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Re: Characterization Summary Report for the Building 812 Study Area at Lawrence Livermore National Laboratory Site 300

Dear Mr. Park, Ms. Setian, and Ms. Timm:

The U.S. Department of Energy (DOE) and Lawrence Livermore National Laboratory (LLNL) are submitting this Characterization Summary Report for the Building 812 study area at LLNL Site 300. This letter report summarizes the results of environmental investigations conducted at the study area and is organized into eight sections:

1. Introduction.
2. Characterization and Remediation Activities.
3. Physical Setting.
4. Geology.
5. Hydrogeology.
6. Nature and Extent of Contamination.
7. Summary.
8. Future Work.

The data collected as part of this characterization effort for the Building 812 study area are presented in Attachment A. A description of the screening-level modeling of the migration of chemicals from surface and subsurface soil and rock in the vadose zone to ground water is presented in Attachment B.

1. Introduction

Site 300 is a U.S. DOE experimental test facility operated by the University of California and is located 17 miles east of Livermore and 9 miles southwest of Tracy, California (Figure 1). LLNL Site 300 was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List in 1990. Environmental investigations have been conducted under the joint oversight of the U.S. Environmental Protection Agency (EPA) – Region IX, the California Regional Water Quality Control Board (RWQCB) – Central Valley Region, and the California Department of Toxic Substances Control (DTSC) – Northern California Coastal Cleanup Operations Branch. A Federal Facility Agreement (FFA) is in place between DOE and these regulatory agencies (U.S. DOE, 1992) governing cleanup operations at LLNL Site 300.

The Building 812 study area is located in the east-central portion of Site 300 (Figure 1). Since the early 1960s, Building 812 facilities have been used to conduct explosives tests and diagnostics in support of national defense programs. Figure 2 shows the locations of these facilities including:

- A main diagnostics structure (Building 812A).
- A change room and photo processing facility (Building 812B).
- A machine shop (Building 812C).
- A small high explosives (HE) storage bunker, termed a “bunkerette” (Building 812D).
- A Cobalt Irradiation Facility (Building 812E).
- A firing gun assembly (Building 812 F).

In the past, Building 812A housed a linear accelerator and a 90-millimeter (mm) Howitzer gun (Webster-Scholten, 1994). At Building 812A, floor drains beneath the building empty into a drain line that leads to a septic tank; the septic tank empties into a tile drain about 15 feet (ft) southeast of the building.

A firing table used for explosives testing is located behind and above Building 812A (Figure 2). In the past, firing table gravel was typically pushed into the adjacent drainage/ravine or to the side of the firing table. In 1988, about 5,364 cubic yards of the gravel was removed from the firing table and disposed into the Pit 7 Landfill (Lamarre and Taffet, 1989). The underlying soil was not removed.

Building 812B is an earthen-covered, corrugated steel shelter located about 80 ft southwest of Building 812A. Building 812B was initially designed in 1959 for a carport and storage area, however, it was used mostly as a photo lab and change room. The wastewater from photo processing operations was reportedly discharged to the ground. A toilet discharges to a drain line that terminates at a septic tank and sewer drain field located about 20 feet southeast of Building 812B.

Building 812C is an earth-covered, corrugated steel shelter located southwest and immediately adjacent to Building 812B. The building was used as a machine shop. An acid wastewater line from the machine shop discharged to a former dry well located about 50 ft southeast and downslope from Building 812C when this facility was in use.

Building 812D is an earth-covered bunkerette located approximately 50 ft northeast of Building 812A. This facility housed cameras that were used on the Building 812 Firing Table. Southwest and adjacent to Building 812D was a former dry well that received drainage from firing table washdowns. The dry well was excavated in 1988 and the excavated materials were placed in the Pit 7 Landfill (Lamarre et al., 1989). Building 812D is currently used to store high explosives.

Building 812E is the Cobalt Irradiation Facility that was used to develop detectors and ancillary diagnostic systems and to investigate radiation damage to materials. The radioactive cobalt source was sealed. No chemicals were reportedly stored in this building.

Building 812F contains a 90-mm firing gun assembly formerly located at Building 812A. No chemicals are known to have been stored or disposed in this area.

A remedial investigation was performed in the Building 812 study area to determine if contamination has been released to the environment as a result of past activities conducted in this area. This Characterization Summary presents the results of this remedial investigation including the physical characteristics, geology, hydrogeology, and nature and extent of contamination for the Building 812 study area. Hydrogeological, chemical, and radiological data collected between January 1, 1988 and March 31, 2005 were used to complete this assessment.

2. Characterization and Remediation Activities

Environmental investigations in the Building 812 study area began in 1988. Investigations intensified in 1996 when milestones for this area were added to the Site 300 FFA schedule (U.S. DOE, 1992). The site characterization work performed in the study area includes:

- Records searches and interviews with current and former employees.
- Geological mapping.
- Drilling, geophysical logging, and collection of soil and rock samples from boreholes.
- Installing ground water monitor wells.
- Correlating stratigraphic units and hydrostratigraphic units.
- Sampling and chemical/radiological analysis of firing table gravel, surface and subsurface water, soil, and rock.
- Measuring ground water elevations.
- Hydraulic testing.

Previous remedial activities include:

- Excavating and disposing of firing table gravel and soil.
- Excavating and disposing of materials from a shallow dry well.

Table 1 contains a summary of investigation and cleanup activities conducted at the Building 812 Firing Table area. Table 2 contains completion data for monitor wells installed in the Building 812 study area.

3. Physical Setting

The Building 812 study area covers approximately 0.35 square miles in east-central Site 300 (Figure 1). The local topography and locations of springs and monitor wells are shown on Figure 2. Physical characteristics of the study area are shown on the geologic map and panoramic photograph presented as Figures 3 and 4, respectively. These features are described in more detail in Section 4.

The Building 812 facilities are located at the base of the Building 812 Canyon, a southwest-northeast trending valley that rises from an elevation of about 940 ft above mean sea level (MSL) near its junction with Elk Ravine to over 1,200 ft above MSL on the steep ridges to the north. Elk Ravine trends northwest to southeast in the southern portion of the study area. A deeply-incised north-south oriented channel within the Building 812 Canyon intersects Elk Ravine. Except for Building 812E, all buildings are situated on a cut-and-fill slope west and above a small drainage ravine that merges with the Building 812 Canyon to the south (Figure 2). Due to the rugged terrain, safe and accessible drilling locations are often limited to paved areas near buildings, fire trails, and other dirt roads.

The climate at Site 300 is classified as semi-arid. Rainfall averages 10 to 11 inches per year, most of which falls during winter storms. During these storms, ephemeral water may flow within the Building 812 Canyon drainage towards Elk Ravine. Discharge from Spring 6 flows to a perennial surface water body that extends southeast beyond the junction of the two valleys. Surface water flowing locally in channels after rainfall events quickly infiltrates into the ground after traveling short distances.

4. Geology

Site 300 is located within the Coast Range Physiographic Province of north-central California. The province is characterized by a sub-parallel system of northwest-southeast trending ridges and valleys. Rocks at Site 300 are principally comprised of terrestrial and estuarine sediments of Miocene to Pliocene age. Quaternary alluvium occurs as fill within valleys. The geology of the Building 812 study area is complex. There are several major faults, and a number of stratigraphic units are offset by faulting. One of the most notable features in the area is the Building 812 Canyon Fault (A) (Figure 3). Another sub-parallel fault, designated the Building 812 Canyon Fault (B), is inferred from subsurface data (Ehman, 2005). These faults are discussed in more detail in Section 4.2.

4.1. Stratigraphy

Quaternary alluvium (Qal) occurs as stream channel sediment within Elk Ravine and the Building 812 Canyon (Figures 3 and 4). Rocks beneath the Building 812 area comprise two formations, the Neroly Formation and the underlying Cierbo Formation. The uppermost bedrock stratigraphic unit is a conglomerate and sandstone of the Neroly Formation ($Tnbs_1$) that contains interbeds of sandstone and siltstone. Beneath the $Tnbs_1$ conglomerate is a blue sandstone unit with interbeds of claystone and siltstone ($Tnbs_0$). The base of the Neroly Formation is a siltstone and claystone-dominated unit ($Tnsc_0$). The Neroly Formation rests on an erosional contact with massive sandstones and interbedded siltstones and claystones of the underlying Cierbo Formation (Tmss).

Figure 5 presents a detailed summary of correlations of stratigraphy encountered in several deep boreholes drilled at the Building 812 study area. These correlations were made using sequence stratigraphic analysis (Ehman, 2005) in which cyclic sequences of distinct rock units observed in borehole core are defined across the study area. Figures 6 (a and b) and 7 (a and b) are two geologic cross-sections through the Building 812 study area. The stratigraphic column for the area is shown within the legend for Figures 6 (a and b) and several detailed columns are shown on Figure 5. The section lines for these cross-sections are shown on Figure 3. Relevant characteristics of each stratigraphic unit present beneath the Building 812 study area are described below.

4.1.1. Quaternary Alluvium (Qal)

The alluvial deposits of the Qal stratigraphic unit are comprised of silty clays, clayey and silty sands, and some gravel. The maximum thickness of alluvial deposits in the Building 812 study area is about 10 feet in the Building 812 Canyon and about 24 feet in Elk Ravine, adjacent to monitor wells NC2-22 and NC2-23.

4.1.2. Neroly Formation Lower Conglomerate and Sandstone Unit ($Tnbs_1$)

The lower conglomerate and sandstone unit of the Neroly Formation ($Tnbs_1$) is exposed on both sides of the Building 812 Canyon Fault Zone (Figures 6 [a and b]). The resistant ledge-forming outcrops of $Tnbs_1$ are one of the most distinctive aspects of the geology in the study area and were mapped by Carpenter et al., 1990 (Figure 3). The unit is composed of conglomerate containing clasts of predominantly volcanic rocks (andesite and basalt) with interbeds of sandstone and gravelly sandstone. The unit is between 30 and 50 feet thick. Because the $Tnbs_1$ is unsaturated, no wells are screened in the unit in the Building 812 study area.

4.1.3. Neroly Formation Lower Blue Sandstone Unit ($Tnbs_0$)

The $Tnbs_0$ unit rests on mudstones, siltstones, and sandstones of the $Tnsc_0$ and below the $Tnbs_1$ (Figures 3 and 4). The $Tnbs_0$ is exposed in outcrop on the east side of the Building 812 Canyon Fault Zone, and is not present in the eastern fault block (Figures 6 [a and b] and 7 [a and b]). However, it was penetrated by the boreholes for wells W-812-1925 and W-812-1933 where there is a narrow section of $Tnbs_0$ preserved in a block between shears A and B of the

Building 812 Canyon Fault Zone (Figures 6 [a and b] and 7 [a and b]). The $Tnbs_0$ unit is present in the subsurface on the west side of the Building 812 Canyon Fault system and is approximately 50 feet thick.

4.1.4. Neroly Formation Lower Claystone Unit ($Tnsc_0$)

The lower claystone unit of the Neroly Formation ($Tnsc_0$) occurs above mudstones and sandstones of the Cierbo Formation (Figure 5) and below the sandstones and silty sandstones of $Tnbs_0$. The unit is comprised of dark greenish-gray claystone, siltstone, clayey siltstone and silty claystone with thin, discontinuous silty sandstone and sandy siltstone interbeds. It is approximately 140 feet thick. The clayey siltstones and silty claystones are fractured and typically have a sheared appearance in core.

Most of the wells on the east side of the 812 Canyon Fault are screened in $Tnsc_0$ sandstones. The $Tnsc_0$ is divided into two informal members, Upper $Tnsc_0$ and Lower $Tnsc_0$ (Figure 5). The Upper $Tnsc_0$ is an average of 60 feet thick and the Lower $Tnsc_0$ is an average of 80 feet thick.

4.1.5. Cierbo Formation (Tmss)

The Cierbo Formation (Tmss) was encountered in the drilling of several boreholes (Figures 5, 6 [a and b], and 7 [a and b]) and is not exposed at the surface in the Building 812 study area. The unit is distinguished by the presence of light gray quartzose sandstones, as opposed to the blue-gray volcanic-rich sandstones of the overlying Neroly Formation.

The Cierbo Formation consists of fine- to medium-grained, light gray to light olive gray sandstones with clayey siltstone and silty claystone interbeds. Rock fragments, pyrite, and feldspar grains are also present in the sandstones. Because the sandstone is very friable, recovery during drilling tends to be fair to poor. The sandstone unit thickness ranges from 5 feet at well W-812-1922, to approximately 36 feet at well W-812-04. Correlations shown on Figure 5 suggest that the Cierbo Formation sandstones are laterally discontinuous and probably channelized. The clayey siltstone and silty claystone interbeds are often fractured.

4.2. Geologic Structure

Neroly Formation rocks on both sides of the Building 812 Canyon Fault Zone possess a very shallow dip that is difficult to accurately measure in outcrop. The panoramic photograph of the Building 812 study area (Figure 4) shows well-exposed conglomerates of the $Tnbs_1$ dipping gently on both sides of the fault zone with apparent offset, north side down. The well-pronounced fault scarp of the Building 812 Canyon Fault A can be observed in the field and on the high-resolution aerial photograph (Figure 3). The measured orientation of the fault on the northwest side of Building 812E is 209 degrees, with a vertical dip and slickenslided lineations that dip 7 degrees south (Ehman, 2005). The apparent offset is down on the northwest side of this fault. Carpenter et al., 1990 depict the fault as a series of left-lateral splays approximately 1,200 feet up the canyon to the northeast of the Building 812 area. At least four different fault splays can be observed on aerial photos. To the south, the fault extends at least to Elk Ravine. The perennial surface water southeast of Spring 6 appears to correspond to the intersection of the Building 812 Canyon Fault A with the Elk Ravine Fault (Ehman, 2005). Southwest of Elk

Ravine, the trace of the fault is unclear, but geomorphic evidence suggests that the Building 812 Canyon Fault A may actually offset the Elk Ravine Fault. The Elk Ravine Fault trends northwest–southeast along Elk Ravine (Figure 3) and extends north-northwest toward the Building 865 area and the northern Site 300 boundary.

The Building 812 Canyon Fault B appears to have more vertical offset than the Building 812 Canyon Fault A as shown on Figure 5. The total apparent vertical offset of the fault system was determined by evaluating geologic cross-sections A-A' and B-B' (Figures 6 [a and b] and 7 [a and b]) and comparing the stratigraphy between wells W-812-1924 (southeast fault block) and W-812-1929 (northwest fault block). The total apparent vertical offset is about 50 to 60 feet.

5. Hydrogeology

The hydrogeology of the Building 812 study area is controlled by stratigraphy, structure, and topography. The distribution of strata and the two main shears of the Building 812 Canyon Fault Zone play important roles in the location and hydraulic character of water-bearing zones. Sections 5.1 describe the major water-bearing or hydrostratigraphic units (HSUs) present within the Building 812 study area and ground water elevations and flow within these units. Section 5.2 discusses ground water elevations and recharge and discharge in the HSUs. The major-ion chemistry of ground water in the major HSUs is discussed in Section 5.3. A description of HSU hydraulic parameters is presented in Section 5.4.

5.1. Hydrostratigraphic Units

For the purposes of this Characterization Summary report, saturated stratigraphic units are grouped into hydrostratigraphic units (HSUs). An HSU is a water-bearing zone that exhibits similar hydraulic and chemical properties within particular stratigraphic units. Based on water elevation time-series analysis, stratigraphic correlation, fault and fracture geometry, and variations in major-ion chemical data, four HSUs have been defined for the Building 812 study area:

1. Qal HSU.
2. $Tnbs_0$ HSU.
3. $Tnsc_0$ HSU.
4. Tmss HSU.

Completion data for monitor wells installed in these HSUs are presented in Table 2. Ground water elevation data are presented in Table A-1. The hydraulic and hydrogeologic characteristics of these HSUs are summarized in Table 3 and described in this and subsequent Sections 5.2 through 5.4.

Due to the presence of the fault zone that runs through the center of the Building 812 study area and the resulting vertical offset of stratigraphic units, saturated conditions in the HSUs vary significantly on the east and west sides of the Building 812 Canyon Fault A. For this reason, the HSUs are discussed relative to Fault A.

East of Fault A, the Qal HSU consists of unconsolidated saturated sediments that occupy the valley bottoms of the Building 812 Canyon and Elk Ravine. Zero to five feet of ephemeral, unconfined ground water are present in the Qal HSU at a depth of 0 to 20 feet below ground surface (bgs). Ground water in this HSU generally follows the topography of the valley bottoms, flowing south-southeast in the Building 812 Canyon and changing to a east-southeast direction as ground water flows into the alluvium in Elk Ravine. A map of ground water elevations in the Qal HSU is shown in Figure 8. The Qal HSU is not present in the region north of Elk Ravine and west of Fault A because there are no alluvial sediments in this area.

The $Tnbs_0$ HSU is the principal water-bearing zone on the west side of the Building 812 Fault Zone. Five to ten feet of confined ground water are present in this HSU at a depth of 50 to 70 feet bgs. Ground water in the $Tnbs_0$ HSU flows in a south-southwest direction with a gradient of 0.0025. The $Tnbs_0$ stratigraphic unit is present as hilltop outcrops and is unsaturated east of the Building 812 Fault A. The potentiometric surface for ground water in the $Tnbs_0$ HSU is shown on Figure 9

West of Fault A, the $Tnsc_0$ stratigraphic unit is primarily unsaturated except for the southwesternmost part of the study area near well NC2-22. Ground water is present in this Upper $Tnsc_0$ well at a depth of 35 feet bgs. No ground water was observed in the $Tnsc_0$ stratigraphic unit while drilling upgradient well W-812-2009, west of Fault A. East of Fault A, ground water occurs in multiple stratigraphic intervals within $Tnsc_0$ rocks. HSU analysis identified an areally-extensive and interconnected water-bearing zone that principally occupies the upper $Tnsc_0$ strata to the north and lower $Tnsc_0$ strata within the southern portion of the study area east of the fault zone. This water-bearing zone has been designated as the $Tnsc_0$ HSU. Depth to ground water in the $Tnsc_0$ HSU ranges from 30 to 70 ft bgs. Ground water within this HSU flows south-southeast with a gradient of about 0.03 to 0.1. The hydraulic connection of the $Tnsc_0$ HSU across Fault B is still under review. The potentiometric surface contours for ground water in the $Tnbs_0$ HSU are shown in Figure 9.

Several discontinuous water-bearing lenses were also identified within the Upper and Lower $Tnsc_0$ claystones and siltstones east of Fault A. Depth to ground water in these water-bearing zones is variable and the direction of ground water flow within these discontinuous lenses is not known. The maximum saturated thickness encountered in these water-bearing zones is 5 ft and well data indicate they are not continuous over a large area. Because of the discontinuous extent and variable saturation in the Upper and Lower $Tnsc_0$, these water-bearing zones do not constitute mappable HSUs. For this reason, they were not designated as separate HSUs, although these designations are used to indicate which wells are screened in these lenses. East of Fault A, wells W-812-1925, -1931, and 1932 are screened in these Upper $Tnsc_0$ water-bearing lenses and well W-812-1939 is screened in a Lower $Tnsc_0$ lens. Additional data from other wells and boreholes drilled through these units were used to identify the discontinuous nature of these water-bearing zones.

A continuous, confined water-bearing zone occurs within the Tmss HSU east of Fault B. West of Fault A, saturated conditions were encountered at a depth of 255 ft bgs in the Tmss bedrock during the drilling of the borehole for well W-812-2009. East of the fault, ground water appears to flow to the north at a gradient of about 0.001 to 0.002. Three wells on the east side of the Building 812 Canyon fault system are screened in the Tmss HSU: W-812-1929, W-812-

1922, and W-812-1924 (Figures 6 and 7). The Tmss HSU east of the fault zone may or may not be hydraulically connected with Tmss water-bearing strata encountered deep in the borehole for well W-812-2009, west of the fault zone. Figure 10 presents ground water potentiometric surface elevations for wells completed in the Tmss HSU.

Ground water in the $Tnbs_0$, $Tnsc_0$, and Tmss HSUs generally flows parallel to the axes of the Building 812 Canyon Fault shear zones (Figure 9). In the drilling of the majority of wells in the study area, it was observed that fractures provide pathways for ground water flow in rocks of otherwise low permeability.

5.2. Ground Water Elevations and Recharge and Discharge

Water elevation hydrographs (Figure 11) were constructed for all wells in the study area to evaluate responses of water elevations to rainfall during winter storm seasons and aid in the delineation of HSUs.

The hydrograph for Qal HSU well W-812-08 indicates that water levels in this well respond fairly rapidly to rainfall events. This well is located near the head of Building 812 Canyon where Qal sediments are saturated primarily in the rainy season. The hydrographs for Qal wells NC2-23 and W-812-1921 show less response to rainfall events. The wells are located in the alluvium in the Elk Ravine drainage. Water from Spring 6, located upstream of these wells, provides subsurface alluvial flow in the vicinity of these wells contributing to more stable water elevations. Ground water recharge to the Qal HSU occurs locally within the Building 812 Canyon and Elk Ravine alluvial valleys. Ground water in the Qal HSU discharges to the surface in Elk Ravine just downgradient of well W-812-1921. Perennial surface water occurs within Elk Ravine from Spring 6 (Figure 2) to beyond the intersection of the Building 812 Canyon and Elk Ravine.

Hydrographs for $Tnbs_0$ and $Tnsc_0$ HSU wells indicate that ground water elevation trends are similar in wells completed in each of these two HSUs. Several wells completed in these two HSUs show small responses to rainfall, but the majority of the hydrographs are relatively flat. This indicates that ground water elevations do not rise significantly as a result of rainfall events. Hydrographs for many wells completed in the $Tnbs_0$ and $Tnsc_0$ HSUs show delayed recovery after sampling of ground water from these wells, indicating the slow rate of flow and low storage capacity of these HSUs. Two pronounced drops in water elevations observed in $Tnsc_0$ well W-812-07 arose from sustained pumping during a treatability study for uranium in ground water. Based on flat and dampened responses observed in water elevations in most $Tnbs_0$ and $Tnsc_0$ HSU bedrock wells after rainfall, and the confined nature of ground water in these HSUs in the immediate study area, direct recharge in the $Tnbs_0$ and $Tnsc_0$ HSUs likely occurs in the hills northeast of the building area. The extent of saturation within the $Tnbs_0$ HSU is limited to the south above Elk Ravine, where $Tnbs_0$ strata outcrop. It is likely that there is some hydraulic connection between the Qal and the $Tnbs_0$ HSUs in the valley bottom in the region of the Building 812 Canyon Fault shears A and B (Figure 6a). Ground water from the $Tnsc_0$ HSU west of the fault zone may discharge at Spring 6. Ground water within the $Tnsc_0$ HSU on the east side of the fault does not discharge within Elk Ravine but rather flows beneath Elk Ravine and southeast.

The hydrograph for well W-812-1932, screened in an Upper $Tnsc_0$ water-bearing lens, shows water elevation response to rainfall events. Ground water elevations in the other three Upper $Tnsc_0$ wells show only small responses to rainfall. This variability in ground water elevation response to rainfall events is likely due to the presence or absence of a confining layer overlying these water-bearing lenses. The hydrograph for the only well in the study area completed in the Lower $Tnsc_0$, W-812-1939, shows strong but delayed responses to rainfall, suggesting that the recharge area is proximal to the well but that the vertical distance for percolation to ground water delays the response observed.

The hydrographs for two of the three wells screened in the Tmss HSU (W-812-04 and W-812-1922) show similar strong rainfall responses, while the third well (W-812-1924) shows dampened responses. This relationship, the northerly-directed flow gradient, and the presence of exposed Tmss strata there, suggest that recharge of the Tmss HSU occurs in Elk Ravine southeast of the Building 812 area. Water elevation responses to this recharge are most pronounced in wells closer to the inferred recharge area (W-812-04 and W-812-1922) and less pronounced farther north at well W-812-1924. There are no identified discharge areas for Tmss HSU ground water.

5.3. Major-Ion Chemistry

Figure 12 is a Piper Diagram depicting major-ion compositions for a representative ground water sample from each monitor well and spring in the study area. The Piper Diagram plots major-anion and major-cation concentrations as percentages on the lower left and lower right triangles, respectively. The intersection, within the central rhomboid, of lines drawn within the triangles and parallel to their outer sides provides a single point for each well's water analysis. Relative total dissolved solids concentrations are shown as purple circles.

Several points emerge from comparison of ground water compositions. Ground water in the $Tnbs_0$ HSU and water-bearing lenses in the Upper $Tnsc_0$ possess similar chemistries. These waters are the shallowest bedrock-hosted ground waters on both sides of the fault zone. Low total dissolved solids concentrations in the $Tnbs_0$ HSU and water-bearing lenses in the Upper $Tnsc_0$ indicate relatively short residence times. The ground water chemistry in the Qal HSU is similar to these HSUs in that the low total dissolved solids content also indicates short residence time. $Tnsc_0$ HSU waters are unique and as a whole have very similar cation chemistry, i.e., sodium and potassium are the dominant cations, as they are in the Tmss ground waters. Qal and $Tnbs_0$ waters are distinct in having relatively more calcium and magnesium as the dominant cations. The major-ion chemistries for the three Tmss HSU waters cluster together and have cation chemistry that is similar to ground water in the $Tnsc_0$ HSU, suggesting a similar provenance for waters in these two HSUs.

5.4. Hydraulic Characterization of the HSUs

Six hydraulic tests have been conducted in the Building 812 study area. The objective of these tests was to determine hydraulic parameters of the HSUs, such as hydraulic conductivity, sustainable yield, and if possible, to determine hydraulic communication between wells and HSUs. Based on the flow rates observed during the initial well development and the slow recovery after sampling events, wells in the Building 812 study area were found not suitable for long-term hydraulic tests. As a result, five tests were conducted as 'slug' tests and one as a short-term constant flow rate pump test. $Tnbs_0$ HSU wells W-812-01 and W-812-02, $Tnsc_0$ HSU wells W-812-07 and W-812-09, and Qal HSU W-812-09 were tested using solid slugs built specifically for each well to maximize the water level displacement. Tmss well W-812-04 was tested using the existing submersible pump in the well. The drawdown test conducted in well W-812-04 using the submersible pump resulted in complete evacuation of water in the well at the lowest flow rate that the pump could sustain. The data obtained during this test were not amenable to hydraulic analysis.

As summarized in Table 4, hydraulic test results vary from well to well. The long-term yields from wells in all HSUs in the Building 812 study area are generally less than 0.5 gpm per well. Wells W-812-07 and W-812-09 are completed in the $Tnsc_0$ HSU that exhibits very low yield and low hydraulic conductivity. Test results for the wells screened in $Tnbs_0$ HSU in the study area yielded the highest hydraulic conductivities and well yields. Results from Qal HSU well W-812-08 were in the same orders of magnitude for well yield and hydraulic conductivity as those for the $Tnbs_0$ HSU wells. The hydraulic test results indicate that all tested HSUs in the study area are of low yield and low to moderate hydraulic conductivity and transmissivity.

6. Nature and Extent of Contamination

Samples were collected from environmental media in the Building 812 study area and analyzed for constituents that may have been released as a result of activities conducted in the area. The nature and extent of contamination in surface soil, subsurface soil/rock, surface water and ground water are presented in Sections 6.1, 6.2, 6.3, and 6.4, respectively. Maximum concentrations of chemicals in environmental media that have consistently exceeded regulatory standards are summarized in Table 5.

As part of the evaluation of the nature and extent of contamination at the Building 812 study area, a screening-level risk assessment was conducted to identify contaminants of potential concern in environmental media. The risk assessment process and results are included in the discussions for each environmental media (Sections 6.1 through 6.4).

6.1. Nature and Extent of Contamination in Surface Soil

In 2003, 40 surface soil samples were collected from the Building 812 study area for analyses of uranium isotopes, thorium-232, and total threshold limit concentration (TTLC) and soluble threshold limit concentration (STLC) metals (CCR, 2002). The analytical results for the surface soil samples are presented in Tables A-2 through A-5. To determine contaminants of concern (COCs) in surface soil in the Building 812 study area, the analytical data were compared to EPA's industrial soil Preliminary Remediation Goals (PRGs) and where detected at sufficient concentration, were modeled to evaluate potential impacts to ground water.

