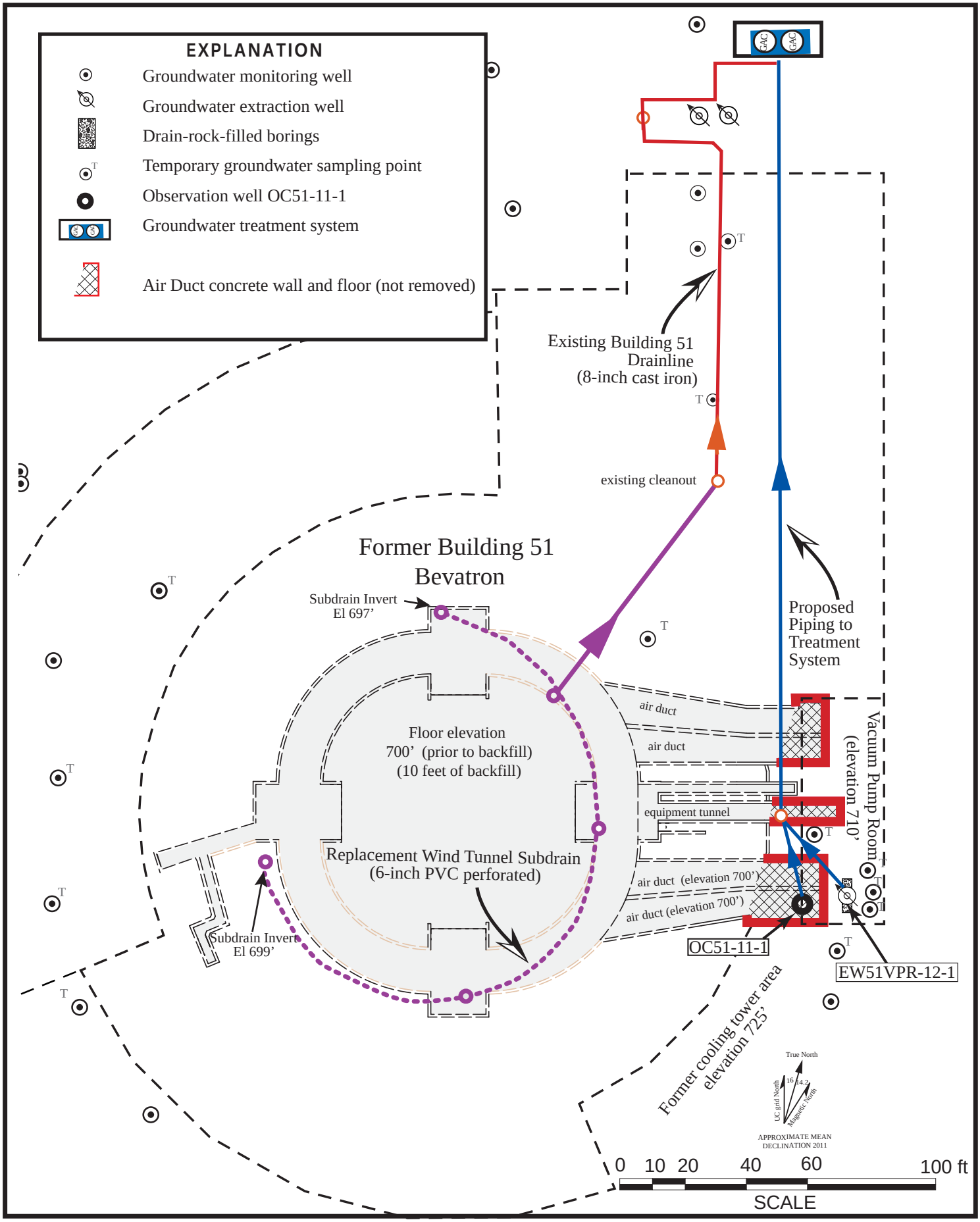


Figure 14. Configuration of Piping from Groundwater Extraction Wells to Building 51 Motor Generator Room Treatment System.

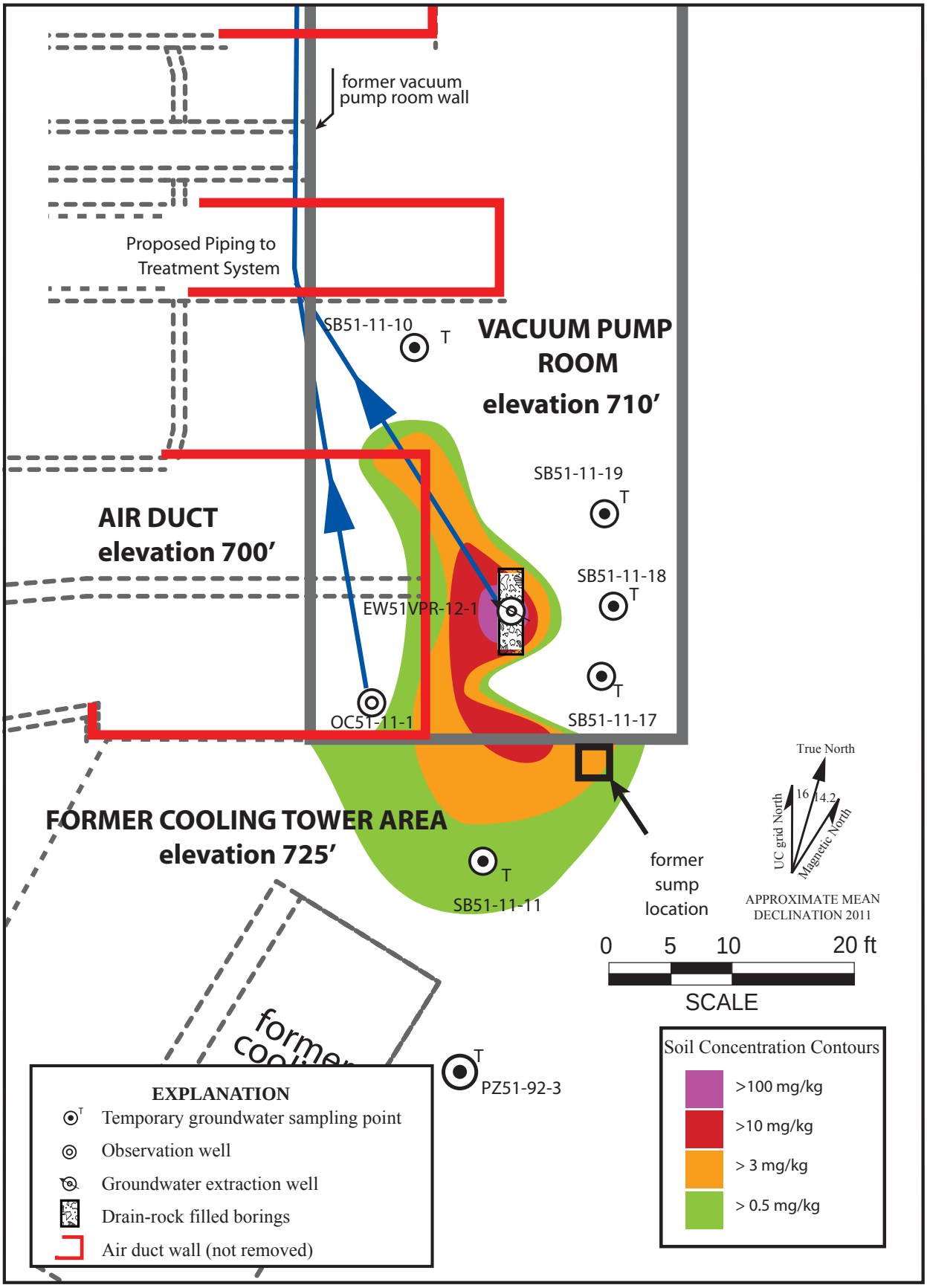
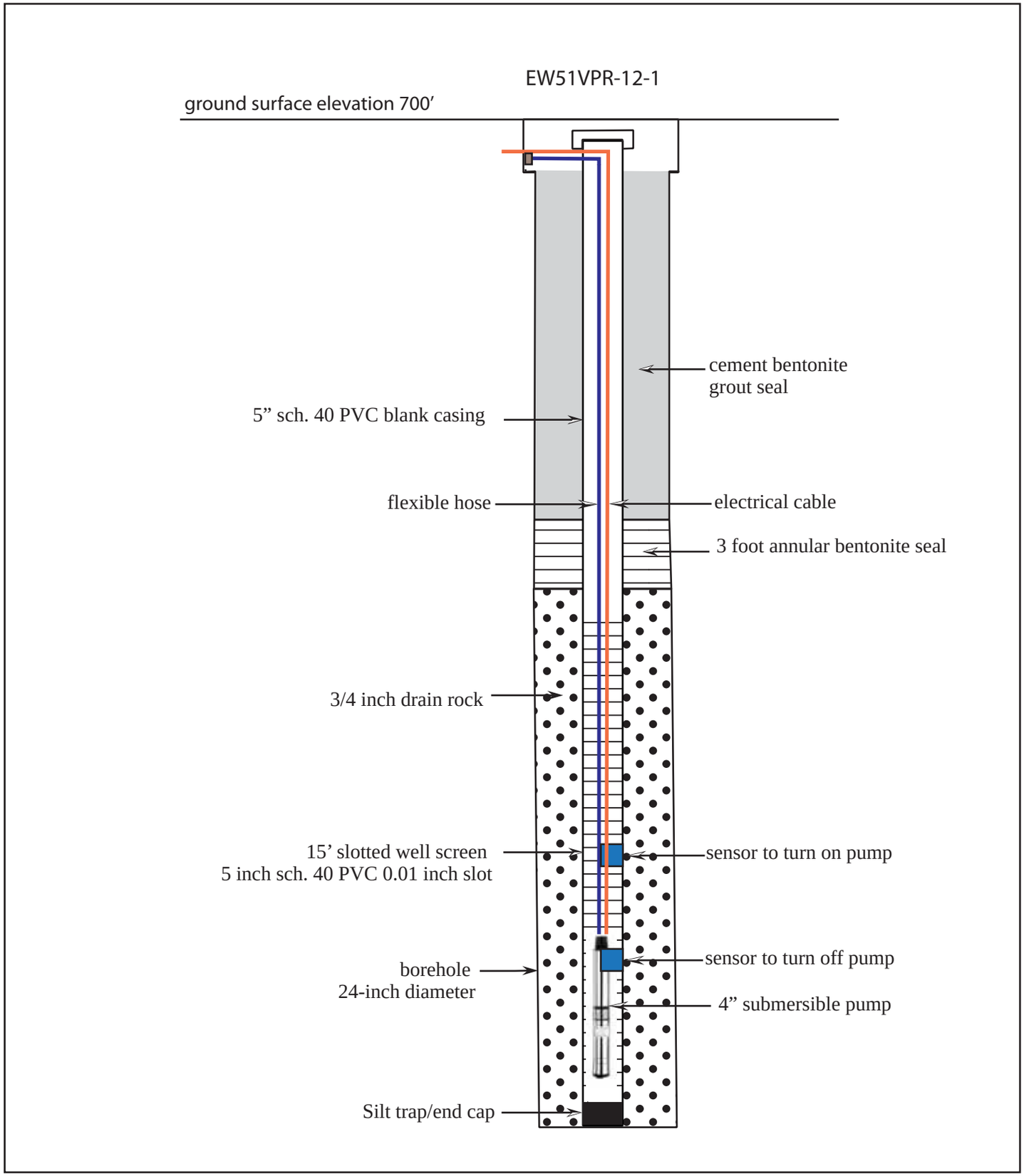


Figure 15. Location Map Showing Proposed Groundwater Extraction Wells.



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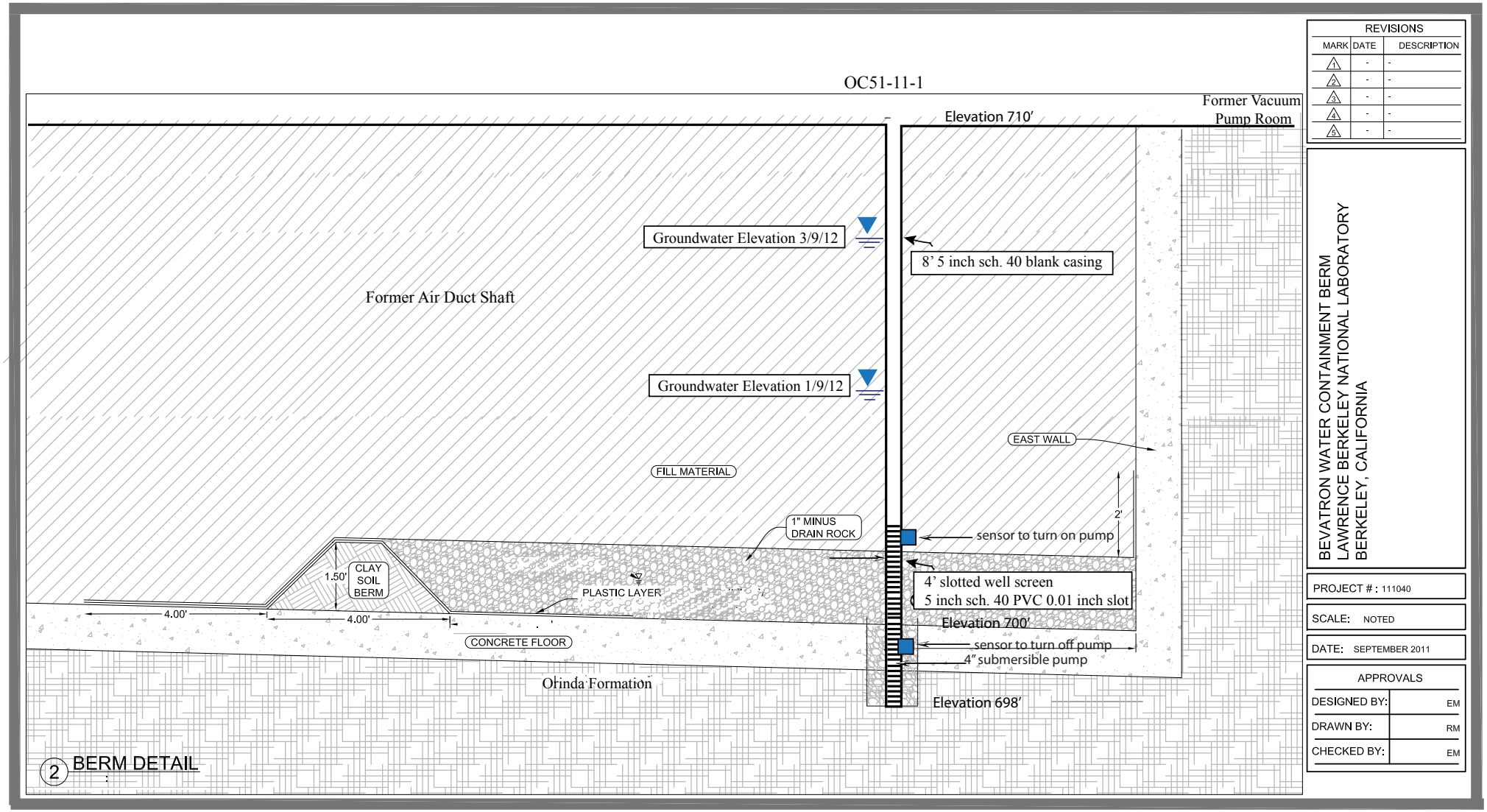

Figure 17. Construction Details for Observation Well OC51-11-1.

