Module D

Outlying Areas

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MODULE D

OUTLYING AREAS

This module is an attachment to Volume 1 of the resource Conservation and recovery Act (RCRA) Facility Investigation (RFI) Report for Lawrence Berkeley National Laboratory (LBNL). Volume 1 presents an overview of the RFI as it pertains to LBNL as a whole and contains information on the overall characteristics of the site (i.e., physical layout, geology, hydrogeology, potential contaminants, contaminant migration pathways, and potential receptors). Volume 1 is accompanied by four modules that correspond to specific areas of LBNL (Figure D-2).

A. Bevalac Area
B. Old Town Area
C. Support Services Area
D. Outlying Areas (this module).

Each of the modules contain the following area-specific information for RCRA Facility Investigation (RFI) activities conducted since the Phase II Progress Report (LBNL, 1995k):

- the physical characteristics of the module area, including geology and hydrogeology
- a description of solid waste management units (SWMUs), areas of concern (AOCs), and other areas that were investigated
- results of characterization activities that were completed
- interim corrective measures (ICMs) that were implemented
- potential and identified sources of contamination
- contaminant migration pathways.

The Outlying Areas (Figures D-3a, D3b, D3c) consist of RCRA Facility Assessment (RFA) Study Areas 6, 8, 11, 12, and 13 (LBNL, 1992d). An evaluation of the release potential of the SWMUs and AOCs in the area was initially provided in the RFA Report. Characterization and ICM activities for those SWMUs and AOCs that have been investigated since preparation of

the Draft Final RCRA Facility Investigation Phase II Progress Report (LBNL, 1995k) are described in this module. Activities conducted at other SWMUs and AOCs located in the Outlying Areas that were investigated previously during the RFI are documented in the Draft Final RFI Phase I and Phase II Progress Reports (LBNL, 1994l and LBNL, 1995k). Table D1-1 lists the SWMUs, AOCs, and other areas investigated within the Outlying Areas and indicates which of those units are discussed in this module. The table also provides references for where information on the other units is documented.

The SWMUs and AOCs discussed in this module are primarily associated with laboratories, research facilities, support shops, and associate fuel storage operations. The locations of those units are shown on Figures D-3a, D3b and D3c.

D1 DESCRIPTION OF OUTLYING AREAS

The Outlying Areas include three geographically separate subareas (Figure D-2). The Western Outlying Area (RFA study areas 6, 8 and 12) contains the following facilities:

- The Building 50/70 complex, which contains the LBNL directorate and various nuclear science, earth science, computer science and engineering laboratories and offices.
- Building 88, which houses the 88-Inch Cyclotron and associated laboratories and offices.

The Northeastern Outlying Area (RFA Study Area 11), which is known as the Life Sciences Area, is separated from the remainder of LBNL by a public road (Centennial Drive). A short tunnel beneath the road allows access to the rest of the facility. This area contains the following facilities:

- Building 74/83/84 complex, which houses the Human Genome Project and other life sciences laboratories.
- Building 85, which houses the Hazardous Waste handling Facility

The Southeastern Outlying Area (RFA study area 13) contains the following facilities:

- The Building 62/66 complex, which houses various materials sciences and environmental energy technology laboratories and offices.
- Building 73, which houses the atmospheric aerosol research laboratory.

D2 PHYSIOGRAPHY, GEOLOGY AND HYDROGEOLOGY

D2.1 Summary of LBNL Site Physical Characteristics

A detailed discussion of the overall physiography, geology, and hydrogeology of LBNL is given in Volume 1 of this report and summarized below:

LBNL is located on the moderate to steep west- and south-facing slopes of the Oakland-Berkeley Hills, with surface elevations ranging from approximately 500 to 1000 feet above mean sea level (msl). The slopes were formed by erosion of several steep stream canyons and mass movement from landslides and soil creep, and modified by cut-and-fill operations associated with construction of LBNL facilities.

Bedrock at LBNL consists primarily of Cretaceous and Miocene sedimentary and volcanic units, as shown on the summary stratigraphic column (Figure D2.1-1). These units form a northeast-dipping, faulted homocline, as shown on the bedrock geologic map (Figure D2.1-2). The homocline is composed of the following three rock units:

- Cretaceous marine mudstones, shales, and sandstones of the Great Valley Group
- Miocene nonmarine sandstones, mudstones and conglomerates of the Orinda Formation.
- Miocene andesitic volcanic and volcaniclastic rocks of the Moraga Formation.

Strata of the Cretaceous Great Valley Group form the structurally lowest portion of the homocline and underlie the southern and western slopes of LBNL. The Orinda Formation lies structurally above the Great Valley Group along a fault contact that dips at a shallow angle to the northeast. The Moraga Formation overlies the Orinda Formation along an apparently

conformable contact. Numerous isolated masses of Moraga formation volcanic rock underlie the developed portions of LBNL. These masses lie structurally below the main Moraga Formation outcrop belt. The rock at the contact between these masses and the Orinda Formation is often composed of slickensided, volcaniclastic/sedimentaclastic rocks that have been informally denoted as the "Mixed Unit".

In the easternmost portion of LBNL, the homocline is disrupted by the north-striking Wildcat and East Canyon faults. The area east of these faults is underlain by marine sedimentary rocks of the Miocene Claremont Formation and the Miocene San Pablo (?) Group. At the western LBNL property boundary, the homocline is truncated by the north to northwest striking Hayward Fault, a regionally extensive, active, right-lateral strike-slip fault. Rocks west of the Hayward fault consist of the Jurassic to Cretaceous Franciscan Complex.

A surficial geologic map of LBNL is shown on Figure D2.1-3. The soil is typically silty clay less than 2-feet thick. Alluvium is present in some of the creek and stream beds. Colluvial deposits, generally less than 20-feet thick, have developed along the bases of slopes and in hillside concavities as a result of mass wasting processes. At least one major, and several minor, landslides are present on the steeper slopes at LBNL; some have moved since construction of LBNL facilities.

Groundwater flow directions generally follow the slope of the surface topography. However, at some locations flow directions deviate due to contrasts in subsurface hydraulic conductivity or artificial drainage features such as building subdrains, subhorizontal hillside drains (hydraugers), and slope stability wells. Hydraulic conductivity testing and groundwater well yields show that the Moraga Formation is relatively permeable, and constitutes the main water-bearing unit at LBNL. In contrast, the underlying Orinda Formation is relatively impermeable. Measured hydraulic conductivities in the other units at LBNL are generally intermediate between these two formations.

LBNL occupies parts of both the Blackberry Creek and Strawberry Creek watersheds (Figure D2.1-4). The Blackberry Creek watershed is drained by North Fork Strawberry Creek,

whereas the Strawberry Creek watershed is drained by the main fork of Strawberry Creek. The two creeks merge west of LBNL within the UC Berkeley campus and ultimately flow into San Francisco Bay.

D2.2 Western Outlying Area

Physiography and Surface Water Hydrology

The Building 50/70 complex, which occupies a broad promontory west of the Bevalac and Old Town Areas, is the main facility within Western Outlying Area (Figure D2.2-1). Prior to development of the area, the promontory was flanked on the northeast by a broad, unnamed, northwest-trending drainage at the present location of Building 51, on the north by Blackberry Canyon, and on the west and southwest by steep hillsides which sloped down towards the present LBNL property boundary.

As discussed in Module A, both the unnamed drainage beneath Building 51 and the upper part of Blackberry Canyon were filled during development of the area. In addition, the slopes to the west of the Building 50/70 complex were cut and filled to allow construction of Building 88, the main LBNL access road, and several parking lot areas.

The area lies across the boundary between the Blackberry Canyon and Strawberry Canyon watersheds (Figure D2.1-4). The main drainages in these watersheds are North Fork Strawberry Creek (in Blackberry Canyon) and Strawberry Creek (in Strawberry Canyon). Surface runoff in most of the area is derived from overland flow off paved and unpaved areas, and discharges from the subhorizontal hillside drains (hydraugers) that lie south and west of the Building 50/70 complex (Figure D2.2-1). Runoff within the developed portions of the area is directed towards storm sewers. The storm sewer system in the northern part of the area discharges into North Fork Strawberry Creek. The storm sewer system draining the southern periphery of the area discharges towards Cafeteria Creek where it merges with stormwater discharges from the western portion of the Old Town Area. Cafeteria Creek flows into a storm

drain system that lies along the former course of Strawberry Creek near the southern property boundary. Water from all of the creeks ultimately discharges to San Francisco Bay.

Geology

As shown on the bedrock geologic map (Figure D2.1-2) and on cross section A-A' (Figure D2.2-2), bedrock underlying almost all of the Western Outlying Area consists of marine mudstones, sandstones, and shales of the Great Valley Group. These rocks dip gently to the north throughout the areas.

In a small area at the eastern boundary of the Western Outlying Area, Great Valley Group strata are in contact with nonmarine siltstones and fine-grained sandstones of the Orinda Formation. Exposures of the contact between the Great Valley Group and the overlying Orinda Formation are relatively poor. However, field relationships observed in the adjacent Old Town Area suggest that the contact is an inactive fault that dips at a relatively low angle.

A splay of the regionally extensive right-lateral Hayward Fault has been mapped on the slope immediately below Building 88. This splay lies entirely within rocks of the Great Valley Group, and does not juxtapose different stratigraphic units. A second splay of the fault lies a short distance west of the LBNL property line and juxtaposes rocks of the Great Valley Group against rocks of the Franciscan Complex.

Colluvium is present in scattered locations within the Western Outlying Area. The thickest colluvial deposit in the area underlies the hillslope above the north end of Building 88. The maximum thickness of this deposit is approximately 25 feet. Most of the remaining colluvial deposits in the area are no greater than 10 feet thick.

Grading for the major building complexes in the area required cuts up to 25 feet deep. Fills up to 25 feet thick were placed on the hillside in the vicinity of Building 88. Only localized fills, such as behind retaining walls, were required during the construction of the Building 50 and 70 complexes.

Hydrogeology

Shallow groundwater within the Western Outlying Area is present primarily in the Great Valley Group. The surficial units (i.e., alluvium, colluvium and artificial fill) are generally above the water table, with a few exceptions in the vicinity of buildings built over thick sections of artificial fill.

Hydraulic conductivities calculated for the Great Valley Group from slug tests of wells in the Western Outlying Area are shown on Figure D2.2-3. The calculated hydraulic conductivities are relatively high in comparison to other bedrock units (particularly the Orinda Formation) at LBNL. No data are available regarding the hydraulic conductivity of the artificial fill underlying many of the developed parts of the area.

Groundwater flow generally follows the topographic slope, as is indicated on the water level elevation contour map (Figure D2.2-4). The groundwater flow direction is predominantly westward, except in the area north of the Building 50 complex where flow is directed northwards towards the former Strawberry Creek drainage beneath the Building 51 complex. Inspection of the map indicates that the horizontal component of the hydraulic gradient (dh/dl) varies between approximately 0.2 and 0.5 within this area. Assuming a hydraulic conductivity (K) of 1×10^{-5} meters per second, which appears to be typical for volcanic rocks of the Great Valley Group, and an effective porosity (n_e) of approximately 0.25, Darcy's law ($v_x = K/n_e \times dh/dl$) indicates that the average linear groundwater velocities (v_x) would range from approximately 800 to 2,000 feet per year within rocks of the great Valley Group. It should be noted that due to the variability in gradients and bedrock physical characteristics, these calculations give only rough, order-of-magnitude estimates of likely groundwater flow velocities.

The relative abundances of major cations and anions in groundwater within the area are shown as Stiff diagrams on Figure D2.2-5. All wells within the area are screened in the Great Valley Group, with one well screened partially within artificial fill. The wells within the area have similar chemical signatures characterized by generally low cation and anion concentrations, with the exception of two wells in the eastern part of the Building 70 complex, which had higher

calcium, magnesium and sulfate concentrations. Chemical signatures of wells screened in the Great Valley Group in the adjacent Old Town Area (Module B) are also similar to those in the Western Outlying Area. However, in the adjacent Bevalac Area (Module A) nearby wells screened in either the Great Valley Group or the Orinda Formation generally have chemical signatures with notably higher sodium+potassium concentrations, whereas wells screened in the relatively permeable Moraga Formation have similar chemical signatures to those in the Western Outlying Area.

Conceptual Hydrogeologic Model

The hydrogeologic information discussed above suggests the following conceptual model for groundwater flow in the Western Outlying Area.

Groundwater flow primarily occurs within the Great Valley Group. The flow direction is generally westward to northwards, parallel to the slope of the overlying topography and radially away from the Building 70 and Building 50 complexes. Groundwater velocities are relatively high, on the order of 1,000 feet per year.

D2.3 Northeastern Outlying Area

Physiography and Surface Water Hydrology

The Northeastern Outlying Area (Life Sciences Area) at the northeastern edge of LBNL is located at the former confluence of several stream channels (Figure D2.1-4 and Figure D2.3-1). Prior to development of the area, a broad north-south trending canyon lay north of Buildings 83 and 85. The western edge of the canyon was formed by the incised channel of Banana Creek, which trended north-south beneath the present location of the east side of Building 85. The eastern edge of the canyon was formed by the incised channel of Pineapple Creek, which passed north-south beneath the present location of the roadway between Buildings 83 and 74. Another unnamed northeast-southwest trending drainage course passed underneath the southeast end of

Building 74. All three drainages formerly joined in the vicinity of UC Berkeley's Botanical Garden to form Botanical Garden Creek, a tributary to Strawberry Creek (Figure D2.1-4).

Grading for Buildings 83 and 74 included cuts and fills up to 20-feet thick. Grading for Building 85 and the adjacent approach road was much more extensive with cuts up to 40-feet deep and fills up to 30-feet thick. The grading for Building 86 consisted of a single cut approximately 30 feet deep. The stream canyons were filled during grading activities, and runoff from all three drainages now passes through culverts under engineered fill in the Life Sciences area.

Surface water runoff is derived from creeks that head above the area, overland flow from paved and unpaved surfaces, and discharges from hydraugers. Essentially all runoff is directed into stormdrains which discharge into covered culverts that pass beneath Centennial Drive. The culverts feed into the stormdrain system along the former course of Strawberry Creek, which ultimately discharges to San Francisco Bay.

Geology

As shown on both the bedrock geologic map (Figure D2.3-2) and cross section B-B' (Figure D2.3-3), of the Northeastern Outlying Area is structurally complex. In the western part of the area, the Moraga and Orinda Formations apparently form a stratigraphically continuous, northward-dipping homocline. The eastern part of the area is underlain by fault-bounded sections composed of the Claremont Formation and San Pablo Group (?). Contact relations between the western and eastern sections are obscured by a large intervening north-south-trending body of volcanic and sedimentary rocks that is derived from the Moraga and Orinda Formations and interpreted to be a landslide deposit.

The Moraga Formation underlies most of the ridge along the west side of the Northeastern Outlying Area, and consists primarily of andesitic flows and volcanic breccias pervasively cut by small-scale faults of variable orientation. As shown on Figure D2.3-2, the Moraga Formation depositionally overlies mudstones, sandstones, and conglomerates of the

Orinda Formation, although the north-south trending section of the contact between the two units is interpreted to be a fault (the East Canyon Fault) that is roughly coincident with a line of historic springs.

The western Moraga and Orinda Formation outcrops discussed above are overlain by a large probable landslide deposit more than 30 feet thick. This deposit is composed primarily of highly brecciated andesite (derived from the Moraga Formation) that underlies the west end of Building 83 and the center of the main canyon. The eastern portion of this deposit also contains structurally intermixed lithologies typical of both the Orinda and Claremont Formations, and so is mapped as the Mixed Unit on Figure D2.3-2.

A section of relatively flat-lying, fossiliferous sandstones tentatively assigned to the San Pablo Group (?) underlies the eastern margin of the interpreted landslide deposit and most of the Building 74/86 complex. The contact between these rocks and the Orinda Formation outcrops to the west of the interpreted landslide deposit is represented as a fault on Figure D2.3-2. However, no information on the nature of this contact is available, and it is possible that the rocks mapped as San Pablo Group (?) are instead correlative with part of the Orinda Formation to the west, with the zone of interfingering concealed under the landslide mass occupying the canyon.

A thick, steeply dipping section of cherts and shales of the Claremont Formation lies to the east of the relatively flat-lying outcrops of San Pablo Group (?) sandstones beneath the Building 74/84 complex. This section is separated from the San Pablo Group (?) rocks by the Wildcat Fault, which passes beneath Building 84 (the Human Genome Center). Based on geotechnical borings that encountered the Claremont Formation beneath Building 74, several investigators mapped a northeast-striking fault beneath the building (Gilpin, 1994; Harding-Lawson Associates, 1980), and suggested that it had offset the Wildcat Fault. However, excavations made during construction of Building 84 revealed that the main trace of the Wildcat Fault actually truncated the northeast-trending fault. This indicates that the Wildcat Fault is not offset, but that juxtaposition of the Claremont Formation and San Pablo Group (?) beneath Building 74 most likely occurs along a second strand of the Wildcat Fault, as shown on Figure D2.3-2.

Thick colluvial deposits generally underlie the creekbeds and adjacent areas. Colluvial deposits under and adjacent to the former course of Banana Creek, which flowed southward beneath the current location of Building 85, consist primarily of silt and clay. Geotechnical borings at the Building 85 site indicated that the thickest sections of colluvium and alluvium in this area actually fill a north-south-trending trough in the underlying bedrock surface a short distance west of the former creekbed. Although much of this colluvium was removed during construction, recent drilling indicates that at least some of colluvial deposits remain beneath the fill in this area.

Debris flow deposits underlie both the former Pineapple Creek drainage where it continues southwest of Building 74, and the easternmost drainage beneath the east ends of Buildings 74 and 84. These deposits generally consist of silt and clay with a large fraction of gravel and cobbles consisting primarily of basalt, chert, and porcelanite.

Hydrogeology

Shallow groundwater within the Northeastern Outlying Area is present primarily in the San Pablo Group (?) on the eastern side of the area. The surficial units (i.e., alluvium, colluvium, and artificial fill) are generally above the water table, with a few exceptions in the vicinity of buildings built over thick sections of artificial fill.

Hydraulic conductivities calculated for the San Pablo Group (?) from slug tests of wells in the Northeastern Outlying Area are shown on Figure D2.3-4. No hydraulic conductivity data were collected for other units within this area. Comparison with hydraulic conductivity data collected elsewhere at LBNL (discussed in Volume 1) indicates that the hydraulic conductivity of the San Pablo Group (?) is relatively low in comparison to other bedrock units at LBNL, except for the Orinda Formation, which also has a relatively low hydraulic conductivity. No hydraulic conductivity data are available regarding the surficial units (i.e. artificial fill, alluvium, colluvium) within the area. However, during drilling and construction within the area, it was noted that where debris flow and alluvial material underlying the drainages was saturated, flow from these units was significant, indicating relatively high hydraulic conductivities.

Groundwater flow is generally southward, following the topographic slope, as indicated by groundwater elevation contours that are generally parallel to the surface topographic contours (Figure D2.3-5). Inspection of the map indicates that the horizontal component of the hydraulic gradient (dh/dl) is approximately 0.2 in this area. A hydraulic conductivity (K) of 1 x 10^{-7} meters per second appears to be typical for rocks of the San Pablo Group (?) and would likely be similar for the Orinda Formation. Given these values and an effective porosity (n_e) of approximately 0.25, Darcy's law ($v_x = K/n_e$ x dh/dl) indicates that the average linear groundwater velocities (v_x) would be approximately 8 feet per year within the San Pablo Group (?) and Orinda Formation. Flow rates for groundwater within the debris flow and alluvial deposits would likely be substantially greater. However, It should be noted that due to the variability in gradients and bedrock physical characteristics, these calculations give only rough, order-of-magnitude estimates of likely groundwater flow velocities.

The relative abundances of major cations and anions in groundwater within the area are shown as Stiff diagrams on Figure D2.3-6. With the exception of well MW74-92-13, chemical signatures are similar, and are characterized by relatively high sodium+potassium and bicarbonate concentrations. Insufficient data are available to compare variations between different lithologic units or between different areas.

Conceptual Hydrogeologic Model

The hydrogeologic information discussed above suggests the following conceptual model for groundwater flow in the Northeastern Outlying Area.

Groundwater flow primarily occurs within the San Pablo Group (?) and Orinda Formation. The flow direction is generally southwards, parallel to the slope of the overlying topography. Groundwater velocities are apparently very low, on the order of 10 feet per year. However, velocities could be substantially greater beneath the eastern end of Building 74 where the water table is in a debris flow deposit that occupies a former creek bed.

Some groundwater flow is captured by hydraugers (Figure D2.3-1) in the area below Building 85, and then discharged to the surface above Centennial Drive.

D2.4 Southeastern Outlying Area

Physiography and Surface Water Hydrology

The main part of the Southeastern Outlying Area is the Building 62/66 complex, which lies atop the broad hill forming the divide between No-Name Creek, Banana Creek, and Botanical Garden Creek (Figures D2.1-4 and D2.4-1). Building 73 lies below the complex on the east flank of the hill.

Surface runoff is derived from overland flow off paved and unpaved areas within the area and eventually is directed into the storm drain system that lies along the former course of Strawberry Creek near the southern property boundary. This water ultimately discharges to San Francisco Bay.

Geology

As shown on the bedrock geologic map (Figure D2.1-2), bedrock underlying the Southeastern Study Area consists of two main stratigraphic units. To the southwest lie marine mudstones, sandstones, and shales of the Great Valley Group. These strata are overlain to the northeast by nonmarine siltstones and fine-grained sandstones of the Orinda Formation. Both the Great Valley Group and the Orinda Formation dip moderately to the northeast. As discussed in the preceding subsection, this contact between the two units is interpreted to be a fault.

The surficial soils within the Southeastern Outlying Area are generally less than 5 feet thick. The only known colluvial deposit underlies the hillside depression between Buildings 66 and 72. This deposit has a maximum thickness of approximately 15 feet.

Grading for the major buildings in the area required cuts up to 15 feet deep. Only localized fills, such as road embankments and behind retaining walls, were required during the

construction of the major buildings in this area. The only significant fill underlies the hillside south of Building 72. This fill has a maximum thickness of approximately 10 feet.

Hydrogeology

Shallow groundwater in monitored wells within the Southeastern Outlying Area is present only in the Great Valley Group, although groundwater is likely to be present within the Orinda Formation north (upgradient) of Buildings 62 and 66. The surficial units (i.e., alluvium, colluvium and artificial fill) are above the water table in this area.

Hydraulic conductivities calculated for the Great Valley Group from slug tests of wells in the Southeastern Outlying Area are shown on Figure D2.4-2. No hydraulic conductivity data were collected for other units within this area. Comparison with hydraulic conductivity data collected elsewhere at LBNL (discussed in Volume 1) indicates that the hydraulic conductivity of the Orinda Formation is relatively low in comparison to other bedrock units at LBNL.

Groundwater flow is generally southward, westward, and eastward, following the topographic slope, as indicated by groundwater elevation contours that are generally parallel to the surface topographic contours (Figure D2.4-3). The horizontal component of the hydraulic gradient (dh/dl) is difficult to determine due to the limited number of data points. However, northwest of Building 62, available well control suggests a gradient of approximately 0.2; topographic slopes suggest that the gradient is lower over much of the rest of the area as shown on the map. A hydraulic conductivity (K) of 1×10^{-6} meters per second appears to be typical for rocks of the Great Valley Group. Given these values and an effective porosity (n_e) of approximately 0.25, Darcy's law ($v_x = K/n_e \times dh/dl$) indicates that the average linear groundwater velocities (v_x) would be approximately 80 feet per year within the Great Valley Group in this area. However, It should be noted that due to the variability in gradients and bedrock physical characteristics, these calculations give only rough, order-of-magnitude estimates of likely groundwater flow velocities.

The relative abundances of major cations and anions in groundwater within the area are shown as Stiff diagrams on Figure D2.4-4. Insufficient data are available to compare chemical variations between different lithologic units or between different areas.

Conceptual Hydrogeologic Model

The hydrogeologic information discussed above suggests the following conceptual model for groundwater flow in the Southeastern Outlying Area.

Groundwater flow primarily occurs within the Orinda Formation and Great Valley Group. Flow in the Great Valley Group is likely to be the more important factor for contaminant migration due to the lack of potential contaminant sources in the undeveloped northern (upgradient) part of the area. The flow direction is generally southwards, westwards, and eastwards, parallel to the slope of the overlying topography. Groundwater velocities are apparently moderate, on the order of 100 feet per year in the Great Valley Group in this area.

D3 SOIL CONTAMINATION - CHARACTERIZATION ACTIVITIES

The following subsections describe the results of the RFI investigations at SWMUs and AOCs in the Outlying Areas where soil characterization activities were conducted subsequent to those included in the Draft Final RFI Phase II Progress Report (LBNL, 1995k) (Table D1-1). As described in Section 1 of this report, the results of the characterization activities were used to assess whether further action was required at a SWMU or AOC (i.e., whether the SWMU or AOC will be included in the site-wide risk assessment). The assessment was made by comparing analytical results to both LBNL background levels and Preliminary Remediation Goals (PRGs) for residential soil (USEPA, 1999). PRGs for metals and site contaminants and LBNL background levels for metals are listed in Section 1, Table 1.6-3.

For organic constituents, Chemicals of Potential Concern (COPCs) and soil analytical results are presented in unit-specific tables in each subsection. For metals, soil analytical results are presented for all units in Table D3-1. Metals results are generally discussed in this module only when concentrations exceed both PRGs and background levels, since metals concentrations

that are within background levels are not considered to represent contamination and metals concentrations that are below PRGs for residential soil are not considered to represent a risk to human health.

Surface runoff and storm drain-flow from the northeastern and southeastern Outlying Areas drain toward Banana Creek, Botanical Garden Creek, No Name Creek, and Cafeteria Creek. Runoff and storm drain-flow from the western Outlying Areas drain toward North Fork Strawberry Creek. The potential for contaminants detected in soil to migrate to surface water and sediment has been addressed by collecting surface water and sediment samples from these creeks and analyzing them for chemicals of potential concern from upgradient sources. This sampling is discussed in Section D4.8. Potential migration of soil contaminants to groundwater has been addressed by installing and sampling groundwater monitoring wells both within and downgradient from the Outlying Areas, as discussed in Sections D4.1 to D4.7.

D3.1 SWMU 13-2: Building 62 Waste Accumulation and Chemical Storage Area

Description and History

The Building 62 Waste Accumulation and Chemical Storage Area is located east of Building 62 (Figure D-3c and Figure D3.1-1). Storage of chemicals at the unit was initiated in 1962; storage of waste has only occurred since 1991. Chemicals including trichloroethene (TCE), Freon, kerosene and methyl ethyl ketone (MEK) were stored in drums on pallets over unbermed concrete, and drums of waste materials were stored upright in plastic double containment systems. Tarps were used to keep the drums and double containment covered.

Presently, all liquid wastes are stored in a factory-manufactured welded steel locker with a built-in secondary containment basin. The chemicals stored include petroleum hydrocarbons, hydraulic oil, vacuum pump oil, cutting oil, and mineral oil. The unit has been upgraded with a steel locker, seismic bracing, warning alarms, and secondary containment.

Soil and Soil-Gas Sampling

Soil and soil-gas sampling activities are described below. Soil sampling locations are shown on Figure D3.1-1. Sampling results are contained in Table D3-1 (metals) and Table D3.1-1 (organics).

- During the RFA, a soil-gas survey was conducted in the vicinity of the unit (LBNL, 1992d). A 20-foot deep soil boring (BS62-92-18) was drilled adjacent to the soil-gas sample location where the highest concentrations of volatile organic compounds (VOCs) (tetrachloroethene [PCE], TCE, and cis-1,2-dichloroethene (DCE) had been detected.
- In 1992, soil samples were collected from depths up to 58 feet below ground surface (bgs) from the boring for monitoring well MW62-92-26, located south of the unit.
- In June 1995, a sample was collected at a depth of 5.7 feet from boring SB62-95-11, located within a few feet of MW62-92-26. The purpose of this boring was to assess the presence of the elevated level of thallium detected at a depth of 6 feet in MW62-92-26.

The only VOC detected in soil samples was PCE, which was detected at concentrations substantially lower than the PRG in two samples from boring BS62-92-18.

Thallium and arsenic were the only metals detected at concentrations above both LBNL background levels and PRGs for residential soil. The elevated thallium concentration (90 mg/kg) was detected in a single sample collected at a depth of 6-feet bgs in MW62-92-26. A sample subsequently collected at 5.7 feet bgs in an immediately adjacent boring (SB62-95-11) did not contain detectable thallium (<5 mg/kg), indicating either that the thallium contamination is not present or is very limited in extent. Arsenic was detected at concentrations above PRGs for residential soil and slightly above LBNL background levels in three samples collected from 30 to 50 feet bgs in MW62-92-26. The elevated arsenic concentrations are typical of concentrations measured at LBNL in rocks of the Great Valley Group (LBNL, 1995i). Although greater than sitewide LBNL background levels, those results are within background levels for rocks at the unit.

Potential Migration of Contaminants

Surface Water

Surface runoff from the area around SWMU 13-2 flows towards Botanical Garden Creek and to stormdrains, both of which eventually discharge to the storm drain system that lies along the former course of Strawberry Creek (Figure D2.1-4 and Figure D2.4-1). Surface-water samples collected from Botanical Garden Creek did not contain either detectable VOCs or metals at concentrations above drinking water Maximum Contaminant Levels (MCLs), indicating no migration of contaminants to surface water (Section D4.8).

Groundwater

Monitoring well MW62-92-26 was installed to monitor the quality of the groundwater at SWMU 13-2. Groundwater samples collected from MW62-92-26 have been analyzed for VOCs, semi-volatile organic compounds (SVOCs), and metals. Groundwater sampling results are discussed in Section D4.3 through D4.7, and do not show evidence of impact from soil at the unit. Selenium and thallium concentrations have been lower than MCLs in all samples except for the initial sample collected from the well in 1992. As described in Section D4.7, the 1992 sample is ascribed to laboratory error, and is interpreted not to be representative of groundwater conditions. PCE was detected in only three samples collected from the well from July 1996 to February 1997. This was a period when anomalous detections of PCE and TCE were reported in several wells, and was attributed to cross contamination during sampling. Groundwater monitoring will continue at the unit as required by the Regional Water Quality Control Board (RWQCB).

Status of Unit

LBNL submitted a request for No Further Action (NFA) status for SWMU 13-2 to the California Environmental Protection Agency (CAL-EPA) Department of Toxic Substances Control (DTSC) in January 1996 (LBNL, 1996a). The request provided the following information:

- Soil investigation results pertaining to the potential for past releases and the magnitude and extent of contamination. These results showed that soil at the unit did not contain contaminants exceeding both unit-specific background levels and PRGs for residential soil, with the possible exception of thallium. Thallium was detected in a single sample at a concentration exceeding background and the residential PRG, but was not detected during confirmation sampling at an adjacent location.
- Groundwater monitoring results indicated that detectable VOCs were not present at the unit.

After reviewing LBNL's request, DTSC approved NFA status for SWMU 13-2 in July 1996 (DTSC, 1996b). Since approval of the NFA request, VOCs have been sporadically detected in MW62-92-26. These detections were attributed to sample contamination and cross contamination during sampling, and are not indicative of groundwater contamination (Section D4.3).

D3.2 AOC 8-1: Building 70A Diesel UST

Description and History

The Building 70A Diesel UST (TK-10-70A) was a 1,000-gallon, single-walled fiberglass underground tank located northeast of Building 70A (Figure D-3a and Figure D3.2-1). The tank was installed in April 1975 and stored diesel fuel for an emergency generator inside Building 70A. The tank had no secondary containment, although a leak detection monitoring system was located in a gravel pit around the tank. Based on environmental investigations performed in 1995, a UST Unauthorized Release (Leak) Contamination Site Report was submitted to the City of Berkeley on September 19, 1995. The tank was subsequently removed and a tank removal report was filed with the City of Berkeley in February 1998 (Boggs Environmental, 1998).

Soil Sampling

Soil sampling activities are described below. Sampling locations are shown on Figure D3.2-1 and Figure D3.2-2. Sampling results are contained in Table D3-1 (metals) and Table D3.2-1 (organics).

- In August 1995, three soil borings (SB70A-95-1, SB70A-95-2, and SB70A-95-3) were drilled at the ends of the tank to assess the extent of any remediation that might be required after the tank was removed.
- In 1996, soil samples were collected from the borings for monitoring wells MW70A-96-5 and MW70A-96-6, which were installed at each end of the tank.

Total petroleum hydrocarbons in the range of diesel (TPH-D) was detected in soil samples from all five borings, with the highest concentrations detected adjacent to the generator supply piping north of the tank. TPH-D concentrations in all borings declined with depth to nondetectable levels close to the water table. Total petroleum hydrocarbons in the range of motor oil (TPH-MO) was also detected in two samples.

Toluene, xylenes and sec-butylbenzene were the only VOCs detected, all at concentrations substantially lower than residential PRGs.

Two fuel-related semi-volatile organic compounds (SVOCs), fluorene and phenanthrene, and (bis[2-ethylhexyl]phthalate (BEHP) were detected in one sample that contained relatively high TPH-D concentrations. Concentrations of these chemicals were substantially lower than PRGs for residential soil.

Concentrations of metals were within LBNL background levels or below PRGs for residential soil.

Potential Migration of Contaminants

Surface Water and Sediment

The storm drain system that captures runoff from AOC 8-1 discharges to Cafeteria Creek (Figure D2.1-4 and Figure D2.2-1). However, the release at AOC 8-1 was a subsurface release and the contaminated soil lies beneath paving precluding erosion and migration of soil contaminants to surface water or sediment. In addition, no VOCs were detected in surface-water samples collected from Cafeteria Creek, indicating no migration of soil contaminants at the unit to surface water (Section D4.8).

Groundwater

Groundwater samples have been collected from two monitoring wells (MW70A-96-5 and MW70A-96-6) and two temporary groundwater sampling points (SB70A-95-1 and SB70A-95-3) to evaluate and monitor groundwater quality at AOC 8-1. The results of the sampling, which are discussed in Section D4.3 and Section D4.4, indicate that groundwater near the unit was impacted by petroleum hydrocarbons and fuel-related aromatic hydrocarbons in 1995 and 1996. However, contaminant concentrations have subsequently declined to nondetectable levels, indicating no current migration to groundwater from contaminated soil at the unit.

Status of Unit

LBNL submitted a tank removal report for the Building 70A Diesel UST to the City of Berkeley (COB) in February 1998 (Boggs Environmental, 1998). Based on the information provided in the tank removal report, COB approved NFA status for AOC 8-1 in May 1998 (COB, 1998).

D3.3 AOC 8-2: Building 70 Former Diesel UST

Description and History

The former Building 70 Diesel UST (TK-10-70) was a 600-gallon, single-walled carbon-steel tank located beneath an asphalt-covered walkway northeast of Building 70 (Figure D-3a and Figure D3.3-1). The UST was installed in 1953 and stored No. 2 diesel oil for an emergency generator located in Building 70. The UST had no secondary containment, but was supplied with fuel via a fill pipe which connected to a fill box with spill containment located approximately 50 feet to the south, uphill from the UST. Fuel was supplied to the generator by a day tank located within the equipment room (Room 130, Building 70). Fuel transfer from the UST to the day tank was accomplished by an electrically driven gear-pump mounted on the day tank. The UST was removed on July 22, 1996 and has been replaced with an aboveground double-walled fiberglass tank.

Soil Sampling

Soil sampling activities are described below. Sampling locations are shown on Figure D3.3-1. Sampling results are contained in Table D3.3-1.

- In June 1995, soil samples were collected from boring SB70-95-1 immediately north of the tank to determine the extent of any soil excavation that might be required when the tank was removed. In addition, three shallow samples (SS70E-1, -2, and -3) were collected by hand auger along the fuel lines.
- In February 1996, during excavation of utilities near the former tank a fuel odor was encountered. Soil was then excavated from the top and sides of the tank to a maximum depth of 5 feet bgs to investigate possible leakage. Two soil samples (SS-70NE-96-1-5.0 and SS-70NE-96-2-4.5) were collected from the bottom of the excavation, adjacent to the tank.

All soil samples were analyzed for TPH-D, which was only detected in the two samples located within the February 1996 tank excavation (Figure D3.3-1, Table D3.3-1).

Potential Migration of Contaminants

Surface Water and Sediment

The storm drain system that captures runoff from the area of AOC 8-2 discharges to North Fork Strawberry Creek (Figure D2.1-4 and Figure D2.2-1). However, the release at AOC 8-2 was a subsurface release and contaminated soil lies beneath paving, precluding erosion and migration of soil contaminants to surface water or sediment. In addition, both surface-water and sediment samples have been collected from sampling locations on North Fork Strawberry Creek.

Surface water and sediment samples were collected from North Fork Strawberry Creek and analyzed for chemicals of potential concern from upflow sources. Sample analyses included VOCs and SVOCs (Section D4.8). In addition, sediment samples were analyzed for TPH. No petroleum-related chemicals (i.e. aromatic hydrocarbons) were detected in surface water samples. Low concentrations of toluene and oil were detected in sediment samples. The source of this contamination may be runoff from surface streets and parking areas.

Status of Unit

LBNL submitted a tank removal report for the Building 70 Diesel UST to the City of Berkeley (COB) in 1996 (Boggs Environmental, 1996). Based on the information provided in the tank removal report, COB approved NFA status for AOC 8-2 in May 1998 (COB, 1998).

D3.4 AOC 8-7: Building 70A Sanitary Sewer

Description and History

The NFA request report for the Building 70A Sanitary Sewer, which was submitted to DTSC in September 1999 (LBNL, 1999p), is included in Appendix C. Following is a summary of the information contained in the NFA request.

Sanitary sewer effluent from Building 70A is conveyed northwestward from the west side of Building 70A (Figure D-3a and Figure D3.4-1). Prior to 1988, this effluent included untreated acidic wastes from the semiconductor fabrication laboratories. Subsequently, a waste neutralization unit (SWMU 8-2) was installed to decrease the acidity of the waste.

Soil and Soil-Gas Sampling

Soil and soil-gas sampling activities are described below. Sampling locations are shown on Figure D3.4-1 and Figure D3.4-2. Soil sampling results are contained in Table D3-1 (metals) and Table D3.4-1 (organics and pH).

- In 1995, ten shallow soil-gas probes were installed along the Building 70A sanitary sewer line. All soil-gas samples contained VOCs and total petroleum hydrocarbons in the range of gasoline. Based on the results of soil-gas sample analysis, shallow soil samples were collected in October 1996 at five locations along the sewer line (SB70A-96-1, -2, -3, -4, and -5), approximately 1 foot below the base of the sewer line (5 to 7 feet bgs).
- In 1996, soil samples were collected from monitoring well borings MW70A-96-13 and MW70A-96-14. Well MW70A-96-14 was located directly adjacent to the sewer line, whereas well MW70A-96-13 was located downslope to the south.

- On September 15, 1999, a video survey of the Building 70A sanitary sewer was conducted. The only potential pipe breach identified was a root intrusion at a joint approximately 160 feet northwest of Building 70A. A test pit dug at the location of the root intrusion revealed no observable evidence of leakage. Two soil samples (SS70ASWR-99-1 and -2) were collected from immediately beneath the sewer line.

No VOCs were detected in the soil samples and no metals were detected in soil samples at concentrations above both LBNL background levels and PRGs for residential soil (Table D3-1). In addition, pH values were close to neutral.

Potential Migration of Contaminants

Soil contaminants were not detected at the unit, so migration of contaminants is not a concern.

Status of Unit

LBNL submitted a request for NFA status for AOC 8-7 to DTSC in September 1999 (LBNL, 1999p). The request provided the following information:

- Soil investigation results pertaining to the potential for past releases and the magnitude and extent of contamination showed no evidence of past releases. Specifically, no VOCs were detected, metals concentrations were within background levels, and pH was neutral.
- A sewer line video survey indicated only one location where the integrity of the pipe may have been compromised. However, soil samples collected from immediately beneath that location did not contain detectable contaminants.

After reviewing LBNL's request, DTSC approved NFA status for AOC 8-7 in September 1999 (DTSC, 1999b).

D3.5 AOC 11-1: Building 74 Former Diesel UST

Description and History

The former Building 74 diesel UST was a 12,000-gallon single-walled fiberglass tank located beneath the roadway between the present location of the Human Genome Center (Building 84) and Building 74 (Figure D-3b and Figure D3.5-1). The tank stored diesel fuel for an emergency generator located approximately 18 feet to the northeast in Building 74C. The generator supply line ran approximately 2 feet beneath the surface between the tank and generator room.

The UST was installed in 1979. A release was reported during a leak test in May 1986, when one of the capped supply lines in the valve vault was noted to be leaking. The leak was repaired in June 1986 and the UST was re-tested and found to be leak-free. In November 1994, the UST was removed and soil was excavated to a depth of approximately 15 feet. Approximately 275 cubic yards of contaminated soil and 10,000 gallons of contaminated water were recovered for recycling. Two 6-inch ID slotted PVC casings, designed for monitoring and soil venting if needed, were installed vertically at opposite ends of the excavation, which was then backfilled with crushed rock. A tank removal report was issued (Boggs Environmental, 1995) and submitted to the City of Berkeley.

Soil Sampling

Soil sampling activities are described below. Sampling locations are shown on Figure D3.5-1. Sampling results are contained in Table D3-1 (metals) and Table D3.5-1 (organics).

- In March and April 1992, soil samples were collected from monitoring well borings MW74-92-13 and MW83-92-14. MW83-92-14 was installed near a potential dislocation in the sanitary sewer line west of the UST site (see Section D3.6) and MW74-92-13 adjacent to the UST site.
- In March 1994, soil samples were collected from two soil borings (SB-1, and G-10[DT-1]) in the vicinity of the UST during a geotechnical investigation conducted for construction of Building 84.

- In June, July, and October 1994, soil samples were collected from ten soil borings (BS74-94-01 through BS74-94-09 and BS74-94-11) drilled in the area around the UST to evaluate the extent of diesel-contaminated soil that had been detected in previous borings. One of these borings (BS74-94-09) was located close to the Building 83 Aboveground Diesel Storage Tank (AOC 11-2) to evaluate whether that tank could have been a source of the diesel-contaminated soil.
- In April and May 1994, soil samples were collected from the borings for monitoring wells MW74-94-7 and MW74-94-8 that were installed south of Building 74 to help assess the downgradient extent of groundwater contamination.
- In November 1994, during removal of the UST, two soil samples (B74-01, B74-04) were collected from the base of the tank excavation and two samples (B74-02 and B74-03) were collected from beneath the fuel supply line north of the UST.
- In May 1995, soil samples were collected from soil boring SB74-95-9, which was installed to help assess the magnitude of contamination on the northwest side of Building 74.
- In June 1995, two shallow soil samples were collected at one location (SS83NE-1) along the southeast wall of the Building83 loading dock near the fill pipe connected to the Building 83 Above Ground Storage Tank (AOC 11-2). The purpose of this sampling was to assess if the building 83 tank could be a source of the detected groundwater contamination.
- In July 1995, two additional monitoring wells were installed to evaluate potential sources for the TPH contamination and to further characterize the vertical and horizontal extent of contamination. MW83-95-7 was installed southeast of Building 83 near the fill pipe for the Building 83 above ground tank. MW74-95-6 was installed north of the former UST where the piping to the emergency generator was located.
- In August 1995, two additional borings (SB74-95-6 and SB74-95-8) were installed to further characterize the extent of the soil contamination, SB74-95-6 was located approximately 80 feet upgradient from the former UST location.
- In October 1996 and February 1997, soil samples were collected from borings SB83-96-1 and SB74-97-1 in order to provide additional characterization of chemical constituents of the diesel contamination. SB83-96-1 was located west of the former UST location in the area of highest TPH-D concentrations.

The soil contamination detected at this unit is defined primarily by the presence of TPH-D, although gasoline (TPH-G) and motor oil (TPH-MO) range hydrocarbons were also detected in some samples. As shown on Figures D3.5-2 through D3.5-6, a number of samples collected from soil borings in the vicinity of the unit contained TPH-D at concentrations of several

hundred to several thousand mg/kg (Table D3.5-1). Samples collected from the base of the UST excavation contained a maximum TPH-D concentration of 85 mg/kg and evidence of leaks were reportedly not observed during tank removal activities (Boggs Environmental, 1995), indicating that the UST itself was probably not the source of contamination. However, high levels of TPH-D in shallow soil samples (B74-02 and B74-03) along the generator supply piping north of the UST indicate that piping leaks probably constituted the primary contaminant source.

The highest TPH-D concentrations near the former UST location were found in two areas: north of the former UST; and close to monitoring well MW83-92-14 between Buildings 74 and 83. Except for near-surface samples immediately adjacent to the generator supply piping, TPH-D was generally not detected in shallow samples collected from most of the soil borings. In contrast, the highest contaminant concentrations at each boring in both of these areas were generally found below the current water table at depths of approximately 30 to 45 feet bgs (Table D3.5-1, Figures D3.5-3 through D3.5-6). Since immiscible fuel hydrocarbon components are buoyant and tend to accumulate immediately above the water table in the capillary fringe zone, this relatively deep zone of soil contamination within the saturated zone appears to be anomalous. However, hydrographs of the site indicate that water levels over the past few years have varied by several tens of feet in some wells, suggesting that the TPH-D contamination could originally have accumulated and sorbed to the soil at the capillary fringe during a period in which the water table was at a lower elevation.

Whereas TPH-D is widespread in soil at the site, individual fuel-related aromatic VOCs were detected in only a few soil samples (Table D3.5-1), with all concentrations below PRGs for residential soil. The highest concentrations of aromatic hydrocarbons and the most chemicals detected were in sample B74-03, which was collected immediately beneath the fuel supply line north of the UST. Generally, these chemicals were detected in the samples that had relatively high concentrations of TPH-D, within the upper portion of the saturated zone.

Soil samples collected from boring SB74-97-1, located between Building 74 and 83 were analyzed for polynuclear aromatic hydrocarbons (PAHs) in addition to aromatic VOCs and TPH-D (Table 3.5-1). These samples had relatively low concentrations of TPH-D and aromatic VOCs

(ethylbenzene, xylenes). The only PAHs detected were fluoranthene, phenanthrene, benzo(a)anthracene, and naphthalene all at concentrations below PRGs for residential soil.

Soil samples obtained from three of the soil borings were analyzed for metals. Metals were detected at concentrations below LBNL maximum background levels or PRGs for residential soil.

Potential Migration of Contaminants

Surface Water and Sediment

The storm drain system that captures runoff from AOC 11-1 discharges to Botanical Garden Creek, which flows into the storm drain system along the former course of Strawberry Creek (Figure D2.1-4 and Figure D2.3-1). The release at AOC 11-1 was in the subsurface and contaminated soil lies beneath paving, precluding potential erosion and migration of soil contaminants to surface water or sediment. In addition, analyses of surface-water samples collected from Botanical Garden Creek included VOCs and SVOCs. As discussed in Section 4.8, no fuel-related chemicals (i.e. aromatic hydrocarbons) were detected, indicating no impacts to surface water from the fuel-contaminated soil at AOC 11-1.

Groundwater

The results of the groundwater monitoring, which are discussed in Section D4.3 and Section D4.4, indicate that groundwater near AOC 11-1 has been impacted by petroleum hydrocarbons in the diesel range. The groundwater contamination has been designated the Building 74 Diesel Plume. Aromatic hydrocarbons have not been detected in groundwater samples collected since 1995, indicating no current migration of these chemicals to groundwater.

Status of Unit

LBNL submitted a request for NFA status for AOC 11-1 to the COB in January 1999 (LBNL, 1999a). The request provided the following information:

- soil investigation results pertaining to the magnitude and extent of contamination showed no evidence that fuel hydrocarbon concentrations exceeded PRGs
- available data indicated that the unit could be classified as a "low risk" site based on RWQCB criteria, including: removal of the UST and piping; the degree of characterization; only minor impacts to groundwater; lack of impacts to sensitive receptors; and, lack of significant risk to human health.

After review of LBNL's request, COB approved AOC 11-1 for NFA status in April 1999 (COB, 1999). Groundwater monitoring will continue as required by the RWQCB.

D3.6 AOC 11-3: Building 83/83A Sanitary Sewers

Description and History

The main Building 83/83A sanitary sewer line runs southward from Building 83A towards the LBNL Strawberry Canyon gate (Figure D-3b and Figure D3.6-1). Two branch lines exit from the east side of Building 83 (Lab Cell Biology Building) and join the Building 83A line in the area between Buildings 74 and 83. A sewer line video survey conducted in 1991 indicated an apparent dislocation in the sewer line east of Building 83. In addition, soil contamination associated with the nearby Building 74 Former Diesel UST (AOC 11-1, described in the preceding section) was detected in the vicinity of the sewer line. Investigations were therefore conducted to assess whether releases could have occurred from the sewer line and to evaluate whether contamination originating from AOC 11-1 could have migrated along permeable backfill material surrounding the sewer line.

Soil and Soil Gas Sampling

Soil and soil-gas sampling activities are described below. Sampling locations are shown on Figure D3.6-1. Soil sampling results are contained in Table D3-1 (metals) and Table D3.6-1 (organics).

- Soil-gas samples collected during the RFA at the two locations where branches of the Building 83 sewer lines intersected the line from Building 83A sanitary sewer line contained PCE, Total Hydrocarbons (THC), acetone, toluene, and/or xylenes (LBNL, 1992d). Based on these results, a shallow soil sample (SS-74-1C) was collected near

the apparent dislocation in the sewer line identified in the 1991 video survey. Soil samples were also collected from the boring for monitoring well MW83-92-14, installed near the same location.

- In April 1995, four shallow soil-gas probes (SG-B83-1, -2, -3 and -4) were installed adjacent to the sanitary sewer line southeast of Building 83.
- In August 1995, five soil borings (SB83-95-1, -2, -3, -4, and SB74-95-8) were drilled adjacent to the sanitary sewer line to assess whether the backfill was a migration pathway for the diesel contamination originating from the Building 74 Former Diesel UST (AOC 11-1). Also in August 1995, SB74-95-8 was installed adjacent to the sewer line as part of characterization activities for the Building 74 UST.

VOCs were detected in all four of the soil gas samples collected in 1995, including benzene, toluene, PCE, Freon-12 and/or TCE. The highest concentrations of VOCs, primarily PCE, were detected in the northernmost probe (SG-B83-1), upstream of the apparent sewer line dislocation.

Except for a trace concentration of PCE (0.005 mg/kg at a depth of 6 feet in MW83-92-14), no VOCs were detected in the soil samples collected in 1992 near the apparent dislocation in the sewer line (SS74-1C and MW83-92-14). TPH-D, TPH-G, and THC were detected, with the maximum concentrations of TPH-D and TPH-G detected at a depth of 57 feet at the bottom of MW83-92-14. No VOCs were detected in soil samples collected from the five borings installed along the sewer line in 1995. Low concentrations of TPH-D (33 mg/kg maximum) were detected at depths of approximately 16 and 24 feet.

Based on the soil sampling results, there was no indication of a release at the apparent dislocation in the sewer line observed in the 1991 video survey. The TPH-D detected in the soil most likely originated from the Building 74 Former Diesel UST (AOC 11-1). With the exception of the PCE detected in well MW83-92-14, only samples collected at depths well below the sewer line contained detectable contaminants, indicating that the soil contamination was not associated with release from or migration along the sewer line.

Potential Migration of Contaminants

Surface Water and Sediment

The storm drain system that captures runoff from AOC 11-3 discharges to Botanical Garden Creek, which flows into the storm drain system along the former course of Strawberry Creek (Figure D2.1-4 and Figure D2.3-1). The area is paved and any potentially contaminated soil originating from releases from AOC 11-3 would be present beneath the sewer line elevation, and therefore would not be available for migration to surface water or sediment. In addition, no VOCs were detected in surface-water samples collected from Botanical Garden Creek, indicating no impacts to surface water from the VOCs detected in soil at AOC 11-3 (Section D4.8). The potential migration of TPH-contaminated soil, which originates from AOC 11-1 is discussed in Section D3.5.

Groundwater

The results of the groundwater monitoring, which are discussed in Section D4.3, indicate no impact to groundwater from AOC 11-3. Monitoring wells MW83-92-14 is located adjacent to AOC 11-3. Except for a single detection of PCE (below the drinking water standard) in 1993, no VOCs have been detected in groundwater samples collected from the well. The TPH and aromatic hydrocarbons detected in groundwater monitoring wells in the area of the sewer line are associated with AOC 11-1 (Section D3.5).

Status of Unit

LBNL submitted a request for NFA status for AOC 11-3 to DTSC in February 1997 (LBNL, 1997d). The request provided soil investigation results pertaining to the potential for past releases and the magnitude and extent of contamination. These results showed no evidence that a release had occurred from the sewer line or that the backfill was a source of, or migration route for contaminants. In addition, concentrations of contaminants detected were below PRGs for residential soil.

After review of LBNL's request, AOC 11-3 was approved for NFA status by DTSC in August 1997 (DTSC, 1997).

D3.7 AOC 12-4: Building 50 Sanitary Sewer Dislocations

Description and History

A sanitary sewer line emanates from the west side of the Building 50 complex and joins the sewer line along Cyclotron Road (Figure D3.7-1). Buildings 50A through 50F house the LBNL Director's Office, Physics Division, Nuclear Science Division, Computer Center, and research laboratories. One SWMU (Building 50 Former Residual Photographic Solution UST [SWMU 12-1]) and three AOCs (Building 50 Transformer [AOC 12-1]; Building 50A Transformer [AOC 12-2]; and the Building 50B Transformer [AOC 12-3]) lie within the Building 50 complex. A range of hazardous materials and wastes (including chlorinated solvents, acids, and metals) could have been used or generated at the SWMU, AOCs, and research laboratories in the Building 50 complex. A sewer line investigation was conducted to assess if releases could have occurred from the sanitary sewer line (Figure D3.7-1).

Soil and Soil-Gas Sampling

Soil characterization and soil-gas sampling activities are described below. Sampling locations are shown on Figure D3.7-1. Soil sampling results are contained in Table D3-1 (metals) and Table D3.7-1 (organics).

- A video survey of the sewer lines was conducted in 1991, and indicated three areas west and northwest of the Building 50 complex where the lines might have been damaged by dislocation or root intrusions (Figure D3.7-1).
- During the RFA, nine soil-gas samples were collected in the Building 50 complex area; four samples were collected along the sanitary sewer line near Buildings 50B/50E/50F, three samples were collected along the sewer line 200 feet to the west of the Building 50 complex, and two samples were collected on the hillside approximately 150 feet west of Building 50F.
- In November 1991, two soil samples (SS50A-1C and SS50B-1C) were collected in the general vicinity of the sewer line sections that appeared to be dislocated in the

1991 video survey. A third soil sample (SS50W-07) was collected adjacent to the sewer line at Building 50F.

- During sanitary sewer restoration work conducted subsequent to the RFA, four test holes were dug along the Building 50 area sanitary sewer lines to visually inspect the condition of the lines. No dislocations or evidence of leaks were found at these locations, so soil samples were not collected from these holes.

PCE, Freon-113, ethylbenzene, toluene, xylenes, isopropylbenzene, and THC were sporadically detected in soil-gas samples collected along the sanitary sewer lines (LBNL, 1992d). However, only fuel-related aromatic hydrocarbons (ethylbenzene, toluene, xylenes, isopropylbenzene) and THC were detected in the two soil samples (SS50A-1C and SS50B-1C) collected near the apparent sewer line dislocations. Detected concentrations were well below PRGs for residential soil. The sample collected adjacent to Building 50F (SS50W-07) was analyzed only for metals, which were detected at concentrations within LBNL background levels.

Potential Migration of Contaminants

Surface Water and Sediment

Surface runoff and storm drain effluent from the Building 50 area discharges to North Fork Strawberry Creek (Figures D2.1-4 and D2.2-1). Any potentially contaminated soil originating from releases at AOC 12-4 would be present beneath the sewer line elevation, and therefore would not be available for migration to surface water or sediment. Migration of contaminants to surface water and sediment is discussed in Section D4.8.

Status of Unit

LBNL submitted a request for NFA status for AOC 12-4 to DTSC in July 1998 (LBNL, 1998j). The request provided the following information:

- a discussion of apparent sewer line dislocations observed during a 1991 video survey
- soil investigation results pertaining to the potential for past releases and the magnitude and extent of contamination (These results indicated that concentrations of contaminants from soil samples collected near the sewer line were below PRGs for residential soil)

- a discussion of test hole observations that indicated no dislocations in the sewer line at the test hole locations.

After review of LBNL's request, AOC 12-4 was approved for NFA status by DTSC in September 1998 (DTSC, 1998).

D3.8 AOC 13-1: Building 62 (Former) Hazardous Materials Storage Area

Description and History

The Building 62 former hazardous materials storage area consisted of a metal shed located on an unbermed concrete floor immediately south of Building 62 (LBNL, 1992d). The area was used to store drums containing hydraulic oil, vacuum oil, cutting oil, and heptane, and had been used for drum storage. Hazardous materials storage activities have been moved to a new area adjacent to SWMU 13-2 (Figure D-3c).

Soil Sampling

Soil sampling activities are described below. Sampling locations are shown on Figure D3.8-1. Soil sampling results are contained in Table D3-1 (metals) and Table D3.8-1 (organics).

- During the RFA, a soil boring (SB62-92-19) was drilled next to the former unit to a depth of approximately 20 feet bgs.
- In 1992, soil samples were collected from monitoring well boring MW62-92-27, which was installed next to the Hazardous Materials Storage Area. The boring was drilled to approximately 65 feet bgs.

The only VOCs detected were Freon-11, 1,3,5-trimethylbenzene, 1,2,3-trichloropropane, acetone, and 2-butanone (aka methyl ethyl ketone). Of these compounds, only 1,2,3-trichloropropane, which was present in one sample was detected at a concentration above the PRG for residential soil. In addition, both acetone and 2-butanone are known to be common laboratory contaminants and were only detected in one sample at considerable depth. Therefore, it is possible that they were introduced during analysis and are not representative of soil contamination at the site.

No metals were detected at concentrations exceeding both LBNL background levels and PRGs for residential soil.

Potential Migration of Contaminants

Groundwater

Well MW62-92-27 was installed to monitor the quality of the groundwater at AOC 13-1. Groundwater sampling results, which are discussed in Section D4.3, do not show evidence of impacts from the VOCs detected in soil at the unit.

Status of Unit

LBNL submitted a request for No Further Investigation (NFI) status for AOC 13-1 to DTSC in January 1996 (LBNL, 1996a). The request provided soil investigation results pertaining to the potential for past releases and the magnitude and extent of contamination, and indicated that the unit would be included in the human health risk assessment due to the detection of 1,2,3-trichloropropane at a concentration above the PRG for residential soil.