Samples were analyzed to evaluate the activities of uranium isotopes, as well as the uranium-235/uranium-238 ($^{235}U/^{238}U$) atom ratios in surface soil. Uranium-235/uranium-238 atom ratios are used to distinguish between natural uranium and anthropogenic, depleted uranium. Uranium-235/uranium-238 atom ratios below 0.007 indicate the presence of depleted uranium; ratios equal to 0.007 indicate natural uranium. The distribution of total uranium activities and $^{235}U/^{238}U$ atom ratios in surface soil is depicted in Figure 14. Uranium data for surface soil samples are presented in Table A-2. The maximum total uranium activity detected in surface soil was 87 picocuries per gram (pCi/g). Maximum total uranium activities were generally detected in surface soil located around the west and north sides of the Building 812 Firing Table. All surface soil samples yielded $^{235}U/^{238}U$ atom ratios below 0.007 indicating the presence of depleted uranium. Most of the samples containing the highest fraction of depleted uranium were collected near the firing table. Maximum activities of uranium-234 (^{234}U), ^{235}U, uranium-236 (^{236}U), and ^{238}U detected in surface soil samples were 9.12, 0.887, 0.451, and 77 pCi/g, respectively. The U.S. EPA-Region IX PRGs for industrial soil for these four uranium isotopes are 32.4, 0.398, 34.8, and 1.8 pCi/g, respectively (U.S. EPA, 2004a). Uranium-235 activities exceeded the ^{235}U PRG in three surface soil samples (3SS-812-1902, -1903, and -1904), collected north of the firing table. Uranium-238 activities exceeded the PRG for ^{238}U in thirty-three of the forty surface soil samples collected in the Building 812 study area. To define the potential for ground water impacts from total uranium in surface soil, a one-dimensional vadose zone model was employed to conservatively simulate vertical transport to ground water. The modeling methodology, input parameters, and results are documented in Attachment B. Results indicate that uranium in surface soil would not impact ground water concentrations in excess of the 20 picocuries per liter (pCi/L) drinking water maximum contaminant level (MCL). The uranium isotopes ^{235}U and ^{238}U, arising from depleted uranium, are COCs in surface soil because activities exceed the industrial soil PRGs.

A maximum thorium-232 (^{232}Th) activity of 3.33 pCi/g was detected in a surface soil sample (3SS-812-1902) collected north of the firing table (Table A-3). Thorium-232 was not detected above the industrial soil PRG of 19 pCi/g for ^{232}Th. A conservative one-dimensional simulation for ^{232}Th indicated that ^{232}Th would not impact ground water concentrations in excess of the 15 pCi/L MCL (Attachment B). Thorium-232 is not considered to be a COC in surface soil because it was not detected at activities exceeding the ^{232}Th PRG and modeling indicated ground water would not be impacted by ^{232}Th migrating from surface soil.

Surface soil samples collected from the Building 812 study area were analyzed for arsenic, barium, beryllium, cadmium, copper, chromium, lead, nickel, selenium, silver, and zinc. Data for surface soil sample metal analyses are tabulated in Table A-4. Arsenic was the only metal detected in surface soil at concentrations exceeding EPA's PRGs for industrial soil (U.S. EPA, 2004b). The distribution of arsenic in surface soil is shown on Figure 15. The maximum arsenic concentration detected in surface samples at the Building 812 study area was 9.3 milligrams per kilogram (mg/kg). The "Cal-modified" industrial soil PRG for arsenic is 0.16 mg/kg. Cal-modified PRGs are used in instances where the California State standard is "significantly more protective" than the EPA Region IX standard (U.S. EPA, 2004b). The EPA industrial soil PRG for arsenic is 1.6 mg/kg. Arsenic concentrations in all the samples exceeded the "Cal-modified" industrial soil PRG for arsenic in all surface soil samples collected, while concentrations in 25 samples exceeded the EPA's industrial soil PRG for arsenic. However, arsenic concentrations in the surface soil samples from the Building 812 study area were within the range of background concentrations of arsenic in Site 300 soil (up to 16 mg/kg) (Ferry et al., 1999). Because arsenic concentrations detected in surface soil samples were within the range of background concentrations, arsenic is not considered to be a COC in surface soil.

Barium was detected in surface soil samples at a maximum concentration of 220 mg/kg, well below the industrial soil PRG for barium of 67,000 mg/kg. The maximum beryllium concentration detected in surface soil samples was 8.5 mg/kg; below the industrial soil PRG of 190 mg/kg for beryllium. However, a map showing the distribution of beryllium in surface soil is provided in Figure 16 because it was used in firing table experiments at Building 812. While copper was detected in one surface soil sample at a maximum concentration of 4,100 mg/kg, copper concentrations ranged from 12 to 170 mg/kg in the other 40 surface soil samples. The concentrations of copper detected in all surface soil samples collected in the Building 812 study area are below the industrial soil PRG of 41,000 mg/kg for copper. Chromium was detected at a maximum concentration of 60 mg/kg in surface soil samples; below the industrial soil PRG of 450 mg/kg for total chromium. The maximum lead concentration detected in surface soil samples was 150 mg/kg. While there is no industrial soil PRG for total lead, the industrial soil PRG for lead^{+3} is 800 mg/kg. A map showing the distribution of lead in surface soil is provided in Figure 17 because it was used to stabilize firing table experiments at Building 812. The maximum concentrations of mercury and nickel detected in soil were an order of magnitude below the PRGs for these metals. Selenium and silver were not detected at concentrations above the detection limit in soil. The maximum concentration of zinc detected in surface soil samples (230 mg/kg) was below the industrial soil PRG of 100,000 mg/kg.

Modeling was performed for all metals that yielded concentrations from STLC analyses of surface soil that exceeded drinking water MCLs. TTLC data in units of mg/kg of these metals were used in the modeling. The downward migration of barium, beryllium, chromium, copper, lead, and zinc were modeled using a set of very conservative assumptions. None of these metals yielded a result that would impact ground water at concentrations in excess of MCLs. The modeling methodology, input parameters, and results are documented in Attachment B. Because metal concentrations in surface soil samples did not exceed industrial soil PRGs or background levels and do not pose a threat to ground water, metals are not COCs in surface soil in the Building 812 study area.

In summary, ^{238}U and ^{235}U derived from depleted uranium were the only constituents detected in surface soil that were identified as COCs in this medium based on exceedences of the industrial soil PRGs for the two uranium isotopes.

6.2. Nature and Extent of Contamination in Subsurface Soil and Rock

In 1988, subsurface soil samples were collected from three boreholes, 812-01, 812-02, and 812-03, drilled through the Building 812 Firing Table to a maximum depth of 23.8 ft. These borings should not to be confused with the boreholes for wells W-812-01, W-812-02, and W-812-03, that were drilled during 2000. The locations of all boreholes are shown on Figure 2.

Subsurface soil samples from the boreholes were analyzed for tritium, uranium isotopes, thorium, radium, CAM-WET and STLC metals, HE compounds, and volatile organic compounds (VOCs). The analytical results for these samples are presented in Tables A-6 through A-10 with the exception of VOCs. VOC results were previously presented in "*Firing Table Gravel Cleanup at Lawrence Livermore National Laboratory Site 300"* (Lamarre and Taffet, 1989). Modeling of constituents detected in subsurface soil/rock was conducted to determine potential impacts to ground water and identify contaminants of potential concern in this medium.

The maximum tritium activity detected in soil and rock moisture in samples collected in 1988 was 379 pCi/L in a rock sample from a depth of 23.8 ft from borehole 812-02 (Table A-6a). All subsurface soil/rock samples collected from boreholes in subsequent years yielded tritium activities below 240 pCi/L (Table A-6b). These maximum tritium activities are within the range of background for tritium in soil moisture at Site 300 (Ferry et al., 1999). For this reason, tritium is not a COC in subsurface soil and rock for the Building 812 study area.

Uranium isotopic data for subsurface soil and rock samples are tabulated in Table A-7. A maximum activity of 22,730 pCi/g of total uranium was detected in a subsurface soil sample collected at a depth of 5 ft below the Building 812 Firing Table from borehole 812-01. The sample contained 110 pCi/g of ^{235}U and 22,630 pCi/g of ^{238}U. A split soil sample collected from the same depth interval yielded a ^{235}U activity of 0.120 pCi/g and a ^{238}U activity of 3.135 pCi/g (3.255 pCi/g of total uranium). Total uranium activities of 3.25, 1.99, and 5.6 pCi/g were detected at the samples collected from the deepest sampled intervals of boreholes 812-01, 812-02, and 812-03 at depths of 5, 9, and 9 ft, respectively.

To assess potential impacts to ground water from total uranium in subsurface soil, a one-dimensional model of vadose zone transport was employed. Very conservative assumptions were made in the modeling, including the loading of the uppermost 1 ft of vadose zone in the model with 22,730 pCi/g of total uranium. This was the total activity of uranium obtained in the sample containing the maximum uranium activity in subsurface soil at Building 812. This modeling resulted in the arrival of the center of mass of uranium reaching ground water in about 90,000 years with a maximum activity of 17,000 pCi/L of total uranium (Attachment B). Because depleted uranium (principally ^{238}U) is an anthropogenic contaminant that already impacted ground water and modeling indicates the potential for further ground water impacts, it is a COC in subsurface soil and bedrock.

Thorium isotope data are tabulated in Table A-8. Thorium-228 (^{228}Th) was detected at a maximum activity of 1.246 pCi/g in borehole 812-01 at a depth of 5 ft. Vadose zone modeling indicates that ^{228}Th will not reach ground water (Attachment B), and therefore ^{228}Th is not a COC in subsurface soil.

Radium-226 (^{226}Ra) was detected at a maximum activity of 10.370 pCi/g at a depth of 5 ft in the sample from borehole 812-01. The ^{228}Ra activity in the sample was 1.246 pCi/g. The duplicate sample from this interval contained 1.058 pCi/g of ^{226}Ra and 0.795 pCi/g of ^{228}Ra (Lamarre and Taffet, 1989). Vadose zone modeling indicates that these radium isotopes will not reach ground water (Attachment B), therefore ^{226}Ra and ^{228}Ra are not COCs in subsurface soil.

The CAM-WET and Soluble Threshold Limit Concentration (STLC) metals data for subsurface soil and rock are tabulated in Table A-9. Samples of subsurface soil and rock from the firing table and adjacent area contained lead at concentrations of 14 milligrams per liter (mg/L) and 19 mg/L at depths of 13.3 ft and 23.3 ft, respectively in samples from borehole

812-01 and 812-03. The sample collected from 13.3 ft in borehole 812-01 also contained 25 mg/L of copper. A maximum of 9 mg/L of barium was detected in a borehole D-812C-02 sample collected at 1.5 ft. A maximum of 0.26 mg/L of beryllium were found at 9.3 ft in borehole 812-01. A maximum of 0.12 mg/L of chromium was detected in a borehole D-812C-02 sample collected at 1.5 ft. A maximum of 12 mg/L of zinc were detected in a sample collected at 23.3 ft from borehole 812-01. Because the STLC concentrations for barium, beryllium, copper, chromium, lead, and zinc exceeded MCLs in at least one subsurface soil/rock sample, indicating a potential for leaching from soil, these metals were considered to have the potential to impact ground water. No other metals yielded STLC data in excess of MCLs. To evaluate impacts to ground water from the metals for which the STLC concentration exceeded MCLs, one-dimensional modeling to ground water was performed using very conservative assumptions. None of these metals caused ground water concentrations to reach MCLs. For this reason, metals are not COCs in subsurface soil and rock in the Building 812 study area.

In 1988, two boreholes, D-812C-01 and D-812C-02, were drilled adjacent to the Building 812C dry well to auger refusal at 3 ft. A sample collected from B-812C-01 at 1.0 ft contained no detectable concentrations of high melting explosive (HMX), research department explosive (RDX), or trinitrotoluene (TNT) above the 0.001 mg/kg detection limit (Table A-10).

A sample collected from B-812C-02 at 1.8 ft contained 0.0048 mg/kg of trichloroethylene (TCE) and 0.003 mg/kg of 1,1,1-trichloroethane (TCA), but no other VOCs or any aromatics or fuel hydrocarbons (Lamarre and Taffet, 1989). One-dimensional vadose zone modeling indicates that VOCs will not impact underlying ground water (Attachment B).

In summary, of the constituents detected in subsurface soil and rock in the Building 812 study area, only depleted uranium (principally ^{238}U) was identified as a contaminant of potential concern in this medium. This is based on modeling results that indicated depleted uranium present in the vadose zone could result in further impacts to ground water at concentrations exceeding the MCL for total uranium.

6.3. Nature and Extent of Contamination in Surface Water

Spring 6 is the only perennial surface water body in the Building 812 study area. Surface water samples were collected from this spring and analyzed for tritium, uranium, nitrate, HE compounds, metals, and VOCs. Analytical results for these surface water samples are presented in Tables A-11 through A-17 and are discussed below.

Tritium has never been detected in excess of background activities (100 to 300 pCi/L) in any of the 27 Spring 6 water samples (Table A-11).

A maximum historical activity of total uranium of 71.63 pCi/L was detected in a surface water sample collected from Spring 6 on July 20, 1993 (Table A-12). Uranium has not been detected above the 20 pCi/L drinking water MCL in any of the 29 subsequent samples collected from Spring 6 from December 1993 to December 2004. Thirteen spring water samples were analyzed by mass spectrometry that determines the $^{235}U/^{238}U$ atom ratio in the samples. Several of these samples contained $^{235}U/^{238}U$ atom ratios indicative of the addition of some depleted uranium to the natural uranium in the water. However, the total uranium activities in these samples were below the total uranium MCL and the most recent sample collected in 2004 had a natural $^{235}U/^{238}U$ atom ratio.

Nitrate (as NO_3) has not been detected in surface water samples collected from Spring 6 at concentrations exceeding the drinking water MCL. Of 12 surface water samples collected from Spring 6, the maximum concentration of nitrate was 43 mg/L in a sample collected on June 23, 1996 (Table A-13). Nitrate was detected at a concentration of 12.8 mg/L in the most recent (December 2003) surface water sample collected from Spring 6.

Samples have not been collected from Spring 6 for perchlorate analysis but will be collected and analyzed in the near-future.

HE compounds were not detected in the 23 surface water samples collected from Spring 6 (Table A-15).

Metals have never been detected in Spring 6 water at concentrations in excess of Federal and State drinking water MCLs (Table A-16).

TCE and tetrachloroethylene (PCE) were reported at concentrations of 0.57 and 0.76 micrograms per liter (μg/L), respectively, in a sample collected on October 30, 1995 (Table A-17). No subsequent samples contained detectable quantities of any VOCs.

A maximum gross alpha and beta radioactivity of 21.58 and 27.28 pCi/L, respectively, were measured in a Spring 6 sample collected on April 5, 1991. The most recent alpha and beta radioactivities observed were 4.84 and 6.19 pCi/L, respectively, in a water sample collected on December 3, 2004. The MCL for alpha radioactivity in drinking water is 15 pCi/L. Since the high values for alpha radioactivity observed in Spring 6 water samples collected in 1991, all subsequent samples have been below the MCL. Most all of the alpha radioactivity observed in natural water results from decay of uranium isotopes.

In summary, because contamination has not been detected in surface water samples from Spring 6 in recent years, no contaminants of potential concern were identified in surface water in the study area.

6.4. Nature and Extent of Contamination in Ground Water

Ground water samples were collected from monitor wells in the Building 812 study area from January 1, 1988 to March 30, 2005 to determine if activities at the Building 812 Firing Table have impacted ground water. The ground water samples were analyzed for tritium, uranium, nitrate, perchlorate, HE compounds, metals, VOCs, and gross alpha and beta radioactivity. Analytical data for these ground water samples are tabulated in Tables A-11 to A-19.

Tritium activities in ground water samples are shown in Table A-11. The maximum historical tritium activity detected in ground water samples collected at the Building 812 study area was 176 pCi/L in a sample collected in 1992. This tritium activity is within the range of background levels of 100 to 300 pCi/L in ground water. Since 2000, tritium has not been measured above the100 pCi/L analytical detection limit in any ground water samples from the study area. Because there is no evidence of anthropogenic tritium in ground water, tritium is not a COC in ground water at the Building 812 study area.

Ground water samples were collected from 22 wells in the Building 812 study area and analyzed for uranium isotopes and $^{235}U/^{238}U$ atom ratios. Uranium-235/uranium-238 ($^{235}U/^{238}U$) atom ratios are used to differentiate anthropogenic, depleted uranium from natural uranium. Uranium isotope activity data and $^{235}U/^{238}U$ atom ratios in ground water samples are shown in Table A-12.

Figure 18 shows the distribution of total uranium and $^{235}U/^{238}U$ atom ratios in ground water samples collected in the Building 812 study area during the first quarter of 2004. In Figure 18, uranium activity results indicating the presence of some depleted uranium ($^{235}U/^{238}U$ atom ratios below 0.007) are depicted in red. During this quarter, uranium activities exceeded the drinking water MCL for total uranium of 20 pCi/L in ground water samples from six wells: W-812-01, W-812-07, W-812-08, W-812-09, W-812-1920, and W-812-1921. Mass spectrometry analyses of ground water samples from these wells indicate that some depleted uranium was present in three of these wells: W-812-01, W-812-08, and W-812-21. The $^{235}U/^{238}U$ atom ratios in samples from the other three wells, W-812-07, W-812-09, and W-812-1920, were indicative of natural uranium. The maximum uranium activity detected in the first quarter 2004 was 53.03 pCi/L in a ground water sample from well W-812-09, which was comprised entirely of natural uranium. Depleted uranium was also detected in ground water samples collected in the first quarter of 2004 from wells W-812-02 and NC2-22. However, the total uranium activities in both of these wells were below the drinking water MCL.

Historical uranium data was evaluated to determine changes in the extent of uranium in ground water over time. Figure 19 is a time-series plot of total uranium activities obtained by mass spectrometry for ground water samples from wells that have yielded the highest total uranium activities and have exceeded the State MCL for uranium in drinking water. Table 6 presents a summary of historical uranium data for all wells in the Building 812 study area including historical maximum activities, frequency of uranium detections above the MCL, $^{235}U/^{238}U$ atom ratios, and the HSU in which each well is completed.

Historically, depleted uranium has been detected in two wells completed in the Qal HSU at activities that exceed the MCL: W-812-08 and W-812-1921. While depleted uranium has been consistently detected in well W-812-08 with total uranium concentrations exceeding the MCL, limited sampling of well W-812-1921 did not enable an evaluation of historical trends. The data indicate that depleted uranium has impacted ground water in the Qal HSU, although migration in this unit is likely limited by the ephemeral saturation in this HSU.

The extent of depleted uranium in bedrock has historically been constrained to two $Tnbs_0$ HSU wells in the vicinity of the Building 812 Firing Table: W-812-01 and W-812-02. Total uranium activities detected in these two wells have exceeded the drinking water MCL, although on only one occasion in samples from well W-812-02. The presence of depleted uranium at activities above drinking water standards indicates that ground water in the $Tnbs_0$ HSU near the firing table has been impacted by anthropogenic uranium contamination. The extent of the depleted uranium contamination in ground water is bounded by downgradient $Tnbs_0$ wells with only natural uranium in ground water.

Depleted uranium has been consistently detected in ground water from one $Tnsc_0$ bedrock HSU well (W-812-03) east of the firing table, but uranium activities have always been below MCLs. This indicates $Tnsc_0$ HSU ground water has not been significantly impacted by anthropogenic uranium. Ground water data from five $Tnsc_0$ HSU wells (W-812-07, -09, -1920, -1923, and -1939) indicate that natural uranium is present in the Building 812 study area at concentrations that consistently exceed the MCL for total uranium. These wells are located several hundred feet downgradient of the firing table. Natural uranium has not been used in firing table experiments and there are no known conditions resulting from programmatic activities at the Building 812 Firing Table that could increase the solubility of natural uranium in the Neroly Formation. For this reason, it appears that the elevated concentrations of natural uranium in ground water in the Building 812 study area are due to ambient ground water geochemical conditions that facilitate the dissolution of natural uranium from the Neroly bedrock. Only depleted uranium is a COC in ground water at the Building 812 study area.

Historically, depleted uranium has never been detected in ground water samples from wells completed in the Tmss HSU in the Building 812 study area. While natural uranium has been detected in ground water samples from Tmss wells, total uranium activities have never exceeded the drinking water MCL, presumably because Tmss rocks do not contain appreciable natural uranium.

Samples from 22 wells in the Building 812 study area have been collected and analyzed for nitrogenous compounds. Nitrate concentration data for ground water samples collected in the study area are tabulated in Table A-13. Figure 20 shows the distribution of nitrate (as NO_3) in ground water for the first quarter of 2004. In the first quarter of 2004, nitrate concentrations exceeded the MCL in ground water samples from three bedrock HSU wells near the Building 812 Firing Table (Figure 20). Historically, nitrate concentrations have exceeded the 45 mg/L State Drinking Water MCL in samples collected from 8 of the 22 wells sampled. Maximum nitrate concentrations detected in these eight wells (W-812-01, -02, -07, -08, -09, 1923, -1929, and -1937) ranged from 58 to 82 mg/L. Seven of these eight wells are completed in the first bedrock HSU ($Tnbs_0$ west of the fault and $Tnsc_0$ east of the fault) and one well in the Qal HSU. In general, the highest historical nitrate concentrations have been detected in ground water from the bedrock HSUs in the vicinity of the Building 812 Firing Table. Nitrate concentrations are generally lower in ground water samples from the Qal HSU and downgradient $Tnsc_0$ HSU wells. The consistent detection of nitrate in ground water from wells located near the firing table indicates that it may be a source of nitrate contamination in ground water. Because nitrate has been detected in ground water at concentrations exceeding the MCL and may be migrating downgradient, nitrate is a COC in ground water at the Building 812 study area.

Samples from 21 wells in the Building 812 study area have been collected and analyzed for perchlorate. Table A-14 contains perchlorate concentration data for ground water samples collected in the Building 812 study area. The distribution of perchlorate in ground water during fourth quarter 2004 is shown on Figure 21. In the fourth quarter 2004, perchlorate was detected at concentrations exceeding the 6 μg/L State Public Health Goal (PHG) (California EPA, 2004) in only one well; W-812-1923. However, historically, perchlorate concentrations have exceeded the PHG in ground water samples from 4 of the 21 monitor wells sampled in the Building 812 study area at concentrations ranging from 8.1 to 21 μg/L. While perchlorate detections in ground water samples from these wells (W-812-01, -07, -1923, and -1924) have been sporadic, wells W-812-07 and -1923 are located several hundred feet from the source area indicating that perchlorate may have migrated. Three of the four wells in which perchlorate has been detected are completed in the first bedrock HSUs. Only one sample collected from a well (W-812-1924) completed in the deeper Tmss HSU contained perchlorate at a concentration above the PHG. Because perchlorate has been periodically detected in ground water at concentrations exceeding the PHG and may be migrating in ground water, perchlorate may be considered a COC in ground water at the Building 812 study area. However, given the current limited extent of this contaminant (one well), additional monitoring is recommended.

Samples from 21 wells have been collected and analyzed for the HE compounds HMX and RDX. Limited analyses for TNT were also conducted. Table A-15 contains HE compound concentration data for these ground water samples. The only HE compound detected in ground water from Building 812 wells was HMX which was detected in three samples collected from well W-812-02 at concentrations of 3 to 4 mg/L. Well W-812-02 is completed in the shallowest bedrock ($Tnbs_0$) HSU west of the fault zone. HMX was not detected above the method detection limit of 1 mg/L in the most recent sample (May 2004) collected from this well. While there is no State or Federal drinking water MCL established for HMX, the maximum concentration of HMX detected in a single well within the study area is an order of magnitude below EPA's Suggested No-Adverse-Response Level of 400 mg/L. HMX was not detected in samples from any other wells in the study area. RDX and TNT were not detected in any ground water samples from study area wells. Based on the ground water characterization data, HE compounds are not COCs in ground water at the Building 812 study area.

Ground water samples from 22 wells have been analyzed for metals and cations. Tables A-16a and A-16b contains metals and cation concentration data for water samples collected at Building 812. Metals concentrations in Building 812 study area water ground samples did not exceed any regulatory criterion, therefore metals are not COCs in ground water in this area.

Samples from 20 wells in the Building 812 study area have been collected and analyzed for VOCs (Table A-17). TCE and PCE were detected in one ground water sample collected from well NC2-23 in 1990 at concentrations of 60 μg/L and 4 μg/L, respectively. TCE and PCE were not detected at concentrations above the 0.5 μg/L method detection limit in 13 subsequent ground water samples collected from 1990 to 2003. VOCs were not detected in any other ground water samples collected from study area wells. Because VOCs have only been detected in one ground water sample in the Building 812 area over a 13-year period and have not been detected since 1990, VOCs are not COCs in ground water.

Table A-18 presents anion concentrations and general water quality parameters for water samples collected at Building 812. The anion concentrations and total dissolved solids data were used to construct the Piper Diagrams presented in Section 5.3.

Table A-19 contains gross alpha and beta radioactivity data for water samples collected at Building 812. A maximum gross alpha radioactivity of 62.8 pCi/L was detected in a sample collected from well W-812-09 on May 28, 2003. A maximum gross beta radioactivity of 33.5 pCi/L was detected in a ground water sample collected from well W-812-07 on August 18,

2003. The gross alpha radioactivity exceeded the 15 pCi/L MCL for alpha radioactivity due to the presence of natural uranium in the water sample.

In summary, the ground water data collected and evaluated as part of this characterization effort indicate that depleted uranium, nitrate, and perchlorate are COCs in ground water in the Building 812 study area. Ground water samples from several wells in the study area have historically contained total uranium activities in excess of the 20 pCi/L MCL. The highest total uranium activities detected are due solely to natural uranium. However, some wells with total uranium activities exceeded the MCLs have contained depleted uranium. Because nitrate has been detected in ground water at concentrations exceeding the MCL and may be migrating downgradient, nitrate is a COC in ground water at the Building 812 study area. Based on the current limited extent of perchlorate in ground water (one well), further monitoring is recommended to determine if this contaminant continues to pose a threat to ground water. Because tritium, HE compounds, metals, and VOCs have not historically and/or currently been detected at concentrations exceeding regulatory standards, these constituents are not considered COCs in ground water in the Building 812 study area.

7. Summary

Environmental investigation activities were conducted in the Building 812 study area to determine if contamination had been released to environmental media and if so, the extent of the contamination. As part of this investigation, the geology and hydrogeology of the study area were characterized to facilitate the evaluation of potential contaminant migration pathways in the subsurface. In addition, a screening-level risk assessment was conducted to identify contaminants of potential concern in environmental media.

Samples of surface soil, subsurface soil/rock, surface water, and ground water were collected and analyzed for chemical and radiological constituents that have been used in programmatic work at Building 812 and may have been released to the environment. Surface soil data were compared to EPA industrial soil PRGs to determine which constituents detected in this media could pose a risk to human health. In addition, modeling of constituents detected in both surface soil and subsurface soil/rock was conducted to determine potential impacts to ground water. The evaluation and modeling of surface soil data indicate that ^{238}U and ^{235}U from depleted uranium exceed industrial soil PRGs and are therefore COCs in surface soil. The evaluation and modeling of subsurface soil and rock data indicate that because depleted uranium present in the vadose zone could result in further impacts to ground water at concentrations exceeding MCL, depleted uranium is a COC in ground water. Because no contamination has been detected in surface water samples from Spring 6 in recent years, no contaminants of potential concern were identified in surface water in the study area. Uranium, nitrate, and perchlorate were identified as contaminants of concern in ground water because concentrations of these constituents exceed drinking water MCLs in ground water in the Building 812 study area.

8. Future Work

Based on ground water data that indicated the presence of depleted uranium at concentrations exceeding drinking water MCLs, DOE/LLNL are currently designing a ground water extraction and treatment system to remove uranium from ground water at Building 812 that exceeds the State MCL and contains depleted uranium. This treatability study is scheduled to begin in Fiscal Year 2006. Long-term actions to address contaminants of concern in environmental media in the Building 812 study area will be discussed with the regulatory agencies.