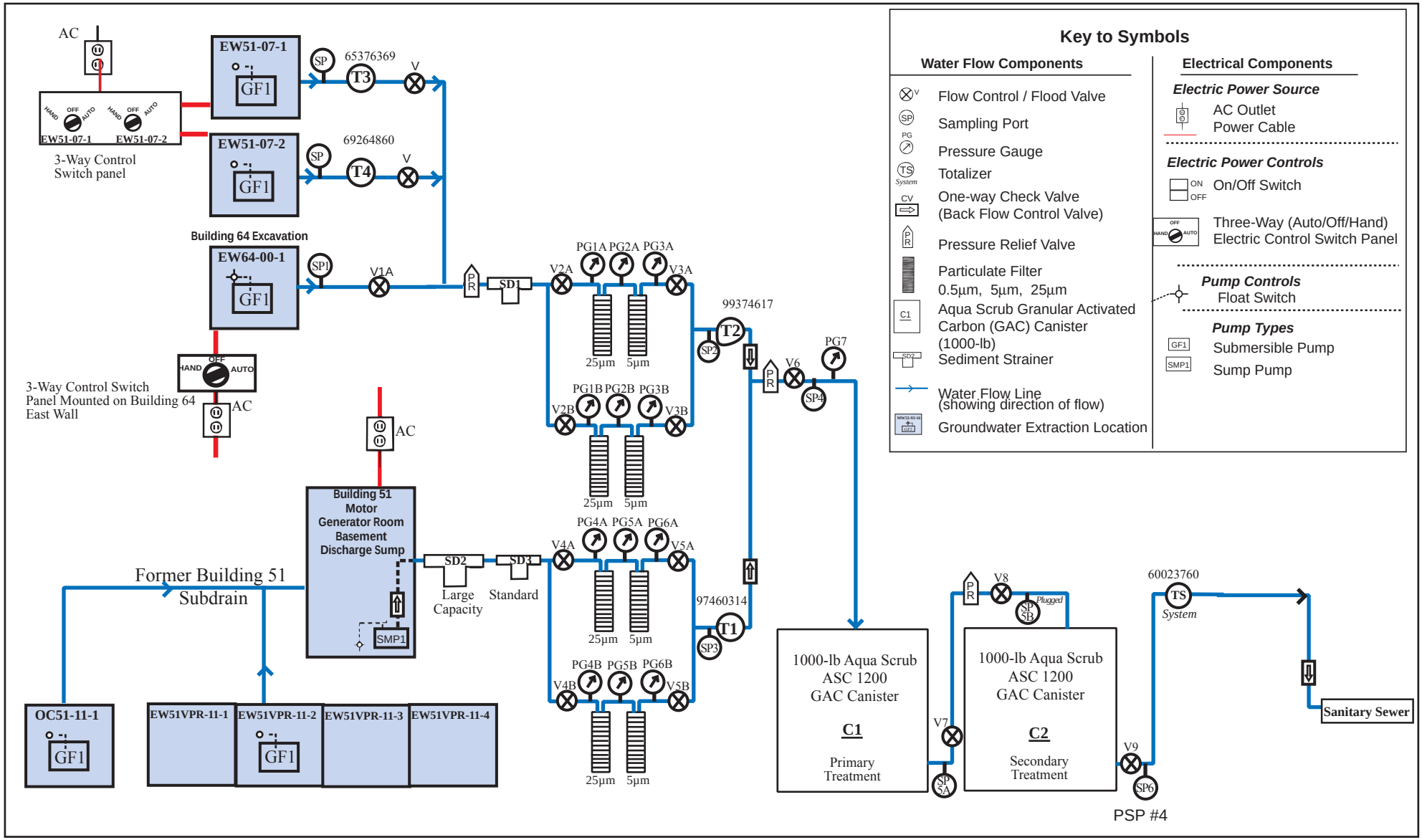

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Figure 18. Schematic Diagram of Building 51 Motor Generator Room Basement Treatment System.

Department of Toxic Substances Control

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Secretary for
Environmental Protection

Deborah O. Raphael, Director
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Edmund G. Brown Jr.
Governor

April 23, 2013

Mr. Ron Pauer
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Dear Mr. Pauer:

The Department of Toxic Substances Control (DTSC) has completed its review of the Interim Corrective Measures Workplan to Control Migration of Contaminated Groundwater at the Bevatron Demolition Project Site for the Lawrence Berkeley National Laboratory, dated August 2012. DTSC comments have been adequately addressed. Therefore, DTSC, hereby, approves the Interim Corrective Measures Workplan. Please make sure that this document, along with the NEPA/CEQA documents, are available for public review at the site information repository on or before the first day of the public comment period.

If you have any questions, please contact me at (510) 540-3842 or via e-mail at Jacinto.Soto@dtsc.ca.gov.

Sincerely,

Jacinto Soto
Project Manager
Brownfields and Environmental Restoration Program

Printed on Recycled Paper

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July 2, 2013

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ROPauer@lbl.gov

Dear Mr. Pauer:

The Department of Toxic Substances Control (DTSC) has completed review of the comments provided during the 30-day public comment period, between May 7, 2013 and June 7, 2017, on the draft Interim Corrective Measures (ICMs) Workplan for the Vacuum Pump Room Area of the Former Bevatron Complex at the Lawrence Berkeley National Laboratory (LBNL).

DTSC has prepared a Responsiveness Summary addressing comments received which will be mailed under separate cover to all those who commented. The draft ICMs Workplan, Addendum to the Tiered Negative Declaration (ND) (enclosed), and Responsiveness Summary (enclosed), together comprise the Final ICMs Workplan. Please forward a copy of the Final ICMs Workplan and Addendum to the Tiered Negative Declaration to those who received copies of these during the comment period, and to the local information repository.

If you have any questions, please contact me at (510) 540-3842 or jacinto.soto@dtsc.ca.gov.

Sincerely,

Jacinto Soto, Project Manager
Brownfields and Environmental Restoration Program - Berkeley Office

Enclosures

Printed on Recycled Paper

ADDENDUM TO THE TIERED NEGATIVE DECLARATION FOR THE CORRECTIVE MEASURES STUDY REPORT – LAWRENCE BERKELEY NATIONAL LABORATORY
APRIL 2013

I. INTRODUCTION

In 2005, the Department of Toxic Substances Control (DTSC) certified an Initial Study/Negative Declaration[1] (ND) pursuant to the requirements of the California Environmental Quality Act (CEQA) for approval of a Corrective Measures Study (CMS) Report. The CMS permitted the U.S. Department of Energy (DOE) and the Ernest Orlando Lawrence Berkeley National Laboratory (LBNL) to implement corrective measures that would remediate contaminants in soil and groundwater associated with historical chemical releases at LBNL. The CMS was circulated for public comment from April 25, 2005 through June 8, 2005 and approved by DTSC on August 25, 2005. The CMS identified four areas of soil contamination and eleven areas of groundwater contamination. However, during the period the CMS Report was being prepared and finalized, LBNL conducted Interim Corrective Measures (soil excavation and off-site disposal) at two other areas of soil contamination that resulted in the required cleanup levels being achieved. Different cleanup technologies were recommended in the CMS Report for areas with soil contamination and areas of groundwater contamination. The primary technologies for soil cleanup were excavation and off-site disposal of contaminated soil. The primary technologies recommended for groundwater were in situ flushing and monitored natural attenuation.

Site History

LBNL is located on approximately 202 acres in the cities of Berkeley and Oakland, California and is surrounded by open space, institutional uses, and residential areas. Research activities began during the 1940's and as a result of past operations, hazardous materials such as degreasers and petroleum products were released to soil and groundwater, primarily by spills and leaks in the piping systems. In 1993, DTSC issued a Hazardous Waste Facility Permit to LBNL. As a condition of that permit, LBNL was required to investigate and address all historical releases of hazardous waste and chemicals that may have occurred at the site.

Cleanup of areas that have been contaminated is a multi-step process as described in the Resource Conservation Recovery Act (RCRA) Corrective Action Process. The Corrective Measure Study (CMS) is designed to assess the risk to human health and the environment associated with the identified contamination and recommend proposed remedies.

The initial draft of the CMS Report was submitted by LBNL to DTSC in July 2004 and DTSC completed the technical review of the document. After this review, LBNL responded

[1] State Clearinghouse No. 2005-042160.

to comments (Comments received from: DTSC; San Francisco Bay Region of California Regional Water Quality Control Board; City of Berkeley) and revised the document in February 2005.

II. DESCRIPTION OF CORRECTIVE MEASURE STUDY REVISION

The Project Description in the Final ND for the CMS stated that the project would implement corrective measures that would remediate contaminants in soil and groundwater associated with historical chemical releases at the LBNL. The corrective measures included excavation and off-site disposal of contaminated soil, soil flushing, extraction of groundwater and removal of contaminants from extracted groundwater using granular activated carbon (GAC).

The CMS Report identified corrective measures would be implemented within the developed portion of LBNL near the following existing buildings: Buildings 51; 51L; 64; 69A; 71B and in the "Old Town Area" near Buildings 7, 25A and 52.

Subsequently, migration of volatile organic compounds (VOCs) in the former Building 51 area of the LBNL had been recently identified. As a result of the migration, an Interim Corrective Measure (ICM) has been proposed. The CEQA (Negative Declaration) and National Environmental Policy Act[2] (Environmental Assessment) analyses permitted the DOE and LBNL to remediate soil and groundwater contamination at the former Building 51L which was adjacent to Building 51/51A. However, the soil and groundwater remediation that was analyzed in the Final Negative Declaration for Building 51L did not overlap the footprint (the space beneath Building 51/51A) of a future anticipated project being the Demolition of Building 51 and the Bevatron.

The Bevatron was a synchrotron accelerator which began operation in 1954, last operated in 1993, and was abandoned in place within Building 51. Building 51 was an approximately 126,500 gross square foot structure built in the early 1950s to house the Bevatron and the associated mechanical, electrical, shop and office functions. The CEQA (Environmental Impact Report) and National Environmental Policy Act (Environmental Assessment) documents to address the demolition of Building 51 referenced the IS/ND and corrective actions at units relevant to Building 51 and directed the reader to the CMS. The findings contained in the IS/ND were cited as sources to document the Hazards and Hazardous Materials impacts would be less than significant. The EIR[3] was certified July 16, 2007 and a Finding of No Significant Impacts was issued on April 3, 2008.

Although the proposed ICM area was not identified in the CMS, the extraction and treatment of contaminated groundwater was a component of the remediation technologies

[2] National Environmental Policy Act environmental review was required as the LBNL is a research laboratory operated and managed by the University of California under a contract with the U.S. Department of Energy.

[3] State Clearinghouse No. 2005-032095

at several other areas[4] of LBNL which would also be utilized for the proposed ICM.

Specifically, the ICM would consist of:

• Construction of an extraction well in the former Vacuum Pump Room area of the former Building 51 site;

• Extraction of groundwater from the new extraction well and existing observation well OC51-11-11;

• Treatment of the extracted groundwater at the existing Building 51 Motor Generator Room Activated Carbon Treatment System.

To address the CMS revision, an Addendum to the ND has been prepared. DTSC has determined that an Addendum is the appropriate subsequent CEQA document to address the CMS revision pursuant to Title 14, California Code of Regulations (Cal. Code Regs. [CEQA Guidelines], tit. 14, §15162), as explained in more detail in Section III, Purpose of Addendum and CEQA Requirements. Pursuant to the CEQA Guidelines [Cal. Code Regs., tit. 14, §15164(c)], this Addendum will be attached to the Final ND. Subsequently, a Notice of Determination will be filed with the State of California Office of Planning and Research, State Clearinghouse.

III. PURPOSE OF ADDENDUM AND CEQA REQUIREMENTS

The purpose of this Addendum is to address the environmental effects of the CMS revision, in order to determine whether any significant environmental impacts which were not identified in the CMS would result, or, whether previously identified significant impacts would be substantially more severe. This document has been prepared in accordance with the CEQA Guidelines, [Cal. Code Regs., tit. 14, §15162 and §15164].

The CEQA Guidelines [Cal. Code Regs., tit. 14, §15162(a)] provides that, for a project covered by a certified Environmental Impact Report (EIR) or adopted Negative Declaration (ND), preparation of a subsequent EIR or ND rather than an Addendum is required only if one or more of the following conditions occur:

1. Substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;

2. Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or negative

[4] Listed in Table II-1 - Summary of Proposed and Ongoing Corrective Measures.

declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or

3. New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete or the negative declaration was adopted, shows any of the following:

   a) The project will have one or more significant effects not discussed in the previous EIR or negative declaration;

   b) Significant effects previously examined will be substantially more severe than shown in the previous EIR;

   c) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or

   d) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.

Cal. Code Regs.,tit., § 15164(b) of the CEQA Guidelines states:

> "An addendum to an adopted negative declaration may be prepared if only minor technical changes or additions are necessary or none of the conditions described in Section 15162 calling for the preparation of a subsequent EIR or negative declaration have occurred."

Based on the analysis presented herein, it has been determined that an Addendum to the ND is the appropriate CEQA document to address the CMS revision given that none of the conditions described in the CEQA Guidelines [Cal. Code Regs., tit. 14, § 15162] calling for the preparation of a subsequent EIR or ND have occurred. The environmental analysis relies on the analyses completed in the Final ND and directly references the Final ND where appropriate.

IV. APPLICATION OF PREVIOUSLY CERTIFIED ENVIRONMENTAL DOCUMENTATION TO CMS REVISION

Environmental Impact Analysis

As stated previously, the selected remedy, excavation and off-site disposal of contaminated soil, soil flushing, extraction of groundwater and removal of contaminants from groundwater using granular activated carbon, will remain the same as what is identified in the CMS. The CMS activities would still be confined to the Project Site, and the CMS revision would comply with the same regulatory requirements and implement the same components in the CMS that serve to minimize impacts on the environment. Based on these considerations, for the following impact issue areas there will be no change to the analyses and findings presented in the Final ND: Aesthetics; Agricultural Resources; Air Quality Resources; Biological Resources; Cultural Resources; Geology and Soils; Hazards and Hazardous Materials; Hydrology and Water Quality; Land Use and Planning; Mineral Resources; Noise; Population and Housing; Public Services; Recreation; Transportation and Traffic and Utilities and Service systems. Therefore, the impacts associated with the CMS for these resource areas will be within the scope of impacts identified in the Final ND, as described below.

A. Aesthetics:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to aesthetics.

CMS Revision. Visually, the area is predominantly industrial/institutional in character. The components of the ICM would be mostly below ground (i.e. extraction wells), small features at the ground surface (i.e. pumps and GAC canisters). Therefore, the proposed ICM would not result in significant, adverse aesthetic impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

B. Agricultural:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to agricultural.

CMS Revision. LBNL is not located within an agricultural area. Therefore, the proposed ICM would not result in significant, adverse agricultural impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

C. Air Quality:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to air impacts.

CMS Revision. The pump and treatment system that are currently operating do not generate air emissions and the proposed ICM would not result in significant, adverse air impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

D. Biological:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to biology.

CMS Revision. Natural native habitats no longer exist in the project area due to the implementation of the CMS and the Demolition of Building 51 and the Bevatron Project. The site is currently used for parking, equipment storage and groundwater remediation activities pursuant to the RCRA CMS. Therefore, the proposed ICM would not result in significant, adverse biological impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

E. Cultural:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to cultural resources.

CMS Revision. The project site does not contain any cultural resources. Therefore, the proposed ICM would not result in significant, adverse cultural impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

F. Geology and Soils:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to geology and soils.

CMS Revision. The ground surface would be restored after construction of the extraction well and the remediation components would be minor, creating little disturbance of soils. Therefore, the proposed ICM would not result in significant, adverse geology and soil impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

G. Hazards and Hazardous Materials:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to hazardous and hazardous materials.

CMS Revision. Extracted groundwater would be treated in the same manner as contained in the CMS. Specifically, extracted groundwater would be treated and recycled for soil flushing or discharged into the sanitary sewer in accordance with conditions in the existing East Bay Municipal Utility District (EBMUD) permit. Therefore, the proposed ICM would not result in significant, adverse hazards and hazardous materials impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

H. Hydrology and Water Quality:

Final ND. The Final ND concluded the CMS activities were to implement corrective measures that would remove contaminants from soil and groundwater and as a result the expected outcome was improved groundwater quality. Therefore, the proposed ICM would not result in significant, adverse impacts related to hydrology and water quality.

CMS Revision. The decontaminated water would be reinjected and would not change the overall volume and pattern of groundwater flow. Therefore, the proposed ICM would not result in significant, adverse hydrology and water impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

I. Land Use and Planning:

Final ND. The Final ND concluded the CMS activities would not add to the amount of development and would not cause land use conflicts with any other proposed projects. Therefore, the proposed ICM would not result in significant, adverse land use and planning impacts.

CMS Revision. The proposed ICM would be consistent with the LBNL's 2006 Long Range Development Plan and not conflict with a habit conservation plan. Therefore, the proposed ICM would not result in significant, adverse land use and planning impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

J. Mineral Resources:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to mineral resources.

CMS Revision. LBNL is not located in a Mineral Resource Zone and no mineral extraction operations are conducted on site. Therefore, the proposed ICM would not result in

significant, adverse mineral resource impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

K. Noise:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to noise.

CMS Revision. Implementation of the ICM would involve the use of equipment that may produce noise and result in a temporary increase of ambient noise levels. However, the proposed ICM would not result in exposure to sensitive receptors to noise levels in excess of applicable standards. The proposed ICM would comply with the Berkeley Municipal Code, Title 13, Chapter 13.40 Community Noise. Therefore, the proposed ICM would not result in significant, adverse noise impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

L. Population and Housing:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would result in no significant, adverse impacts related to population and housing.