After review of LBNL's request, AOC 13-1 was approved for NFI status by DTSC in July 1996 (DTSC, 1996b).

D3.9 AOC 13-2: Building 62 Former Diesel UST

Description and History

A 750-gallon, single-walled, steel UST (TK-02-62) previously stored diesel fuel for an emergency generator located in Building 62 (Figures D-3c and D3.9-1). The tank was installed in 1965 beneath the access road approximately 15 feet west of Building 62. There were no known release controls for the tank. A 1986 tank test indicated a leak through the tank's manway cover. Leakage from the tank piping was also reportedly detected in 1986 (DTSC, 1991). The tank was removed in September 1987. Samples indicated that leakage had contaminated soil beneath the tank, so soil was excavated to a depth of approximately 25 feet

bgs using large-diameter augers. A tank removal and soil excavation report was completed (Dames and Moore, 1987a).

Soil and Soil-Gas Sampling

Soil characterization and soil-gas sampling activities are described below. Locations of soil samples collected subsequent to submission of the tank removal report are shown on Figure D3.9-1. Soil sampling results are contained in Table D3.9-1 and Figure D3.9-2.

- In August 1986, prior to tank removal, two soil samples (1 and 2) were collected adjacent to the tank manway cover
- In September 1986, soil samples were collected from monitoring well borings MW62-B1 and MW62-B2, immediately adjacent to the tank.
- In September 1987, the tank was removed and soil samples TK62-1 through TK62-4 were collected immediately beneath the tank. Diesel-contaminated soil beneath the tank was then removed to a depth of approximately 25 feet bgs using large-diameter augers. Samples TK62-5A through TK62-23B were collected from the auger holes during drilling.

All of the sample locations described above were excavated, except for those collected from monitoring well boring MW62-B2, and those collected from the base of each auger hole (Table D3.9-1).

- In September 1987, after soil excavation was completed, samples B-1 through B-7 were collected from beneath the fuel supply piping.
- In 1995, five shallow soil gas probes were installed on the steep slope approximately 20 to 30 feet west of the former UST site.
- In August, 1995, soil samples were collected from the boring for monitoring well MW62-95-16. The well was installed on a lower access road, approximately 20 feet downslope (downgradient) from the soil gas probe where the maximum concentration of TPH had been detected. The purpose of the well was to monitor groundwater quality downgradient from the former UST near the LBNL perimeter.
- In October 1996, soil samples were collected from two soil borings (SB62-96-1 and SB62-96-2) at depths of 20 and 25 feet bgs in the tank excavation area. The samples were collected immediately beneath two 1987 auger sample locations where soil containing more than 100 mg/kg TPH-D had been left in place. The purpose of these borings was to further characterize the vertical extent of the fuel contamination and

assess the presence of chemicals of potential concern (benzene, toluene, ethylbenzene, and xylenes [BTEX]).

- In February 1997, soil samples were collected from two additional soil borings (SB62-97-1 and SB62-97-2) adjacent to samples collected from borings SB62-96-1 and SB62-96-2. These samples were collected to further assess the presence of chemicals of potential concern (PAHs and BTEX) in the soil.

Samples collected from soil excavated in 1987 contained TPH-D at concentrations up to 18,000 mg/kg (Table D3.9-1). Soil remaining in place contained less than 100 mg/kg TPH-D, except for samples TK62-6A (190 mg/kg) and TK62-10B (450 mg/kg), which were located in the southwest and northeast corners, respectively, of the excavation area. Samples collected in 1996 and 1997 from immediately beneath sample locations TK62-6A and TK62-10B contained considerably lower concentrations of TPH-D (49 mg/kg maximum).

No BTEX was detected in the samples collected in 1996. Trace concentrations (<0.001 mg/kg) of PAHs were detected in one sample and toluene in a second sample collected in 1997. Concentrations of these chemicals of potential concern were all several orders of magnitude below PRGs for residential soil.

Potential Migration of Contaminants

Surface Water and Sediment

Surface runoff from the area around SWMU 13-2 flows towards No-Name Creek which eventually discharges to the storm drain system that lies along the former course of Strawberry Creek (Figure D2.1-4 and Figure D2.4-1). Some surface water from the area may also be directed into storm drains, which also discharge to the storm drain system along the former course of Strawberry Creek. The release at AOC 13-2 was in the subsurface and the majority of contaminated soil lies beneath paving, minimizing the potential for erosion and migration of soil contaminants to surface water or sediment. In addition, no VOCs were detected in surface-water samples collected from No-Name Creek.

Groundwater

Two groundwater monitoring wells are at the former UST site and one groundwater monitoring well is downgradient. In addition a temporary groundwater sampling point at the site has been sampled. As discussed in Section D4.4, TPH has been detected sporadically in wells immediately adjacent to the former tank, but not at the downgradient well located approximately 40 feet to the west. Except for a trace concentration (<1 μg/L) of p-isopropyltoluene, which was detected in a single sample, no monoaromatic hydrocarbons have been detected. In addition, low concentrations (<1 μg/L) of PAHs were detected in the sample collected from the temporary groundwater sampling point at the tank site. These results show that contaminants from the unit have impacted groundwater below the former tank, but not in the area downgradient from the unit.

Status of Unit

LBNL submitted a request for NFA status for AOC 13-2 to the COB in July 1997 (LBNL, 1997l). The request provided the following information:

- soil investigation results pertaining to the potential for past releases and the magnitude and extent of contamination (These results indicated that although TPH was present in residual soil, it had only a limited extent)
- the UST had been removed and not replaced
- no evidence exists that groundwater downgradient from the unit has been impacted.

After review of LBNL's request, AOC 13-2 was approved for NFA status by the COB in July 1997 (COB, 1997b). Groundwater monitoring will continue as required by the RWQCB.

D3.10 AOC 13-4: Possible Solvent Spills East Of Building 62

Description and History

The LBNL RFA (LBNL, 1992d) reported that solvents and acids may have been dumped on the hillside east of the Building 62 Waste Accumulation Area, after construction of Building

62 in 1965. Chemicals that could potentially have been dumped included acids and solvents that had been used in association with polishing of metals and ceramics.

Soil Sampling

Soil sampling activities are described below. Locations of soil samples are shown on Figure D3.10-1. Soil sampling results are contained in Table D3.10-1.

- During the RFA, two shallow soil samples (BS92-20A and BS62-92-20B) were collected at a depth of 3.5 feet bgs in the area of the reported spills.
- In August 1995, five shallow soil samples (SS62E-95-1 through SS62E-95-5) were collected from the area of the reported spills at a depth of 3 feet.

No VOCs were detected in any of the samples and pH values were close to neutral.

Potential Migration of Contaminants

Soil contaminants were not detected at the unit, so migration of contaminants is not a concern.

Status of Unit

LBNL submitted a request for NFA status for AOC 13-4 to the DTSC in February 1997 (LBNL, 1997d). The request stated that no analytes had been detected in soil samples collected at the unit.

After review of LBNL's request, AOC 13-4 was approved for NFA status by the DTSC in August 1997 (DTSC, 1997).

D3.11 Other Soil Sampling

Soil samples were also collected at other locations in the Outlying Areas that are not associated with specific SWMUs or AOCs and include:

- soil samples collected from the boring for groundwater monitoring well MW88-96-4 installed north of Building 88

- two shallow soil samples collected in a trench excavated beneath Building 70A in September 1996 at the location of a broken drainpipe that was being replaced.

Samples collected from MW88-96-4 were analyzed for VOCs and metals. No VOCs were detected. Metals were detected within LBNL background levels or below PRGs for residential soil.

Samples from the utility trench under Building 70A were analyzed for VOCs, metals, and pH. A trace concentration of TCE (0.0061 mg/kg) was the only VOC detected. Metals were detected at concentrations within LBNL background levels. The pH was slightly basic.

D4 NATURE AND EXTENT OF CONTAMINATION IN GROUNDWATER AND SURFACE WATER

D4.1 Introduction

Concentrations of contaminants detected in groundwater and surface water in the Outlying Areas are documented in the analytical tables and on the figures referenced in the following sections. The magnitude and extent of groundwater contamination were evaluated based on samples collected from groundwater monitoring wells, temporary groundwater sampling points, and hydraugers (horizontal drains) south of Building 54. Halogenated non-aromatic VOCs and fuel hydrocarbons were the primary contaminants detected in groundwater in the Outlying Areas. Only one groundwater plume (the Building 74 Diesel Plume) has been identified in the Outlying Areas, and no area of groundwater contamination has been designated as an AOC.

MCLs for drinking water are referenced on the groundwater sampling result tables. The more restrictive MCLs of either the Federal (Safe Drinking Water Act [40 CFR 141]) or State (Cal-EPA CCR Title 22) standards are listed on the tables.

D4.2 Conceptual Model for Contaminant Transport in Groundwater

The conceptual hydrogeologic model for the Outlying Areas is discussed in Sections D2.2, D2.3, and D2.4. Within the Western (Figure D-3a) and Southeastern (Figure D-3c) Outlying Areas, the water table is primarily in the Great Valley Group rocks. Within the Northeastern Outlying Area (Figure D-3b) the water table is in the San Pablo Group and Moraga Formation rocks. To a lesser extent, the water table may be in overlying colluvium and fill, depending on the location and season. Groundwater flow direction is variable, but generally parallels the surface topography (Figures D2.2-4, D2.3-5 and D2.4-3).

A conceptual model for contaminant transport was not developed for this module for the following reasons. VOCs have only been sporadically detected in groundwater samples collected in the Outlying Areas. Detected concentrations have been below MCLs since 1997. TPH-D has been detected in groundwater samples collected in the area of Building 74 (Building 74 Diesel Plume) and Building 70A; however, aromatic hydrocarbons have not been detected in groundwater samples collected in these areas since 1995.

D4.3 Halogenated Non-Aromatic VOCs in Groundwater

The halogenated non-aromatic VOCs that have been detected in groundwater samples collected from monitoring wells in the Outlying Areas during more than one quarter are solvents (PCE and 1,1,1-trichloroethane [1,1,1-TCA), solvent degradation products (1-1-DCE and chloroform), or both (TCE). The source of chloroform could also be drinking water, where it is present as the result of the disinfection processes. Concentrations of halogenated non-aromatic VOCs detected in groundwater are presented in Table D4.3-1 (monitoring wells), Table D4.3-2 (temporary groundwater sampling points), and Table D4.3-3 (hydraugers). Maps of halogenated non-aromatic VOCs in the Outlying Areas are presented on Figure D4.3-1a (western), Figure D4.3-1b (northeastern), and Figure D4.3-1c (southeastern). To illustrate current conditions, these figures only show concentrations of halogenated non-aromatic VOCs detected during FY99.

Since 1997, low concentrations of chloroform (12 μg/L maximum), 1,1,1-TCA (1.2 μg/L maximum), 1,1-dichloroethane (1,1-DCA) (0.53 μg/L maximum), Freon-12 (0.6 μg/L), and p-isopropyltoluene (0.93 μg/L) have been the only VOCs detected in the Outlying Areas. Concentrations of chloroform, 1,1,1-TCA, and 1,1-DCA were an order of magnitude or more below MCLs. P-isopropyltoluene and Freon–12 have no MCL. Except for chloroform in MW74-95-6, these sporadic detections were inconsistent with other results from the wells.

D4.3.1 Western Outlying Area (RFA Study Areas 6, 8, and 12)

Trace concentrations (approximately 1 μg/L or less) of Freon-12 and 1,1,1-TCA were the only halogenated non-aromatic VOCs detected in the Western Outlying Area during FY1999 (Figure D4.3-1a). Prior to FY1999, PCE, TCE, 1,1,1-TCA, 1,1-DCE, chloroform, and Freon-113 had been detected in the groundwater (Tables D4.3-1 and D4.3-2). Except for MW88-92-4, these halogenated non-aromatic hydrocarbons were detected in a well during only one or two sampling events. TCE was detected in MW88-92-4 during all but one quarter between March 1993 and November 1995, at concentrations below MCLs. Halogenated non-aromatic hydrocarbons have not been detected in MW88-92-4 since November 1995. Chloroform was also detected in a water sample from hydrauger 54-01-07 in 1998 during one of the three quarters it has been sampled (Table D4.3-3; Figure D4.3-1a).

Potential sources for halogenated non-aromatic VOCs in the Western Outlying Area include SWMUs and AOCs reported to have stored or used organic solvents (Figure D4.3-1a). These SWMUs and AOCs are listed in the following table:

SWMUs and AOCs in the Western Outlying Area That Stored or Used Solvents

Unit Number	Unit Name
SWMU 6-2	Building 88 Waste Accumulation Area
AOC 6-4	Building 88 Hazardous Materials Storage Area
SWMU 8-3	Building 70 Temporary Waste Accumulation Area
AOC 8-5	Building 70 Hazardous Materials Storage Area
AOC 8-6	Building 58/70 Sanitary Sewer
AOC 8-7*	Building 70A Sanitary Sewer
AOC 12-4*	Building 50 Sanitary Sewer Dislocations

* SWMUs and AOCs discussed in Section D3

The potential for a release from these units was evaluated in the RFA (LBNL, 1992d) and/or the RFI. Monitoring well MW88-92-4 is the only well in the Outlying Areas where halogenated non-aromatic VOCs have been consistently detected. MW88-96-4 was installed adjacent to the Building 88 Hazardous Materials Storage Area (AOC 6-4), upgradient from MW88-2-4, to help assess whether AOC 6-4 was the source of the groundwater contamination. Except for a trace concentration of 1,1,1-TCA (1.1 μg/L) in MW88-96-4 in January 1999, no VOCs were detected in the well, indicating that AOC 6-4 was not the source of the groundwater contamination.

D4.3.2 Northeastern Outlying Area (RFA Study Area 11)

Chloroform was the only halogenated non-aromatic VOC detected in the Northeastern Outlying Area during FY1999 (Figure D4.3-1b). Prior to FY1999, PCE; TCE; chloroform; Freon-12; and Freon-113 had been detected in the groundwater (Tables D4.3-1 and D4.3-2). The only halogenated non-aromatic VOCs that have been detected in a monitoring well during more than one quarter are PCE in MW74-94-7 and chloroform in MW74-95-6. The concentrations of PCE and chloroform detected have been well below MCLs. PCE has not been detected in MW74-94-7 since June 1996.

The Building 83/83A Sanitary Sewer System (AOC 11-3) is the only SWMU or AOC that was identified as a potential source for halogenated non-aromatic VOCs in the Northeastern Outlying Area. Based on investigation of AOC 11-3; however, the sanitary sewer line does not

appear to be a source or migration pathway for contaminants Section D3.6. A potential source for chloroform could be a leaking water line or sanitary sewer.

D4.3.3 Southeastern Outlying Area (RFA Study Area 13)

No halogenated non-aromatic VOCs were detected in the Southeastern Outlying Area during FY1999 (Figure D4.3-1c). Prior to FY1999, PCE TCE 1,1-DCA, and chloroform had been sporadically detected in the groundwater (Tables D4.3-1 and D4.3-2). The only halogenated non-aromatic VOCs detected since February 1997 have been 1,1-DCA in MW62-B1A and chloroform in MW62-92-26. These two contaminants were only detected a single time in each well, with the concentration an order of magnitude below MCLs.

Potential sources for halogenated non-aromatic VOCs in the Southeastern Outlying Area include SWMUs and AOCs reported to have stored or used organic solvents (Figure D4.3-1c). These SWMUs and AOCs are listed in the following table:

SWMUs and AOCs in the Southeastern outlying Area That Stored or Used Solvents

Unit Number	Unit Name
SWMU 13-2*	Building 62 Waste Accumulation Area
AOC 13-4*	Possible Solvent Spills East of Building 62
AOC 13-8	Acid Sewer Lines West of Building 62
AOC 13-9	Sanitary Sewer Lines South of Building 62

* SWMUs and AOCs discussed in Section D3.

The potential for release from these units was evaluated in the RFA (LBNL, 1992d) and/or the RFI. Halogenated non-aromatic VOCs have only been detected sporadically in groundwater in the Southeastern Outlying Area, with concentrations below MCLs since February 1997. The source of the chloroform detected in MW62-92-26 in August 1999 was most likely cross contamination during sampling. Chloroform was also detected in a field/equipment blank during the same quarter.

D4.4 Petroleum Hydrocarbons in Groundwater

Two general evaluation methods were used to assess potential releases of fuels or lubricants to groundwater:

1. Groundwater samples collected in the vicinity of SWMUs and AOCs that managed fuel hydrocarbon products, petroleum lubricants, or petroleum wastes were analyzed for Total Petroleum Hydrocarbons (TPH) (Table D4.4-1; Figures D4.4-1a, D4.4-1b, and D4.4-1c).

2. Samples collected from all groundwater monitoring wells have been routinely analyzed for VOCs by EPA Method 8260. Samples collected from temporary groundwater sampling points and flowing hydraugers are also analyzed for VOCs by EPA Method 8260. The target analytes for this method include several classes of organic compounds, including non-aromatic halogenated hydrocarbons (e.g., PCE, TCE, etc.), monoaromatic halogenated hydrocarbons (e.g., 1,2 dichlorobenzene [DCB]), monoaromatic non-halogenated hydrocarbons (e.g., benzene), and polyaromatic non-halogenated hydrocarbons (e.g., naphthalene and other PAHs). The first class of compounds (non-aromatic hydrocarbons) are commonly derived from industrial solvents, and are discussed in detail in Section D4.3. The last three classes of compounds (all three comprise various aromatic hydrocarbons) include constituents that are commonly present in fuel products. For this reason, compounds in these three classes were evaluated separately from other VOCs. These data are presented on Tables D4.3-1 (monitoring wells), Table D4.3-2 (temporary groundwater sampling points), Table D4.3-3 (hydraugers), and Figures D4.4-2a, D4.4-2b, and D4.4-2c. In addition, a groundwater sample from temporary groundwater sampling point SB62-96-1 was analyzed for PAHs and BTEX, which are constituents of diesel fuel (Table D4.4-2 and Figure D4.4-2c).

Western Outlying Area (RFA Study Areas 6, 8, and 12)

TPH in the range of diesel (760 μg/L maximum) was detected in groundwater samples collected from two groundwater monitoring wells and two temporary groundwater sampling points at the Building 70A Former Diesel UST (AOC 8-1) (Figure D4.4-1a). The source of the TPH was the former UST. TPH has not been detected at the former UST site since May 1997 (Table D4.4-1). TPH (510 μg/L maximum) was also detected in monitoring well MW88-93-13 downgradient from the Building 88 Abandoned UST (AOC 6-1) (Figure D4.4-1a). TPH has not been detected in this well since December 1996.

Aromatic hydrocarbons were detected in two groundwater monitoring wells (MW88-93-13 and OW3-225) and one hydrauger (54-01-08) (Tables D4.3-1 and D4.3.3). The detections, which occurred a single time prior to 1995, were inconsistent with other results from the wells and hydrauger. In addition, naphthalene was detected in the sample collected from temporary groundwater sampling point SB70A-95-1 at AOC 8-1; however, aromatic hydrocarbons have not been detected in either of the two groundwater monitoring wells at the former UST site.

Potential sources for petroleum hydrocarbons in the Western Outlying Area include SWMUs and AOCs reported to have stored or used fuel products or other hydrocarbon-based products (Figures D4.4-1a and D4.4-2a). These SWMUs and AOCs are listed in the following table:

SWMUs and AOCs in the Western Outlying Area That Stored or Used Fuel Products

Unit Number	Unit Name
AOC 6-1	Building 88 Abandoned Diesel UST
AOC 6-2	Building 88 Transformers
AOC 6-3	Building 88 Hydraulic Gate Unit
SWMU 6-2	Building 88 Waste Accumulation Area
AOC 8-1*	Former Building 70A Diesel UST
AOC 8-2*	Building 70 Diesel UST
AOC 8-3	Building 70A Transformer
AOC 8-4	Building 70 Transformer
AOC 8-5	Building 70 Hazardous Materials Storage Area
SWMU 8-3	Building 70 Temporary Waste Accumulation Area
AOC 12-1	Building 50 Transformer
AOC 12-2	Building 50A Transformer
AOC 12-3	Building 62 Transformer
AOC 12-4*	Building 50 Sanitary Sewer Dislocations

* SWMUs and AOCs discussed in Section D3.

Potential releases from these units were evaluated in the RFA (LBNL, 1992d) and/or the RFI. The Building 70A Former UST is the source of the TPH detected in groundwater east of Building 70A. The Building 88 Abandoned Diesel UST (AOC 6-1) is the most likely source of the TPH detected in groundwater near the southwest corner of building 88.

Northeastern Outlying Area (RFA Study Area 11)

TPH in the range of diesel has been detected in all groundwater monitoring wells in the Northeastern Outlying Area (Figure D4.4-1b and Table D4.4-1). The maximum concentrations (maximum 1,200 μg/L) and most consistent detections have been in wells near the Building 74 Former Diesel UST (AOC 11-1). Lower concentrations of TPH-D have been detected in downgradient wells (MW74-94-7 and MW74-94-8), located south of Building 74, approximately half the times the wells have been sampled. TPH in the range of gasoline has also been detected in two of the wells near the former UST site (maximum 140 μg/L). The groundwater contamination in the Building 74 area has been designated as the Building 74 Diesel Plume. Low concentrations (90 μg/L maximum) of TPH-D have also been occasionally detected in wells to the west and north of the Building 74/83 area. Concentrations of TPH-D detected in wells monitoring the plume have either remained relatively stable or indicate a decreasing trend (Table D4.4-1).

Aromatic hydrocarbons were detected in monitoring wells and a temporary groundwater sampling point near the Former Building 74 Diesel UST (AOC 11-1) prior to 1996 (Figure D4.4-2b). Detected concentrations were below MCLs (Tables D4.3-1 and D4.3-2).

Potential sources for petroleum hydrocarbons in the Northeastern Outlying Area include:

- Building 74 Former Diesel UST (AOC 11-1)
- Building 83 Diesel Aboveground Storage Tank (AOC 11-2).

The locations of these AOCs are shown on Figures D4.4-1b and D4.4-2b. Potential releases from these AOCs were evaluated in the RFA (LBNL, 1992d) and the RFI. The source of the groundwater contamination in the Building 74 area is most likely a pipeline leak associated with the Former Building 74 UST (AOC 11-1). AOC 11-1 is discussed in Section D3.

Southeastern Outlying Area (RFA Study Area 13)

TPH in the range of diesel (940 μg/L maximum) was detected in two groundwater monitoring wells and one temporary groundwater sampling point at the location of the Former Building 62 Diesel UST (AOC 13-2) (Figure D4.4-1c). TPH in the range of crude oil was also detected in one sample (2,000 μg/L). TPH has been detected approximately half the times the monitoring wells have been sampled (Table D4.4-1). TPH has not been detected in MW62-95-16, located downgradient from AOC 13-2.

A trace concentration (<1 μg/l) of p-isopropyltoluene in the MW62-B2 has been the only mono-aromatic hydrocarbon detected in the Southeastern Outlying Area (Table D4.3-1c). Numerous PAHs were detected in a sample collected from SB62-96-1 in November 1996 (Table D4.4-2). Benzo(a)pyrene was detected at a concentration below the MCL. The remaining PAHs detected have no MCL specified.

Potential sources for petroleum hydrocarbons (including AOC 13-2) in the Southeastern Outlying Area include SWMUs and AOCs reported to have stored or used fuel products or other hydrocarbon-based products (Figures D4.4-1c and D4.4-2c). These SWMUs and AOCs are listed in the following table:

SWMUs and AOCs in the Southeastern Outlying Area That Stored or Used Fuel Products

Unit Number	Unit Name
AOC 13-1*	Building 62 Hazardous Materials Storage Area
AOC 13-2*	Building 62 Former Diesel UST
AOC 13-3	Building 62 Transformer
AOC 13-5	Building 66 Diesel UST #1
AOC 13-6	Building 66 Aboveground Diesel Day tank
AOC 13-7	Building 66 Diesel UST #2
SWMU 13-2*	Building 62 Waste Accumulation Area

* SWMUs and AOCs discussed in Section D3.

Potential releases from these units were evaluated in the RFA (LBNL, 1992d) and/or the RFI. The source of the TPH and PAHs detected in groundwater west of Building 62 is Former Building 62 Diesel UST (AOC 13-2).

D4.5 Semi-Volatile Organic Compounds (SVOCs) in Groundwater

Samples were collected from 19 groundwater monitoring wells in the Outlying Areas between 1994 and 1999 and analyzed for SVOCs (Table D4.5-1 and Figures D4.5-1a, D4.5-1b, and D4.5-1c). Bis(2-ethylhexyl)phthalate (DEHP) was detected in 10 of the wells. DEHP was also detected in 35 of the 79 wells sampled site-wide during 1994, and in 5 of the 7 field (rinse) blanks; no DEHP was detected in laboratory QC samples. Since DEHP is a common laboratory contaminant, the presence of DEHP in these samples is interpreted to have resulted from sample contamination and the results, therefore, are not representative of groundwater contamination.

In addition, pentachlorophenol (PCP) was detected in one well and phenol in three wells in the Northeastern Outlying Area (Figure D4.5-1b). These chemicals were detected in each well only a single time it was sampled. These chemicals were each detected only a single time in a well (Table D4.5-1). The concentration of PCP detected (9 μg/L) was above the MCL (1 μg/L). Phenol has no MCL established. PCP is a common wood preservative, herbicide, and insecticide. Phenol (also known as carbolic acid) is primarily a man-made chemical, although it is also found naturally in animal wastes and decomposing organic matter. Phenol is also used as an antibacterial and anti-fungal agent.

D4.6 Polychlorinated Biphenyls (PCBs) in Groundwater

SWMUs and AOCs where polychlorinated biphenyls (PCBs) were used, and areas of PCB contaminated soil in the Outlying Areas, are shown on Figures D4.6-1a and D4.6-1b. PCBs were detected in soil at the following locations:

- Building 88 Hydraulic Gate Unit (AOC 6-3) (Figure D4.6-1a)
- Building 62 Transformer (AOC 13-3) (Figure D4.6-1b).

To investigate the potential impact of PCBs to groundwater at these locations, groundwater samples were collected in April 2000 from downgradient wells MW88-93-13 (for AOC 6-3) and MW62-B1A and MW62-B2 (for AOC 13-3). No PCBs were detected (Table D4.6-1).

D4.7 Metals in Groundwater

Initial groundwater samples collected after installation of groundwater monitoring wells at LBNL are analyzed for metals, and subsequently analyzed for metals in accordance with requirements of the RWQCB. The locations of the wells in the Outlying Areas sampled for metals are shown on (Figures D4.7-1a, D4.7-1b, and D4.7-1c). MW70A-96-5 is the only monitoring well in which a metal has been detected above the MCL since 1992 (Table D4.7-1 and Figure D4.7-1a). Antimony was detected above the MCL in the initial duplicate samples collected from the well in May 1996. Concentrations of antimony were below the MCL in samples collected in May 1997, 1998, and 1999. Anomalously high concentrations of several metals reported by the analytical laboratories in 1992 and 1993 were not supported by subsequent results and may have resulted from laboratory error.

D4.8 Potential Migration of Contaminants to Surface Water

The Outlying Areas are located within both the Strawberry Canyon and Blackberry Canyon Watersheds (Figure D4.8-1). Surface runoff and storm drain-flow from the northeastern and Southeastern Outlying Area (within the Strawberry Canyon Watershed) drain toward Banana Creek, Botanical Garden Creek, No Name Creek, and Cafeteria Creek. Runoff and storm drain-flow from the Western Outlying Area (within the Blackberry Canyon) Watershed drain toward North Fork Strawberry Creek. Surface water and sediment samples were therefore collected from these creeks and analyzed for chemicals of potential concern (COPCs) from upgradient sources.

Surface water sampling results for organics and metals are included in Table D4.8-1 and Table D4.8-3, respectively. Sediment sampling are included in Table D4.8-2 (organics) and

Table D4.8-4 (metals). Surface water and sediment sampling locations are shown on Figure D4.8-1 and Figure D4.8-2, respectively. Surface water and sediment sampling results are discussed below. The potential impact to the environment from contaminants detected in surface water and sediment will be evaluated in the ecological risk assessment.

D4.8.1 North Fork Strawberry Creek

Surface water samples were collected from North Fork Strawberry Creek and analyzed for VOCs, SVOCs, PCBs, and metals including hexavalent chromium. The only VOC detected was a trace concentration of 1,1,1-TCA (0.95 μg/L) at the erosion control basins in 1995. 1,1,1-TCA has not been detected in the ten surface water samples collected since that time. The MCL for 1,1,1-TCA is 200 μg/L. Diethylphthalate (2.2 μg/L), which was detected in April 1998, has been the only SVOC detected. Diethylphthalate was not detected in three other surface water samples collected from the creek. Phthalates are common laboratory contaminants. No PCBs were detected. Metals were either not detected or detected at concentrations well below MCLs. Hexavalent chromium was detected in a surface water sample collected from the creek at the site boundary in July 1999, but was not detected in water collected upstream at the erosion control basin. Hexavalent chromium was not detected in a subsequent sample collected from the creek at the boundary in January 2000. The detected concentration of hexavalent chromium (4.2 μg/L) is below the MCL for drinking water (50 μg/L) and the State of California Department of Health Services (DHS) Water Quality Criteria of 11 μg/L for protection of freshwater aquatic life.

Sediment samples were collected from North Fork Strawberry Creek and analyzed for VOCs, SVOCs, PCBs, fuels, and metals including hexavalent chromium. The only VOC detected was a trace concentration of toluene (0.013 mg/kg) in April 1993 at the site boundary. Neither SVOCs nor PCBs were detected. TPH quantified as 'oil' (within the diesel range) was also detected. The only metals detected at concentrations above both LBNL background levels for soil and PRGs for residential soil were lead and nickel in one sample each (out of eleven). No hexavalent chromium was detected.

Surface runoff and storm drain-flow from the Bevalac Area (Module A) also drain toward North Fork Strawberry Creek.

D4.8.2 Cafeteria Creek

Surface water samples were collected from Cafeteria Creek and analyzed for VOCs and metals. No VOCs were detected. Metals were either not detected or detected at concentrations below MCLs.

Sediment samples collected from Cafeteria Creek were analyzed for metals. Metals were detected at concentrations within LBNL background levels for soil.

D4.8.3 No-Name Creek

Surface water samples were collected from No Name Creek and analyzed for VOCs and Title 22 Metals. No VOCs were detected. Metals were either not detected or detected at concentrations well below MCLs.

Sediment samples were collected from No Name Creek and analyzed for SVOCs PCBs, and metals. Neither PCBs nor SVOCs were detected. Metals were detected at concentrations within LBNL background levels for soil.

D4.8.4 Banana Creek

Sediment samples were collected from Banana Creek and analyzed for SVOCs and metals. No SVOCs were detected. Metals were detected at concentrations within LBNL background levels for soil.

D4.8.5 Botanical Garden Creek

Surface water samples were collected from Botanical Garden Creek and analyzed for VOCs, SVOCs, and metals. No VOCs or SVOCs were detected. Metals were either not detected or detected at concentrations well below MCLs.

D5 AIR SAMPLING

Ambient air samples were collected both inside and outside of buildings in the Outlying Areas and analyzed for VOCs, to provide data that will be required for the human health risk assessment.

D5.1 Outdoor Air Sampling

Twenty-four hour outdoor air samples were collected at one location in the Outlying Areas in November 1997. The sampling location is shown on Figure D5.1-1. Also included on the figure is a windrose that covers the period when the outdoor air samples were collected. The windrose shows the percentage of the time the wind was blowing from directions spaced at 30° intervals. For most of the sampling period the wind was blowing either directly from the east or from the west.

Concentrations of analytes detected are listed in the table below. Also included in the table are Bay Area Air Quality Management District (BAAQMD) and California Air Resources Board (ARB) data from nearby monitoring stations, for comparison.

Outdoor Air Sample Results, Old Town Area

		Concentration (ppbv)					
Sample Number	**Location**	**Vinyl chloride**	**Freon-113**	**Chloroform**	**Carbon Tetrachloride**	**TCE**	**PCE**
LBNL Outlying Areas							
Outdoor Air Sample Results							
A97-1-4.9	West of Building 88	<0.18	0.19	0.072	0.099	0.055	0.09
A97-1-12	QC sample (blank)	<0.1	<0.1	<0.1	<0.1	0.059	0.033
BAAQMD and ARB							
Comparison Results							
Oakland (November 1997)		NA	NA	<0.02	0.1	<0.08	0.06
Fremont (median 1996)		NA	NA	0.03	0.08	0.01	0.06
Fremont (90th percentile 1996)		NA	NA	0.05	0.09	0.01	0.12
Richmond (median 1996)		NA	NA	0.02	0.08	0.01	0.03
Richmond (90th percentile 1996)		NA	NA	0.04	0.08	0.04	0.06

<0.18: Not detected (showing detection limit in ppbv)
NA: Not analyzed

D5.2 Indoor Air Sampling

Twenty-four hour indoor air samples were collected in March 1999 at five locations in the Outlying Areas. In addition, a background sample was collected from the second floor of Building 90. Sampling locations are shown on Figure D5.1-1. Samples were analyzed for following seven chemicals:

- PCE
- TCE
- benzene
- 1,1-DCE
- carbon tetrachloride
- chloroform
- vinyl chloride.

These chemicals are among the most commonly detected in soil gas and they have the most potential to present a health risk should their vapors infiltrate into buildings. Concentrations of analytes detected are listed in the following table. Also listed in the table are the California OSHA Permissible Exposure Limits (PELs). TCE, PCE, vinyl chloride and 1,1-DCE were not detected. Except for the chloroform concentration detected in Building 83, benzene, chloroform, and carbon tetrachloride were detected at similar concentrations as detected in the background samples from Building 90. Building 83 is a life science laboratory.

Indoor Air Sample Results, Support Services Area

		Concentration (ppbv)						
		1,1-DCE	**Benzene**	**chloroform**	**carbon tetrachloride**	**TCE**	**PCE**	**Vinyl chloride**
	PELs Action Level	1000	1000 500	2000	2000	25,000	25,000	1000
Sample No.	***Building No.***							
IA54-99-1	54	<0.034	0.38	0.046	0.062	<0.17	<0.086	<0.14
IA70A-99-1	70A	<0.032	0.5	0.058	0.064	<0.16	<0.081	<0.13
IA62-99-1	62	<0.030	0.33	0.054	0.056	<0.15	<0.075	<0.12
IA84-99-1	84	<0.032	0.38	0.043	0.062	<0.16	<0.079	<0.13
IA84-99-1 duplicate	84	<0.032	0.37	0.044	0.075	<0.11	<0.079	<0.13
IA83-99-1	83	<0.037	0.39	0.1	0.068	<0.18	<0.092	<0.15
IA90-99-1 Background Sample	90	<0.03	0.52	0.064	0.071	<0.15	<0.076	<0.12

PEL: California OSHA Permissible Exposure Limit
<0.03: Not detected (showing detection limit in ppbv)

D6. SUMMARY AND CONCLUSIONS

D6.1 Status of Solid Waste Management Units and Areas of Concern

The status of SWMUs and AOCs in the Outlying Areas is listed in Table D1-1. During the RFI, LBNL submitted requests for No Further Action (NFA) or No Further Investigation (NFI) status to the regulatory agency with oversight responsibility for the specific SWMU or AOC, in accordance with procedures approved by the DTSC. The requests provided the following information, as appropriate:

- soil investigation results that provided information on the potential for past releases and on the magnitude and extent of contamination
- groundwater sampling data pertaining to potential migration of soil contaminants to these media
- groundwater, surface water, and sediment sampling data pertaining to potential migration of contaminants to these media.

All identified SWMUs and AOCs in the Outlying Areas have been approved for either NFA or NFI Status. No further site characterization is required for SWMUs and AOCs approved for either NFA or NFI status; however, SWMUs and AOCs approved for NFI status will be included in the site wide risk assessment to be conducted as part of the Corrective Measures Studies (CMS) phase of the RCRA Corrective Action Program (CAP). Units that have been approved for NFA status will not be included in the CMS. Radiological units are not included under RCRA but are being reviewed by the United States Department of Energy (DOE) using a similar process.

D6.2 Groundwater Contamination

Halogenated non-aromatic VOCs and fuel hydrocarbons were the primary contaminants detected in groundwater in the Outlying Areas. Only one groundwater plume (the Building 74 Diesel Plume) has been identified in the Outlying Areas, and no area of groundwater contamination has been designated as an AOC.

Only sporadic detections of VOCs have been reported in the Outlying Areas. Since 1997, low concentrations of chloroform (12 μg/L maximum), 1,1,1-TCA (1.2 μg/L maximum), 1,1-DCA (0.53 μg/L maximum), Freon-12 (0.6 μg/L), and p-isopropyltoluene (0.93 μg/L) have been the only VOCs detected. Except for chloroform in one well, the detections were inconsistent with other results from the wells. Concentrations of chloroform, 1,1,1-TCA, and 1,1-DCA were an order of magnitude or more below MCLs. P-isopropyltoluene and Freon–12 have no MCL.

LBNL will continue to sample groundwater monitoring wells in accordance with requirements of the RWQCB.

Building 74 Diesel Plume

TPH-D has been detected in groundwater samples collected in the area of Building 74 (Building 74 Diesel Plume) and Building 70A; however, aromatic hydrocarbons have not been

detected in groundwater samples collected in these areas since 1995. TPH-D was detected in groundwater at a maximum concentration of 170 μg/L in FY99.

Source Identification and Removal

The source of the groundwater contamination in the Building 74 area is most likely a pipeline leak associated with the Former Building 74 UST (AOC 11-1). The tank, pipeline, and contaminated soil in the source area were removed.

Plume Characterization

TPH-D has been detected in monitoring well MW74-95-6, at the tank site adjacent to the former pipeline, and in MW74-92-13, MW83-92-14, and MW83-95-7 located west and northwest of the former tank location most quarters the wells have been sampled. MW74-94-7 and MW74-94-8 monitor groundwater quality south of Building 74 near the site perimeter. TPH-D (150 μg/L maximum) has not been detected approximately 2/3 of the time these wells have been sampled.

Plume Stability and Potential Migration of Contaminants

Concentrations of TPH-D detected in wells monitoring the plume have either remained relatively stable or indicate a decreasing trend. The plume appears to be stable, in that TPH-D has only been sporadically detected (150 μg/L maximum concentration) in downgradient wells MW74-94-7 and MW74-94-8. These wells have been sampled since June 1994. Aromatic hydrocarbons have not been detected in groundwater samples collected in this area since 1995.

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Figure D4.8-1 Surface Water Sampling Locations Evaluating Potential Migration Pathways of Contamination in Outlying Areas to Surface Water.

Figure D4.8-2 Sediment Sampling Locations Evaluating Potential Migration Pathways of Contamination in Outlying Areas to Surface Water.

Figure D5.1-1 Indoor and Outdoor Air Sampling Locations, Outlying Areas.

T SB16-94-11	Temporary groundwater sampling point
MW76-93-7	Groundwater monitoring well
SB76-94-01	Soil boring
SB76-94-04	Angled soil boring
SS51-97-1	Shallow soil sample location
SG-76W-7	Soil-gas probe
	Shallow soil-gas sampling location
7-95-1	Soil-gas monitoring well
VZM-OT-1	Vadose zone monitoring well
L-3	Vacuum lysimeter
P PZ 51-92-3	Piezometer
SSW-C.63	Slope stability well
SI-8.107	Slope indicator well
EW 7B-96-1	Extraction well
T SB16-94-11 / MW76-93-7	Properly destroyed groundwater monitoring well or temporary groundwater sampling point
	Soil sampling location (in soil borings)
	Sample location was excavated

LT	Less than reporting limit
ND (or <)	Not detected
NS	Not sampled
NA	Not analyzed
17	Surface structure (e.g., buildings, etc.)
A — A'	Cross section
	Sanitary sewer line
	Abandoned sanitary sewer
	Storm drain line
	LBNL site boundary
750	Water level elevation contour line (feet)
900	Topographic contour line (feet)
51-01-09	Hydrauger
	Solid Waste Management Unit
	Area of Concern

NOTE: Other symbols used are explained on the figures.

Figure D-1. Key to Symbols Used on Figures.

D-1 Symbols.ai
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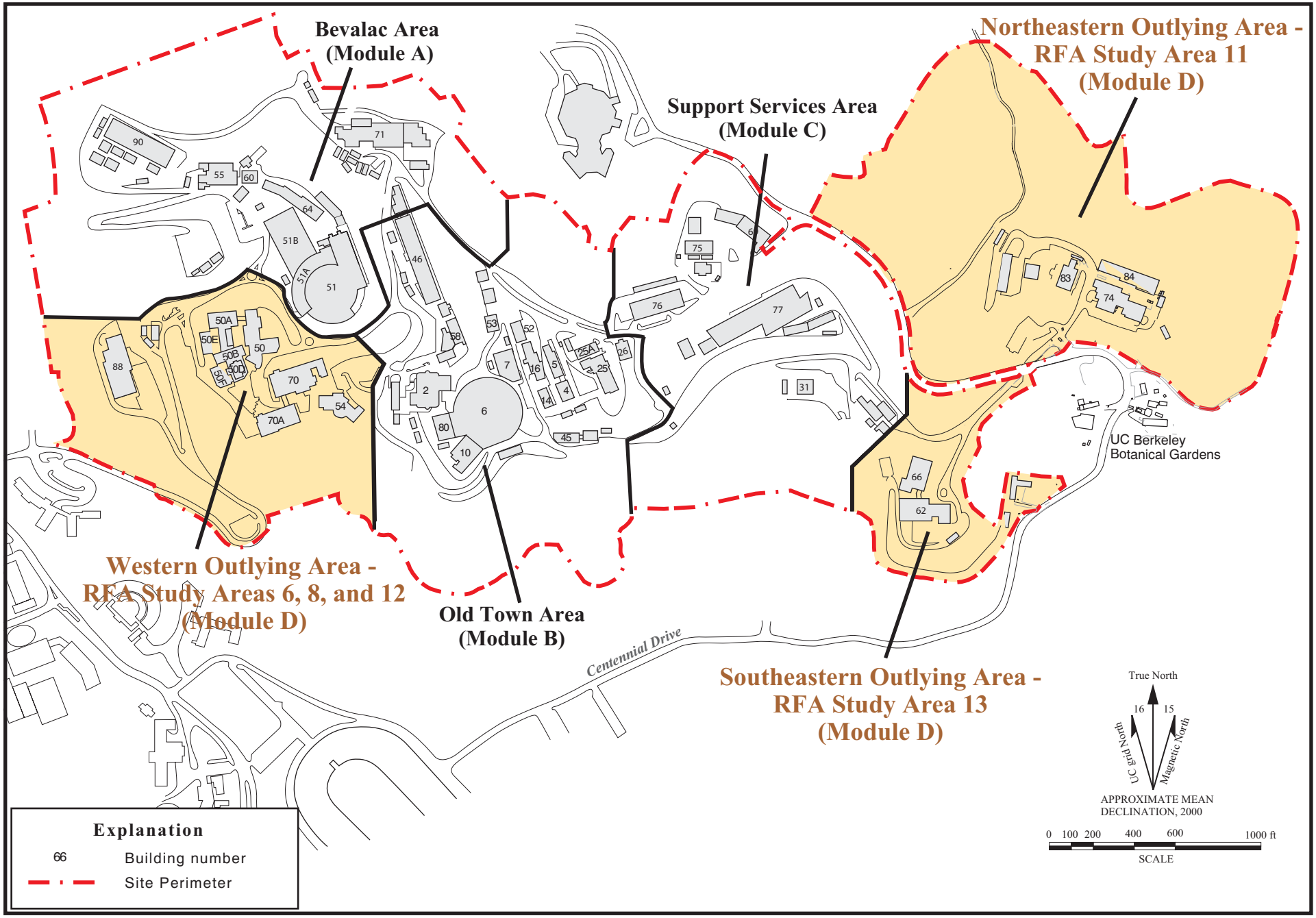

Figure D-2. Location of Outlying Areas, Lawrence Berkeley National Laboratory.

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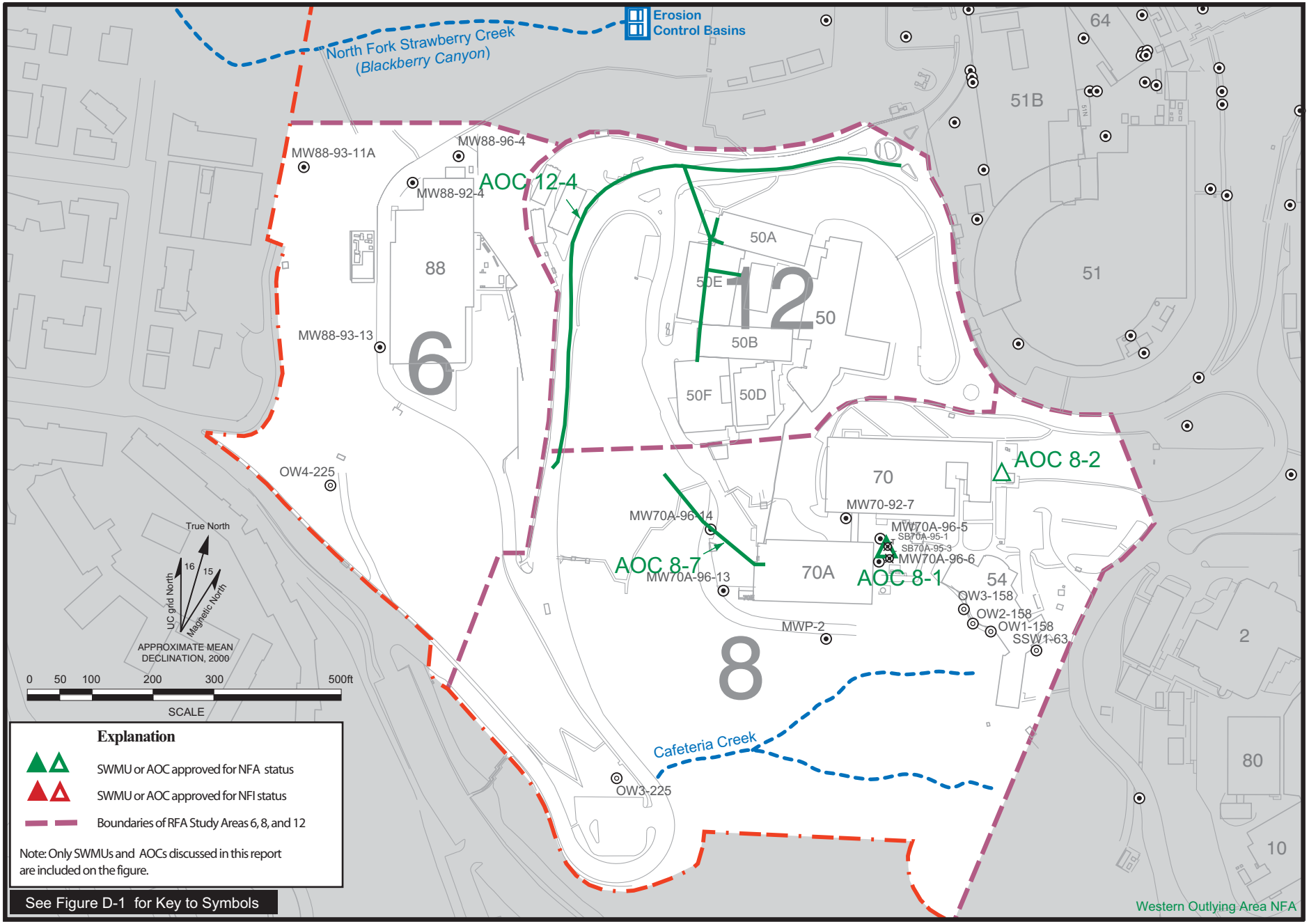

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Figure D-3a. Locations of SWMUs and AOCs in Western Outlying Area (RFA Study Areas 6, 8, and 12) Discussed in Module D.

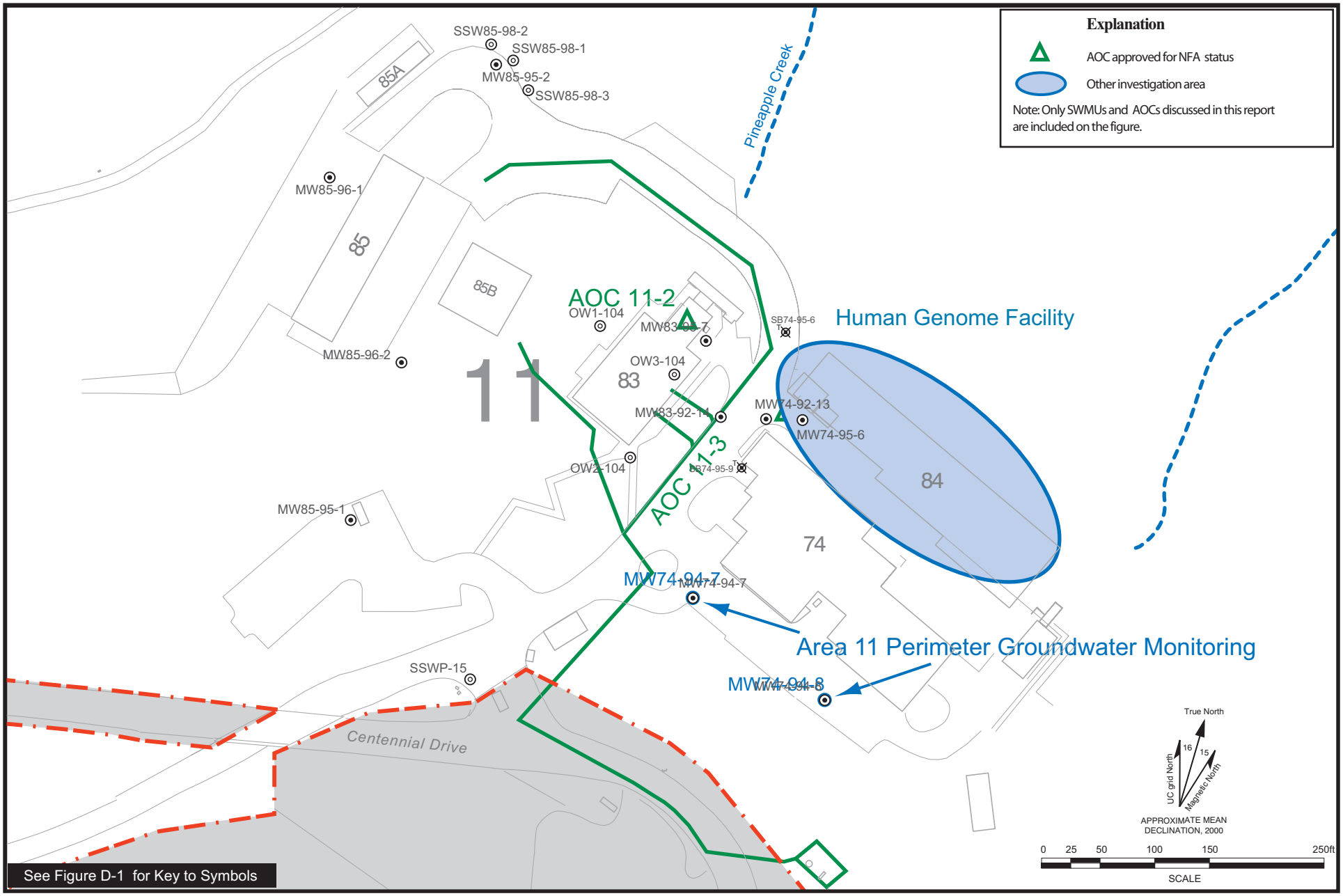

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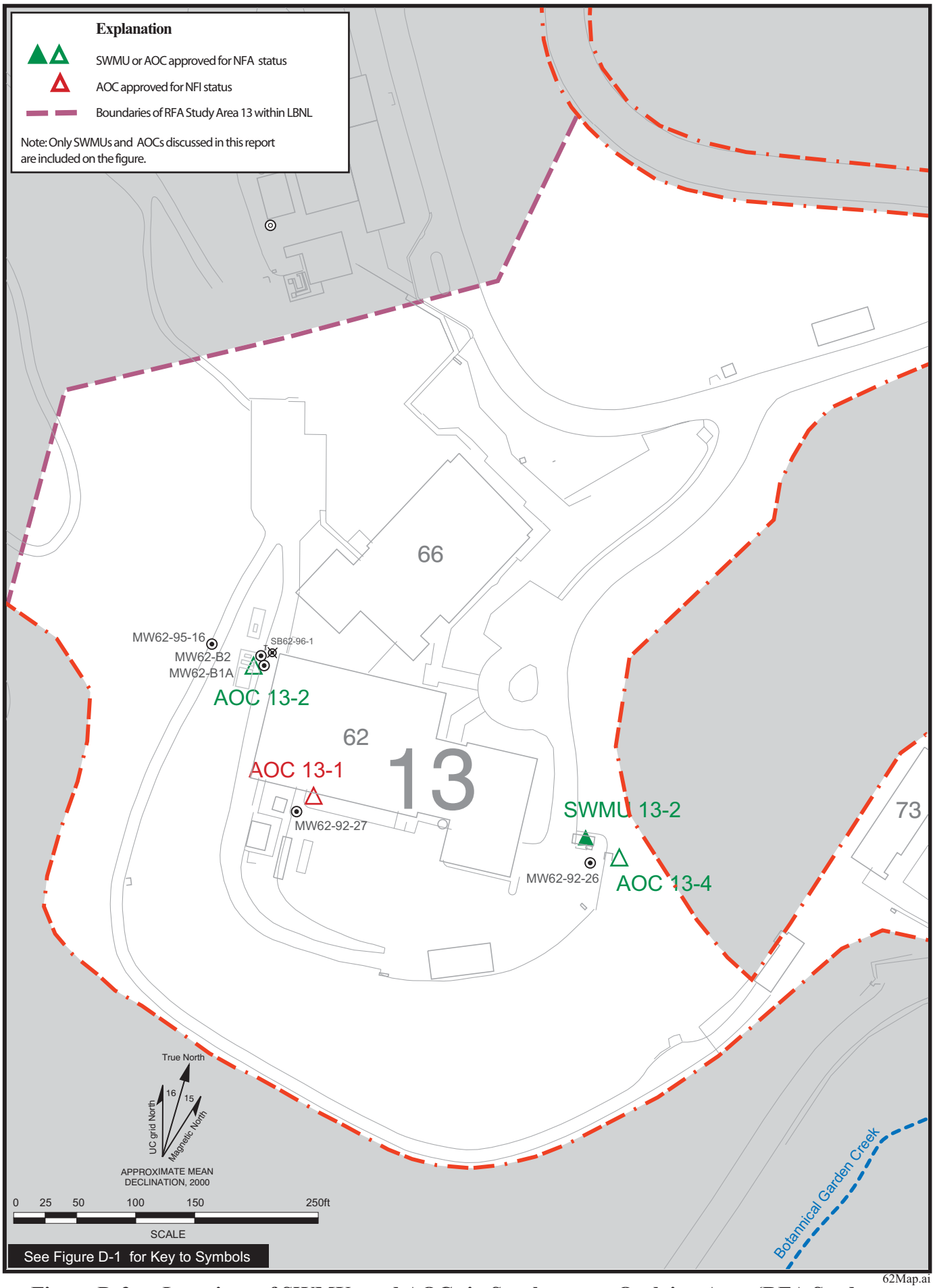
Figure D-3b. Locations of AOCs and Other Investigation Areas in Northeastern Outlying Area (RFA Study Area 11 - Life Sciences Area) Discussed in Module D.



62Map.ai
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Figure D-3c. Locations of SWMUs and AOCs in Southeastern Outlying Area (RFA Study Area 13) Discussed in Module D.

Age	Formation	Description
Quaternary	Artificial fill	Generally engineered fill consisting of fine-grained material. Older fills include vegetative and other debris.
	Colluvium	Predominantly clayey silt.
	Debris flows	Boulders and gravels of basalt, chert, and porcelenite in a silty clay matrix.
	Landslides	Translational/rotational slide masses incorporating bedrock. Occur at the Moraga/Orinda Formation contact.

	WEST OF HAYWARD FAULT	EAST OF HAYWARD FAULT					
		West of Life Sciences Area Main Canyon Landslide Deposit			*East of Life Sciences Area Main Canyon Landslide Deposit*		
Age		**Group**	**Formation**	**Description**	**Group**	**Formation**	**Description**
Tertiary		Contra Costa	Moraga	Andesitic flows, breccias, and agglomerates with minor amounts of basaltic flows and interbedded volcaniclastic sandstone and conglomerate.	San Pablo (?)	Neroly	Fossiliferous, shallow marine, fine grained sandstones with minor amounts of siltstone.
			Orinda	Alluvial sedimentary deposits consisting primarily of claystone and siltstone with lenticular to linear beds of sandstone and conglomerate.		Briones	Fossiliferous, shallow marine, fine grained sandstones with minor amounts of siltstone.
					Monterey	Claremont	Chert and shale with minor amounts of sandstone.
Cretaceous		Great Valley		Marine mudstones, shales, and sandstones.			
Jurassic	Franciscan Complex						

Figure D2.1-1. Stratigraphic Correlation Chart, Lawrence Berkeley National Laboratory.