9. References

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Should you have any questions or concerning this report, please contact Leslie Ferry at (925) 422-0060 or Claire Holtzapple at (925) 422-0670.

Sincerely,

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Attachments (Figures, Tables, Attachments A and B)

cc: K. Angleberger (DOE/HQ)
M. Brown (DOE/OAK)
W. Bookless (w/o attachs)
E. Raber (w/o attachs)
J. Steenhoven (w/o attachs)
J. Yow (w/o attachs)

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V. Dibley, LLNL
K. Ehman, Skyline Ridge, Inc.
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B. Heffner, LLNL (Repositories)
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M. Kelley, TVC
L. Koch, TechLaw, Inc.
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B. Heffner, LLNL
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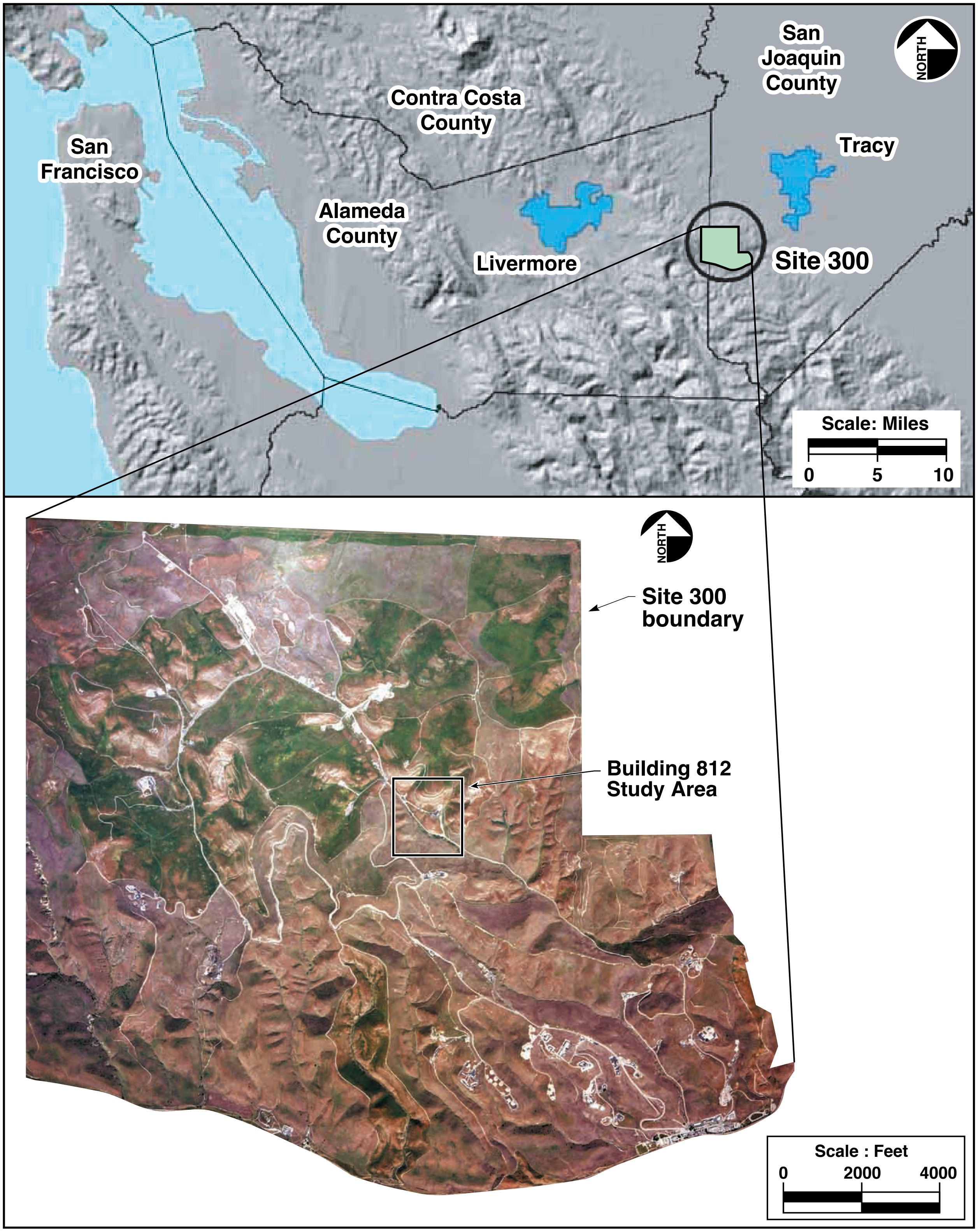
J. Parenti, DOE/GLD
K. Rauhut, LLNL

Figures



ERD-S3R-05-0101

Figure 1. Locations of LLNL Site 300 and Building 812 Study Area.

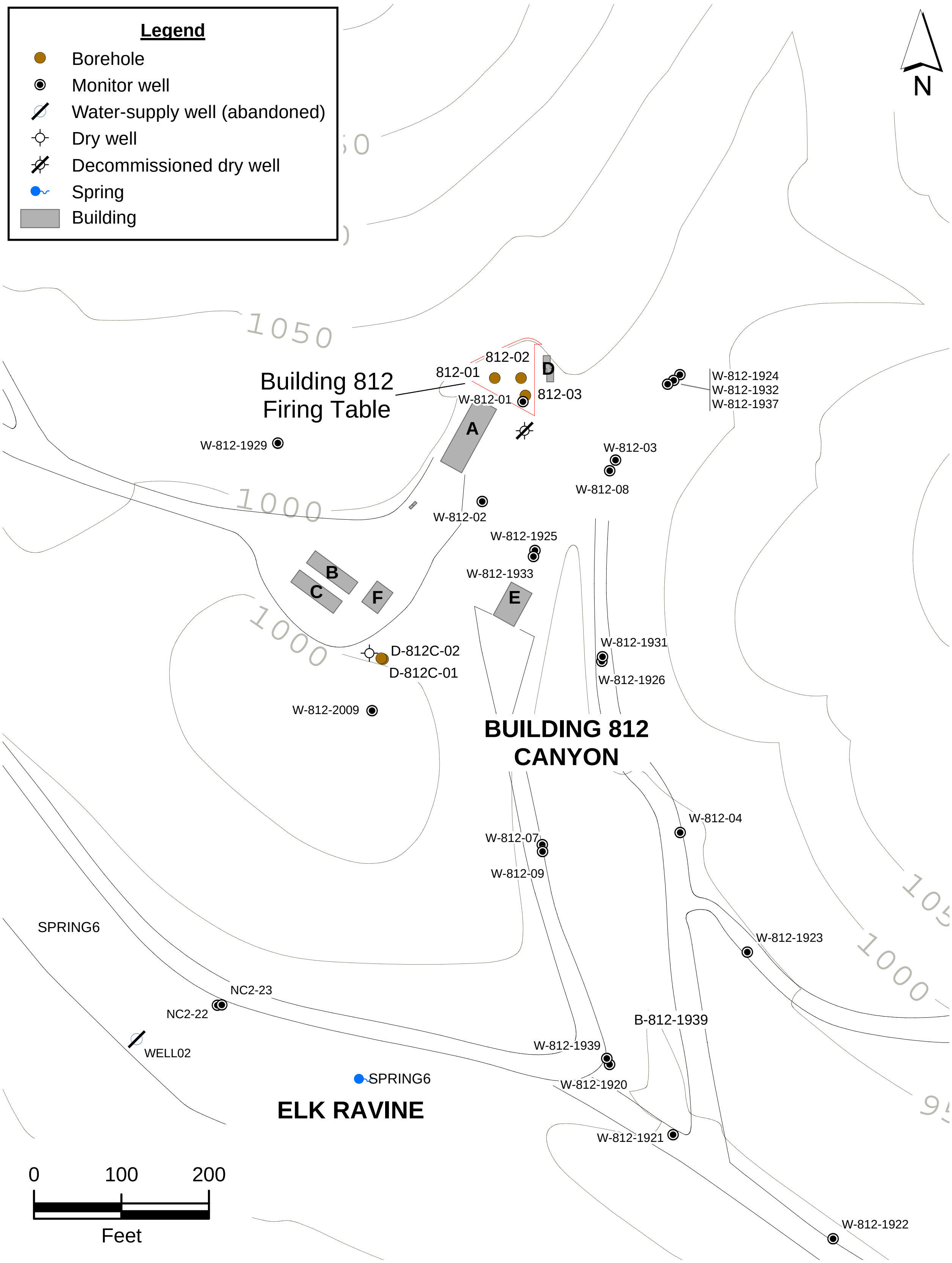


Figure 2. Locations of buildings, firing table, boreholes, monitor wells, dry wells, and springs at the Building 812 study area.

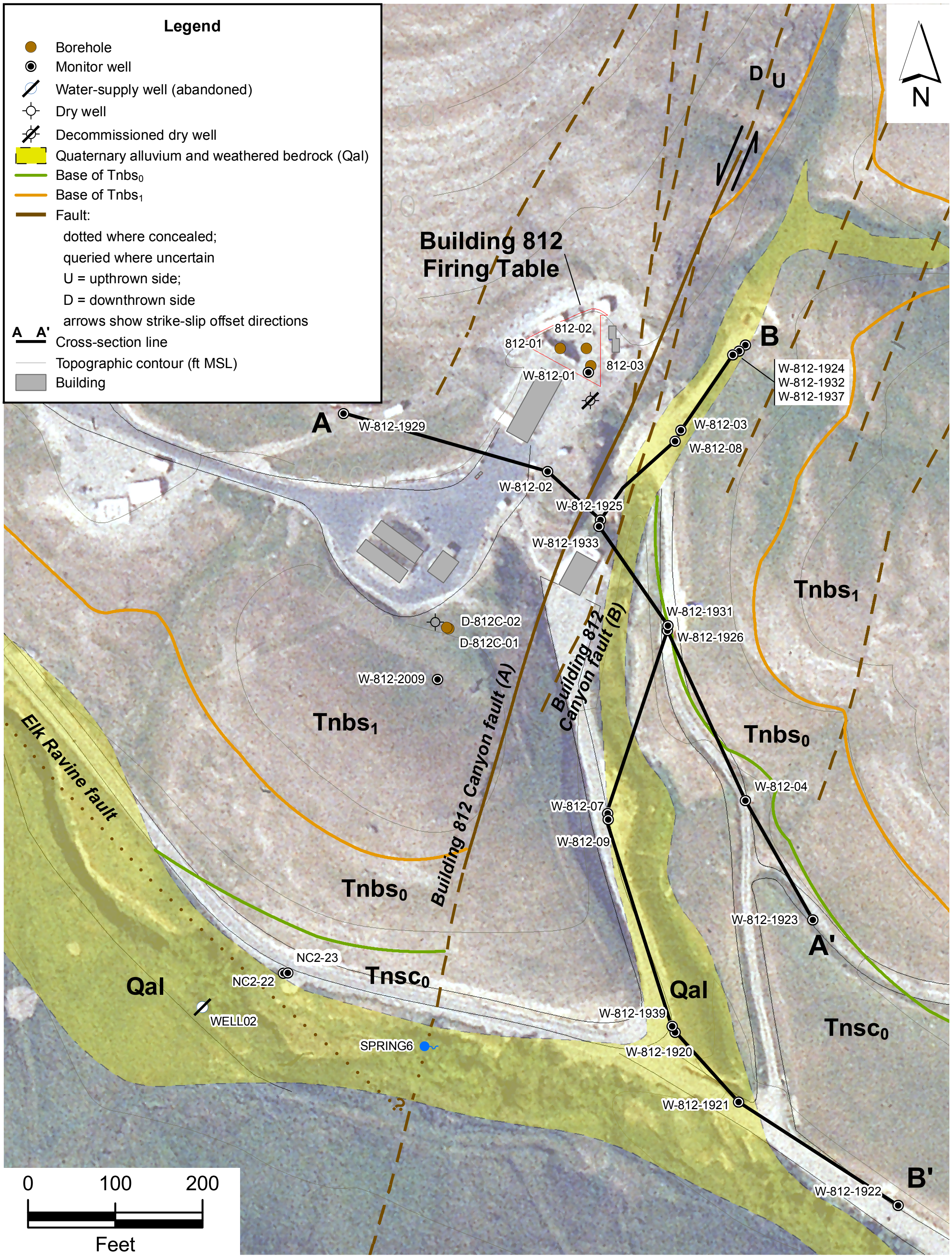
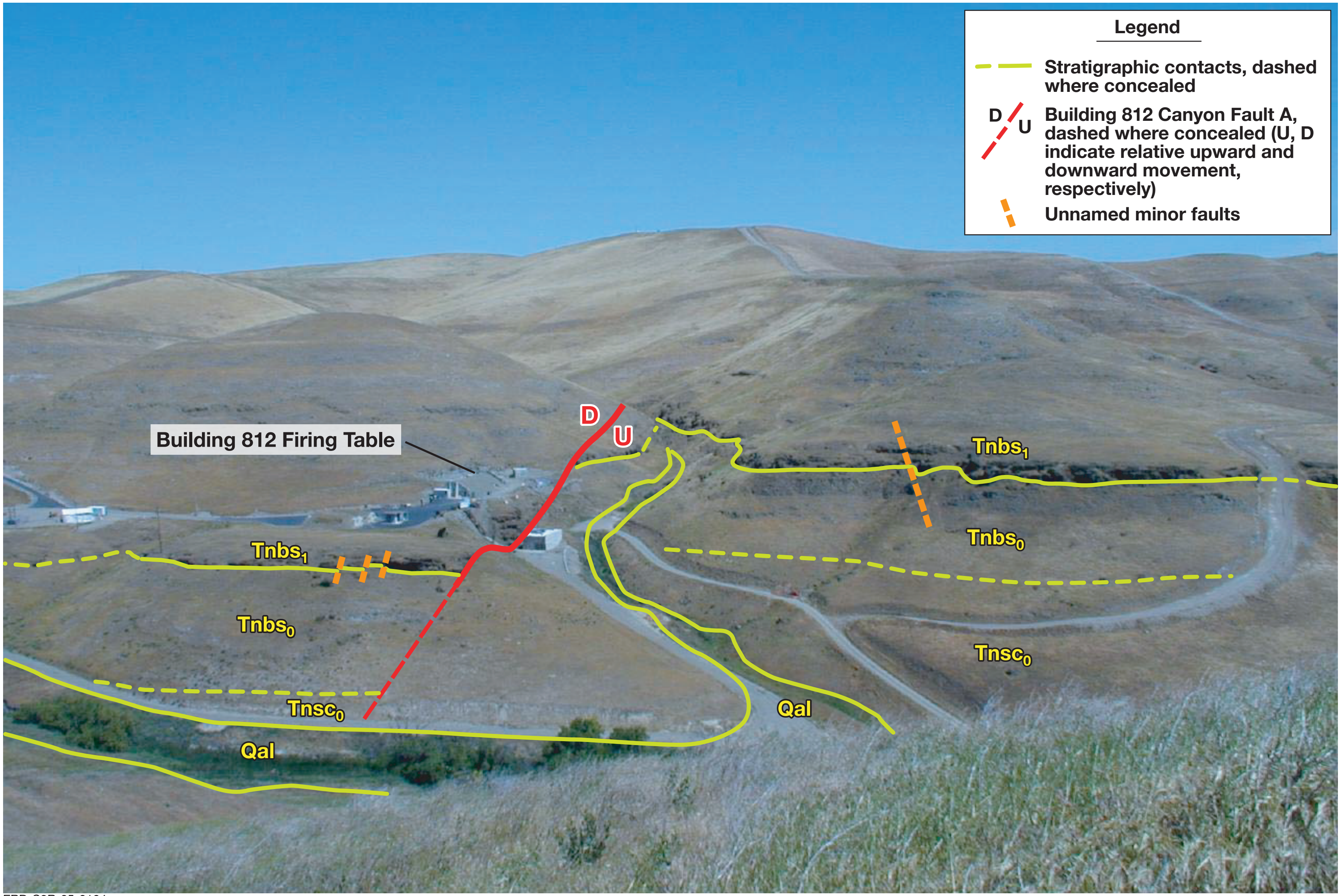


Figure 3. Geologic map of the Building 812 study area.



ERD-S3R-05-0104

Figure 4. Panoramic photograph of the Building 812 study area showing stratigraphic contacts and other geologic features.

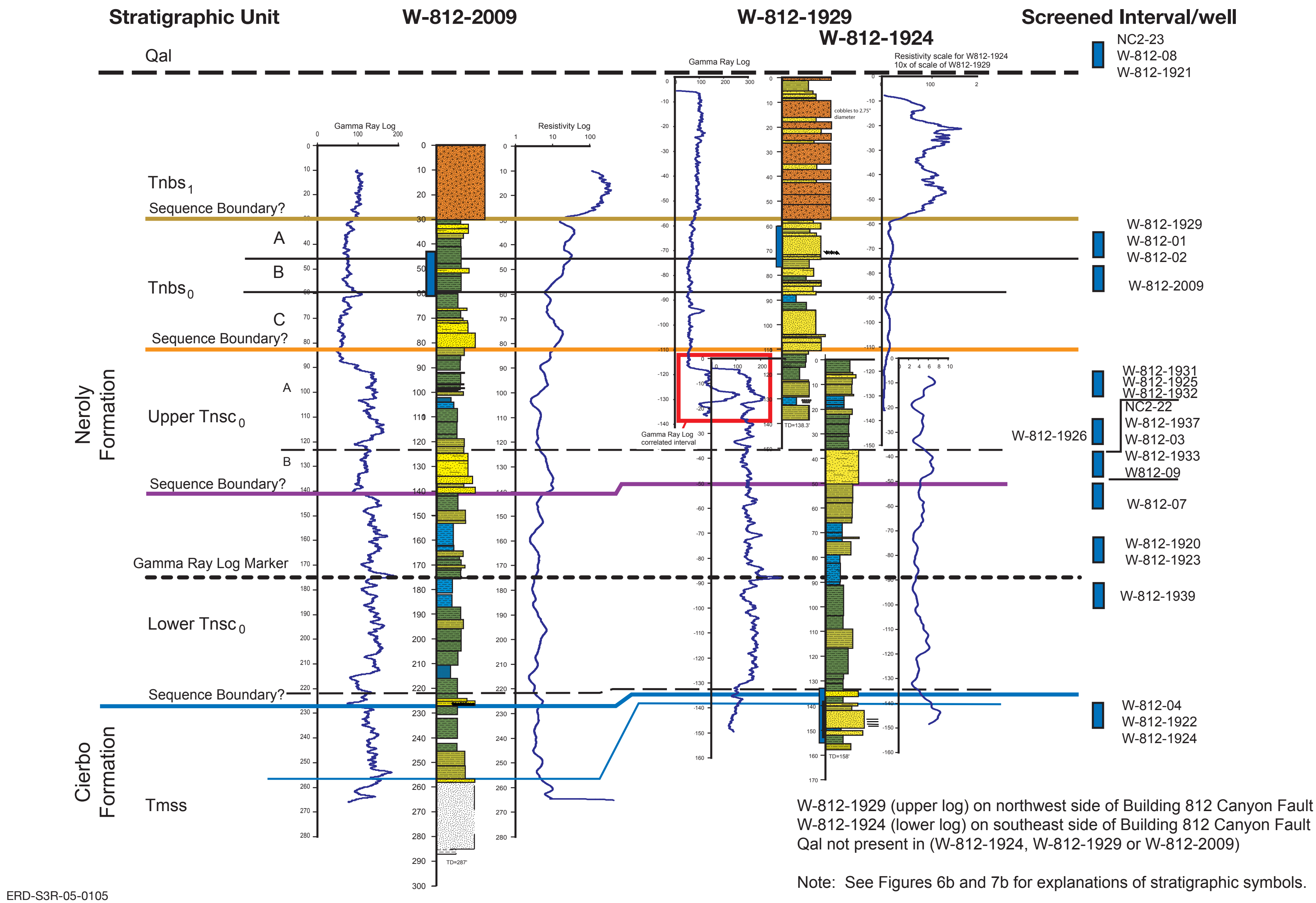
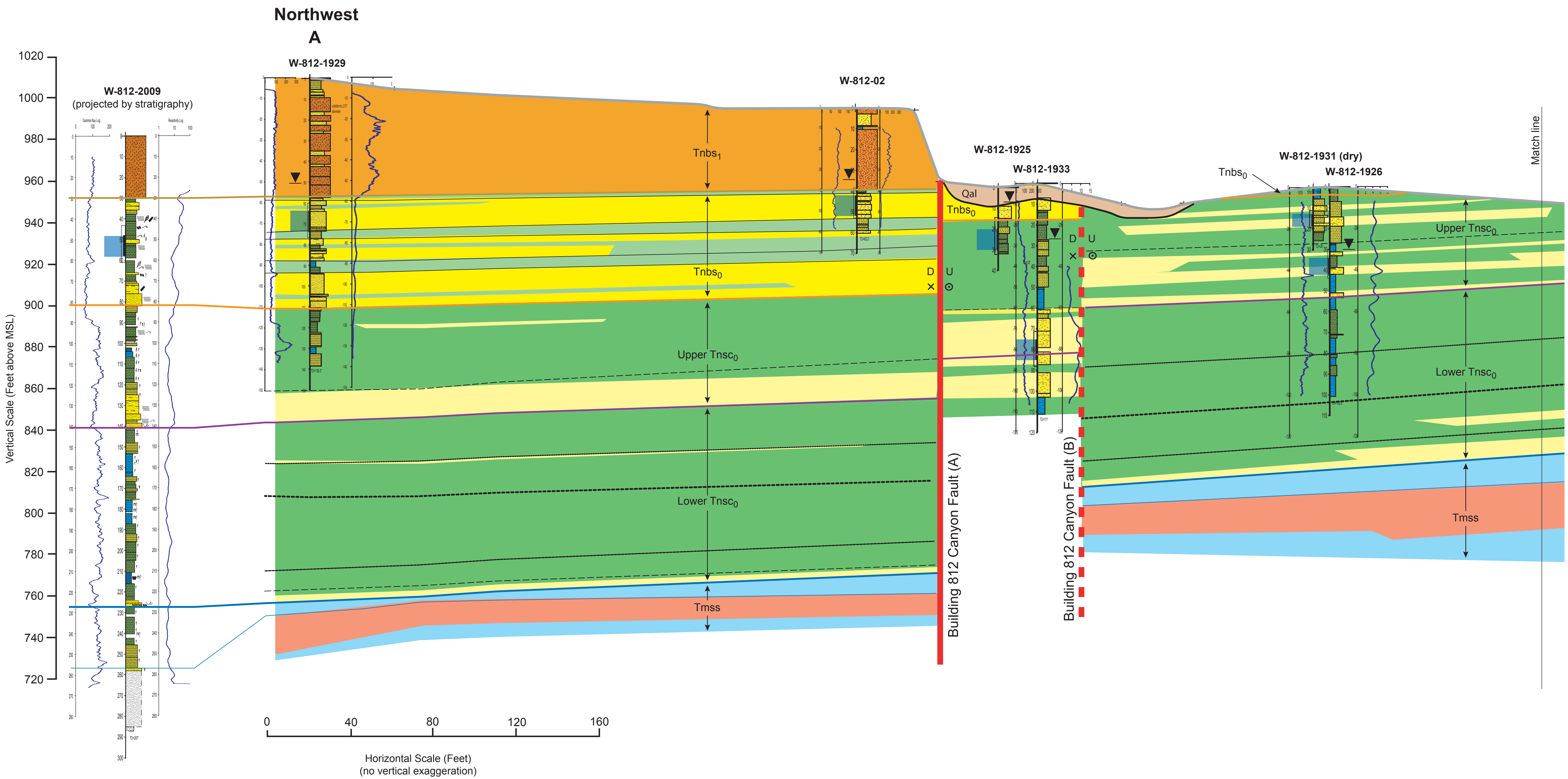


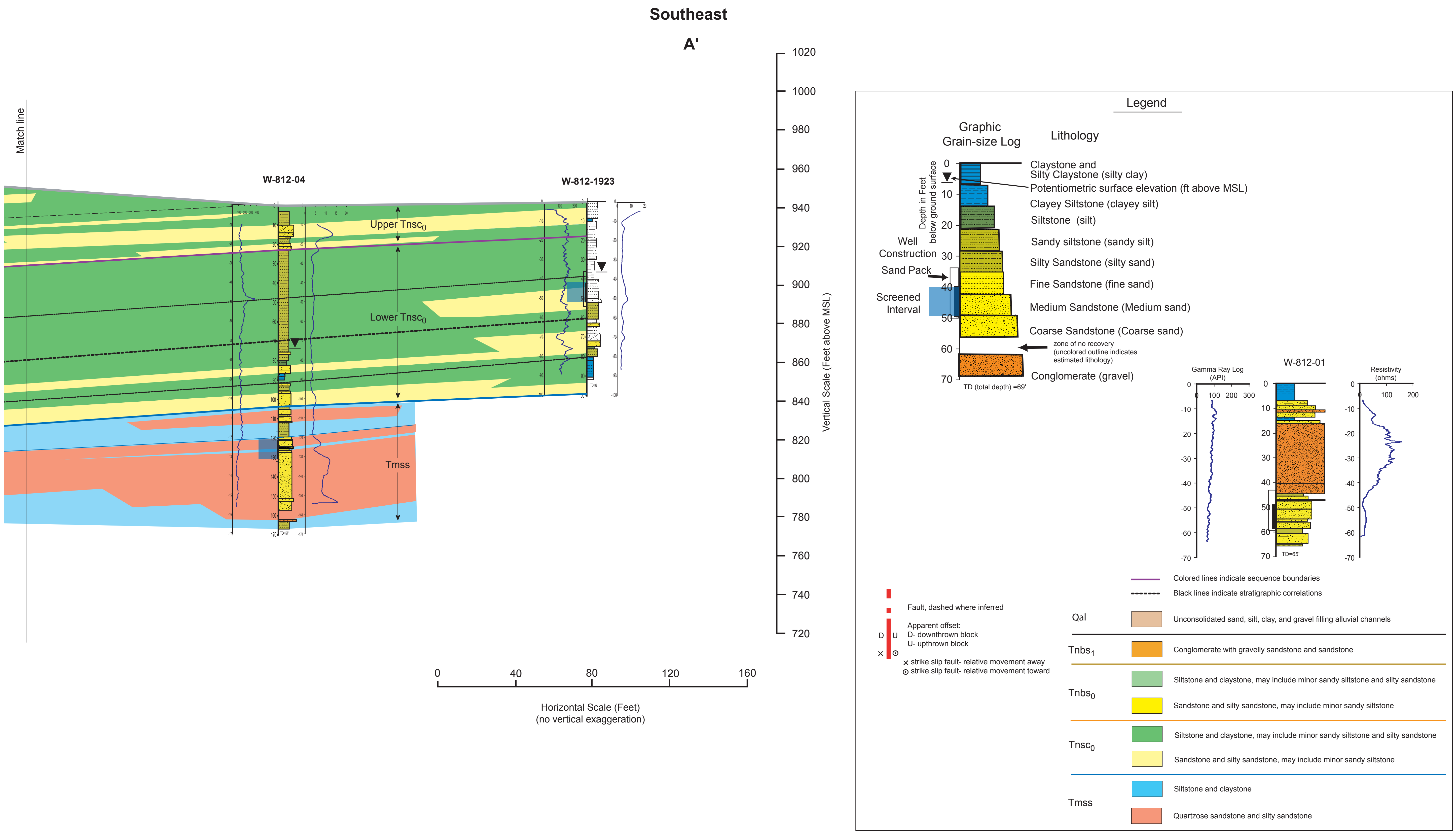
Figure 5. Stratigraphic sections for the Building 812 study area showing vertical locations of screened zones for monitor wells.