CMS Revision. The proposed ICM would have no impact population and housing; would not create new homes and would not demolish existing housing structures. Therefore, the proposed ICM would not result in significant, adverse population and housing impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

M. Public Services:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to public services.

CMS Revision. The proposed ICM would not result in the need for new governmental facilities or services. Therefore, the proposed ICM would not result in significant, adverse public services impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

N. Recreation:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to recreation.

CMS Revision: The proposed ICM would not increase or change the existing level of use of neighborhood parks and regional facilities or require the construction of new facilities.

Therefore, the proposed ICM would not result in significant, adverse recreation impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

O. Transportation and Traffic:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to transportation and traffic.

CMS Revision. Project construction would occur over a two day period and require approximately three truck trips. One truck trip to transport supplies and materials to the project site; and two truck trips to transport the soil to the landfill. In addition, a drill rig would also be transported to and from the project site. Construction generated traffic would be temporary and not result in long-term degradation in operating conditions on roadways or at intersections. Therefore, the proposed ICM would not result in significant, adverse transportation and traffic impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

P. Utilities and Service Systems:

Final ND. The Final ND concluded the CMS activities would not exceed applicable standards of significance and would not result in significant, adverse impacts related to utilities and service systems.

CMS Revision. Soil flushing is the primary method recommend for the cleanup of contaminated groundwater. The extracted groundwater would be treated on site using GAC and then reinjected to flush contaminants from the subsurface. Therefore, the proposed ICM would not result in significant, adverse utilities and service system impacts. This finding is consistent with the conclusion reached in the Initial Study prepared in support of the Final ND.

V. CONCLUSION

The addition of a new extraction well would not alter the impact findings and mitigation measures presented in the Final ND for Aesthetics; Agricultural Resources; Air Quality Resources; Biological Resources; Cultural Resources; Geology and Soils; Hazards and Hazardous Materials; Hydrology and Water Quality; Land Use and Planning; Mineral Resources; Noise; Population and Housing; Public Services; Recreation; Transportation and Traffic and Utilities and Service systems. With implementation of the revision, there would be no new significant impacts and no substantial increase in the severity of impacts regarding these issues compared to the issues identified in the Final ND. No mitigation measures are required for the CMS Revision. Therefore, the impacts for the CMS Revision are within the scope of impacts identified in the Final ND, and the Final ND adequately addressed all impacts of the project as revised.

Based on the above, an Addendum is the appropriate CEQA document for the CMS Revision pursuant to the CEQA Guidelines [Cal. Code Regs., tit. 14, § 15164(b)] because none of the conditions described in the CEQA Guidelines [Cal. Code Regs., tit. 14, §15162] calling for the preparation of a subsequent EIR or ND have occurred. This Addendum has appropriately disclosed the potential impacts from the CMS revisions and will be included as part of the CEQA record for the CMS. A Notice of Determination for this Addendum to the Final ND will be filed with the State of California Office of Planning and Research/State Clearinghouse.

RESPONSIVENESS SUMMARY
LAWRENCE BERKELEY NATIONAL LABORATORY
ON
PROPOSED INTERIM CORRECTIVE MEASURES WORKPLAN AND CEQA ADDENDUM TO THE TIERED NEGATIVE DECLARATION

BACKGROUND

Between May 7, 2013 and June 7, 2013, the Department of Toxic Substances Control (DTSC) held a 30-day public comment period for the draft Interim Corrective Measure (ICM) Workplan and Addendum to the Tiered Negative Declaration (ND) for the Vacuum Pump Room Area of the Former Bevatron Complex at the Lawrence Berkeley National Laboratory (LBNL). The draft ICM Workplan and Addendum to the Tiered ND were placed in the information repositories listed below to provide the public with information regarding the proposed remedial action and to solicit public comment on the adequacy of the document.

On May 1, 2013, LBNL, on behalf of DTSC, mailed out a Fact Sheet, which summarized the draft ICM Workplan and proposed site cleanup methods, to the site mailing list. A Public Notice display advertisement for the draft ICM Workplan was placed in the Oakland Tribune on May 14, 2013. Copies of the fact sheet and display advertisement are found in Attachment A. DTSC received written comments during the public comment period. After review and consideration of the comments, DTSC approved the draft ICM Workplan with no changes. DTSC's responses to these comments are provided below. A copy of the Final ICM Workplan and other site-related documents are available for review at the following locations:

Department of Toxic Substances Control
700 Heinz Avenue
Berkeley, California 94710
(510) 540-3800

Berkeley Public Library
2090 Kittredge Street
Berkeley, CA 94704
(510) 981-6100

This Responsiveness Summary is organized as follows:

- Section I is the introduction.
- Section II lists the comments received and provides responses to those comments
- Attachment A provides copies of the fact sheet and display advertisements.
- Attachment B provides a map showing the location of the LBNL Site.
- Attachment C includes copies of the written comments received.

Section II - Comments and Responses
Written Comments

This section provides responses to written comments received during the public comment period. Comments have been paraphrased.

Commenter: Zachary Runningwolf, Community Member

Comment 1 (paraphrased): Could you set up a community meeting to alert the community?

Response 1: DTSC followed up with Mr. Running Wolf to identify the issues which needed to be addressed in a public meeting. Since no specific issues were identified, DTSC has requested that LBNL attend the next Community Advisory Group (CAG) meeting on July 15, 2013, to discus and be prepared to answer any questions you may have about the ICM Workplan. LBNL has agreed to discuss the ICM Workplan at the meeting. Please come the next CAG meeting.

Commenter: Nigel Guest, Community Member

Comment 2 (paraphrased): I received a copy of your fact sheet on the project yesterday (June, 6, 2013). I was not able to read or download the documents referenced on the fact sheet. Please correct this defect and extend the comment period.

Response 2: Copies of the CEQA document and Draft ICM Workplan were available on DTSC's website and in the Information Repositories. Copies were e-mailed to Mr. Guest on June 7, 2013. Once he received these documents, no additional request to extend the public comment period was made.

Comment 3 (paraphrased): The report references soil depths of at least 28', however the fact sheet states that the extraction well be only 20' deep. Shouldn't the well go all the way to (uncontaminated) bedrock?

Response 3: The maximum depth of soil sampling from well SB51-11-9 was 25 feet and the only contaminant observed at that depth was TCE at a concentration of 0.018 mg/kg. Since this is well below the environmental screening level of 0.46 mg/kg, it was decided to propose that the total depth of the extraction well be 20 feet. In addition, extraction of water from the well will affect the groundwater flow direction all around the well.

Comment 4 (paraphrased): The Fact Sheet references a Negative Declaration, not a Notice of Exemption. Which is correct?

Response 4: The CEQA document published for public review is an Addendum to the Tiered Negative Declaration.

Comment 5 (paraphrased): I do not believe that a CEQA Negative Declaration is appropriate, because there are significant groundwater impacts, which will be mitigated by the ICM Workplan. Either a Mitigated Negative Declaration or an EIR could be appropriate, but without the Workplan, I can't say which is acceptable.

Response 5: The Addendum to the Tiered Negative Declaration is appropriate. Since there was already a Tiered Negative Declaration approved in August 2005 for the Corrective Measures Study (CMS) Report that allowed the U.S. Department of Energy and the Ernest Orlando Lawrence Berkeley National Laboratory to implement corrective measures that would remediate contaminants in soil and groundwater associated with historical chemical releases at the site, DTSC amended this document to address the additional area of contamination and related corrective measures.

Commenter: Cynthia Johnson, Board Member of the Berkeley Fellowship of Unitarian Universalist and Vice Chair of the Social Justice Committee

Comment 6 (paraphrased): Please hold a public hearing on this issue, which is the minimum the public requires to feel that our water is safe.

Response 6: See Response 1 above.

E. Commenter: Lesley Emmington, Save Strawberry Canyon

Comment 7 (paraphrased): How are the waters of the Lennart Aquifer integral to the plan to mitigate the contaminated groundwater at the site?

Response 7: The Lennart Aquifer is in the volcanic rock of the Moraga Formation and is separated from the area of the ICM by a large mass of very low permeability sedimentary rock, called the Orinda Formation.

Commenter: Gene C. Bernardi, Committee to Minimize Waste

Comment 8 (paraphrased): Proposing a Negative Declaration for the Bevatron contamination is outrageous. A full Environmental Impact Report must be done.

Response 8: See Response 5 above. No significant impact was identified during the CEQA evaluation of the proposed corrective measure, so developing an Environmental Impact Report would be inappropriate.

Commenter: Pamela Sihvola, Committee to Minimize Toxic Waste

Comment 9 (paraphrased): The migration of contaminated groundwater at LBNL is already an imminent threat to the environment as well as a risk to human health; a negative declaration under CEQA is insufficient; an EIR must be prepared to address the problem of migrating contaminated groundwater within the entire western/central portion of the LBNL site. Also, prepare an EA or EIS under NEPA to address any

radioactive components associated with the migration of contaminated groundwater, soil, soil vapor and sediment.

Response 9: See Response 5 above. The project being evaluated under this CEQA review is the implementation of interim corrective measures for groundwater at the Vacuum Pump Room Area only.

Comment 10 (paraphrased): Stop gap measures, such as the one proposed, it will not be sufficient. A comprehensive investigation must be completed to determine the hydrogeological reasons for the current rise in water levels and the migration of contaminated groundwater in the clean fill.

Response 10: The interim measures proposed are intended to prevent further migration of contaminated groundwater by lowering the water level in this section of the former Bevatron area. The extracted water will be treated at an existing, approved treatment facility. This interim action will eliminate an immediate threat to the environment until long-term corrective measures can be evaluated, reviewed, selected, and approved.

Comment 11 (paraphrased): How are the waters of the Lennart Aquifer integral to the plan to mitigate the contaminated groundwater at the site?

Response 11: See Response 7 above

Comment 12 (paraphrased): The Bevatron basement was always full of water and had to be constantly pumped by sump pumps. How much of this knowledge was used when decisions were made to backfill the site and pave it following demolition?

Response 12: There was a sump with a pump in the Motor Generator Room Basement that controlled the water level. The water in this sump was primarily from a drainage system outside of the building. A sump with a pump and a drainage system still exists at the site. The sump pump is checked regularly to make sure it is working.

Comment 13 (paraphrased): How many areas under the current parking lot are monitored for the migrating contamination?

Response 13: There are four wells in the parking lot and another four wells close to the contaminated area that are used to monitor the migration of contaminants.

Comment 14 (paraphrased): Why did the water level rise several feet and how many feet exactly. Was the water level rise anticipated or not?

Response 14: It is not known with certainty why the water level rose. The water level had come up a total of about 10 feet to an elevation of 710 feet. A significant water level rise was not anticipated because only a couple of inches of water were observed on top of a concrete slab within the excavation at an elevation of 700 feet prior to backfilling.

Comment 15 (paraphrased): Why did the concentrations of VOCs increase?

Response 15: The concentration of VOCs in groundwater did not increase and has decreased significantly since the contamination was discovered.

Comment 16 (paraphrased): Where did the contaminated groundwater originate?

Response 16: The contaminated groundwater in this area is believed to originate from the south section of the Former Vacuum Pump Room.

Comment 17 (paraphrased): What is the next step if the ICMs do not work?

Response 17: The purpose of this ICM is to maintain a low water level and to inhibit the migration of contaminated groundwater. This is intended to be an interim measure and a final corrective measure will be developed and submitted for regulatory and public review. The final corrective measure will look at the source of contamination and identify how that source will be addressed, as well as the long term groundwater remedy.

Comment 18 (paraphrased): Contrary to DTSC's Fact Sheet, LBNL is planning major development on the Bevatron Complex demolition site. We request that DTSC execute immediately a Land Use Covenant for this parcel and request LBNL to completely fence off this parcel.

Response 18: Industrial land use is the current, reasonable and likely future land use at Berkeley Lab, and was therefore the land use scenario that was approved by DTSC to establish cleanup requirements for the entire Berkeley Lab site in 2005. A land Use Covenant is not needed at this time, because the cleanups are based on this land use. The need for a Land Use Covenant will be determined once the final corrective measures are determined. Because there is no threat to onsite workers or visitors in this area, a fence is not required.

Comment 19 (paraphrased): We ask that the concrete of the parking lot be removed.

Response 19: It is unclear what this request would achieve. No basis has been provided as to why this would be more protective.

ATTACHMENT A

FACT SHEET AND DISPLAY ADVERTISEMENTS

COMMUNITY Notice

The mission of DTSC is to protect California's people and environment from harmful effects of toxic substances through the restoration of contaminated resources, enforcement, regulation and pollution prevention.

Lawrence Berkeley National Laboratory Interim Corrective Measures Workplan Available for Public Comment

Background

The California Department of Toxic Substance Control (DTSC) has prepared this fact sheet to inform the community about the 30-Day Public Comment Period for the Interim Corrective Measures Workplan to Control the Migration of Contaminated Groundwater at the Bevatron Demolition Project Site (Site) located at One Cyclotron Road in Berkeley, California 94720-8272, Alameda County, California. The purpose of this Work Plan is to provide the rationale and establish the requirements for constructing and operating an Interim Corrective Measure (ICM) in the Vacuum Pump Room area of the former Bevatron Complex at the Lawrence Berkeley National Laboratory (LBNL).

The main LBNL site is located on 202 acres of land within the hillside area, east of the University of California, Berkeley campus. In 1993, DTSC issued a Hazardous Waste Facility Permit to LBNL. As a condition of that permit, LBNL is required to investigate and address all historical releases of hazardous waste and chemicals that may have occurred at the site in accordance with RCRA corrective action process requirements. Investigation of the historical releases, determination of which releases require corrective action, and evaluation/recommendation of proposed remedies have been completed. In August 2005, DTSC approved LBNL's Corrective Measure Study, which provided remedies for all contamination known at that time to require corrective action.

Building 51, which housed the Bevatron, occupied approximately 2.25 acres in the west-central part of the LBNL Site. During its operation from 1954 until 1993, the Bevatron was among the world's leading particle accelerators. The Building 51 and Bevatron Demolition Project, which began in 2010, consisted of the demolition, deactivation, and disposal of the Building 51 structure and contents; including the shallow foundations, shield blocks, and the Bevatron accelerator housed within the building. Following demolition, the site was backfilled to grade with clean soil. Between September 2010 and April 2011, LBNL conducted a preliminary investigation of potential subsurface contamination beneath the Building 51 Demolition Project area.

Public Comment Period

Public Comment Period

We encourage you to review the Draft ICM Workplan and proposed Negative Declaration. DTSC is holding a 30-day public comment period for the ICM beginning May 7, 2013 All comments must be postmarked by June 7, 2013. All e-mailed comments must be received no later than 5:00 pm on that same day.

Please submit written comments to:
Jacinto Soto
DTSC Project Manager
700 Heinz Avenue
Berkeley, California 94710
Call 510-540-3842 or
Email Jacinto.Soto@dtsc.ca.gov

During this preliminary investigation, relatively high concentrations of volatile organic compounds (VOCs) were detected in the soil and groundwater under the former Vacuum Pump Room area of Building 51. The project area is primarily referred to as Building 51 in the workplan, but is also referred to as the Bevatron Complex or simply as the Bevatron. Building 51 included Building 51A, an integral addition. Except for the area overlying the former Vacuum Pump Room, the project area has been paved to provide parking, and is not currently scheduled for development.

Objective of the ICM

The objective of the ICM is to control the migration of contaminated groundwater from the former Vacuum Pump Room area of the Bevatron. The groundwater level in the eastern end of the backfilled Bevatron Air Duct shafts has risen several feet since demolition of the Bevatron was completed. This groundwater is contaminated with trichloroethylene (TCE), cis-1,2-dichloroethene (DCE), 1,1,1-trichloroethane (TCA), and vinyl chloride. The results indicate that since demolition of the Bevatron and backfilling of the Air Duct shafts, contaminated groundwater has migrated from the former Vacuum Pump Room area into the clean Air Duct backfill.

Summary of Existing Conditions

The description of existing conditions in the Vacuum Pump Room area is based on environmental investigations conducted between September 2010 and December 2011. The investigations included soil vapor, soil, and groundwater sampling. The results of these investigations are reported in detail in the Report of Environmental Investigations in the Building 51A and Vacuum Pump Room Areas for the Building 51 and Bevatron Demolition Project and are summarized in the following subsections.

Potential Risk to Human Health

Currently, there is no significant risk to human health associated with VOC contamination detected in the former Vacuum Pump Room area. The potential exposure pathways relevant to human health risks are inhalation due to vapor intrusion into indoor air and/or direct contact with contaminated soil. Groundwater at LBNL is not used for drinking, irrigation, or other industrial or domestic purposes.