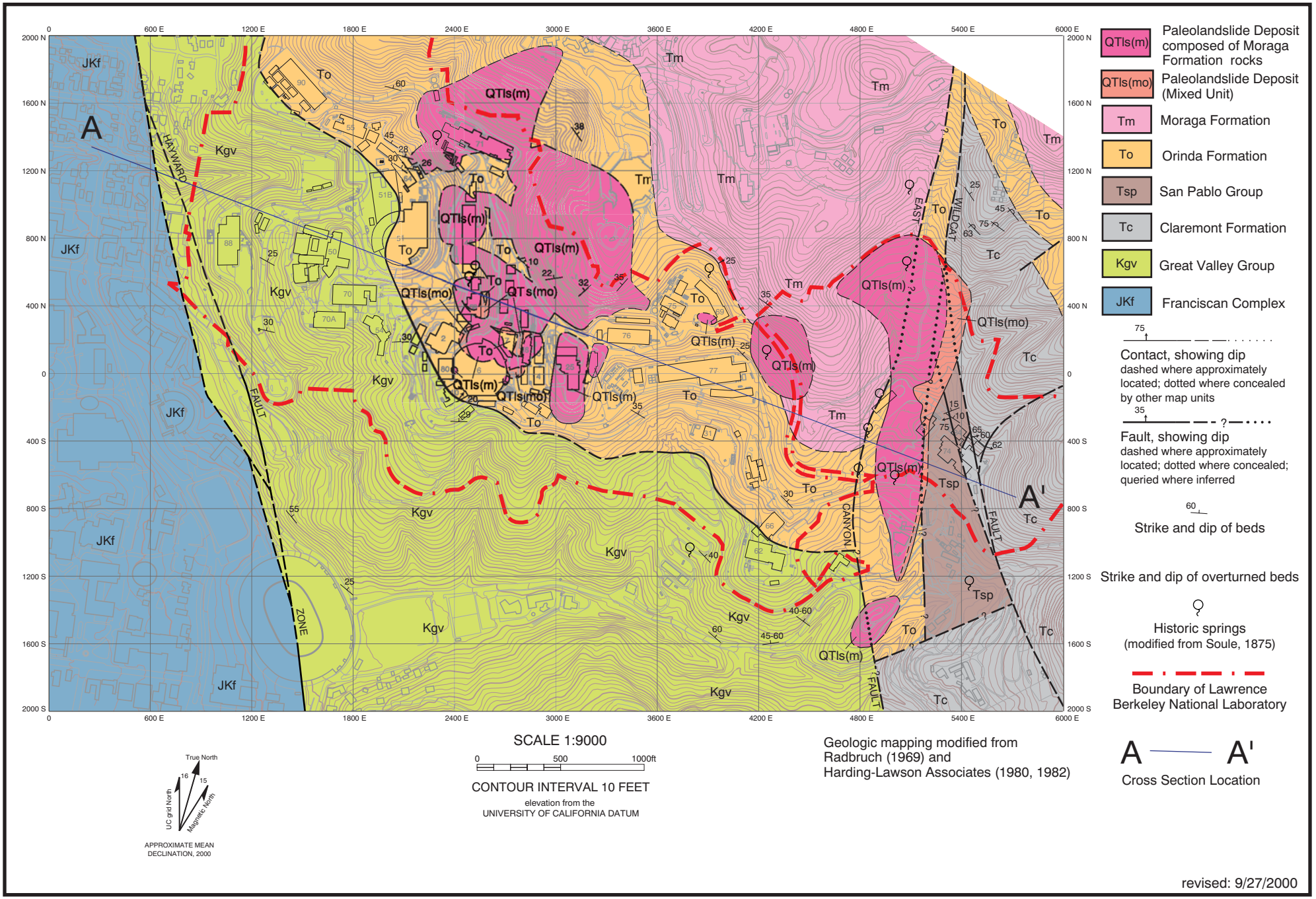

Figure D2.1-2. Bedrock Geologic Map, Lawrence Berkeley National Laboratory.

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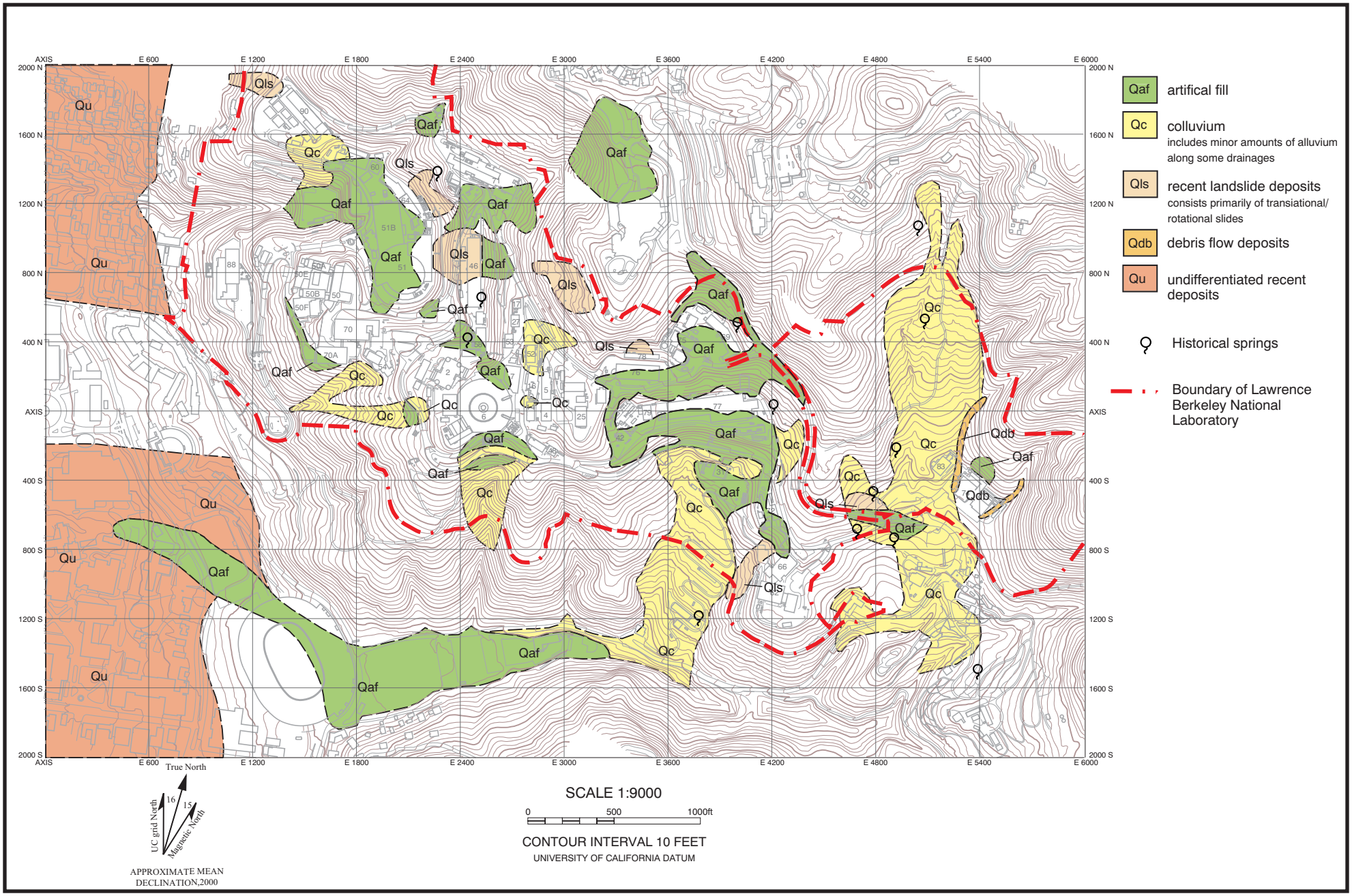

Figure D2.1-3 Surficial Geologic Map (modified from Harding-Lawson Associates, 1982), Lawrence Berkeley National Laboratory.

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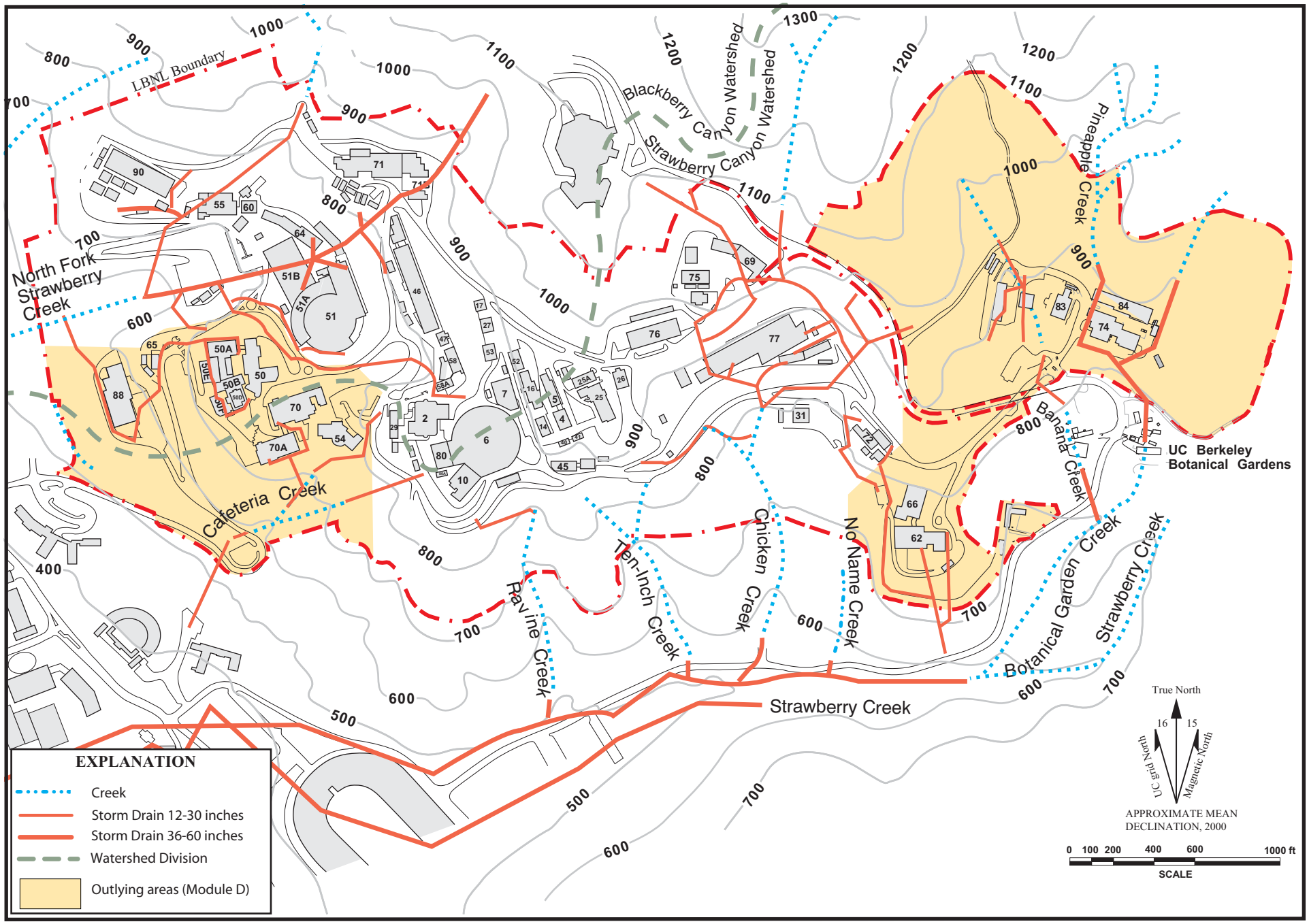

Figure D2.1-4. LBNL Surface Hydrology and Stormwater Drainage System.

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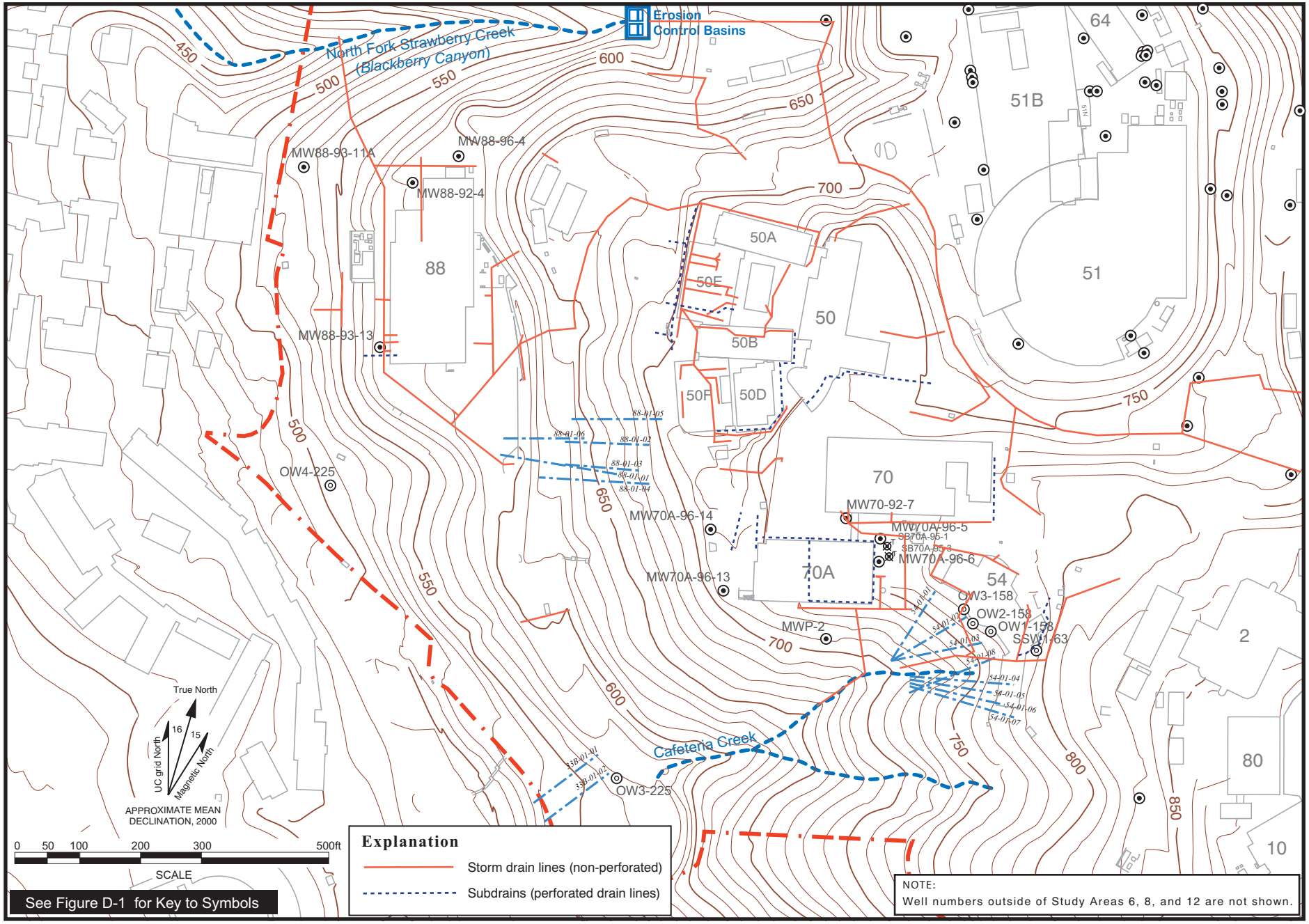

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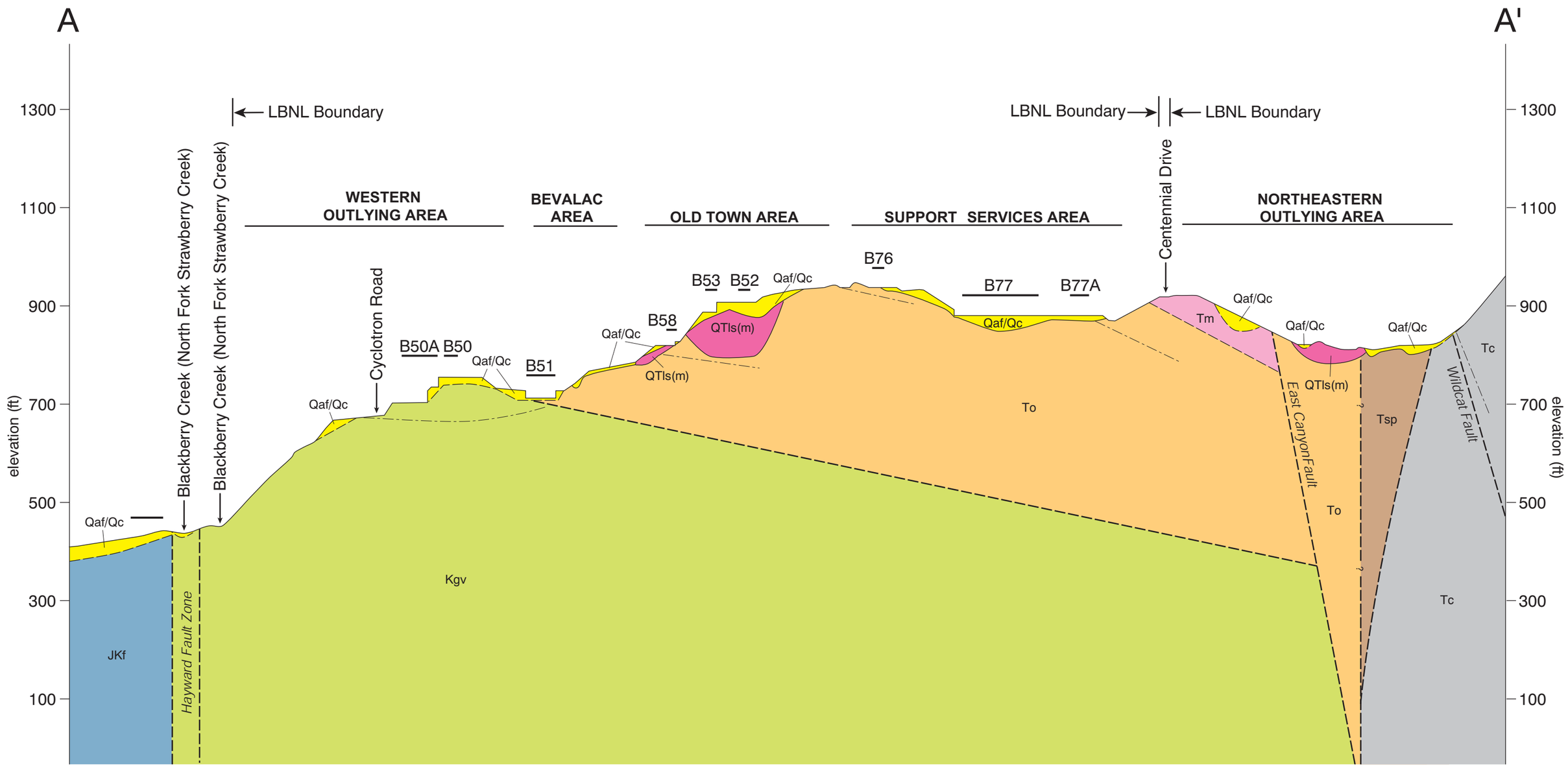
Figure D2.2-1. Storm Drains, Subdrains, and Hydraugers in Western Outlying Area (RFA Study Areas 6, 8, and 12).



HORIZONTAL SCALE 1:4800

0 500 1000 ft

2x vertical exaggeration

elevation from the UNIVERSITY OF CALIFORNIA DATUM

B58 — approximate horizontal location of buildings on or near section

tinted box indicates unit appears in section

- Qaf/Qc — artificial fill/colluvium (may locally include alluvium)
- QTls(m) — Paleolandslide Deposit Composed of Moraga Formation Rocks
- Tm — Moraga Formation
- To — Orinda Formation
- Tsp — San Pablo Group
- Tc — Claremont Formation
- Kgv — Great Valley Group
- JKf — Franciscan Complex

Contact — dashed where approximately located

Fault — dashed where approximately located; queried where inferred

generalized apparent dip

revision: 9/26/2000

Figure D2.2-2. LBNL Site Cross Section A-A', Including Western Outlying Area.

D2.2-2 A-A'.ai

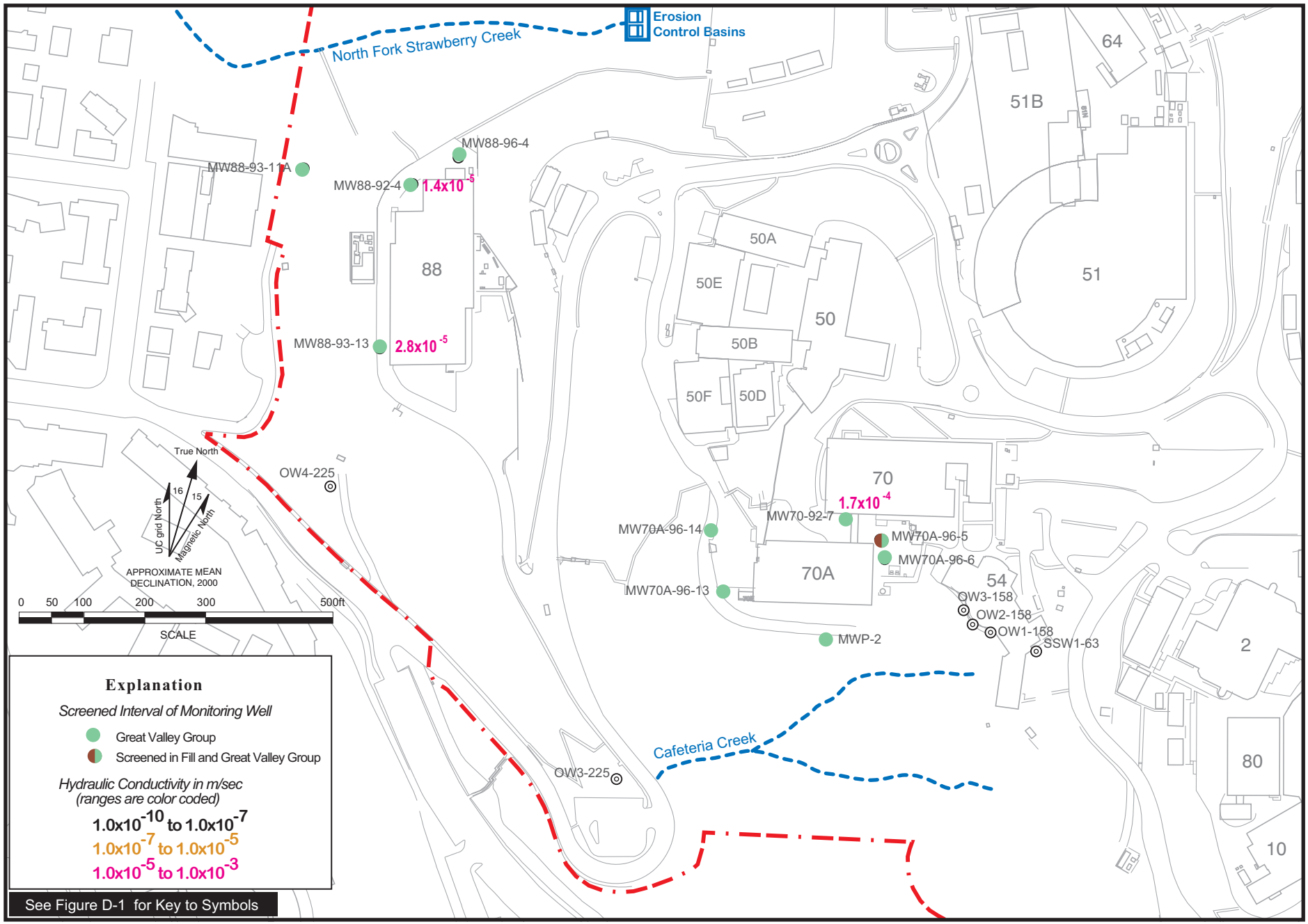
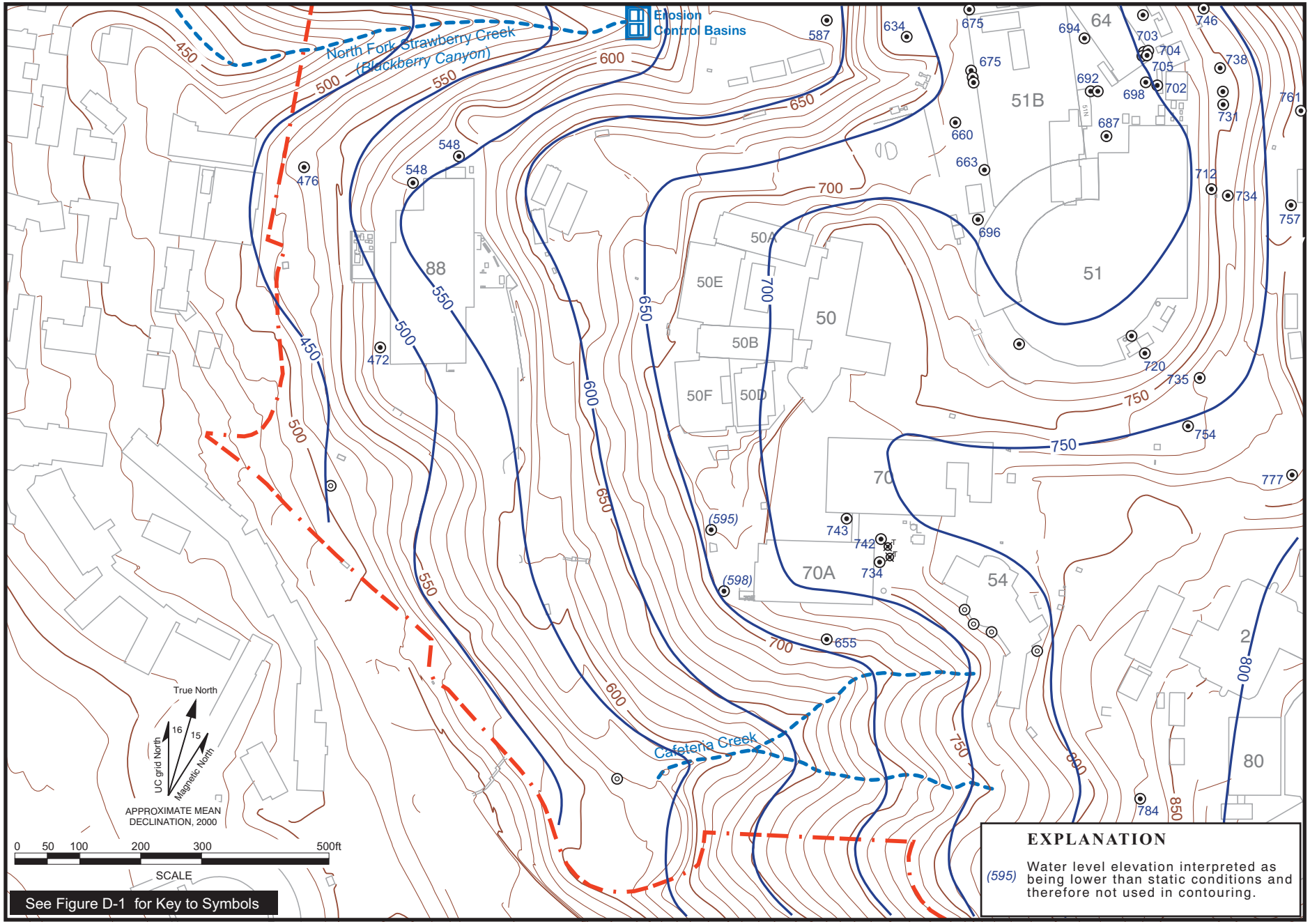


Figure D2.2-3. Well Locations Showing Hydraulic Conductivity Estimates Calculated from Slug Tests and Pumping Tests in Western Outlying Area.

D2.2-3 B50,70,88K
09/00



50-70-88map.ai
09/00

Figure D2.2-4. Water Level Elevation Contour Map, Western Outlying Area (RFA Study Areas 6, 8, and 12), Fourth Quarter Fiscal Year 1999.

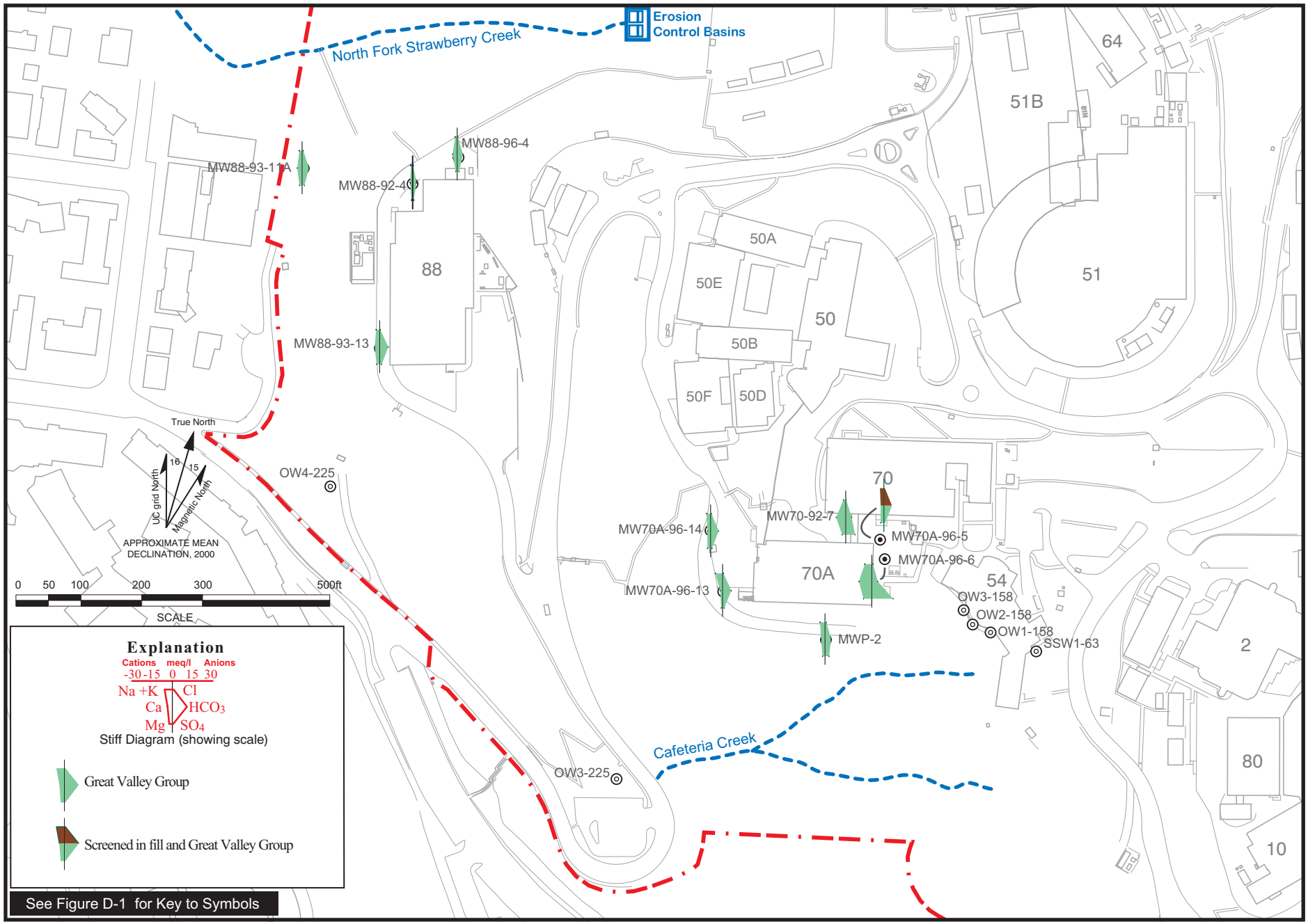
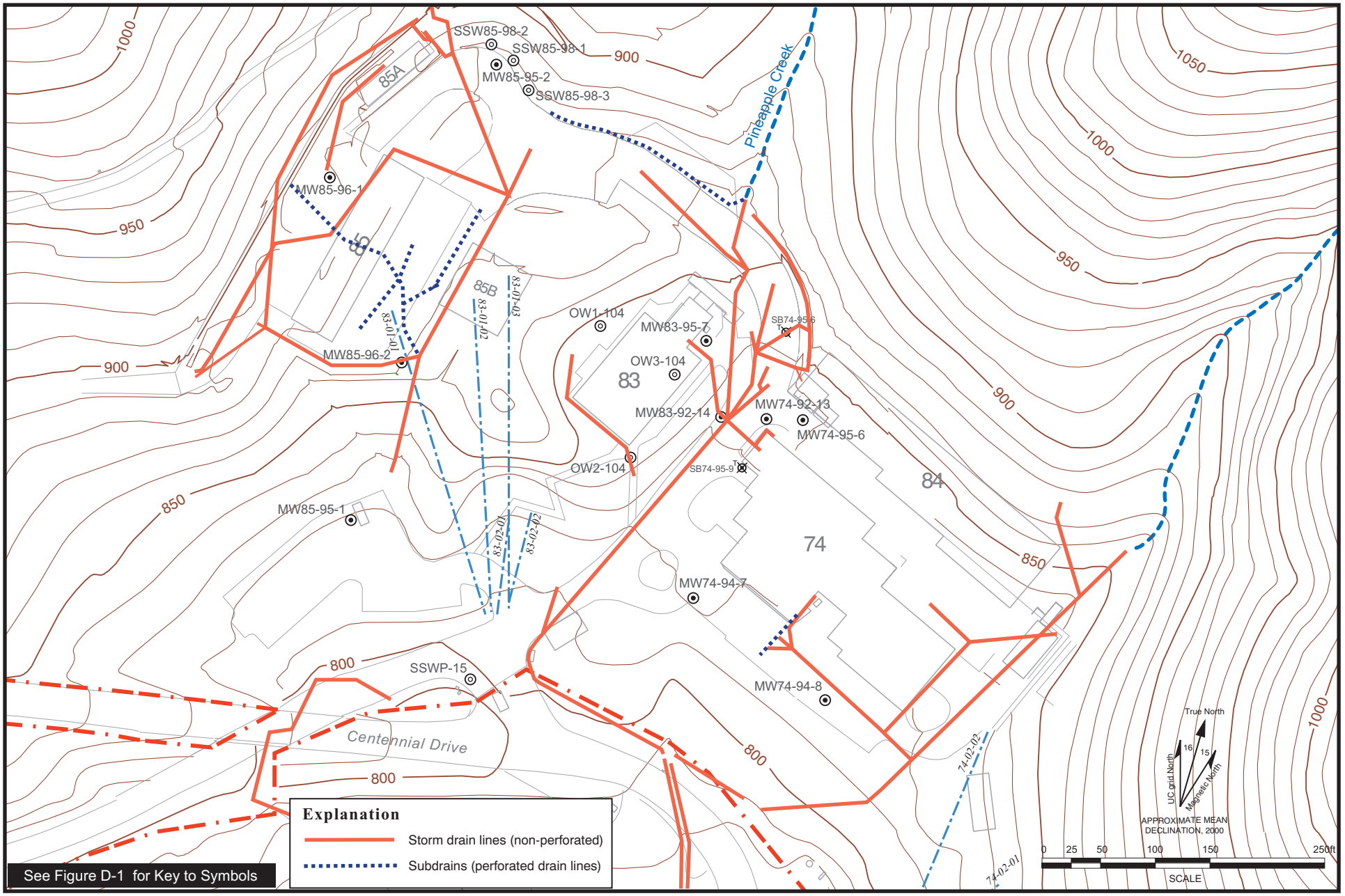


Figure D2.2-5. Stiff Diagram of Groundwater Geochemical Parameters in Western Outlying Area.

D2.2-5 B50,70,88Stiff
09/00



74-85map.ai
09/00

Figure D2.3-1. Storm Drains, Subdrains, and Hydraugers in Northeastern Outlying Area.

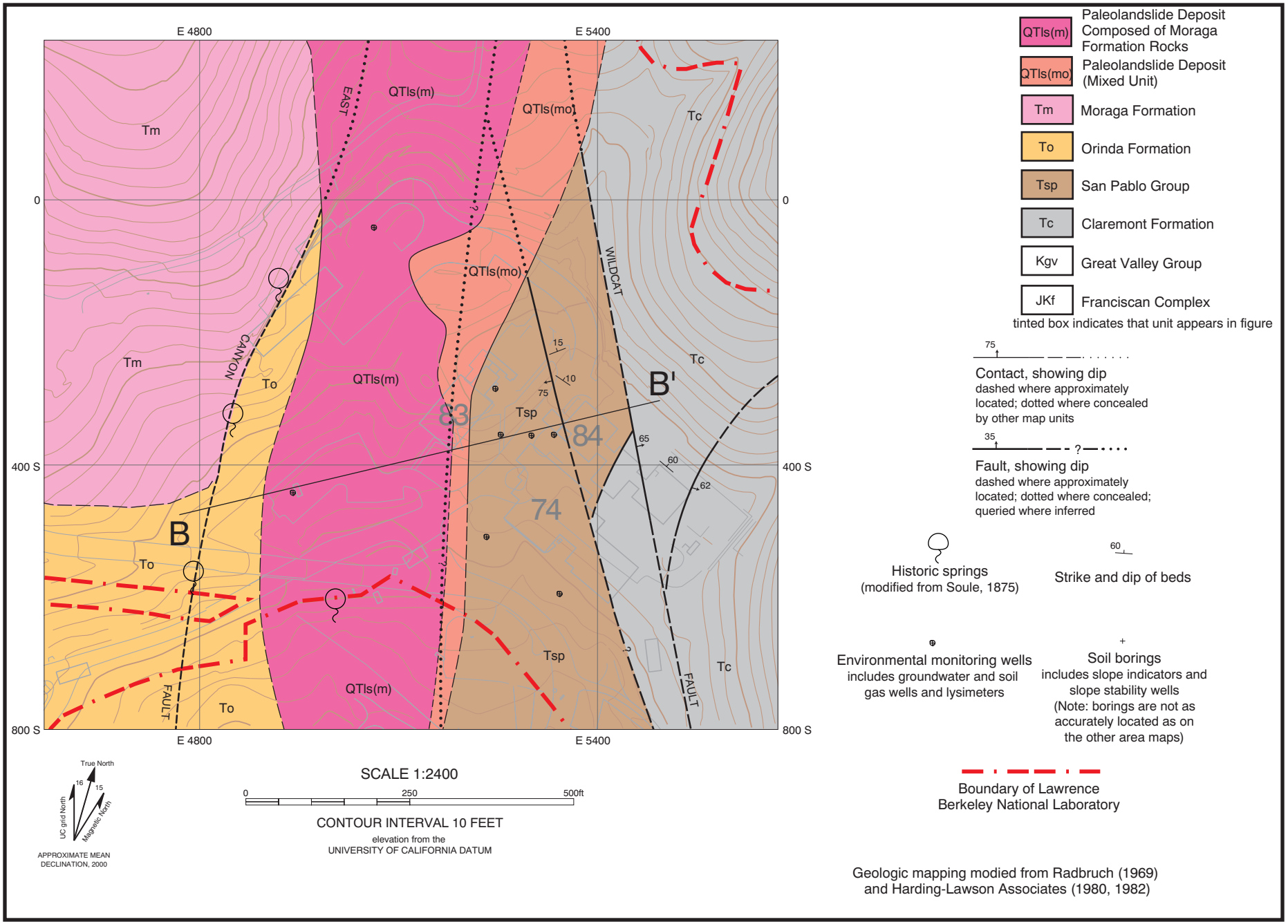
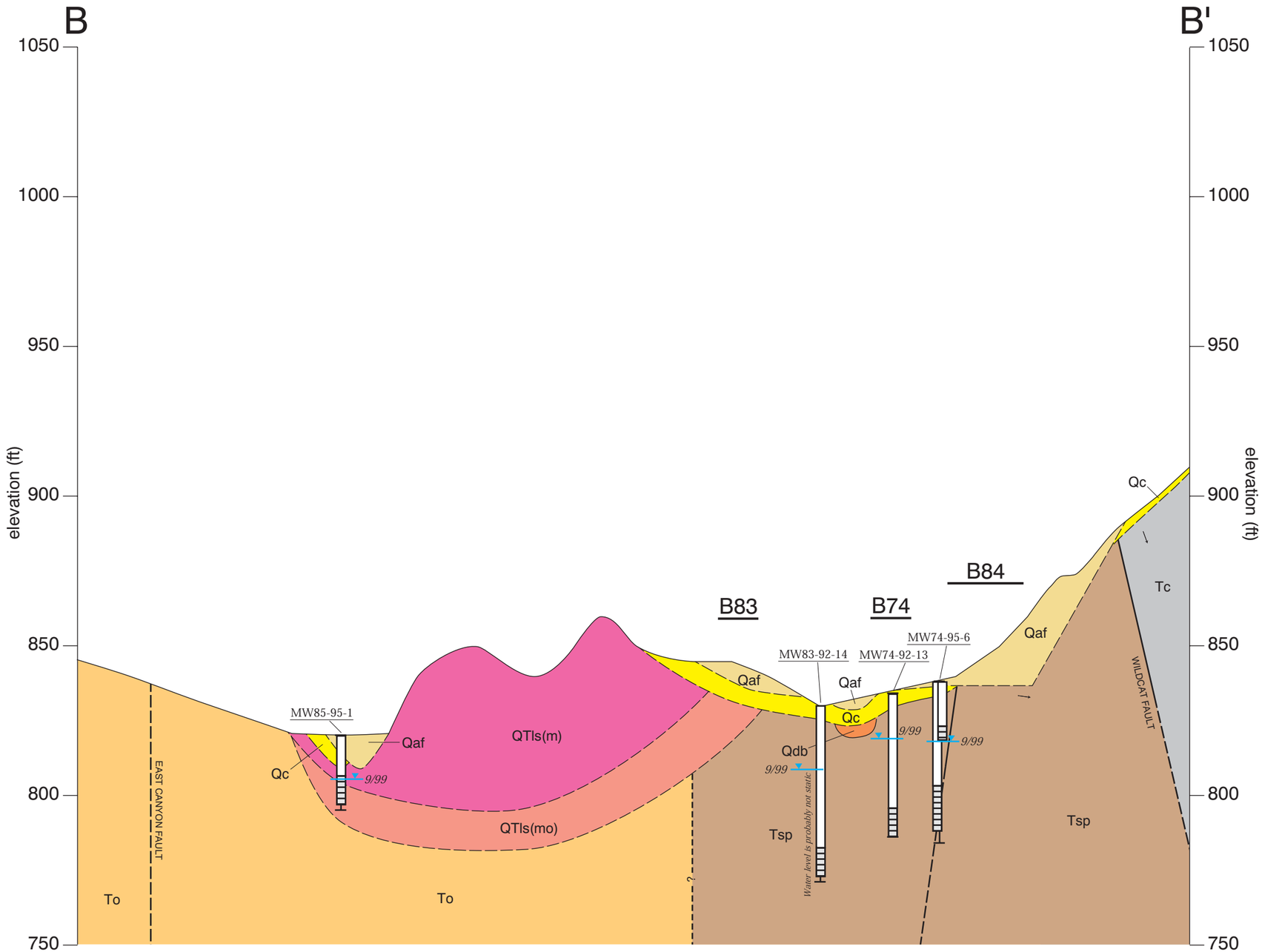


Figure D2.3-2. Life Sciences Area Bedrock Geologic Map.

D2.3-2 LSBRmap.ai
09/00



HORIZONTAL SCALE 1:900

0 100 200ft

2x vertical exaggeration

elevation from the UNIVERSITY OF CALIFORNIA DATUM

B58 — approximate horizontal location of buildings on or near section

tinted box indicates unit appears in section

Qaf	artificial fill	QTls(m)	Paleolandslide Deposit Composed of Moraga Formation Rocks	Tsp	San Pablo Group
Qc	colluvium (may locally include alluvium)	QTls(mo)	Paleolandslide Deposit (Mixed Unit)	Tc	Claremont Formation
Qdb	debris flow deposits	Tm	Moraga Formation	Kgv	Great Valley Group
		To	Orinda Formation		

Contact — dashed where approximately located

Fault — dashed where approximately located; queried where inferred

generalized apparent dip

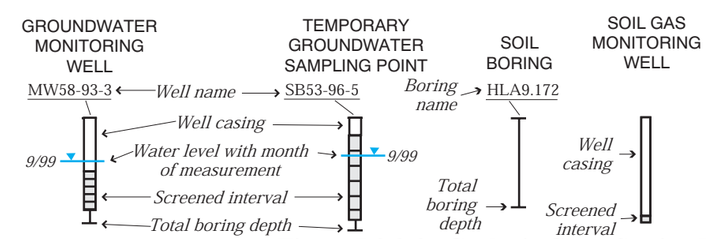


Figure D2.3-3. Geologic Cross Section B-B', Life Sciences Area.

D2.3-3 LifeSciBB.ai
09/00

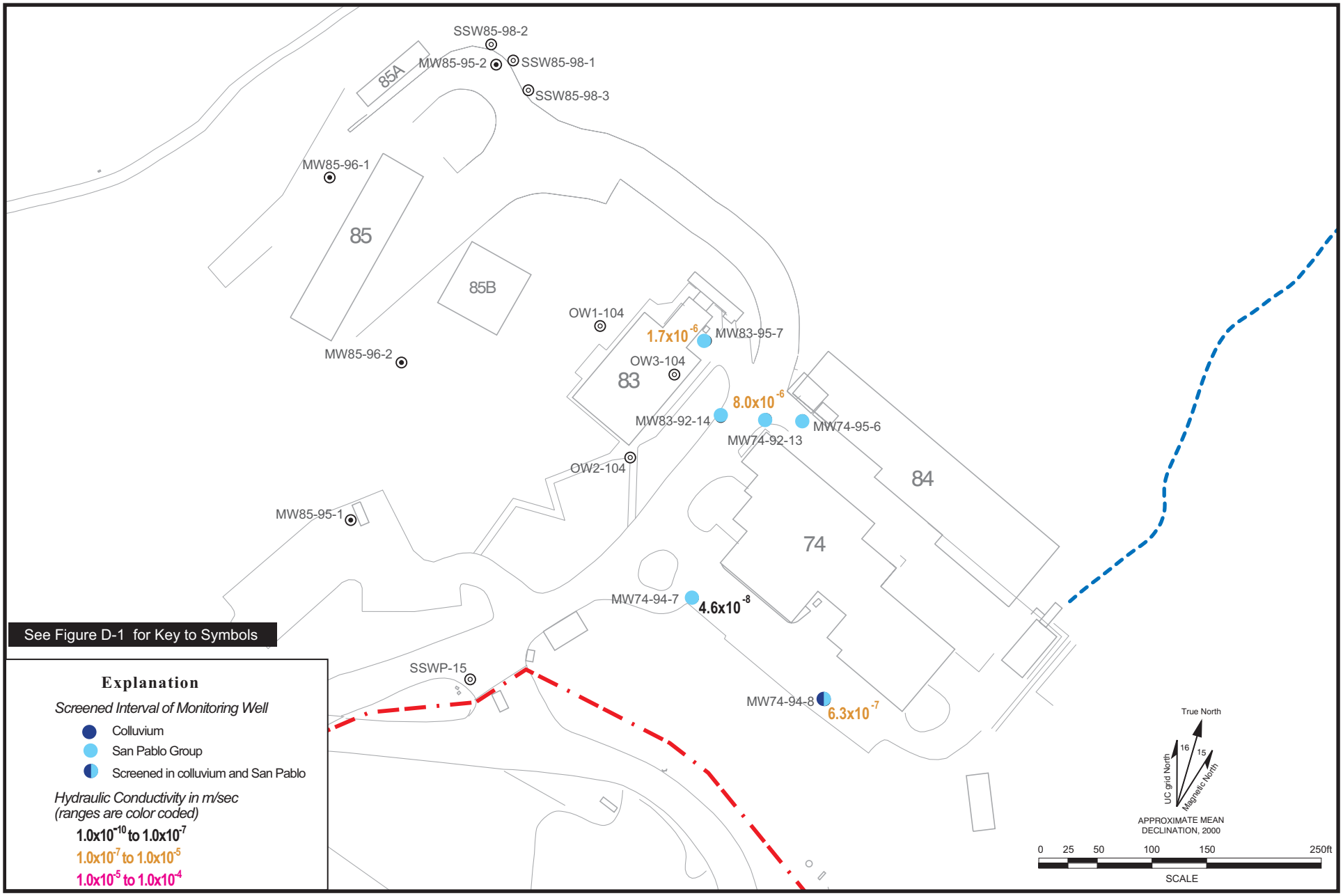
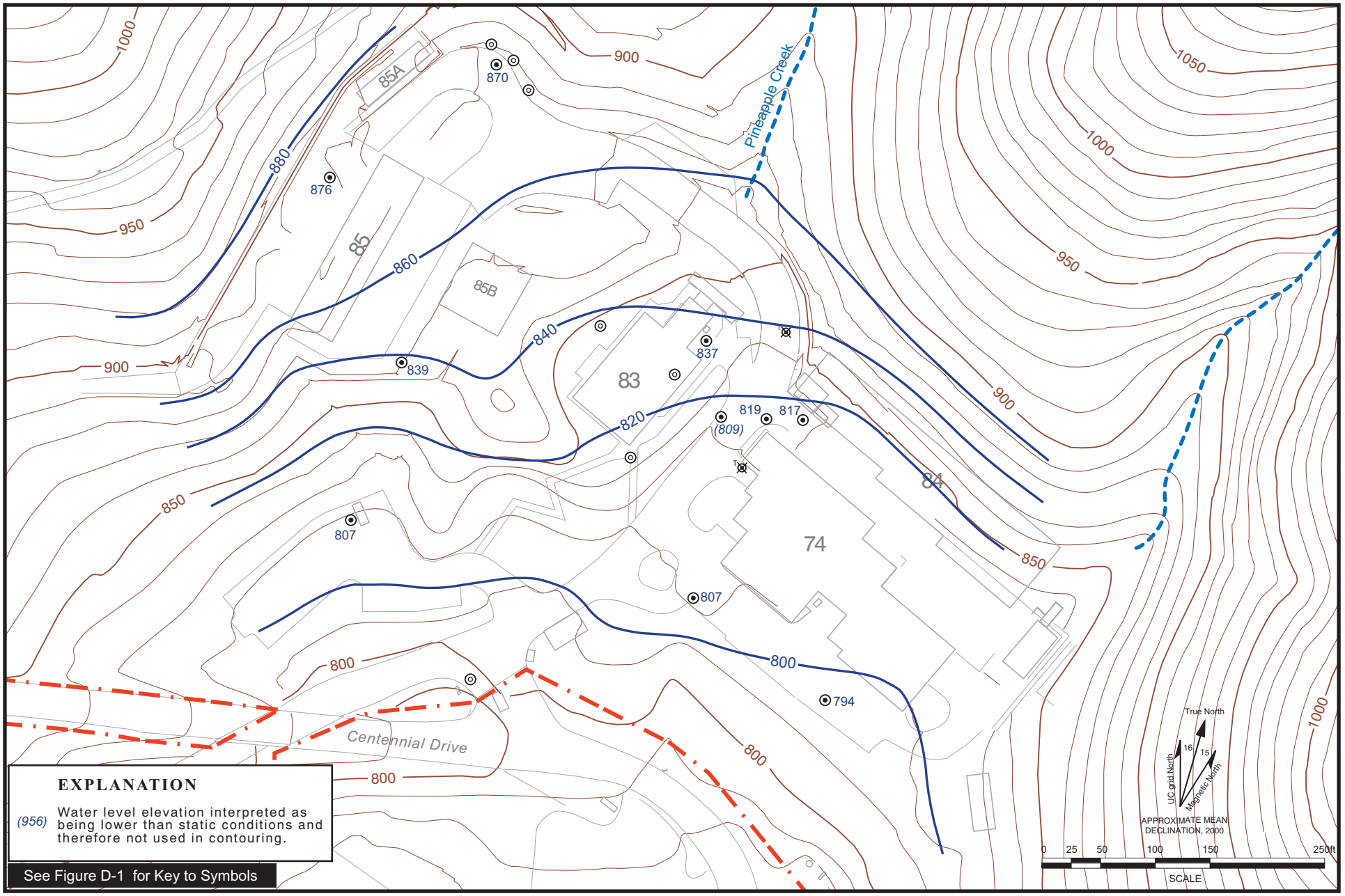


Figure D2.3-4. Well Locations Showing Hydraulic Conductivity Estimates Calculated from Slug Tests and Pumping Tests in Northeastern Outlying Area.

D2.3-4 B74,85K.ai
09/00



74-85map.ai
09/00

Figure D2.3-5. Water Level Elevation Contour Map, Northeastern Outlying Area, Fourth Quarter Fiscal Year 1999.

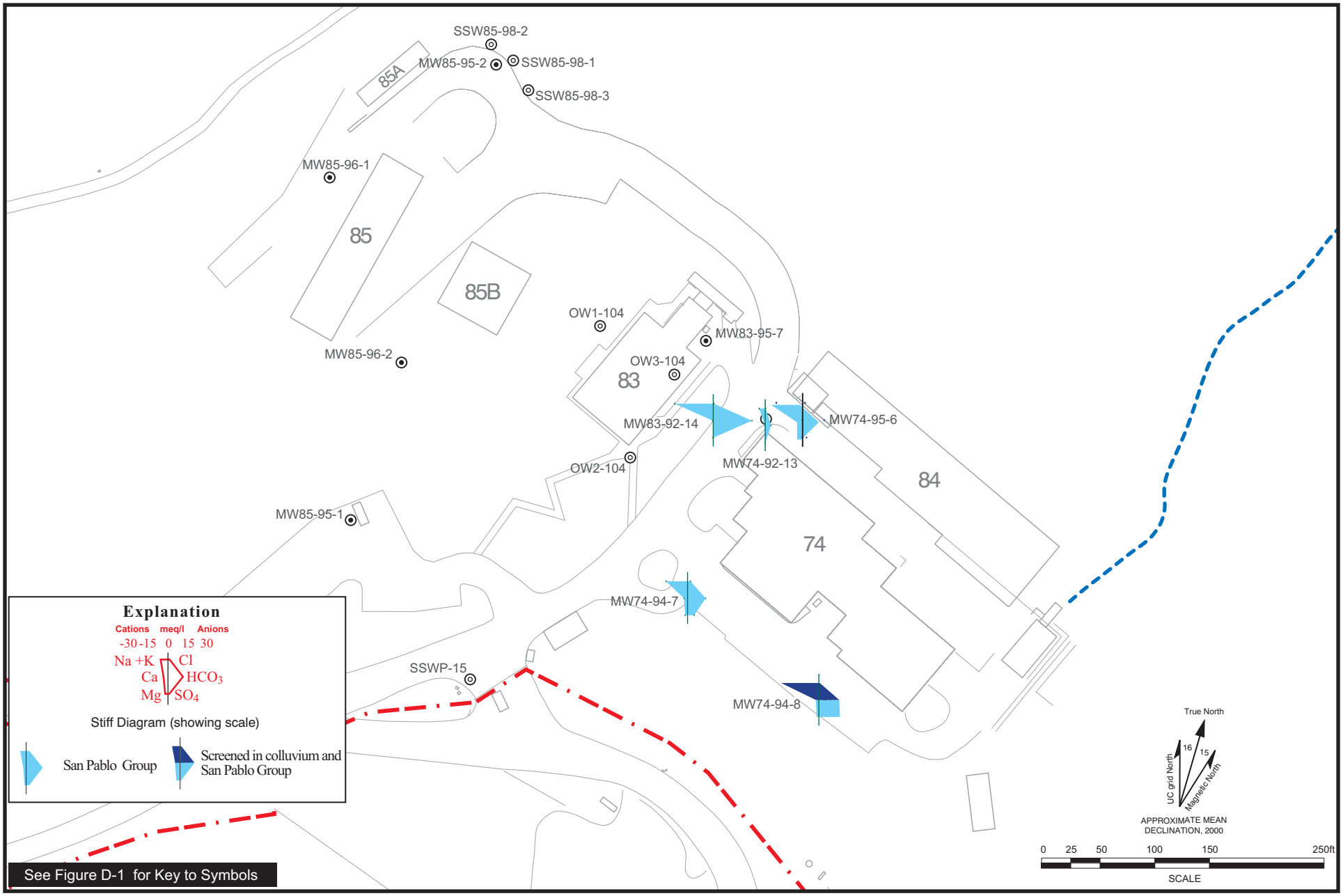
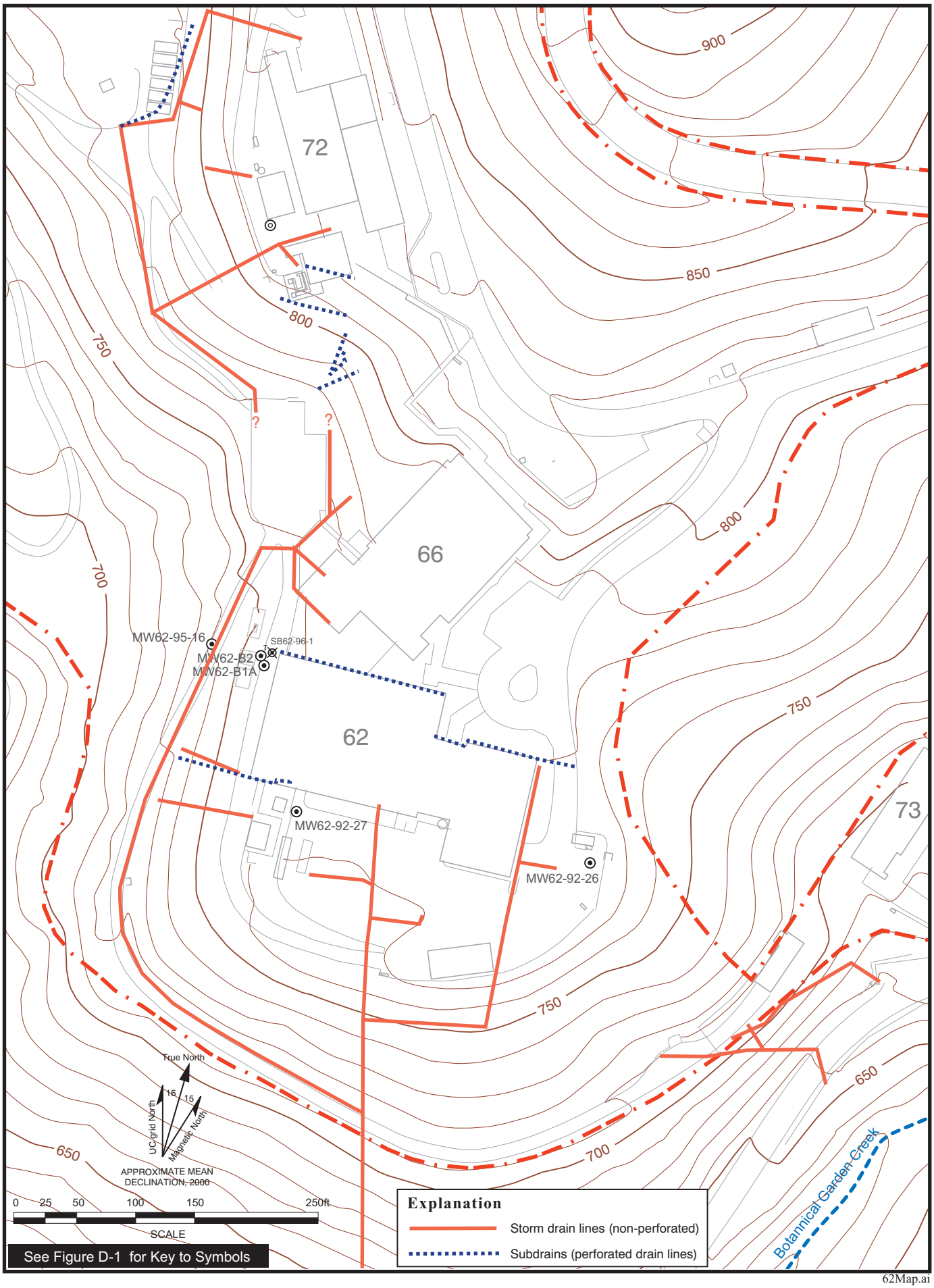


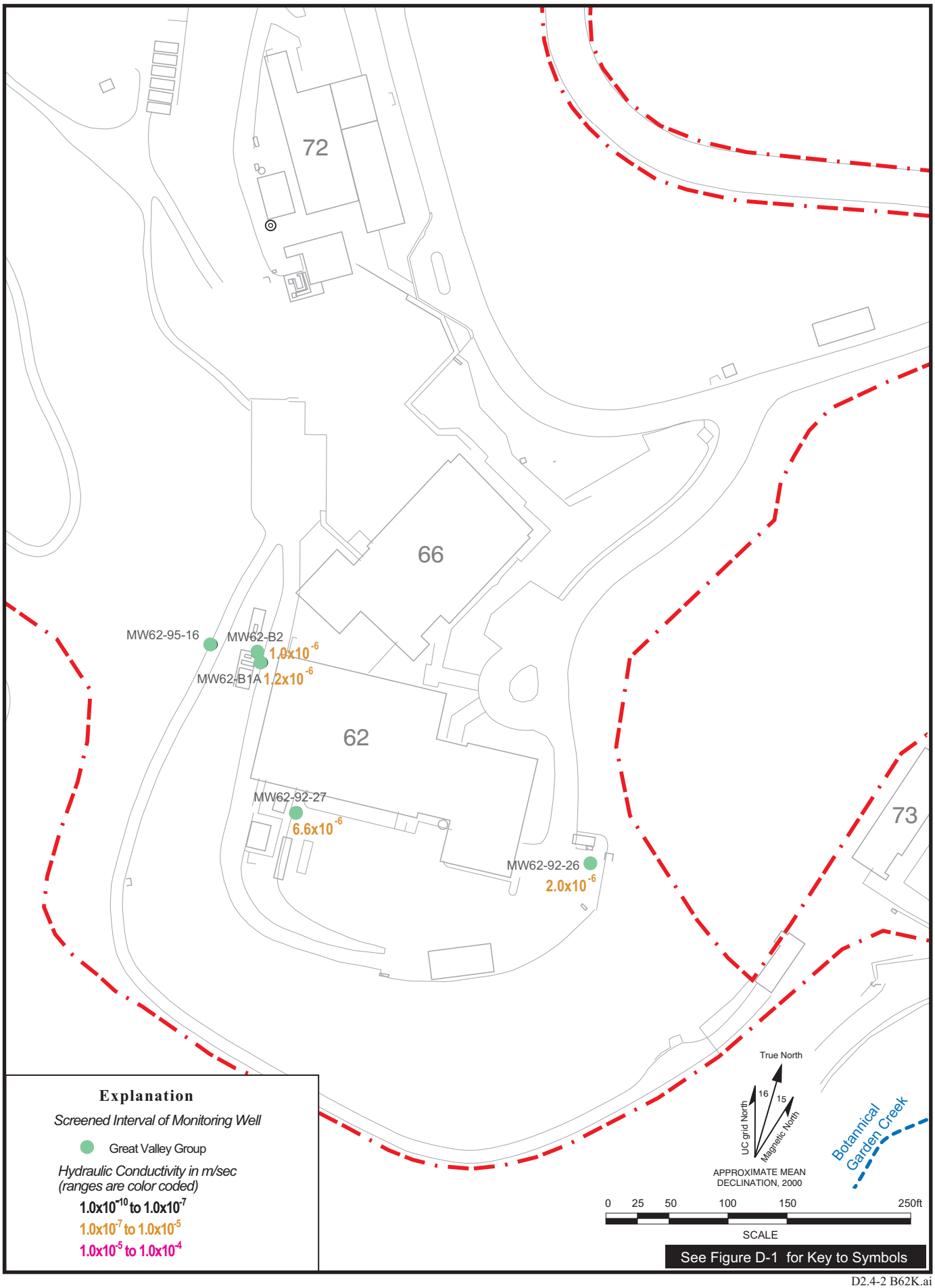
Figure D2.3-6. Stiff Diagrams of Groundwater Geochemical Parameters in Northeastern Outlying Area.