See Figure 6b for Legend

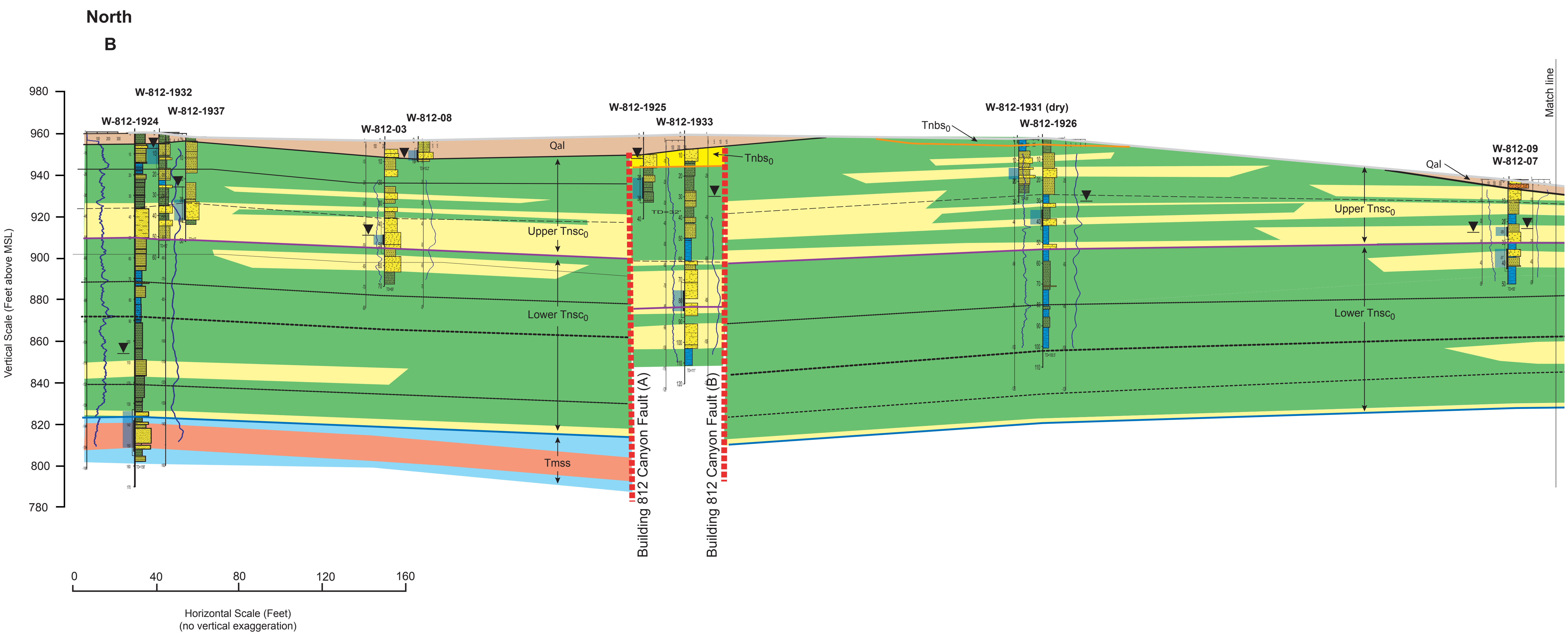
ERD-S3R-05-0096

Figure 6a. Geologic cross section A-A', Building 812 study area.



ERD-S3R-05-0097

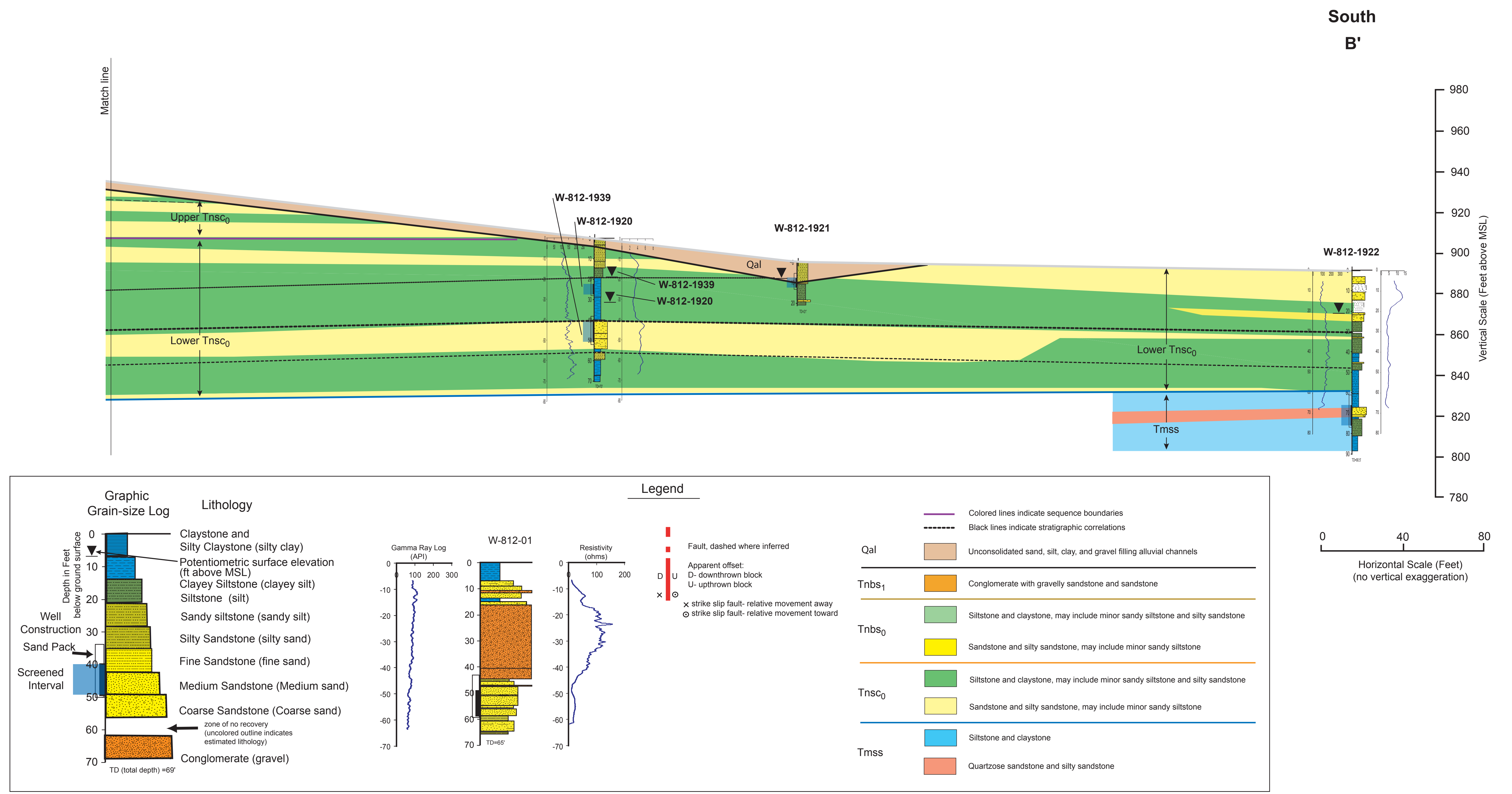
Figure 6b. Geologic cross section A-A', Building 812 study area.



See Figure 7b for Legend

ERD-S3R-05-0098

Figure 7a. Geologic cross section B-B', Building 812 study area.



ERD-S3R-05-0099

Figure 7b. Geologic cross section B-B', Building 812 study area.

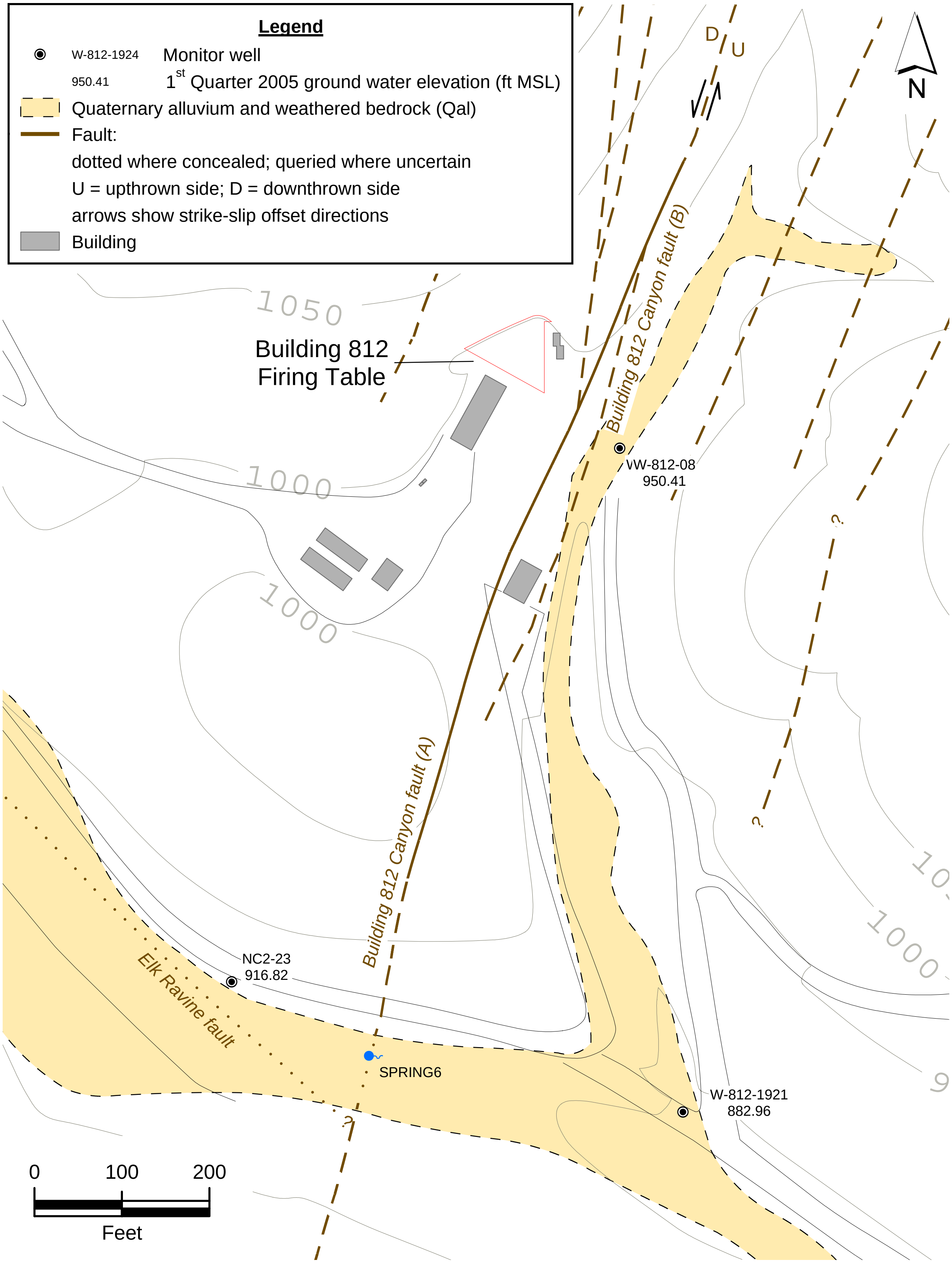


Figure 8. Ground water elevations in the Qal HSU at the Building 812 study area, 1st Quarter 2005.

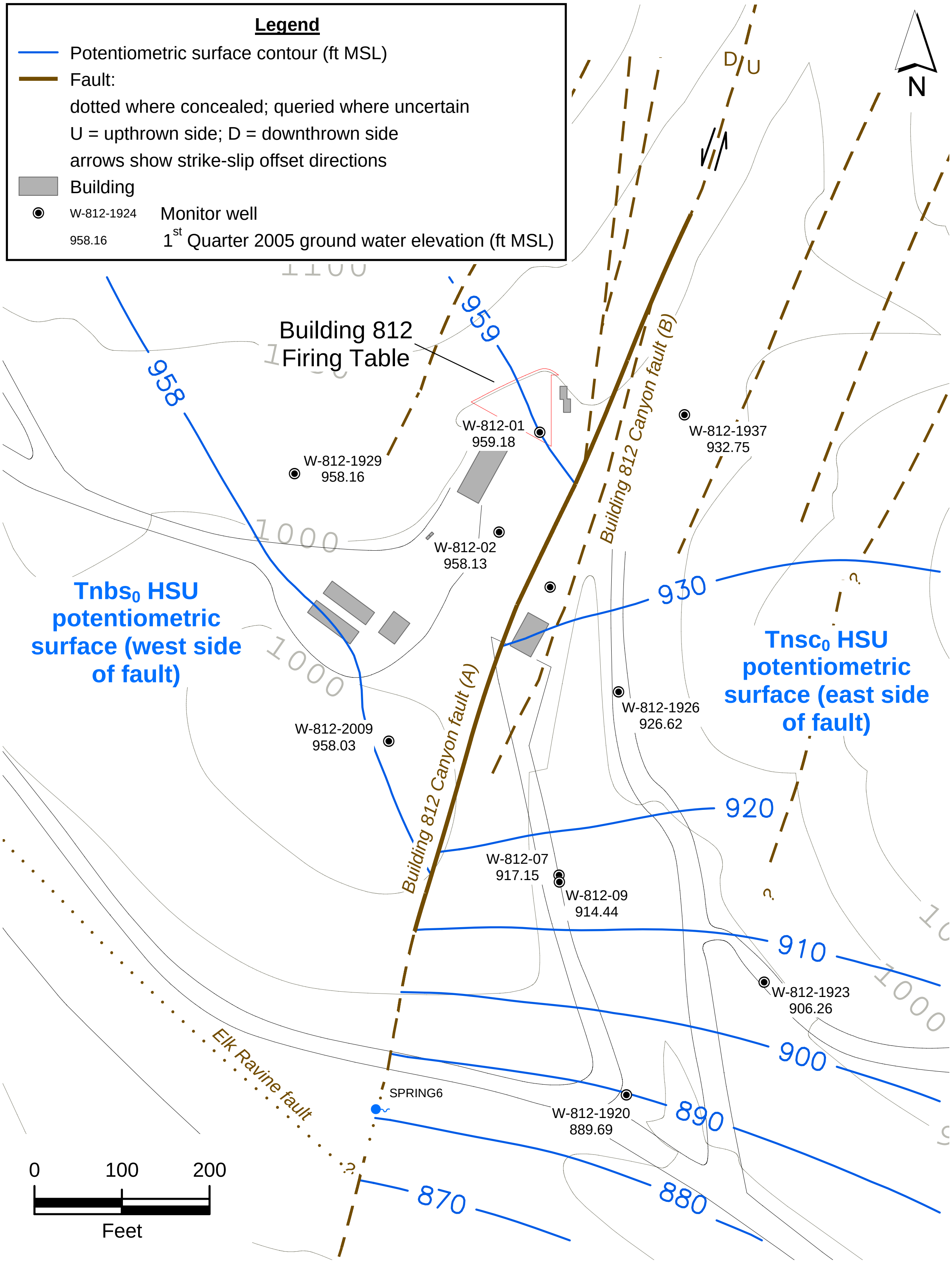


Figure 9. Potentiometric surface contours for ground water in the Tnbs$_0$ HSU (west side of fault) Tnbs$_0$ HSU (east side of fault), 1st Quarter 2005.

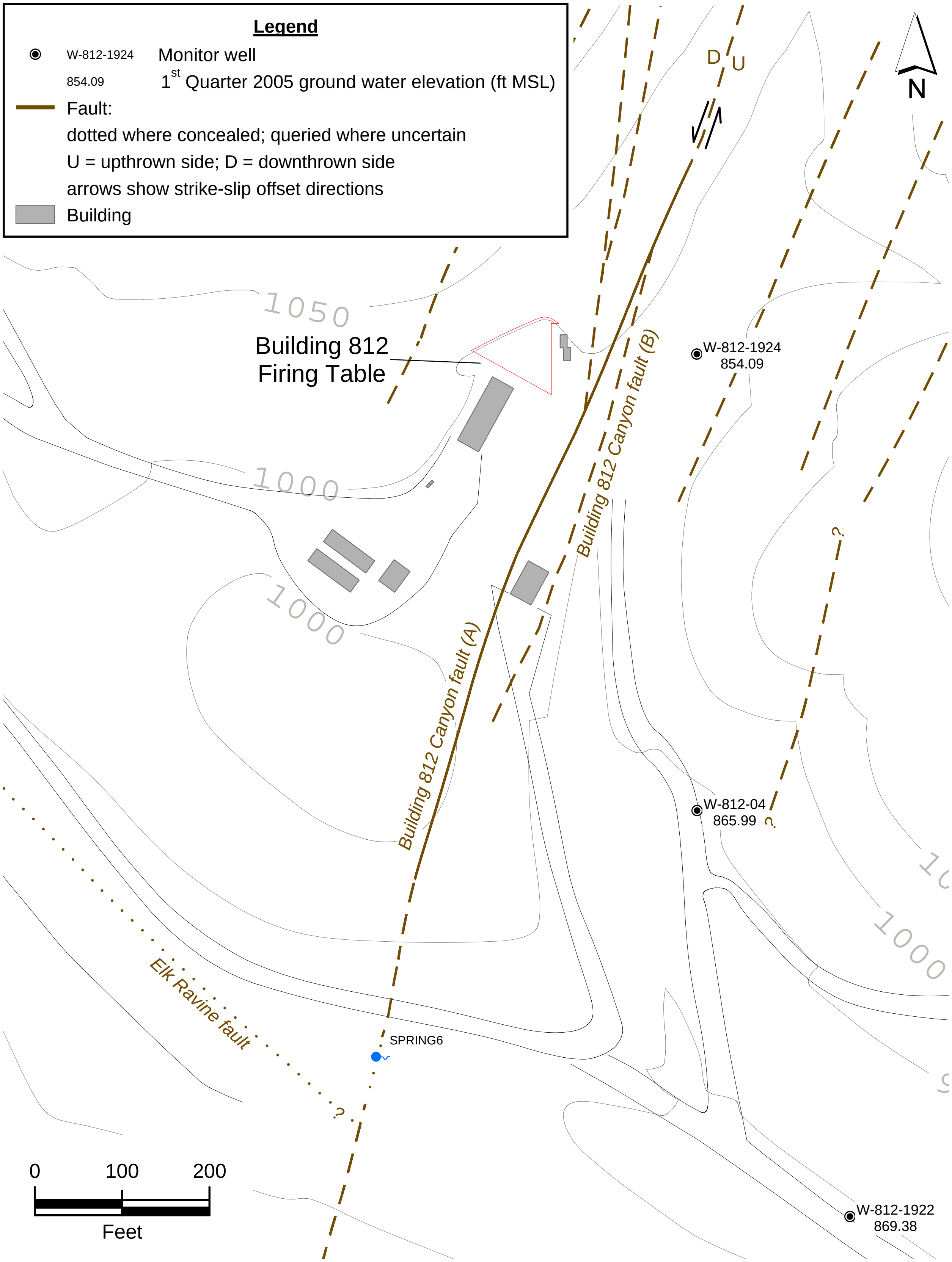
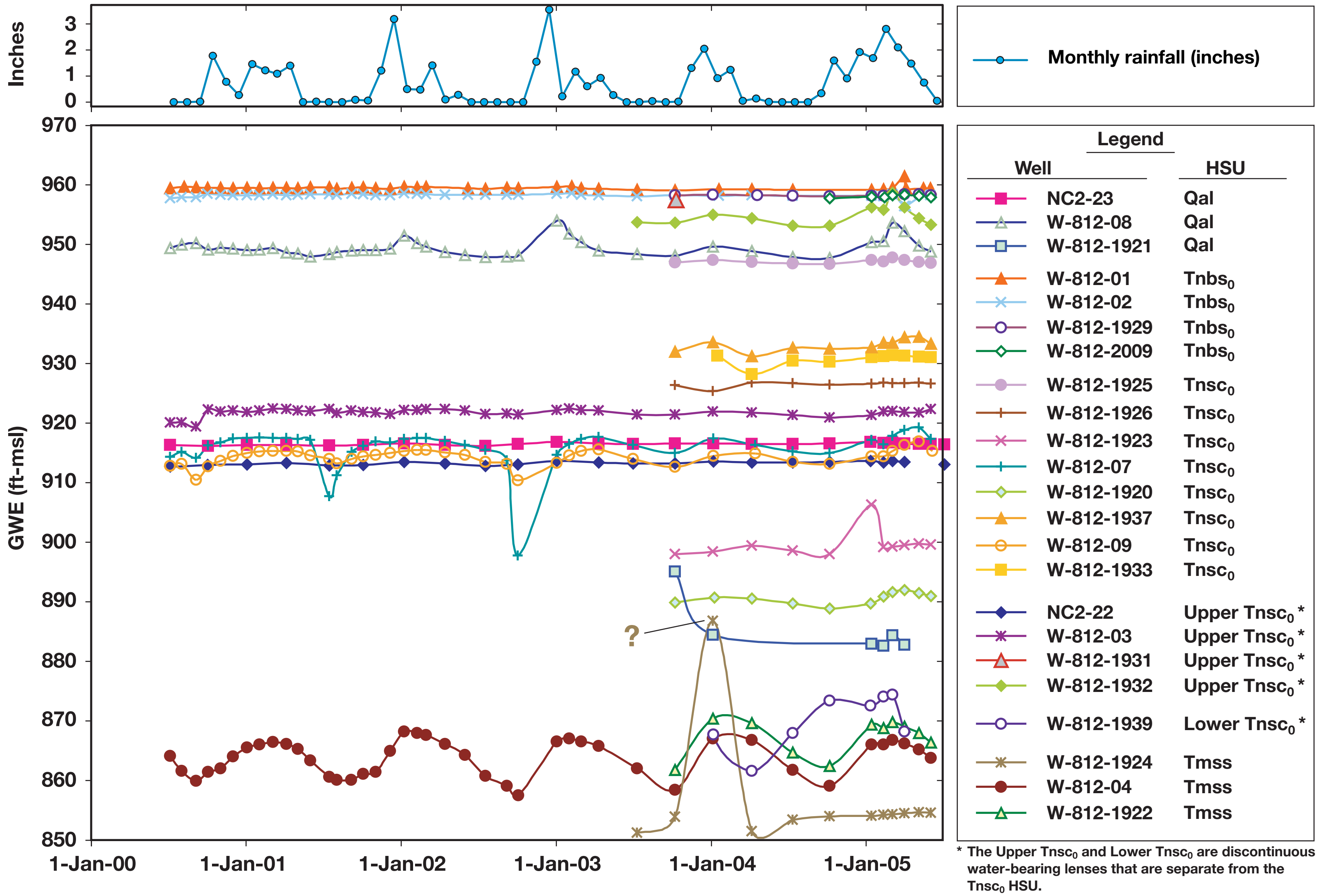


Figure 10. Ground water elevations in the Tmss HSU at the Building 812 study area, 1st Quarter 2005.



ERD-S3R-05-0114

Figure 11. Hydrographs of ground water elevations for monitor wells in the Building 812 study area.

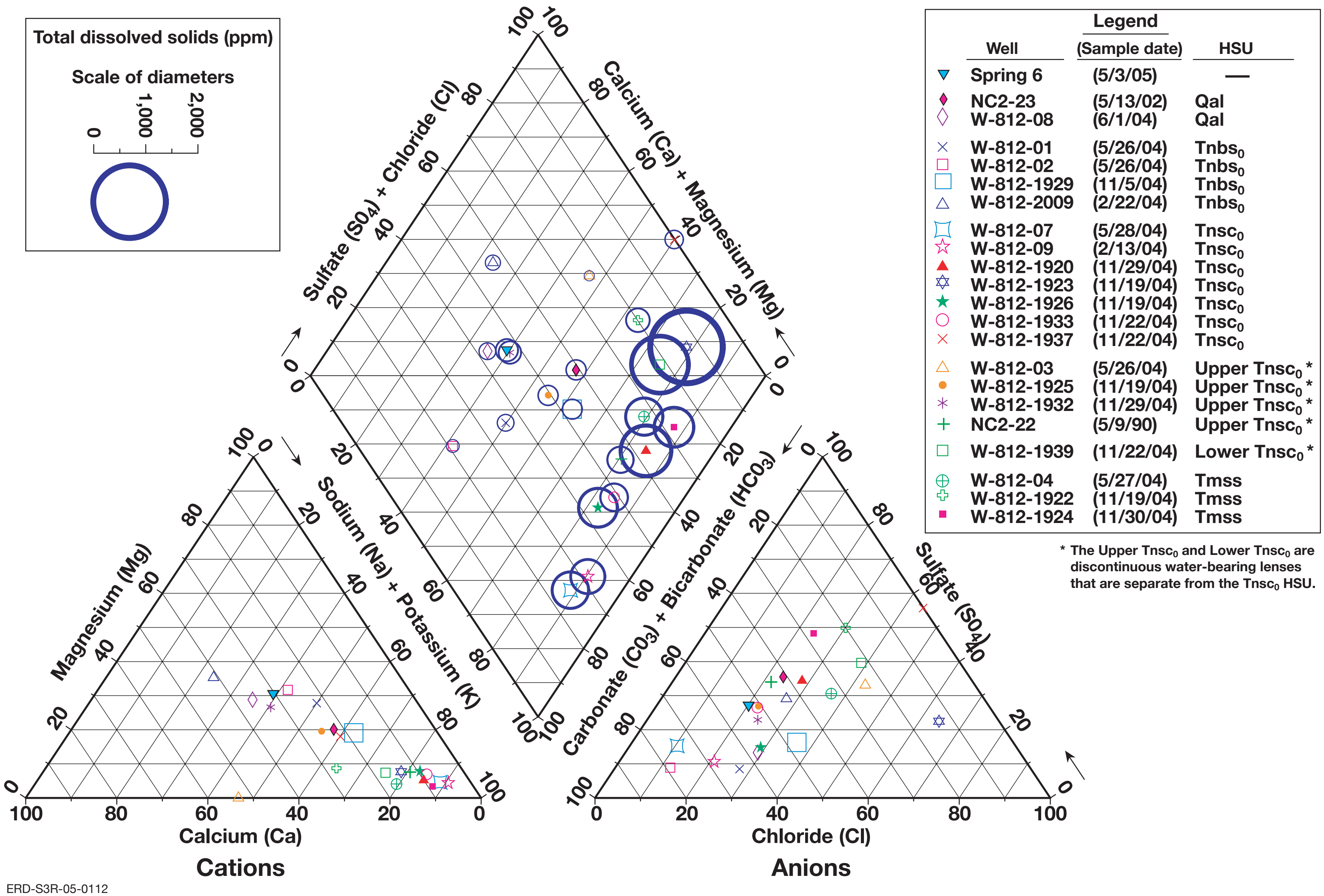


Figure 12. Piper diagram for water samples from the Building 812 study area.