VOCs have been detected in soil vapor and groundwater at concentrations well above screening levels for potential risk to potential future indoor workers via the vapor intrusion pathway. However, there is no risk to current workers since this pathway is not complete because there are no buildings overlying the areas where the screening levels are exceeded

Concentrations of VOCs in the soil exceed screening levels for direct contact by outdoor workers in two limited locations in the former Vacuum Pump Room area. Both of these locations have been posted with warning signs requiring Hazardous Waste Operation (HAZWOPER) training for any worker handling soil in the posted area.

Potential Risk to the Environment

Since demolition of the Bevatron and backfilling of the Air Duct shafts, contaminated groundwater has been migrating from the former Vacuum Pump Room area into the clean Air Duct backfill. Although a replacement subdrain system that was installed under the central Bevatron area during the demolition project may capture the migrating groundwater, the potential impact to the clean Air Duct backfill before that barrier is reached is considered to be an imminent threat to the environment, and is therefore the subject of this ICM.

System Design

The ICM will comprise construction of an extraction well in the former Vacuum Pump Room area, extraction of groundwater from the new extraction well and existing observation well, and treatment of the extracted groundwater at the existing Building 51 Motor Generator Room Treatment System. This treatment system was approved as part of the November 2005 Corrective Measures Implementation Workplan.

Extraction Well

A 2-foot diameter groundwater extraction well will be drilled to a depth of 20 feet (approximately 10

feet beneath the Air Duct floor) inside the southern part of the former Vacuum Pump Room upgradient from the Air Duct shafts. Three contiguous 2-foot diameter borings will be drilled immediately adjacent to the extraction well and will be backfilled with drain rock to enhance the yield of the extraction well. The multiple large-diameter borings are required for groundwater extraction due to the low hydraulic conductivity of the artificial fill and bedrock beneath the former Vacuum Pump Room location.

Informational Repositories

Department of Toxic Substances Control Berkeley
File Room
700 Heinz Avenue
Berkeley, CA 94710
(510) 540-3800 Call for Appointment

Berkeley Public Library
2090 Kittredge Street
Berkeley, CA 94704
(510) 981-6100
Call for hours and days of operation

Envirostor Link

To view electronic versions of the ICM Workplan, visit DTSC's Envirostor website: http://www.envirostor.dtsc.ca.gov/public Enter "Berkeley" in the city section and select "Lawrence Berkeley National Laboratory" from the alphabetical list of sites.

For More Information

Jacinto Soto
DTSC Project Manager
700 Heinz Avenue
Berkeley, CA 94710
(510) 540-3842
Jacinto.Soto@dtsc.ca.gov

Richard A Perry
DTSC Public Participation Specialist
700 Heinz Avenue
Berkeley, CA 94710
(510) 540-3910
Richard.Perry@dtsc.ca.gov

Notice to the Hearing Impaired

TDD users can use the California Relay Service at (888) 877-5378 and ask to speak with Richard Perry at (510) 540-3910.

Annuncio

Si prefiere hablar con alguien en español acera de ésta información, favor de llamar a Jacinto Soto, Departamento de Control de Substancias Tóxicas, al número de teléfono (510) 540-3842.

Oakland Tribune

c/o Bay Area News Group-East Bay
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Legal Advertising
(800) 595-9595 opt. 4

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PROOF OF PUBLICATION

FILE NO. Corrective Wrkpl

In the matter of

Oakland Tribune

The Oakland Tribune

I am a citizen of the United States; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter. I am the Legal Advertising Clerk of the printer and publisher of The Oakland Tribune, a newspaper published in the English language in the City of Oakland, County of Alameda, State of California.

I declare that The Oakland Tribune is a newspaper of general circulation as defined by the laws of the State of California as determined by this court's order, dated December 6, 1951, in the action entitled In the Matter of the Ascertainment and Establishment of the Standing of The Oakland Tribune as a Newspaper of General Circulation, Case Number 237798. Said order states that "The Oakland Tribune is a newspaper of general circulation within the City of Oakland, and the County of Alameda, and the State of California, within the meaning and intent of Chapter 1, Division 7, Title 1 [§§ 6000 et seq.], of the Government Code of the State of California." Said order has not been revoked, vacated, or set aside.

I declare that the notice, of which the annexed is a printed copy, has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

5/14/2013

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated: May 17, 2013

Public Notice Advertising Clerk

Legal No. **0004856086**

Department of Toxic Substances Control - Fact Sheet, May 2013

Lawrence Berkeley National Laboratory Interim Corrective Measures Workplan Available for Public Comment

Background
The California Department of Toxic Substance Control (DTSC) has prepared this fact sheet to inform the community about the 30-Day Public Comment Period for the Interim Corrective Measures Workplan to Control the Migration of Contaminated Groundwater at the Bevatron Demolition Project Site (Site) located at One Cyclotron Road in Berkeley, California 94720-8272, Alameda County, California. The purpose of this Work Plan is to provide the rationale and establish the requirements for constructing and operating an Interim Corrective Measure (ICM) in the Vacuum Pump Room area of the former Bevatron Complex at the Lawrence Berkeley National Laboratory (LBNL).

The main LBNL site is located on 202 acres of land within the hillside area, east of the University of California, Berkeley campus. In 1993, DTSC issued a Hazardous Waste Facility Permit to LBNL. As a condition of that permit, LBNL is required to investigate and address all historical releases of hazardous waste and chemicals that may have occurred at the site in accordance with RCRA corrective action process requirements. Investigation of the historical releases, determination of which releases require corrective action, and evaluation/recommendation of proposed remedies have been completed. In August 2005, DTSC approved LBNL's Corrective Measure Study, which provided remedies for all contamination known at that time to require corrective action.

Building 51, which housed the Bevatron, occupied approximately 2.25 acres in the west-central part of the LBNL Site. During its operation from 1954 until 1993, the Bevatron was among the world's leading particle accelerators. The Building 51 and Bevatron Demolition Project, which began in 2010, consisted of the demolition, deactivation, and disposal of the Building 51 structure and contents; including the shallow foundations, shield blocks, and the Bevatron accelerator housed within the building. Following demolition, the site was backfilled to grade with clean soil. Between September 2010 and April 2011, LBNL conducted a preliminary investigation of potential subsurface contamination beneath the Building 51 Demolition Project area. During this preliminary investigation, relatively high concentrations of volatile organic compounds (VOCs) were detected in the soil and groundwater under the former Vacuum Pump Room area of Building 51. The project area is primarily referred to as Building 51 in the workplan, but is also referred to as the Bevatron Complex or simply as the Bevatron. Building 51 included Building 51A, an integral addition. Except for the area overlying the former Vacuum Pump Room, the project area has been paved to provide parking, and is not currently scheduled for development.

Objective of the ICM
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Currently, there is no significant risk to human health associated with VOC contamination detected in the former Vacuum Pump Room area. The potential exposure pathways relevant to human health risks are inhalation due to vapor intrusion into indoor air and/or direct contact with contaminated soil. Groundwater at LBNL is not used for drinking, irrigation, or other industrial or domestic purposes. VOCs have been detected in soil vapor and groundwater at concentrations well above screening levels for potential risk to potential future indoor workers via the vapor intrusion pathway. However, there is no risk to current workers since this

there is no risk to current workers since this pathway is not complete because there are no buildings overlying the areas where the screening levels are exceeded. Concentrations of VOCs in the soil exceed screening levels for direct contact by outdoor workers in two limited locations in the former Vacuum Pump Room area. Both of these locations have been posted with warning signs requiring Hazardous Waste Operation (HAZWOPER) training for any worker handling soil in the posted area.

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For More Information
Jacinto Soto
DTSC Project Manager
700 Heinz Avenue
Berkeley, CA 94710
(510) 540-3842
Jacinto.Soto@dtsc.ca.gov

Richard A Perry
DTSC Public Participation Specialist
700 Heinz Avenue
Berkeley, CA 94710
(510) 540-3910
Richard.Perry@dtsc.ca.gov

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TDD users can use the California Relay Service at (888) 877-5378 and ask to speak with Richard Perry at (510) 540-3910.

Anuncio
Si prefiere hablar con alguien en español acera de ésta información, favor de llamar a Jacinto Soto, Departamento de Control de Substancias Tóxicas, al número de teléfono (510) 540-3842.

Public Comment Period
We encourage you to review the Draft ICM Workplan and proposed Negative Declaration. DTSC is holding a 30-day public comment period for the ICM beginning May 7, 2013. All comments must be postmarked by June 7, 2013. All e-mailed comments must be received no later than 5:00 pm on that same day.

Please submit written comments to:
Jacinto Soto
DTSC Project Manager
700 Heinz Avenue
Berkeley, CA 94710
Call (510) 540-3842 or
email Jacinto.Soto@dtsc.ca.gov

OT #4856086; May 14, 2013

ATTACHMENT B

MAP SHOWING THE LOCATION OF THE LBNL SITE

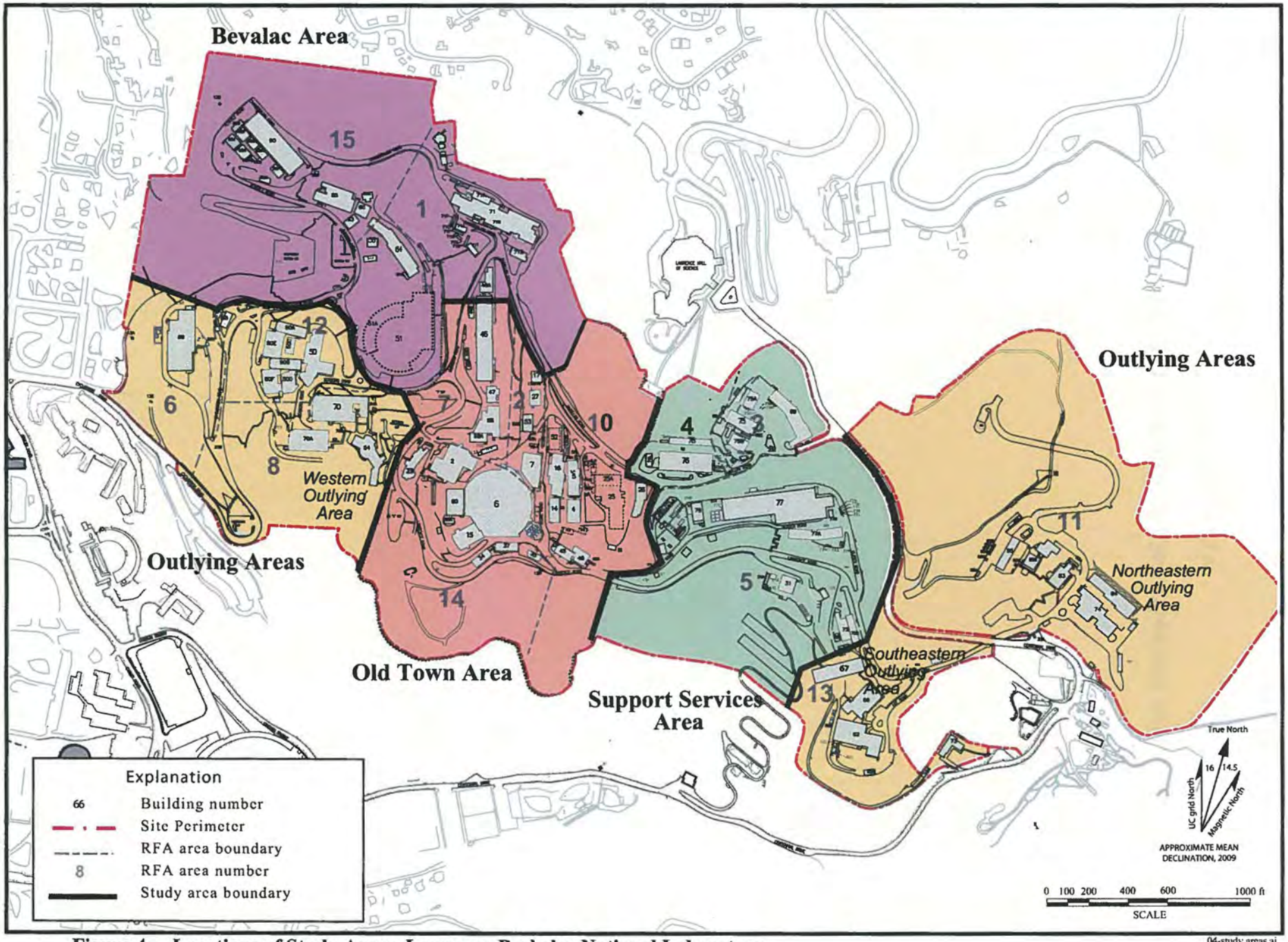

Figure 4. Locations of Study Areas, Lawrence Berkeley National Laboratory.

04-study areas.ai
5/12

ATTACHMENT C

COPIES OF THE WRITTEN COMMENTS RECEIVED.

Soto, Jacinto@DTSC

From: Zachary Runningwolf <runningwolf.zachary@yahoo.com>
Sent: Friday, May 31, 2013 10:32 AM
To: Soto, Jacinto@DTSC
Subject: Bevatron

Dear Mr. Soto,

I am an Indigenous elder and leader here in the Bay Area along with being a candidate for Mayor in Berkeley and I'm very concerned about this report and lack of community input. Two things could you send me the information on this issue at this same e-mail and could you set up a community meeting top alert the community which is required by law.

Respectfully Zachary RunningWolf

Soto, Jacinto@DTSC

From: Zachary Runningwolf <runningwolf.zachary@yahoo.com>
Sent: Friday, June 07, 2013 11:37 AM
To: Soto, Jacinto@DTSC
Subject: Re: Bevatron

Dear Mr Soto,

Thank for the information on the study the Bevatron and the ironic timing of being the last day of Public comment period. I wonder for public safety or hiding the public safety for a pay check and I was wondering how you can sleep at night. Please get a conscience it is that time (Mayan calendar and Hopi Prophecy).

Respectfully RunningWolf, Indigenous elder and Pipe carrier

PS. I'm not trying to be confrontational just trying to alert all people that this Bullshit illegal government is done.

From: "Soto, Jacinto@DTSC" <Jacinto.Soto@dtsc.ca.gov>
To: Zachary Runningwolf <runningwolf.zachary@yahoo.com>
Sent: Thursday, 6 June 2013, 11:31
Subject: RE: Bevatron

Hello Mr. Running Wolf,

The documents are available for review on Envirostor (DTSC's online database). Here is a link to the site page: http://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=80001259. Completed Documents can be accessed by going to the Activities Tab. Draft documents that are out for Public Review can be accessed by going to the Community Involvement Tab. Also, these documents are available at Berkeley Public Library, 2090 Kittredge Street, Berkeley. The document that is out for review is the Interim Measure Workplan which proposes to conduct groundwater extraction in the area near the former Bevatron. Could you let me know what issues related to the proposed work you would like to discuss at a community meeting? I need to have some additional information about the meeting purpose in order to adequately respond to your request.

From: Zachary Runningwolf [mailto:runningwolf.zachary@yahoo.com]
Sent: Friday, May 31, 2013 10:32 AM
To: Soto, Jacinto@DTSC
Subject: Bevatron

Dear Mr. Soto,

I am an Indigenous elder and leader here in the Bay Area along with being a candidate for Mayor in Berkeley and I'm very concerned about this report and lack of community input. Two things could you send me the information on this issue at this same e-mail and could you set up a community meeting top alert the community which is required by law.

Respectfully Zachary RunningWolf

Soto, Jacinto@DTSC

From: Carol Denney <carol.denney@no-smoke.org>
Sent: Friday, June 07, 2013 1:00 PM
To: Soto, Jacinto@DTSC
Cc: cdenney@igc.org
Subject: migrating toxics in Strawberry Canyon

Dear Mr. Soto,

Please count me among the local citizens greatly alarmed to hear that deadly toxins are migrating down our watershed, toxins which a sensible plan for Strawberry Canyon would never have placed there in the first place.

Now the whole community will be saddled with serious clean-up costs, which I nonetheless fully support, because otherwise the migration will affect groundwater, wildlife, and the health of our community. Do NOT leave these toxics in place, which only passes on the costs to future generations and presumes, in the case wrongly, that toxics stay neatly in the places we put them.

I sincerely hope that no more buildings are built in this sensitive, fire-prone and earthquake-prone area, where, in the event of disaster, fire trucks and rescue vehicles have to compete with fleeing residents on the very few roads providing access to this area.