D2.3-6 B74,85Stiff.ai
09/00



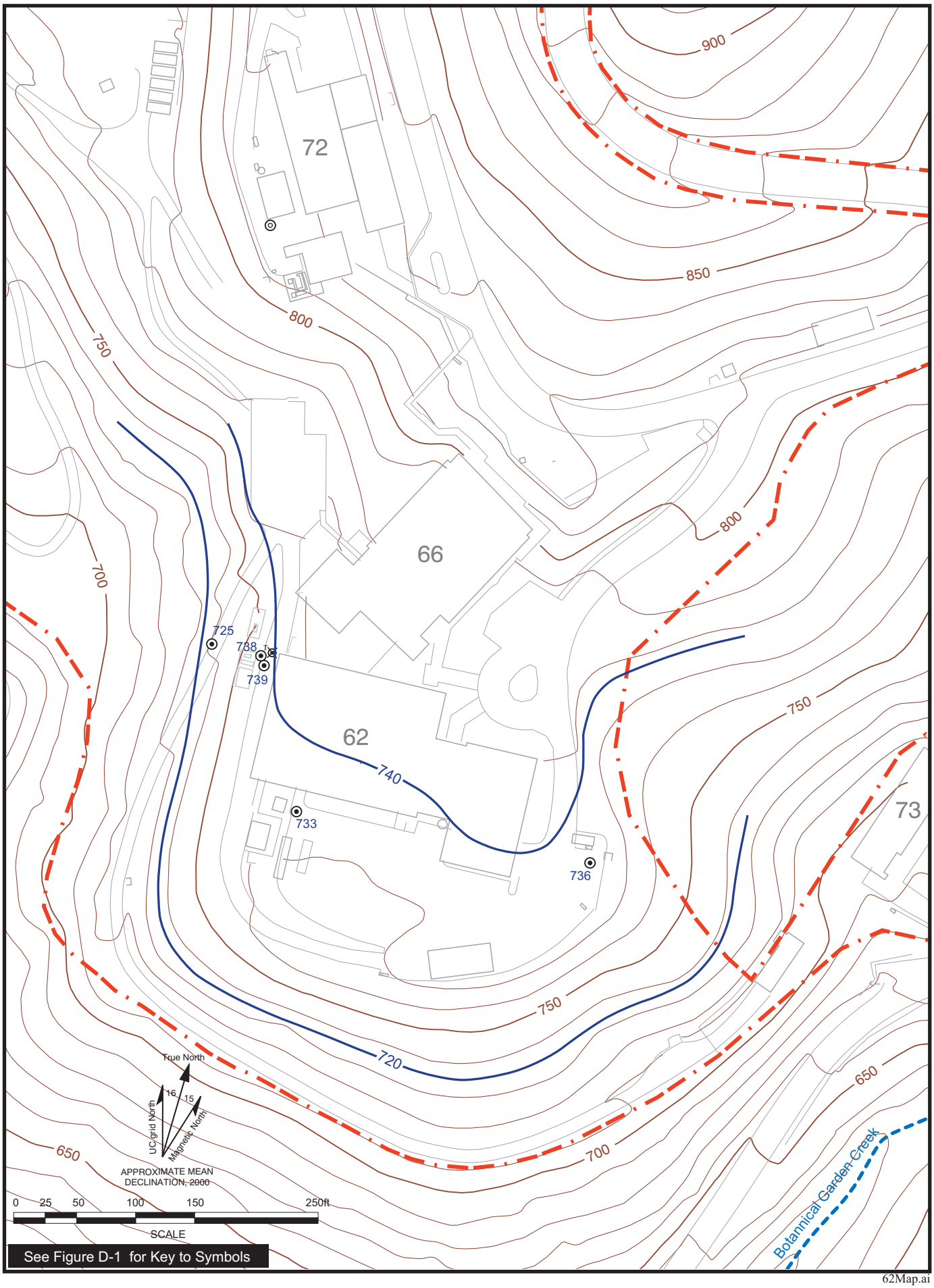
62Map.ai
09/00

Figure D2.4-1. Storm Drains and Subdrains in Southeastern Outlying Area.



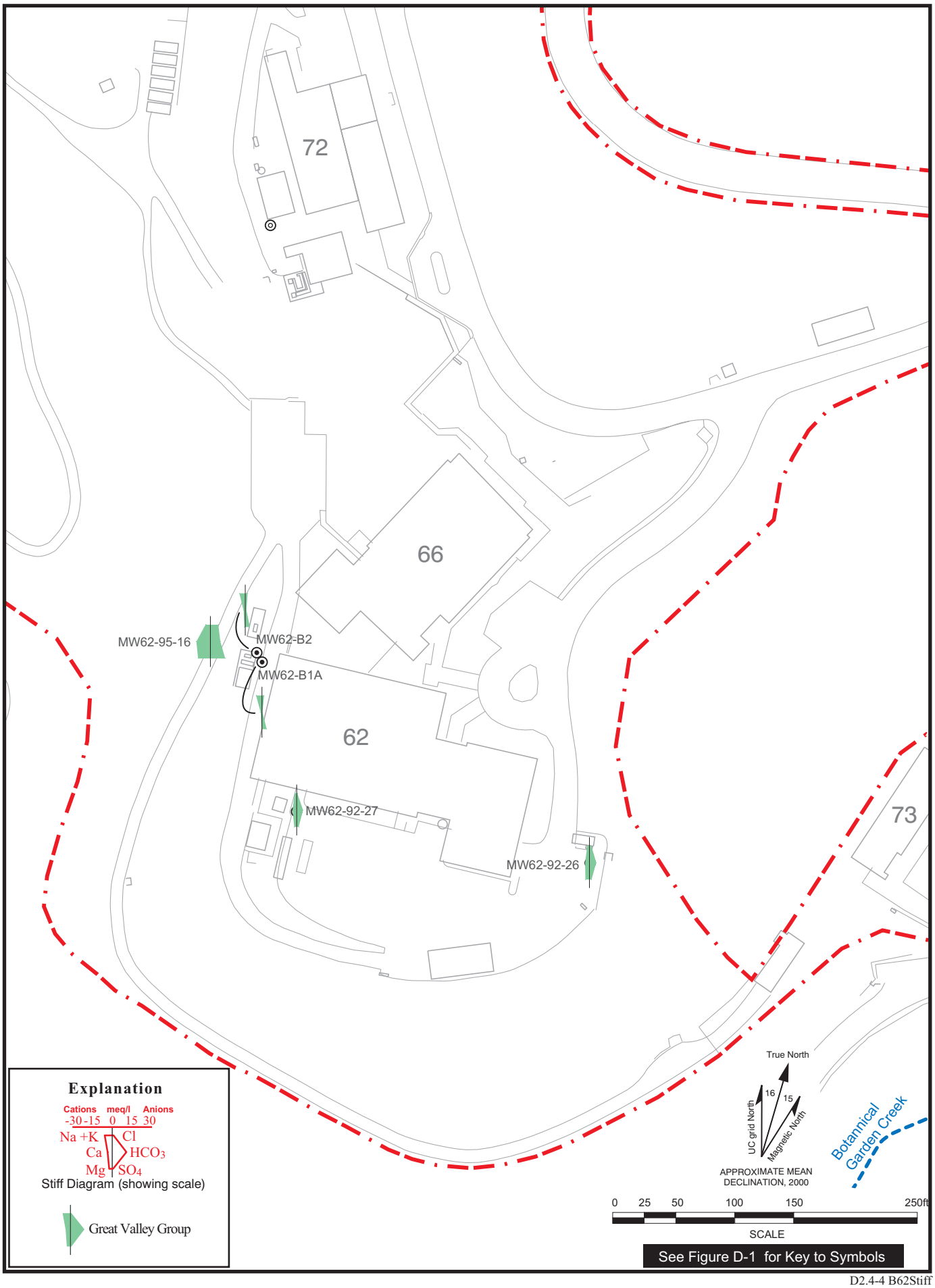
D2.4-2 B62K.ai
09/00

Figure D2.4-2. Well Locations Showing Hydraulic Conductivity Estimates Calculated from Slug Tests and Pumping Tests in Southeastern Outlying Area.



62Map.ai
09/00

Figure D2.4-3. Water Level Elevation Contour Map, Southeastern Outlying Area, Fourth Quarter Fiscal Year 1999.



D2.4-4 B62Stiff
09/00

Figure D2.4-4. Stiff Diagram of Groundwater Geochemical Parameters in Southeastern Outlying Area.

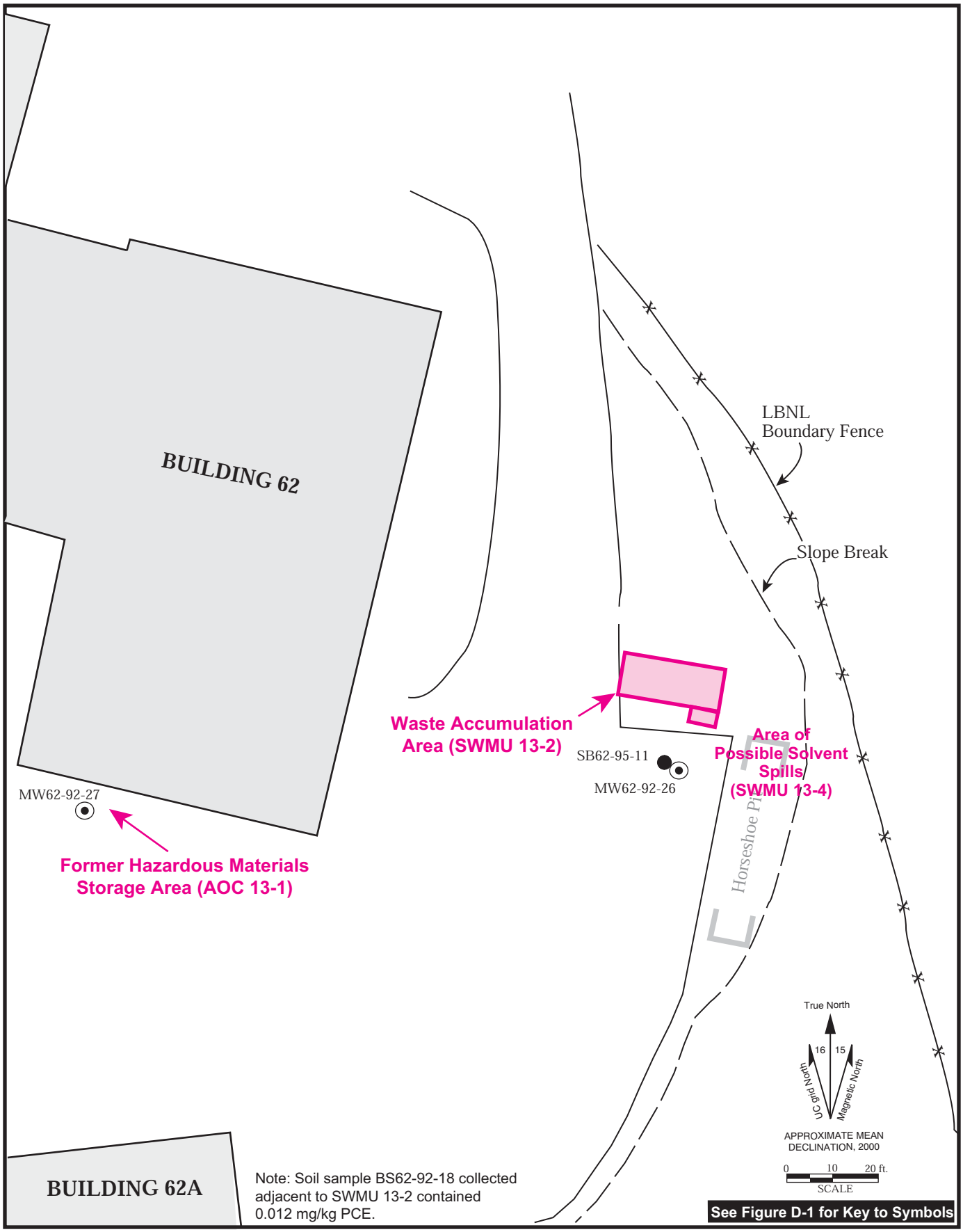
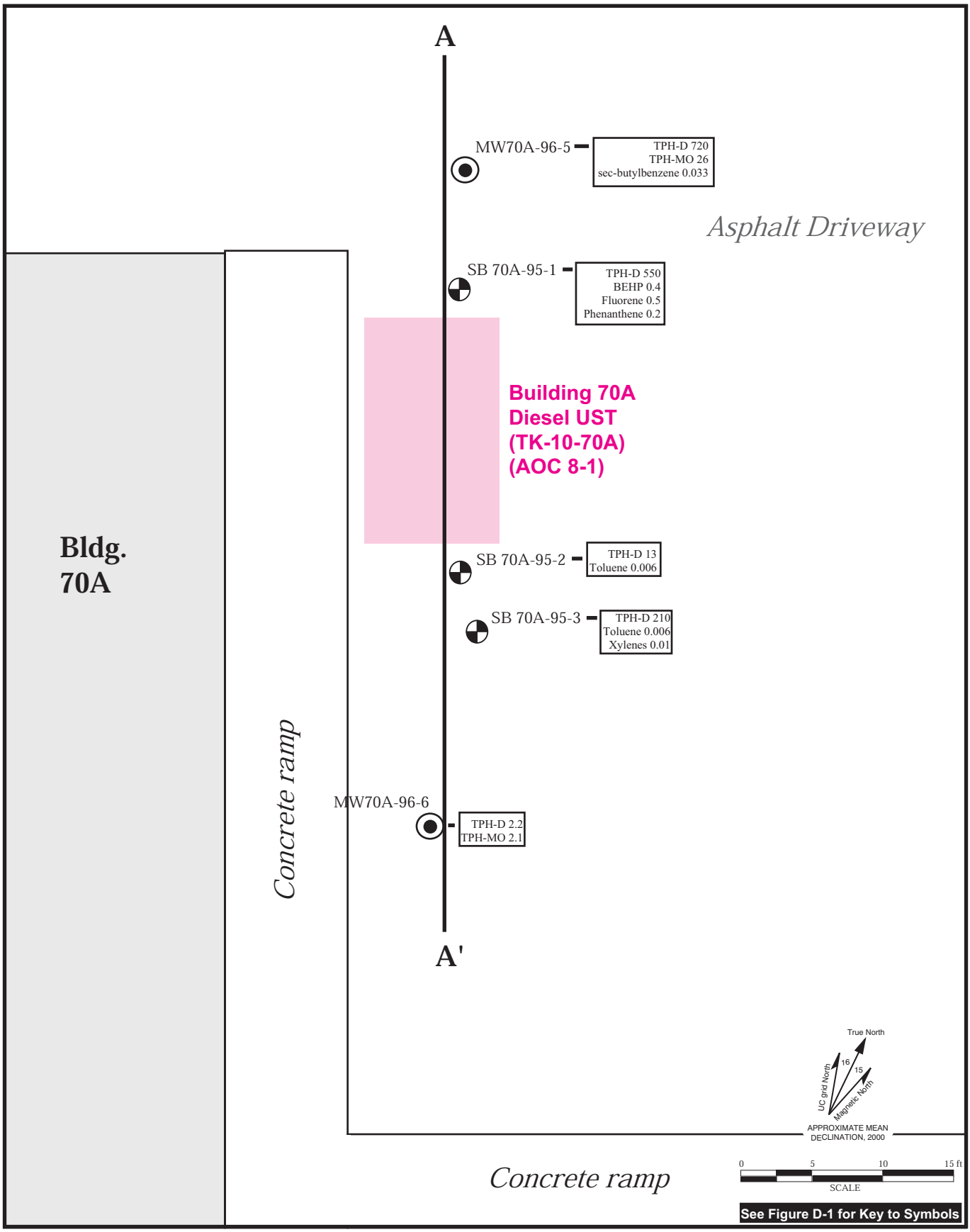


Figure D3.1-1. Locations of Soil Borings Showing Contaminant Concentrations (mg/kg) Exceeding Background, Building 62 Waste Accumulation and Chemical Storage Area (SWMU 13-2).

D3.1-1 B62Soil
09/00



D3.2-1 B70A.ai
09/00

Figure D3.2-1. Locations of Soil Borings and Maximum Concentrations of Analytes Detected Above Background Levels (mg/kg), Building 70A Diesel UST (AOC 8-1).

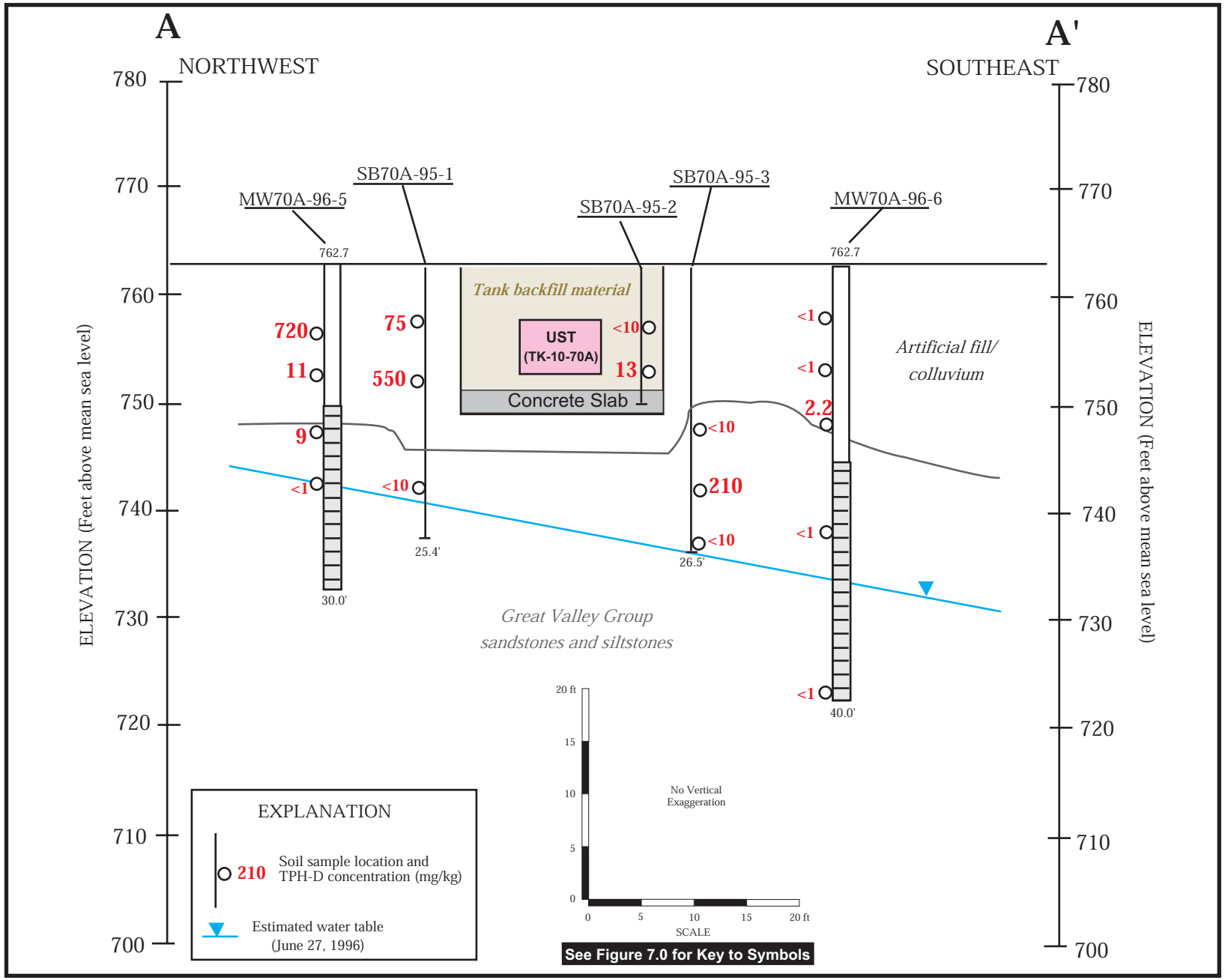
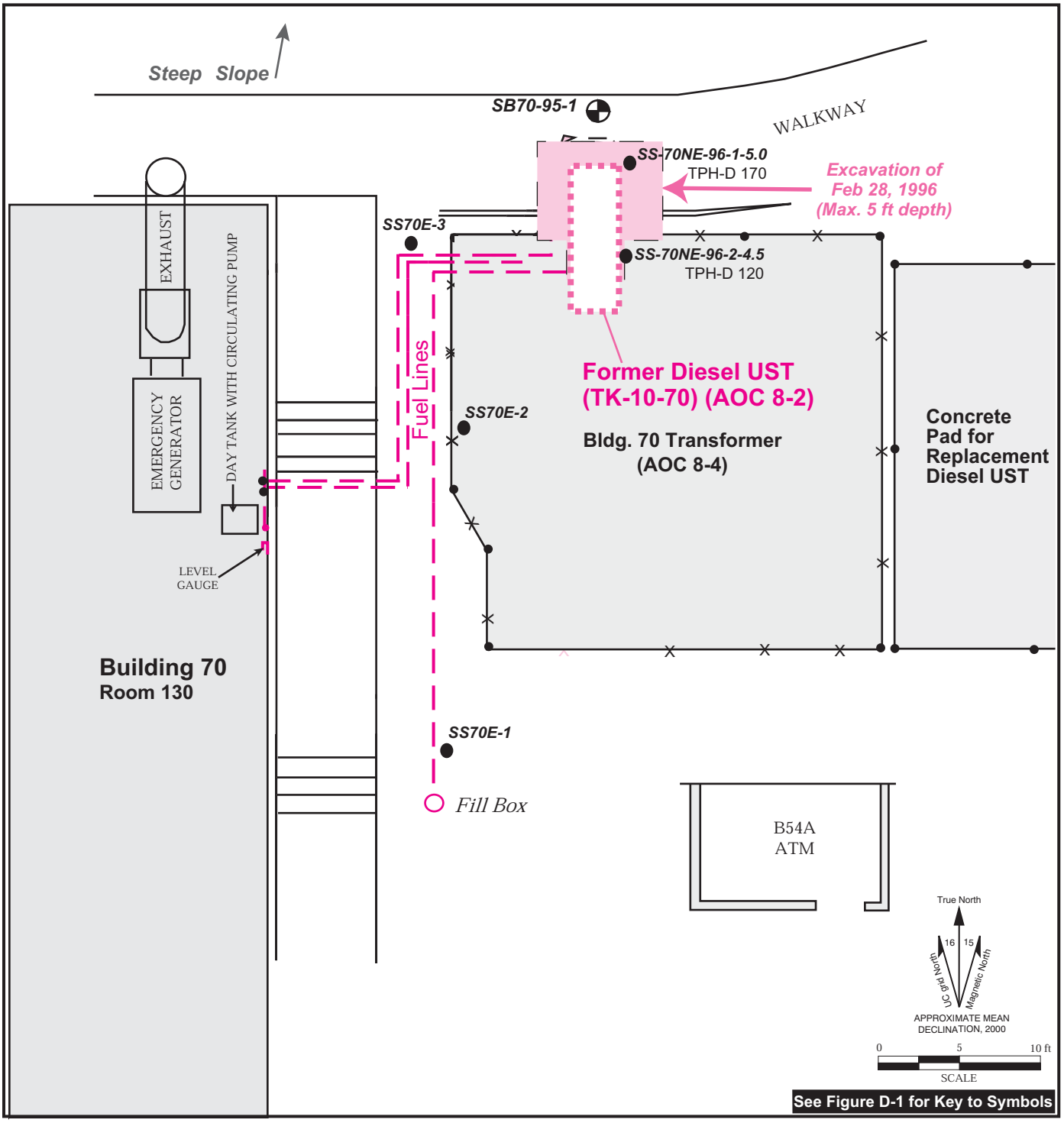


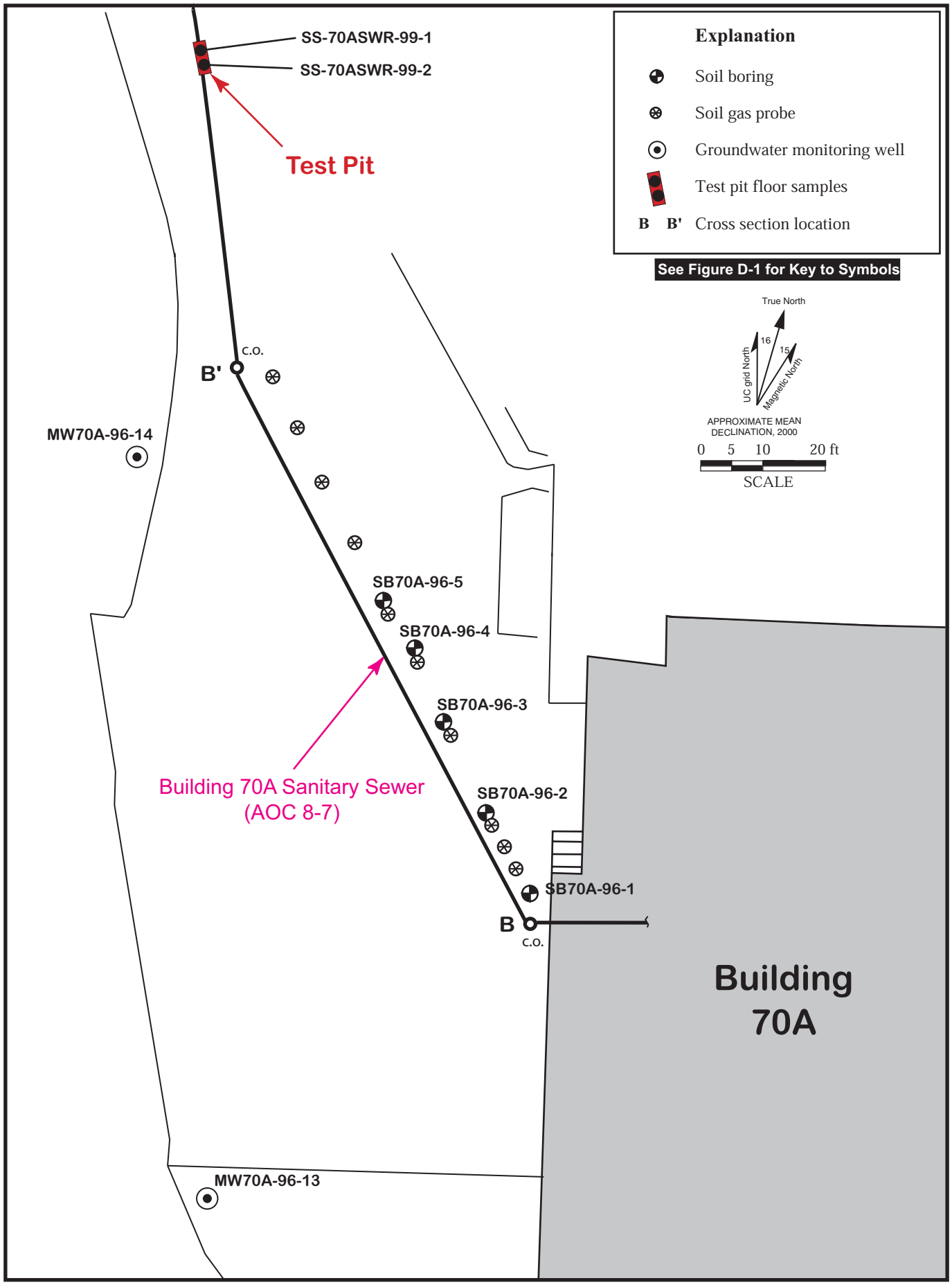
Figure D3.2-2. Geologic Cross Section A-A' Showing TPH-D Concentrations (mg/kg), Building 70A Diesel UST (AOC 8-1).

D3.2-2 AA70A.ai
09/00



D3.3-1 B70.ai
09/00

Figure 3.3-1. Locations of Soil Borings and Maximum Concentrations of TPH-D Detected (mg/kg), Building 70 Diesel UST (AOC 8-2).



D3.4-1 B70Asewer.ai
09/00

Figure D3.4-1. Locations of Soil Gas Probes, Soil Borings, Monitoring Wells, and Test Pit Samples, Building 70A Sanitary Sewer (AOC 8-7).

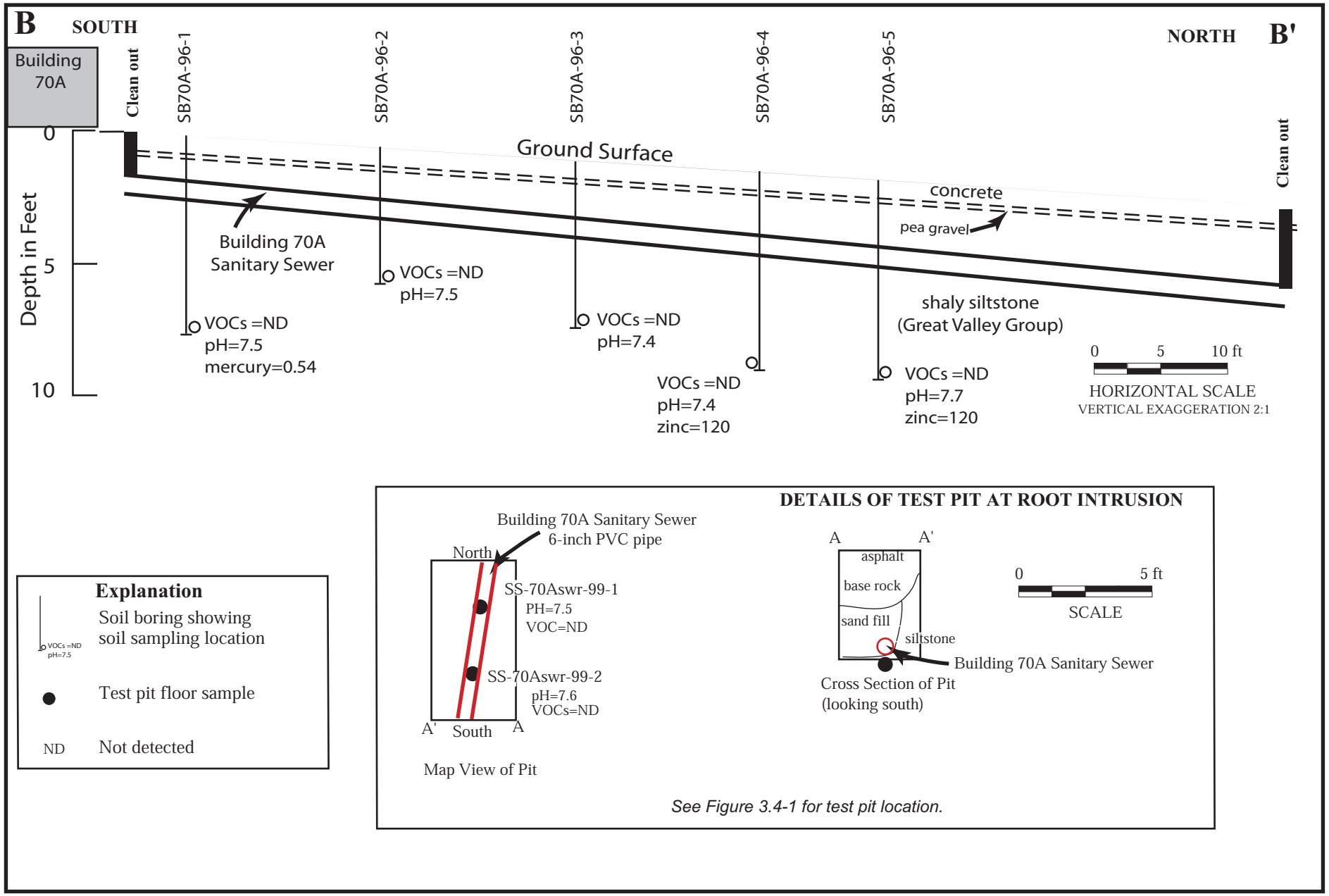
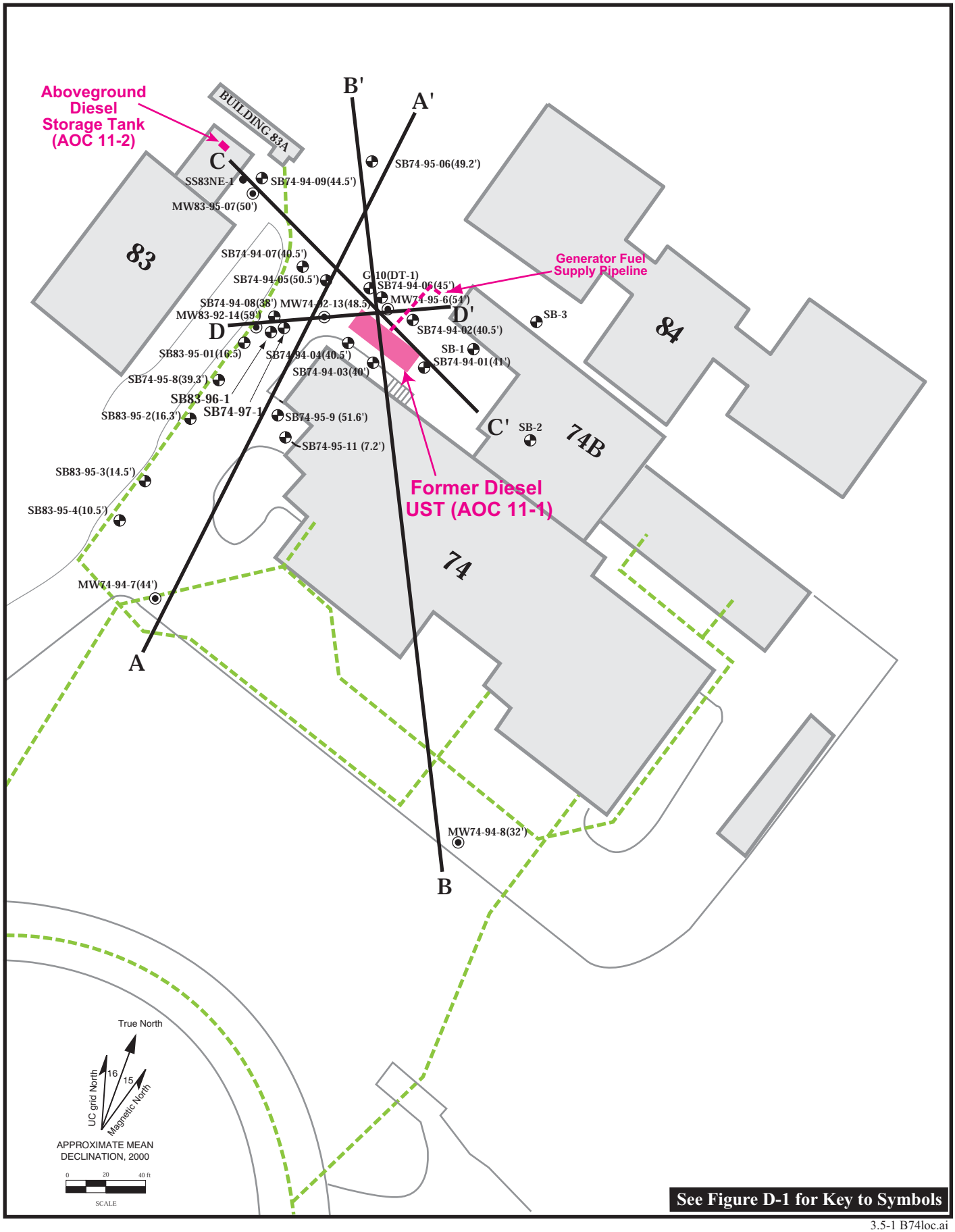


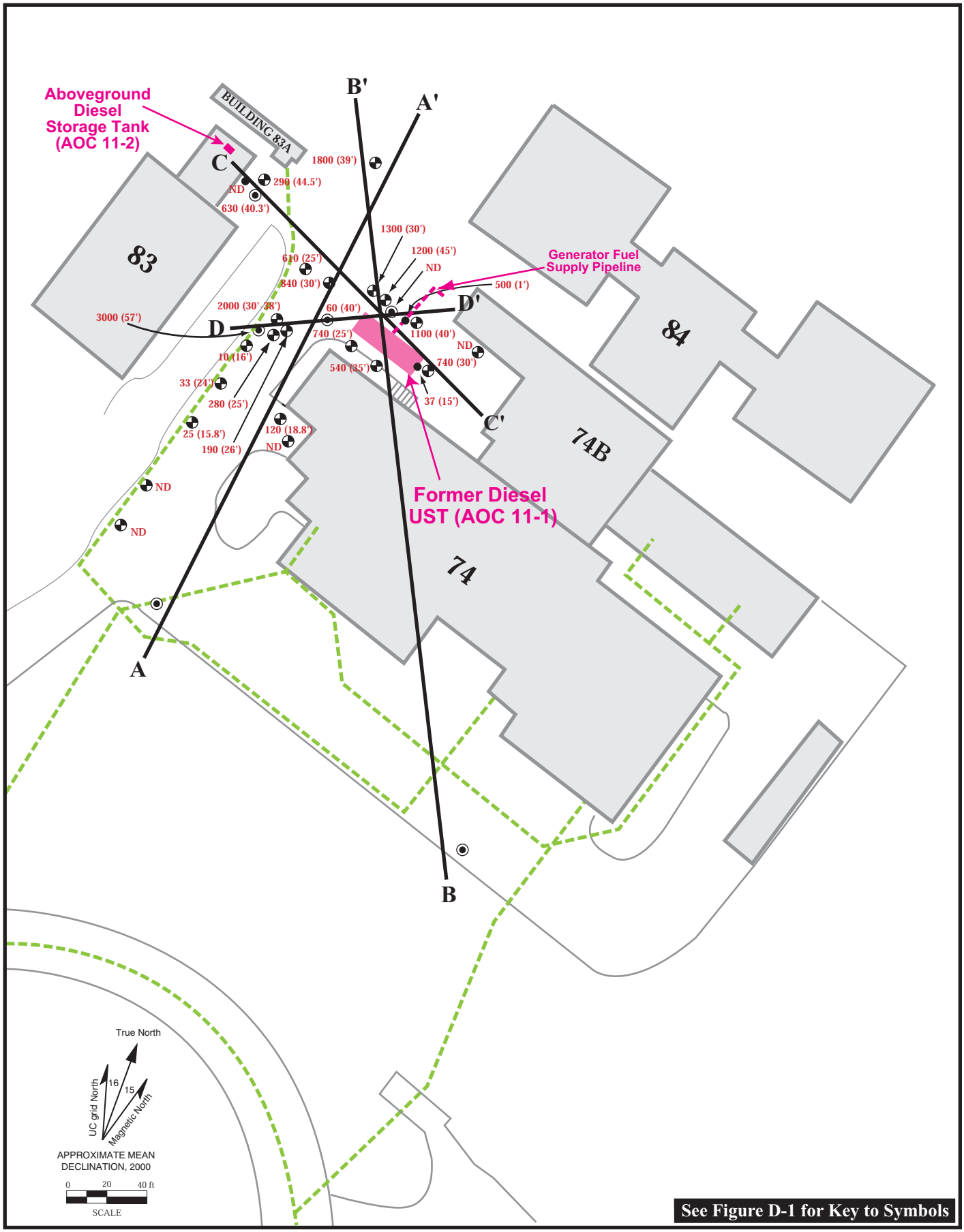
Figure D3.4-2. Geologic Cross Section B-B' Showing Concentrations of Analytes Detected Above Background Levels (mg/kg), Building 70A Sanitary Sewer UST (AOC 8-7).

D3.4-2 BBb76.ai
09/00



3.5-1 B74loc.ai
09/00

Figure D3.5-1. Site Map and Locations of Geologic Cross Sections, Former Building 74 Diesel UST (AOC 11-1).



D3.5-2 TPH74.ai
09/00

Figure D3.5-2. Locations of Soil Borings and Maximum Detected Concentrations of TPH-D (mg/kg), Former Building 74 Diesel UST (AOC 11-1).

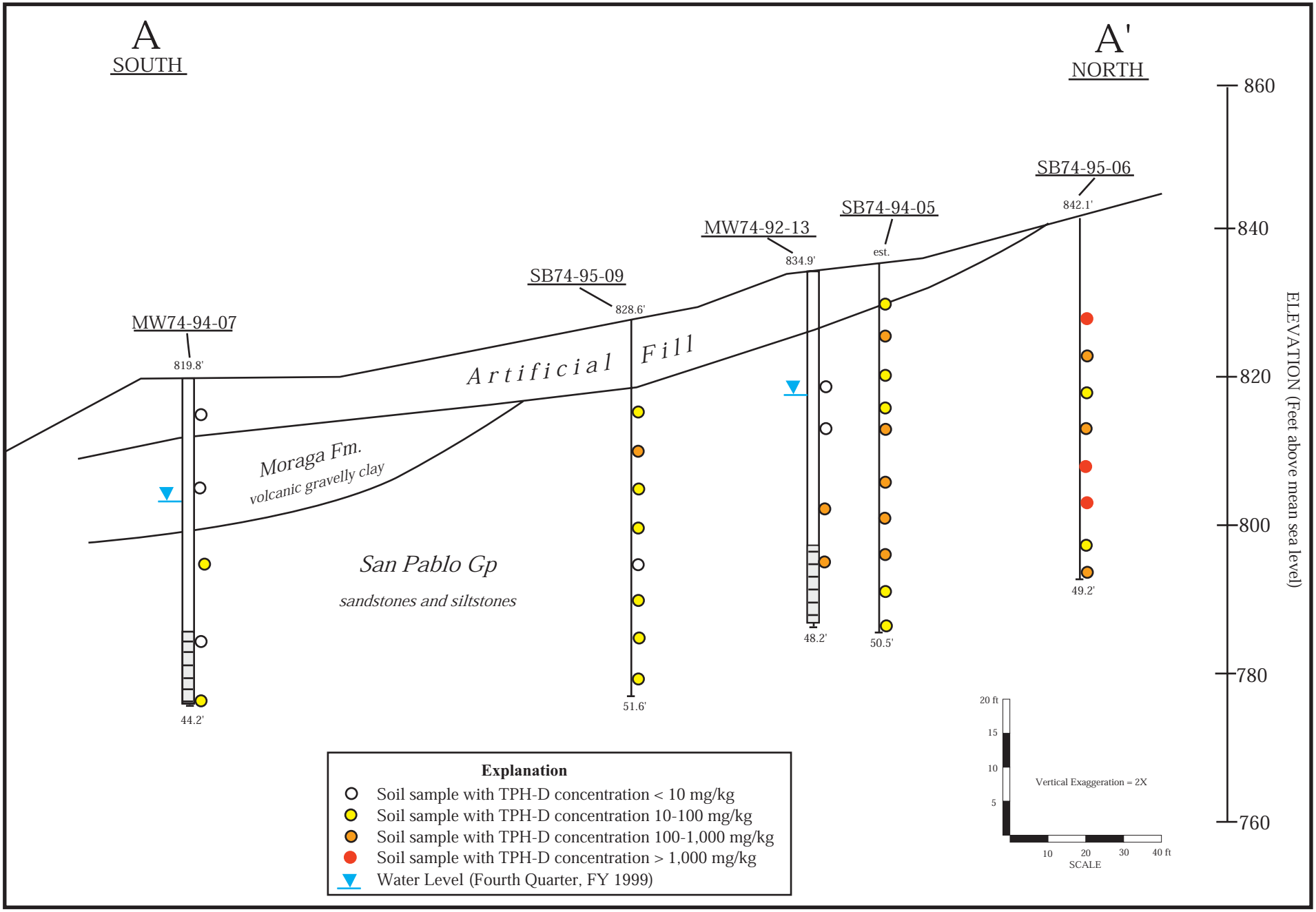


Figure D3.5-3. Life Sciences Area Geologic Cross Section A-A' Showing TPH-D Concentrations (mg/kg), Former Building 74 Diesel UST (AOC 11-1).

D3.5-3 AA.ai
09/00

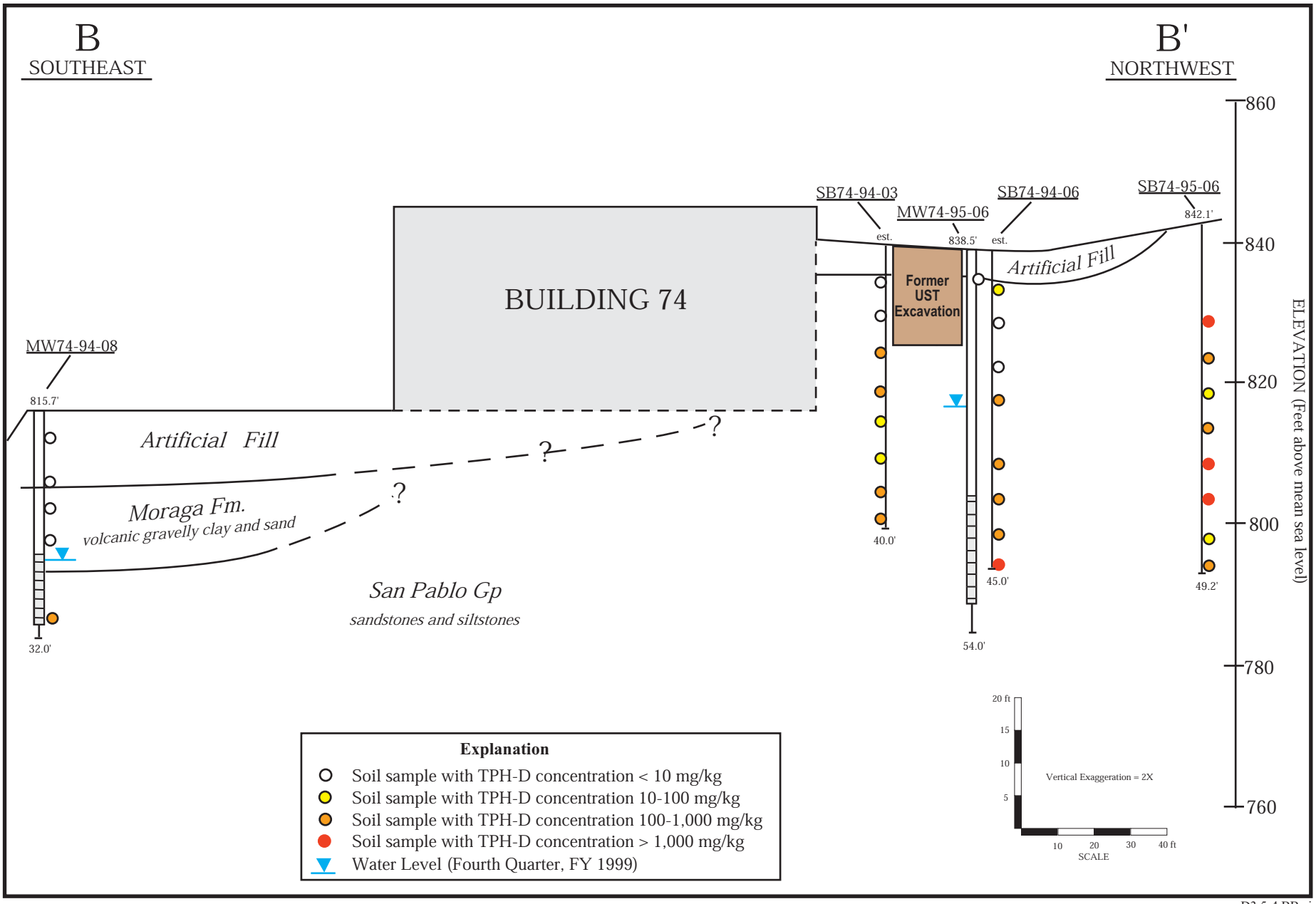


Figure D3.5-4. Life Sciences Area Geologic Cross Section B-B' Showing TPH-D Concentrations (mg/kg), Former Building 74 Diesel UST (AOC 11-1) .

D3.5-4 BB.ai
09/00

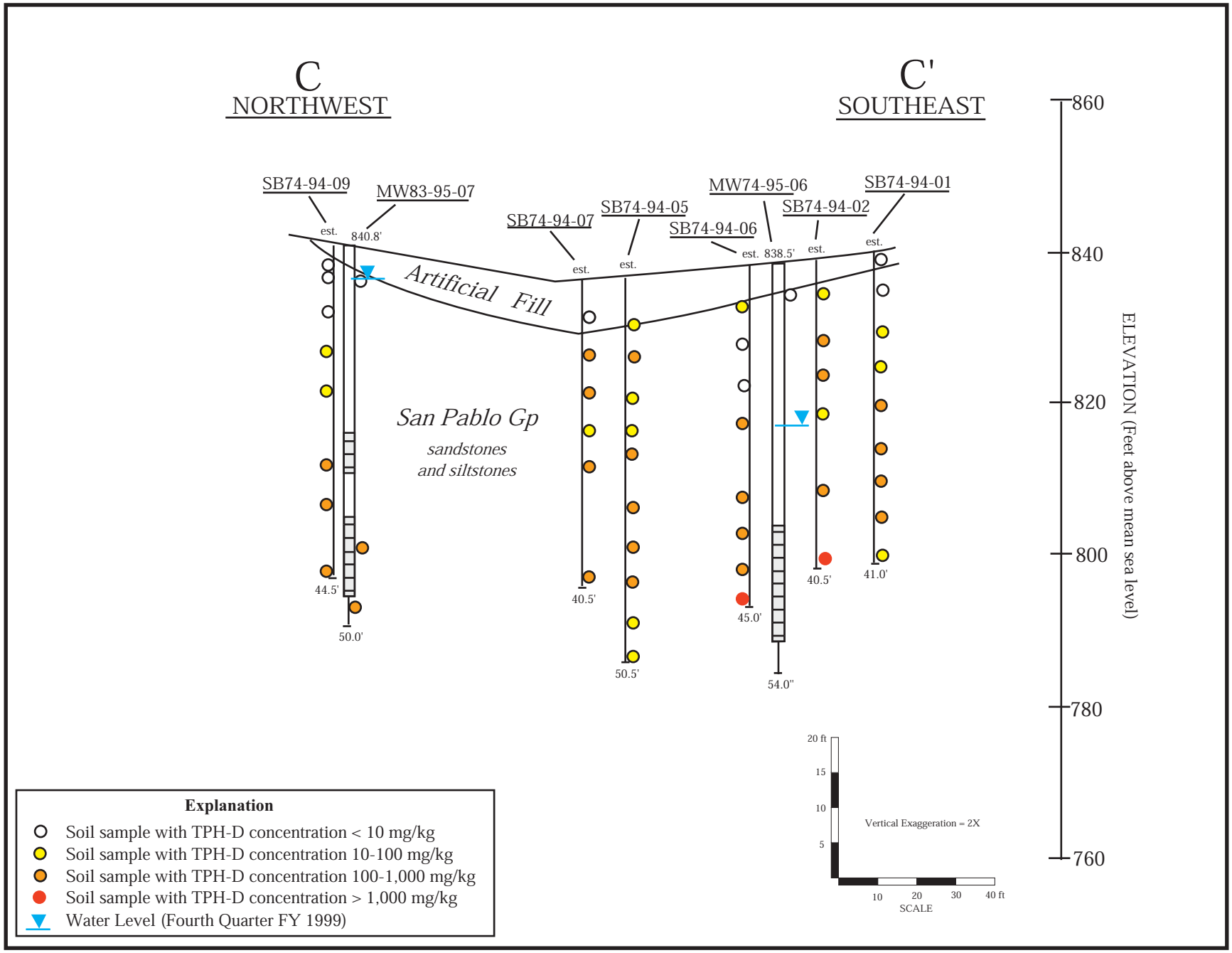


Figure D3.5-5. Life Sciences Area Geologic Cross Section C-C' Showing TPH-D Concentrations (mg/kg), Former Building 74 Diesel UST (AOC 11-1).

D3.5-5 CC.ai
09/00

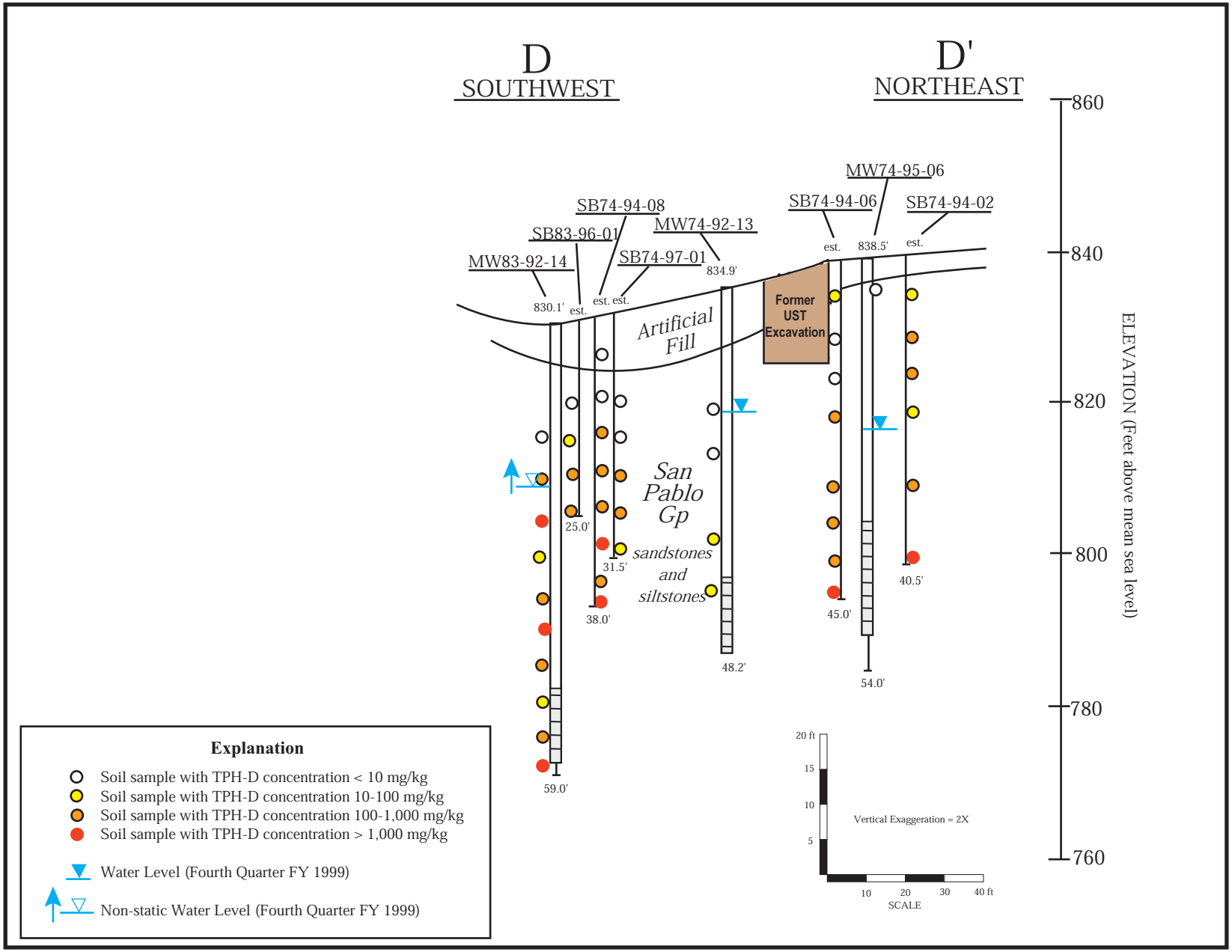


Figure D3.5-6. Life Sciences Area Geologic Cross Section D-D' Showing TPH-D Concentrations (mg/kg), Former Building 74 Diesel UST (AOC 11-1).