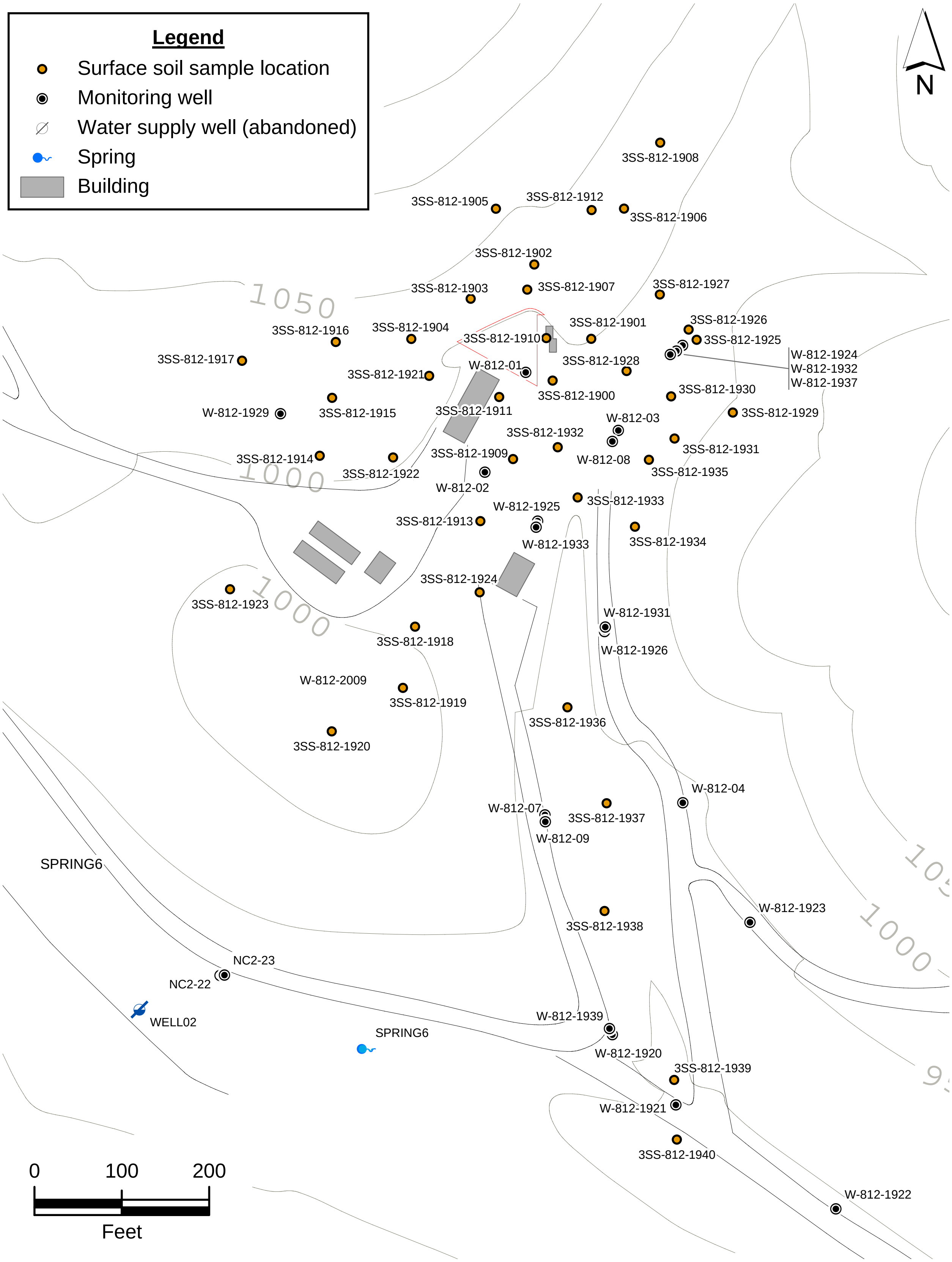


Figure 13. Locations of surface soil samples collected at the Building 812 study area.

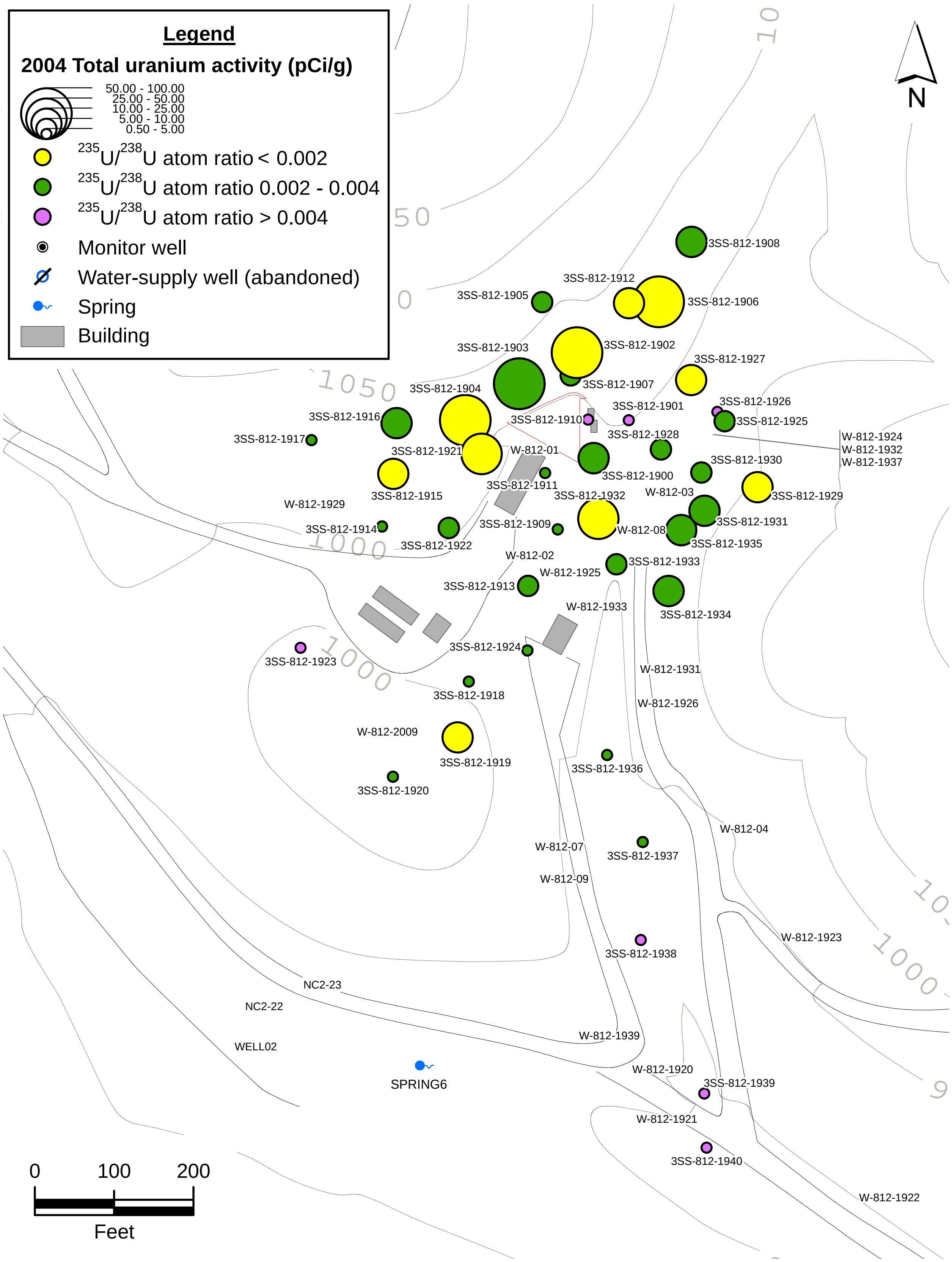


Figure 14. Surface soil sample locations at the Building 812 study area showing total uranium activities (pCi/g) and $^{235}U/^{238}U$ atom ratios.

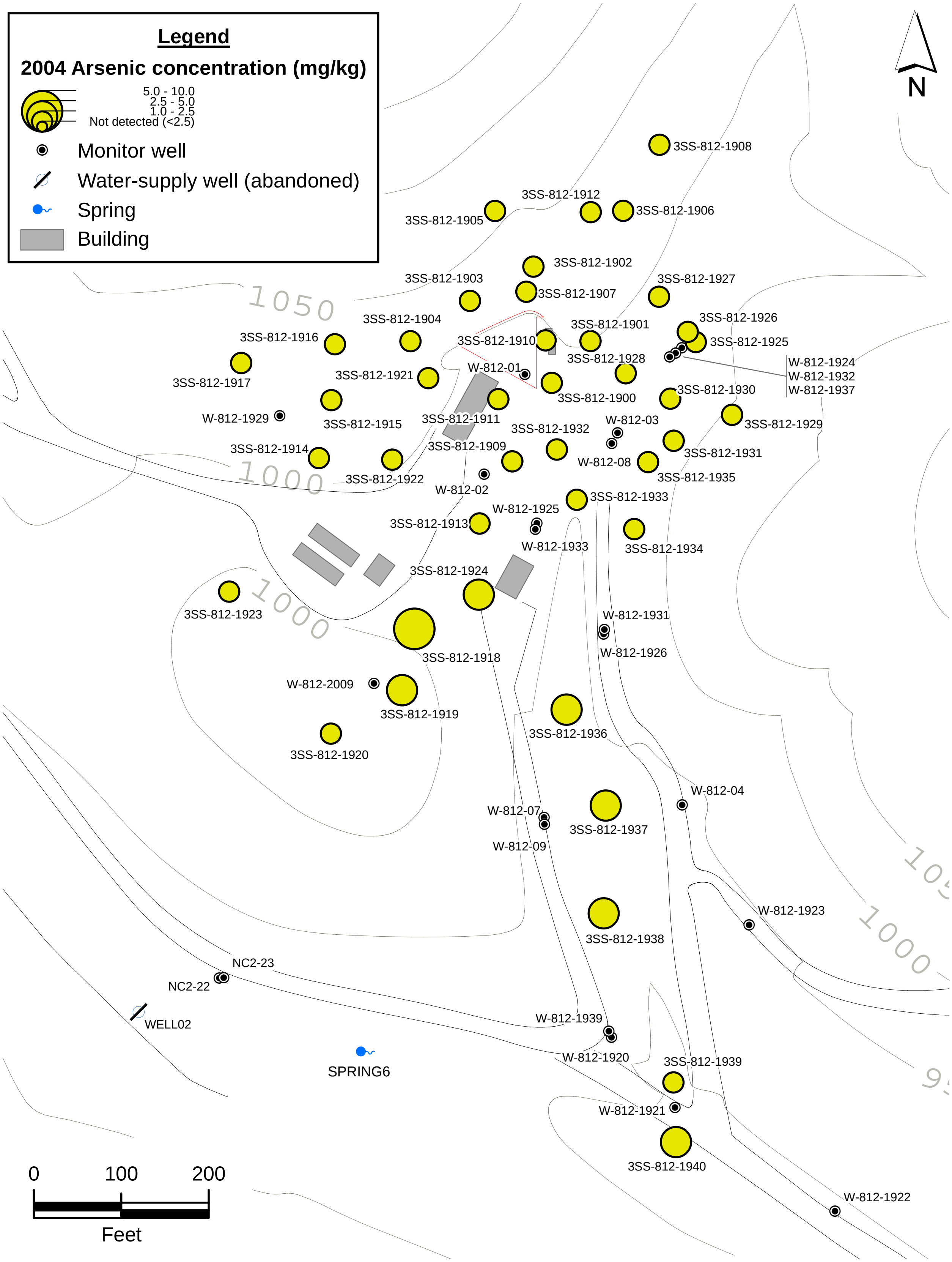


Figure 15. Surface soil sample locations at the Building 812 study area showing total arsenic concentrations (mg/kg).

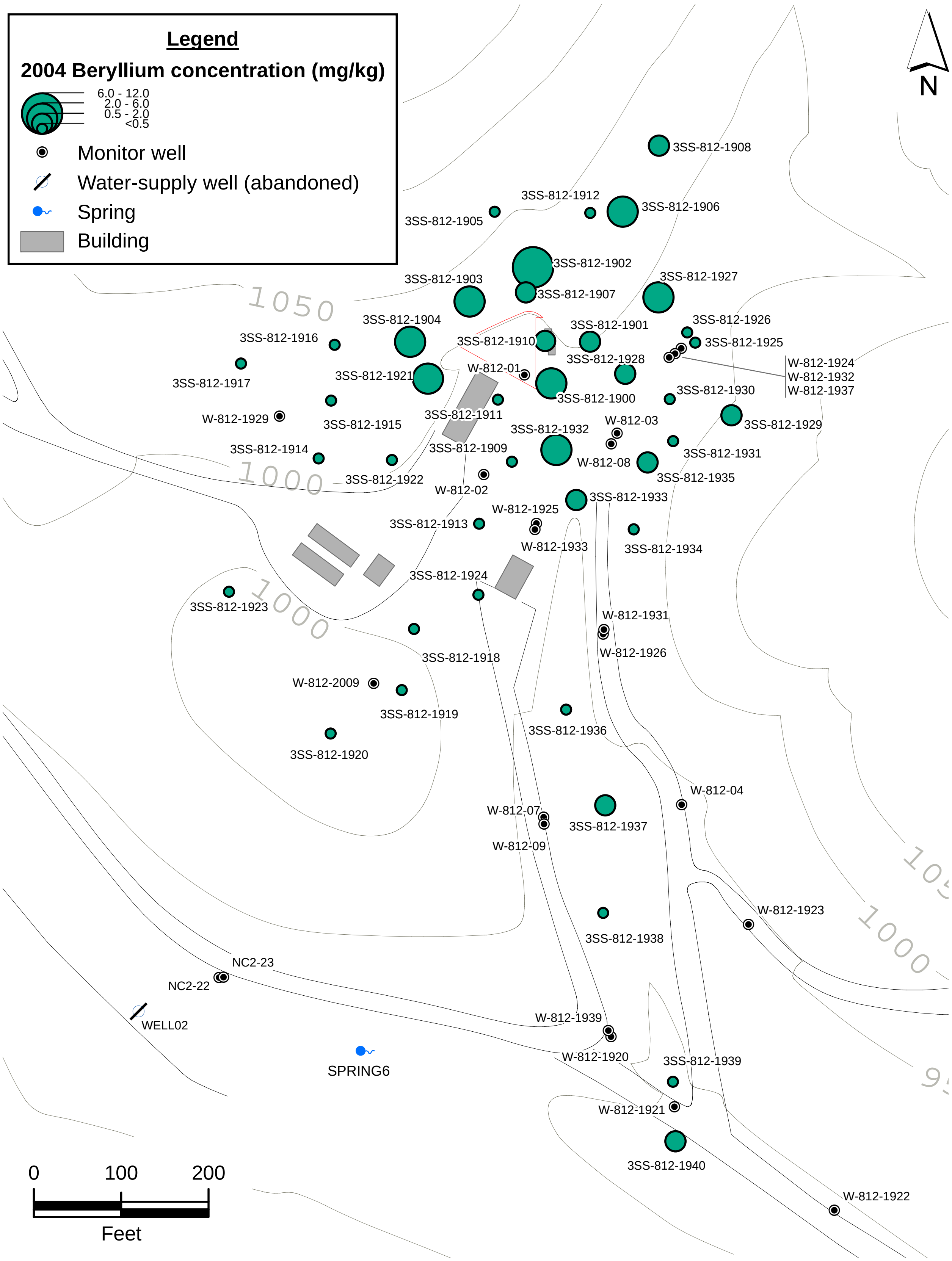


Figure 16. Surface soil sample locations at the Building 812 study area showing total beryllium concentrations (mg/kg).

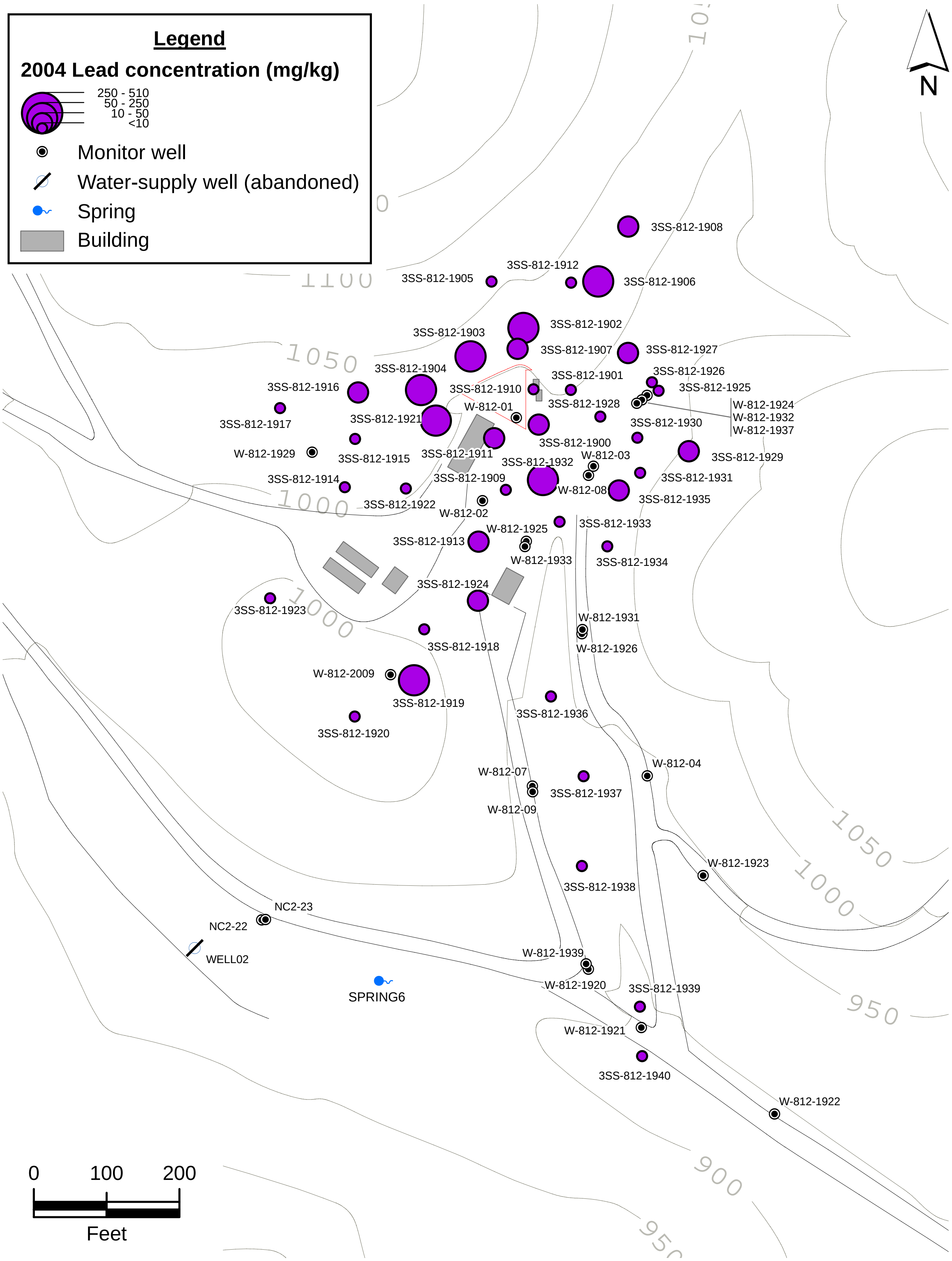


Figure 17. Surface soil sample locations at the Building 812 study area showing total lead concentrations (mg/kg).

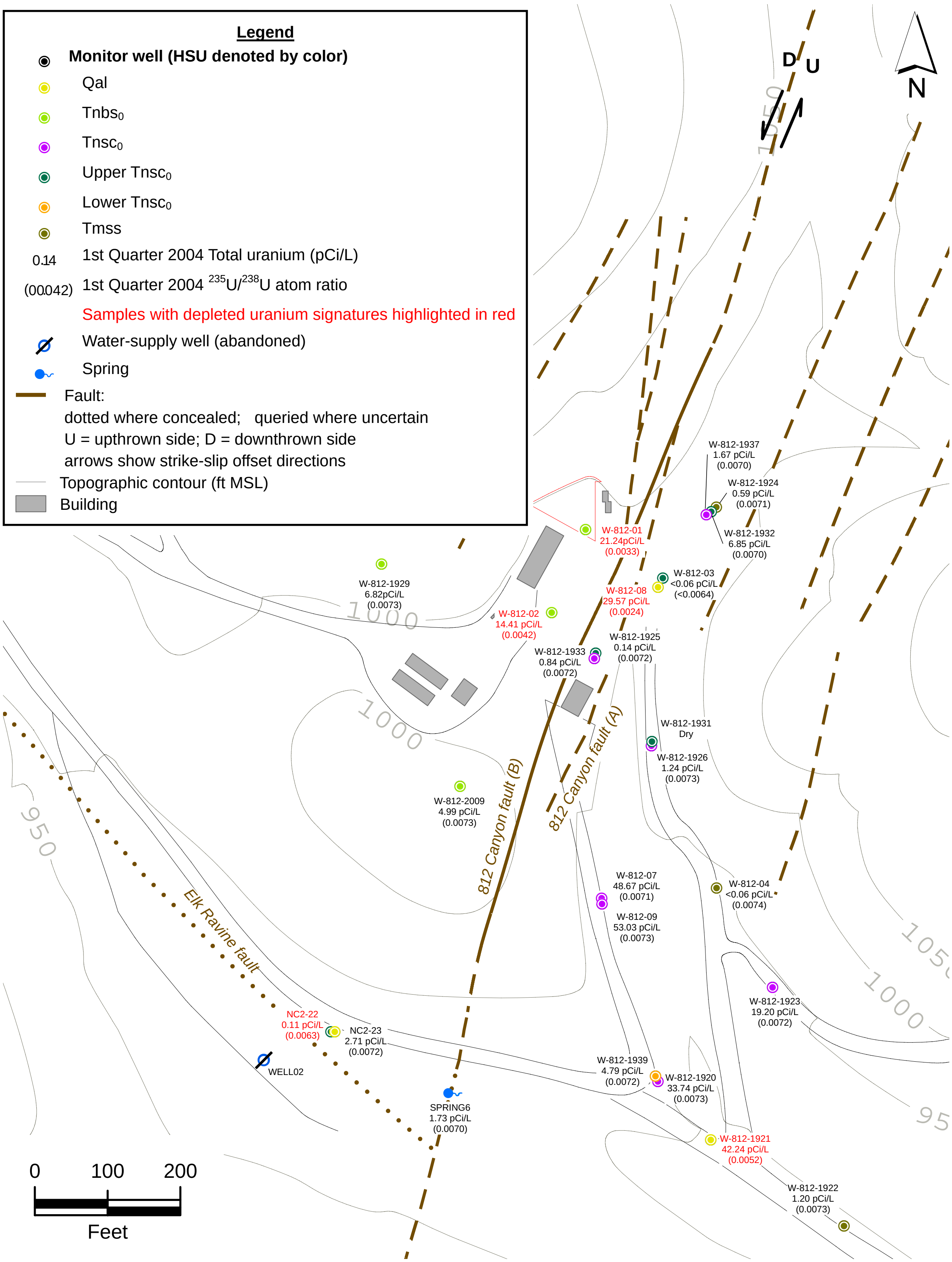


Figure 18. Total uranium activities (pCi/L) and $^{235}U/^{238}U$ atom ratios in ground water at the Building 812 area, 1st Quarter 2004.

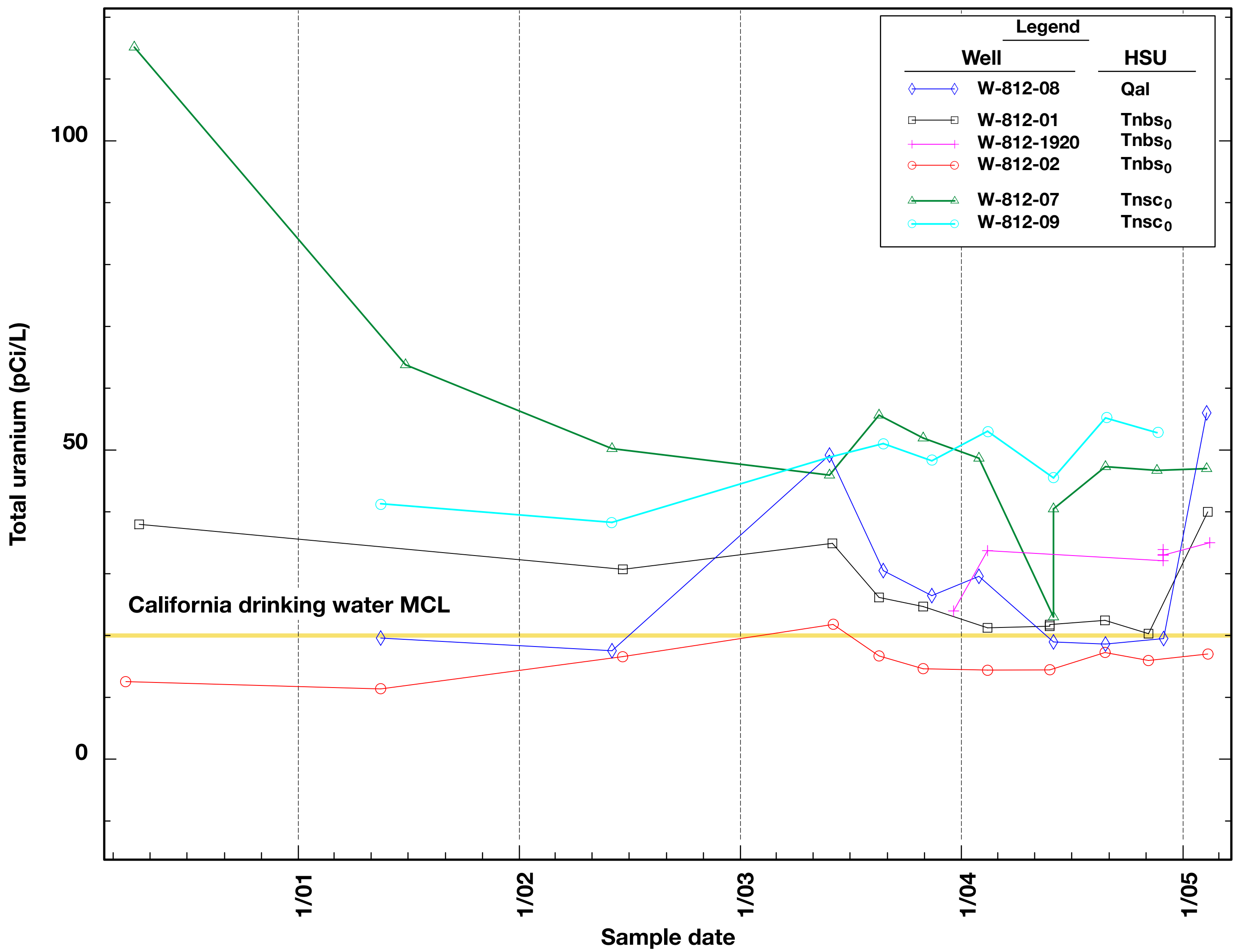


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Figure 19. Time-series plot of total uranium activities in ground water samples from selected wells in the Building 812 study area.

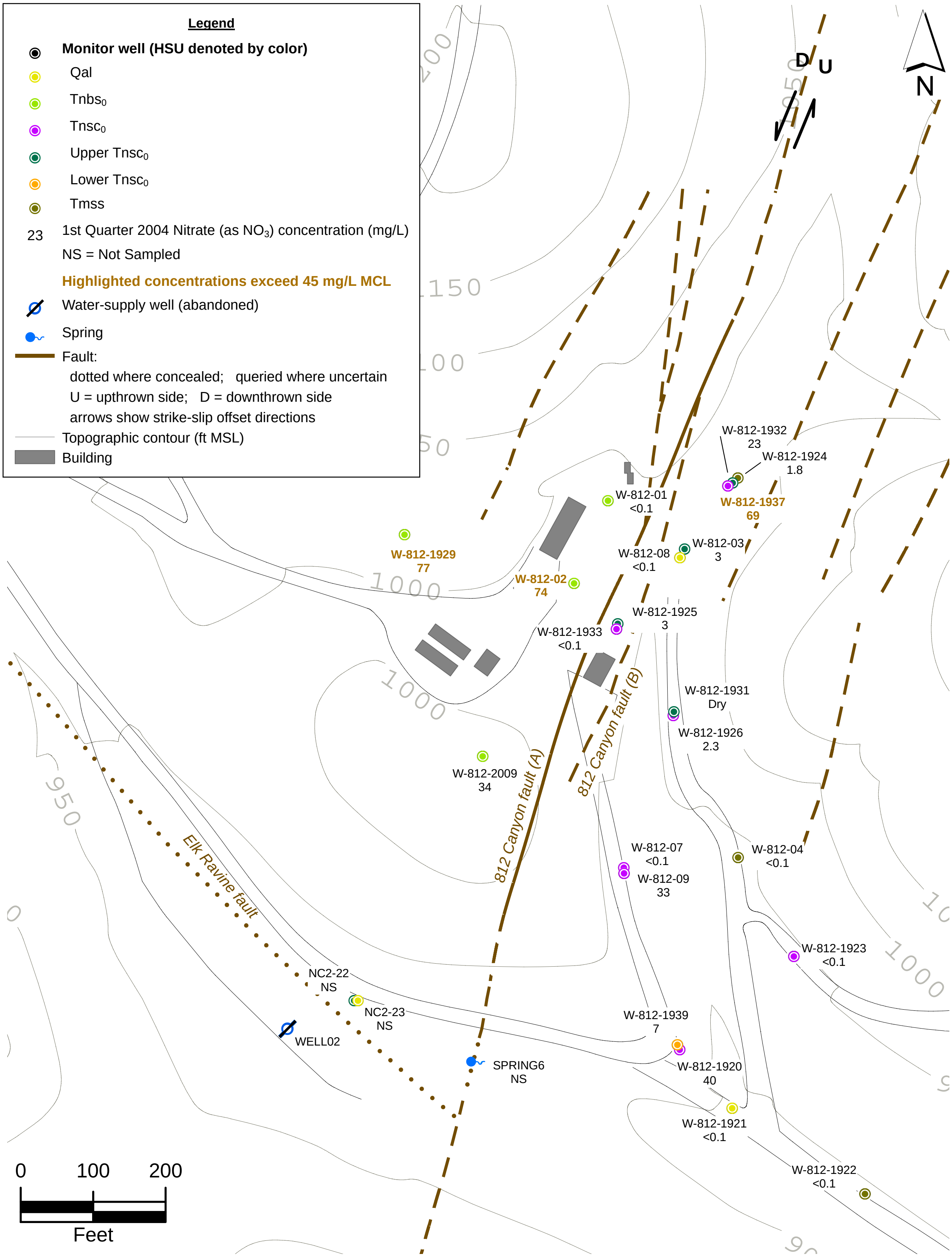

Figure 20. Nitrate (as NO_3) concentrations (mg/L) in ground water at the Building 812 study area, 4th Quarter 2004 or the most recent data.