Thank you,

Carol Denney
1970 San Pablo Avenue #4
Berkeley, CA 94702
510-548-1512

Soto, Jacinto@DTSC

From: Nigel Guest <info@avalon-enviro.com>
Sent: Friday, June 07, 2013 3:27 PM
To: Soto, Jacinto@DTSC
Subject: Comments on LBNL draft ICM Workplan for the former building 51 area

Dear Ms. Soto

I live on Panoramic Hill, which is close to LBNL, and the former Building 51. I received a copy of your Fact Sheet on the project yesterday. I followed the instructions on the last page, and found:

1. A reference to a revised Report of Environmental Investigations (at
...) Building 51 ..., dated 8/6/12. I was able to download the report.
2. A reference to DTSC's approval of the report, dated 9/18/12. Again, I could download this.
3. A reference to the ICM Workplan, originally scheduled for 1/3/13, then rescheduled to 8/6/13.However, there was nothing to read or download.
4. A reference to a CEQA Notice of Exemption, scheduled for 3/25/13.
Again, there was nothing to read or download.

Unless I have erred, it would appear that neither the Workplan nor the Notice of Exemption is available on the internet, which is the most common means of access today. I would appreciate it if this defect were corrected, and the comment period extended.

Re: item 1. The Report references soil depths of at least 28', but the Fact Sheet states that the extraction well will be only 20' deep.
Shouldn't the well go all the way to (uncontaminated) bedrock?

Re: Item 4. The Fact Sheet references a Negative Declaration, not a Notice of Exemption. Which is correct?

Re: Fact Sheet. I do not believe that a CEQA Negative Declaration is appropriate, because there are significant groundwater impacts, which will be mitigated by the ICM Workplan. Either a Mitigated Negative Declaration or an EIR could be appropriate, but without the Workplan, I can't say which is acceptable.

Regards

Nigel Guest

Soto, Jacinto@DTSC

From: Cynthia Johnson <cyn4justice@gmail.com>
Sent: Friday, June 07, 2013 6:17 PM
To: Soto, Jacinto@DTSC
Subject: BFUU Social Justice Committee objection to Bevetron site plan without more Sudy

Dear Project Manager Honorable Mr. Soto,
Our Social Justice Committee of the Berkeley Fellowship of Unitarian Universalists is very concerned that without a Environmental Impact Statement and Review that assures that the water level and safety issues regarding the dangerous toxins at the area of the vacuum pump room are likely unhealthy for human and all life for that matter. The Toxic TCE s and Vinylchloride apparently having migrated to an unsafe level demands assurances to the public that our ground water is safe. Please hold public hearings on this issue-that is the minimum the public requires to feel that our water is safe. Please respond as soon as possible
Berkeley Fellowship of Unitarian Universalists
www.bfuu.org
1924 Cedar at Bonita
Social Justice Center 1606 Bonita 94709
Justice Center Phone 510-274-4272
Cynthia Johnson on behalf of the Social Justice Center Members

--
Cynthia Jean Johnson is a Board Member of the Berkeley Fellowship of Unitarian Universalists (BFUU) and is currently Vice Chair of the Social Justice Committee.

The Berkeley Fellowship Monthly Open Mic (BF MOM, formerly "Country Joe's Monthly Open Mic") happens "Every 2nd Friday of Every Month" at 7 pm at 1924 Cedar Street at Bonita Ave. Performer sign-up begins at 6:30 pm. For more info on Social Justice Committee projects and the "Partners For Justice" program go to http://www.bfuu.org/events/social-justice

Cynthia is on Facebook at http://www.facebook.com/CynthiaJeanJohnson4Justice

Cynthia also serves on the Boards of the Ecumenical Peace Institute, the Marin Task Force on the Americas, the Local Station Board of KPFA Pacifica 94.1FM. Please communicate regarding KPFA at cyn4pacifica@gmail.com or call 510-495-5132

SAVE STRAWBERRY CANYON

P.O. BOX 1234
BERKELEY, CALIFORNIA 94701

Save Strawberry Canyon is a citizens' group that seeks to preserve and protect the watershed lands and cultural landscape of Strawberry Canyon. Save Strawberry Canyon was formed out of the urgent need to take action in response to the threat of intrusive, inappropriate development on the Canyon lands.

Strawberry Canyon watershed, opposite the Golden Gate, is a unique link to the East Bay Regional Park District lands and, by its streams and views, to San Francisco Bay. The canyons, with their streamside vegetation, oak-bay woodlands, grasslands, and surrounding slopes, form a rich repository of wildlife adjacent to the dense urban populations of the UC Berkeley Campus and the cities of Berkeley and Oakland.

Save Strawberry Canyon seeks to inform the public about the impacts of proposed developments, to encourage location of such developments at more suitable sites, and to promote better public access to the beautiful watershed lands with their wildlife and scenic resources. Mission Statement

Jacinto Soto, Project Manager
Department of Toxic Substances Control (DTSC)
700 Heinz Avenue Sent via e.mail: Jacinto.Soto@dtsc.ca.gov
Berkeley, California 94710 June 7, 2013

RE: Lawrence Berkeley National Laboratory (LBNL) Interim Corrective Measures Workplan (ICM) to Control the Migration of Contaminated Groundwater at the Bevatron Demolition Site

Dear Mr. Soto:

Save Strawberry (SSC) appreciates being informed of DTSC's efforts to address an "imminent threat to the environment that needs to be mitigated" — the contaminated groundwater identified at the Beaverton Demolition Site (Site) now migrating with toxic substances, as well as radionuclide matter. Whether the proposed ICM is adequate or not, is a highly technical matter requiring engineering and geotechnical expertise far beyond the understanding of SSC at this time.

The ICM narrative, as well as LBNL's Quarterly Progress Report and Annual Status Summary, issued in February 2012, seems to establish that the Strawberry Creek watershed, with its linkage to the San Francisco Bay, is an *impaired* body of water. However, the lack of discussion regarding cumulative impacts upon the "clean" waters beyond the Site would seem to mandate that local, county, state and federal agencies, along with DTSC, collaborate to address the potential ongoing contamination. Toward this end, SSC urges that Strawberry Creek and its Headwater Tributaries, in both Berkeley and Oakland, be designated for listing on the LIST OF IMPAIRED WATERS [Clean Water Act Sections 305(b) and 303 (d)], recognizing the integral flow of waters from above the Site, as well as waters flowing from the Site, through the City of Berkeley into Aquatic Park and, then, into the federal waters of the San Francisco Bay.

While the ICM is thorough in many ways, no reference is made to volumes upon volumes of pristine water being pumped 24/7 from the Lennart Aquifer, located above the Strawberry and Blackberry Canyons, into pipes directed down into Blackberry Canyon. To the knowledge of SSC there has been no public disclosure or discussion of this significant source of clean water. How are the waters of the Lennart Aquifer integral to the plan to "mitigate" the contaminated groundwater at the Site? 1

Thank you for your efforts to address the contaminated groundwaters at the Bevetron Demolition Project Site. It is our hope that there will be increased community attention given to this matter.

Sincerely,

Lesley Emmington, for
Save Strawberry Canyon

cc:
Ron Pauer Environmental Services Group, LBNL
Thomas Howard, Executive Director, State Water Resources Control Board
Bruce Wolfe, Executive Officer, San Francisco Regional Water Quality Control Board
Alexander Coate, General Manager, East Bay Municipal Utility District
Geoff Brosseau, Executive Director, Bay Area Stormwater Management Agencies Association
Bill Jennings, California Sportfishing Protection Alliance
Nabil al Hadithy, Toxic Management, City of Berkeley
Arthur Feinstein, Chair, San Francisco Bay Chapter, Sierra Club
Carole Schemmerling, Strawberry Creek Watershed Council

GENE C. BERNARDI
9 Arden Road
Berkeley, CA 94704

June 6, 2013

Jacinto Soto
DTSC Project Manager
700 Heinz Ave.
Berkeley, CA. 94710

Re: Interim Corrective Measures Work Plan ... Bevatron Contamination

Dear Mr Soto,

Proposing a Negative Declaration for the Bevatron contamination, described as a "Potential Risk to Human Health [and] ... imminent threat to the environment ..." is outrageous, and, of course, a totally inadequate plan for this serious problem.

A full Environmental Impact Report and Environmental Impact Statement must be done. If these reports had been done re: the Bevatron demolition, as the public demanded, the severity of this contamination calamity may have been avoided.

The Department of Toxic Substances Control having NO jurisdiction over radioactive contamination, even when combined with hazardous contaminants (over which it does have jurisdiction), is NO excuse for its NOT alerting the public to the possible existence of such health threatening combined waste, misleadingly referred to as "mixed" waste. As an agency devoted to protecting human health and the environment, you must call upon the agencies with jurisdiction over radioactive contamination to investigate the presence and extent of such contamination in mixed state or otherwise.

Treating the "imminent threat" to human health and

GENE C. BERNARDI
9 Arden Road
Berkeley, CA 94704

the environment lightly by proposing a Negative declaration, flies in the face of the fact that LBNL qualifies as a Superfund site by virtue of its Hazard Ranking Score (HRS) due to ambient tritium levels exceeding screening criteria (EPA, Summer 1998). Unfortunately, by administrative decision LBNL was not placed on the National Priorities List for cleanup.

It takes tritium 125 years to decay to an infinitesimal amount. Might not tritium in the soil, plants, water, or transpiring from trees standing or chipped, be mixing with the Volatile Organic Compounds (VOC's) found in the soil and groundwater under the Bevatron's former Vacuum Pump Room of Building 51?

What of the possible contamination of VOC's by the following radioactive materials disclosed, by a 9/20/02 letter from the Dept of Energy to the Committee to Minimize Toxic Waste, as contaminants in the metals and concrete materials of the Bevatron?:

The maximum activation levels currently allowable for the metals and concrete materials being shipped to the Nevada Test Site are: from the Bevatron Demolition.

PKE 678 - Electromagnets and PKE 683 - Misc. Scrap Metal
Ar-42 - 10 pCi/g
Co-60 - 220 pCi/g
Fe-55 - 220 pCi/g
Ti-44 - 220 pCi/g
Total - 670 pCi/g

PKE 682 - Concrete Shielding Blocks
Ar-42 - 5 pCi/g
Ba-133 - 250 pCi/g
Co-60 - 110 pCi/g
Cs-137 - 250 pCi/g
Eu-152 - 150 pCi/g
Eu-154 - 15 pCi/g
Fe-55 - 110 pCi/g
Ti-44 - 110 pCi/g
Total - 1000 pCi/g

GENE C. BERNARDI
9 Arden Road
Berkeley, CA 94704

LBNL is located in a Watershed, the Strawberry Creek Watershed. VOC's and radioactive materials, used by LBNL labs, find their way into the tributaries that feed the Strawberry's South and North forks, the latter fork receiving runoff from the Bevatron site under which the Lennert Aquifer is said to travel. VOC's and radioactive soils and runoff ~~from~~ make their way down the North Fork (AKA Blackberry Creek) which passes through a residential area at LeConte and LeRoy Aves. and continues past Etcheverry Hall where more VOC's and radioactive materials used there may enter the creek. What of the health of children, pets and wildlife that come in contact with this contaminated creek water? Have the residents of the LeRoy, LeConte Aves area, including the nearby home with a well, been notified?

Has anything really changed since the 1991 Tiger Team Assessment of LBL? which found LBL violated DOE Order 5400.1 "General Environmental Protection Program".

Please fulfill your obligation to protect the public health by conducting and calling for thorough investigations of both hazardous and radioactive contamination migrating from the Bevatron site to work and residential areas. Notification of LBNL employees and surrounding residents must be carried out followed by PUBLIC HEARINGS.

Sincerely, Gene Bernardi
member Committee to Minimize Waste

page three of three pages.

DEPARTMENT OF TOXIC SUBSTANCES CONTROL
SITE MITIGATION BRANCH
BERKELEY
JUN 10 2013
STATE OF
CALIFORNIA
EPA
RECEIVED

URGENT

JACINTO SOTO
DTSC PROJECT MANAGER
700 HEINZ AVE.
BERKELEY, CA 94710

JUNE 5, 2013

SUBJECT: COMMENTS ON THE DRAFT INTERIM CORRECTIVE MEASURES (ICM) WORKPLAN AND PROPOSED NEGATIVE DECLARATION TO CONTROL THE MIGRATION OF CONTAMINATED GROUND WATER AT THE BEVATRON COMPLEX/ BUILDING 51 SITE OF THE LAWRENCE BERKELEY NATIONAL LABORATORY (LBNL).

THE MIGRATION OF CONTAMINATED GROUND WATER AT LBNL IS ALREADY AN IMMINENT THREAT TO THE ENVIRONMENT AS WELL AS A RISK TO HUMAN HEALTH!

A NEGATIVE DECLARATION UNDER CEQA IS NOT SUFFICIENT AND WE ASK THAT A MORE THOROUGH REVIEW, AN EIR, BE PREPARED TO ADDRESS THE PROBLEM OF MIGRATING CONTAMINATED GROUND WATER WITHIN THE ENTIRE WESTERN/ CENTRAL PORTION OF THE LBNL SITE.

SINCE THE BEVATRON COMPLEX WAS INVOLVED IN HIGH ENERGY PHYSICS RESEARCH FOR SOME 4 DECADES, WE ALSO ASK THAT DOE PREPARE

AN EA OR EIS UNDER NEPA TO ADDRESS ANY RADIOACTIVE COMPONENTS ASSOCIATED WITH THE MIGRATION OF CONTAMINATED GROUNDWATER, SOIL, SOIL VAPOR, SEDIMENT ETC.

— PAST AND CURRENT HYDROGEOLOGICAL INVESTIGATIONS AT LBNL CLEARLY HAVE NOT BEEN SUFFICIENT TO ADDRESS ALL THE COMPLEXITIES OF THE SITE, BUILT ON TOP OF A COLLAPSED CRATER, CALDERA OF AN ANCIENT VOLCANO (SEE ATTACHMENT 1. SIBLEY VOLCANIC REGIONAL PRESERVE, ITEM #11: "HOW MANY VOLCANOES"?) — IN A MAJOR WATERSHED, THE STRAWBERRY CREEK WATERSHED, (SEE ATTACHMENT 2. HISTORIC HYDROLOGY, ADAPTED FROM FRANK SOULE'S 1875 MAP) — FILLED WITH NETWORKS OF LAND-SLIDES (SEE ATTACHMENT 3.) AS WELL AS DOZENS OF EARTHQUAKE FAULTS CRISS-CROSSING THE AREA (SEE ATTACHMENT 4.) CONSTANTLY CREATING HAVOC. MOST RECENT LANDSLIDE STARTED IN DECEMBER OF 2012, IN THE VICINITY OF THE BEVATRON, FORCING THE EVACUATION OF BUILDING 46, AGAIN! — STOP GAP MEASURES, SUCH AS WHAT IS PROPOSED, WILL NOT SUFFICE.

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PRESERVE.