D3.5-6 DD.ai
09/00

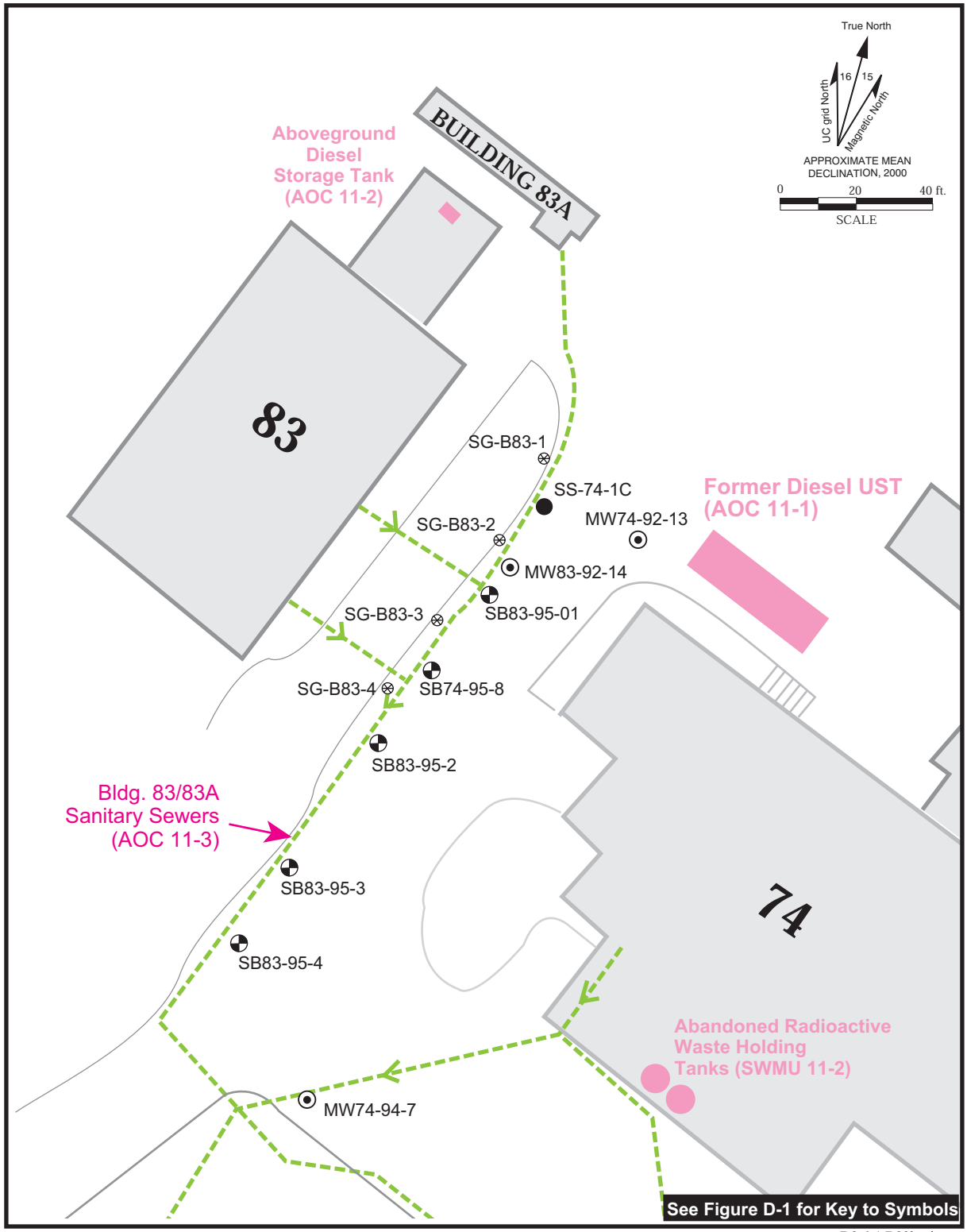
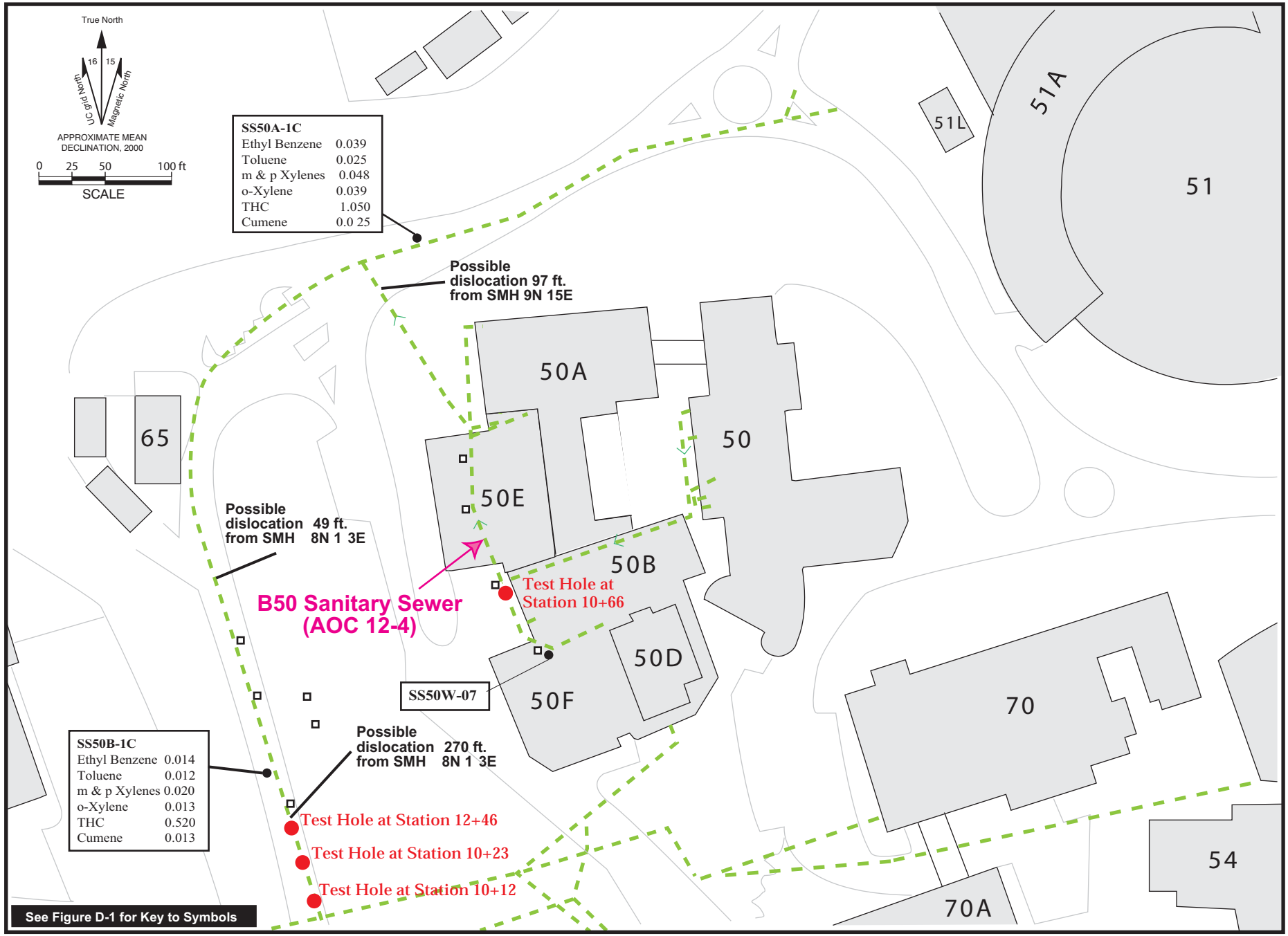


Figure D3.6-1. Locations of Soil Borings, Buildings 83/83A Sanitary Sewers (AOC 11-3).

D3.6-1 B83borings
09/00



D3.7-1 B50borings.ai
09/00

Figure D3.7-1. Locations of Soil Borings Showing Detected Contaminant Concentrations (mg/kg), Building 50 Sanitary Sewer Dislocations (AOC 12-4).

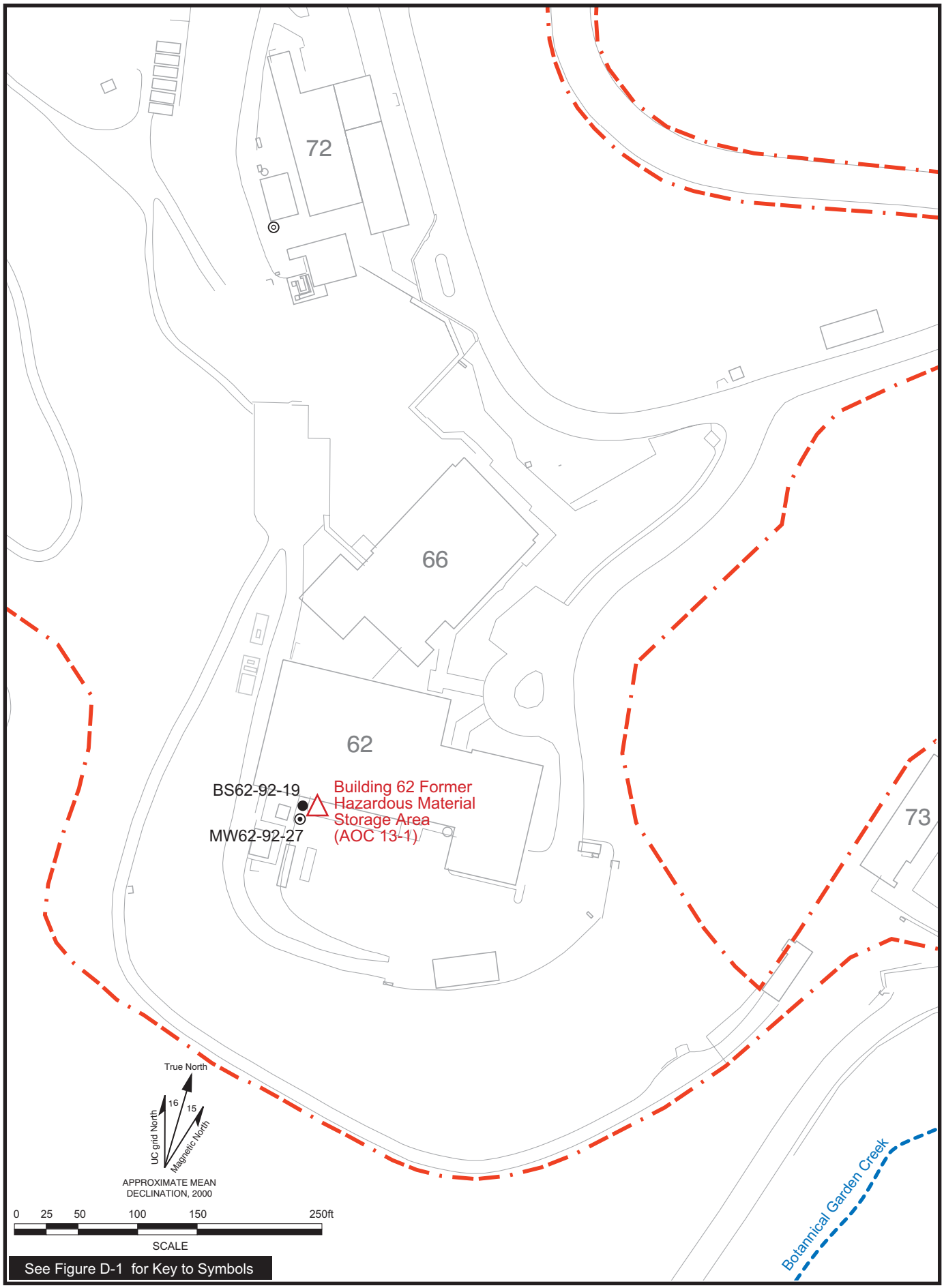


Figure D3.8-1. Locations of Soil Samples, Building 62 (Former) Hazardous Materials Storage Area (AOC 13-1).

D3.8-1 B61ss.ai
09/00

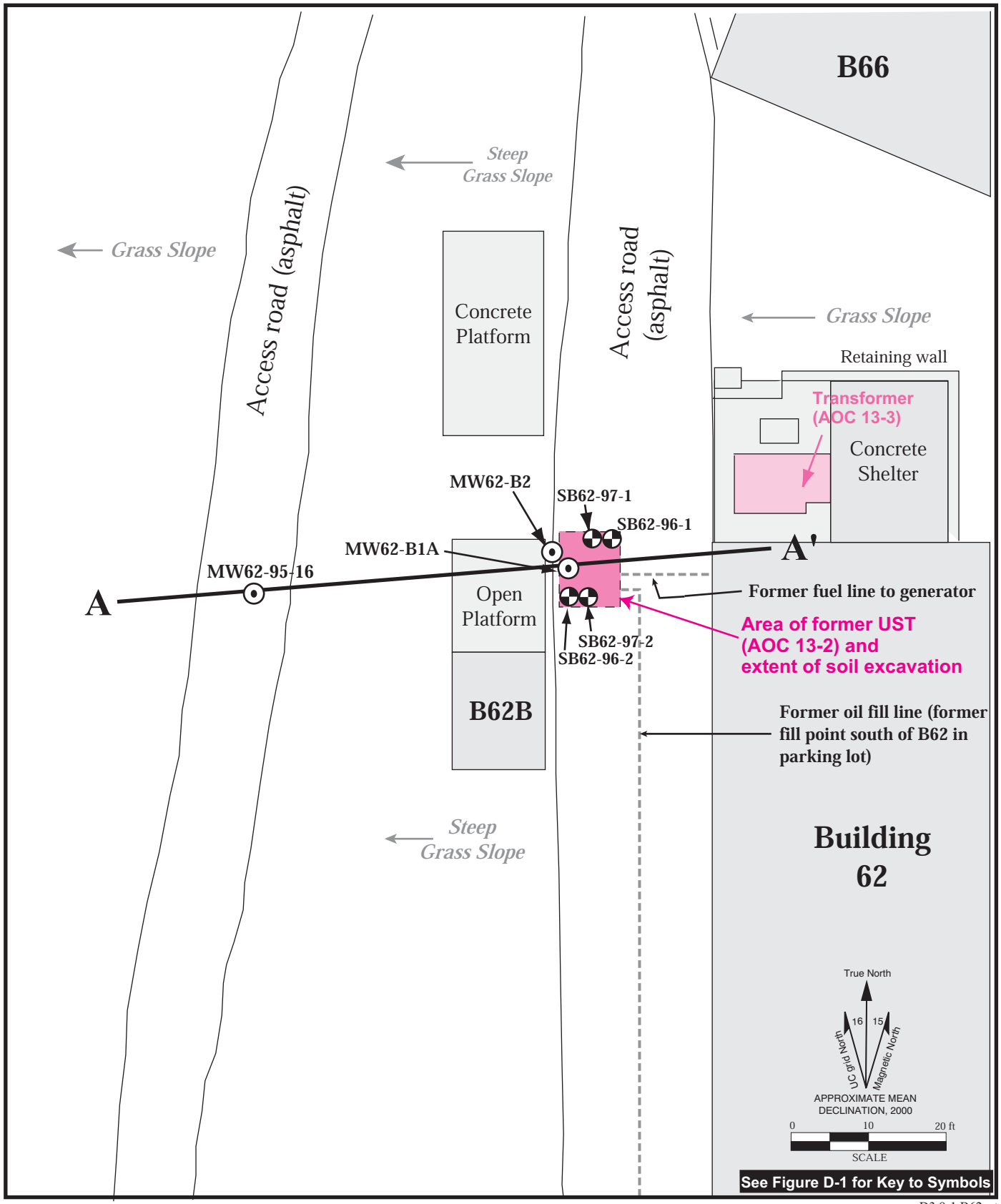


Figure D3.9-1. Locations of Soil Samples Collected Subsequent to Soil Removal Activities, Building 62 Former Diesel UST (AOC 13-2).

D3.9-1 B62ust
09/00

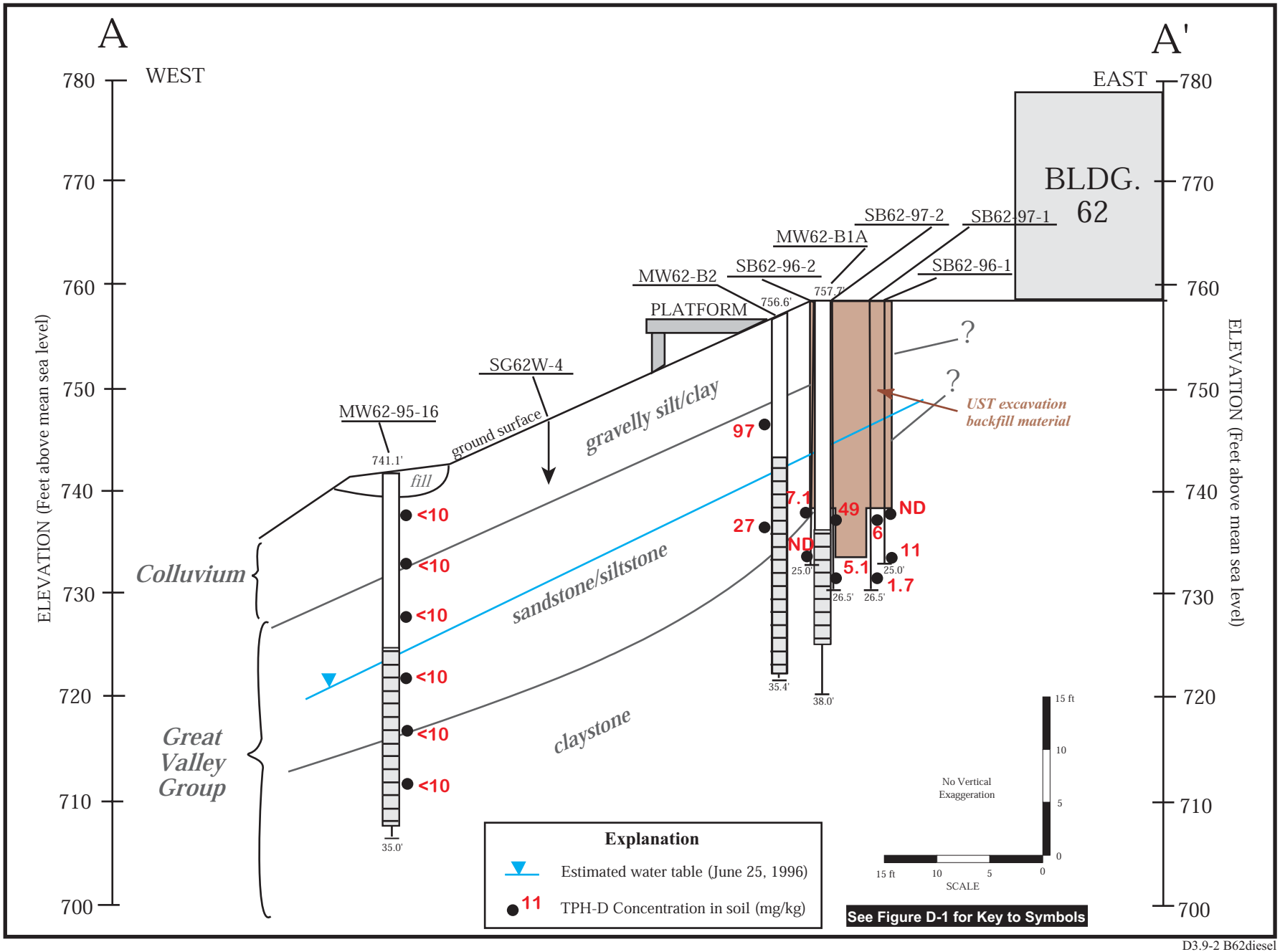


Figure D3.9-2. Geologic Cross Section Showing TPH-D Concentrations in Soil Samples Collected Subsequent to Soil Removal Activities, Building 62 Former Diesel UST (AOC 13-2).

D3.9-2 B62diesel
09/00

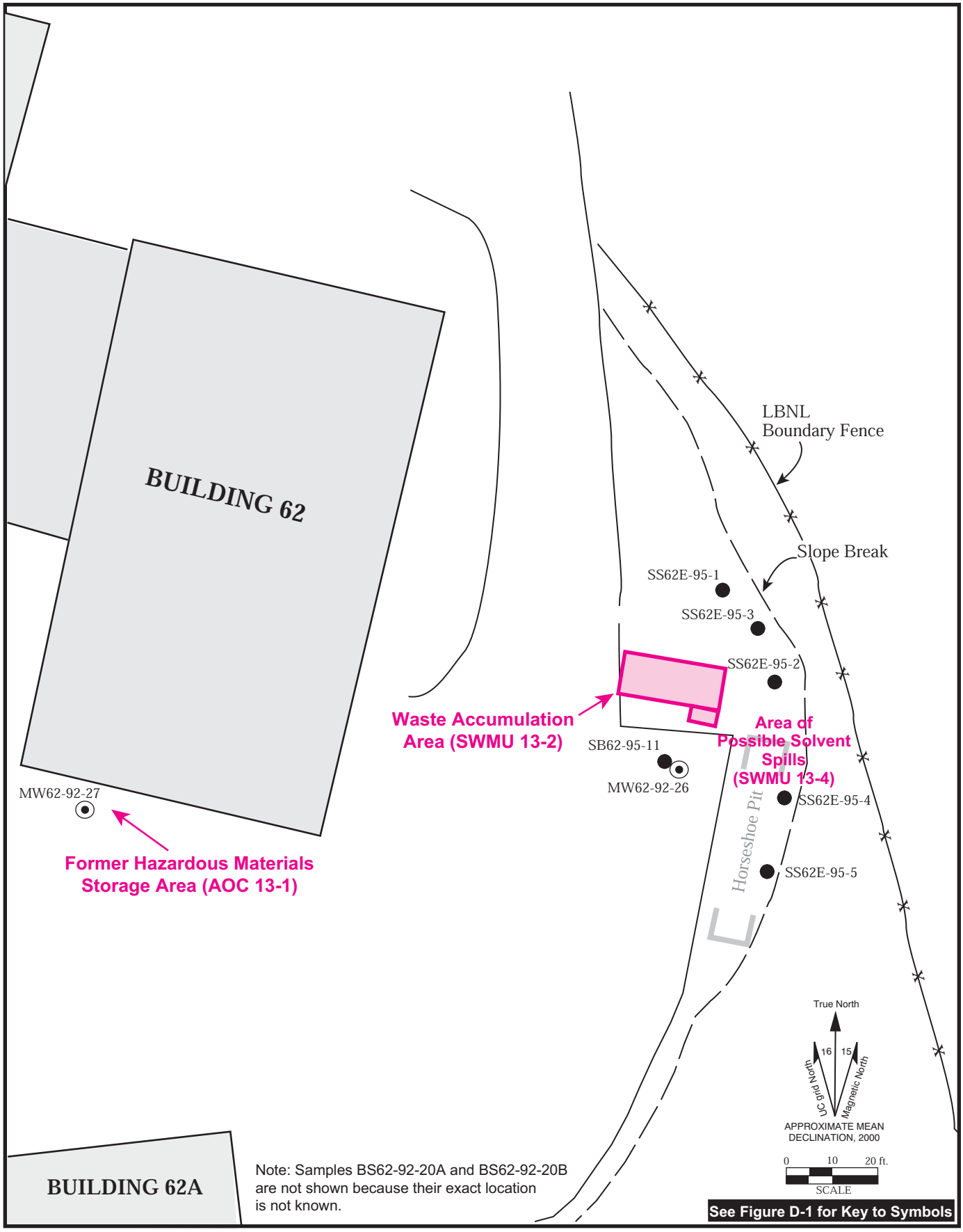
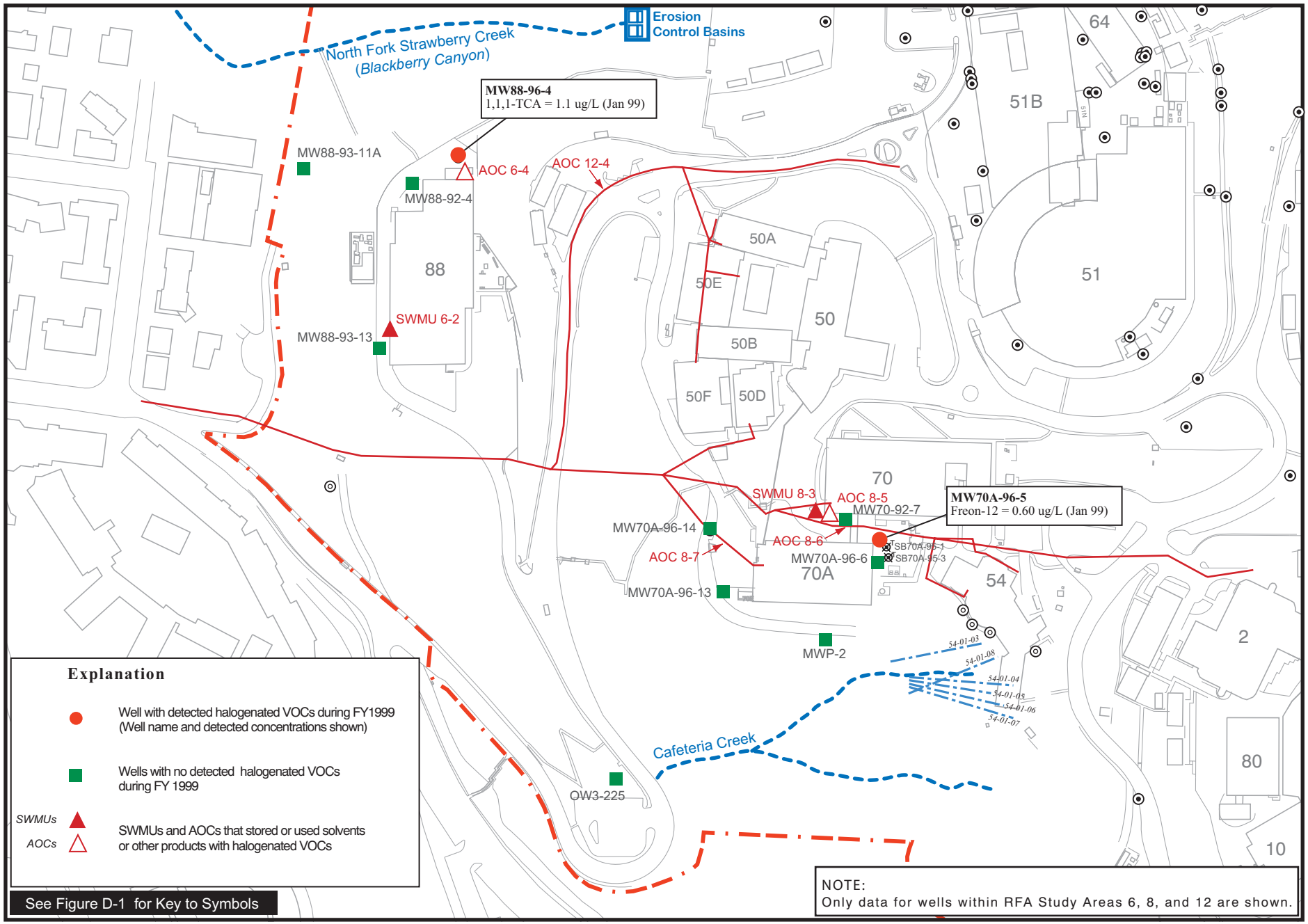


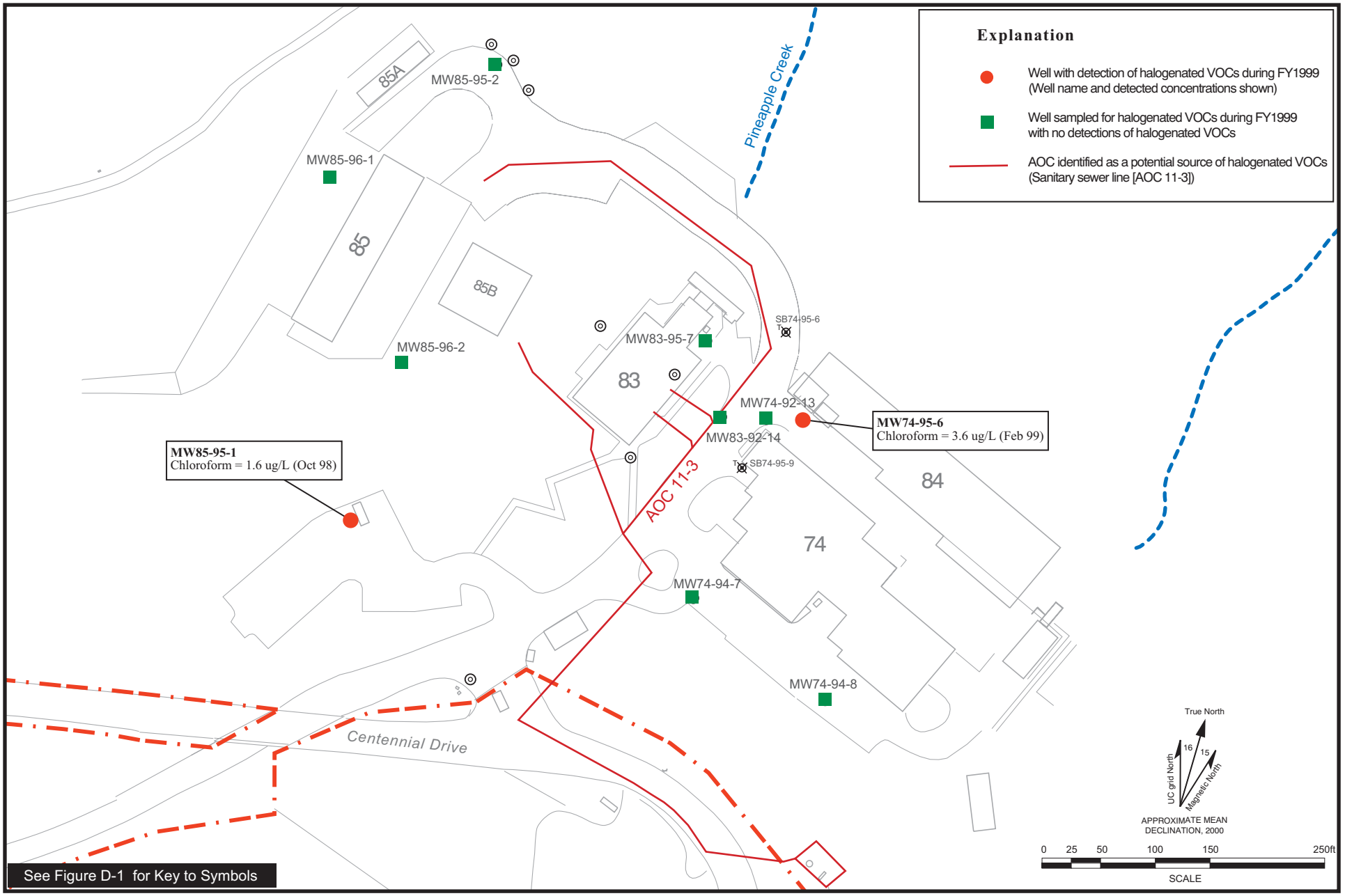
Figure D3.10-1. Locations of Soil Samples, Possible Solvent Spills East of Building 62 (AOC 13-1).

D3.10-1 B62ss.ai
09/00



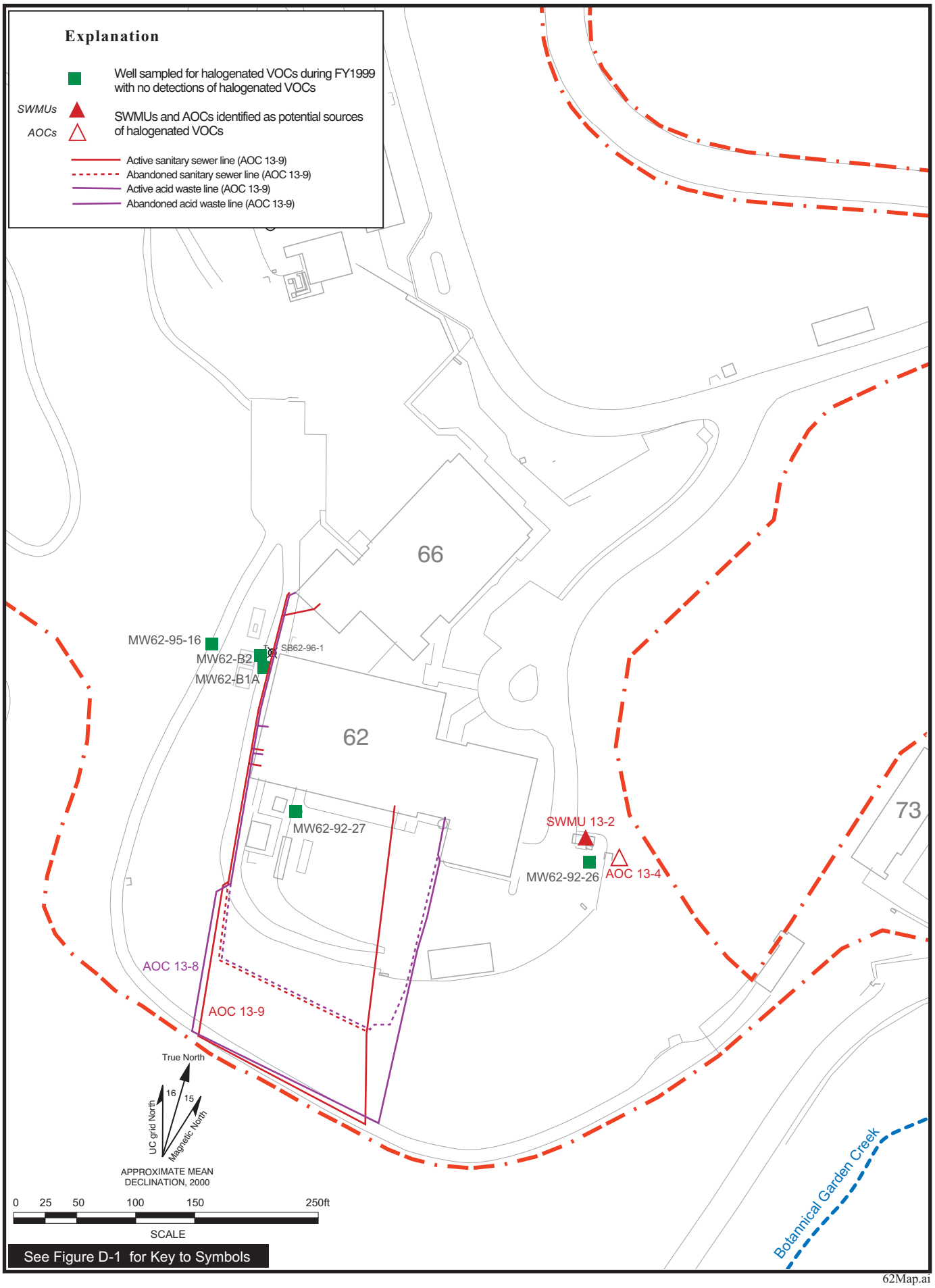
50-70-88map.ai
09/00

Figure D4.3-1a. Halogenated VOCs Detected During FY 1999 in Groundwater in Western Outlying Area With Potential Source Areas.



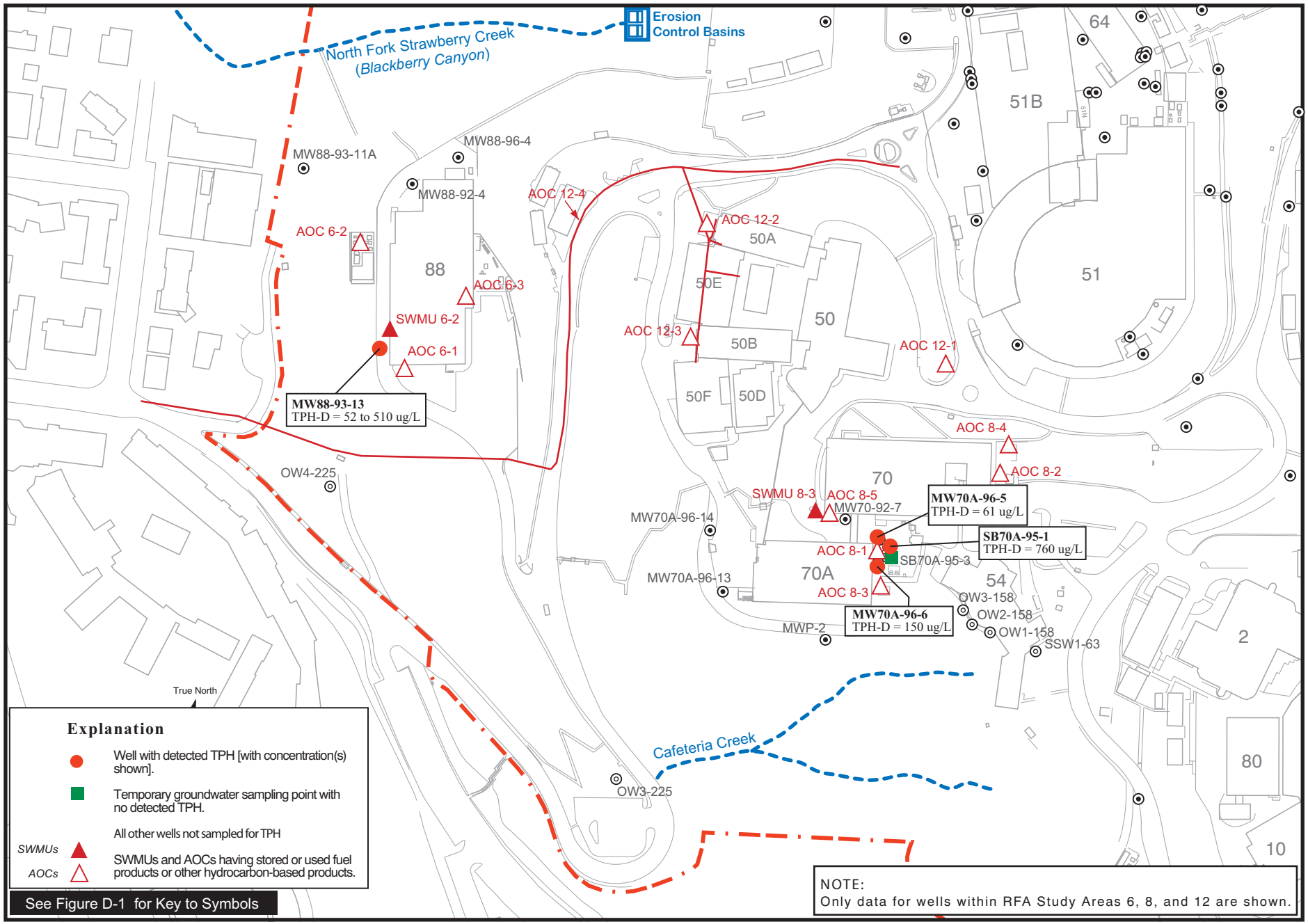
74-85map.ai
09/00

Figure D4.3-1b. Halogenated VOCs Detected During FY 1999 in Groundwater in Northeastern Outlying Area With Potential Source Areas.



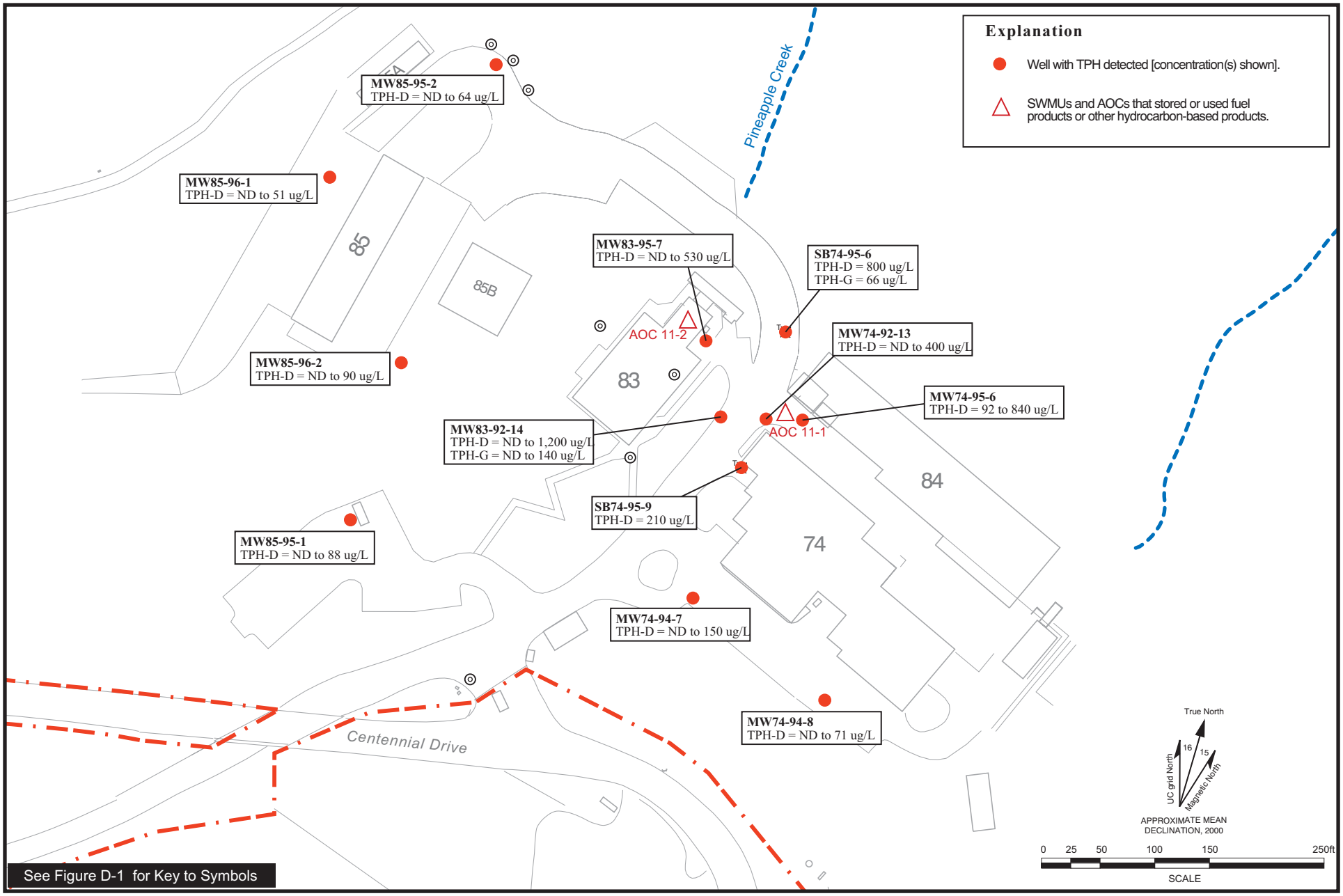
62Map.ai
09/00

Figure D4.3-1c. Wells Sampled for Halogenated VOCs in Groundwater in Southeastern Outlying Area During FY1999, With Potential Source Areas.



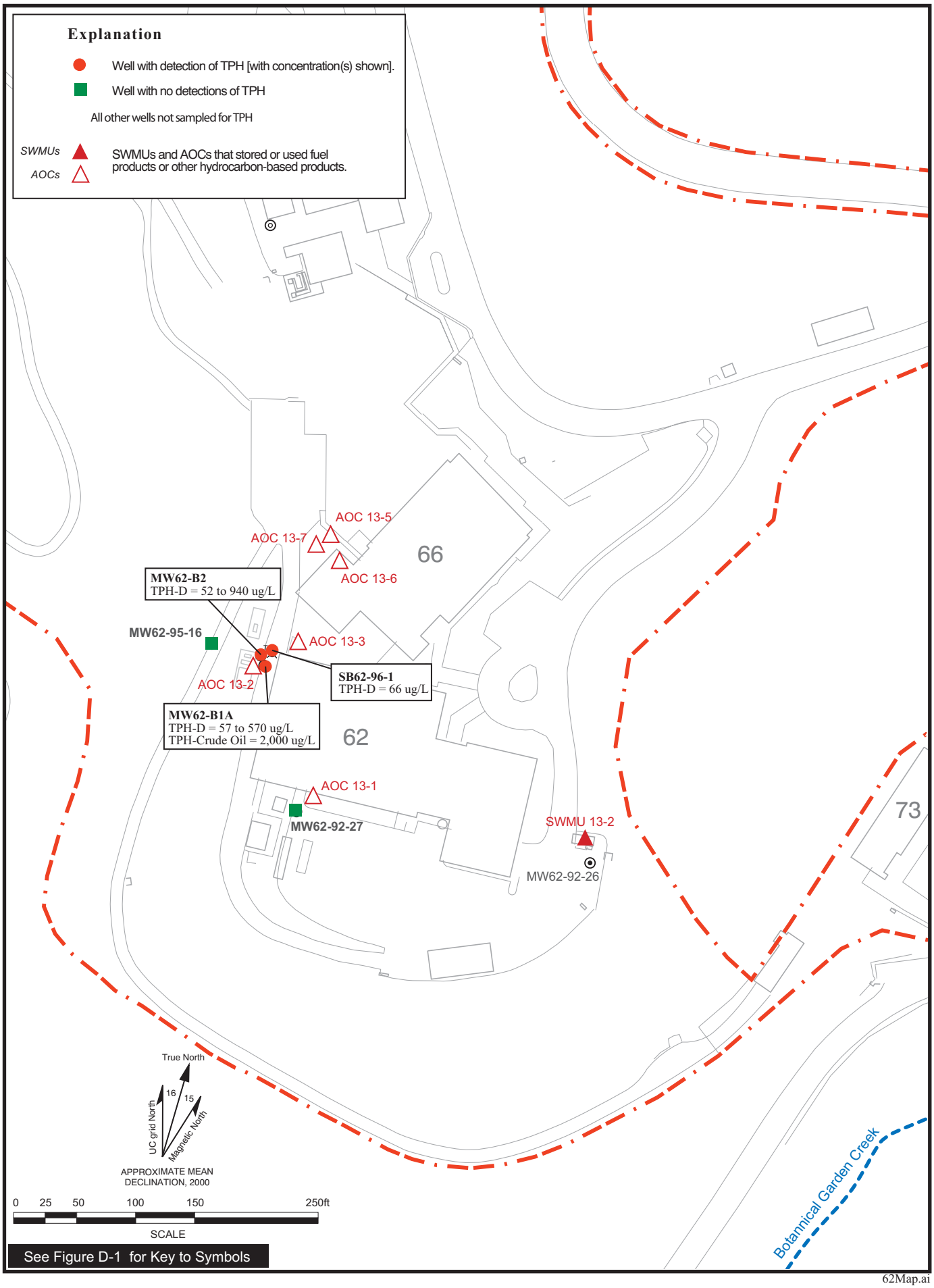
50-70-88map.ai
09/00

Figure D4.4-1a. TPH Concentration Ranges Detected in Groundwater in Western Outlying Area With Locations of SWMUs and AOCs That Stored or Used Fuel Products or Other Hydrocarbon-Based Products.



74-85map.ai
09/00

Figure D4.4-1b. TPH Concentration Ranges Detected in Groundwater in Northeastern Outlying Area With Locations of AOCs That Stored or Used Fuel Products or Other Hydrocarbon-Based Products.



62Map.ai
09/00

Figure D4.4-1c. Concentrations of TPH Detected in Groundwater in Southeastern Outlying Area With Locations of SWMUs and AOCs That Stored or Used Fuel Products or Other Hydrocarbon-Based Products.

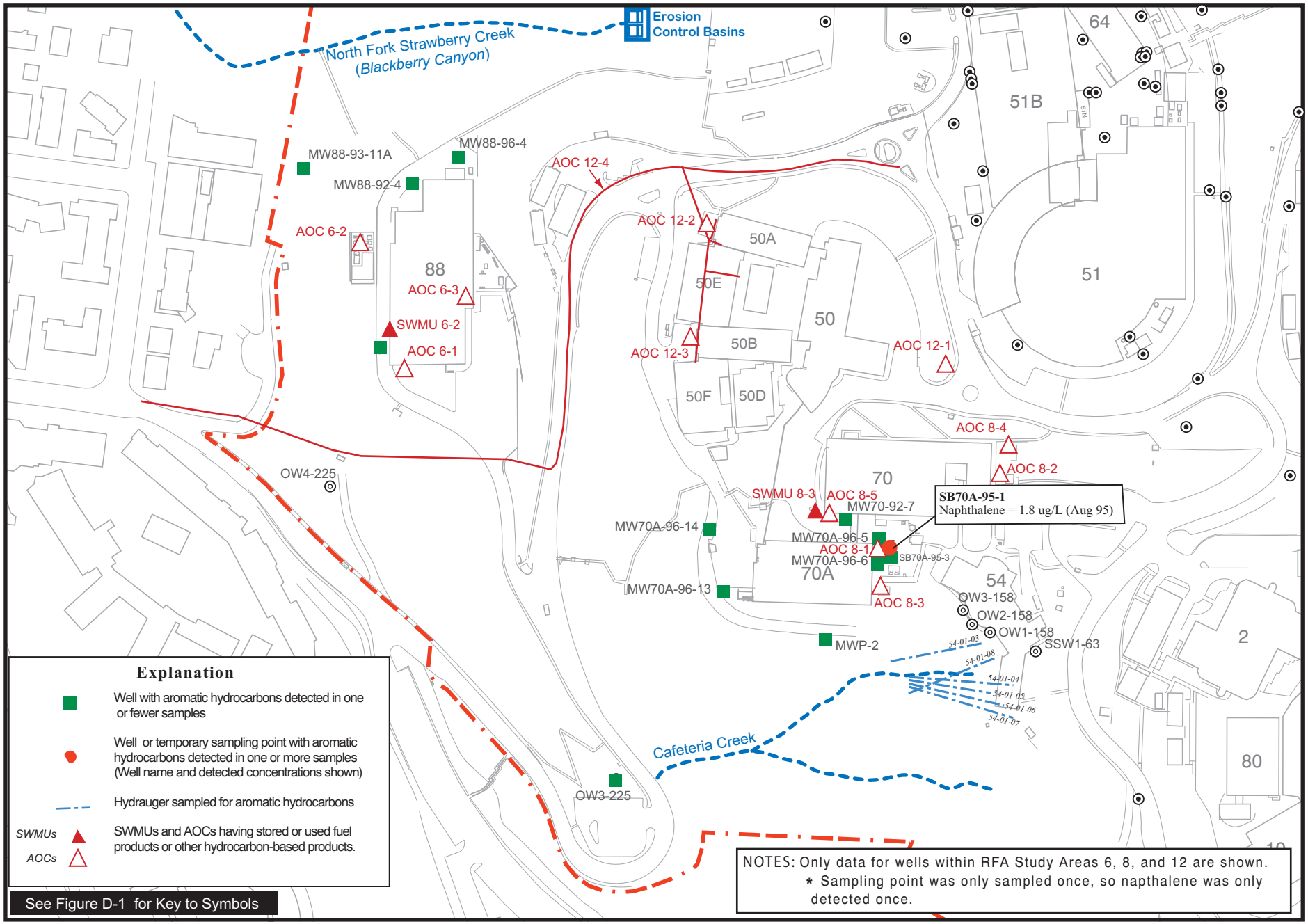
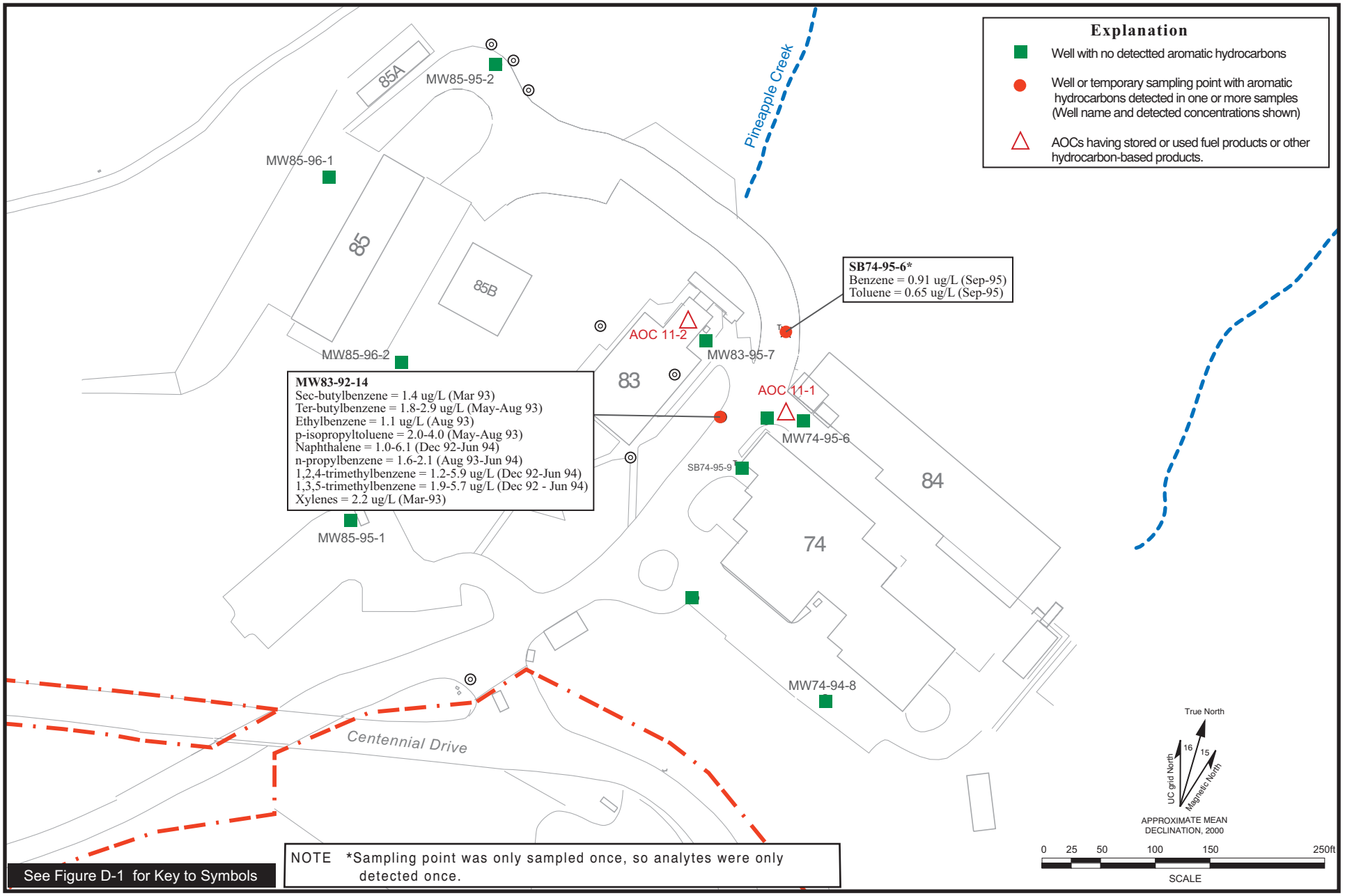


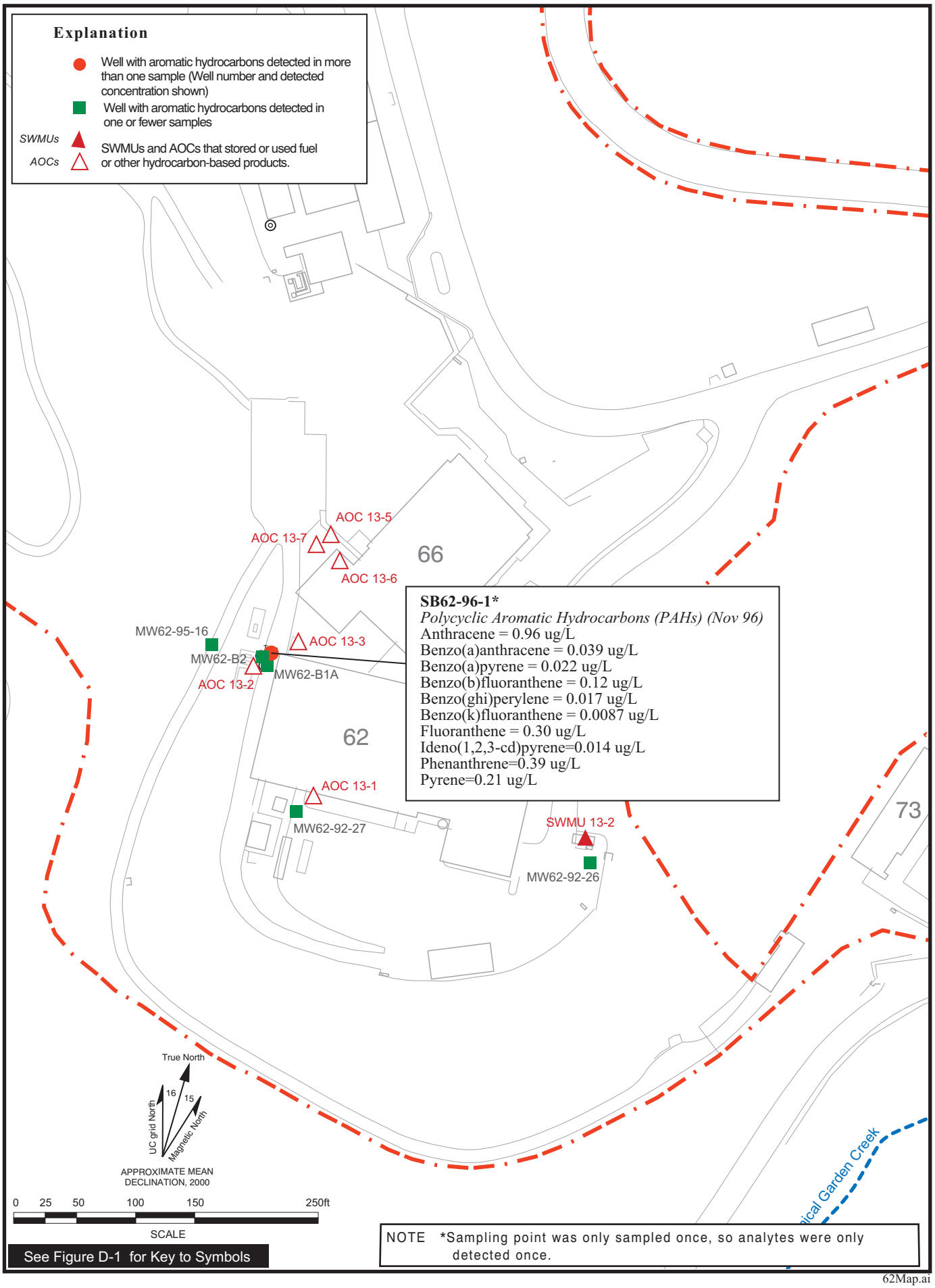
Figure D4.4-2a. Aromatic Hydrocarbons Detected in More Than One Sample in Western Outlying Area With Locations of SWMUs and AOCs That Stored or Used Fuel Products or Other Hydrocarbon-Based Products.