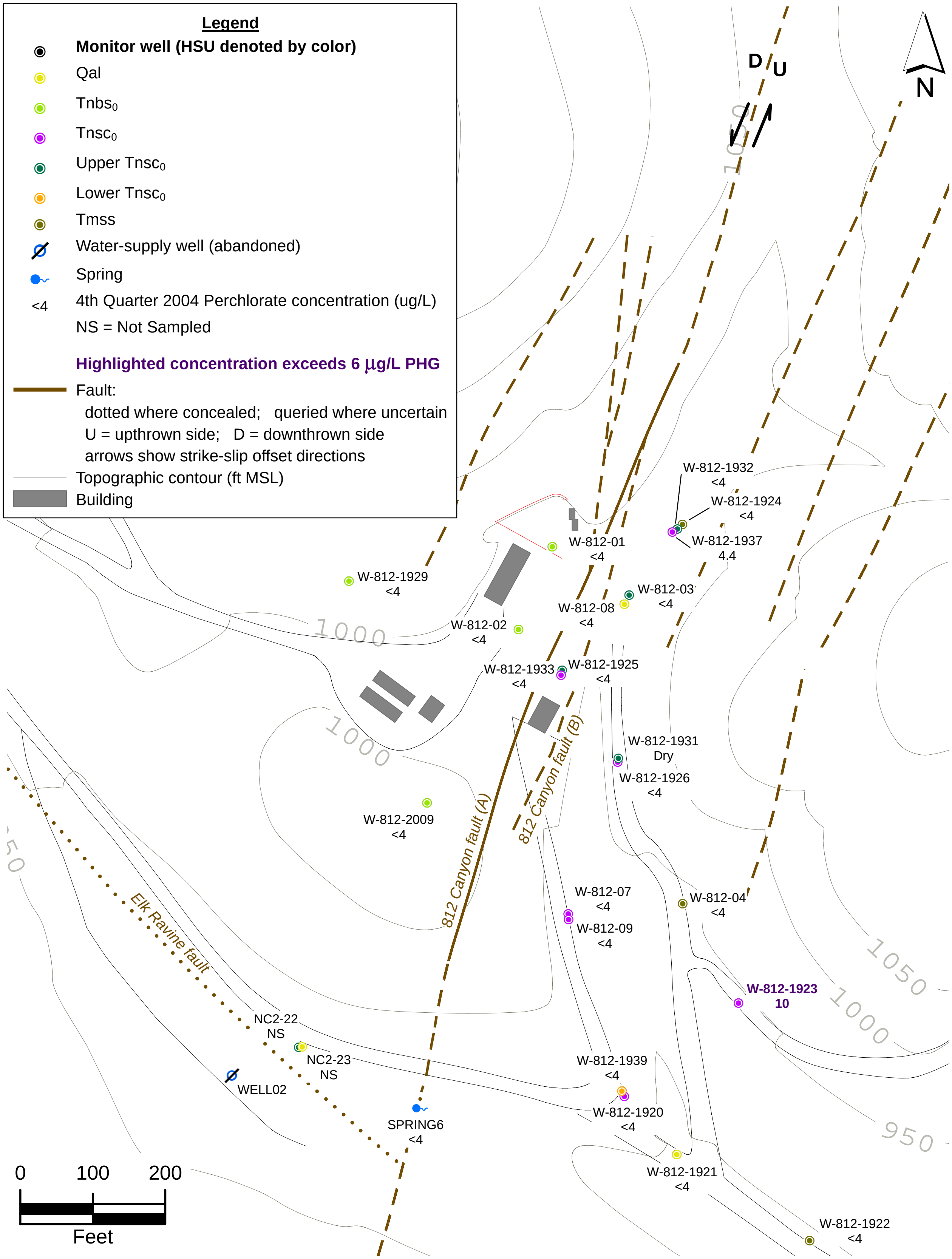

Figure 21. Perchlorate concentrations (µg/L) in ground water at the Building 812 study area, 4th Quarter 2004.

Tables

Table 1. Field characterization and remediation activities at the Building 812 study area.

1988	**Drilled dry well characterization boreholes.**
1988	**Firing table gravel and underlying soil and rock characterized. Approximately 5,634 yd^3 of firing table gravel were excavated and disposed at landfill Pit 7. Building 812D dry well excavated and disposed in Pit 7.**
1990	**Drilled and installed monitor wells NC2-22 and NC2-23.**
1990/2004	**Conducted geologic mapping.**
2000	**Drilled and installed monitor wells W-812-01 through W-812-09.**
2000–present	**Conducted ground water sampling and analysis.**
2003	**Installed monitor wells in W-812-1900 series**
2004	**Conducted hydraulic tests.**
2004	**Collected surface soil samples.**
2004	**Drilled and installed monitor well W-812-2009.**

Table 2. Monitor well completion data for the Building 812 study area.

Well	HSU	Northing	Easting	Borehole depth (ft)	Depth of screened interval (ft)	Ground elevation (ft above MSL)	Casing diameter (ft)	Approximate well yield (gpm)	Completion date
W-812-01	$Tnbs_0$	423422.85	1703342.21	65	49–59	996.39	5	< 0.5	05/19/00
W-812-02	$Tnbs_0$	423308.85	1703295.55	60.3	42–52	996.68	5	< 0.5	03/23/00
W-812-03	Upper $Tnsc_0$*	423356.12	1703448.13	69	45–50	956.32	5	NA	03/23/00
W-812-04	Tmss	422931.3	1703522.06	167	121–131	942.94	5	< 0.5	04/12/00
W-812-07	$Tnsc_0$	422917.25	1703364.21	50	33–43	938.46	5	< 0.1	04/05/00
W-812-08	Qal	423343.85	1703441.49	10.2	5–9.9	956.09	5	2	03/28/00
W-812-09	$Tnsc_0$	422909.58	1703364.6	28.5	22.3–27.3	937.9	5	< 0.1	05/06/00
W-812-1920	$Tnsc_0$	422666.21	1703441.31	70	22–27	907.95	5	0.1	07/15/03
W-812-1921	Qal	422586.05	1703513.93	21	7–12	895.06	5	NA	07/22/03
W-812-1922	Tmss	422467.5	1703697.1	90.5	66–76	891.34	5	2	07/30/03
W-812-1923	$Tnsc_0$	422794.7	1703598.95	92	42–52	944.35	5	0.2	07/02/03
W-812-1924	Tmss	423453.54	1703521.69	153.5	138–153	960.56	5	NA	05/12/03
W-812-1925	Upper $Tnsc_0$*	423252.99	1703355.92	32	20–30	958.75	5	1	05/29/03
W-812-1926	$Tnsc_0$	423126.49	1703432.41	100.5	37.5–42.5	957.29	5	0.1	04/17/03
W-812-1929	$Tnbs_0$	423375.61	1703061.62	138.3	64–74	1010.57	5	NA	04/07/03
W-812-1931	Upper $Tnsc_0$*	423131.81	1703433.18	26	13.4–18.4	957.52	5	NA	04/24/03
W-812-1932	Upper $Tnsc_0$*	423447.08	1703514.62	52	5–15	959.85	5	NA	05/20/03
W-812-1933	$Tnsc_0$	423245.99	1703354.14	111	75–85	959.32	5	0.2	06/11/03
W-812-1937	$Tnsc_0$	423442.79	1703507.75	42	30–40	958.96	5	0.1	06/19/03
W-812-1939	Lower $Tnsc_0$*	422673.14	1703438.18	60	41–51	908.63	5	0.1	07/22/03
W-812-2009	$Tnbs_0$	423070.34	1703169.4	287	48–58	1004.69	5	0.5	02/24/04
NC2-22	Upper $Tnsc_0$*	422733.9	1702992.3	75	34.2–39	929.09	4.5	1.2	02/07/90
NC2-23	Qal	422734.3	1702997.4	26.5	20–24.8	928.9	4.5	1.2	02/08/90

Notes appear on following page.

Table 2. Monitor well completion data for the Building 812 study area. (Cont. Page 2 of 2)

Notes:

* **Upper and lower $Tnsc_0$ water-bearing zones are not continuous mappable HSUs.**

ft =	**Feet.**
gpm =	**Gallons per minute.**
HSU =	**Hydrostratigraphic unit.**
MSL =	**Mean sea level.**
NA =	**Not applicable.**
Qal =	**Quaternary alluvium.**
Tmss =	**Miocene Cierbo Formation.**
$Tnbs_0$ =	**Miocene Neroly lower blue sandstone.**
$Tnsc_0$ =	**Miocene Neroly Formation—lower siltstone/claystone member.**
Lower $Tnsc_0$ =	**Lower member of the lower Neroly siltstone/claystone unit.**
Upper $Tnsc_0$ =	**Upper member of the lower Neroly siltstone/claystone unit.**

Table 3. Characteristics of hydrostratigraphic units (HSUs) in the Building 812 Study Area.

HSU	Hydraulic condition	Saturated thickness	Extent of saturation	Gradient and flow direction	Depth to water below ground surface
Qal	Unconfined	0 to 5 ft (ephemeral saturation exists following storms, unsaturated most of the year)	Restricted to valley-fill alluvium and weathered bedrock. Continuous saturation during and following rainy periods.	Flow direction is south-southeast in Building 812 Canyon and east-southeast in Elk Ravine.	0 to 20 ft
$Tnbs_0$	Confined	5 to 10 ft	Extent of saturation is locally restricted to the west side of the Building 812 Fault (A). Limited to south by outcrop of entire Tnbs0 section immediately north of Elk Ravine.	Very flat gradient of about 0.0025. Flow direction is south-southwest.	50 to 70 ft
$Tnsc_0$	Confined-semi-confined	5 to 10 ft	Restricted to east side of the Building 812 Fault (A). May be hydraulically connected across Building 812 Fault (B).	Gradient of about 0.03 to 0.1. Average flow direction is south-southeast. Downward gradient between $Tnsc_0$ HSU and underlying Tmss HSU.	30 to 70 ft
Tmss	Confined	5 to 10 ft	Found on east side of Building 812 Canyon Fault (A). HSU also found on west side of fault (A) at W-812-2009.	Gradient of about 0.001 to 0.002. Flow appears to be directed north.	70 to 80 ft on east side of Building 812 Canyon Fault and 255 ft on west side of the fault.
Upper $Tnsc_0$*	Confined to unconfined	0 to 5 ft	Includes several discontinuous water-bearing lenses within $Tnsc_0$ U.	Unknown	30 to 80 ft
Lower $Tnsc_0$*	Confined	0 to 5 ft	Discontinuous	Unknown	Varies

Notes:

* Denotes discontinuous lenses of ground water within the $Tnsc_0$ stratigraphic unit. These are not mappable HSUs.

ft = Feet.
HSU = Hydrostratigraphic unit.
Lower $Tnsc_0$ = Lower member of the lower Neroly siltstone/claystone unit.
Qal = Quaternary alluvium.
Tmss = Miocene Cierbo Formation.
$Tnbs_0$ = Miocene Neroly lower blue sandstone.
$Tnsc_0$ = Miocene Neroly Formation—lower siltstone/claystone member.
Upper $Tnsc_0$ = Upper member of the lower Neroly siltstone/claystone unit.

Table 4. Summary of hydraulic test data for the Building 812 study area.

Well	Date	Type of test	Flow rate (Q) (gpm)	Transmissivity (T) (gpd/ft)	Hydraulic conductivity (K) (gpd/ft^2)	Data quality[a]	Estimated sustainable yield (gpm)	HSU
W-812-01	3/25/04	Slug	NA	300	30	Good	< 0.5	$Tnbs_0$
W-812-02	3/25/04	Slug	NA	750	75	Good	< 0.5	$Tnbs_0$
W-812-04	3/25/04	Drawdown	< 0.5	NC	NC	Poor	< 0.5	Tmss
W-812-07	3/31/04	Slug	NA	0.10	0.01	Fair	< 0.1	$Tnsc_0$
W-812-08	4/14/04	Slug	NA	100	50	Fair	< 0.5	Qal
W-812-09	3/31/04	Slug	NA	0.20	0.06	Fair	< 0.1	$Tnsc_0$

Notes:

gpd/ft = Gallons per day per foot.
gpd/ft^2 = Gallons per square-foot.
gpm = Gallons per minute.
HSU = Hydrostratigraphic unit.
NA = Not applicable.
Qal = Quaternary alluvium.
Tmss = Miocene Cierbo Formation.
$Tnbs_0$ = Miocene Neroly lower blue sandstone.
$Tnsc_0$ = Miocene Neroly Formation—lower siltstone/claystone member.

Data quality[a]

Excellent High confidence that type curve match is unique. Data are smooth and flow rate well-controlled.

Good Some confidence that curve match is unique. Data are not too "noisy." Well bore storage effects, if present, do not significantly interfere with the curve match. Boundary effects can be separated from properties of the pumped zone.

Fair Low confidence that curve match is unique. Data are "noisy." Multiple leakiness and other boundary effects tend to obscure the curve match.

Poor Unique curve match cannot be obtained due to multiple boundaries, well bore storage, uneven flow rate, or equipment problems. Usually, the test is repeated.

Table 5. Maximum concentrations and activities of chemicals that exceeded regulatory standards in soil, rock, and water samples collected from the Building 812 study area.

Chemical	Maximum concentration	Regulatory standard
Surface soil		
arsenic	9.3 mg/kg[a]	0.16 mg/kg (EPA Region IX "CA-modified" Industrial Soil PRG) 1.6 mg/kg (EPA Region IX Industrial Soil PRG)
Uranium-235	0.887 pCi/g	0.398 pCi/g (EPA Region IX Industrial Soil PRG)
Uranium-238	77 pCi/g	1.8 pCi/g (EPA Region IX Industrial Soil PRG)
Subsurface soil		
Total uranium (Uranium-238 plus -235)	22,740 pCi/g	Modeling indicates potential to cause exceedence of uranium MCL in ground water.
Ground water		
Uranium (natural only)	63.8 pCi/L	20 pCi/L (State MCL)
Uranium (some depleted uranium added)	49.2 pCi/L	20 pCi/L (State MCL)
Nitrate (as NO_3)	77 mg/L	45 mg/L (State and Federal MCL)
Perchlorate	11 μg/L	6 μg/L (State PHG)

Notes:

Sporadic and isolated exceedences of chemical standards for surface water and ground water are not included.

CA = California.
EPA = U.S. Environmental Protection Agency.
MCL = Maximum Contaminant Level in drinking water.
mg/kg = Milligram per kilogram.
mg/L = Milligram per liter.
pCi/g = PicoCurie per gram.
pCi/L = PicoCurie per liter.
PRG = Preliminary Remediation Guideline.
PHG = Public Health Goal.

[a] Although arsenic concentrations exceed the industrial soil PRG, they are within the range of natural background concentrations for arsenic in surface soil at Site 300.

Table 6. Summary of uranium data in ground water from Building 812 study area wells.

Well	Maximum historical total uranium concentration (in pCi/L)	No. of samples above 20 pCi/L MCL /total no. of samples	$^{235}U/^{238}U$ ratio[a]	No. of samples with depleted uranium/total No. of samples	HSU	Comment
Wells sampling ground water with depleted uranium above MCL						
W-812-01	40.0	11/11	0.003	10/10	$Tnbs_0$	Depleted U; >MCL
W-812-02	21.8	1/11	0.004	10/10	$Tnbs_0$	Depleted U; 1 sample>MCL
W-812-08	56.0	13/13	0.002	10/10	Qal	Depleted U; >MCL
W-812-1921	42.2	1/1	0.005	1/1	Qal	Depleted U; >MCL
Wells sampling ground water with mostly depleted uranium below MCL						
W-812-03	1.69	0/14	0.005	10/13	Upper $Tnsc_0$	Mostly depleted U; <MCL
Wells sampling ground water with natural uranium above MCL						
W-812-07	142	15/15	0.007	0/11	$Tnsc_0$	Natural U; >MCL
W-812-09	55.2	14/14	0.007	0/9	$Tnsc_0$	Natural U; >MCL
W-812-1920	33.9	7/7	0.007	0/7	$Tnsc_0$	Natural U; >MCL
W-812-1923	21.0	2/7	0.007	0/7	$Tnsc_0$	Natural U; 2 samples slightly >MCL
W-812-1939	53.0	5/6	0.007	0/7	Lower $Tnsc_0$	Natural U; >MCL
Wells sampling ground water with mostly natural uranium below MCL						
NC2-22	4.34	0/26	0.007 (1 sample: 0.006)	1/26	Upper $Tnsc_0$	Mostly natural U; <MCL
W-812-04	3.64	0/12	0.007 (1 sample: 0.006)	1/10	Tmss	Mostly natural U; <MCL
Wells sampling ground water with natural uranium below MCL						
NC2-23	4.50	0/27	0.007	0/8	Qal	Natural U; <MCL
W-812-1922	0.54	0/6	0.007	0/5	Tmss	Natural U; <MCL
W-812-1924	1.54	0/5	0.007	0/5	Tmss	Natural U; <MCL
W-812-1925	0.39	0/5	0.007	0/5	Upper $Tnsc_0$	Natural U; <MCL

Table 6. Summary of uranium data in ground water from Building 812 study area wells. (Cont. Page 2 of 2)

Well	Maximum historical total uranium concentration (in pCi/L)	No. of samples above 20 pCi/L MCL /total no. of samples	$^{235}U/^{238}U$ ratio[a]	No. of samples with depleted uranium/total No. of samples	HSU	Comment
W-812-1926	2.02	0/6	0.007	0/6	$Tnsc_0$	Natural U; <MCL
W-812-1929	6.82	0/5	0.007	0/5	$Tnbs_0$	Natural U; <MCL
W-812-1932	9.02	0/5	0.007	0/5	Upper $Tnsc_0$	Natural U; <MCL
W-812-1933	0.95	0/5	0.007	0/5	$Tnsc_0$	Natural U; <MCL
W-812-1937	4.97	0/6	0.007	0/6	$Tnsc_0$	Natural U; <MCL
W-812-2002	4.50	0/1	0.007	0/1	$Tnbs_0$	Natural U; <MCL

Notes:

HSU = Hydrostratigraphic unit.
MCL = Maximum Contaminant Level in drinking water.
pCi/L = Picocuries per liter
Qal = Quaternary alluvium.
Tmss = Miocene Cierbo Formation.
$Tnbs_0$ = Miocene Neroly lower blue sandstone.
$Tnsc_0$ = Miocene Neroly Formation—lower siltstone/claystone member.
Lower $Tnsc_0$ = Lower member of the lower Neroly siltstone/claystone unit.
Upper $Tnsc_0$ = Upper member of the lower Neroly siltstone/claystone unit.
$^{235}U/^{238}U$ = Uranium-235/uranium-238 atom ratio.

[a] $^{235}U/^{238}U$ atom ratio = 0.007 indicates the presence of only natural uranium; $^{235}U/^{238}U$ atom ratio <0.007 indicates some added depleted uranium.

Attachment A

Data Tables

B812 Characterization Summary Report
Appendix A Table List
Draft of 7/29/05

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

Table A-2. Surface soil analyses for total uranium and uranium isotopes (pCi/g) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-3. Surface soil analyses for thorium isotopes (pCi/g) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-4. Surface soil analyses for TTLC metals (mg/kg) in samples collected from the Building 812 study area between January 1, 1988 and March 30, 2005.

Table A-5. Surface soil analyses for STLC metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-6a. Subsurface soil and rock analyses for tritium (pCi/L) in samples collected from the Building 812 study area before January 1, 1989.

Table A-6b. Subsurface soil and rock analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1989 and March 30, 2005.

Table A-7. Subsurface soil and rock analyses for total uranium and uranium isotopes* (pCi/g) and 235U/238U atom ratio in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005. * Data taken from Lamarre, A. L., and Taffet, M. J., Firing Table Gravel Cleanup at Lawrence Livermore National Laboratory Site 300, Appendix A, Table A-4.

Table A-8. Subsurface soil and rock analyses for thorium isotopes** (pCi/g) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.** Data taken from Lamarre, A. L., and Taffet, M. J., Firing Table Gravel Cleanup at Lawrence Livermore National Laboratory Site 300, Appendix A, Table A-4.

Table A-9. Subsurface soil and rock analyses for STLC metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-10. Subsurface soil and rock analyses for high explosives compounds (mg/kg) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-12. Ground and surface water analyses for total uranium and uranium isotopes (pCi/L) and 235U/238U atom ratio in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-13. Ground and surface water analyses for nitrogenous compounds (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-14. Ground and surface water analyses for perchlorate (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-15. Ground and surface water analyses for high explosive compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-16a. Ground and surface water analyses for metals and cations (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-17. Ground and surface water analyses for volatile organic compounds (μg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-19. Ground and surface water analyses for gross alpha and beta radioactivity (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