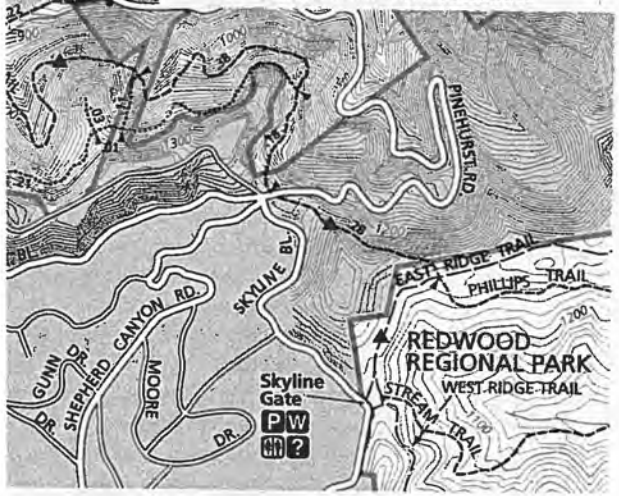
LEGEND

- Hikers, Horses & Bicycles
- Hikers & Horses
- Skyline Trail/Bay Area Ridge Trail–Hikers & Horses
- Hikers Only
- .28 Mileage Between Points
- Paved Road
- P Parking
- Restrooms
- Visitor Center
- W Drinking Water
- ? Information
- 4 Self-Guided Tour Stops
- Gate, No Vehicle Access

North

0 1/4 1/2 Mile

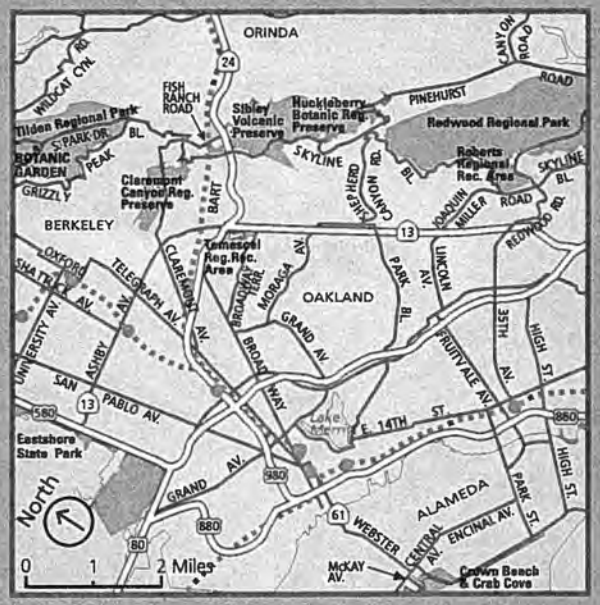
Contour Interval 20 feet in Claremont Canyon, Redwood, and Sibley triangle west of Thorndale Dr. Contour interval 10 feet elsewhere.



is roadcut exposes Orinda Formation river gravels, ıds, and mudstones. The red (when moist) streaks yers in these river beds were caused by oxidation of ı the sediments. Such varicolored "redbeds" are red worldwide for the fossils of plants and animals ontain. Elsewhere in the Preserve, bands of more e red are found at the tops and bottoms of lava In such cases iron was oxidized and reddened by ; and steam action; these bands are called "bake ." A related process occurs when a brushfire ns rocks and soil. To see Post 4, walk about 100 feet ost 3, then bear to the right.

ore you is a wall with basalt on the left and Orinda dstones on the right. The bedding in the mudstones

ued on reverse



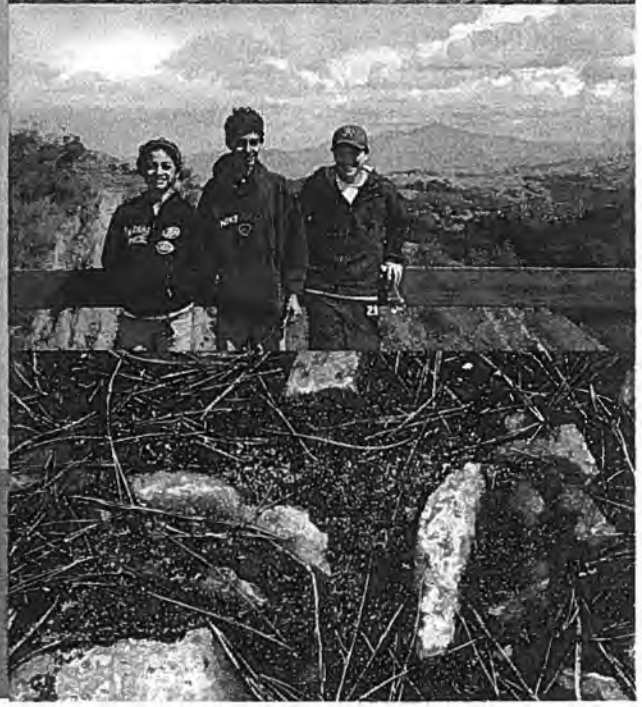
To Reach Sibley Volcanic Regional Preserve: From Highway 24 just east of the Caldecott Tunnel, take the Fish Ranch Road exit and go north, uphill, for .8 miles to Grizzly Peak Blvd. Turn left and go 2.4 miles to Skyline Boulevard. Turn left on Skyline and proceed to the park entrance, on the left. PUBLIC TRANSIT: The closest bus line, AC Transit #305, runs Tuesdays and Thursdays, from mid-morning to mid-afternoon. From Lake Merritt BART, 19th Street BART, or Rockridge BART, take AC Transit bus 59 or 59A to the Montclair Transit Center. Transfer to AC Transit #305 and exit at Colton Boulevard and Ridgewood Drive. Walk the short distance from Colton to Skyline Boulevard, turn left and proceed a mostly level, 0.9-mile walk that passes the Huckleberry Preserve staging area. AC Transit: dial 511 (TDD/TTY: 1-800-448-9790) to confirm transit information.

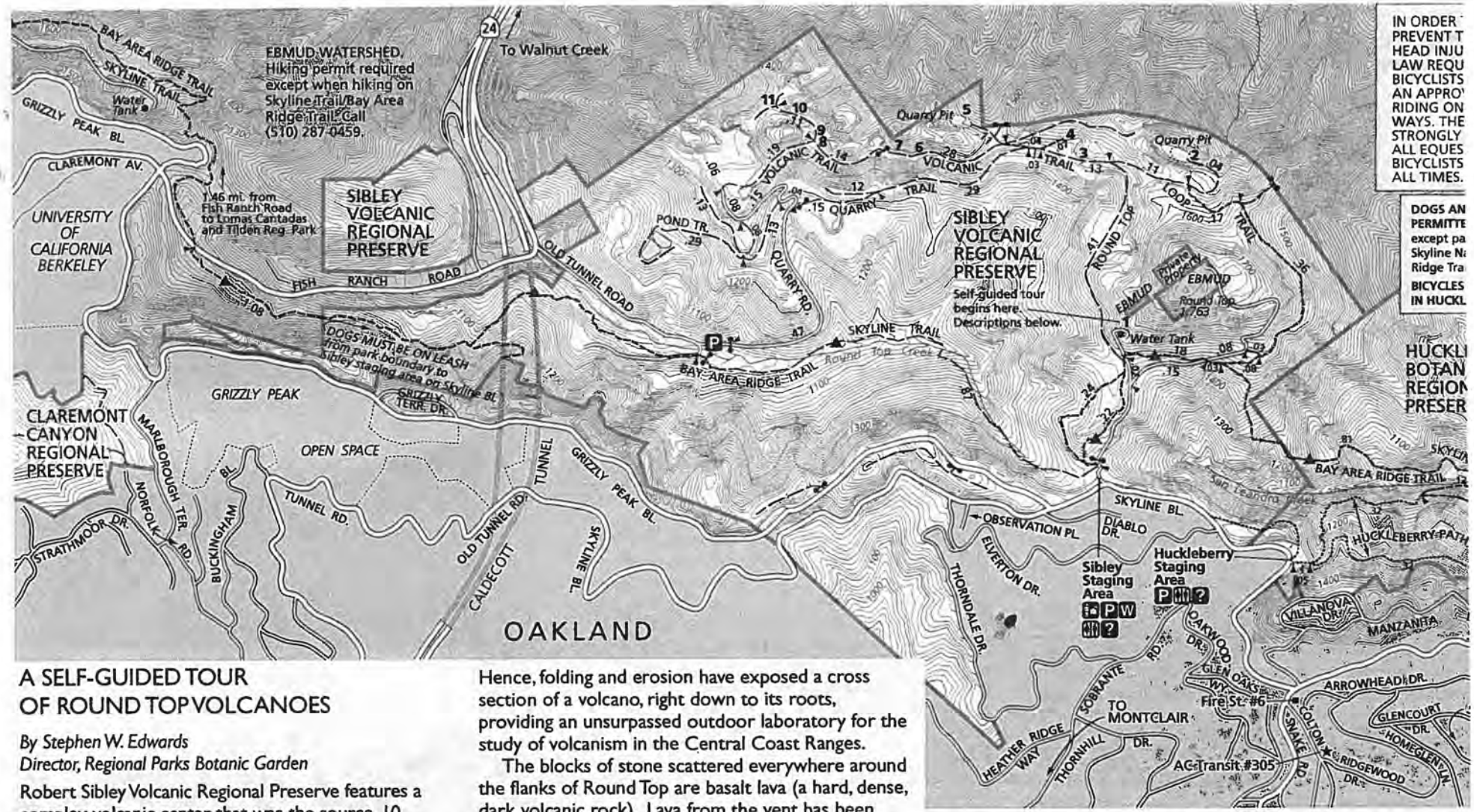
If you would like this information in an alternative format, please contact the EBRPD Public Affairs Department at (510) 544-2200, fax (510) 635-3478, TDD (510) 633-0460, or info@ebparks.org.

East Bay Regional Park District
2950 Peralta Oaks Court,
P.O. Box 5381
Oakland, CA 94605-0381
1-888-EBPARKS www.ebparks.org
Rev. 4/10

Sibley Volcanic
Regional Preserve

East Bay
Regional Park District





A SELF-GUIDED TOUR OF ROUND TOP VOLCANOES

By Stephen W. Edwards
Director, Regional Parks Botanic Garden

Robert Sibley Volcanic Regional Preserve features a complex volcanic center that was the source, 10 million years ago, of most of the lavas that underlie the ridges from Inspiration Point in Tilden Regional Park to Moraga. Round Top, one of the highest peaks in the Berkeley Hills, consists of lavas, breccias (unsorted mixtures of fine and coarse volcanic debris) and tuffs (lithified volcanic ash – ash that has become stone) that once filled a volcano.

Though Round Top was once the infilling of a great crater, it stands out today because it was originally surrounded by "incompetent" (easily eroded) sedimentary rocks of the Orinda Formation, which have eroded away. During the past 10 million years the Berkeley Hills were uplifted on a gigantic scale because of strains on the Hayward and Moraga fault systems. This uplift folded the rock formations, and the Round Top vent complex was tilted on its side. Hence, folding and erosion have exposed a cross section of a volcano, right down to its roots, providing an unsurpassed outdoor laboratory for the study of volcanism in the Central Coast Ranges.

The blocks of stone scattered everywhere around the flanks of Round Top are basalt lava (a hard, dense, dark volcanic rock). Lava from the vent has been dated at UC Berkeley by the potassium-argon radio-isotopic dating method. The oldest is 10.2 million years old.

A great diversity of volcanic phenomena is preserved for study at Sibley. Basaltic dikes (feeders of the vents), tuff-breccias (ash containing a jumble of blocks and chunks of lava), lava flows, red-baked cinder piles, air-fall tuffs, and the major vent itself can all be seen first-hand in the course of an easy hike. Numbered posts, which correspond to the numbered descriptions below, have been placed at some of the most interesting outcrops.

1 To visit this site, walk up the paved road to the EBMUD water tank. A dark basalt dike, an important feeder of lava to the crater, cuts through a sequence of tuff-breccias (grayish brown) and pebbly mudstones (light gray), all inside and near the bottom of the crater. The mudstones indicate ponding of water; the tuff-breccias are the remains of landslides and blockfalls into the pit from the surrounding walls.

2 This pit was made by quarry operations in which huge amounts of massive basalt lava were removed. The result is a tremendous boon to geology, for the pit exposes the interior of the Round Top volcano. You are standing on bedded tuff-breccias, which filled much of the crater, settling at times into a small lake. Studies of exposures north and south suggest the crater was a little wider than the present quarry pit. The steep wall across the pit consists of lava that capped the crater after it was filled. Eventually the Round Top vent buried itself in basalt flows. From this point, note the view of Mt. Diablo, which, though it contains some submarine volcanic rocks, never was a volcano.

● BEVATRON COMPLEX

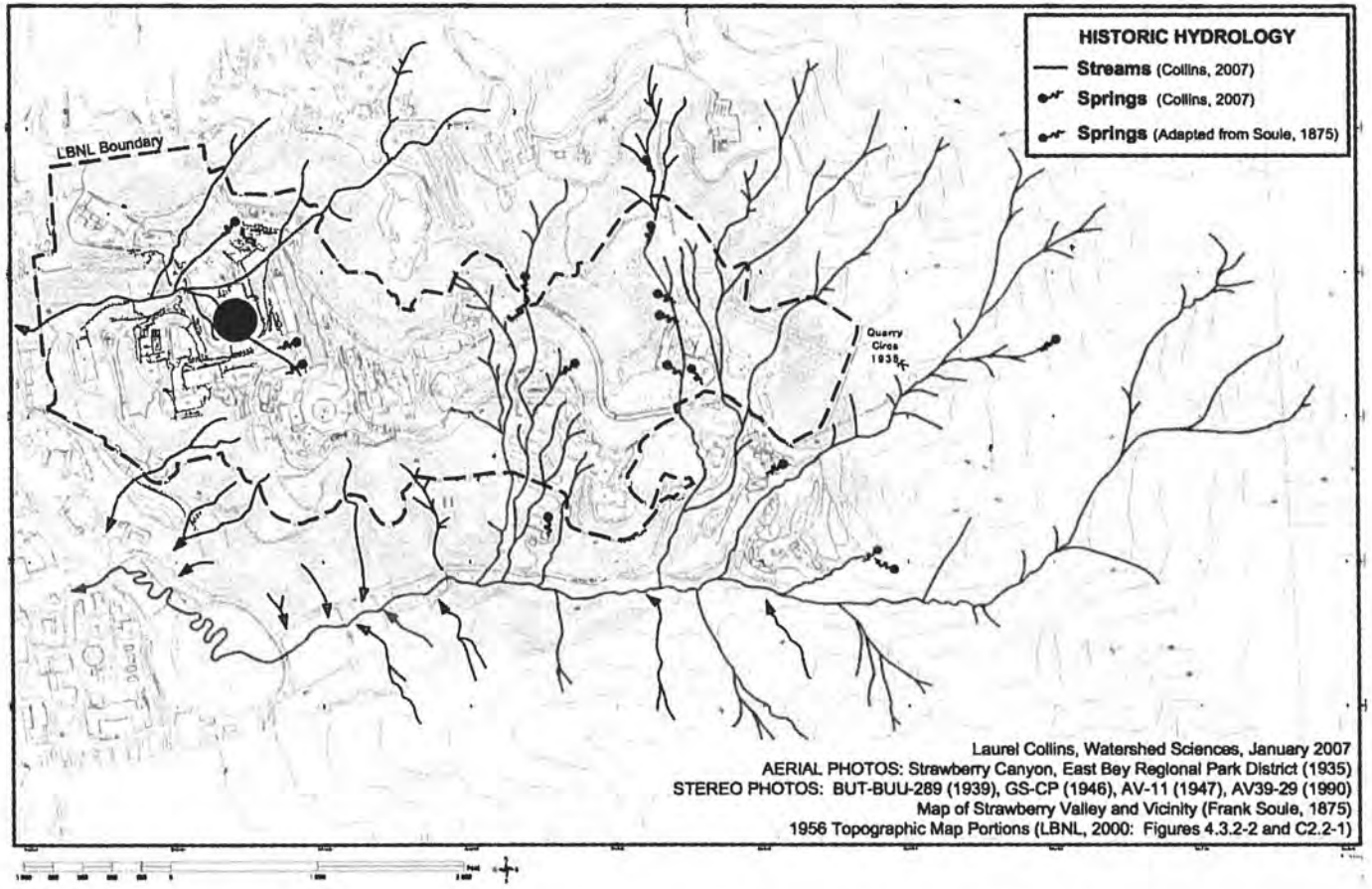


FIGURE 5. INTERPRETATION OF HISTORIC CHANNEL NETWORK AT LBNL IN STRAWBERRY CREEK WATERSHED

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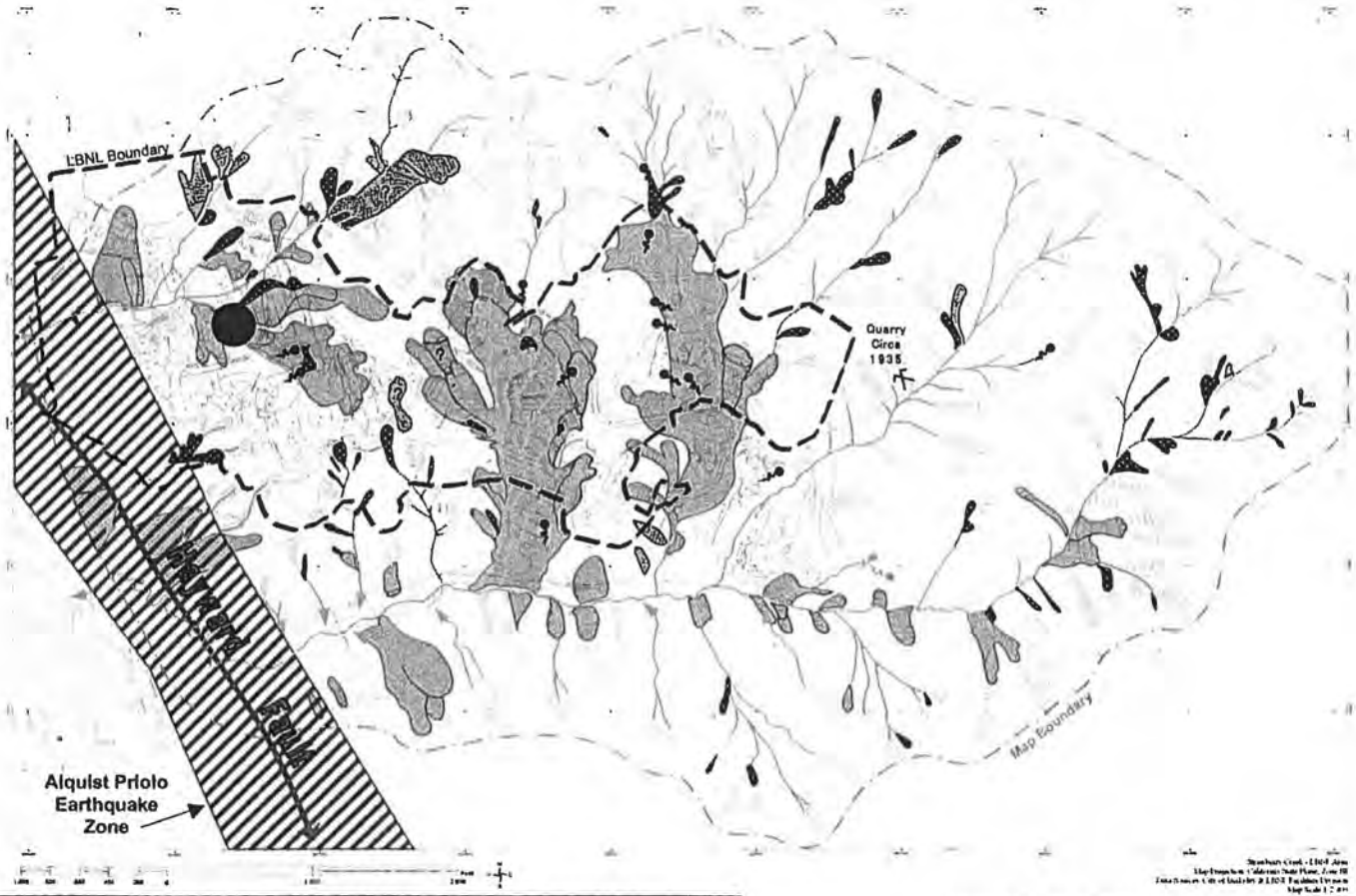
ATTACHMENT 7

● = INDICATES THE CENTER OF THE BEVATRON ACCELERATOR



Coliuvial Hollow: Source Area for Shallow Slides and/or Landslide Scar; Might Have Had Some Activity Within Colluvial Hollow During Last Century.