50-70-88map.ai
09/00



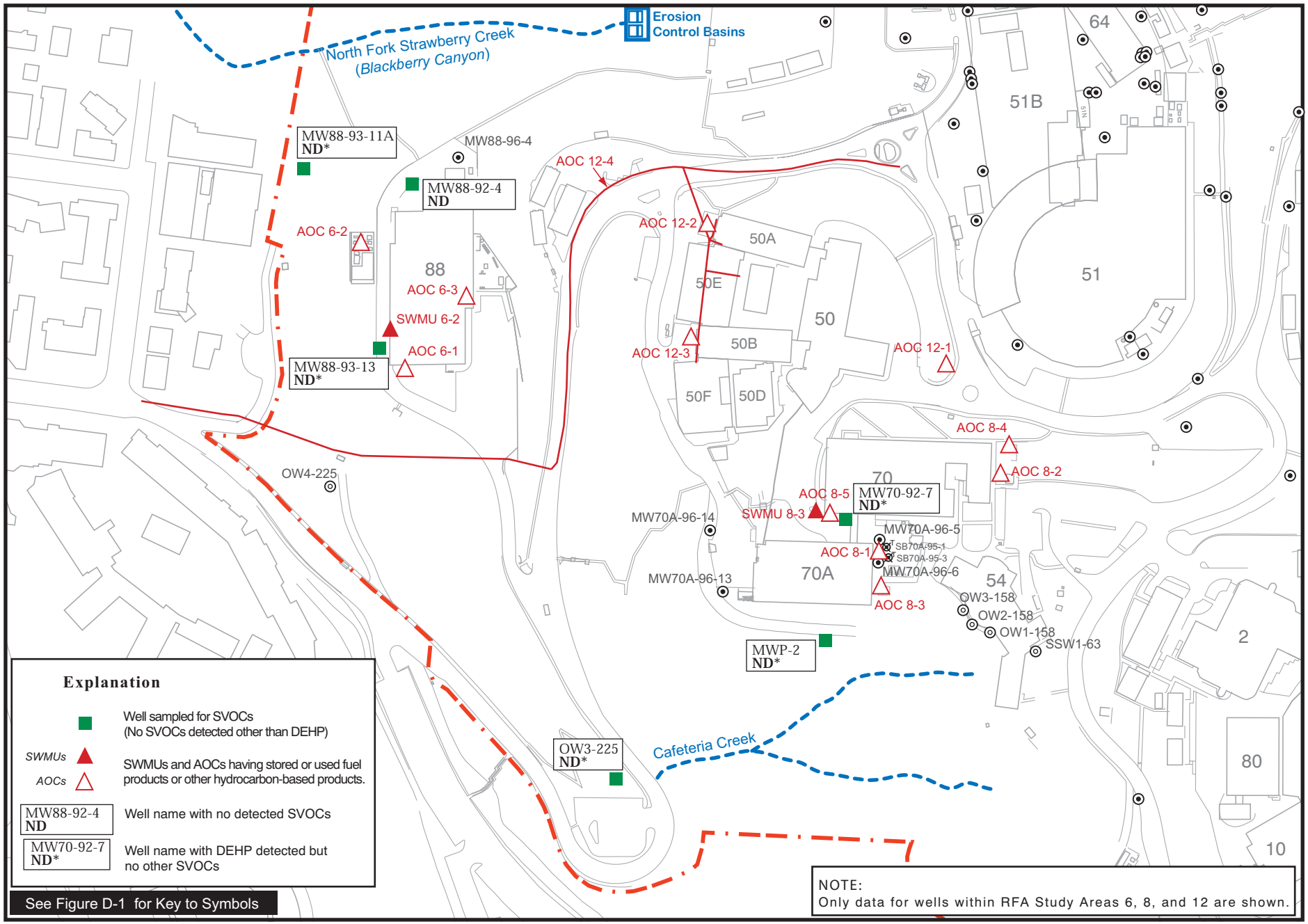
74-85map.ai
09/00

Figure D4.4-2b. Aromatic Hydrocarbons Detected in MoreThan One Sample in Northeastern Outlying Area With Locations of AOCs That Stored or Used Fuel Products or Other Hydrocarbon-Based Products.



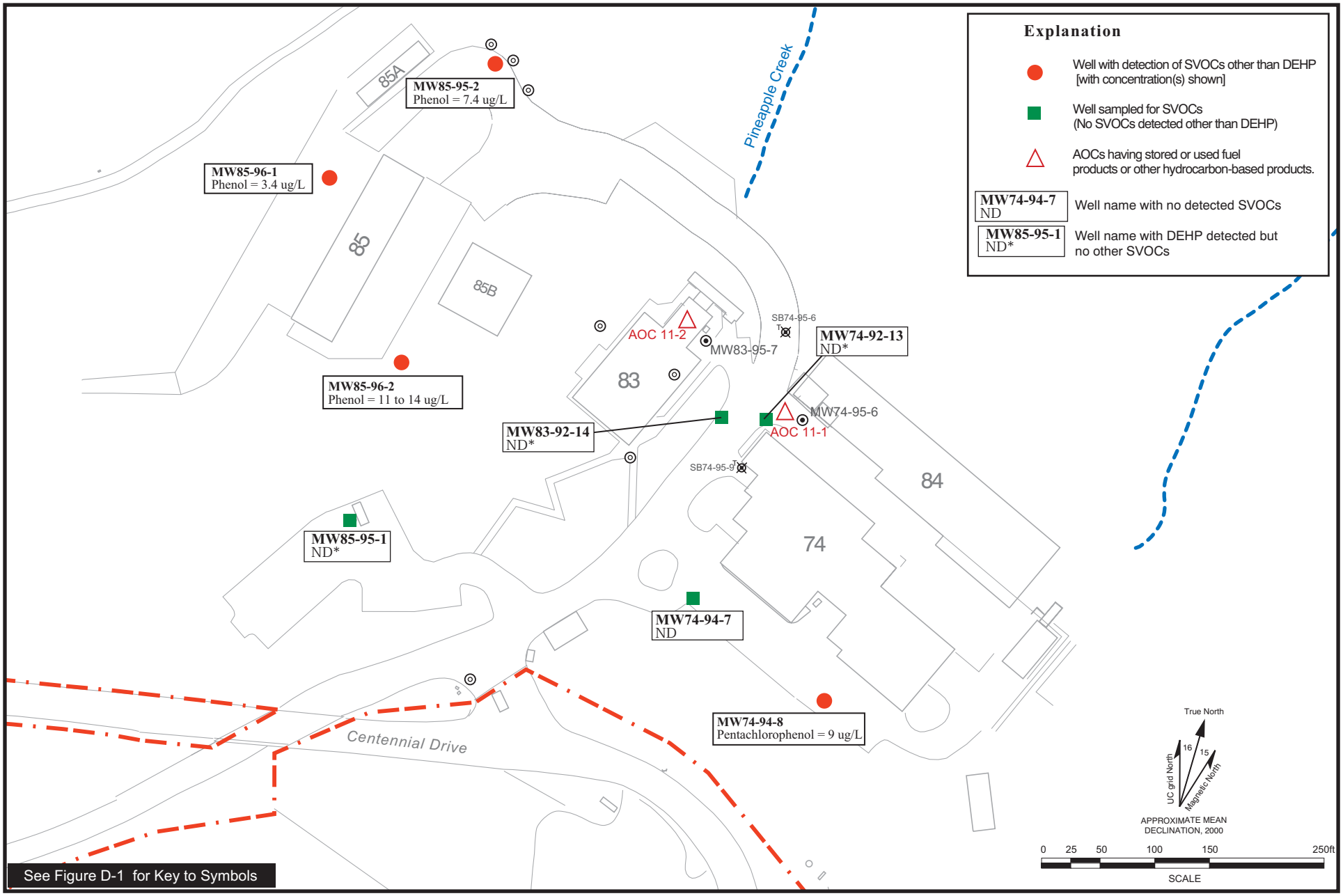
62Map.ai
09/00

Figure D4.4-2c. Aromatic Hydrocarbons Detected in One or More Samples in Groundwater in Southeastern Outlying Area With Locations of SWMUs and AOCs That Stored or Used Fuel Products or Other Hydrocarbon-Based Products.



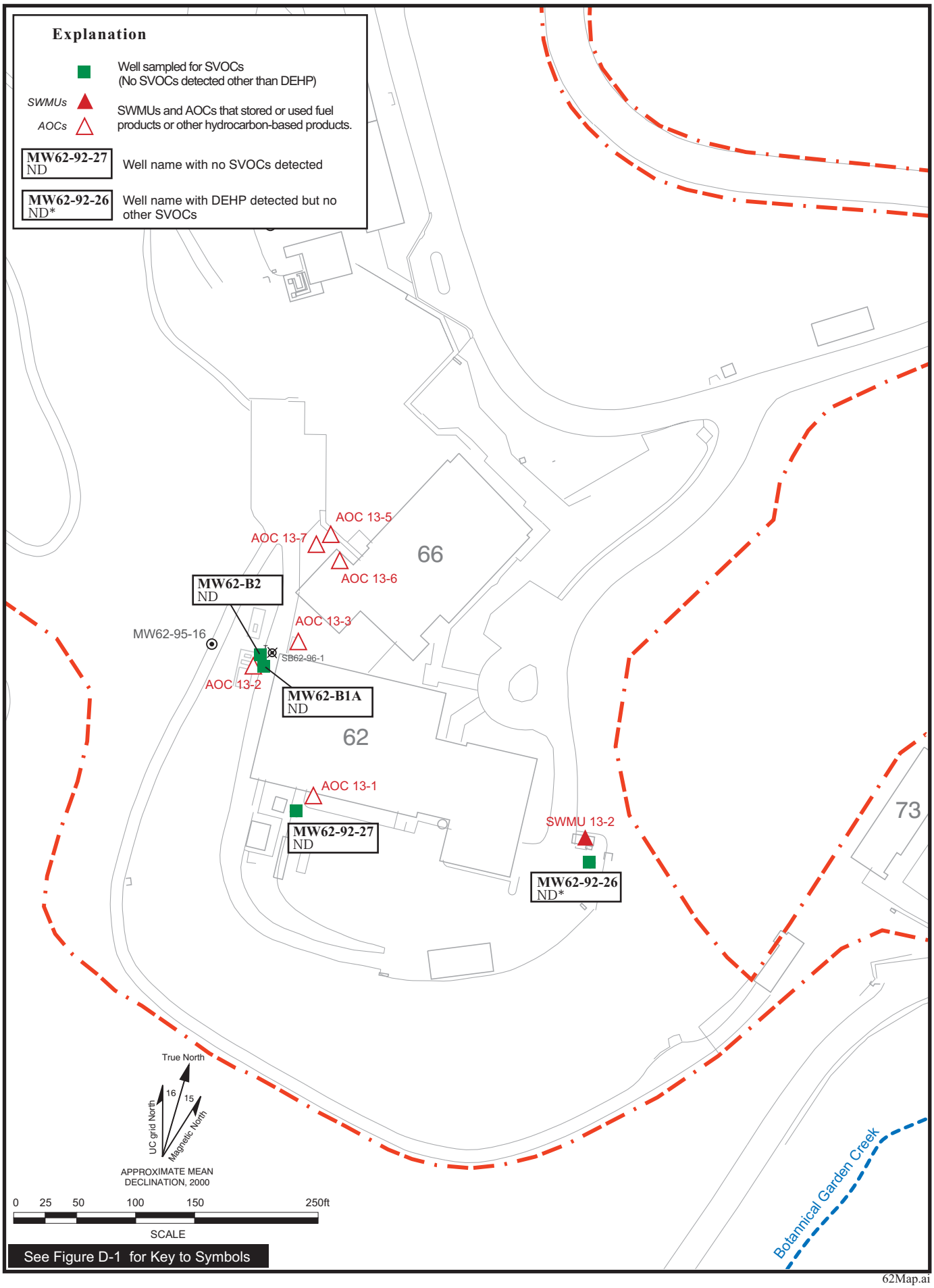
50-70-88map.ai
09/00

Figure D4.5-1a. Locations of Wells Sampled for SVOCs in Western Outlying Area With Locations of SWMUs and AOCs That Stored or Used SVOCs.



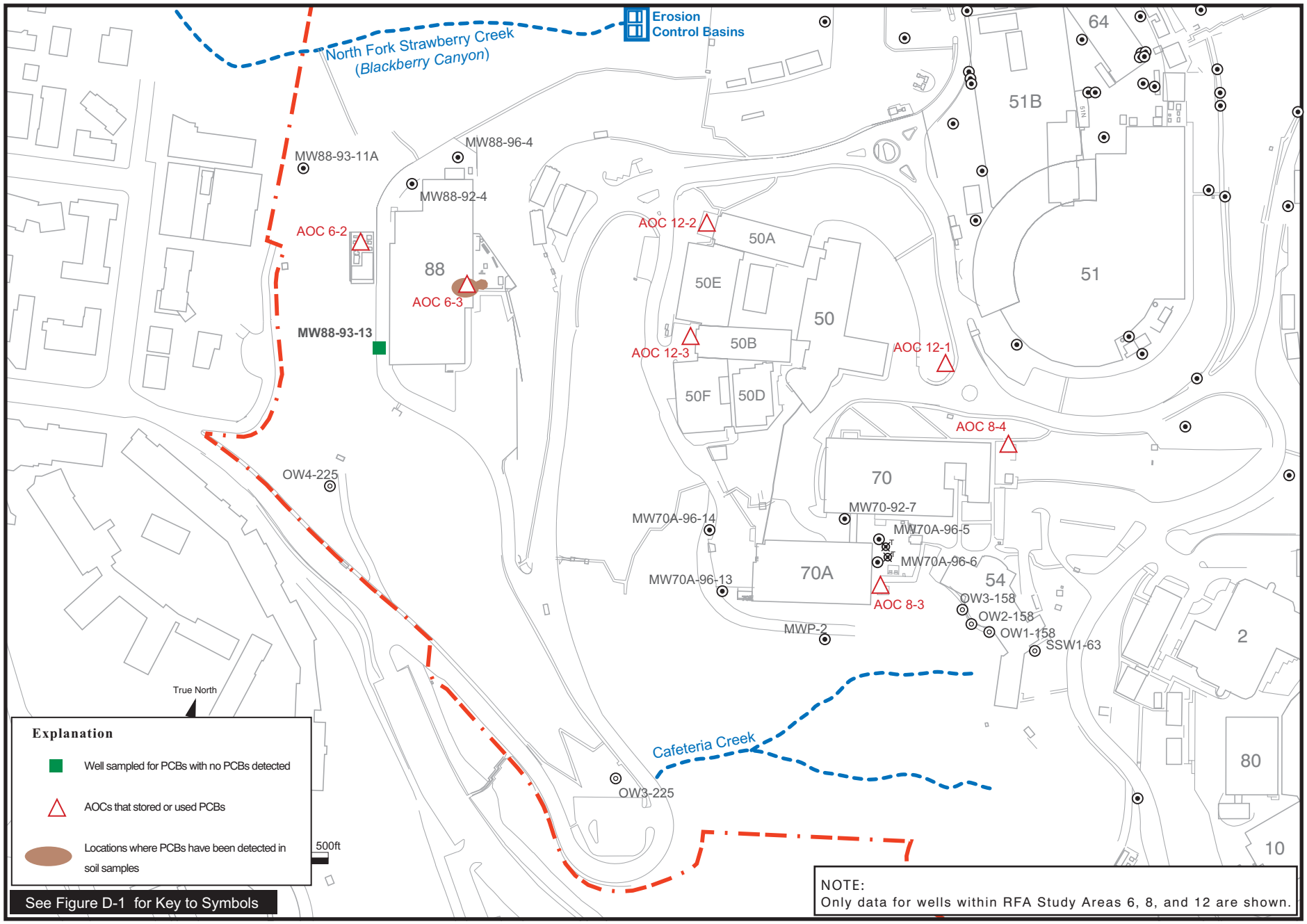
74-85map.ai
09/00

Figure D4.5-1b. Locations of Wells Sampled for SVOCs in Northeastern Outlying Area With Locations of AOCs That Stored or Used SVOCs.



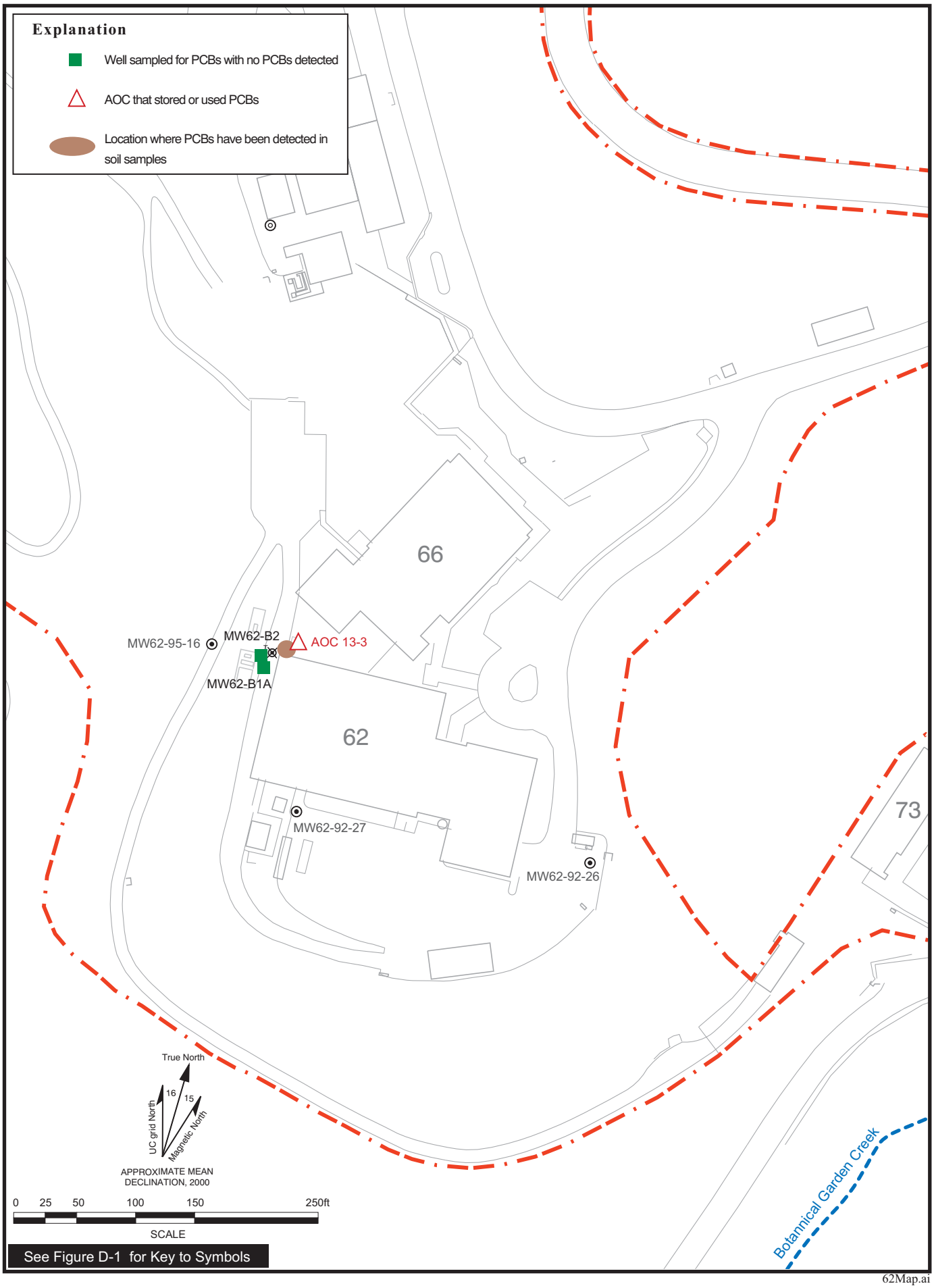
62Map.ai
09/00

Figure D4.5-1c. Locations of Wells Sampled for SVOCs in Southeastern Outlying Area With Locations of SWMUs and AOCs That Stored or Used SVOCs.



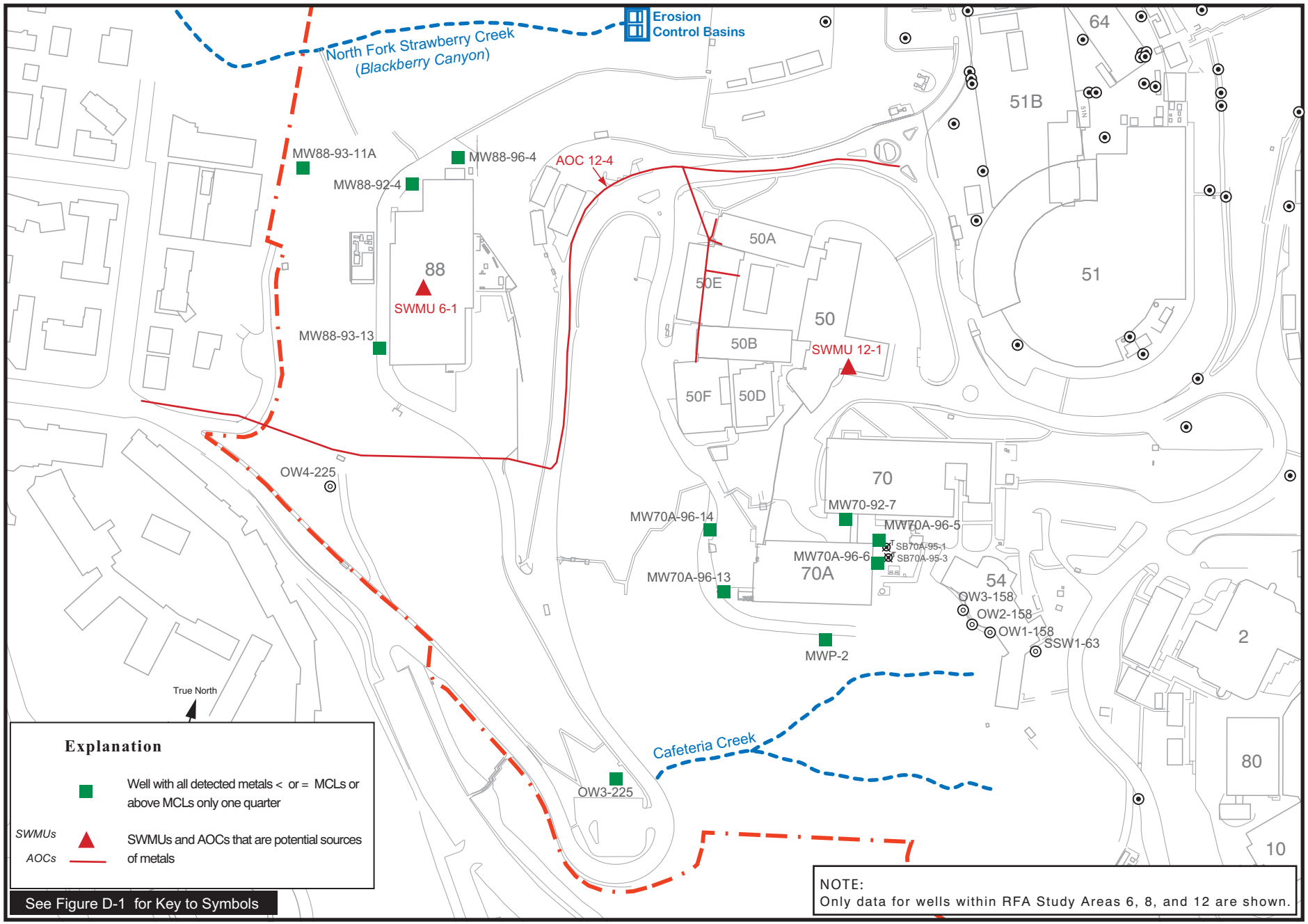
50-70-88map.ai
09/00

Figure D4.6-1a. Location of Well Sampled for PCBs in Groundwater in Western Outlying Area With Locations of AOCs That Stored or Used PCBs.



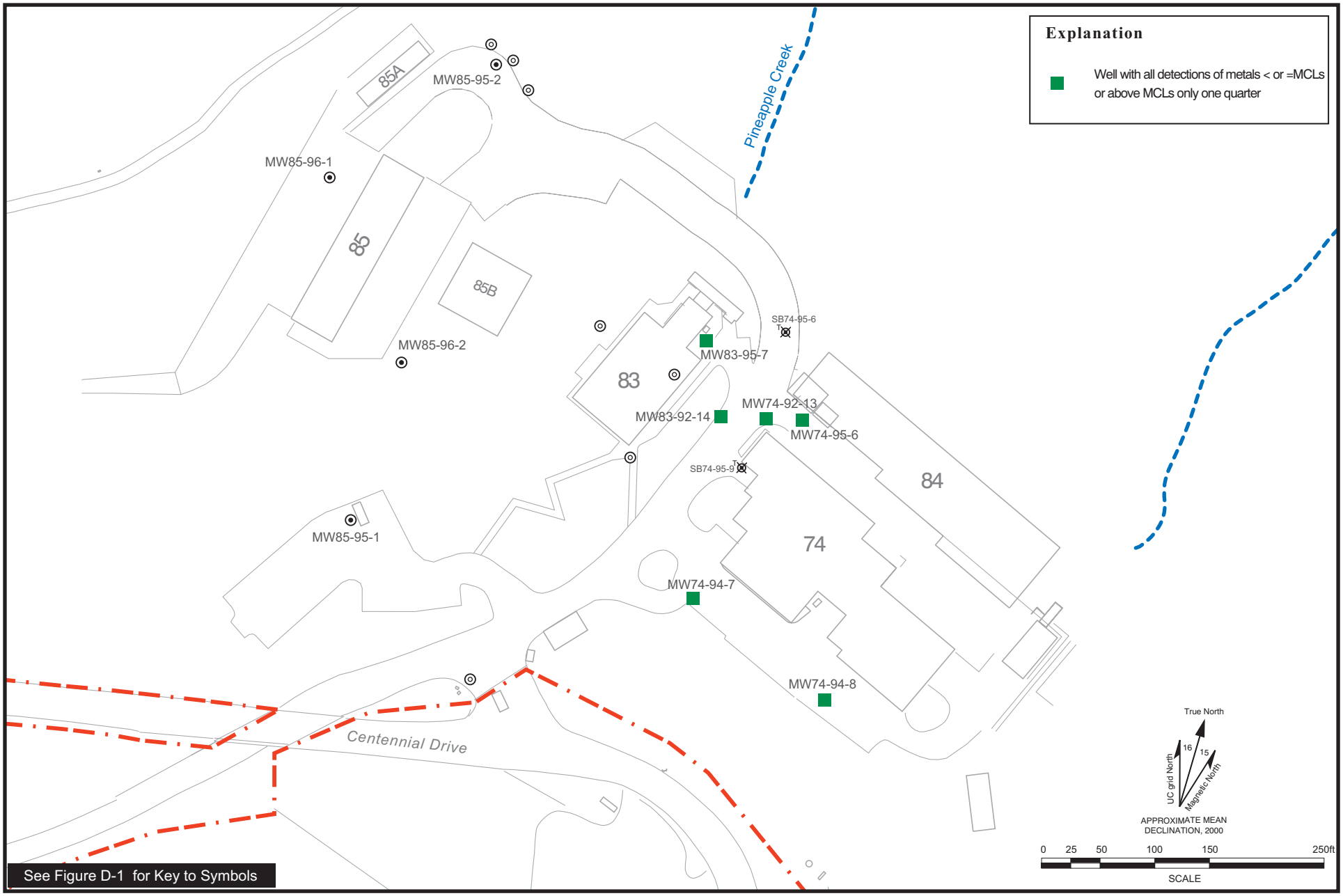
62Map.ai
09/00

Figure D4.6-1b. PCBs in Groundwater and Soil in Southeastern Outlying Area With Location of AOC That Stored or Used PCBs.



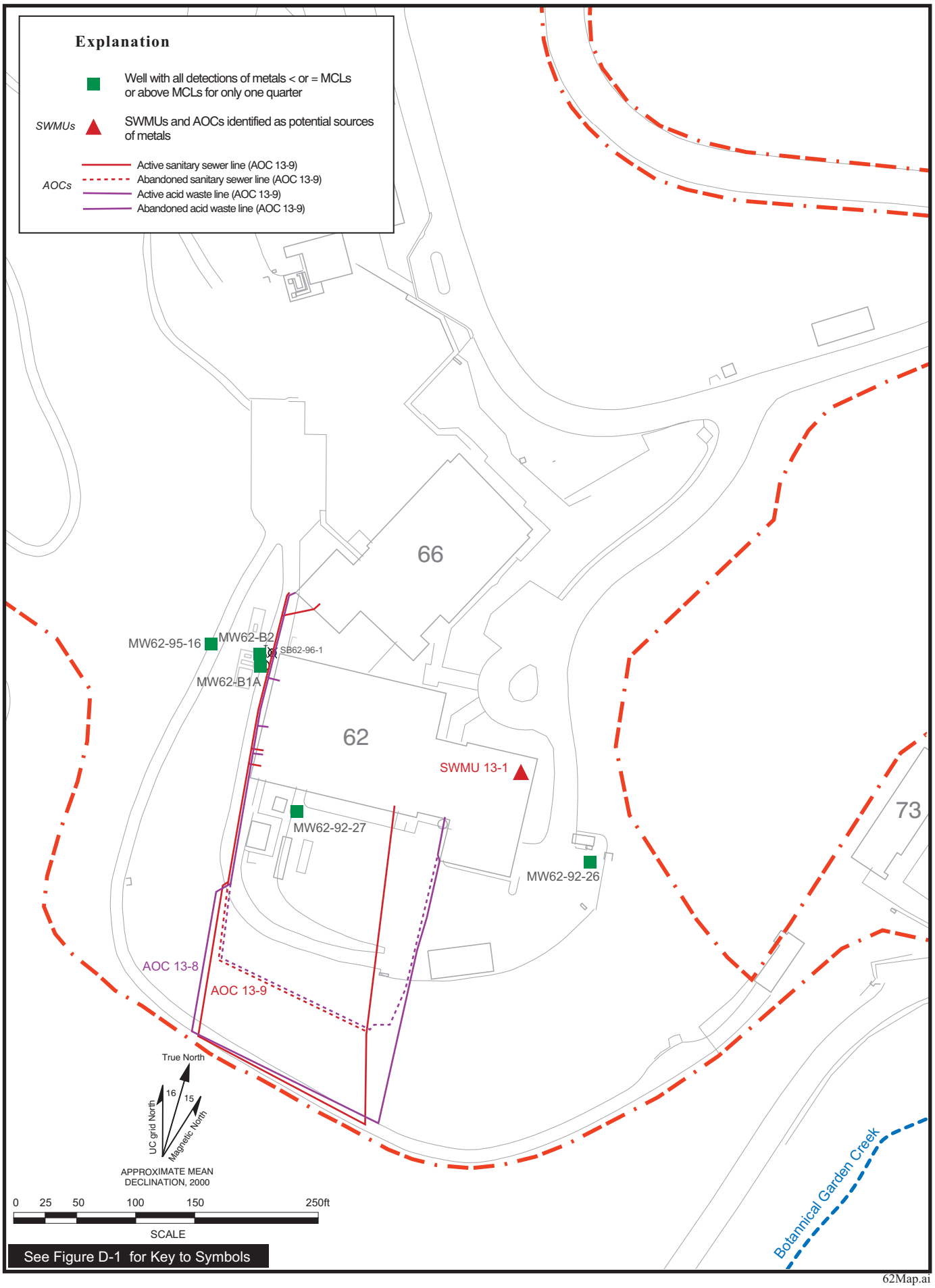
50-70-88map.ai
09/00

Figure D4.7-1a. Location of Wells Sampled for Metals in Groundwater in Western Outlying Area.



74-85map.ai
09/00

Figure D4.7-1b. Wells Sampled for Metals in Groundwater in Northeastern Outlying Area.



62Map.ai
09/00

Figure D4.7-1c. Wells Sampled for Metals in Groundwater in Southeastern Outlying Area.

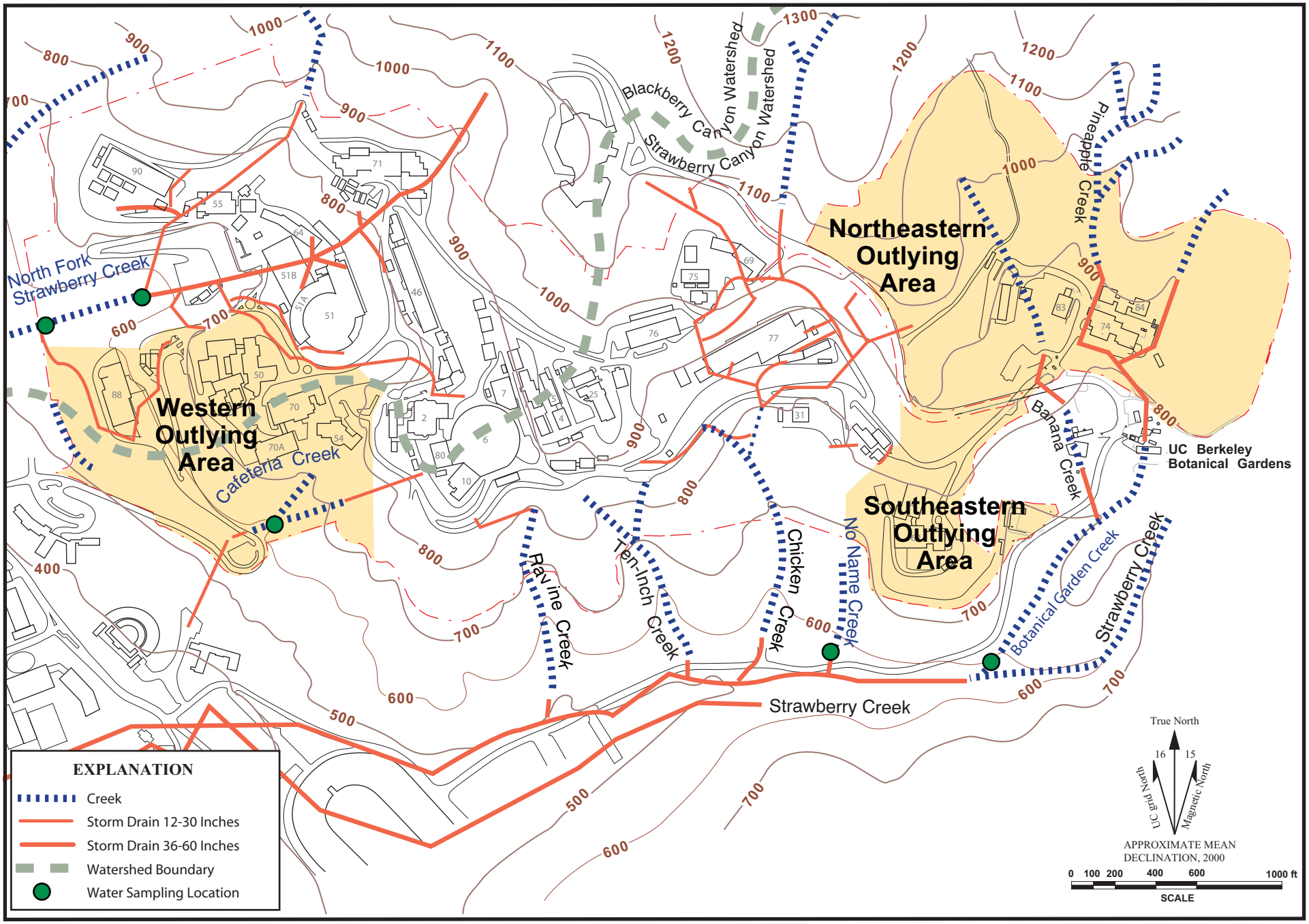


Figure D4.8-1. Surface Water Sampling Locations Evaluating Potential Migration Pathways of Contamination in Outlying Areas to Surface Water.

D4.8-1 OutAreaSurfWtr.ai
09/00

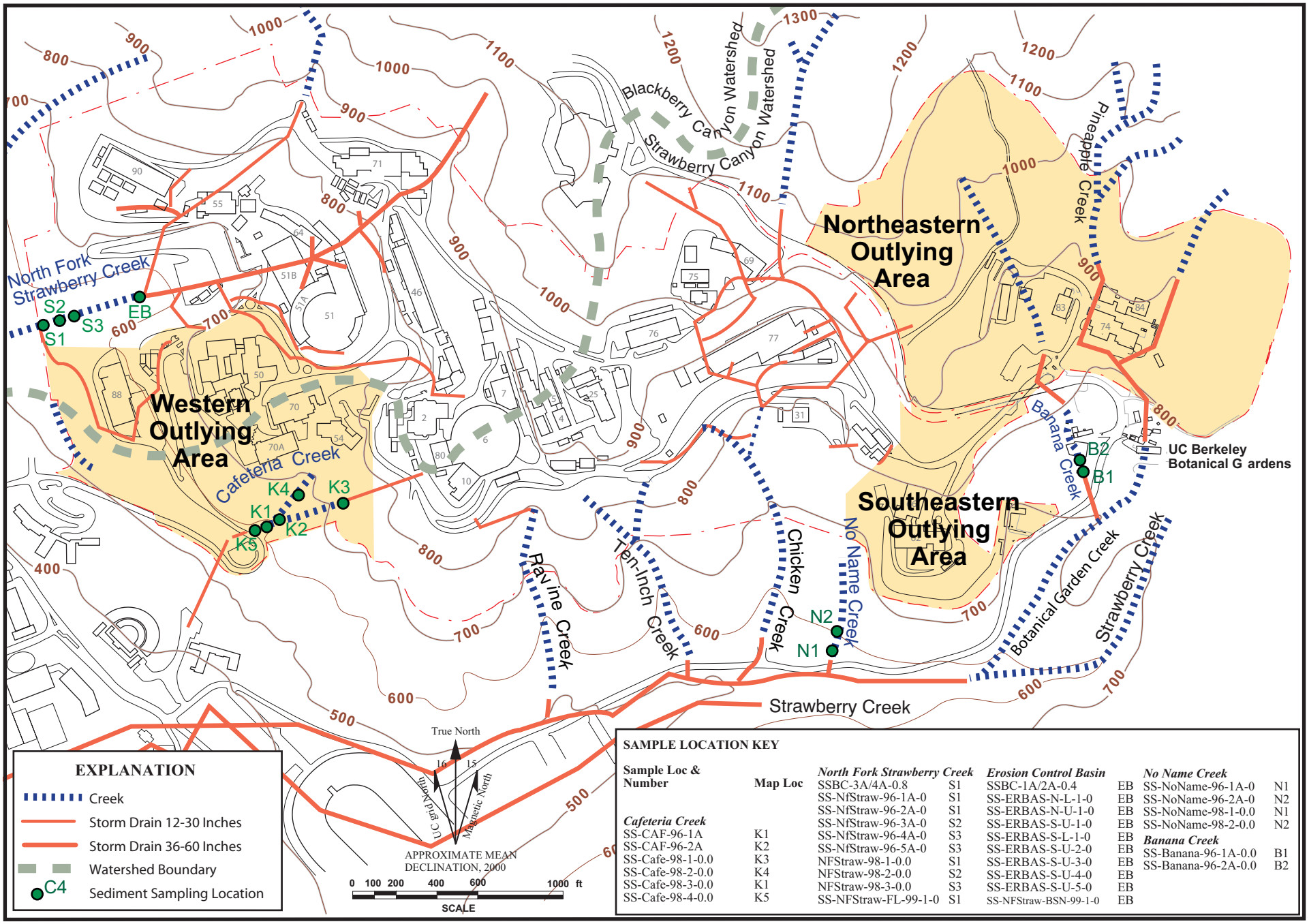
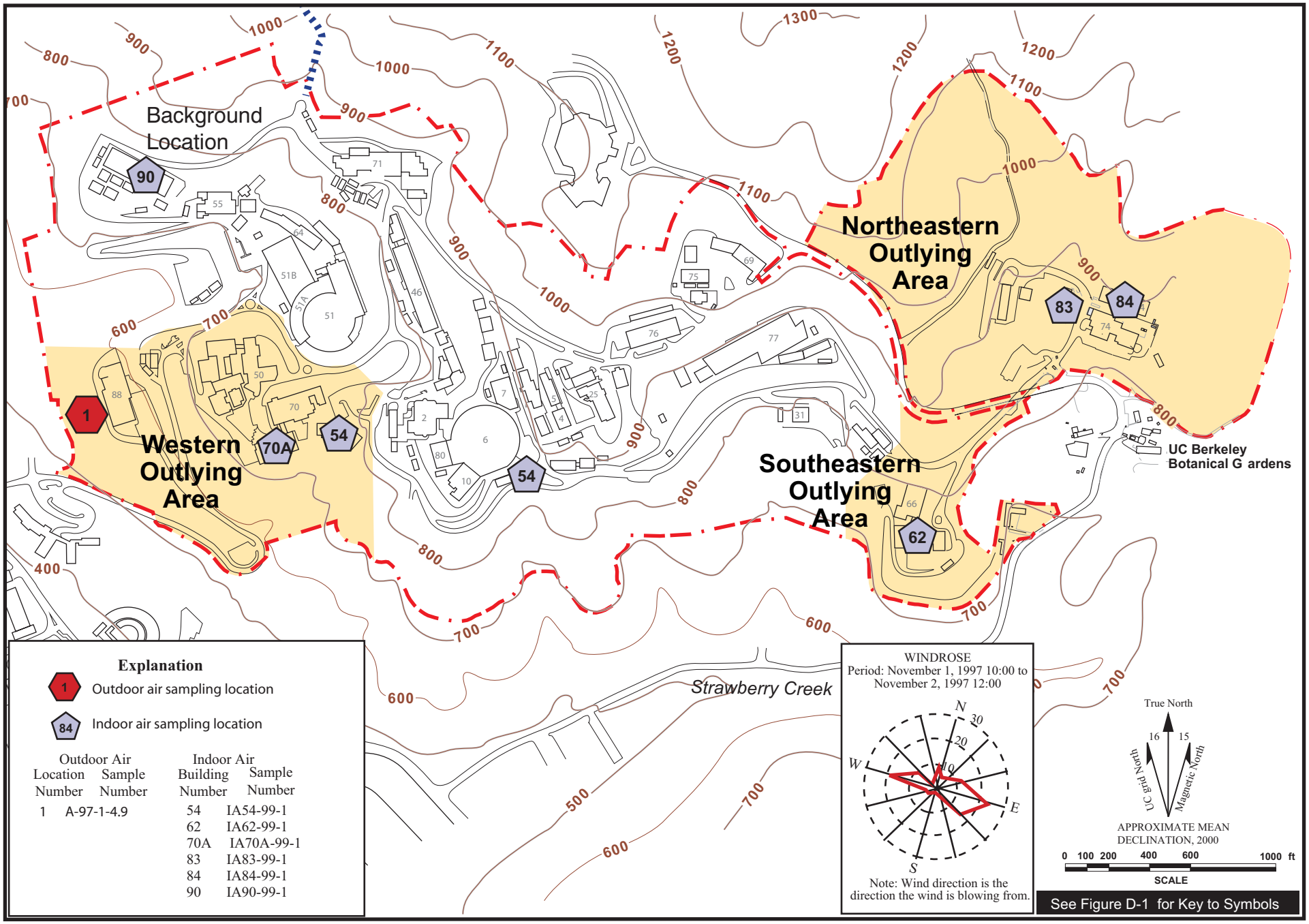


Figure D4.8-2. **Sediment Sampling Locations Evaluating Potential Migration Pathways of Contamination in Outlying Areas to Surface Water.**

D4.8-2 OutAreaSed.ai
09/00



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D5.1-1air.ai
09/00

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Table D1-1
Outlying Areas RCRA SWMUs and AOCs

LBNL Unit Number		Current Status	Status Approval Date	Module Section or RFI Report Where Unit is Described
Units Described in This Report				***Module Section***
SWMU 13-02	B62 Waste Accumulation and Chemical Storage Area	NFA	7/5/1996 (DTSC, 1996b)	D3.1
AOC 08-01	B70A Diesel UST	NFA	5/4/1998 (COB, 1998)	D3.2
AOC 08-02	B70 Former Diesel UST	NFA	12/3/1996 (COB, 1996b)	D3.3
AOC 08-07	B70A Sanitary Sewer	NFA	9/28/1999 (DTSC, 1999b)	D3.4
AOC 11-01	B74 Former Diesel UST	NFA	4/9/1999 (COB, 1999)	D3.5
AOC 11-03	B83/83A Sanitary Sewers	NFA	8/25/1997 (DTSC, 1997)	D3.6
AOC 12-04	B50 Sanitary Sewer Dislocations	NFA	9/30/1998 (DTSC, 1998)	D3.7
AOC 13-01	B62 (Former) Hazardous Materials Storage Area	NFI	7/5/1996 (DTSC, 1996b)	D3.8
AOC 13-02	B62 Former Diesel UST	NFA	7/15/1997 (COB, 1997b)	D3.9
AOC 13-04	Possible Solvent Spills East of Building 62	NFA	8/25/1997 (DTSC, 1997)	D3.10
Units Described in Prior Reports				***Report***
SWMU 06-01	*B88 Acid Dip Sink*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1992d
SWMU 06-02	B88 Former Waste Accumulation Area	NFA	7/5/96 (DTSC, 1996b)	LBNL, 1994l
SWMU 08-01	B70A Former Wastewater Storage Tanks	NFA	7/5/96 (DTSC, 1996b)	LBNL, 1995k
SWMU 08-02	*B70 New and Inactive Waste Neutralization Units*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1994l
SWMU 08-03	*B70 Temporary Waste Accumulation Area*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1992d
SWMU 11-01	*B74 Temporary Waste Accumulation Area*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1992d
SWMU 12-01	B50 Former Residual Photographic Solution UST	NFA	7/29/1996 (COB, 1996a)	LBNL, 1992d
SWMU 13-01	*B62 Machine Shop Acid Dip Sink*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1992d
SWMU 13-03	*B62 Former Ion Exchange Column*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1994l
AOC 06-01	B88 Abandoned Diesel UST	NFA	7/29/1996 (COB, 1996a)	LBNL, 1992d
AOC 06-02	B88 Transformers	NFA	5/18/1995 (DTSC, 1995)	LBNL, 1992d
AOC 06-03	B88 Hydraulic Gate Unit	NFI	7/5/96 (DTSC, 1996b)	LBNL, 1994l
AOC 06-04	B88 Hazardous Materials Storage Area	NFA	7/5/96 (DTSC, 1996b)	LBNL, 1992d
AOC 08-03	B70A Transformer	NFA	5/18/1995 (DTSC, 1995)	LBNL, 1992d
AOC 08-04	B70 Transformer	NFA	5/18/1995 (DTSC, 1995)	LBNL, 1992d
AOC 08-05	B70 Hazardous Materials Storage Area	NFA	8/25/1997 (DTSC, 1997)	LBNL, 1995k
AOC 08-06	B58/70 Sanitary Sewer	NFI	9/30/1998 (DTSC, 1998)	LBNL, 1992d
AOC 11-02	B83 Diesel Above Ground Storage Tank	NFA	8/25/1997 (DTSC, 1997)	LBNL, 1992d
AOC 12-01	*B50 Transformer*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1994l
AOC 12-02	*B50A Transformer*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1995k
AOC 12-03	*B50B Transformer*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1995k
AOC 13-03	B62 Transformer	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1992d
AOC 13-05	*B66 Diesel UST #1*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1995k
AOC 13-06	*B66 Aboveground Diesel Day Tank*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1992d
AOC 13-07	*B66 Diesel UST #2*	NFA	4/6/1994 (DTSC, 1994a)	LBNL, 1992d
AOC 13-08	Acid Sewer Lines West of B62	NFA	8/25/1997 (DTSC, 1997)	LBNL, 1992d
AOC 13-09	Sanitary Sewers South of B62	NFA	8/25/1997 (DTSC, 1997)	LBNL, 1992d

NFI = No Further Investigation Status. Unit will be included in the site wide risk assessment.
NFA = No Further Action Status. Unit has been approved for exclusion from any additional RCRA corrective action process requirements.

Note: Radiological SWMUs and AOCs are not included in this table.

Table D3-1
Soil Sampling Results
Metals
(Concentrations in mg/kg)

				Sb	As	Ba	Be	Cd	Cr	CrVI	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
Maximum Background Concentrations				5.5	19.1	323.6	1.0	2.7	99.6		22.2	69.4	16.1	0.4	7.4	119.8	5.6	1.8	7.6	74.3	106.1
USEPA Region 9 PRGs				31	0.39	5400	150	37	210	30	4700	2900	400	23	390	1600	390	390	6.3	550	23000
California Modified PRGs								9		0.2						150					
Sample ID	Depth (ft)	Date	Lab																		
SWMU 13-2: Building 62																					
BS62-92-18-3	3.0	Jun-92	C	1.8	4.9	110	<0.05	1.9	23		9.8	8.7	9.9	<0.05	<0.25	19	<0.5	<0.25	<2	16	37
BS62-92-18-8.5	8.5			<1	3.4	99	<0.05	1.9	7.6		11	13	9.9	<0.05	<0.25	27	<0.5	<0.25	<2	11	70
BS62-92-18-13.5	13.5			1.1	12.4	140	0.29	2.3	23		17	24	12	<0.05	<0.25	25	<0.5	<0.25	<2	17	87
BS62-92-18-18	18.0			<1	5.3	180	<0.05	2.6	39		7.5	11	10	<0.05	<0.25	37	<0.5	<0.25	<2	21	60
MW62-92-26-6	6	Sep-92	C	<1	13	120	0.38	<0.05	25		2.5	9.8	2.8	<0.05	<0.25	18	5.7	<0.25	90	14	39
MW62-92-26-11	11			<1	11	170	0.39	<0.05	21		5.2	27	8.4	<0.05	<0.25	23	2.5	<0.25	<2	17	140
MW62-92-26-21	21			<1	11	84	0.17	<0.05	23		4.6	30	2.6	<0.05	<0.25	26	0.9	<0.25	<2	16	60
MW62-92-26-30.5	30.5			1.3	21	53	0.11	<0.05	26		13	46	11	0.11	<0.25	28	<0.5	<0.25	<2	43	98
MW62-92-26-40.3	40.3			<1	26	39	0.16	<0.05	29		14	53	9.9	0.08	<0.25	31	<0.5	<0.25	<2	51	95
MW62-92-26-50.5	50.5			1.3	28	37	0.07	<0.05	27		17	41	12	0.09	<0.25	38	<0.5	<0.25	<2	38	90
SB62-95-11-5.7	5.7	Jul-95	BC																<5		
AOC 8-1: Building 70A Diesel Underground Storage Tank																					
BS-MW70A-96-5-6	6	Apr-96	CLS	<5	3.0	110	<0.14	0.63	29		9.4	32	13	<0.05	<2.5	31	<0.5	<1	<4	36	75
BS-MW70A-96-5-15	15			<6	9.7	58	0.60	1.1	44		9.4	46	15	<0.05	<2.5	40	<0.5	<1	<4	52	110
BS-MW70A-96-6-4.5	4.5	Apr-96	CLS	<5	5.8	120	<0.14	0.84	29		11	36	14	<0.05	<2.5	36	<0.5	<1	<4	36	93
BS-MW70A-96-6-14.5	14.5			<5	17	53	0.66	2.0	48		14	49	27	<0.05	<2.5	61	<0.1	<1	<4	52	110
BS-MW70A-96-6-24.5	24.5			<5	15	54	0.47	1.2	31		7.7	38	16	<0.05	<2.5	33	<0.5	<1	<4	38	89
BS-MW70A-96-6-39.5	39.5			<5	17	60	<0.14	0.7	24		16	16	13	0.050	<2.5	32	<0.5	<1	<4	38	65
AOC 8-7: Building 70A Sanitary Sewer System																					
MW70A-96-13-8.2	8.2	Sep-96	BC	<10	14	178	<1	<1	40		15	44	12	<0.2	<5	34	2.4	<2	<10	48	92
MW70A-96-13-18	18			<10	18	170	<1	<1	33		13	45	14	<0.2	<5	39	2.2	<2	<10	43	103
MW70A-96-13-48	48			<10	18	32	<1	<1	17		<5	19	<5	<0.2	<5	8.7	1.1	<2	<10	20	42
MW70A-96-13-68	68			<10	14	138	<1	<1	64		16	61	14	<0.2	<5	67	2.5	<2	<10	59	105
MW70A-96-13-78	78			<20	12	75	<2	<2	68		15	63	15	<0.2	<10	67	3.4	<4	<20	65	122
MW70A-96-14-10	10	Sep-96	BC	<10	12	188	<1	<1	43		26	60	14	<0.2	<5	51	3.0	<2	<10	59	127
MW70A-96-14-20.5	20.5			<10	9.3	110	<1	<1	40		18	80	13	<0.2	<5	56	2.4	<2	<10	52	142

Table D3-1
Soil Sampling Results
Metals
(Concentrations in mg/kg)

				Sb	As	Ba	Be	Cd	Cr	CrVI	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
Maximum Background Concentrations				5.5	19.1	323.6	1.0	2.7	99.6		22.2	69.4	16.1	0.4	7.4	119.8	5.6	1.8	7.6	74.3	106.1
USEPA Region 9 PRGs				31	0.39	5400	150	37	210	30	4700	2900	400	23	390	1600	390	390	6.3	550	23000
California Modified PRGs								9		0.2						150					
Sample ID	Depth (ft)	Date	Lab																		
MW70A-96-14-30	30	Sep-96	BC	<10	10	179	<1	<1	44		18	44	9.2	<0.2	<5	52	2.6	<2	<10	59	109
MW70A-96-14-40	40			<10	8.9	137	<1	<1	44		19	49	10	<0.2	<5	57	2.6	<2	<10	53	109
SB70A-96-1-7	7	Oct-96	CLS	<0.9	<1	170	0.94	<1	36		18	48	10	0.54	<4	44	<1	<0.4	<1	52	100
SB70A-96-2-5	5			<0.9	4.1	120	0.85	<1	26		14	34	13	<0.2	<4	37	<1	<0.4	<1	39	80
SB70A-96-3-5.5	5.5			<0.9	2.1	150	0.73	<1	29		16	41	11	<0.2	<4	37	<1	<0.4	<1	43	97
SB70A-96-4-7	7			<0.9	2.1	130	0.91	<1	36		22	59	12	<0.2	<4	45	<1	<0.4	<1	51	120
SB70A-96-5-7	7			<0.9	1.7	83	0.84	<1	34		18	60	12	<0.2	<4	48	<1	<0.4	<1	49	120
SS-70ASWR-99-1-4.0	4	Sep-99	BC	<10	10	173	<1	<1	34		13	14	12	<0.2	<5	41	<1	<2	<10	50	88
SS-70ASWR-99-2-3.6	3.6			<10	9.5	181	<1	<1	40		46	46	13	<0.2	<5	45	<1	<2	<10	63	90

AOC 11-1: Building 74 Former Diesel Underground Storage Tank

SB74-92-13-6	6	Apr-92	C	1.5	<0.25	45	0.1	1.2	12		3.2	7.5	4.5	0.12	0.28	45	<0.5	<0.25	<2	7.8	26
SB74-92-13-16	16			<1	<0.25	39	0.23	1.4	11		3.5	11	3.5	0.1	<0.25	16	<0.5	<0.25	<2	5.4	24
SB74-92-13-25.5	25.5			<1	<0.25	38	0.08	3.3	11		3.7	21	4.3	0.39	<0.25	25	<0.5	<0.25	<2	9.0	29
SB74-92-13-33	33			<1	<0.25	49	0.26	1.4	12		3.6	17	3.9	0.4	0.26	21	0.63	<0.25	<2	5.5	24
SB74-92-13-40	40			<1	<0.25	1.7	0.06	0.69	4.1		1.7	6.6	2.3	0.07	0.38	6.2	<0.5	<0.25	<2	3.3	17
SB83-92-14-6	6	Mar-92	Q	<2	3	69	0.4	0.5	21		10	18	7	<0.2	<0.6	56	<2	<0.2	4	28	55
SB83-92-14-11	11			<2	1	87	0.4	<0.2	16		9	13	8	<0.2	<0.6	51	<2	<0.2	<2	8	42
SB83-92-14-16	16			<2	3	250	0.4	0.5	27		9.7	20	8	<0.2	<0.6	56	3	<0.2	8	13	75
SB83-92-14-20	20			<2	4	59	0.3	0.5	22		7.1	7	4	<0.2	<0.6	51	3	<0.2	5	11	32
SB83-92-14-30.5	30.5			<2	7	210	0.6	0.3	34		23	30	9	<0.2	<0.6	120	3	<0.2	5	8	84
SB83-92-14-40.5	40.5			<2	14	100	0.3	<0.2	9		4.6	3	6	<0.2	<0.6	21	3	<0.2	10	7	19
SB83-92-14-50	50			<2	4	120	0.4	0.3	14		5.4	16	7.0	<0.2	1.2	33	<2	<0.2	3	8	47
SB83-92-14-57	57			<2	3	92	0.3	0.3	10		4.5	6	6.0	<0.2	<0.6	34	3	<0.2	<3	6	41
SB74-94-06-10.5	10.5	Jul-94	BC	<5	0.76	105	<0.5	<0.5	19		5.6	19	3.4	<0.2	<2.5	22	<0.5	<1	<5	9.6	45
SB74-94-06-21.5	21.5			<5	9.6	135	<0.5	<0.5	18		10	34	5.4	<0.2	<2.5	46	<0.5	<1	<5	12	52
BS74-94-06-30	30			<5	4.1	75	<0.5	<0.5	19		4.8	23	<2.5	<0.2	<2.5	21	<0.5	<1	<5	15	35
BS74-94-06-40	40			<5	4.3	90	<0.5	<0.5	14		4.2	28	4	<0.2	<2.5	27	<0.5	<1	<5	9.8	53
BS74-94-07-5	5			<5	5.3	11	<0.5	<0.5	21		4.6	5	3.5	<0.2	<2.5	20	<0.5	<1	<5	17	18
BS74-94-07-15	15			<5	2.7	61	<0.5	0.52	15		4.2	12	3	<0.2	<2.5	16	<0.5	<1	<5	11	28
BS74-94-07-25	25			<5	4.1	95	<0.5	<0.5	14		5.4	13	4.4	<0.2	<2.5	30	<0.5	<1	<5	11	37
BS74-94-08-10.5	10.5			<5	6.8	111	0.54	0.84	40		9.7	32	7.7	<0.2	<2.5	48	0.62	<1	<5	20	94
BS74-94-08-20	20			<5	8.7	106	<0.5	<0.5	23		8.4	20	4.8	0.36	<2.5	42	<0.5	<1	<5	14	48