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Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
NC2-22	13-Feb-90	18.6	912.7	
NC2-22	6-Mar-90	19.3	912.8	
NC2-22	3-Apr-90	17.71	913.68	
NC2-22	4-May-90	17.87	913.52	
NC2-22	4-Jun-90	18.1	913.29	
NC2-22	2-Jul-90	18.21	913.18	
NC2-22	31-Jul-90	18.25	913.14	
NC2-22	6-Sep-90	18.36	913.03	
NC2-22	1-Oct-90	18.19	913.87	
NC2-22	5-Nov-90	18.52	913.54	
NC2-22	3-Dec-90	18.44	913.62	
NC2-22	3-Jan-91	18.34	913.05	
NC2-22	6-Feb-91	18.41	912.98	
NC2-22	5-Mar-91	18.44	912.95	
NC2-22	2-Apr-91	18.67	912.72	
NC2-22	2-May-91	18.83	912.56	
NC2-22	12-Jun-91	18.81	912.58	
NC2-22	9-Jul-91	18.89	912.5	
NC2-22	2-Aug-91	19.02	912.37	
NC2-22	12-Sep-91	19.12	912.27	
NC2-22	9-Oct-91	19.1	912.29	
NC2-22	6-Nov-91	18.99	912.4	
NC2-22	2-Dec-91	18.96	912.43	
NC2-22	7-Jan-92	18.76	912.63	
NC2-22	14-Apr-92	18.32	913.07	
NC2-22	6-Jul-92	18.72	912.67	
NC2-22	1-Oct-92	18.77	912.62	
NC2-22	6-Nov-92	18.82	912.57	
NC2-22	13-Jan-93	18.2	913.19	
NC2-22	21-Jan-93	18.07	913.32	
NC2-22	5-Feb-93	18.22	913.17	
NC2-22	16-Feb-93	18.15	913.24	
NC2-22	22-Feb-93	18.11	913.28	
NC2-22	14-Apr-93	18.15	913.24	
NC2-22	7-Jul-93	18.75	912.64	
NC2-22	12-Oct-93	18.76	912.63	
NC2-22	6-Jan-94	18.64	912.75	
NC2-22	6-Apr-94	18.79	912.6	
NC2-22	5-Jul-94	18.8	912.59	
NC2-22	17-Oct-94	18.87	912.52	
NC2-22	10-Jan-95	18.23	913.16	
NC2-22	20-Apr-95	18.44	912.95	
NC2-22	14-Jul-95	18.98	912.41	
NC2-22	2-Oct-95	18.97	912.42	
NC2-22	9-Jan-96	18.55	912.84	
NC2-22	5-Apr-96	18.29	913.1	
NC2-22	16-Jul-96	18.56	912.83	
NC2-22	9-Oct-96	18.54	912.85	
NC2-22	10-Jan-97	18.02	913.37	
NC2-22	10-Apr-97	18.05	913.34	
NC2-22	10-Jul-97	18.5	912.89	
NC2-22	10-Oct-97	18.29	913.1	
NC2-22	12-Jan-98	18.28	913.11	
NC2-22	6-Apr-98	17.9	913.49	
NC2-22	13-Jul-98	18.43	912.96	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
NC2-22	23-Oct-98	18.59	912.8	
NC2-22	5-Jan-99	18.33	913.06	
NC2-22	6-Apr-99	18.18	913.21	
NC2-22	23-Jul-99	18.29	913.1	
NC2-22	12-Oct-99	18.18	913.21	
NC2-22	20-Jan-00	18.03	913.36	
NC2-22	5-Apr-00	18.03	913.36	
NC2-22	6-Jul-00	18.68	912.71	
NC2-22	2-Oct-00	18.43	912.96	
NC2-22	3-Jan-01	18.33	913.06	
NC2-22	5-Apr-01	18.1	913.29	
NC2-22	16-Jul-01	18.53	912.86	
NC2-22	3-Oct-01	18.39	913.	
NC2-22	8-Jan-02	17.89	913.5	
NC2-22	15-Apr-02	18.19	913.2	
NC2-22	19-Jul-02	18.55	912.84	
NC2-22	3-Oct-02	18.37	913.02	
NC2-22	3-Jan-03	17.73	913.66	
NC2-22	12-Apr-03	18.03	913.36	
NC2-22	2-Jul-03	18.14	913.25	
NC2-22	9-Oct-03	18.15	913.24	
NC2-22	7-Jan-04	17.8	913.59	
NC2-22	7-Apr-04	18.	913.39	
NC2-22	12-Jul-04	18.01	913.38	
NC2-22	7-Oct-04	17.89	913.5	
NC2-22	11-Jan-05	17.77	913.62	
NC2-22	11-Feb-05	18.	913.39	
NC2-22	4-Mar-05	17.75	913.64	
NC2-23	13-Feb-90	12.9	918.3	
NC2-23	6-Mar-90	12.8	918.4	
NC2-23	3-Apr-90	14.15	917.05	
NC2-23	4-May-90	14.3	916.9	
NC2-23	4-Jun-90	14.3	916.9	
NC2-23	2-Jul-90	14.51	916.69	
NC2-23	31-Jul-90	14.64	916.56	
NC2-23	6-Sep-90	14.56	916.64	
NC2-23	1-Oct-90	14.53	916.67	
NC2-23	5-Nov-90	14.53	916.67	
NC2-23	3-Dec-90	14.59	916.61	
NC2-23	3-Jan-91	14.58	916.62	
NC2-23	6-Feb-91	14.58	916.62	
NC2-23	5-Mar-91	14.51	916.69	
NC2-23	2-Apr-91	14.65	916.55	
NC2-23	2-May-91	14.75	916.45	
NC2-23	12-Jun-91	14.83	916.37	
NC2-23	9-Jul-91	14.83	916.37	
NC2-23	2-Aug-91	14.91	916.29	
NC2-23	12-Sep-91	14.87	916.33	
NC2-23	9-Oct-91	14.85	916.35	
NC2-23	6-Nov-91	14.78	916.42	
NC2-23	2-Dec-91	14.76	916.44	
NC2-23	3-Feb-92	14.69	916.51	
NC2-23	2-Mar-92	14.52	916.68	
NC2-23	17-Mar-92	14.62	916.58	
NC2-23	27-Mar-92	14.62	916.58	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
NC2-23	14-Apr-92	14.71	916.49	
NC2-23	17-Apr-92	14.7	916.5	
NC2-23	5-May-92	14.79	916.41	
NC2-23	2-Jun-92	14.9	916.3	
NC2-23	6-Jul-92	14.9	916.3	
NC2-23	4-Aug-92	14.94	916.26	
NC2-23	1-Sep-92	14.89	916.31	
NC2-23	1-Oct-92	14.82	916.38	
NC2-23	6-Nov-92	14.73	916.47	
NC2-23	21-Jan-93	14.31	916.89	
NC2-23	24-Feb-93	14.37	916.83	
NC2-23	15-Mar-93	14.51	916.69	
NC2-23	14-Apr-93	14.6	916.6	
NC2-23	11-May-93	14.7	916.5	
NC2-23	15-Jun-93	14.9	916.3	
NC2-23	7-Jul-93	14.8	916.4	
NC2-23	10-Aug-93	14.83	916.37	
NC2-23	31-Aug-93	14.77	916.43	
NC2-23	12-Oct-93	14.7	916.5	
NC2-23	15-Nov-93	14.62	916.58	
NC2-23	1-Dec-93	14.65	916.55	
NC2-23	6-Jan-94	14.62	916.58	
NC2-23	2-Feb-94	14.65	916.55	
NC2-23	6-Apr-94	14.71	916.49	
NC2-23	5-Jul-94	14.77	916.43	
NC2-23	17-Oct-94	14.76	916.44	
NC2-23	10-Jan-95	14.42	916.78	
NC2-23	20-Apr-95	14.76	916.44	
NC2-23	14-Jul-95	15.12	916.08	
NC2-23	2-Oct-95	14.8	916.4	
NC2-23	9-Jan-96	14.74	916.46	
NC2-23	5-Apr-96	14.7	916.5	
NC2-23	16-Jul-96	14.9	916.3	
NC2-23	9-Oct-96	14.82	916.38	
NC2-23	10-Jan-97	14.57	916.63	
NC2-23	10-Apr-97	14.77	916.43	
NC2-23	10-Jul-97	14.91	916.29	
NC2-23	10-Oct-97	14.68	916.52	
NC2-23	12-Jan-98	14.63	916.57	
NC2-23	6-Apr-98	14.76	916.44	
NC2-23	13-Jul-98	15.14	916.06	
NC2-23	23-Oct-98	14.86	916.34	
NC2-23	5-Jan-99	14.82	916.38	
NC2-23	6-Apr-99	14.92	916.28	
NC2-23	23-Jul-99	14.92	916.28	
NC2-23	12-Oct-99	14.79	916.41	
NC2-23	20-Jan-00	14.61	916.59	
NC2-23	5-Apr-00	14.64	916.56	
NC2-23	6-Jul-00	14.89	916.31	
NC2-23	3-Oct-00	15.01	916.19	
NC2-23	3-Jan-01	14.88	916.32	
NC2-23	5-Apr-01	14.85	916.35	
NC2-23	16-Jul-01	14.98	916.22	
NC2-23	3-Oct-01	14.86	916.34	
NC2-23	8-Jan-02	14.59	916.61	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
NC2-23	15-Apr-02	14.85	916.35	
NC2-23	19-Jul-02	15.08	916.12	
NC2-23	3-Oct-02	14.75	916.45	
NC2-23	3-Jan-03	14.38	916.82	
NC2-23	12-Apr-03	14.65	916.55	
NC2-23	2-Jul-03	14.73	916.47	
NC2-23	9-Oct-03	14.67	916.53	
NC2-23	7-Jan-04	14.6	916.6	
NC2-23	7-Apr-04	14.68	916.52	
NC2-23	12-Jul-04	14.69	916.51	
NC2-23	7-Oct-04	14.67	916.53	
NC2-23	11-Jan-05	14.38	916.82	
NC2-23	11-Feb-05	14.55	916.65	
NC2-23	4-Mar-05	14.5	916.7	
W-812-01	6-Jul-00	36.94	959.45	CB
W-812-01	8-Aug-00	36.71	959.68	
W-812-01	5-Sep-00	36.78	959.61	
W-812-01	2-Oct-00	36.91	959.48	CB
W-812-01	1-Nov-00	36.87	959.52	CB
W-812-01	1-Dec-00	36.97	959.42	CB
W-812-01	3-Jan-01	36.91	959.48	CB
W-812-01	1-Feb-01	36.98	959.41	CB
W-812-01	5-Mar-01	36.92	959.47	CB
W-812-01	5-Apr-01	36.86	959.53	CB
W-812-01	2-May-01	37.	959.39	CB
W-812-01	1-Jun-01	36.83	959.56	CB
W-812-01	16-Jul-01	36.84	959.55	CB
W-812-01	2-Aug-01	37.03	959.36	CB
W-812-01	7-Sep-01	36.87	959.52	CB
W-812-01	3-Oct-01	36.84	959.55	CB
W-812-01	2-Nov-01	36.95	959.44	CB
W-812-01	6-Dec-01	37.02	959.37	CB
W-812-01	8-Jan-02	36.74	959.65	CB
W-812-01	7-Feb-02	36.84	959.55	CB
W-812-01	1-Mar-02	36.75	959.64	CB
W-812-01	8-Jun-02	36.97	959.42	CB
W-812-01	19-Jul-02	37.06	959.33	CB
W-812-01	7-Sep-02	36.93	959.46	CB
W-812-01	4-Oct-02	36.98	959.41	CB
W-812-01	3-Jan-03	36.71	959.68	CB
W-812-01	7-Feb-03	36.68	959.71	CB
W-812-01	1-Mar-03	36.97	959.42	CB
W-812-01	12-Apr-03	37.02	959.37	CB
W-812-01	11-Jul-03	37.24	959.15	CB
W-812-01	9-Oct-03	37.32	959.07	CB
W-812-01	20-Jan-04	37.12	959.27	CB
W-812-01	7-Apr-04	37.13	959.26	CB
W-812-01	12-Jul-04	37.19	959.2	CB
W-812-01	14-Jan-05	37.21	959.18	CB
W-812-01	11-Feb-05	37.12	959.27	CB
W-812-01	4-Mar-05	36.9	959.49	CB
W-812-02	6-Jul-00	40.93	957.75	
W-812-02	2-Aug-00	40.8	957.88	
W-812-02	5-Sep-00	40.76	957.92	
W-812-02	2-Oct-00	40.19	958.49	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
W-812-02	1-Nov-00	40.39	958.29	
W-812-02	1-Dec-00	40.42	958.26	
W-812-02	3-Jan-01	40.44	958.24	
W-812-02	1-Feb-01	40.43	958.25	
W-812-02	5-Mar-01	40.29	958.39	
W-812-02	5-Apr-01	40.42	958.26	
W-812-02	2-May-01	40.39	958.29	
W-812-02	1-Jun-01	40.25	958.43	
W-812-02	16-Jul-01	40.3	958.38	
W-812-02	2-Aug-01	40.33	958.35	
W-812-02	7-Sep-01	40.21	958.47	
W-812-02	3-Oct-01	40.29	958.39	
W-812-02	2-Nov-01	40.4	958.28	
W-812-02	6-Dec-01	40.44	958.24	
W-812-02	8-Jan-02	40.1	958.58	
W-812-02	7-Feb-02	40.23	958.45	
W-812-02	1-Mar-02	40.26	958.42	
W-812-02	15-Apr-02	40.32	958.36	
W-812-02	8-Jun-02	40.32	958.36	
W-812-02	19-Jul-02	40.35	958.33	
W-812-02	7-Sep-02	40.32	958.36	
W-812-02	4-Oct-02	40.38	958.3	
W-812-02	3-Jan-03	40.15	958.53	
W-812-02	7-Feb-03	40.1	958.58	
W-812-02	1-Mar-03	40.35	958.33	
W-812-02	12-Apr-03	40.46	958.22	
W-812-02	11-Jul-03	40.59	958.09	
W-812-02	9-Oct-03	40.48	958.2	
W-812-02	20-Jan-04	40.55	958.13	
W-812-02	7-Apr-04	40.45	958.23	
W-812-02	12-Jul-04	40.52	958.16	
W-812-02	14-Jan-05	40.55	958.13	RA
W-812-02	11-Feb-05	40.57	958.11	
W-812-02	4-Mar-05	40.3	958.38	
W-812-03	6-Jul-00	38.23	920.09	
W-812-03	2-Aug-00	38.2	920.12	
W-812-03	5-Sep-00	38.88	919.44	
W-812-03	3-Oct-00	36.03	922.29	
W-812-03	1-Nov-00	36.4	921.92	
W-812-03	1-Dec-00	36.22	922.1	
W-812-03	3-Jan-01	36.52	921.8	
W-812-03	1-Feb-01	36.25	922.07	
W-812-03	5-Mar-01	35.9	922.42	
W-812-03	5-Apr-01	36.02	922.3	
W-812-03	2-May-01	36.24	922.08	
W-812-03	1-Jun-01	36.34	921.98	
W-812-03	16-Jul-01	35.95	922.37	
W-812-03	2-Aug-01	36.67	921.65	
W-812-03	5-Sep-01	36.25	922.07	
W-812-03	3-Oct-01	36.47	921.85	
W-812-03	2-Nov-01	36.59	921.73	
W-812-03	6-Dec-01	36.78	921.54	
W-812-03	8-Jan-02	36.11	922.21	
W-812-03	7-Feb-02	36.11	922.21	
W-812-03	1-Mar-02	35.97	922.35	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
W-812-04	11-Feb-05	78.95	865.99	
W-812-04	4-Mar-05	78.2	866.74	
W-812-07	6-Jul-00	26.14	914.32	
W-812-07	2-Aug-00	25.3	915.16	
W-812-07	5-Sep-00	26.28	914.18	
W-812-07	3-Oct-00	24.19	916.27	
W-812-07	1-Nov-00	23.72	916.74	
W-812-07	1-Dec-00	23.08	917.38	
W-812-07	3-Jan-01	22.99	917.47	
W-812-07	1-Feb-01	22.91	917.55	
W-812-07	5-Mar-01	22.95	917.51	
W-812-07	5-Apr-01	22.93	917.53	
W-812-07	2-May-01	23.17	917.29	
W-812-07	1-Jun-01	23.32	917.14	
W-812-07	16-Jul-01	32.72	907.74	
W-812-07	2-Aug-01	29.27	911.19	
W-812-07	7-Sep-01	25.35	915.11	
W-812-07	3-Oct-01	24.28	916.18	
W-812-07	2-Nov-01	23.57	916.89	
W-812-07	6-Dec-01	23.72	916.74	
W-812-07	8-Jan-02	23.13	917.33	
W-812-07	7-Feb-02	22.93	917.53	
W-812-07	1-Mar-02	22.98	917.48	
W-812-07	15-Apr-02	23.51	916.95	
W-812-07	1-Jun-02	24.15	916.31	
W-812-07	19-Jul-02	25.	915.46	
W-812-07	7-Sep-02	26.75	913.71	
W-812-07	3-Oct-02	42.75	897.71	
W-812-07	3-Jan-03	25.85	914.61	
W-812-07	1-Feb-03	24.	916.46	
W-812-07	1-Mar-03	23.1	917.36	
W-812-07	12-Apr-03	22.82	917.64	
W-812-07	2-Jul-03	24.16	916.3	
W-812-07	9-Oct-03	25.51	914.95	
W-812-07	7-Jan-04	23.06	917.4	
W-812-07	15-Apr-04	24.1	916.36	
W-812-07	12-Jul-04	25.2	915.26	
W-812-07	7-Oct-04	25.46	915.	
W-812-07	14-Jan-05	23.31	917.15	
W-812-07	11-Feb-05	24.07	916.39	
W-812-07	4-Mar-05	22.6	917.86	
W-812-08	6-Jul-00	8.68	949.41	
W-812-08	2-Aug-00	8.13	949.96	
W-812-08	5-Sep-00	7.85	950.24	
W-812-08	3-Oct-00	8.96	949.13	
W-812-08	1-Nov-00	8.63	949.46	
W-812-08	1-Dec-00	8.81	949.28	
W-812-08	3-Jan-01	9.01	949.08	
W-812-08	1-Feb-01	8.94	949.15	
W-812-08	5-Mar-01	8.69	949.4	
W-812-08	5-Apr-01	9.5	948.59	
W-812-08	2-May-01	9.67	948.42	
W-812-08	1-Jun-01	10.16	947.93	
W-812-08	16-Jul-01	9.7	948.39	
W-812-08	2-Aug-01	9.39	948.7	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
W-812-08	7-Sep-01	9.12	948.97	
W-812-08	3-Oct-01	9.04	949.05	
W-812-08	2-Nov-01	9.01	949.08	
W-812-08	6-Dec-01	8.82	949.27	
W-812-08	8-Jan-02	6.59	951.49	
W-812-08	7-Feb-02	7.89	950.2	
W-812-08	1-Mar-02	8.43	949.66	
W-812-08	15-Apr-02	9.38	948.71	
W-812-08	1-Jun-02	9.88	948.21	
W-812-08	19-Jul-02	10.25	947.84	
W-812-08	7-Sep-02	10.13	947.96	
W-812-08	4-Oct-02	9.94	948.15	
W-812-08	3-Jan-03	4.11	953.98	
W-812-08	1-Feb-03	6.25	951.84	
W-812-08	1-Mar-03	7.67	950.42	
W-812-08	12-Apr-03	9.16	948.93	
W-812-08	11-Jul-03	9.75	948.34	
W-812-08	9-Oct-03	9.94	948.15	
W-812-08	6-Jan-04	8.49	949.6	
W-812-08	7-Apr-04	9.25	948.84	
W-812-08	12-Jul-04	10.19	947.9	
W-812-08	7-Oct-04	10.36	947.73	
W-812-08	14-Jan-05	7.68	950.41	
W-812-08	11-Feb-05	7.5	950.59	
W-812-08	4-Mar-05	4.45	953.64	
W-812-09	6-Jul-00	27.13	912.77	
W-812-09	2-Aug-00	26.79	913.11	
W-812-09	5-Sep-00	29.43	910.47	
W-812-09	3-Oct-00	27.16	912.74	
W-812-09	1-Nov-00	26.22	913.68	
W-812-09	1-Dec-00	25.45	914.45	
W-812-09	3-Jan-01	24.92	914.98	
W-812-09	1-Feb-01	24.67	915.23	
W-812-09	5-Mar-01	24.62	915.28	
W-812-09	5-Apr-01	24.57	915.33	
W-812-09	2-May-01	24.63	915.27	
W-812-09	1-Jun-01	25.31	914.59	
W-812-09	16-Jul-01	25.92	913.98	
W-812-09	2-Aug-01	26.67	913.23	
W-812-09	7-Sep-01	25.94	913.96	
W-812-09	3-Oct-01	25.52	914.38	
W-812-09	2-Nov-01	25.23	914.67	
W-812-09	6-Dec-01	24.93	914.97	
W-812-09	8-Jan-02	24.59	915.3	
W-812-09	7-Feb-02	24.44	915.46	
W-812-09	1-Mar-02	24.44	915.46	
W-812-09	15-Apr-02	24.82	915.08	
W-812-09	1-Jun-02	25.28	914.61	
W-812-09	19-Jul-02	26.45	913.45	
W-812-09	7-Sep-02	26.72	913.18	
W-812-09	3-Oct-02	29.49	910.41	
W-812-09	3-Jan-03	26.61	913.29	
W-812-09	1-Feb-03	25.37	914.53	
W-812-09	1-Mar-03	24.61	915.29	
W-812-09	12-Apr-03	24.33	915.57	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
W-812-09	2-Jul-03	25.92	913.98	
W-812-09	9-Oct-03	27.26	912.64	
W-812-09	7-Jan-04	25.42	914.48	
W-812-09	15-Apr-04	25.01	914.89	
W-812-09	12-Jul-04	26.39	913.51	
W-812-09	7-Oct-04	26.72	913.18	
W-812-09	14-Jan-05	25.46	914.44	
W-812-09	11-Feb-05	25.5	914.4	
W-812-09	4-Mar-05	24.62	915.28	
W-812-1920	9-Oct-03	20.04	889.91	
W-812-1920	9-Jan-04	19.25	890.7	
W-812-1920	7-Apr-04	19.41	890.54	
W-812-1920	12-Jul-04	20.24	889.71	
W-812-1920	7-Oct-04	21.12	888.83	
W-812-1920	11-Jan-05	20.26	889.69	
W-812-1920	11-Feb-05	19.05	890.9	
W-812-1920	4-Mar-05	18.32	891.63	
W-812-1921	9-Oct-03			DRY
W-812-1921	6-Jan-04	12.6	884.46	
W-812-1921	7-Apr-04			DRY
W-812-1921	12-Jul-04			DRY
W-812-1921	7-Oct-04			DRY
W-812-1921	14-Jan-05	14.1	882.96	
W-812-1921	11-Feb-05	14.46	882.6	
W-812-1921	4-Mar-05	12.73	884.33	
W-812-1922	9-Oct-03	31.62	861.73	
W-812-1922	6-Jan-04	22.97	870.37	
W-812-1922	7-Apr-04	23.71	869.63	
W-812-1922	12-Jul-04	28.67	864.67	
W-812-1922	7-Oct-04	30.91	862.43	
W-812-1922	14-Jan-05	23.96	869.38	
W-812-1922	11-Feb-05	24.57	868.77	
W-812-1922	4-Mar-05	23.56	869.78	
W-812-1923	9-Oct-03	48.38	897.97	
W-812-1923	6-Jan-04	47.95	898.4	
W-812-1923	7-Apr-04	46.93	899.42	
W-812-1923	12-Jul-04	47.79	898.55	
W-812-1923	7-Oct-04	48.36	897.98	
W-812-1923	14-Jan-05	40.08	906.26	
W-812-1923	11-Feb-05	47.2	899.14	
W-812-1923	4-Mar-05	47.1	899.24	
W-812-1924	11-Jul-03	111.37	851.19	
W-812-1924	9-Oct-03	108.66	853.9	
W-812-1924	6-Jan-04	75.81	886.75	
W-812-1924	7-Apr-04	111.11	851.45	
W-812-1924	12-Jul-04	109.21	853.35	
W-812-1924	7-Oct-04	108.58	853.98	
W-812-1924	14-Jan-05	108.47	854.09	
W-812-1924	11-Feb-05	108.3	854.26	
W-812-1924	4-Mar-05	108.27	854.29	
W-812-1925	9-Oct-03	13.82	946.93	
W-812-1925	6-Jan-04	13.41	947.34	
W-812-1925	7-Apr-04	13.75	947	
W-812-1925	12-Jul-04	13.99	946.76	
W-812-1925	7-Oct-04	14.02	946.73	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
W-812-1925	14-Jan-05	13.40	947.35	
W-812-1925	11-Feb-05	13.60	947.15	
W-812-1925	4-Mar-05	12.97	947.78	
W-812-1926	9-Oct-03	32.96	926.33	
W-812-1926	6-Jan-04	33.95	925.34	
W-812-1926	7-Apr-04	32.5	926.79	
W-812-1926	12-Jul-04	32.58	926.71	
W-812-1926	7-Oct-04	32.87	926.42	
W-812-1926	14-Jan-05	32.67	926.62	
W-812-1926	11-Feb-05	32.55	926.74	
W-812-1926	4-Mar-05	32.62	926.67	
W-812-1929	9-Oct-03	54.36	958.21	
W-812-1929	6-Jan-04	54.21	958.36	
W-812-1929	19-Apr-04	54.35	958.22	
W-812-1929	12-Jul-04	54.44	958.13	
W-812-1929	7-Oct-04	54.46	958.11	
W-812-1929	14-Jan-05	54.41	958.16	
W-812-1929	11-Feb-05	54.4	958.17	
W-812-1929	4-Mar-05	54.15	958.42	
W-812-1931	11-Jul-03			DRY
W-812-1931	11-Oct-03			DRY
W-812-1931	6-Jan-04			DRY
W-812-1931	7-Apr-04			DRY
W-812-1931	12-Jul-04			DRY
W-812-1931	7-Oct-04			DRY
W-812-1931	14-Jan-05			DRY
W-812-1931	11-Feb-05			DRY
W-812-1931	4-Mar-05			DRY
W-812-1932	11-Jul-03	8.11	953.74	
W-812-1932	9-Oct-03	8.19	953.66	
W-812-1932	6-Jan-04	6.89	954.96	
W-812-1932	7-Apr-04	7.43	954.42	
W-812-1932	12-Jul-04	8.7	953.15	
W-812-1932	7-Oct-04	8.7	953.15	
W-812-1932	14-Jan-05	5.59	956.26	
W-812-1932	11-Feb-05	6.	955.85	
W-812-1932	4-Mar-05	3.2	958.65	
W-812-1933	16-Jan-04	30.	931.32	
W-812-1933	7-Apr-04	33.13	928.19	
W-812-1933	12-Jul-04	30.9	930.42	
W-812-1933	7-Oct-04	31.02	930.3	
W-812-1933	14-Jan-05	30.24	931.08	
W-812-1933	11-Feb-05	30.1	931.22	
W-812-1933	4-Mar-05	29.9	931.42	
W-812-1937	9-Oct-03	28.99	931.97	
W-812-1937	6-Jan-04	27.39	933.57	
W-812-1937	7-Apr-04	29.73	931.23	
W-812-1937	12-Jul-04	28.35	932.61	
W-812-1937	7-Oct-04	28.52	932.44	
W-812-1937	14-Jan-05	28.21	932.75	
W-812-1937	11-Feb-05	27.5	933.46	
W-812-1937	4-Mar-05	27.45	933.51	
W-812-1939	9-Oct-03	48.24	908.63	
W-812-1939	7-Jan-04	42.9	867.73	
W-812-1939	7-Apr-04	49.	861.63	

Table A-1. Ground water elevations for monitor wells in the Building 812 study area measured between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	DEPTH TO WATER feet	ELEVATION feet	REPORT_NOTE*
W-812-1939	12-Jul-04	42.71	867.92	
W-812-1939	7-Oct-04	37.26	873.37	
W-812-1939	11-Jan-05	38.07	872.56	
W-812-1939	11-Feb-05	36.57	874.06	
W-812-1939	4-Mar-05	36.26	874.37	
W-812-2009	7-Oct-04	46.92	957.77	
W-812-2009	14-Jan-05	46.66	958.03	
W-812-2009	14-Feb-05	46.78	957.91	
W-812-2009	4-Mar-05	46.43	958.26	

*Report Notes:

CB	Installation completed as a christy box
DRY	Well dry at time of measurement
PS	Measurement taken just before sampling
RA	Restricted access

Table A-2. Surface soil analyses for total uranium and uranium isotopes (pCi/g) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Uranium Isotopes and Atom Ratios in Surface Soil
July 22, 2005

Table A-2. Surface soil analyses for total uranium and uranium isotopes (pCi/g) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

			Total Uranium pCi/g			Uranium 233+234 pCi/g			Uranium 235+236 pCi/g			Uranium 238 pCi/g			Uranium 235/238 (atom ratio)		
LOCATION	DEPTH feet	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
3SS-812-1900	0	10-Sep-03	15.8	± 0.4											0.00204	± 4.00E-05	
3SS-812-1901	0	10-Sep-03	0.505	± 0.012											0.00613	± 0.00014	
3SS-812-1902	0	10-Sep-03	87	± 2											0.0018	± 3.00E-05	
3SS-812-1903	0	10-Sep-03	63	± 2											0.00222	± 7.00E-05	
3SS-812-1904	0	10-Sep-03	73	± 2											0.00172	± 4.00E-05	
3SS-812-1905	0	10-Sep-03	8.9	± 0.2											0.00224	± 4.00E-05	
3SS-812-1906	0	10-Sep-03	67	± 3											0.00195	± 7.00E-05	
3SS-812-1907	0	10-Sep-03	9.9	± 0.2											0.00213	± 4.00E-05	
3SS-812-1908	0	10-Sep-03	24.3	± 0.4											0.00206	± 2.00E-05	
3SS-812-1909	0	10-Sep-03	1.76	± 0.07											0.00393	± 7.00E-05	
3SS-812-1910	0	10-Sep-03	0.97	± 0.07											0.00515	± 7.00E-05	
3SS-812-1911	0	10-Sep-03	0.72	± 0.02											0.00298	± 7.00E-05	
3SS-812-1912	0	10-Sep-03	19.9	± 0.6											0.00193	± 5.00E-05	
3SS-812-1913	0	10-Sep-03	7.43	± 0.12											0.00223	± 3.00E-05	
3SS-812-1914	0	10-Sep-03	4.41	± 0.14											0.00248	± 7.00E-05	
3SS-812-1915	0	10-Sep-03	19.4	± 0.4											0.00183	± 2.00E-05	
3SS-812-1916	0	10-Sep-03	11.4	± 0.3											0.00215	± 5.00E-05	
3SS-812-1917	0	10-Sep-03	4.3	± 0.2											0.00251	± 7.00E-05	
3SS-812-1918	0	10-Sep-03	3.02	± 0.1											0.0029	± 5.00E-05	
3SS-812-1919	0	10-Sep-03	16.3	± 0.4											0.00197	± 3.00E-05	
3SS-812-1920	0	10-Sep-03	4.9	± 0.2											0.00238	± 5.00E-05	
3SS-812-1921	0	10-Sep-03	25.7	± 0.7											0.00194	± 6.00E-05	
3SS-812-1922	0	10-Sep-03	5.3	± 0.2											0.00232	± 4.00E-05	
3SS-812-1923	0	10-Sep-03	2.28	± 0.11											0.00446	± 9.00E-05	
3SS-812-1924	0	10-Sep-03	1.92	± 0.03											0.00284	± 5.00E-05	
3SS-812-1925	0	10-Sep-03	6.78	± 0.13											0.00242	± 2.00E-05	
3SS-812-1926	0	10-Sep-03	0.58	± 0.01											0.00409	± 5.00E-05	
3SS-812-1927	0	10-Sep-03	17.1	± 0.4											0.00188	± 3.00E-05	
3SS-812-1928	0	10-Sep-03	6.4	± 0.2											0.00236	± 5.00E-05	
3SS-812-1929	0	10-Sep-03	18.3	± 0.4											0.00197	± 4.00E-05	
3SS-812-1930	0	10-Sep-03	7.3	± 0.2											0.00231	± 3.00E-05	
3SS-812-1931	0	10-Sep-03	12.8	± 0.4											0.00217	± 3.00E-05	
3SS-812-1932	0	10-Sep-03	34.1	± 0.6											0.00189	± 2.00E-05	
3SS-812-1933	0	10-Sep-03	7.3	± 0.2											0.0024	± 3.00E-05	
3SS-812-1934	0	10-Sep-03	17	± 0.5											0.002	± 3.00E-05	
3SS-812-1935	0	10-Sep-03	18.6	± 0.4											0.00229	± 2.00E-05	
3SS-812-1936	0	10-Sep-03	1.23	± 0.05											0.00362	± 0.00015	
3SS-812-1937	0	10-Sep-03	3.5	± 0.2											0.00325	± 4.00E-05	
3SS-812-1938	0	10-Sep-03	0.91	± 0.02											0.00484	± 8.00E-05	
3SS-812-1939	0	10-Sep-03	0.9	± 0.02											0.00645	± 0.00012	
3SS-812-1940	0	10-Sep-03	2.5	± 0.2											0.00592	± 0.00011	

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below the LLNL reporting limit, but above the analytical laboratory minimum detection limit.
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (fuel maybe gasoline, diesel, motor oil etc.).
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits.
J	Analyte was postively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