Earthflow, Slump, or Deep Seated Slide; Includes Area of Crown Scarp; Can Include bedrock blocks; Portions of Some Earthflows May be Buried Beneath Alluvial Fans and Colluvium.

Debris Flow or Shallow Slide Active During Last Century

Historic Channel Network and Springs; Springs Adapted from Soule 1895

Laurel Collins, Watershed Sciences, January 2007

AERIAL PHOTOS: Strawberry Canyon, East Bay Regional Park District (1935)
STEREO PHOTOS: BUT-BUU-289 (1939), GS-CP (1946), AV-11 (1947), AV39-29 (1990)
Map of Strawberry Valley and Vicinity (Frank Soule, 1895)
1956 Topographic Map Portions (LBNL, 2000: Figures 4.3.2-2 and C2.2-1)
Hayward Fault from USGS Faults on Google Earth (2007)

FIGURE 13f. INTERPRETATION OF HISTORIC CHANNEL AND LANDSLIDE NETWORK AT LBNL IN STRAWBERRY CANYON

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● BEVATRON COMPLEX

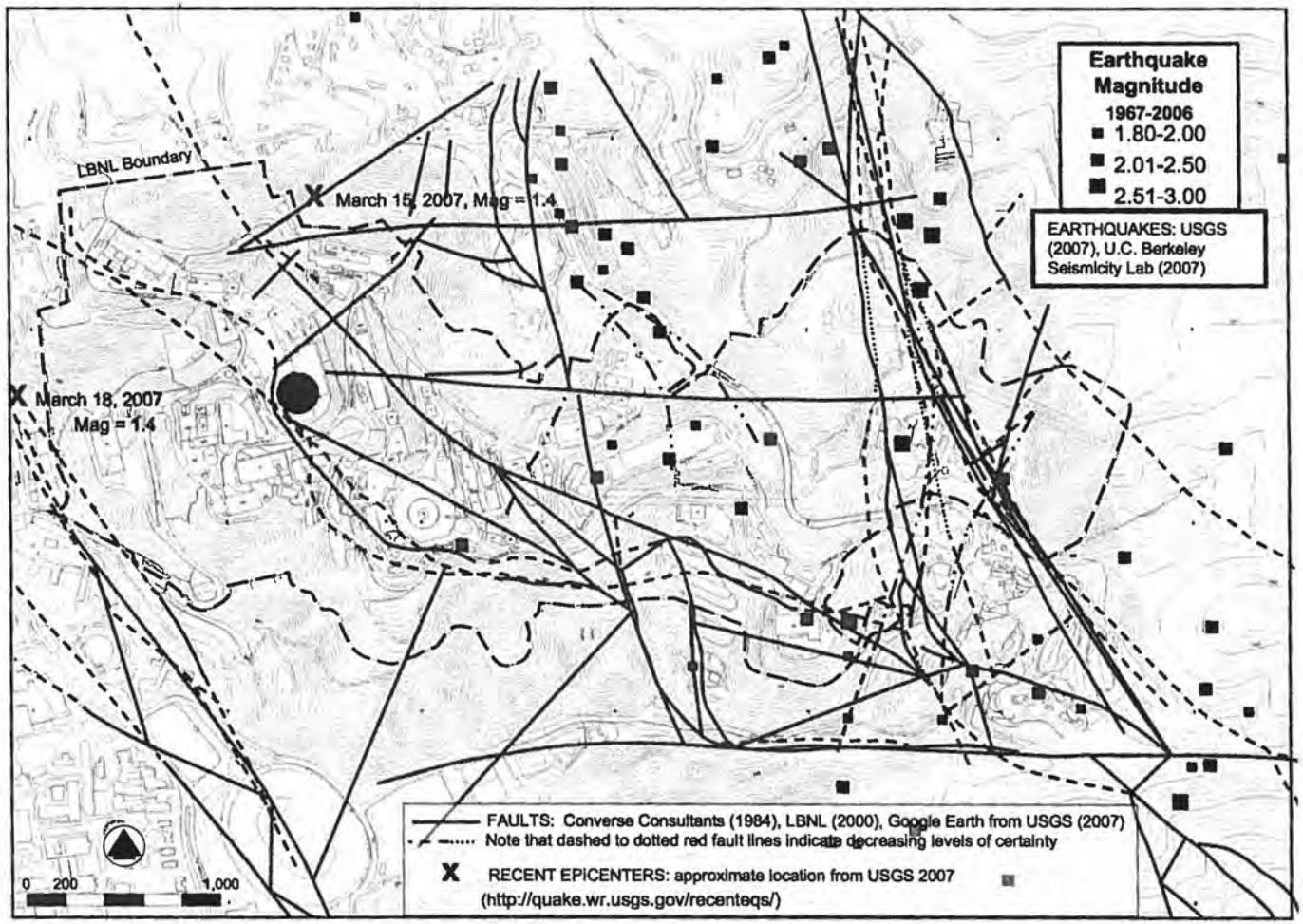

FIGURE 12a. EARTHQUAKE EPICENTERS AND FAULT COMPILATION AT LBNL IN STRAWBERRY CANYON 1967 - 2007

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ATTACHMENT 4.

AND COMPREHENSIVE INVESTIGATIONS MUST BE COMPLETED TO DETERMINE THE HYDRO GEOLOGICAL REASONS FOR THE CURRENT RISE IN WATER LEVELS AND THE MIGRATION OF CONTAMINATED GROUND WATER INTO CLEAN FILL.

THE BEVATRON COMPLEX WAS BUILT DIRECTLY ON TOP OF THE NORTH FORK OF THE STRAWBERRY CREEK AND AT LEAST 3 OF ITS TRIBUTARIES, FED BY 3 SPRINGS. (SEE ATTACHMENT 2.) THE BEVATRON BASEMENT WAS ALWAYS FULL OF WATER AND HAD TO BE CONSTANTLY PUMPED BY SUMP PUMPS.

HOW MUCH OF THIS KNOWLEDGE WAS USED WHEN DECISIONS WERE MADE TO BACK FILL THE SITE AND PAVE IT — AFTER DEMOLITION? — HOW MANY AREAS UNDER THE CURRENT PARKING LOT ARE MONITORED FOR THE MIGRATING CONTAMINATION?

WHAT IS THE LONG TERM PLAN, SINCE WATER IN CREEKS ULTIMATELY FLOWS ALONG THE ORIGINAL CREEK BED?

EARTHQUAKE FAULTS AT LBNL — ACT AS BARRIERS AND CONDUITS FOR CONTAMINATED GROUNDWATER (SEE ATTACHMENT 5.)

● = BEVATRON COMPLEX

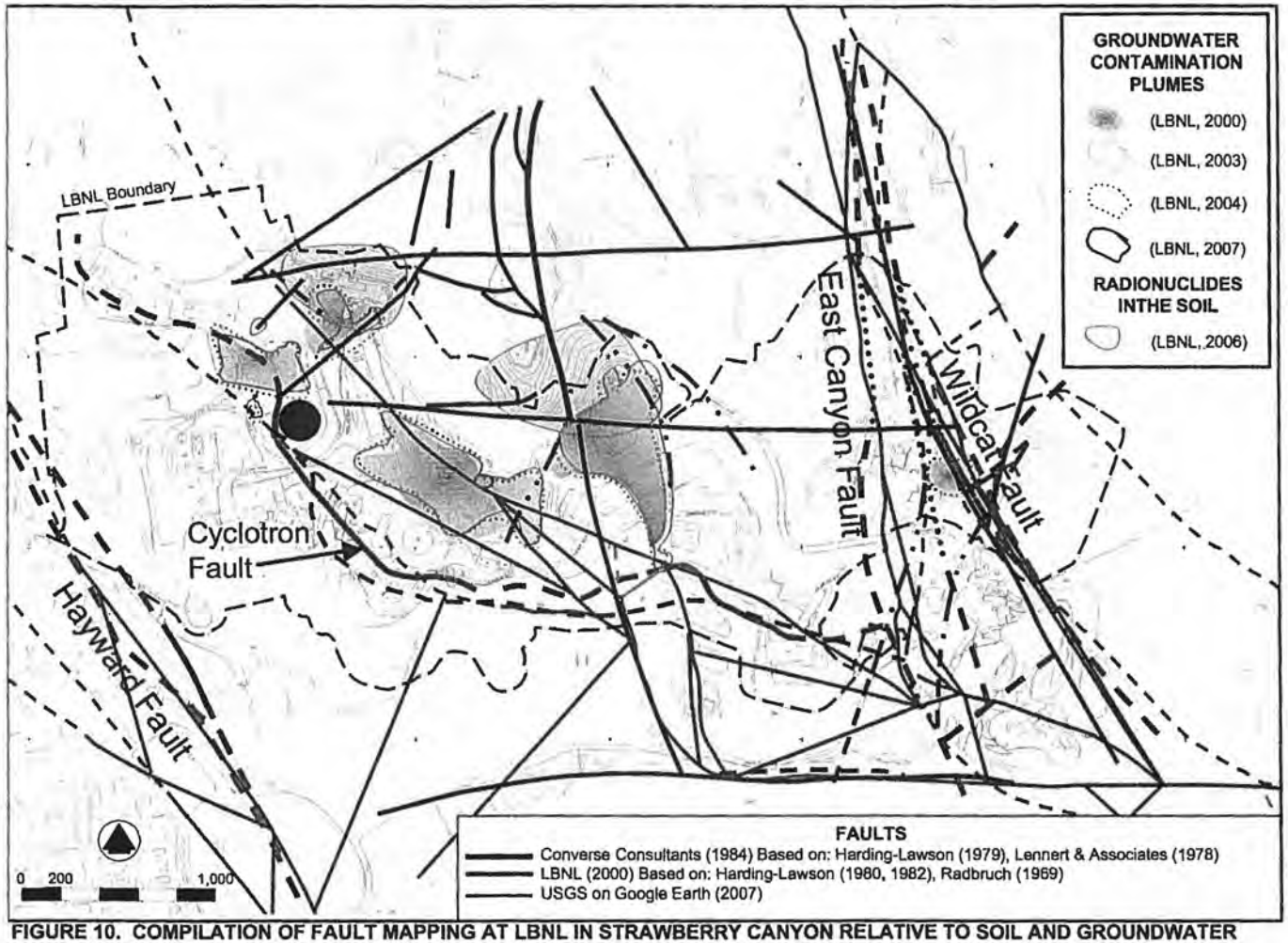


FIGURE 10. COMPILATION OF FAULT MAPPING AT LBNL IN STRAWBERRY CANYON RELATIVE TO SOIL AND GROUNDWATER CONTAMINANT PLUMES.

ATTACHMENT 5.

IN CMTW'S REPORT: "CONTAMINANT PLUMES OF LBNL AND THEIR INTERRELATIONSHIP TO FAULTS, LANDSLIDES, AND STREAMS IN STRAWBERRY CANYON, BERKELEY AND OAKLAND, CALIFORNIA" — (SEE ATTACHMENT 6.)

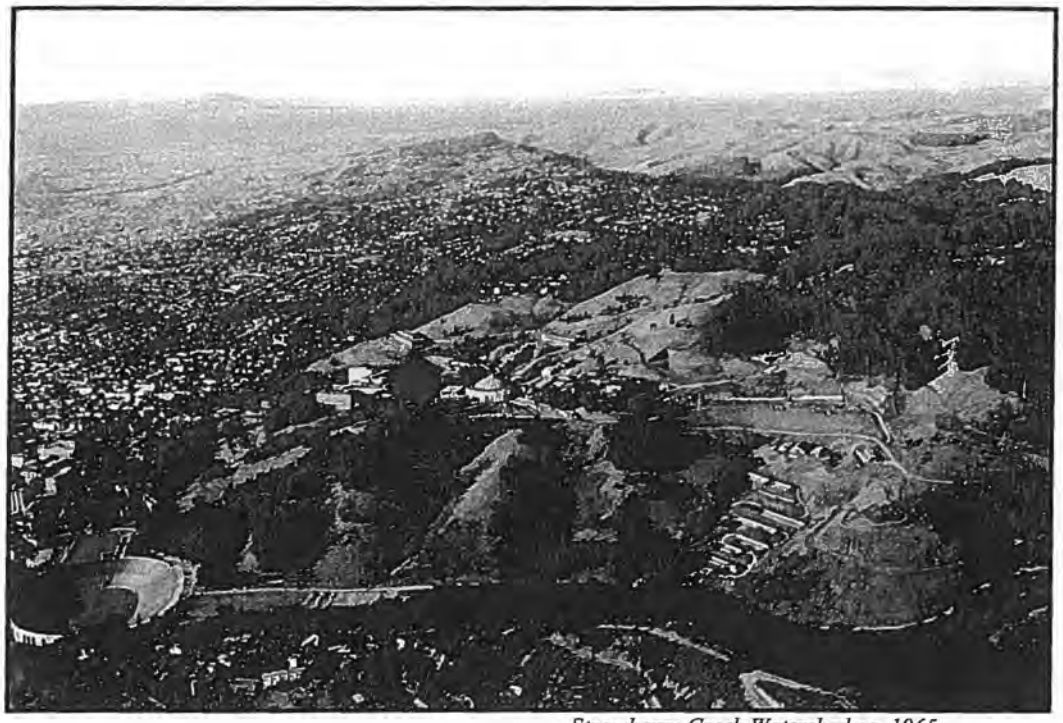
WE SHOW POSSIBLE CONTAMINANT MIGRATION ZONES AT LBNL ALONG FAULTS, BEDROCK CONTACTS AND LANDSLIDE AREAS (SEE ATTACHMENT 7.) ~ IT IS CLEAR THAT ALL OF THE CONTAMINANT PLUMES OF THE WESTERN / CENTRAL PORTION OF LBNL, IF NOT YET, WILL ULTIMATELY JOIN, AND IT APPEARS THAT THE BEVATRON COMPLEX AREA MAYBE THE CENTER FOR THESE WATERS. (SEE ATTACHMENT 8.)

~ WE ASK THAT A COMPREHENSIVE REVIEW, AN EIR BE PREPARED TO ADDRESS THIS SITUATION, AND WE ASK THAT THE FOLLOWING QUESTIONS BE ANSWERED:

1. WHY DID THE WATER LEVEL RISE "SEVERAL FEET"? HOW MANY FEET EXACTLY? WHEN DID THE WATER RISE START? — WAS IT ANTICIPATED IN PREVIOUS PLANS? — IF NOT — WHY NOT?
2. WHY DID THE CONCENTRATIONS OF VOCs INCREASE? WHERE DID THE CONTAMINATED GROUND WATER ORIGINATE? WHAT IS THE NEXT STEP, IF THE ICMs DO NOT WORK?