Table D3-1
Soil Sampling Results
Metals
(Concentrations in mg/kg)

Sample ID	Depth (ft)	Date	Lab	Sb	As	Ba	Be	Cd	Cr	CrVI	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
Maximum Background Concentrations				5.5	19.1	323.6	1.0	2.7	99.6		22.2	69.4	16.1	0.4	7.4	119.8	5.6	1.8	7.6	74.3	106.1
USEPA Region 9 PRGs				31	0.39	5400	150	37	210	30	4700	2900	400	23	390	1600	390	390	6.3	550	23000
California Modified PRGs								9		0.2						150					
BS74-94-08-30	30	Jul-94	BC	<5	5.5	123	<0.5	<0.5	26		5.1	25	4.2	<0.2	3.8	31	<0.5	<1	<5	26	55
BS74-94-08-38	38			<5	3.2	75	<0.5	<0.5	17		3.6	6.2	3.2	<0.2	<2.5	19	<0.5	<1	<5	13	28
BS-SB74-97-1-11-31comp	11-31	Feb-97	BC	<5	7.9	114	<0.5	<0.5	40		9.8	18	3.5	<0.2	<2.5	64	<0.5	<1	<5	18	43
AOC 12-4: Building 50 Sanitary Sewer Dislocations																					
SS50W-07-8	8.0	May-92		<1	3.2	18	0.2	2.2	12		5.7	24	6.4	0.05	<0.25	14	<0.5	<0.25	<2	17	35
AOC 13-1: Building 62 Former Hazardous Materials Storage Area																					
BS62-92-19-11.5	11.5	Jun-92	C	2.1	13.1	84	0.28	5.8	81		9.9	42	24	0.12	<0.25	27	<0.5	<0.25	<2	40	97
MW62-92-27-5.5	5.5	Sep-92	C	1.2	16	103	0.17	<0.05	19		6.3	11	6.1	<0.05	0.68	14	2.0	<0.25	<2	38	49
MW62-92-27-15.5	15.5			1.9	17	51	0.11	<0.05	32		11	60	12	0.08	<0.25	33	<0.5	<0.25	<2	40	130
MW62-92-27-25.5	25.5			1.8	18	320	0.57	<0.05	31		10	77	9.2	<0.05	<0.25	28	<0.5	<0.25	<2	47	130
MW62-92-27-35.5	35.5			<1	25	36	0.09	<0.05	26		16	45	12	0.07	<0.25	38	<0.5	<0.25	<2	34	93
MW62-92-27-45.5	45.5			1.2	18	41	0.15	<0.05	29		11	44	9.6	0.08	<0.25	37	<0.5	<0.25	<2	37	107
MW62-92-27-55.5	55.5			<1	24	53	0.23	<0.05	34		12	50	11	0.08	<0.25	37	<0.5	<0.25	<2	43	105
MW62-92-27-65	65			1.9	18	55	0.13	<0.05	32		9.3	53	8.9	0.06	<0.25	28	<0.5	<0.25	<2	45	107
AOC 13-2: Building 62 Former Diesel UST																					
MW62-95-16-10.3	10.3	Aug-95	BC	<5	8.0	195	0.69	<0.5	43		31	58	12	<0.2	<2.5	37	<0.5	1.1	8.9	57	114
MW62-95-16-20	20			<5	19	159	0.60	<0.5	39		14	40	14	<0.2	<2.5	32	<0.5	<1	6.9	52	99
MW62-95-16-30.5	30.5			<5	9.2	57	0.58	<0.5	38		19	54	13	<0.2	<2.5	53	0.59	1.1	8.0	47	107

Table D3.1-1
Soil Sampling Results (mg/kg)
SWMU 13-2: Building 62
Concentrations of Organic Constituents
COPCs: Halogenated VOCs

				VOCs
				PCE
			PRG	5.7
Sample ID	Depth (ft)	Date	Lab	
BS62-92-18-3.5	3.5	Jun-92	LBNL	<0.005
BS62-92-18-5	5			0.0106
BS62-92-18-9.5	9.5			<0.005
BS62-92-18-14.5	14.5			<0.005
BS62-92-18-19.5	19.5			0.0122
MW62-92-26-6	6	Sep-92	C	<0.005
MW62-92-26-11	11			<0.005
MW62-92-26-21	21			<0.005
MW62-92-26-30.5	30.5			<0.005
MW62-92-26-40.3	40.3			<0.005
MW62-92-26-50.5	50.5			<0.005

= Not analyzed

< = Not detected above reporting limit (reporting limit shown)

C = Analysis by Chromalab
LBNL = Analysis by Lawrence Berkeley Lab
COPCs = Chemicals of Potential Concern
VOCs analyzed by EPA Method 8240, or 8260

Table D3.2-1

Soil Sampling Results (mg/kg)

AOC 8-1: Building 70A Diesel Underground Storage Tank

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

				VOCs	SVOCs	BTEX		TPH-Motor Oil	TPH-Diesel
						Toluene	Xylene		
			PRG			520	210		
Sample ID	Depth (ft)	Date	Lab						
BS-SB-70A-95-1-5.2	5.2	Aug-95	BC		ND	<0.005	<0.01		75
BS-SB-70A-95-1-10.7	10.7				Bis(2-ethylhexyl)phthalate=0.4 Fluorene=0.5 Phenanthrene=0.2	<0.005	<0.01		550
BS-SB-70A-95-1-20.4	20.4				ND	0.006	<0.01		<10
BS-SB-70A-95-2-5.8	5.8				ND	<0.005	<0.01		<10
BS-SB-70A-95-2-10.6	10.6				ND	<0.005	<0.01		13
BS-SB-70A-95-3-15	15				ND	0.006	0.01		<10
BS-SB-70A-95-3-20.6	20.6				ND	<0.005	<0.01		210
BS-SB-70A-95-3-25.8	25.8				ND	0.005	<0.01		<10
BS-MW70A-96-5-6	6	Apr-96	CLS	sec-butylbenzene=0.033				<100	720
BS-MW70A-96-5-10	10							26	11
BS-MW70A-96-5-15	15			ND				<20	9.0
BS-MW70A-96-5-20	20							<2.0	<1.0
BS-MW70A-96-6-4.5	4.5	Apr-96	CLS	ND				2.1	<1.0
BS-MW70A-96-6-9.5	9.5							<2.0	<1.0
BS-MW70A-96-6-14.5	14.5			ND				<2.0	2.2
BS-MW70A-96-6-24.5	24.5			ND				<2.0	<1.0
BS-MW70A-96-6-39.5	39.5			ND				<2.0	<1.0

= Not analyzed

<2 = Not detected above reporting limit (reporting limit shown)

ND = Not detected above reporting limit (reporting limit varies with analyte)

PRGs for Residential Soil for Detected Organic Analytes (mg/kg)

sec-butylbenzene = 110

Bis(2-ethylhexyl)phthalate = 35

Fluorene = 2600

BC = Analysis by BC Laboratories

CLS = Analysis by California Laboratory Services

COPCs = Chemicals of Potential Concern

VOCs analyzed by EPA Method 8010, 8240, or 8260

BTEX analyzed by EPA Method 8020

TPH-Diesel analyzed by EPA Method 8015M

TPH-Motor Oil analyzed by EPA Method 8015M

Table D3.3-1
Soil Sampling Results (mg/kg)
AOC 8-2: Building 70 Diesel Underground Storage Tank
Concentrations of Organic Constituents
COPCs: Fuel Hydrocarbons

				TPH-Diesel
Sample ID	Depth (ft)	Date	Lab	
BS-SB-70-95-1-4.2	4.2	Jun-95	BC	<10
BS-SB-70-95-1-10	10			<10
BS-SB-70-95-1-22	22			<10
SS-70E-1-1.5	1.5	Jun-95	BC	<10
SS-70E-2-3.0	3			<10
SS-70E-3-2.0	2			<10
SS-70NE-96-1-5	5	Feb-96	BC	**170**
SS-70NE-96-2-4.5	4.5			**120**

< = Not detected above reporting limit (reporting limit shown)

BC = Analysis by BC Laboratories
COPCs = Chemicals of Potential Concern
TPH-Diesel analyzed by EPA Method 8015M

Table D3.4-1

Soil Sampling Results (mg/kg*)

AOC 8-7: Building 70A Sanitary Sewer System

Concentrations of Organic Constituents

COPCs: Halogenated VOCs

Sample ID	Depth (ft)	Date	Lab	VOCs	pH
MW70A-96-13-8.2	8.2	Sep-96	BC	ND	
MW70A-96-13-18	18			ND	
MW70A-96-13-48	48			ND	
MW70A-96-13-68	68			ND	
MW70A-96-13-78	78			ND	
MW70A-96-14-10	10	Sep-96	BC	ND	
MW70A-96-14-20.5	20.5			ND	
MW70A-96-14-30	30			ND	
MW70A-96-14-40	40			ND	
SB70A-96-1-7	7	Oct-96	CLS	ND	7.5
SB70A-96-2-5	5			ND	7.5
SB70A-96-3-5.5	5.5			ND	7.4
SB70A-96-4-7	7			ND	7.4
SB70A-96-5-7	7			ND	7.7
SS-70ASWR-99-1-4.0	4	Sep-99	BC	ND	7.51
SS-70ASWR-99-2-3.6	3.6			ND	7.62

ND	= Not detected above reporting limit (reporting limit varies with analyte)
	= Not analyzed

BC = Analysis by BC Laboratories

CLS= Analysis by California Laboratory Services

VOCs analyzed by EPA Method 8260
pH analyzed by EPA Method 9040

*pH reported in standard units

Table D3.5-1

Soil Sampling Results (mg/kg)

AOC 11-1: Building 74 Former Diesel Underground Storage Tank

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

				VOCs	BTEX	Fuel Identification	TPH-Diesel	TPH-Gas	PAH
Sample ID	Depth (ft)	Date	Lab						
MW74-92-13-6	6	Apr-92	C	ND			<1	<1	
MW74-92-13-16	16			ND			9.0	<1	
MW74-92-13-25.5	25.5			ND			9.5	1.2	
MW74-92-13-33	33			ND			28	<1	
MW74-92-13-40	40			ND			60	<1	
MW83-92-14-6	6	Mar-92	Q	PCE=0.005			<1	<0.2	
MW83-92-14-11	11			ND			<1	<0.2	
MW83-92-14-16	16			ND			6	<0.2	
MW83-92-14-20	20			ND			280	<0.2	
MW83-92-14-25.5	25.5			ND			1300	270	
MW83-92-14-30.5	30.5			ND			87	0.4	
MW83-92-14-36	36			ND			800	280	
MW83-92-14-40.5	40.5			ND			2000	<0.2	
MW83-92-14-45.5	45.5			ND			230	1.0	
MW83-92-14-50	50			ND			510	160	
MW83-92-14-55	55			ND			110	0.4	
MW83-92-14-57	57			ND			3000	650	
SB-1	4.5	Mar-94	S	ND			<1		
G-10	5						15		
	10.25						13		
	13			ND			720		
	15.5						1200		
	20.5						40		
	25						950		
	30						1300		
MW74-94-7-5.1	5.1	Apr-94	BC	ND		ND			
MW74-94-7-15.5	15.5			ND		ND			
MW74-94-7-25.5	25.5			ND		Crude Oil=100			

Table D3.5-1

Soil Sampling Results (mg/kg)

AOC 11-1: Building 74 Former Diesel Underground Storage Tank

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

Sample ID	Depth (ft)	Date	Lab	VOCs	BTEX	Fuel Identification	TPH-Diesel	TPH-Gas	PAH
MW74-94-7-35.7	35.7	Apr-94	BC	ND		ND			
MW74-94-7-44.7	44.7			ND		Crude Oil=78			
MW74-94-8-4.2	4.2	May-94	BC	ND		ND		<1	
MW74-94-8-10	10			ND		ND		<1	
MW74-94-8-13.8	13.8			ND		ND		<1	
MW74-94-8-19.5	19.5			ND		ND		<1	
MW74-94-8-29	29			ND		Crude/Waste Oil=130		<1	
SB74-94-01-1	1	Jun-94	BC		ND		<10		
SB74-94-01-5	5				ND		<10		
SB74-94-01-10	10				ND		30		
SB74-94-01-15	15				ND		24		
SB74-94-01-20	20				ND		170		
SB74-94-01-25.5	25.5				ND		140		
SB74-94-01-30	30				ND		740		
SB74-94-01-35	35			ND			740		
SB74-94-01-40	40			ND			63		
SB74-94-02-5	5	Jul-94	BC	ND			12		
SB74-94-02-10	10			ND			130		
SB74-94-02-15	15			ND			710		
SB74-94-02-20	20			ND			11		
SB74-94-02-30	30			ND			630		
SB74-94-02-40	40			ND			1100		
SB74-94-03-5	5			ND			<10		
SB74-94-03-10	10			ND			<10		
SB74-94-03-15	15			ND			100		
SB74-94-03-20	20			ND			160		
SB74-94-03-25	25			ND			15		
SB74-94-03-30	30			ND			13		

Table D3.5-1

Soil Sampling Results (mg/kg)

AOC 11-1: Building 74 Former Diesel Underground Storage Tank

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

Sample ID	Depth (ft)	Date	Lab	VOCs	BTEX	Fuel Identification	TPH-Diesel	TPH-Gas	PAH
SB74-94-03-35	35	Jul-94	BC	ND			540		
SB74-94-03-40	40			ND			140		
SB74-94-04-5	5			ND			<10		
SB74-94-04-10	10			ND			200		
SB74-94-04-15	15			ND			220		
SB74-94-04-20	20			ND			110		
SB74-94-04-25	25			ND			740		
SB74-94-04-30	30			p-Isopropyltoluene=0.0052 Naphthalene=0.012 1,2,4-Trimethylbenzene=0.017			150		
SB74-94-04-35	35			ND			220		
SB74-94-04-40	40			ND			450		
SB74-94-05-6	6				ND		16		
SB74-94-05-10	10				ND		220		
SB74-94-05-16	16				ND		23		
SB74-94-05-20.5	20.5				ND		40		
SB74-94-05-23	23				ND		170		
SB74-94-05-30	30			ND			840		
SB74-94-05-35	35			ND			630		
SB74-94-05-40	40			ND			240		
SB74-94-05-45	45			ND			93		
SB74-94-05-50	50			ND			44		
SB74-94-06-5.5	5.5			ND			40		
SB74-94-06-10.5	10.5			ND			<10		
SB74-94-06-15.5	15.5			ND			<10		
SB74-94-06-21.5	21.5			ND			380		
SB74-94-06-30	30			ND			460		
SB74-94-06-35	35			ND			490		

Table D3.5-1

Soil Sampling Results (mg/kg)

AOC 11-1: Building 74 Former Diesel Underground Storage Tank

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

Sample ID	Depth (ft)	Date	Lab	VOCs	BTEX	Fuel Identification	TPH-Diesel	TPH-Gas	PAH
SB74-94-06-40	40	Jul-94	BC	ND			560		
SB74-94-06-45	45			1,2,4-Trimethylbenzene=0.043			1200		
SB74-94-07-5	5			ND			<10		
SB74-94-07-10	10			ND			240		
SB74-94-07-15	15			ND			190		
SB74-94-07-20	20			ND			19		
SB74-94-07-25	25			ND			610		
SB74-94-07-40	40			p-Isopropyltoluene=0.053 1,2,4-Trimethylbenzene=0.21			270		
SB74-94-08-5	5			ND			<10		
SB74-94-08-10.5	10.5			ND			<10		
SB74-94-08-15	15			ND			830		
SB74-94-08-20	20			ND			100		
SB74-94-08-25	25			ND			140		
SB74-94-08-30	30			sec-butylbenzene=0.064 p-Isopropyltoluene=0.075			2000		
SB74-94-08-35	35			ND			570		
SB74-94-08-38	38			ND			1700		
BS-SB74-94-09-3.6	3.6	Oct-94	BC				<10		
BS-SB74-94-09-4.7	4.7						<10		
BS-SB74-94-09-9.5	9.5						<10		
BS-SB74-94-09-14.7	14.7						86		
BS-SB74-94-09-19.7	19.7						35		
BS-SB74-94-09-29.5	29.5						250		
BS-SB74-94-09-34.5	34.5						170		
BS-SB74-94-09-44.5	44.5						290		
BS-SB74-94-11-4.9	4.9						<10		
BS-SB74-94-11-7.2	7.2						<10		

Table D3.5-1

Soil Sampling Results (mg/kg)

AOC 11-1: Building 74 Former Diesel Underground Storage Tank

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

Sample ID	Depth (ft)	Date	Lab	VOCs	BTEX	Fuel Identification	TPH-Diesel	TPH-Gas	PAH
B74-01		Nov-94	AEN	ND	<5		37		
B74-02				ND	<5		500		
B74-03				sec-butylbenzene=0.079 ethylbenzene=0.11 isopropylbenzene=0.068 p-Isopropyltoluene=0.12 naphthalene=0.32 n-propylbenzene=0.17 toluene=0.046, xylenes=0.32 1,2,4-Trimethylbenzene=0.48 1,3,5-Trimethylbenzene=0.17	ethylbenzene=0.055 xylenes=0.46		3000		
B74-04				ND	<5		85		
BS-SB-74-95-9-12.7	12.7	May-95	BC	ND			28	<1	
BS-SB-74-95-9-18.8	18.8			ND			120	1.4	
BS-SB-74-95-9-23.8	23.8			ND			15	3.0	
BS-SB-74-95-9-28.9	28.9			ND†			21	6.3	
BS-SB-74-95-9-34.2	34.2			ND			<10	<1	
BS-SB-74-95-9-39.5	39.5			ND			11	<1	
BS-SB-74-95-9-44.5	44.5			ND			11	<1	
BS-SB-74-95-9-50.6	50.6			ND			55	<1	
SS-83NE-1-0.5	0.5	Jun-95	BC				<10		
SS-83NE-1-1.5	1.5						<10		
BS-MW-74-95-6-4	4	Jul-95	BC				<10		
BS-MW-83-95-7-10.2	10.2	Jul-95	BC				<10		
BS-MW-83-95-7-40.3	40.3						630		
BS-MW-83-95-7-48	48						610		
BS-SB74-95-6-14	14	Aug-95	BC				1700		
BS-SB74-95-6-19	19						390		

Table D3.5-1

Soil Sampling Results (mg/kg)

AOC 11-1: Building 74 Former Diesel Underground Storage Tank

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

Sample ID	Depth (ft)	Date	Lab	VOCs	BTEX	Fuel Identification	TPH-Diesel	TPH-Gas	PAH
BS-SB74-95-6-20Comp	20	Aug-95	BC						
BS-SB74-95-6-24	24						81		
BS-SB74-95-6-29	29						650		
BS-SB74-95-6-30Comp	30								
BS-SB74-95-6-34	34						1200		
BS-SB74-95-6-39	39						1800		
BS-SB74-95-6-41Comp	41								
BS-SB74-95-6-44.3	44.3						44		
BS-SB74-95-6-49	49						460		
BS-SB74-95-8-4.8	4.8			ND					
BS-SB74-95-8-10	10			ND					
BS-SB74-95-8-14.5	14.5						<10	<1	
BS-SB74-95-8-19	19								
BS-SB74-95-8-19.7	19.7						<10	<1	
BS-SB74-95-8-24	24						33	<1	
BS-SB74-95-8-29	29						<10	<1	
BS-SB74-95-8-29.5	29.5								
BS-SB74-95-8-34	34						<10	<1	
BS-SB74-95-8-39	39						<10	<1	
BS-SB74-95-8-39.3	39.3								
BS-SB83-96-1-10.3	10.3	Oct-96	BC		ND	Motor Oil=7.8	<1		
BS-SB83-96-1-15.1	15.1				ND		15		
BS-SB83-96-1-20	20				Xylenes=0.016	Motor Oil=370	150		
BS-SB83-96-1-25	25				Xylenes=0.031	Motor Oil=290	280		
BS-SB74-97-1-11	11	Feb-97	BC		ND		4		ND
BS-SB74-97-1-16	16				ND		6		Fluoranthene=0.054 Naphthalene=0.059 Phenanthrene=0.023

Table D3.5-1

Soil Sampling Results (mg/kg)

AOC 11-1: Building 74 Former Diesel Underground Storage Tank

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

Sample ID	Depth (ft)	Date	Lab	VOCs	BTEX	Fuel Identification	TPH-Diesel	TPH-Gas	PAH
BS-SB74-97-1-21	21	Feb-97	BC		ND		160		ND
BS-SB74-97-1-26	26				Ethylbenzene=0.007		190		Benzo(a)anthracene=0.28
BS-SB74-97-1-31	31				Ethylbenzene=0.53 Total xylenes=0.075		32		Phenanthrene=0.48

= Not analyzed
< = Not detected above reporting limit (reporting limit shown)
ND = Not detected above reporting limit (reporting limit varies with analyte)

† - Tentatively identified compounds detected: 1,2,4-trimethyl cyclo pentane, 1,2-dimethyl trans cyclo hexane, 1,1,3-trimethyl cyclo hexane, trans1,3-diethyl cyclo pentane, and 1,2,4,5-tetramethyl benzene

COPCs = Chemicals of Potential Concern
VOCs analyzed by EPA Method 8240, or 8260
BTEX analyzed by EPA Method 8020
Fuel Identification analyzed by EPA Method 8015M included: Light Naptha, Aviation Fuel, Stoddard/White Spirits, Heavy Naptha/Ligroin/Petroleum Benzine, Gasoline, JP4, JP5, JP6, JP8, Kerosene/Jet Fuel, Diesel, Crude/Waste Oil, Hydraulic Oil, and WD-40
TPH-Diesel analyzed by EPA Method 8015M
TPH-Gasoline analyzed by EPA Method 8015M
PAH analyzed by EPA Method 8310

AEN = Analysis by American Environmental Network
BC = Analysis by BC Laboratories
C = Analysis by Chromalab
Q = Analysis by Quanteq Laboratories
S = Analysis by Subsurface Consultants

PRGs for Residential Soil for Detected Organic Analytes (mg/kg)

1,2,4-trimethylbenzene=5.7
1,3,5-trimethylbenzene=21
benzo(a)anthracene=0.62
ethylbenzene=230
fluoranthene=2300
isopropylbenzene=160
n-propylbenzene=140
naphthalene=56
sec-butylbenzene=110
toluene=520
xylene=210

Table D3.6-1

Soil Sampling Results (mg/kg)

AOC 11-3: Building 83/83A Sanitary Sewers

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

				VOCs	Total Hydrocarbons	TPH-Diesel	TPH-Gas
				PCE			
			PRG	5.7			
Sample ID	Depth (ft)	Date	Lab				
SS74-1C		Nov-91	H	<0.0001	0.52		
MW83-92-14-6	6	Mar-92	Q	0.005		<1	<0.2
MW83-92-14-11	11			<0.005		<1	<0.2
MW83-92-14-16	16			<0.005		6	<0.2
MW83-92-14-20	20			<0.005		280	<0.2
MW83-92-14-25.5	25.5			<0.005		1300	270
MW83-92-14-30.5	30.5			<0.005		87	0.4
MW83-92-14-36	36			<0.005		800	280
MW83-92-14-40.5	40.5			<0.005		2000	<0.2
MW83-92-14-45.5	45.5			<0.005		230	1.0
MW83-92-14-50	50			<0.005		510	160
MW83-92-14-55	55			<0.005		110	0.4
MW83-92-14-57	57			<0.005		3000	650
BS-SB74-95-8-4.8	4.8	Aug-95	BC	<0.005			
BS-SB74-95-8-10	10			<0.005			
BS-SB74-95-8-14.5	14.5					<10	<1
BS-SB74-95-8-19	19						
BS-SB74-95-8-19.7	19.7					<10	<1
BS-SB74-95-8-24	24					33	<1
BS-SB74-95-8-29	29					<10	<1
BS-SB74-95-8-29.5	29.5						
BS-SB74-95-8-34	34					<10	<1
BS-SB74-95-8-39	39					<10	<1
BS-SB74-95-8-39.3	39.3						
BS-SB83-95-1-7.3	7.3	Aug-95	BC	<0.005		<10	<1
BS-SB83-95-1-10.8	10.8			<0.005		<10	<1
BS-SB83-95-1-16	16			<0.005		10	<1
BS-SB83-95-2-15.8	15.8			<0.005		25	<1
BS-SB83-95-3-7	7			<0.005		<10	<1
BS-SB83-95-3-9.8	9.8			<0.005		<10	<1
BS-SB83-95-3-14	14			<0.005		<10	<1
BS-SB83-95-4-6.6	6.6			<0.005		<10	<1
BS-SB83-95-4-9.5	9.5			<0.005		<10	<1

	= Not analyzed
<	= Not detected above reporting limit (reporting limit shown)
ND	= Not detected above reporting limit (reporting limit varies with analyte)

COPCs = Chemicals of Potential Concern
VOCs analyzed by EPA Method 8240, or 8260
TPH-Diesel analyzed by EPA Method 8015M
TPH-Gasoline analyzed by EPA Method 8015M

BC = Analysis by BC Laboratories
H = Analysis by Hydro GeoChem
Q = Analysis by Quanteq Laboratories

Table D3.7-1

Soil Sampling Results (mg/kg)

AOC 12-4: Building 50 Sanitary Sewer Dislocations

Concentrations of Organic Constituents

COPCs: Halogenated VOCs, Fuel Hydrocarbons

				VOCs					Total Hydrocarbons
				Ethylbenzene	Toluene	Isopropylbenzene	m&p-Xylenes	o-Xylene	
			PRG	230	520	160	210	210	
Sample ID	Depth (ft)	Date	Lab						
SS50A-1C		Nov-91	H	0.039	0.025	0.025	0.048	0.039	1.05
SS50B-1C				0.014	0.012	0.013	0.02	0.013	0.52

COPCs = Chemicals of Potential Concern

H = Analysis by Hydro GeoChem

Table D3.8-1
Soil Sampling Results (mg/kg)
AOC 13-1: Building 62 Former Hazardous Materials Storage Area
Concentrations of Organic Constituents
COPCs: Halogenated VOCs

				VOCs					
				PCE	Acetone	MEK	Freon-11	1,3,5-TMB	1,2,3-TCP
			PRG	5.7	1600	7300	390	21	0.0014
Sample ID	Depth (ft)	Date	Lab						
BS62-92-19-3	3	Jun-92	LBNL	<0.005	<0.1	<0.1	<0.002	0.0192	
BS62-92-19-5	5			<0.005	<0.1	<0.1	<0.002	<0.005	
BS62-92-19-10	10			<0.005	<0.1	<0.1	0.0051	<0.005	**0.0082**
BS62-92-19-15	15			<0.005	<0.1	<0.1	0.0074	<0.005	
BS62-92-19-19.5	19.5			<0.005	<0.1	<0.1	0.0496	<0.005	
MW62-92-27-5.5	5.5	Sep-92	C	<0.005	<0.1	<0.1	<0.005		
MW62-92-27-15.5	15.5			<0.005	<0.1	<0.1	<0.005		
MW62-92-27-25.5	25.5			<0.005	<0.1	<0.1	<0.005		
MW62-92-27-35.5	35.5			<0.005	<0.1	<0.1	<0.005		
MW62-92-27-45.5	45.5			<0.005	0.54	0.17	<0.005		
MW62-92-27-55.5	55.5			<0.005	<0.1	<0.1	<0.005		
MW62-92-27-65	65			<0.005	<0.1	<0.1	<0.005		

= Not analyzed

= Not detected above reporting limit (reporting limit shown)

C = Analysis by Chromalab
LBNL = Analysis by Lawrence Berkeley Lab
COPCs = Chemicals of Potential Concern
VOCs analyzed by EPA Method 8240, or 8260

MEK = Methyl ethyl ketone
1,3,5-TMB = 1,3,5-trimethylbenzene
1,2,3-TCP = 1,2,3-trichloropropane

Table D3.9-1
Soil Sampling Results (mg/kg)
AOC 13-2: Building 62 Former Diesel UST
Concentrations of Organic Constituents
COPCs: Halogenated VOCs, Fuel Hydrocarbons

Sample ID		Depth (ft)	Date	Lab	BTEX	TPH-Diesel	TPH-Motor Oil	PAH
1	X	4.5	Aug-86			12,000		
2	X	4.5				18,000		
MW62-B1-10	X	10.0	Sep-86			3300		
MW62-B1-20	X	20.0				98		
MW62-B2-10	X	10.0				97		
MW62-B2-20		20.0				27		
TK62-1	X	8.0	Sep-87			1200		
TK62-2	X	8.0				2500		
TK62-3	X	8.0				1200		
TK62-4	X	8.0				950		
TK62-5A		20.6				4.5		
TK62-6A		21.5				190		
TK62-7A	X	10.0				500		
TK62-7B	X	15.0				55		
TK62-8B	X	10.0				210		
TK62-8C		20.0				31		
TK62-9A	X	16.0				290		
TK62-9B		20.2				30		
TK62-10A	X	15.0				320		
TK62-10B		20.0				450		
TK62-12C	X	15.5				120		
TK62-13A	X	8.0				9000		
TK62-14A	X	10.0				1300		
TK62-15A	X	10.0				<10		
TK62-15B	X	14.0				<10		
TK62-15C	X	20.0				<10		
TK62-15D		26.0				<10		
TK62-16A	X	9.0				<10		
TK62-16B	X	14.9				<10		
TK62-16C		25.0				<10		
TK62-17A	X	10.6				<10		
TK62-17B	X	16.0						
TK62-17C	X	20.0				<10		
TK62-17D		26.0				<10		
TK62-18A	X	10.8				<10		
TK62-18B	X	15.0				<10		
TK62-18C		20.6				<10		
TK62-19A	X	9.1				<10		
TK62-19B	X	20.0				<10		
TK62-19C		25.0				<10		
TK62-20A	X	21.0				<10		
TK62-20B		25.5				40		
TK62-21B		25.0				<10		
TK62-22B		25.6				21		

Table D3.9-1 (Cont'd)
Soil Sampling Results (mg/kg)
AOC 13-2: Building 62 Former Diesel UST
Concentrations of Organic Constituents
COPCs: Halogenated VOCs, Fuel Hydrocarbons

Sample ID	Depth (ft)	Date	Lab	BTEX	TPH-Diesel	TPH-Motor Oil	PAH
TK62-23A X	20.0				<10		
TK62-23B	25.5				<10		
TK62-23B(dup)	25.5				23		
B-1	4.0	Sep-87			<10		
B-2	4.0				<10		
B-3	4.0				<10		
B-4	4.0				<10		
B-5	4.0				<10		
B-6	3.8				<10		
B-7	4.0				<10		
MW62-95-16-5.6	5.6	Aug-95	BC		<10		
MW62-95-16-10.3	10.3			ND	<10		
MW62-95-16-15.1	15.1				<10		
MW62-95-16-20	20.0			ND	<10		
MW62-95-16-25	25.0				<10		
MW62-95-16-30.5	30.5			ND	<10		
SB62-96-1-20	20.0	Oct-96	CLS	ND	<1	4.4	
SB62-96-1-25	25.0			ND	11	8.8	
SB62-96-2-20.1	20.1			ND	7.1	6.5	
SB62-96-2-25	25.0			ND	<1	4.1	
BS-SB62-97-1-21	21	Feb-97	BC	ND	6		Benzo(a)pyrene=0.00021 Benzo(b)fluoranthene=0.00053 Benzo(ghi)perylene=0.00034 Benzo(k)fluoranthene=0.000077 Fluoranthene=0.00046 Ideno(1,2,3-cd)pyrene=0.00032 Phenanthrene=0.00075
BS-SB62-97-1-26	26			ND	1.7		ND
BS-SB62-97-2-21	21			ND	49		ND
BS-SB62-97-2-26	26			Toluene=0.006	5.1		ND

BC = Analysis by BC Laboratories
CLS = Analysis by California Laboratory Services
COPCs = Chemicals of Potential Concern
BTEX Analysis by EPA Method 8020
TPH diesel analyzed by EPA Method 8015 Modified
TPH motor oil analyzed by EPA Method 8015 Modified
PAHs = Polynuclear aromatic hydrocarbons analyzed by EPA Method 8310

PRGs for Residential Soil for Detected Organic Analytes (mg/kg)
Benzo(b)fluoranthene=0.62
Benzo(k)fluoranthene=0.62
Fluoranthene=2300
Ideno(1,2,3-cd)pyrene=0.62

= Not analyzed
= Not detected above reporting limit (reporting limit shown)
ND = Not detected above reporting limit (reporting limit varies with analyte)

X = sample collected from soil that has been excavated

Table D3.10-1
Soil Sampling Results (mg/kg)
AOC 13-4: Building 62 Possible Solvent Spills East of B62
Concentrations of Organic Constituents
COPCs: Halogenated VOCs, Fuel Hydrocarbons

				VOCs	TPH-Diesel	TPH-Gas	pH
Sample ID	Depth (ft)	Date	Lab				
BS62-92-20A-3.5	3.5	Jun-92	C	ND	<1	<1	
BS62-92-20B-3.5	3.5			ND	<1	<1	
SS-62E-95-1-3	3	Aug-95	BC	ND			8.26
SS-62E-95-2-3	3			ND			8.02
SS-62E-95-3-3	3			ND			7.53
SS-62E-95-4-3	3			ND			7.91
SS-62E-95-5-3	3			ND			7.61

ND = Not detected above reporting limit (reporting limit varies with analyte)

COPCs = Chemicals of Potential Concern
BC = Analysis by BC Laboratories
C = Analysis by Chromalab

VOCs analyzed by EPA Method 8240, or 8260
TPH diesel analyzed by EPA Method 8015 Modified
TPH gasoline analyzed by EPA Method 8015 Modified

Table D4.3-1A
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	MWP-2																																	
		Nov-92	Mar-93	(D)	May-93	Aug-93	Nov-93	Mar-94	May-94	Sep-94	Nov-94*	Feb-95*	May-95*	Sep-95	Nov-95	Feb-96	May-96	Jul-96	Jul-96	Dec-96	Feb-97	May-97	Aug-97	Nov-97	Feb-98	May-98	Aug-98	Oct-98	Jan-99	Apr-99	Aug-99	Oct-99	Jan-00	May-00
Aromatic and Non-Halogenated Hydrocarbons																																			
Benzene	1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	150	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons																																			
Halogenated Non-Aromatic Hydrocarbons																																			
Chloroform	100	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<1	1.1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	5.9	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<0.6	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons				1.1														5.9																	
Total Concentration of VOCs				1.1														5.9																	

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

(D) = Duplicate sample
* = Analysis by BC Laboratories

NewArea 8 VOC Sum
9/26/00

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	88-92-4 (well is on annual sampling)																							
		Dec-92	Mar-93	Jun-93	Aug-93	Nov-93	Mar-94	Jun-94	Sep-94	Oct-94*	Dec-94*	(D)*	Feb-95*	Jun-95*	Aug-95	Nov-95	Mar-96	Jun-96	Aug-96	Dec-96	Mar-97	Aug-97	Feb-98	Aug-98	Jan-99
Aromatic and Non-Halogenated Hydrocarbons																									
Benzene	1	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
Toluene	150	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons																									
Halogenated Non-Aromatic Hydrocarbons																									
Chloroform	100	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<5	1.8	1.9	1.2	<1	<1	<1	<1	<0.5	0.56	0.55	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<1	<1	<1	<1	<1	<1	6.5	<0.5	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<5	2.4	1.7	1.0	<1	<1	<1	<1	<0.5	0.53	0.54	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<5	2.5	4.0	2.7	2.5	1.5	1.1	<1	1.2	1.93	2.0	1.1	0.73	1.0	1.3	<1	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<0.6	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons			6.7	7.6	4.9	2.5	1.5	1.1	6.5	1.2	3.02	3.09	1.1	0.73	1.0	1.3									
Total Concentration of VOCs			6.7	7.6	4.9	2.5	1.5	1.1	6.5	1.2	3.02	3.09	1.1	0.73	1.0	1.3									

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories
(D) = Duplicate sample

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	88-93-11A																										
		Apr-94	(D)	Apr-94	Sep-94	Dec-94*	Mar-95*	Jun-95*	Aug-95	Nov-95	Mar-96	Jun-96	Aug-96	Dec-96*	Mar-97	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Nov-98	Feb-99	May-99	Aug-99	Nov-99	Feb-00	May-00
Aromatic and Non-Halogenated Hydrocarbons																												
Benzene	1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<2	<0.5	<2	<2	<2	<2	<2	<0.5	<2	<2	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	150	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<1	<1	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<2	<1	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons																												
Halogenated Non-Aromatic Hydrocarbons																												
Chloroform	100	2.0	1.7	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	1.0	<1	1.7	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	18.9	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<1	<1	<1	<1	1.3	<0.5	<0.5	<5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons		21.9	1.7	1.7		1.3																						
Total Concentration of VOCs		21.9	1.7	1.7		1.3																						

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories
(D) = Duplicate sample

NewArea 6 VOC Sum
9/26/00

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	88-93-13 (well is on annual sampling)																	
		Mar-94	(D)*	Jun-94	Aug-94	Dec-94*	Feb-95*	Jun-95*	Sep-95	Nov-95	Mar-96	Jun-96	Aug-96	Dec-96*	Feb-97	May-97	Feb-98	Aug-98	Jan-99
Aromatic and Non-Halogenated Hydrocarbons																			
Benzene	1	<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
sec-Butylbenzene		<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1
ter-Butylbenzene		<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1
Ethylbenzene	700	<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1
p-Isopropyltoluene		<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Naphthalene		<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<2	<0.5	<2	<2	<2	<2	<2
n-Propylbenzene		<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1
Toluene	150	4.4	2.9	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1
Xylenes, total	1750	<1	<1.0	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons		4.4	2.9																
Halogenated Non-Aromatic Hydrocarbons																			
Chloroform	100	<1	<0.5	3.2	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Methylene Chloride	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<0.5	1.6	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<0.5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Trichloroethene	5	<1	<0.5	2.0	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Freon-113	1200	<1	<0.5	7.1	<1	<0.5	<0.5	<0.5	<5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons				13.9															
Total Concentration of VOCs		4.4	2.9	13.9															

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

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(D) = Duplicate sample

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	88-96-4 (well is on annual sampling)														
		Jul-96	(D)*	Jul-96	Aug-96	Dec-96	Feb-97	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Nov-98	Jan-99	Apr-99
Aromatic and Non-Halogenated Hydrocarbons																
Benzene	1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
sec-Butylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
ter-Butylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Ethylbenzene	700	<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
p-Isopropyltoluene		<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Naphthalene		<1	<0.5	<1	<2	<2	<2	<2	<2	<2	<2	<0.5	<2	<2	<2	<2
n-Propylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Toluene	150	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Xylenes, total	1750	<2	<1.0	<2	<2	<2	<2	<2	<2	<2	<2	<1.0	<2	<2	<2	<2
Total Aromatic Hydrocarbons																
Halogenated Non-Aromatic Hydrocarbons																
Chloroform	100	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Methylene Chloride	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Tetrachloroethene	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	1.1	<1
Trichloroethene	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Freon-113	1200	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Total Halogenated Hydrocarbons															1.1	
Total Concentration of VOCs															1.1	

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories
(D) = Duplicate sample

NewArea 6 VOC Sum
9/26/00

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	70-92-7 (well is on annual sampling)																							
		Dec-92	Mar-93	Jun-93	Aug-93	Oct-93	Mar-94	Jun-94	Aug-94	(D)	Dec-94*	Feb-95*	(D)†	Jun-95*	Sep-95	Dec-95	Mar-96	Jun-96	Jul-96	Dec-96	Mar-97	Aug-97	Feb-98	Aug-98	Jan-99
Aromatic and Non-Halogenated Hydrocarbons																									
Benzene	1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1
Toluene	150	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons																									
Halogenated Non-Aromatic Hydrocarbons																									
Chloroform	100	<5	<1	<1	<1	<1	<1	<1	1.5	1.1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<1	<1	<1	<1	3.6	<1	2.9	2.8	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<0.6	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5		<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons							3.6		4.4	3.9															
Total Concentration of VOCs							3.6		4.4	3.9															

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

<| = Less than Quantitation Limit
= Compound not included in analysis

(D) = Duplicate sample
* = Analysis by BC Laboratories
† = Analysis by AEN

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	70A-96-5 (well is on annual sampling)													
		May-96	(D)*	Jul-96	Dec-96	Feb-97	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Nov-98	Jan-99*	Apr-99
Aromatic and Non-Halogenated Hydrocarbons															
Benzene	1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
sec-Butylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
ter-Butylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Ethylbenzene	700	<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
p-Isopropyltoluene		<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Naphthalene		<1	<0.5	<1	<2	<2	<2	<2	<2	<2	<0.5	<2	<2	<0.5	<2
n-Propylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Toluene	150	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,2,4-Trimethylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,3,5-Trimethylbenzene		<2	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Xylenes, total	1750	<2	<1	<2	<2	<2	<2	<2	<2	<2	<1	<2	<2	<1	<2
Total Aromatic Hydrocarbons															
Halogenated Non-Aromatic Hydrocarbons															
Chloroform	100	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,1-Dichloroethane	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,1-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Methylene Chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	1.0	0.82	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,1,1-Trichloroethane	200	<1	<0.5	<1	<1	<1	<1	<1	<1	1.2	0.92	<1	<1	<0.5	<1
Trichloroethene	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Freon-12		<2	<0.5	<2	<2	<3	<3	<3	<3	<3	<0.5	<3	<3	0.60	<3
Freon-113	1200	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Total Halogenated Hydrocarbon		1.0	0.82							1.2	0.92			0.60	
Total Concentration of VOCs		1.0	0.82							1.2	0.92			0.60	

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
* = Analysis by BC Laboratories

(D) = Duplicate sample

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	70A-96-6 (well is on annual sampling) May-96†	(D)*	Jul-96	Dec-96	Feb-97	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Nov-98	Jan-99*	Apr-99
Aromatic and Non-Halogenated Hydrocarbons															
Benzene	1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
sec-Butylbenzene		<5	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
ter-Butylbenzene		<5	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Ethylbenzene	700	<5	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
p-Isopropyltoluene		<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Naphthalene			<0.5	<1	<2	<2	<2	<2	<2	<2	<0.5	<2	<2	<0.5	<2
n-Propylbenzene		<5	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Toluene	150	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,2,4-Trimethylbenzene		<5	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,3,5-Trimethylbenzene		<5	<0.5	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Xylenes, total	1750	<10	<1	<2	<2	<2	<2	<2	<2	<2	<1	<2	<2	<1	<2
Total Aromatic Hydrocarbons															
Halogenated Non-Aromatic Hydrocarbons															
Chloroform	100	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,1-Dichloroethane	5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,1-Dichloroethene	6	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
cis-1,2-Dichloroethene	6	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
1,1,1-Trichloroethane	200	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Trichloroethene	5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Freon-113	1200		<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<0.5	<1
Total Halogenated Hydrocarbons															
Total Concentration of VOCs															

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
= Compound not included in analysis
† = Analysis by California Laboratory Services

(D) = Duplicate sample
* = Analysis by BC Laboratories

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	70A-96-13 (well is on annual sampling)										
		Jan-97	(D)*	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Nov-98	Jan-99	Apr-99
Aromatic and Non-Halogenated Hydrocarbons												
Benzene	1	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
sec-Butylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
ter-Butylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Ethylbenzene	700	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
p-Isopropyltoluene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Naphthalene		<2	<0.5	<2	<2	<2	<2	<0.5	<2	<2	<2	<2
n-Propylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Toluene	150	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Xylenes, total	1750	<2	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2
Total Aromatic Hydrocarbons												
Halogenated Non-Aromatic Hydrocarbons												
Chloroform	100	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Methylene Chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Trichloroethene	5	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Freon-113	1200	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Total Halogenated Hydrocarbons												
Total Concentration of VOCs												

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories
(D) = Duplicate sample

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	70A-96-14 (well is on annual sampling)										
		Jan-97	(D)*	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Nov-98	Jan-99	Apr-99
Aromatic and Non-Halogenated Hydrocarbons												
Benzene	1	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
sec-Butylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
ter-Butylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Ethylbenzene	700	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
p-Isopropyltoluene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Naphthalene		<2	<0.5	<2	<2	<2	<2	<0.5	<2	<2	<2	<2
n-Propylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Toluene	150	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Xylenes, total	1750	<2	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2
Total Aromatic Hydrocarbons												
Halogenated Non-Aromatic Hydrocarbons												
Chloroform	100	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Methylene Chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Trichloroethene	5	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Freon-113	1200	<1	<0.5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Total Halogenated Hydrocarbons												
Total Concentration of VOCs												

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories
(D) = Duplicate sample

Table D4.3-1A (Cont'd)
LBNL Groundwater Monitoring Well Results - Western Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	OW3-225																															
		Dec-92	Jun-93	Aug-93	Nov-93	Mar-94	May-94	Aug-94	Dec-94*	(D)*	Feb-95*	May-95*	Sep-95	Nov-95	Feb-96	May-96	Jul-96	Nov-96	Feb-97*	Feb-97	Apr-97	Jul-97	Nov-97	Jan-98	May-98	Aug-98	Nov-98	Jan-99	Apr-99	Aug-99	Oct-99	Jan-00	May-00
Aromatic and Non-Halogenated Hydrocarbons																																	
Benzene	1	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	150	<5	<1	<1	<1	<1	<1	201.0	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons								201.0																									
Halogenated Non-Aromatic Hydrocarbons																																	
Chloroform	100	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	30.1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	3.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<0.6	<1	<1	<1	<1	<1	<1	0.51	0.57	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons									0.51	0.57									33.4														
Total Concentration of VOCs								201.0	0.51	0.57									33.4														

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
* = Analysis by BC Laboratories

(D) = Duplicate sample
• = Detections are due to cross contamination during sampling

NewArea 8 VOC Sum
9/26/00

Table D4.3-1B
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	74-92-13 (well is on annual sampling)																		
		Dec-92	Mar-93	May-93	Aug-93	Oct-93	Mar-94	May-94	Aug-94	Dec-94*	Feb-95*	May-95*	Sep-95	Sep-96	Dec-96*	Mar-97	Aug-97	Mar-98	Aug-98	Jan-99*
Aromatic and Non-Halogenated Hydrocarbons																				
Benzene	1	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
sec-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
ter-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
Ethylbenzene	700	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
p-Isopropyltoluene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
Naphthalene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<0.5	<2	<2	<2	<2	<0.5
n-Propylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
Toluene	150	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
1,2,4-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
1,3,5-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
Xylenes, total	1750	<5	1.3	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<2	<2	<2	<2	<1
Total Aromatic Hydrocarbons			1.3																	
Halogenated Non-Aromatic Hydrocarbons																				
Chloroform	100	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
1,1-Dichloroethane	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
1,1-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
cis-1,2-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
1,1,1-Trichloroethane	200	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
Trichloroethene	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<0.5	<1	<1	<1	<1	<0.5
Freon-113	1200	<0.6	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<5	<1	<0.5	<1	<1	<1	<1	<0.5
Total Halogenated Hydrocarbons																				
Total Concentration of VOCs			1.3																	

MCL = Maximum contaminant level for drinking water

All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	83-92-14 (well is on annual sampling)																				
		Dec-92	Mar-93	May-93	Aug-93	Nov-93	Mar-94	Jun-94	Aug-94	Dec-94*	Mar-95*	Jun-95	Aug-95	Dec-95	Mar-96	Jun-96	Aug-96	Mar-97	Aug-97	Mar-98	Sep-98	Jan-99
Aromatic and Non-Halogenated Hydrocarbons																						
Benzene	1	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<5	1.4	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<5	<1	1.8	2.9	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<5	<1	<1	1.1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<5	<1	4.0	2.0	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		6.1	2.3	3.1	2.9	1.0	<1	2.1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<5	<1	<1	2.1	<1	<1	1.6	<1	<0.5	<0.5	<1	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1
Toluene	150	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		5.9	2.1	1.8	3.5	<1	<1	1.2	<1	<0.5	<0.5	<1	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		5.5	2.0	4.2	5.7	<1	<1	1.9	<1	<0.5	<0.5	<1	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<5	2.2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons		17.5	10.0	14.9	20.2	1.0		6.8														
Halogenated Non-Aromatic Hydrocarbons																						
Chloroform	100	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<1	<1	<1	4.1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<0.6	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons						4.1																
Total Concentration of VOCs		17.5	10.0	14.9	20.2	5.1		6.8														

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	74-94-7																									
		Jun-94*	(D)†	Aug-94	Dec-94*	Feb-95*	May-95*	Aug-95	Nov-95	Mar-96	Jun-96	Aug-96	Dec-96*	Feb-97	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Nov-98	Jan-99	Apr-99	Aug-99	Oct-99	Jan-00	May-00
Aromatic and Non-Halogenated Hydrocarbons																											
Benzene	1	<0.5	<5	<1	<0.5	0.63	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<2	<0.5	<2	<2	<2	<2	<2	<0.5	<2	<2	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	150	<0.5	<5	<1	<0.5	1.6	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<1.0	<10	<1	<1	1.0	<1	<1	<2	<2	<2	<2	<1	<2	<2	<2	<2	<2	<1	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons						3.23																					
Halogenated Non-Aromatic Hydrocarbons																											
Chloroform	100	<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	10	<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<0.5	<5	<1	<0.5	0.87	<0.5	<1	<1	2.5	2.9	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<0.5	<5	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<0.5		<1	<0.5	<0.5	<0.5	<5	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons						0.87				2.5	2.9																
Total Concentration of VOCs						4.10				2.5	2.9																

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
= Compound not included in analysis

† = Analysis by AEN
* = Analysis by BC Laboratories
(D) = Duplicate sample

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	74-94-8 Jun-94*	(D)†	Aug-94	Sep-94	Dec-94*	Feb-95*	May-95*	Sep-95	Nov-95	Mar-96	May-96	Aug-96	Dec-96	Mar-97	May-97	Aug-97	Nov-97	Feb-98	Jun-98	Aug-98	Nov-98	Jan-99*	May-99	Aug-99	Nov-99	Jan-00	May-00
Aromatic and Non-Halogenated Hydrocarbons																												
Benzene	1	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
sec-Butylbenzene		<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
ter-Butylbenzene		<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Ethylbenzene	700	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
p-Isopropyltoluene		<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Naphthalene		<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<0.5	<2	<2	<2	<2	<2
n-Propylbenzene		<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Toluene	150	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Xylenes, total	1750	<1.0	<10	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons																												
Halogenated Non-Aromatic Hydrocarbons																												
Chloroform	100	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Methylene Chloride	5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Trichloroethene	5	<0.5	<5	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Freon-113	1200	1.8		<1	<1	<0.5	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons		1.8																										
Total Concentration of VOCs		1.8																										

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
= Compound not included in analysis

† = Analysis by AEN
* = Analysis by BC Laboratories
(D) = Duplicate sample

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	74-95-6 (well is on annual sampling)										
		Aug-95	Aug-95†	(S)*	Aug-97	Nov-97	Mar-98	Jun-98	Aug-98	Nov-98	Feb-99	May-99
Aromatic and Non-Halogenated Hydrocarbons												
Benzene	1	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<1	<5	<0.5	<2	<2	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	150	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<1	<10	<1	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons												
Halogenated Non-Aromatic Hydrocarbons												
Chloroform	100	<1	<5	<0.5	3.2	2.1	<1	<1	12.0	<1	3.6	<1
1,1-Dichloroethane	5	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<5		<0.5	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons					3.2	2.1			12.0		3.6	
Total Concentration of VOCs					3.2	2.1			12.0		3.6	

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= Compound not included in analysis

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* = Analysis by BC Laboratories
(S) = Split sample

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	83-95-7 (well is on annual sampling)											
		Aug-95	Aug-95†	(S)*	Dec-95	Mar-96	May-96	Aug-96	Dec-96	Feb-97	May-97	May-98*	Apr-99
Aromatic and Non-Halogenated Hydrocarbons													
Benzene	1	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
sec-Butylbenzene		<1	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<0.5	<1
ter-Butylbenzene		<1	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<0.5	<1
Ethylbenzene	700	<1	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<0.5	<1
p-Isopropyltoluene		<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
Naphthalene		<1	<5	<0.5	<1	<1	<1	<2	<2	<2	<2	<0.5	<2
n-Propylbenzene		<1	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<0.5	<1
Toluene	150	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
1,2,4-Trimethylbenzene		<1	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<0.5	<1
1,3,5-Trimethylbenzene		<1	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<0.5	<1
Xylenes, total	1750	<1	<10	<1	<2	<2	<2	<2	<2	<2	<2	<1	<2
Total Aromatic Hydrocarbons													
Halogenated Non-Aromatic Hydrocarbons													
Chloroform	100	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
1,1-Dichloroethane	5	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
1,1-Dichloroethene	6	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
cis-1,2-Dichloroethene	6	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
Methylene Chloride	5	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
1,1,1-Trichloroethane	200	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
Trichloroethene	5	<1	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
Freon-113	1200	<5		<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
Total Halogenated Hydrocarbons													
Total Concentration of VOCs													

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
= Compound not included in analysis

† = Analysis by AEN
* = Analysis by BC Laboratories
(S) = Split sample

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	85-95-1 (well is on annual sampling)																	
		Aug-95	(D)*	(S)†	Dec-95*	Feb-96	(D)*	May-96	May-96	Aug-96	Nov-96	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Oct-98	Nov-99
Aromatic and Non-Halogenated Hydrocarbons																			
Benzene	1	<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
sec-Butylbenzene		<1	<0.5	<5	<0.5	<2	<0.5	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
ter-Butylbenzene		<1	<0.5	<5	<0.5	<2	<0.5	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Ethylbenzene	700	<1	<0.5	<5	<0.5	<2	<0.5	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
p-Isopropyltoluene		<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Naphthalene		<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<2	<2	<2	<2	<2	<2	<0.5	<2	<2	<2
n-Propylbenzene		<1	<0.5	<5	<0.5	<2	<0.5	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Toluene	150	<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,2,4-Trimethylbenzene		<1	<0.5	<5	<0.5	<2	<0.5	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,3,5-Trimethylbenzene		<1	<0.5	<5	<0.5	<2	<0.5	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Xylenes, total	1750	<1	<1	<10	<1	<2	<1	<2	<2	<2	<2	<2	<2	<2	<2	<1	<2	<2	<2
Total Aromatic Hydrocarbons																			
Halogenated Non-Aromatic Hydrocarbons																			
Chloroform	100	<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	1.6	<1
1,1-Dichloroethane	5	<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,1-Dichloroethene	6	<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
trans-1,2-Dichloroethene	10	<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Methylene Chloride	5	<1	<1	<20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<0.5	<5	<0.5	<1	<0.5	2.8	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Trichloroethene	5	<1	<0.5	<5	<0.5	<1	<0.5	1.1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Freon-113	1200	<5	<0.5	<5	<0.5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Total Halogenated Hydrocarbons								3.9										1.6	
Total Concentration of VOCs								3.9										1.6	

MCL = Maximum contaminant level for drinking water
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< = Less than Quantitation Limit
(D) = Duplicate sample
(S) = Split sample

* = Analysis by BC Laboratories
† = Analysis by American Environmental Network

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	85-95-2														
		Aug-95	(D)*	(S)†	Jan-96*	Feb-96	May-96	Jul-96	Nov-96	May-97	Aug-97	Nov-97	Feb-98	May-98	Aug-98	Oct-98
Aromatic and Non-Halogenated Hydrocarbons																
Benzene	1	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<1	<0.5	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<1	<0.5	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<1	<0.5	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<1	<0.5	<5	<0.5	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<1	<0.5	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	150	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<1	<0.5	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<1	<0.5	<5	<0.5	<2	<2	<2	<1	<1	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<1	<1	<10	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons																
Halogenated Non-Aromatic Hydrocarbons																
Chloroform	100	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<1	<1	<20	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<1	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<5	<0.5	<5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons																
Total Concentration of VOCs																

MCL = Maximum contaminant level for drinking water
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< = Less than Quantitation Limit
(D) = Duplicate sample
(S) = Split sample

* = Analysis by BC Laboratories
† = Analysis by American Environmental Network

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	85-96-1 Jul-96	(D)*	Aug-96	Nov-96	Mar-97	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Oct-98
Aromatic and Non-Halogenated Hydrocarbons													
Benzene	1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
sec-Butylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
ter-Butylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
Ethylbenzene	700	<2	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
p-Isopropyltoluene		<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
Naphthalene		<1	<0.5	<2	<2	<2	<2	<2	<2	<2	<0.5	<2	<2
n-Propylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
Toluene	150	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
1,2,4-Trimethylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
1,3,5-Trimethylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
Xylenes, total	1750	<2	<1	<2	<2	<2	<2	<2	<2	<2	<1	<2	<2
Total Aromatic Hydrocarbons													
Halogenated Non-Aromatic Hydrocarbons													
Chloroform	100	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
1,1-Dichloroethane	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
1,1-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
Methylene Chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	0.76	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
1,1,1-Trichloroethane	200	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
Trichloroethene	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
Freon-113	1200	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1
Total Halogenated Hydrocarbons			0.76										
Total Concentration of VOCs			0.76										

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories
(D) = Duplicate sample

Table D4.3-1B (Cont'd)
LBNL Groundwater Monitoring Well Results - Northeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	85-96-2 (well is on annual sampling)											
		Jul-96	(D)*	Nov-96	Mar-97	May-97	Aug-97	Nov-97	Feb-98	May-98*	Aug-98	Oct-98	Nov-99
Aromatic and Non-Halogenated Hydrocarbons													
Benzene	1	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
sec-Butylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
ter-Butylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Ethylbenzene	700	<2	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
p-Isopropyltoluene		<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Naphthalene		<1	<0.5	<2	<2	<2	<2	<2	<2	<0.5	<2	<2	<2
n-Propylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Toluene	150	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,2,4-Trimethylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,3,5-Trimethylbenzene		<2	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Xylenes, total	1750	<2	<1	<2	<2	<2	<2	<2	<2	<1	<2	<2	<2
Total Aromatic Hydrocarbons													
Halogenated Non-Aromatic Hydrocarbons													
Chloroform	100	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,1-Dichloroethane	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,1-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Methylene Chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Trichloroethene	5	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Freon-113	1200	<1	<0.5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1
Total Halogenated Hydrocarbons													
Total Concentration of VOCs													

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
* = Analysis by BC Laboratories

(D) = Duplicate sample

Table D4.3-1C
LBNL Groundwater Monitoring Well Results - Southeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	MW62-B1A (well is on annual sampling)																		
		Dec-92	Mar-93	May-93	Aug-93	Nov-93	Mar-94	May-94	Aug-94	Dec-94*	Feb-95*	Sep-95	Feb-96	Jul-96	Dec-96	Feb-97•	Feb-97	Aug-97	May-98*	Apr-99
Aromatic and Non-Halogenated Hydrocarbons																				
Benzene	1	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
sec-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<2	<1	<1	<1	<1	<0.5	<1
ter-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<2	<1	<1	<1	<1	<0.5	<1
Ethylbenzene	700	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<2	<1	<1	<1	<1	<0.5	<1
p-Isopropyltoluene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
Naphthalene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<2	<2	<2	<2	<0.5	<2
n-Propylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<2	<1	<1	<1	<1	<0.5	<1
Toluene	150	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
1,2,4-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<2	<1	<1	<1	<1	<0.5	<1
1,3,5-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<2	<1	<1	<1	<1	<0.5	<1
Xylenes, total	1750	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<1	<2
Total Aromatic Hydrocarbons																				
Halogenated Non-Aromatic Hydrocarbons																				
Chloroform	100	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
1,1-Dichloroethane	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	0.53	<1
1,1-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
cis-1,2-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<1	<1	<1	<1	2.7	<1	<1	<0.5	<0.5	<1	<1	<1	<1	16.3	<1	<1	<0.5	<1
1,1,1-Trichloroethane	200	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<1
Trichloroethene	5	<5	<1	<1	<1	<1	1.2	<1	<1	<0.5	<0.5	<1	<1	<1	<1	3.5	<1	<1	<0.5	<1
Freon-113	1200	<0.6	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<0.5	<1
Total Halogenated Hydrocarbons							3.9									19.8			0.53	
Total Concentration of VOCs							3.9									19.8			0.53	

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
* = Analysis by BC Laboratories
• = Detections are due to cross contamination during sampling

Table D4.3-1C (Cont'd)
LBNL Groundwater Monitoring Well Results - Southeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	MW62-B2 (well is on annual sampling)																				
		Dec-92	Mar-93	May-93	Aug-93	Nov-93	Mar-94	May-94	Sep-94	Dec-94*	Feb-95*	(D)†	Sep-95	Feb-96•	Mar-96•	Jul-96	Dec-96	Feb-97	Aug-97	Mar-98	Aug-98	Jan-99*
Aromatic and Non-Halogenated Hydrocarbons																						
Benzene	1	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
sec-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<0.5
ter-Butylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<0.5
Ethylbenzene	700	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<0.5
p-Isopropyltoluene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.93
Naphthalene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<2	<2	<2	<2	<2	<0.5
n-Propylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<0.5
Toluene	150	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
1,2,4-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<0.5
1,3,5-Trimethylbenzene		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<2	<2	<2	<1	<1	<1	<1	<1	<0.5
Xylenes, total	1750	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<10	<1	<2	<2	<2	<2	<2	<2	<2	<2	<1
Total Aromatic Hydrocarbons																						0.93
Halogenated Non-Aromatic Hydrocarbons																						
Chloroform	100	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
1,1-Dichloroethane	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
1,1-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
cis-1,2-Dichloroethene	6	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
Methylene Chloride	5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	57.7	9.0	<1	<1	<1	<1	<1	<1	<0.5
1,1,1-Trichloroethane	200	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
Trichloroethene	5	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	17.2	1.1	<1	<1	<1	<1	<1	<1	<0.5
Freon-113	1200	<0.6	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5		<5	<1	<1	<1	<1	<1	<1	<1	<1	<0.5
Total Halogenated Hydrocarbons														74.9	10.1							
Total Concentration of VOCs														74.9	10.1							0.93

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
= Compound not included in analysis

* = Analysis by BC Laboratories
† = Analysis by AEN
(D) = Duplicate sample
• = Detections are due to cross contamination during sampling

Table D4.3-1C (Cont'd)
LBNL Groundwater Monitoring Well Results - Southeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	62-92-26 Oct-92	(D)†	Dec-92	Mar-93	Jun-93	Aug-93	Oct-93	Mar-94	Aug-94	(D)*	Feb-95*	Aug-95	Feb-96	Jul-96	Feb-97	Feb-97	May-97	Nov-97	May-98*	Jan-99*	Apr-99	Aug-99*	Aug-99	Oct-99	Jan-00	May-00
Aromatic and Non-Halogenated Hydrocarbons																											
Benzene	1	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<5		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
Naphthalene		<5		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<2	<2	<2	<2	<2	<0.5	<0.5	<2	<2	<2	<2	<2	<2
n-Propylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
Toluene	150	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<2	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1.0	<1	<1	<2	<2	<2	<2	<2	<2	<1	<1	<2	<2	<2	<2	<2	<2
Total Aromatic Hydrocarbons																											
Halogenated Non-Aromatic Hydrocarbons																											
Chloroform	100	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	5.4	<1	<1	<1	<1
1,1-Dichloroethane	5	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	1.1	23.2	5.2	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<5	<2	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	5.1	1.4	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
Freon-113	1200	<1		<0.6	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons															1.1	28.3	6.6						5.4				
Total Concentration of VOCs															1.1	28.3	6.6						5.4				

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted
† = Analysis by Chromalab, EPA Method 8240

< = Less than Quantitation Limit
= Compound not included in analysis
• = Detection is most likely due to cross contamination during sampling

* = Analysis by BC Laboratories
(D) = Duplicate sample

Table D4.3-1C (Cont'd)
LBNL Groundwater Monitoring Well Results - Southeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	62-92-27 Oct-92	(D)†	Dec-92	Mar-93	Jun-93	Aug-93	Nov-93	Mar-94	May-94	Aug-94	Dec-94*	Feb-95*	May-95*	Aug-95	Nov-95	Feb-96	May-96	Jul-96	Dec-96	Feb-97	Feb-97	May-97	Feb-98	Aug-98	Jan-99*	Aug-99	Oct-99	Jan-00	May-00
Aromatic and Non-Halogenated Hydrocarbons																														
Benzene	1	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
sec-Butylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
ter-Butylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Ethylbenzene	700	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
p-Isopropyltoluene		<5		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Naphthalene		<5		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<0.5	<2	<2	<2	<2
n-Propylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Toluene	150	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<5		<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<2	<2	<2	<2	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Xylenes, total	1750	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	<2	<2	<2	<2
Total Aromatic Hydrocarbons																														
Halogenated Non-Aromatic Hydrocarbons																														
Chloroform	100	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethane	5	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethene	6	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Methylene Chloride	5	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.8	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<5	<2	<5	<1	<1	<1	<1	5.3	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	11.2	7.7	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<5	<2	<5	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Trichloroethene	5	<5	<2	<5	<1	<1	<1	<1	2.1	<1	<1	<0.5	<0.5	<0.5	<1	<1	<1	<1	<1	<1	2.7	2.1	<1	<1	<1	<0.5	<1	<1	<1	<1
Freon-113	1200	<1		<0.6	<1	<1	<1	<1	<1	<1	<1	<0.5	<0.5	<0.5	<5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Total Halogenated Hydrocarbons									7.4									1.8			13.9	9.8								
Total Concentration of VOCs									7.4									1.8			13.9	9.8								

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
= Compound not included in analysis

† = Analysis by Chromalab, EPA Method 8240
* = Analysis by BC Laboratories
(D) = Duplicate sample

Table D4.3-1C (Cont'd)
LBNL Groundwater Monitoring Well Results - Southeastern Outlying Area
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	62-95-16 (well is on annual sampling)													
		Mar-96	Jun-96	Aug-96	Dec-96	Feb-97	May-97	Aug-97	Nov-97	Mar-98	May-98*	Aug-98	Nov-98	Jan-99	May-99
Aromatic and Non-Halogenated Hydrocarbons															
Benzene	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
sec-Butylbenzene		<2	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
ter-Butylbenzene		<2	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Ethylbenzene	700	<2	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
p-Isopropyltoluene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Naphthalene		<1	<1	<2	<2	<2	<2	<2	<2	<2	<0.5	<2	<2	<2	<2
n-Propylbenzene		<2	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Toluene	150	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<2	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<2	<2	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Xylenes, total	1750	<2	<2	<2	<2	<2	<2	<2	<2	<2	<1	<2	<2	<2	<2
Total Aromatic Hydrocarbons															
Halogenated Non-Aromatic Hydrocarbons															
Chloroform	100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethane	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Methylene Chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Trichloroethene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Freon-113	1200	<1	<1	<1	<1	<1	<1	<1	<1	<1	<0.5	<1	<1	<1	<1
Total Halogenated Hydrocarbons															
Total Concentration of VOCs															

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit
* = Analysis by BC Laboratories

Table D4.3-2
LBNL Temporary Groundwater Sampling Points - Outlying Areas
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	SB62-96-1 Aug-98	SB70A-95-1 Aug-95*	SB70A-95-3 Aug-95*	SB74-95-6 Sep-95*	SB74-95-9 May-95*
Aromatic and Non-Halogenated Hydrocarbons						
Benzene	1	<1	<0.5	<0.5	0.91	<0.5
sec-Butylbenzene		<1	<0.5	<0.5	<0.5	<0.5
ter-Butylbenzene		<1	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	700	<1	<0.5	<0.5	<0.5	<0.5
p-Isopropyltoluene		<1	<0.5	<0.5	<0.5	<0.5
Naphthalene		<2	1.8	<0.5	<0.5	<0.5
n-Propylbenzene		<1	<0.5	<0.5	<0.5	<0.5
Toluene	150	<1	<0.5	<0.5	0.65	<0.5
1,2,4-Trimethylbenzene		<1	<0.5	<0.5	<0.5	<0.5
1,3,5-Trimethylbenzene		<1	<0.5	<0.5	<0.5	<0.5
Xylenes, total	1750	<2	<1	<1	<1	<1
Total Aromatic Hydrocarbons			1.8		1.56	
Halogenated Non-Aromatic Hydrocarbons						
Chloroform	100	<1	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	5	<1	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethene	6	<1	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethene	6	<1	<0.5	<0.5	<0.5	<0.5
Methylene Chloride	5	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	200	<1	8.3	1.3	<0.5	<0.5
Trichloroethene	5	<1	<0.5	<0.5	<0.5	<0.5
Freon-12		<1	<0.5	<0.5	<0.5	4.5
Freon-113	1200	<1	<0.5	<0.5	<0.5	<0.5
Total Halogenated Hydrocarbons			8.3	1.3		4.5
Total Concentration of VOCs			10.1	1.3	1.6	4.5

MCL = Maximum contaminant level for drinking water

All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

* = Analysis by BC Laboratories

Table D4.3-3
LBNL Hydrauger Sampling - Outlying Areas
Volatile Organic Compounds - EPA Method 8260
(concentrations in µg/L)

Constituent	MCL	54-01-03	54-01-04		54-01-05			54-01-06			54-01-07			54-01-08	
		Aug-98	Jan-93	Aug-98	Jan-93	Mar-94	Aug-98	Jan-93	Mar-94	Aug-98	Jan-93	Mar-94	Aug-98	Jan-93	Mar-94
Aromatic and Non-Halogenated Hydrocarbons															
Benzene	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
sec-Butylbenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
ter-Butylbenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene	700	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
p-Isopropyltoluene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	12.1	<1
Naphthalene		<2	<1	<2	<1	<1	<2	<1	<1	<2	<1	<1	<2	<1	<1
n-Propylbenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Toluene	150	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,2,4-Trimethylbenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,3,5-Trimethylbenzene		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Xylenes, total	1750	<2	<1	<2	<1	<1	<2	<1	<1	<2	<1	<1	<2	<1	<1
Total Aromatic Hydrocarbons														12.1	
Halogenated Non-Aromatic Hydrocarbons															
Chloroform	100	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.4	<1	<1
1,1-Dichloroethane	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethene	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	6	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Methylene Chloride	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
1,1,1-Trichloroethane	200	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene	5	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Freon-113	1200	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Halogenated Hydrocarbons													1.4		
Total Concentration of VOCs													1.4	12.1	

MCL = Maximum contaminant level for drinking water
All analyses by LBNL EML unless otherwise noted

< = Less than Quantitation Limit

Table D4.4-1
Groundwater Monitoring Well Results - Outlying Areas
Concentrations of Total Petroleum Hydrocarbons
(Concentrations in µg/L)

RFI Unit	Area	Well No.	Date	Lab	TPH-Diesel	TPH-Gasoline	TPH-FI
Western Outlying Area							
AOC 6-1	6	88-93-13	Jun-94	BC	**510**		
			Aug-94	BC	<200		
			Dec-94	BC			ND
			Feb-95	BC			ND
			Jun-95	BC	<200		
			Sep-95	BC	<200		
				AEN	<50 (D)		
			Nov-95	BC	<50 **78 (S)**		
			Mar-96	BC	<50 <200 (D)		
			Jun-96	BC	<50		
			Aug-96	BC	<50		
			Dec-96	BC	**52**		
			Feb-97	BC	<50		
			May-97	BC	<50		
			Aug-97	BC	<50 <50 (D)		
			Feb-98	BC	<50		
			Aug-98	BC	<50		
			Jan-99	BC	<50		
AOC 8-1	8	70A-96-5	May-96	CLS	<50		
				BC	<50 (D)		
			Jul-96	BC	<50		
			Dec-96	BC	<50		
			May-97	BC	**61**		
			Aug-97	BC	<50		
			Nov-97	BC	<50		
			May-98	BC	<50		
			Aug-98	BC	<50		
			Nov-98	BC	<50		
		70A-96-6	May-96	CLS	<50		
				BC	<50 (D)		
			Jul-96	BC	<50		
			Dec-96	BC	<50		
			May-97	BC	**150**		
			Aug-97	BC	<50		

Table D4.4-1 (Cont'd)
Groundwater Monitoring Well Results - Outlying Areas
Concentrations of Total Petroleum Hydrocarbons
(Concentrations in µg/L)

RFI Unit	Area	Well No.	Date	Lab	TPH-Diesel	TPH-Gasoline	TPH-FI
AOC 8-1	8	70A-96-6	Nov-97	BC	<50		
			May-98	BC	<50		
			Aug-98	BC	<50		
			Nov-98	BC	<50		
Northeastern Outlying Area							
AOC 11-1	11	74-92-13	Jul-92	C		<50	
			Aug-92	C	<50		
			May-93	C	<50	<50	
			Mar-94	BC			ND
			May-94	BC			**300** (Diesel)
			Aug-94	BC	<200		
			Oct-94	BC			**290** (Diesel)
			Feb-95	BC	**290**		
				AEN	**400 (D)** **400 (S)**		
			May-95	BC	**280**		
			Sep-95	BC	<200		
			Nov-95	BC	**66**		
			Sep-96	BC	**280**		
			Dec-96	BC	**280**		
			Mar-97	BC	**160**		
			May-97	BC	**200**		
			Aug-97	BC	**110**		
			Mar-98	BC	**150**		
			Aug-98	BC	**170**		
			Jan-99	BC	**140**		
			Aug-99	BC	**140**		
AOC 11-1	11	83-92-14	Jul-92	C		**140**	
			Aug-92	C	<50		
			May-93	C	**430**	**69**	
			Mar-94	BC			**350** (Diesel)
			Jun-94	BC			**1200** (Diesel)
			Aug-94	BC	**300**		
			Dec-94	BC			**440** (Diesel)
			Mar-95	BC			ND

Table D4.4-1 (Cont'd)
Groundwater Monitoring Well Results - Outlying Areas
Concentrations of Total Petroleum Hydrocarbons
(Concentrations in µg/L)

RFI Unit	Area	Well No.	Date	Lab	TPH-Diesel	TPH-Gasoline	TPH-FI
AOC 11-1	11	83-92-14	Jun-95	BC	**280**	<50	
			Aug-95	BC	**240**	<50 <50 (S)	-
			Dec-95	BC	**330**		
			Mar-96	BC	**340** **410 (S)**		
			Jun-96	CLS	<50		
			Aug-96	BC	**230**		
			Mar-97	BC	**85** **75 (D)**		
			Jun-97	BC	**75**		
			Aug-97	BC	<50 <50 (S)		
			Mar-98	BC	**57**		
			Sep-98	BC	**59**		
			Jan-99	BC	**81**		
			Aug-99	BC	**53**		
		74-94-7	Jun-94	BC	<200		
			Aug-95	BC	<200		
			Nov-95	BC	**85**		
			Mar-96	BC	**110**		
			Jun-96	BC	<50		
			Aug-96	BC	**50**		
			Dec-96	BC	**130**		
			Feb-97	BC	**150**		
			May-97	BC	<50		
			Aug-97	BC	<50		
			Nov-97	BC	<50		
			Feb-98	BC	<50		
			May-98	BC	<50		
			Aug-98	BC	**140**		
			Jan-99	BC	<50		
			Aug-99	BC	<50		
			Jan-00	BC	<200		
		74-94-8	Jun-94	BC	<200		
			Sep-95	BC	<200		
			Nov-95	BC	**54**		
			Mar-96	BC	<50		
			May-96	CLS	<50		

Table D4.4-1 (Cont'd)
Groundwater Monitoring Well Results - Outlying Areas
Concentrations of Total Petroleum Hydrocarbons
(Concentrations in µg/L)

RFI Unit	Area	Well No.	Date	Lab	TPH-Diesel	TPH-Gasoline	TPH-FI
AOC 11-1	11	74-94-8	Aug-96	BC	<50		
			Dec-96	BC	<50		
			Mar-97	BC	<50		
			May-97	BC	<50		
			Aug-97	BC	<50		
			Nov-97	BC	<50		
			Feb-98	BC	70		
			Jun-98	BC	51*		
			Aug-98	BC	66		
			Jan-99	BC	71		
			Aug-99	BC	<50		
			Jan-00	BC	<200		
		74-95-6	Aug-95	BC	340		
				AEN	100		
			Aug-97	BC	170		
			Mar-98	BC	840		
			Aug-98	BC	110		
			Nov-98	BC	170		
			Feb-99	BC	92		
			Aug-99	BC	170		
		83-95-7	Aug-95	BC	530		
				AEN	200		
			Apr-96	CLS	<50		
			Aug-96	BC	72		
			Dec-96	BC	70		
			Feb-97	BC	120		
			Aug-97	BC	98		
			Mar-98	BC	130		
			Aug-98	BC	140		
			Jan-99	BC	110**		
			Aug-99	BC	130		
	11	85-95-1	Aug-95	BC	<200	<50	
			Dec-95	BC	<50	<50	
			Feb-96	BC	54	<50	
			May-96	CLS	<50		
				BC		<50	
			Aug-96	BC	<50	<50	
			May-97	BC	88	<50	

Table D4.4-1 (Cont'd)
Groundwater Monitoring Well Results - Outlying Areas
Concentrations of Total Petroleum Hydrocarbons
(Concentrations in µg/L)

RFI Unit	Area	Well No.	Date	Lab	TPH-Diesel	TPH-Gasoline	TPH-FI
	11	85-95-1	Nov-97	BC	<50	<50 <50 (D)	
			May-98	BC	<50	<50	
			Aug-98	BC	**70**	<50	
			Oct-98	BC	**51**	<50	
			Nov-99	BC	**72**	<50	
		85-95-2	Aug-95	BC	<200	<50	
			Jan-96	BC	<50	<50	
			Feb-96	BC	<50	<50	
			May-96	CLS	<50		
			Jul-96	BC	<50	<50	
			May-97	BC	<50	<50	
			Nov-97	BC	<50	<50 <50 (S)	
			May-98	BC	<50	<50	
			Aug-98	BC	<50	<50	
			Oct-98	BC	**64**	<50	
		85-96-1	Jul-96	BC	<50	<50	
			Nov-96	BC	<50	<50	
			May-97	BC	<50	<50	
			Nov-97	BC	<50	<50	
			May-98	BC	<50	<50	
			Aug-98	BC	**51**	<50	
			Oct-98	BC	<50	<50	
		85-96-2	Jul-96	BC	<50	<50	
			Nov-96	BC	**55**	<50	
			Mar-97	BC	**90**		
			May-97	BC	<50	<50	
			Aug-97	BC	<50		
			Nov-97	BC	<50	<50	
			Feb-98	BC	<50		
			May-98	BC	<50	<50	
			Aug-98	BC	**67** <50 (D)	<50	
			Oct-98	BC	<50	<50	
			Nov-99	BC	<50		
Southeastern Outlying Area							
AOC 13-2	13	MW62-B1A	May-93	C	<50	<50	
			Mar-94	BC			**2000** (Crude Oil)

Table D4.4-1 (Cont'd)
Groundwater Monitoring Well Results - Outlying Areas
Concentrations of Total Petroleum Hydrocarbons
(Concentrations in µg/L)

RFI Unit	Area	Well No.	Date	Lab	TPH-Diesel	TPH-Gasoline	TPH-FI
AOC 13-2	13	MW62-B1A	May-94	BC			ND
			Aug-94	BC	<200		
			Dec-94	BC			**530** (Diesel)
			Feb-95	BC			**230** (Diesel)
			Jun-95	BC	<200		
			Sep-95	BC	<200		
			Nov-95	BC	**58**		
			Feb-96	BC	**160**		
			May-96	CLS	<50		
				BC	**480 (S)**		
			Jul-96	BC	<50		
			Dec-96	BC	<50		
			Feb-97	BC	<200		
			May-97	BC	<50		
			Aug-97	BC	<50		
			Nov-97	BC	<50		
			May-98	BC	<50		
			Jan-99	BC	**57****		
			Apr-99	BC	**570**		
		MW62-B2	May-93	C	<50	<50	
			Mar-94	BC			**510** (Diesel)
			May-94	BC			**470** (Diesel)
			Sep-94	BC	<200 <200 (D)		
			Dec-94	BC			**940** (Diesel)
			Feb-95	BC			**400** (Diesel)
			Jun-95	BC	<200		
			Sep-95	BC	<200		
				AEN	**80 (S)**		
			Nov-95	BC	**83**		
			Feb-96	BC	**150**		
			May-96	CLS	<50		
			Jul-96	BC	**72**		
			Dec-96	BC	**130**		

Table D4.4-1 (Cont'd)
Groundwater Monitoring Well Results - Outlying Areas
Concentrations of Total Petroleum Hydrocarbons
(Concentrations in µg/L)

RFI Unit	Area	Well No.	Date	Lab	TPH-Diesel	TPH-Gasoline	TPH-FI
AOC 13-2	13	MW62-B2	Feb-97	BC	**52**		
			May-97	BC	<50		
			Aug-97	BC	**59**		
			Nov-97	BC	<50		
			Mar-98	BC	<50		
			Jan-99	BC	**53****		
			May-99	BC	<50		
		62-95-16	Mar-96	BC	<50		
			Jun-96	BC	<50		
				CLS	<50 (D)		
			Aug-96	BC	<50		
			Dec-96	BC	<50		
			Feb-97	BC	<50		
			May-97	BC	<50		
			Nov-97	BC	<50		
			Mar-98	BC	<50		
			May-98	BC	<50		
			Aug-98	BC	<50		
			Nov-98	BC	<50		
			Jan-99	BC	<50		
			May-99	BC	<50		
			Aug-99	BC	<50		
		62-92-27	Aug-94	BC	<200		
			Dec-94	BC			ND ND (D)
			Feb-95	BC			ND
			May-95	BC			ND
			Aug-95	BC			ND
			May-96	CLS	<50		
			Jul-96	BC	<50		
			Feb-97	BC	<50		

Temporary Groundwater Sampling Points

AOC 8-1	8	SB70A-95-1	Aug-95	BC	**760**	<50	
		SB70A-95-3	Aug-95	BC	<200	<50	
AOC 11-1	11	SB74-95-6	Sep-95	BC	**800**	**66**	
		SB74-95-9	May-95	BC	**210**	<50	

Table D4.4-1 (Cont'd)
Groundwater Monitoring Well Results - Outlying Areas
Concentrations of Total Petroleum Hydrocarbons
(Concentrations in µg/L)

RFI Unit	Area	Well No.	Date	Lab	TPH-Diesel	TPH-Gasoline	TPH-FI
	13	SB62-96-1	Oct-96	CLS	<50		
			Nov-96	BC	**66**		

	= Not Sampled
<	= Constituent not detected above reporting limit
ND	= All target analytes not detected above reporting limit

* - Method Blank contained 65 µg/L diesel.
** - Method blank contained 110 µg/L in crude/waste oil range
Analysis for TPH-FI, included: Light Naptha, Aviation Fuel, Stoddard/White Spirits, Heavy Naptha/Ligroin/Petroleum Benzin, Gasoline, JP4, JP5, JP8, Kerosene/Jet Fuel, Diesel, Crude/ Waste Oil, Hydraulic/Motor Oil, and WD-40
(D) = Duplicate sample
(S) = Split sample

Table D4.4-2
BTEX and PAH Results
Temporary Groundwater Sampling Points - Outlying Areas
(Concentrations in µg/L)

Area	Location	Lab	Date	BTEX	PAH
13	SB62-96-1	BC	Oct-96	ND	-
			Nov-96		Anthracene=0.96
					Benzo(a)anthracene=0.039
					Benzo(a)pyrene=0.022
					Benzo(b)fluoranthene=0.12
					Benzo(ghi)perylene=0.017
					Benzo(k)fluoranthene=0.0087
					Fluoranthene=0.30
					Ideno(1,2,3-cd)pyrene=0.014
					Phenanthrene=0.39
					Pyrene=0.21

ND = Not detected above reporting limit (reporting limit varies with analyte)

BC = Analysis by BC Laboratories
BTEX analyzed by EPA Method 602
PAH analyzed by EPA Method 8310

MCLs (National Primary Drinking Water Regulations) of detected chemicals:
Benzo(a)pyrene=0.2 µg/L

Table D4.5-1
Groundwater Monitoring Well Results - Outlying Areas
Semi-Volatile Organic Compounds
(Concentrations in µg/L)

Area	Well No.	Lab	Date	8270
Western Outlying Area				
6	88-92-4	BC	Sep-94	ND
	88-93-11A	BC	Sep-94	Bis(2-ethylhexyl)phthalate = 12
	88-93-13	BC	Aug-94	Bis(2-ethylhexyl)phthalate = 8
8	MWP-2	BC	Sep-94	ND
				Bis(2-ethylhexyl)phthalate = 2
	70-92-7	BC	Aug-94	Bis(2-ethylhexyl)phthalate = 9
	OW3-225	BC	Aug-94	Bis(2-ethylhexyl)phthalate = 8
Northeastern Outlying Area				
11	74-92-13	BC	Aug-94	Bis(2-ethylhexyl)phthalate = 27
	83-92-14	BC	Aug-94	Bis(2-ethylhexyl)phthalate = 11
	74-94-7	BC	Aug-94	ND
	74-94-8	BC	Aug-94	Pentachlorophenol = 9
			Sep-94	ND
	85-95-1	BC	Aug-95	ND
		AEN		ND (S)
		BC	Dec-95	ND
		BC	Feb-96	ND
		CLS	May-96	Bis(2-ethylhexyl)phthalate = 9.5
		BC	Aug-96	ND
				ND (D)
		BC	Aug-98	ND
			Nov-99	ND
	85-95-2	BC	Aug-95	ND
		AEN		ND (S)
		BC	Jan-96	Bis(2-ethylhexyl)phthalate = 8
		BC	Feb-96	ND
		BC	May-96	ND
		BC	Jul-96	ND
				ND (S)
		BC	Nov-97	ND
		BC	Aug-98	Phenol = 7.4
				ND
	85-96-1	BC	Jul-96	ND
		BC	Nov-96	ND
				ND (D)
				ND (S)
		BC	Nov-97	ND
				ND (D)

Table D4.5-1 (Cont'd)
Groundwater Monitoring Well Results - Outlying Areas
Semi-Volatile Organic Compounds
(Concentrations in µg/L)

Area	Well No.	Lab	Date	8270
	85-96-1	BC	Aug-98	Phenol = 3.4
				ND
		BC	Oct-98	ND
	85-96-2	BC	Jul-96	ND
		BC	Nov-96	ND
		BC	Nov-97	Phenol = 11 Phenol = 14 (S)
		BC	Aug-98	ND
		BC	Oct-98	ND
		BC	Nov-99	ND

Southeastern Outlying Area

13	MW62-B1A	BC	Aug-94	ND
	MW62-B2	BC	Sep-94	ND
	62-92-26	BC	Aug-94	Bis(2-ethylhexyl)phthalate = 3
	62-92-27	BC	Aug-94	ND

ND = All target analytes not detected above reporting limit

AEN = Analysis by American Environmental Network
BC = Analysis by BC Laboratories
CLS = Analysis by California Laboratory Services
(D) = Duplicate sample
(S) = Split sample

Table D4.6-1
Polychlorinated Biphenyls (PCBs)
Groundwater Monitoring Well Results - Outlying Areas
(Concentrations in µg/L)

Area	Well No.	Lab	Date	PCBs (8080)
Western Outlying Area				
6	88-93-13	BC	Apr-00	<0.2
Southeastern Outlying Area				
13	MW62-B1A	BC	Apr-00	<0.2
	MW62-B2	BC	Apr-00	<0.2

< = Not detected above reporting limit (reporting limit shown)

BC = Analysis by BC Laboratories

Table D4.7-1
CONCENTRATION OF METALS IN GROUNDWATER - Outlying Areas
(Concentrations in µg/L)

AREA	WELL NO.	LAB	DATE	Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
			MCL:	6	50	1000	4	5	50		NS	1000 (a)	15 (b)	2	NS	100	50	100 (a)	2	NS	5000 (a)
Western Outlying Area																					
6	88-92-4	C	Apr-92	<20	<5	20	<1	<1	<10		<10	<5	<10	<1	<5	<20	<10	<5	<10	<10	<5
		LBNL	Dec-92	<2	<5.6	<6.5	<0.7	<6.6	7.2		<6.6	4.7	<6.2		<12.2	<8	<0.2	<0.9	<19	<6.7	<7.7
		LBNL	Jun-93	<10	<33.5	30	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	<2	<10	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<20	<100	<10	<10
	88-93-11A	BC	Jun-95	<4	<2	<10	<10	<5	<10		<10	<10	<5	<0.2	<10	<50	<2	<10	<5	<50	<50
		LBNL	Mar-96	<50	<2	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		CLS	Jun-96				<0.5	<5											<1		
	88-93-13	BC	Mar-94	<100	<2	30	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<10	<20	<100	<10	<10
		BC	Mar-94	<100	<2	30	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<10	<20	<100	<10	<10
		BC	Jun-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.2	<10	<50	<2	<10	<5	<50	<50
	88-93-13	LBNL	Mar-96	<50	2.5	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		CLS	Jun-96				<0.5	<5											<1		
	88-96-4	BC	Jul-96	<4	<2	<100	<10	<10	<10		<50	<10	<5	<0.2	<50	<50	<2	<10	<1	<10	<50
		LBNL	Jul-96	<4	<2	70	<4	<40	<50		<50	<50	<15	<0.2	<50	<50	<1	<50	<10	<50	<20
8	MWP-2	Q	Feb-92	<20	<20	11	<1	<5	<10		<5	<40	<20	<0.3	20	<10	<4	<5	<100	<5	20
		LBNL	Nov-92	14	<5.6	17	<0.7	<6.6	<0.4		<6.6	2.5	<6.2		<12.2	<8	<0.2	<0.9	<19	<6.7	<7.7
		LBNL	Jun-93	<10	<33.5	30	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	<2	10	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<20	<100	<10	<10
		BC	May-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.2	<10	<50	2.4	<10	<5	<50	<50
		LBNL	Feb-96	<50	<2	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		CLS	May-96				<0.5	<5											<1		
		LBNL	May-97	<4	<2	<50	<4	<5	<5		<5	<5	<5	<0.2	<50	<50	<2	<5	<1	<5	<20
	70-92-7	Q	Mar-92	<20	4	28	<1	<5	<10		<5	<40	<20	<0.3	<10	10	<4	<5	<100	<5	61
		LBNL	Dec-92	<2	<5.6	<6.5	<0.7	<6.6	<0.4		<6.6	<0.2	<6.2		<12.2	<8	<0.2	<0.9	<19	<6.7	<7.7
		LBNL	Jun-93	<10	<33.5	<25.5	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	<2	10	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<20	<100	<10	<10
	70A-96-5	BC	May-96	7	2.0	<100	<10	<10	<10		<50	<10	<5	<0.2	<50	<50	<2	<10	<1	<10	<50
		LBNL	May-96	9.1	2.2	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		LBNL	May-97	<4	<2	56	<4	<5	<5		<5	8.6	<5	<0.2	<50	<50	<2	<5	<1	<5	<20

Table D4.7-1 (Cont'd)
CONCENTRATION OF METALS IN GROUNDWATER - Outlying Areas
(Concentrations in µg/L)

AREA	WELL NO.	LAB	DATE	Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
			MCL:	6	50	1000	4	5	50		NS	1000 (a)	15 (b)	2	NS	100	50	100 (a)	2	NS	5000 (a)
8	70A-96-5	LBNL	May-98	<1																	
		LBNL	Apr-99	1.1																	
	70A-96-6	BC	May-96	<4	3.6	<100	<10	<10	<10		<50	<10	<5	<0.2	<50	<50	<2	<10	<1	<10	<50
		LBNL	May-96	4.1	3.0	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		LBNL	May-97	<4	2.5	<50	<4	<5	<5		<5	<5	<5	<0.2	57	<50	<2	<5	<1	<5	<20
		LBNL	May-98	<1																	
		LBNL	Apr-99	2.4																	
	70A-96-13	BC	Jan-97	<4	5.6	<100	<10	<10	<10		<50	<10	<5	<0.2	<50	<50	<2	<10	<1	<10	<50
		CLS	Jan-97	<5	<10	32	<0.5	<5	12		<50	<10	<5	<0.2	<50	<50	<2	<10	<1	<10	<20
		LBNL	May-97	<4	4.1	57	<4	<5	<5		<5	<5	<5	<0.2	<50	<50	<2	<5	<1	<5	<20
		LBNL	May-98	1.1	8.0	36.8	<1	<1	1.4		<1	1.0	<1	<0.2	5.3	1.5	8.9	<1	<1	1.7	<5
		LBNL	Apr-99	<1	32.6	<1	<1	<1	<1		<1	<1	<1	<0.2	2.7	1.9	<2	<1	<1	<1	<5
	70A-96-14	BC	Jan-97	<4	8.3	<100	<10	<10	<10		<50	<10	<5	<0.2	<50	<50	<2	<10	<1	<10	<50
		CLS	Jan-97	<5	<10	22	<0.5	<5	<10		<50	<10	<5	<0.2	<50	<50	<2	<10	<1	<10	<20
		LBNL	May-97	<4	5.2	50	<4	<5	<5		<5	<5	<5	<0.2	<50	<50	<2	<5	<1	<5	<20
		LBNL	May-98	<1	5.8	35.4	<1	<1	1.2		<1	<1	<1	<0.2	3.6	<1	10.6	<1	<1	1.4	<5
		LBNL	Apr-99	<1	4.5	48.6	<1	<1	<1		<1	1.9	<1	<0.2	3.1	3.1	<2	<1	<1	<1	5.3
	OW3-225	LBNL	Dec-92	<2	<5.6	51	<0.7	<6.6	<0.4		<6.6	<0.2	<6.2		<12.2	<8	<2	<0.9	<19	<6.7	<7.7
		BC	Mar-94	<100	<2	50	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<20	<100	<10	<10
		BC	May-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.2	<10	<50	<2	<10	<5	<50	<50
		LBNL	Feb-96	<50	<2	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		CLS	May-96				<0.5	<5											<1		
		LBNL	Apr-97	<4	<2	70	<4	<5	<5		<5	<5	<5	<0.2	<50	<50	<2	<5	<1	<5	<20
		LBNL	May-98	<1	<2	49.4	<1	<1	3.6		<1	1.5	<1	<0.2	2.4	2.1	<2	<1	<1	1.1	<5
Northeastern Outlying Area																					
11	74-92-13	C	Apr-92	<20	<5	20	<1	<1	<10		<10	<5	<10	<1	<5	<20	<10	<5	<10	<10	<5
		LBNL	Dec-92	40	<5.6	50	<0.7	<6.6	4.3		<6.6	2.8	<6.2		<12.2	<8	<0.2	<0.9	<19	<6.7	148
		LBNL	May-93	<10	<33.5	65	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	<2	140	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<20	<100	<10	<10

Table D4.7-1 (Cont'd)
CONCENTRATION OF METALS IN GROUNDWATER - Outlying Areas
(Concentrations in µg/L)

AREA	WELL NO.	LAB	DATE	Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
			MCL:	6	50	1000	4	5	50		NS	1000 (a)	15 (b)	2	NS	100	50	100 (a)	2	NS	5000 (a)
11	83-92-14	C	Apr-92	<20	<5	90	<1	<1	<10		<10	<5	<10	<1	20	50	<10	<5	<10	<10	10
		LBNL	Dec-92	<2	<5.6	140	<0.7	<6.6	4.5		<6.6	<0.2	<6.2		<12.2	<8	<0.2	<0.9	<19	<6.7	<7.7
		LBNL	May-93	<10	<33.5	100	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	6	50	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<20	<20	<100	<10	<10
	74-94-7	AEN	Jun-94	<20	6	100	<2	<5	<10		<5	<10	<40	<0.2	30	<10	<4	<5	<100	<5	<10
		BC	Jun-94	<100	4	130	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<10	<100	<10	<10
		BC	May-95	<4	3	<100	<10	<5	<10		<10	<10	<5	<0.2	12	<50	3.4	<10	<5	<50	<50
		LBNL	Mar-96	<50	<2	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		CLS	Jun-96				<0.5	<5											<1		
	74-94-8	AEN	Jun-94	<20	47	310	<2	<5	<10		<5	<10	<40	<0.2	10	<10	<4	<5	<100	<5	50
		BC	Jun-94	<100	36	40	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<10	<100	10	<10
		BC	May-95	<4	2.8	<100	<10	<5	<10		<10	<10	<5	<0.2	<10	<50	<2	<10	<5	<50	<10
		LBNL	Mar-96	<50	2.1	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		BC	May-96				<0.5	<5											<1		
		LBNL	May-97		10.7																
		BC	Jun-98		2.6																
		LBNL	May-99		2.9																
	74-95-6	BC	Aug-95	<4	38	<100	<10	<5	<10		<10	<10	<5	<0.2	22	<50	<2	<10	<5	<50	<50
		AEN	Aug-95	<20	30	50	<2	<5	<10		<5	<10	<40	<0.2	30	10	<4	<5	<50	<5	10
		BC	Jun-98		<2																
		LBNL	May-99		<2																
	83-95-7	BC	Aug-95	<4	23	150	<10	<5	<10		<10	<10	<5	<100	20	<50	<2	<10	<5	<50	<50
		AEN	Aug-95	<20	29	140	<2	<5	20		9	<10	<40	<0.2	20	40	4	<5	<50	10	10
		LBNL	Mar-96	<50	6.0	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		CLS	May-96				<0.5	<5											<1		
		LBNL	May-97		<2																
		LBNL	May-98		3.7																
		LBNL	Apr-99		1.6																

Table D4.7-1 (Cont'd)
CONCENTRATION OF METALS IN GROUNDWATER - Outlying Areas
(Concentrations in µg/L)

AREA	WELL NO.	LAB	DATE	Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
			MCL:	6	50	1000	4	5	50		NS	1000 (a)	15 (b)	2	NS	100	50	100 (a)	2	NS	5000 (a)
Southeastern Outlying Area																					
13	MW62-B1A	LBNL	Dec-92	<2	<5.6	55	<0.7	<6.6	<0.4		<6.6	<0.2	<6.2		<12.2	<8	<0.2	<0.9	<19	<6.7	<7.7
		LBNL	May-93	<10	<33.5	60	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	6	70	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<20	<100	<10	<10
	MW62-B2	LBNL	Dec-92	<2	<5.6	42	<0.7	<6.6	<0.4		<6.6	<0.2	<6.2		<12.2	<8	1.6	<0.9	<19	<6.7	<7.7
		LBNL	May-93	<10	<33.5	32	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	3	40	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<10	<20	<100	<10	<10
	62-92-26	C	Oct-92	<20	16	22	<1	<1	<10		<10	<5	<10	<1	7	<20	70	<5	280	<10	18
		LBNL	Oct-92	<150	<60	<70	<10	<70	<10		<70	<10	<60		<120	<60	4.8	<10	<190	<70	<10
		LBNL	Jun-93	<10	<33.5	45	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	3	56	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<20	<100	<10	<10
		BC	May-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.2	<10	<50	<2	<10	<5	<50	<50
		LBNL	Feb-96	<50	<2	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		CLS	May-96				<0.5	<5											<1		
	62-92-27	C	Oct-92	<20	20	35	<1	<1	<10		<10	<5	<10	<1	<5	<20	100	<5	210	<10	20
		LBNL	Oct-92	<150	<60	<70	<10	<70	<10		<70	<10	<60		<120	<60	<0.2	<10	<190	<70	<10
		LBNL	Jun-93	<10	<33.5	32	<4.5	<9	<7		<20.5	<5.5	<43.5	<0.1	<16.5	<61	<1	<12.5	<98.5	<24.5	<16.5
		BC	Mar-94	<100	3	33	<10	<10	<10		<50	<10	<50	<0.2	<50	<50	<2	<20	<100	<10	<10
		BC	May-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.2	<10	<50	<2	<10	<5	<50	<50
		LBNL	Feb-96	<50	2.0	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	24
		CLS	May-96				<0.5	<5											<1		
	62-95-16	LBNL	Mar-96	<50	2.4	<50	<5	<40	<50		<50	<50	<40	<0.2	<50	<50	<1	<50	<50	<50	<20
		CLS	Jun-96				<0.5	<5											<1		
		LBNL	May-97	<4	<2	<50	<4	<5	<5		<5	<5	<5	<0.2	<50	<50	6.9	<5	<1	<5	<20

MCL: Maximum contaminant level for drinking water (determined by California DTSC)

(a): secondary MCL
(b): action level
NS: Not Specified
* = Grab sample

<	= not detected
40	= concentration above MCL
	= not analyzed

AEN = Analysis by American Environmental Network
BC = Analysis by BC Analytical laboratory
C = Analysis by Chromalab
CLS = Analysis by California Laboratory Services
LBNL = Analysis by Lawrence Berkeley National Laboratory
Q = Analysis by Quanteq

Table D4.8-1
Surface Water Sampling Results - Outlying Areas
Concentrations of Organic Constituents
(concentrations in µg/L)

Location	Date	Lab	VOCs 8260	SVOCs 625/8270	PCBs 8080
North Fork Strawberry Creek	Feb-93	LBNL	ND		
	Feb-93*	LBNL	ND		
	Apr-93	LBNL	ND		
	Aug-93	LBNL	ND ND (D)		
		C		ND ND (D)	
	Mar-94	LBNL	ND		
	Jul-94	LBNL	ND		
		BC	ND (D)	ND	
	Jan-95	BC	ND		
	May-95**	BC	1,1,1-TCA=0.95 1,1,1-TCA=0.91 (D)		
	Jul-95	LBNL	ND		
	Dec-95**	LBNL	ND		
	Jan-96	LBNL	ND		
	Apr-96#	LBNL	ND		
	Apr-97	LBNL	ND		
	Jan-98	LBNL	ND		
	Apr-98	LBNL	ND		
		BC		Diethyl phthalate=2.2	
	Jul-98	BC		ND	
	Apr-99	LBNL	ND		
	Jul-99	BC			<0.2
	Jul-99**	BC			<0.2
	Jan-00	LBNL	ND		
	Mar-00**	LBNL	ND		
Botanical Garden Creek	Aug-93	LBNL	ND	ND	
	Mar-94	LBNL	ND		
	Jul-94	LBNL	ND		
	Jan-95	BC	ND		
	Jul-95	LBNL	ND		
		BC	ND (D)		
	Jan-96	LBNL	ND		
		BC	ND (D)		
	Apr-96	LBNL	ND (c)		
Cafeteria Creek	Mar-94	LBNL	ND		
	Jan-95	BC	ND		
	Jan-96	LBNL	ND		
	Apr-96#	LBNL	ND		
	Apr-97	LBNL	ND		
	Jan-98	LBNL	ND		
	Apr-99	LBNL	ND		
	Jan-00	LBNL	ND		
No Name Creek	Mar-94	LBNL	ND		
	Jul-94	BC	ND		
	Jan-95	BC	ND		
	Jul-95	LBNL	ND		
	Jan-96	LBNL	ND		
	Apr-96#	LBNL	ND		
	Apr-97	LBNL	ND		
	Jan-98	LBNL	ND		
	Apr-99	LBNL	ND		
	Jan-00	LBNL	ND		

ND	= Not detected above reporting limit (reporting limit varies with analyte)
	= Not analyzed

- All April 1996 creek samples missed holding times for 8260 analysis (D) = Duplicate sample
* - Sample taken at UC Women's Faculty Club
** - Sample taken at Erosion Control Basin

Table D4.8-2
Sediment Sampling Results - Outlying Areas
Concentrations of Organic Constituents (mg/kg)

Location	Sample ID	Date	Lab	VOCs 8260	SVOCs 8270	TPH-Diesel 3550	TPH-Gas 5030	PCBs 8080
No. Fork Strawberry Creek	SSBC-1A/2A-0.4	Apr-93	Q	ND*	ND	49**	<0.2	
	SSBC-3A/4A-0.8			Toluene 0.013*	ND	<5**	<0.2	
	SS-NFStraw-96-1A-0	Aug-96	BC		ND			
	SS-NFStraw-96-2A-0				ND			
	SS-NFStraw-96-3A-0				ND			
	SS-NFStraw-96-4A-0				ND			
	SS-NFStraw-96-5A-0				ND			
	SS-Nfstraw-98-1-0.0	Jan-98	BC					<0.02
	SS-Nfstraw-98-2-0.0							<0.02
	SS-Nfstraw-98-3-0.0							<0.02
No Name Creek	SS-Noname-96-1A-0.0	Aug-96	BC		ND			
	SS-Noname-96-2A-0.0				ND			
	SS-Noname-98-1-0.0	Jan-98	BC					<0.02
	SS-Noname-98-2-0.0							<0.02
Banana Creek	SS-Banana-96-1A-0.0	Aug-96	BC		ND			
	SS-Banana-96-2A-0.0				ND			

BC = Analysis by BC Laboratories
Q = Analysis by Quanteq

* = Analyzed by EPA Method 8240
** = Oil detected

	= Not analyzed
ND	= Not detected above reporting limit
<	= Not detected above reporting limit (reporting limit shown)

Table D4.8-3
Surface Water Sampling Results - Outlying Areas
Concentrations of Metals (µg/L)

			Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
		MCL:	6	50	1000	4	5	50		NS	1000 (a)	15 (b)	2	NS	100	50	100 (a)	2	NS	5000 (a)
LOCATION	LAB	DATE																		
North Fork Strawberry Creek	C	Aug-93	<20	<5	96	<1	<1	<10		<10	<5	<10	<1	15	<20	<10	7	<10	<10	93
			<20	<5	45	<1	<1	<10		<10	<5	<10	<1	<5	<20	<10	<5	<10	40	8
	BC	Jul-94	<100	<2	<100	<10	<5	<10		<10	<10	<5	<0.20	<10	<50	<2	<10	<5	<50	<50
			<100	2	<100	<10	<5	<10		<10	<10	<5	<0.20	<10	<50	<2	<10	<5	<50	<50
	BC	Jul-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.20	<10	<50	<2	<10	<5	<50	<50
	BC	Jan-96	<4	2.4	<100	<10	<5	<10		<10	<10	<5	<0.20	<10	<50	<2	<10	<5	<50	<50
	LBNL	Apr-96	<50	<2	<50	<5	<40	<50		<50	<50	<40	<0.20	<50	<50	<1	<50	<50	<50	<20
	LBNL	Apr-97	<4	<2	104	<4	<5	<5		<5	<5	<5	<0.20	<50	<50	<2	<5	<1	<5	<20
	LBNL	Jan-98	<1	<2	40.2	<1	<1	<5		<5	2.3	<1	<0.10	<5	<5	<2	<1	<1	4.3	8.8
	LBNL	Apr-98	<1	<2	48.7	<1	<1	1.0		<1	1.9	2.9	<0.20	1.4	<1	5.2	<1	<1	5.1	6.9
	LBNL	Apr-99	<1	4.2	76.9	<1	<1	8.6		<1	1.2	<1	<0.25	2.5	<1	4.5	<1	<1	15.9	9.3
	BC	Jul-99							4.2											
Erosion Control Basin >	BC	Jul-99							<2											
	LBNL	Jan-00	<1	<2	41.0	<1	<1	2.5		<1	4.6	<1	<0.10	1.6	1.5	<2	<1	<1	5.4	51.6
	BC	Jan-00							<2											
No Name Creek	BC	Jul-94	<100	3.0	120	<10	<5	<10		<10	10	8	<0.20	<10	<50	<2	<10	<5	<50	<50
	BC	Aug-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.20	<10	<50	<2	<10	<5	<50	<10
	BC	Jan-96	<4	3.0	<100	<10	<10	<10		<50	<10	<5	<0.20	<50	<50	<2	<10	<5	<10	<50
	LBNL	Apr-96	<50	2.9	<50	<5	<40	<50		<50	<50	<40	<0.20	<50	<50	<1	<50	<50	<50	<20
	LBNL	Apr-97	<4	3.2	99	<4	<5	5.9		<5	<5	<5	<0.20	<50	<50	<2	<5	<1	<5	<20
	LBNL	Jan-98	<1	3.4	51.2	<1	<1	<5		<5	4.2	<1	<0.10	<5	<5	12.3	<1	<1	4.2	<5
	LBNL	Apr-99	<1	2.4	109	<1	<1	7.4		<1	1.1	<1	<0.25	1.2	1.8	5.0	<1	<1	6.1	<5
	LBNL	Jan-00	<1	<2	80.1	<1	<1	<1		<1	<1	<1	<0.20	1.8	<1	<2	<1	<1	3.8	<5

Table D4.8-3 (Cont'd)
Surface Water Sampling Results - Outlying Areas
Concentrations of Metals (µg/L)

			Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
		MCL:	6	50	1000	4	5	50		NS	1000 (a)	15 (b)	2	NS	100	.50	100 (a)	2	NS	5000 (a)
LOCATION	LAB	DATE																		
Botanical Garden Creek	C	Aug-93	<20	<5	77	<1	<1	<10		<10	<5	<10	<1	<5	<20	<10	<5	<10	<10	6
	BC	Jul-94	<100	3	<100	<10	<5	<10		<10	<10	<5	<0.20	<10	<50	<2	<10	<5	<50	<50
	BC	Jul-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.20	<10	<50	<2	<10	<5	<50	<50
	BC	Jul-95	<4	<2	<100	<10	<5	<10		<10	<10	<5	<0.20	<10	<50	<2	<10	<5	<50	<50
	BC	Jan-96	<4	2.6	<100	<10	<10	<10		<50	10	<5	<0.20	<50	<50	<2	<10	<5	<10	51
	LBNL	Apr-96	<50	3.4	<50	<5	<40	<50		<50	<50	<40	<0.20	<50	<50	<1	<50	<50	<50	<20
	LBNL	Apr-97	<4	2.1	103	<4	<5	8.7		<5	<5	<5	<0.20	<50	<50	<2	<5	<1	<5	<20
	LBNL	Jan-98	<1	<2	29.6	<1	<1	<5		<5	3.9	<1	<0.10	<5	<5	3.4	<1	<1	3.7	8.5
	LBNL	Apr-99	<1	<2	82.7	<1	<1	7.8		<1	1.9	<1	<0.25	3.4	3.1	5.4	<1	<1	8.8	<5
	LBNL	Jan-00	<1	<2	68.6	<1	<1	1.6		<1	1.3	<1	<0.20	2.9	<1	<2	<1	<1	3.8	<5
Cafeteria Creek	BC	Jan-96	<4	<2	<100	<10	<10	<10		<50	<10	<5	<0.20	<50	<50	<2	<10	<5	<10	50
	LBNL	Apr-96	<50	<2	<50	<5	<40	<50		<50	<50	<40	<0.20	<50	<50	<1	<50	<50	<50	<20
	LBNL	Apr-97	<4	<2	121	<4	<5	6.3		<5	<5	<5	<0.20	<50	<50	<2	<5	<1	<5	<20
	LBNL	Jan-98	<1	<2	35.7	<1	<1	<5		<5	2.2	<1	<0.10	<5	<5	<2	<1	<1	1.1	7.6
	LBNL	Apr-99	<1	<2	89.3	<1	<1	7.4		<1	1.9	<1	<0.25	2.5	3.7	2.9	<1	<1	1.9	11.7
	LBNL	Jan-00	<1	<2	22.1	<1	<1	1.9		<1	3.5	<1	<0.20	1.1	<1	<2	<1	<1	<1	27.8

MCL: Maximum contaminant level for drinking water (determined by California DTSC)
BC = Analysis by BC Laboratories
C = Analysis by Chromalab
LBNL: Analysis by Lawrence Berkeley National Laboratory

(a): secondary MCL
(b): action level
NS: Not Specified

< = Not detected above quantitation limit
= Not analyzed

Table D4.8-4
Sediment Sampling Results - Outlying Areas
Concentrations of Metals (mg/kg)

Location		Sample ID	Date	Lab	Sb	As	Ba	Be	Cd	Cr	Cr6	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	V	Zn
North Fork Strawberry Creek	BL	SSBC-1/2A-0.4	Apr-93	Q	<2	3	140	<0.2	0.6	59		8.9	47	180	0.3	0.6	32	<2	3.5	<3	28	160
	BL	SSBC-3/4A-0.5/0.8	Apr-93	Q	<2	5	79	<0.2	0.6	45		11	40	53	0.6	<0.6	38	<2	<0.2	<3	35	160
	ECB	SS-ERBAS-N-L-1-0	Jan-95	BC											<0.2							
	ECB	SS-ERBAS-N-U-1-0													<0.2							
	ECB	SS-ERBAS-S-U-1-0													<0.2							
	ECB	SS-ERBAS-S-L-1-0													<0.2							
	ECB	SS-ERBAS-S-U-2-0	Jul-95	BC	<5	2.6	334	<0.5	<0.5	36		6.8	28	17	<0.2	<2.5	26	<0.5	<1	5.4	31	130
	ECB	SS-ERBAS-S-U-3-0			<5	1.9	93	<0.5	0.57	42		6.5	38	73	<0.2	<2.5	29	<0.5	<1	<5	32	259
	ECB	SS-ERBAS-S-U-4-0			<5	2.0	52	<0.5	0.5	33		8.0	55	45	0.22	<2.5	27	<0.5	<1	<5	29	182
	ECB	SS-ERBAS-S-U-5-0			<5	2.5	47	<0.5	<0.5	79	<1	6.8	216	69	<0.2	<2.5	27	<0.5	<1	<5	32	314
	BL	SS-Nfstraw-96-1A-0	Aug-96	BC	<10	3.5	98	<1	<1	129		7.1	19	17	<0.2	15	105	1.0	<2	<10	37	109
	BL	SS-Nfstraw-96-2A-0			<10	4.7	83	<1	1.2	43		8.7	30	49	<0.2	<5	27	1.6	<2	<10	53	108
	BL	SS-Nfstraw-96-3A-0			<10	9.2	1300	<1	2.5	21		13	44	21	<0.2	<5	181	2.6	<2	<10	48	148
	BL	SS-Nfstraw-96-4A-0			<10	4.1	78	<1	<1	31		6.1	18	20	<0.2	<5	20	1.1	<2	<10	37	115
	BL	SS-Nfstraw-96-5A-0			<10	4.2	81	<1	<1	29		7.3	26	19	<0.2	<5	22	1.0	<2	<10	49	144
	BL	SS-NFStraw-FL-99-1-0	Jul-99	BC							<0.1											
	ECB	SS-NFStraw-BSN-99-1-0									<0.1											
No Name Creek		SS-Noname-96-1A-0.0	Aug-96	BC	<10	9.3	212	<1	<1	36		13	66	19	<0.2	<5	43	2.4	<2	<10	51	78
		SS-Noname-96-2A-0.0			<10	9.9	199	<1	<1	30		19	31	24	<0.2	<5	47	2.2	<2	<10	37	86
Cafeteria Creek		SS-Cafe-96-1A-0.0	Aug-96	BC	<10	11	187	<1	1.4	68		19	45	35	<0.2	<5	46	1.5	<2	<10	54	235
		SS-Cafe-96-2A-0.0			<10	11	146	<1	13	53		15	54	29	<0.2	<5	41	1.7	<2	<10	49	186
		SS-Cafe-98-1-0.0	Jan-98	BC					<1.0													
		SS-Cafe-98-2-0.0							<1.0													
		SS-Cafe-98-3-0.0							<1.0													
		SS-Cafe-98-4-0.0							<1.0													
Banana Creek		SS-Banana-96-1A-0.0	Aug-96	BC	<10	5.4	110	<1	<1	68		16	27	13	<0.2	<5	64	2.6	<2	<10	72	78
		SS-Banana-96-2A-0.0			<10	3.9	74	<1	<1	38		14	27	12	<0.2	<5	52	2.2	<2	<10	44	86

BL = Sample taken at LBNL Boundary Line
ECB = Sample taken at Erosion Control Basin

BC = Analysis by BC Laboratories
Q = Analysis by Quanteq

< = Not detected above quantitation limit
= Not analyzed