CONTAMINANT PLUMES OF THE LAWRENCE BERKELEY NATIONAL LABORATORY AND THEIR INTERRELATION TO FAULTS, LANDSLIDES, AND STREAMS IN STRAWBERRY CANYON, BERKELEY AND OAKLAND, CALIFORNIA

March 2007



Strawberry Creek Watershed ca. 1965

Laurel Collins, Geomorphologist
Watershed Sciences
1128 Fresno Ave
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collins@lmi.net

● = BEVATRON COMPLEX

for

Pamela Sihvola, Project Manager
Committee to Minimize Toxic Waste
P.O. Box 9646
Berkeley, California 94709

ATTACHMENT 6.

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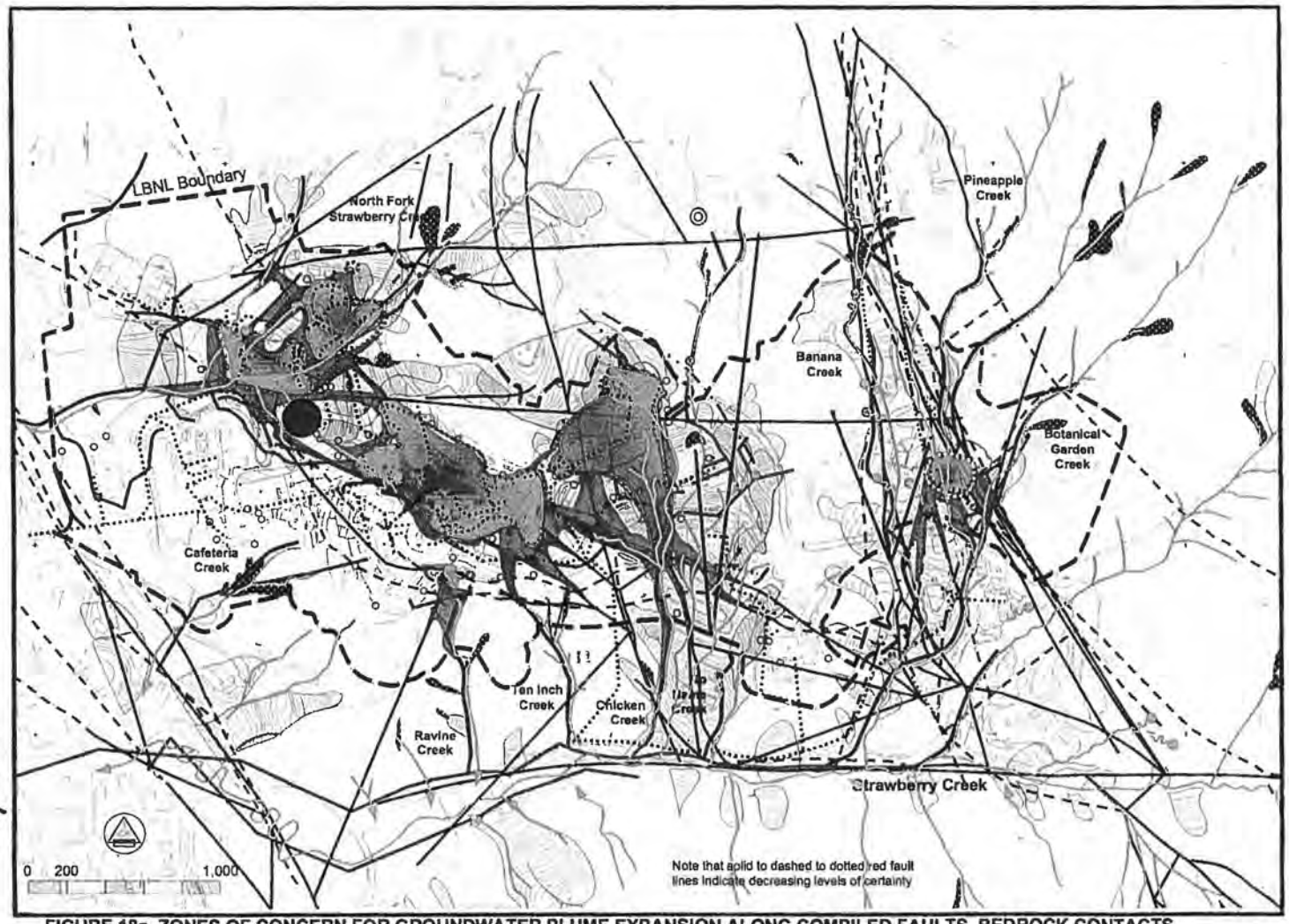
● = INDICATES THE CENTER OF THE BEVATRON ACCELERATOR



HYDROLOGY
- Sanitary Sewers (LBNL, 2000)
- Modern Streams (LBNL, 2000)
- Storm Drains (LBNL, 2000)
- Hydraugers (Converse, 1984)
- Shively Well Pumping the Lennert Aquifer (Converse, 1984)
- Historic Drainage Network (Collins,2007)

PLUMES IDENTIFIED BY LBNL
- Contamination Plumes (LBNL, 2000)
- Contamination Plumes (LBNL, 2003)
- Contamination Plumes (LBNL, 2004)
- Contamination Plumes (LBNL, 2007)
- Sampling Wells (LBNL, 2000)
- Radionuclides in the Soil (LBNL, 2006)

ZONES OF CONCERN FOR GROUNDWATER CONTAMINATION
- Possible contaminant migration zone along fault, bedrock contact, or landslide

LANDSLIDES
- Active Shallow Slides (Collins, 2007)
- Deep-seated Earthflow (Collins, 2007)

FAULTS
- Converse Consultants (1984), LBNL (2000), USGS on Google Earth (2007)

FIGURE 18b. LEGEND TO POTENTIAL FACTORS INFLUENCING CONTAMINATED GROUNDWATER PLUME EXPANSION

FIGURE 18a. ZONES OF CONCERN FOR GROUNDWATER PLUME EXPANSION ALONG COMPILED FAULTS, BEDROCK CONTACTS, LANDSLIDES, HISTORIC AND MODERN CREEKS. SEE NEXT PAGE FOR MAP LEGEND

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●=BEVATRON COMPLEX

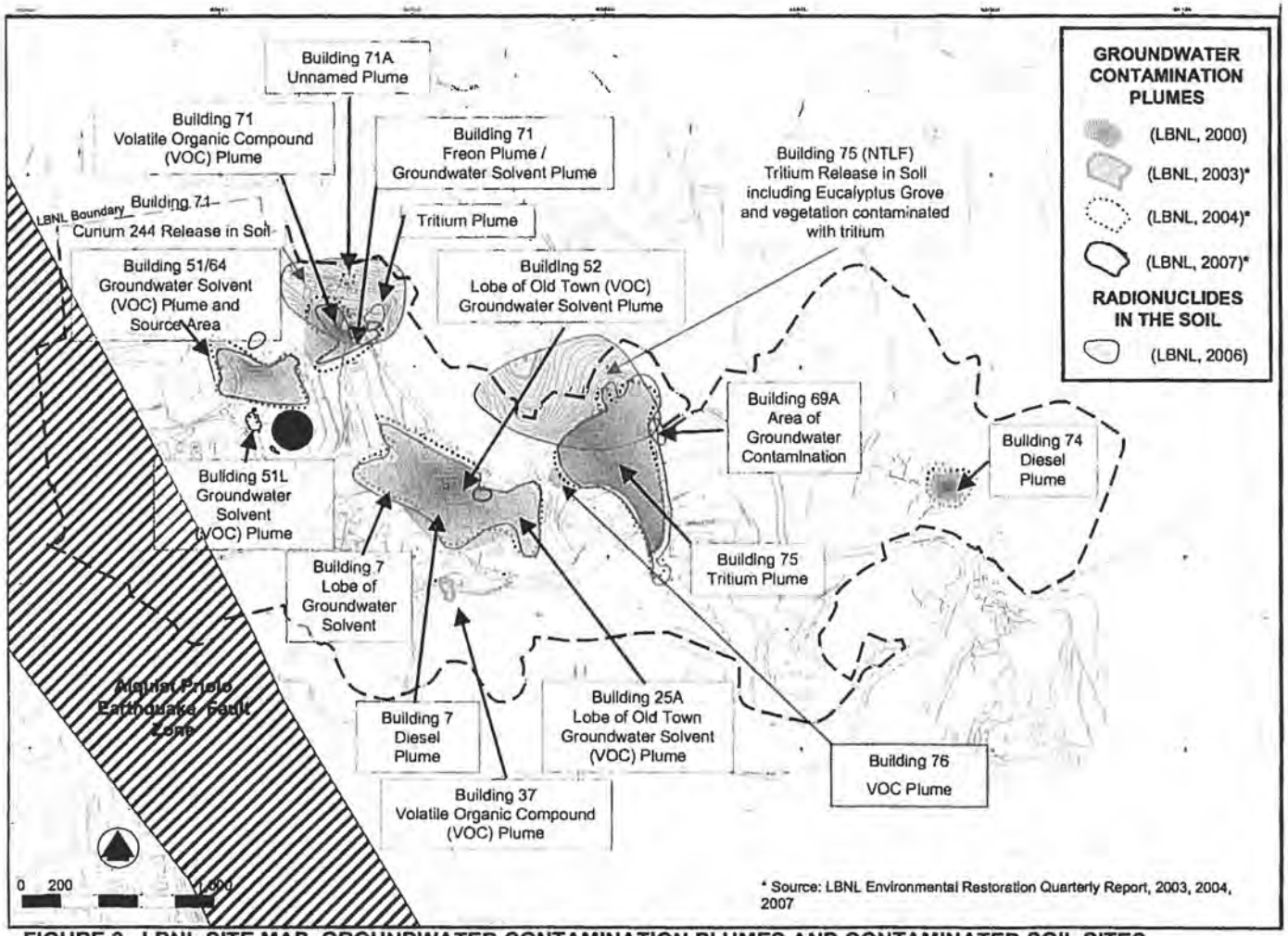

FIGURE 2. LBNL SITE MAP, GROUNDWATER CONTAMINATION PLUMES AND CONTAMINATED SOIL SITES.

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— CONTRARY TO DISC'S FACT SHEET — LBNL IS PLANNING MAJOR DEVELOPMENT, 2 HUGE STRUCTURES TO BE BUILT ON THE BEVATRON COMPLEX DEMOLITION SITE (SEE ATTACHMENT 9.)

— WE THEREFORE ASK THAT DISC IMMEDIATELY ISSUE DEED-RESTRICTIONS TO THIS PARCEL AND ASK THAT IT WILL BE COMPLETELY FENCED-OFF.

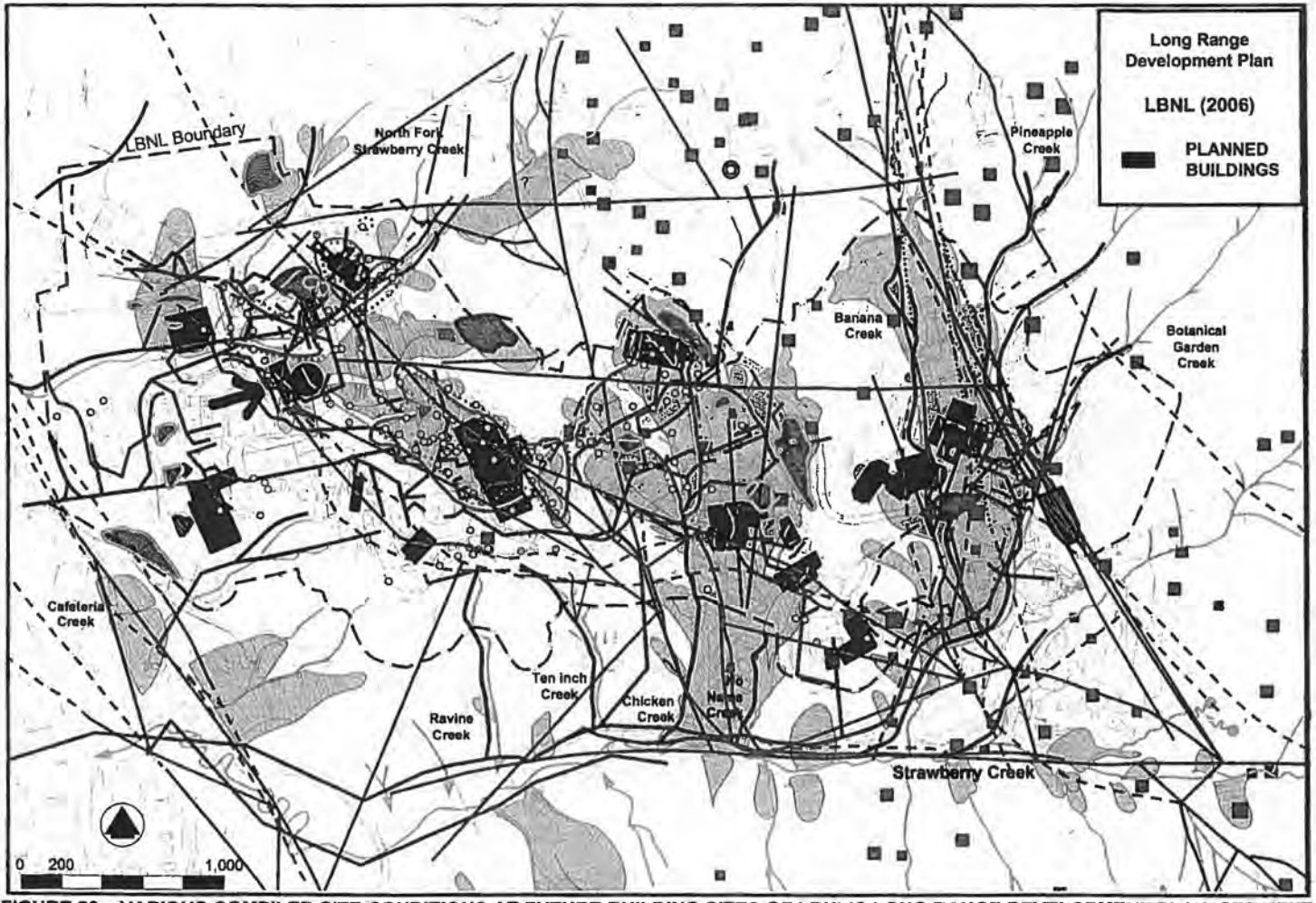
— WE ALSO ASK THAT THE CONCRETE OF THE PARKING LOT BE REMOVED AND THE NORTH FORK OF THE STRAWBERRY CREEK BE DAYLIGHTED, INCLUDING THE SPRING FED TRIBUTARIES, AND THAT THE AREA BE DEDICATED AS OPEN SPACE INTO PERPETUITY.

— WE ALSO REFER YOU TO THE WEB SITES OF SAVE STRAWBERRY CANYON: WWW.SAVESTRAWBERRYCANYON.ORG AND THE COMMITTEE TO MINIMIZE TOXIC WASTE: WWW.CMTWBERKELEY.ORG (SEE ATTACHMENT 10) FOR MORE INFORMATION.

SINCERELY, Pamela Sihvola

PAMELA SIHVOLA
CMTW
P.O. BOX 9646
BERKELEY, CA 94709

CC: KIM ABBOTT. DOE
BERKELEY SITE OFFICE



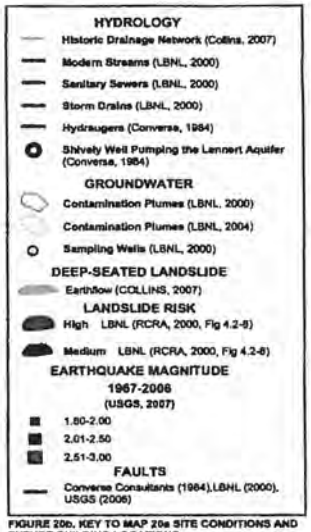


FIGURE 20b. KEY TO MAP 20a SITE CONDITIONS AND FUTURE BUILDING LOCATIONS

FIGURE 20a. VARIOUS COMPILED SITE CONDITIONS AT FUTURE BUILDING SITES OF LBNL'S LONG RANGE DEVELOPMENT PLAN. SEE NEXT PAGE FOR MAP LEGEND. NOTE THAT SOLID TO DASHED TO DOTTED RED FAULT LINES INDICATE DECREASING LEVELS OF CERTAINTY.

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→ = PROPOSED NEW FUTURE DEVELOPMENT OF THE BEVATRON SITE (I.E. PLANNED BUILDINGS)

These reports can be found on the web:
http://www.cmtwberkeley.org

or contact:
The Committee to Minimize Toxic Waste
Pamela Sihvola
P.O. Box 9646
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