Table A-2. Surface soil analyses for total uranium and uranium isotopes (pCi/g) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Uranium 233 by mass measurement pCi/g			Uranium 234 by mass measurement pCi/g			Uranium 235 by mass measurement pCi/g			Uranium 236 by mass measurement pCi/g			Uranium 238 by mass measurement pCi/g		
RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
			2.04	± 0.17		0.177	± 0.005		0.073	± 0.0001		13.5	± 0.3	
			< 0.48	±	U	0.019	± 0.001		< 0.002	±	U	0.486	± 0.012	
			8.74	± 1.52		0.887	± 0.024		0.451	± 0.0008		77	± 2	
			9.12	± 1.08		0.755	± 0.036		0.26915	± 0.00083		53	± 2	
			7.25	± 1.2		0.713	± 0.025		0.384	± 0.001		65	± 2	
			1.41	± 0.14		0.107	± 0.003		0.03551	± 0.00014		7.38	± 0.13	
			8.4	± 1		0.72	± 0.044		0.327	± 0.002		57	± 3	
			1.27	± 0.15		0.117	± 0.003		0.04799	± 7.00E-05		8.51	± 0.14	
			3.1	± 0.3		0.277	± 0.004		0.1079	± 0.0003		20.9	± 0.2	
			0.52	± 0.07		0.03	± 0.001		< 0.007	± 0.00013	U	1.21	± 0.02	
			0.3	± 0.07		0.022	± 0		< 0.001	±	U	0.649	± 0.009	
			< 0.3	±	U	0.013	± 0		< 0.3	± 0.0004	U	0.7	± 0.02	
			2.5	± 0.3		0.212	± 0.008		0.0939	± 0.0004		17.1	± 0.5	
			1.04	± 0.08		0.09	± 0.002		0.03009	± 6.00E-05		6.27	± 0.09	
			0.7	± 0.08		0.058	± 0.002		0.01707	± 0.0001		3.63	± 0.11	
			1.9	± 0.3		0.202	± 0.003		0.10716	± 0.00013		17.2	± 0.2	
			1.63	± 0.1		0.133	± 0.005		0.04758	± 0.00014		9.6	± 0.3	
			0.7	± 0.11		0.056	± 0.002		0.01849	± 0.00013		3.5	± 0.11	
			0.61	± 0.09		0.044	± 0.001		0.01054	± 0.0001		2.36	± 0.04	
			1.9	± 0.3		0.178	± 0.004		0.0775	± 0.0002		14.1	± 0.2	
			0.8	± 0.2		0.06	± 0.002		0.02048	± 0.0001		3.93	± 0.09	
			3.1	± 0.3		0.278	± 0.011		0.134	± 0.0004		22.3	± 0.7	
			0.79	± 0.13		0.066	± 0.002		0.02146	± 9.00E-05		4.43	± 0.09	
			0.82	± 0.1		0.041	± 0.001		< 0.007	± 0.0003	U	1.42	± 0.03	
			< 0.7	±	U	0.034	± 0.001		0.0094	± 0.0003		1.88	± 0.03	
			1.09	± 0.11		0.087	± 0.001		0.02599	± 7.00E-05		5.57	± 0.08	
			< 0.5	±	U	0.015	± 0		< 0.002	±	U	0.56	± 0.01	
			1.92	± 0.13		0.179	± 0.005		0.08046	± 0.00014		14.9	± 0.3	
			1.01	± 0.13		0.08	± 0.002		0.02591	± 7.00E-05		5.24	± 0.11	
			2.31	± 0.14		0.199	± 0.006		0.08375	± 0.00013		15.7	± 0.3	
			1.1	± 0.2		0.091	± 0.002		0.03262	± 0.00019		6.11	± 0.12	
			1.8	± 0.3		0.151	± 0.004		0.05279	± 0.00014		10.8	± 0.2	
			4	± 0.5		0.359	± 0.005		0.1853	± 0.0004		29.6	± 0.3	
			1.14	± 0.15		0.094	± 0.002		0.02873	± 0.00011		6.07	± 0.09	
			2.1	± 0.3		0.189	± 0.006		0.0742	± 0.0002		14.7	± 0.4	
			2.8	± 0.3		0.228	± 0.005		0.07951	± 0.00014		15.5	± 0.3	
			< 0.07	±	U	0.028	± 0.002		< 0.007	±	U	1.2	± 0.05	
			0.8	± 0.2		0.055	± 0.001		0.0101	± 0.0006		2.63	± 0.04	
			< 0.7	±	U	0.028	± 0.001		< 0.003	±	U	0.88	± 0.02	
			< 0.9	±	U	0.036	± 0.001		< 0.003	±	U	0.87	± 0.02	
			1	± 0.2		0.057	± 0.002		< 0.003	±	U	1.49	± 0.04	

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Table A-3. Surface soil analyses for thorium isotopes (pCi/g) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Thorium Isotopes in Surface Soil
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Table A-3. Surface soil analyses for thorium isotopes (pCi/g) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

LOCATION	DEPTH feet	SAMPLED	Thorium 232 by mass measurement pCi/g RESULT		ERROR
3SS-812-1900	0	10-Sep-03	0.58	±	0.01
3SS-812-1901	0	10-Sep-03	0.92	±	0.01
3SS-812-1902	0	10-Sep-03	3.33	±	0.09
3SS-812-1903	0	10-Sep-03	0.54	±	0.02
3SS-812-1904	0	10-Sep-03	0.83	±	0.02
3SS-812-1905	0	10-Sep-03	0.593	±	0.008
3SS-812-1906	0	10-Sep-03	0.6	±	0.02
3SS-812-1907	0	10-Sep-03	0.552	±	0.011
3SS-812-1908	0	10-Sep-03	0.545	±	0.009
3SS-812-1909	0	10-Sep-03	0.569	±	0.008
3SS-812-1910	0	10-Sep-03	0.897	±	0.013
3SS-812-1911	0	10-Sep-03	0.188	±	0.003
3SS-812-1912	0	10-Sep-03	0.54	±	0.02
3SS-812-1913	0	10-Sep-03	0.41	±	0.005
3SS-812-1914	0	10-Sep-03	0.58	±	0.016
3SS-812-1915	0	10-Sep-03	0.47	±	0.009
3SS-812-1916	0	10-Sep-03	0.69	±	0.02
3SS-812-1917	0	10-Sep-03	0.471	±	0.011
3SS-812-1918	0	10-Sep-03	0.427	±	0.006
3SS-812-1919	0	10-Sep-03	0.515	±	0.006
3SS-812-1920	0	10-Sep-03	0.456	±	0.007
3SS-812-1921	0	10-Sep-03	0.542	±	0.013
3SS-812-1922	0	10-Sep-03	0.545	±	0.007
3SS-812-1923	0	10-Sep-03	0.546	±	0.009
3SS-812-1924	0	10-Sep-03	0.326	±	0.005
3SS-812-1925	0	10-Sep-03	0.66	±	0.008
3SS-812-1926	0	10-Sep-03	0.445	±	0.005
3SS-812-1927	0	10-Sep-03	0.505	±	0.007
3SS-812-1928	0	10-Sep-03	0.434	±	0.008
3SS-812-1929	0	10-Sep-03	0.772	±	0.013
3SS-812-1930	0	10-Sep-03	0.571	±	0.007
3SS-812-1931	0	10-Sep-03	0.526	±	0.006
3SS-812-1932	0	10-Sep-03	0.531	±	0.007
3SS-812-1933	0	10-Sep-03	0.619	±	0.009
3SS-812-1934	0	10-Sep-03	0.58	±	0.008
3SS-812-1935	0	10-Sep-03	0.622	±	0.007
3SS-812-1936	0	10-Sep-03	0.499	±	0.017
3SS-812-1937	0	10-Sep-03	0.874	±	0.01
3SS-812-1938	0	10-Sep-03	0.877	±	0.009
3SS-812-1939	0	10-Sep-03	0.895	±	0.013
3SS-812-1940	0	10-Sep-03	1.12	±	0.02

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Table A-4. Surface soil analyses for TTLC metals (mg/kg) in samples collected from the Building 812 study area between January 1, 1988 and March 30, 2005.

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Table A-4. Surface soil analyses for TTLC metals (mg/kg) in samples collected from the Building 812 study area between January 1, 1988 and March 30, 2005.

			Lead mg/kg		Mercury mg/kg		Nickel mg/kg		Selenium mg/kg		Silver mg/kg		Zinc mg/kg	
LOACTION	DEPTH feet	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
3SS-812-1900	0	10-Sep-03	40	D	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	48	D
3SS-812-1901	0	10-Sep-03	< 10	DU	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	29	D
3SS-812-1902	0	10-Sep-03	150	D	< 0.05	U	20	D	< 2.5	LDU	< 2.5	DU	62	D
3SS-812-1903	0	10-Sep-03	70	D	< 0.05	U	< 10	DU	< 2.5	LDU	< 2.5	DU	38	D
3SS-812-1904	0	10-Sep-03	150	D	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	52	D
3SS-812-1905	0	10-Sep-03	10	D	< 0.05	U	< 10	DU	< 2.5	LDU	< 2.5	DU	32	D
3SS-812-1906	0	10-Sep-03	80	D	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	56	D
3SS-812-1907	0	10-Sep-03	30	D	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	40	D
3SS-812-1908	0	10-Sep-03	30	D	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	40	D
3SS-812-1909	0	10-Sep-03	< 10	DU	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	32	D
3SS-812-1910	0	10-Sep-03	< 10	DU	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	30	D
3SS-812-1911	0	10-Sep-03	20	D	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	36	D
3SS-812-1912	0	10-Sep-03	< 10	DU	< 0.05	U	20	D	< 2.5	LDU	< 2.5	DU	33	D
3SS-812-1913	0	10-Sep-03	20	D	< 0.05	U	10	D	< 2.5	LDU	< 2.5	DU	200	D
3SS-812-1914	0	10-Sep-03	10	D	< 0.05	U	< 10	DU	< 2.5	LDU	< 2.5	DU	36	D
3SS-812-1915	0	10-Sep-03	10	D	< 0.05	U	< 10	DU	< 2.5	LDU	< 2.5	DU	32	D
3SS-812-1916	0	10-Sep-03	20	D	< 0.05	U	< 10	DU	< 2.5	LDU	< 2.5	DU	35	D
3SS-812-1917	0	10-Sep-03	< 10	DU	< 0.05	U	< 10	DU	< 2.5	LDU	< 2.5	DU	32	D
3SS-812-1918	0	10-Sep-03	10	D	< 0.05	U	20	D	< 2.5	LDU	< 2.5	DU	59	D
3SS-812-1919	0	10-Sep-03	80	D	< 0.05	U	540	D	< 2.5	LDU	< 2.5	DU	67	D
3SS-812-1920	0	10-Sep-03	10	D	< 0.05	U	< 10	DU	< 2.5	DU	< 2.5	DU	37	D
3SS-812-1921	0	10-Sep-03	80	D	< 0.05	U	20	D	< 2.5	DU	< 2.5	DU	46	D
3SS-812-1922	0	10-Sep-03	10	D	< 0.05	U	< 10	DU	< 2.5	DU	< 2.5	DU	35	D
3SS-812-1923	0	10-Sep-03	10	D	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	30	D
3SS-812-1924	0	10-Sep-03	50	D	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	120	D
3SS-812-1925	0	10-Sep-03	< 10	DU	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	41	D
3SS-812-1926	0	10-Sep-03	< 10	DU	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	48	D
3SS-812-1927	0	10-Sep-03	30	D	< 0.05	U	30	D	< 2.5	DU	< 2.5	DU	42	D
3SS-812-1928	0	10-Sep-03	10	D	< 0.05	U	< 10	DU	< 2.5	DU	< 2.5	DU	29	D
3SS-812-1929	0	10-Sep-03	20	D	< 0.05	U	10	D	< 2.5	DU			33	D
3SS-812-1930	0	10-Sep-03	10	D	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	34	D
3SS-812-1931	0	10-Sep-03	10	D	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	60	D
3SS-812-1932	0	10-Sep-03	100	D	0.13		10	D	< 2.5	DU	< 2.5	DU	36	D
3SS-812-1933	0	10-Sep-03	10	D	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	35	D
3SS-812-1934	0	10-Sep-03	10	D	< 0.05	U	< 10	DU	< 2.5	DU	< 2.5	DU	40	D
3SS-812-1935	0	10-Sep-03	20	D	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	36	D
3SS-812-1936	0	10-Sep-03	10	D	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	230	D
3SS-812-1937	0	10-Sep-03	10	D	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	63	D
3SS-812-1938	0	10-Sep-03	< 10	DU	< 0.05	U	10	D	< 2.5	DU	< 2.5	DU	42	D
3SS-812-1939	0	10-Sep-03	< 10	DU	< 0.05	U	< 10	DU	< 2.5	DU	< 2.5	DU	24	D
3SS-812-1940	0	10-Sep-03	< 10	LDU	< 0.05	U	10	LD	< 2.5	DLU	< 2.5	DLU	48	DL

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

Table A-4. Surface soil analyses for TTLC metals (mg/kg) in samples collected from the Building 812 study area between January 1, 1988 and March 30, 2005.

			Arsenic mg/kg		Barium mg/kg		Beryllium mg/kg		Cadmium mg/kg		Total Chromium mg/kg		Copper mg/kg	
LOACTION	DEPTH feet	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
3SS-812-1900	0	10-Sep-03	1.9	D	130	LD	3	D	< 1	DU	11	D	31	LD
3SS-812-1901	0	10-Sep-03	1.8	D	220	LD	0.7	D	< 1	DU	12	D	18	LD
3SS-812-1902	0	10-Sep-03	1.1	D	130	LD	8.4	D	< 1	DU	9	D	170	LD
3SS-812-1903	0	10-Sep-03	1.2	D	82	LD	3.5	D	< 1	DU	7	D	54	LD
3SS-812-1904	0	10-Sep-03	2.1	D	95	LD	2.5	D	< 1	DU	8	D	4100	LD
3SS-812-1905	0	10-Sep-03	1.3	D	76	LD	< 0.5	DU	< 1	DU	8	D	20	LD
3SS-812-1906	0	10-Sep-03	1.3	D	110	LD	2.2	D	< 1	DU	8	D	61	LD
3SS-812-1907	0	10-Sep-03	1.2	D	82	LD	0.6	D	< 1	DU	8	D	23	LD
3SS-812-1908	0	10-Sep-03	1.4	D	120	LD	0.5	D	< 1	DU	10	D	29	LD
3SS-812-1909	0	10-Sep-03	2.1	D	120	LD	< 0.5	DU	< 1	DU	8	D	16	LD
3SS-812-1910	0	10-Sep-03	1.5	D	210	LD	0.5	D	< 1	DU	12	D	21	LD
3SS-812-1911	0	10-Sep-03	1.1	D	86	LD	< 0.5	DU	< 1	DU	8	D	20	LD
3SS-812-1912	0	10-Sep-03	1.9	D	86	LD	< 0.5	DU	< 1	DU	20	D	54	LD
3SS-812-1913	0	10-Sep-03	2.4	D	79	LD	< 0.5	DU	< 1	DU	13	D	26	LD
3SS-812-1914	0	10-Sep-03	1.5	D	98	LD	< 0.5	DU	< 1	DU	8	D	16	LD
3SS-812-1915	0	10-Sep-03	1.3	D	85	LD	< 0.5	DU	< 1	DU	7	D	18	LD
3SS-812-1916	0	10-Sep-03	1.3	D	71	LD	< 0.5	DU	< 1	DU	7	D	23	LD
3SS-812-1917	0	10-Sep-03	1.1	D	81	LD	< 0.5	DU	< 1	DU	7	D	16	LD
3SS-812-1918	0	10-Sep-03	9.2	D	130	LD	< 0.5	DU	< 1	DU	60	D	53	LD
3SS-812-1919	0	10-Sep-03	3.5	D	170	LD	< 0.5	DU	< 1	DU	48	D	54	LD
3SS-812-1920	0	10-Sep-03	2.2	D	120	D	< 0.5	DU	< 1	DU	8	D	12	D
3SS-812-1921	0	10-Sep-03	1.7	D	78	D	2.3	D	< 1	DU	7	D	34	D
3SS-812-1922	0	10-Sep-03	1.3	D	93	D	< 0.5	DU	< 1	DU	15	D	26	D
3SS-812-1923	0	10-Sep-03	2.4	D	120	D	< 0.5	DU	< 1	DU	9	D	12	D
3SS-812-1924	0	10-Sep-03	3.6	D	82	D	< 0.5	DU	< 1	DU	8	D	20	D
3SS-812-1925	0	10-Sep-03	2.4	D	85	D	< 0.5	DU	< 1	DU	6	D	26	D
3SS-812-1926	0	10-Sep-03	1.9	D	59	D	< 0.5	DU	< 1	DU	9	D	24	D
3SS-812-1927	0	10-Sep-03	2.5	D	89	D	5.8	D	< 1	DU	17	D	33	D
3SS-812-1928	0	10-Sep-03	1.1	D	67	D	0.7	D	< 1	DU	5	D	15	D
3SS-812-1929	0	10-Sep-03	1.6	D	130	D	0.6	D	< 1	DU	7	D	19	D
3SS-812-1930	0	10-Sep-03	1.8	D	100	D	< 0.5	DU	< 1	DU	7	D	18	D
3SS-812-1931	0	10-Sep-03	2.2	D	110	D	< 0.5	DU	< 1	DU	6	D	21	D
3SS-812-1932	0	10-Sep-03	1.4	D	65	D	4	D	< 1	DU	7	D	110	D
3SS-812-1933	0	10-Sep-03	2.1	D	110	D	0.8	D	< 1	DU	8	D	19	D
3SS-812-1934	0	10-Sep-03	1.7	D	93	D	< 0.5	DU	< 1	DU	6	D	14	D
3SS-812-1935	0	10-Sep-03	2.1	D	120	D	0.5	D	< 1	DU	6	D	20	D
3SS-812-1936	0	10-Sep-03	3.3	D	66	D	< 0.5	DU	< 1	DU	6	D	21	D
3SS-812-1937	0	10-Sep-03	4.1	D	160	D	0.7	D	< 1	DU	11	D	23	D
3SS-812-1938	0	10-Sep-03	4.1	D	100	D	< 0.5	DU	< 1	DU	9	D	19	D
3SS-812-1939	0	10-Sep-03	2.2	D	78	D	< 0.5	DU	< 1	DU	8	D	12	D
3SS-812-1940	0	10-Sep-03	3.2	LD	83	LD	0.5	LD	< 1	LDU	13	LD	17	LD

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Table A-5. Surface soil analyses for STLC metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

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Table A-5. Surface soil analyses for STLC metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

			Antimony mg/L		Arsenic mg/L		Barium mg/L		Beryllium mg/L		Cadmium mg/L		Chromium mg/L		Cobalt mg/L		Copper mg/L	
LOCATION	DEPTH feet	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
3SS-812-1900	0	10-Sep-03	< 0.06	LU	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	1	
3SS-812-1901	0	10-Sep-03	< 0.1	DLU	0.06						< 0.05	U	< 0.5	U	0.7		< 0.5	U
3SS-812-1902	0	10-Sep-03	< 0.06	LU	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	4.2	
3SS-812-1903	0	10-Sep-03	< 0.06	LU	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	2.8	
3SS-812-1904	0	10-Sep-03	< 0.06	LU	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	7.7	
3SS-812-1905	0	10-Sep-03	< 0.1	DLU	0.06						< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1906	0	10-Sep-03	< 0.1	DLU	0.06						< 0.05	U	< 0.5	U	< 0.5	U	1.9	
3SS-812-1907	0	10-Sep-03	< 0.1	DLU	0.05						< 0.05	U	< 0.5	U	< 0.5	U	0.8	
3SS-812-1908	0	10-Sep-03	< 0.1	DLU	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1909	0	10-Sep-03	< 0.06	LU	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1910	0	10-Sep-03	< 0.1	DU	< 0.05	DU					< 0.05	DU	< 0.5	DU	0.7	D	< 0.5	DU
3SS-812-1911	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1912	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	3	
3SS-812-1913	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1914	0	10-Sep-03	< 0.1	DU	< 0.05	DU					< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1915	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1916	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	0.6	
3SS-812-1917	0	10-Sep-03	< 0.1	DU	< 0.05	DU					< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1918	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	1.5		< 0.5	U	0.9	
3SS-812-1919	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1920	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1921	0	10-Sep-03	< 0.06	U	< 0.05	U			0.09	L	< 0.05	U	< 0.5	U	< 0.5	U	1.6	
3SS-812-1922	0	10-Sep-03	< 0.1	DU	0.05	D			< 0.04	LDU	< 0.05	DU	< 0.5	DU	< 0.5	DU	1	D
3SS-812-1923	0	10-Sep-03	< 0.1	DU	0.07	D			< 0.04	LDU	< 0.05	DU	< 0.5	DU	0.7	D	< 0.5	DU
3SS-812-1924	0	10-Sep-03	< 0.06	U	0.08				< 0.04	LU	< 0.05	U	< 0.5	U	< 0.5	U	0.8	
3SS-812-1925	0	10-Sep-03	< 0.1	DU	< 0.05	DU			< 0.04	LDU	< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1926	0	10-Sep-03	< 0.1	DU	0.08	D			< 0.04	LDU	< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1927	0	10-Sep-03	< 0.06	U	< 0.05	U			0.17	L	< 0.05	U	< 0.5	U	< 0.5	U	1.5	
3SS-812-1928	0	10-Sep-03	< 0.06	U	< 0.05	U			0.05	L	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1929	0	10-Sep-03	< 0.1	DU	< 0.05	DU	7.3	D	< 0.04	DU	< 0.05	DU	< 0.5	DU	0.6	D	< 0.5	DU
3SS-812-1930	0	10-Sep-03	< 0.1	DU	< 0.05	DU					0.07	D	< 0.5	DU	< 0.5	DU	0.7	D
3SS-812-1931	0	10-Sep-03	< 0.1	DU	< 0.05	DU					< 0.05	DU	< 0.5	DU	0.5	D	< 0.5	DU
3SS-812-1932	0	10-Sep-03	< 0.06	U	< 0.05	U					< 0.05	U	< 0.5	U	< 0.5	U	1.6	
3SS-812-1933	0	10-Sep-03	< 0.1	DU	0.1	D	6	D			< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1934	0	10-Sep-03	< 0.1	DU	0.05	D	5.5	D			< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1935	0	10-Sep-03	< 0.1	DU	0.06	D	6.2	D			< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1936	0	10-Sep-03	< 0.06	U	0.1		2.7				< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1937	0	10-Sep-03	< 0.1	DU	0.12	D	7.1	D			< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1938	0	10-Sep-03	< 0.06	U	0.11		3.4				< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
3SS-812-1939	0	10-Sep-03	< 0.1	DU	0.1	D	4.2	D			< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
3SS-812-1940	0	10-Sep-03	< 0.1	DU	0.11	D	4.7	D			< 0.05	DU	< 0.5	DU	< 0.5	DU	< 0.5	DU
W-812-01	0	11-Apr-00	< 0.06	LU	< 0.1	U	5.5	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	0	21-Mar-00	< 0.06	U	< 0.05	U	5.7	L	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	1.1	

*QC FLA(DEFINITION

B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

Table A-5. Surface soil analyses for STLC metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

			Lead mg/L		Mercury mg/L		Molybdenum mg/L		Nickel mg/L		Selenium mg/L		Silver mg/L		Thallium mg/L		Vanadium mg/L		Zinc mg/L	
LOCATION	DEPTH feet	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
3SS-812-1900	0	10-Sep-03	0.9	L	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.02	LU	< 0.5	U	0.8	
3SS-812-1901	0	10-Sep-03	< 0.5	LU	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.1	LDU	1.3		< 0.5	U
3SS-812-1902	0	10-Sep-03	5.9	L	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.02	LU	< 0.5	U	1.1	
3SS-812-1903	0	10-Sep-03	2.5	L	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.02	LU	< 0.5	U	< 0.5	U
3SS-812-1904	0	10-Sep-03	6.2	L	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.02	LU	< 0.5	U	1.9	
3SS-812-1905	0	10-Sep-03	< 0.5	LU	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.1	LDU	< 0.5	U	< 0.5	U
3SS-812-1906	0	10-Sep-03	3.3	L	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.1	LDU	< 0.5	U	1	
3SS-812-1907	0	10-Sep-03	1.6	L	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.1	LDU	< 0.5	U	< 0.5	U
3SS-812-1908	0	10-Sep-03	0.7	L	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.1	LDU	0.6		0.6	
3SS-812-1909	0	10-Sep-03	< 0.5	LU	< 0.005	DU	< 0.5	U	< 0.5	U					< 0.02	LU	< 0.5	U	< 0.5	U
3SS-812-1910	0	10-Sep-03	< 0.5	DU	< 0.005	DU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	1.2	D	1	D
3SS-812-1911	0	10-Sep-03	< 0.5	U	< 0.005	DU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
3SS-812-1912	0	10-Sep-03	< 0.5	U	< 0.005	DU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	0.5	
3SS-812-1913	0	10-Sep-03	< 0.5	U	< 0.005	DU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	7.2	
3SS-812-1914	0	10-Sep-03	< 0.5	DU	< 0.005	DU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	< 0.5	DU	0.5	D
3SS-812-1915	0	10-Sep-03	< 0.5	U	< 0.005	DU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
3SS-812-1916	0	10-Sep-03	< 0.5	U	< 0.005	DU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
3SS-812-1917	0	10-Sep-03	< 0.5	DU	< 0.005	DU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	< 0.5	DU	< 0.5	DU
3SS-812-1918	0	10-Sep-03	< 0.5	U	< 0.005	DU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	2	
3SS-812-1919	0	10-Sep-03	0.7		< 0.005	DU	< 0.5	U	7.8				< 0.5	U	< 0.02	U	< 0.5	U	1	
3SS-812-1920	0	10-Sep-03	< 0.5	U	< 0.005	DU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
3SS-812-1921	0	10-Sep-03	3.2		< 0.005	DU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	0.8	
3SS-812-1922	0	10-Sep-03	< 0.5	DU	< 0.005	DU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	0.5	D	0.7	D
3SS-812-1923	0	10-Sep-03	< 0.5	DU	< 0.005	DU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	0.6	D	< 0.5	DU
3SS-812-1924	0	10-Sep-03	0.6		< 0.005	LDU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	4.8	
3SS-812-1925	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	< 0.5	DU	< 0.5	DU
3SS-812-1926	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	< 0.5	DU	< 0.5	DU
3SS-812-1927	0	10-Sep-03	< 0.5	U	< 0.005	LDU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	0.9	
3SS-812-1928	0	10-Sep-03	< 0.5	U	< 0.005	LDU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
3SS-812-1929	0	10-Sep-03	< 0.5	DHU	< 0.005	DU	< 0.5	DU	< 0.5	DU	< 0.1	DU	< 0.5	DU	< 0.1	DU	0.7	D	< 0.5	DU
3SS-812-1930	0	10-Sep-03	0.8	D	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	< 0.5	DU	0.5	D
3SS-812-1931	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	< 0.5	DU	1.2	D
3SS-812-1932	0	10-Sep-03	8		< 0.005	LDU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	0.9	
3SS-812-1933	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	0.8	D	< 0.5	DU
3SS-812-1934	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	< 0.5	DU	< 0.5	DU
3SS-812-1935	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	< 0.5	DU	< 0.5	DU
3SS-812-1936	0	10-Sep-03	0.6		< 0.005	LDU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	< 0.5	U	16	D
3SS-812-1937	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	1.7	D	1	D
3SS-812-1938	0	10-Sep-03	< 0.5	U	< 0.005	LDU	< 0.5	U	< 0.5	U			< 0.5	U	< 0.02	U	0.8		0.8	
3SS-812-1939	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	0.6	D	< 0.5	DU
3SS-812-1940	0	10-Sep-03	< 0.5	DU	< 0.005	LDU	< 0.5	DU	< 0.5	DU			< 0.5	DU	< 0.1	DU	0.8	D	1.9	D
W-812-01	0	11-Apr-00	< 1	U	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	0.5		< 0.5	U
W-812-02	0	21-Mar-00	3.7	L	< 0.005	U	< 0.5	U	< 0.5	U	0.05	B	< 0.5	U	< 0.02	LU	< 0.5	U	2.6	

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Table A-6b. Subsurface soil and rock analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1989 and March 31, 2005.

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Table A-6a. Subsurface soil and rock analyses for tritium (pCi/L) and percent moisture in samples collected from the Building 812 study area between January 1, 1988 and December 31, 1988.

Borehole	Depth	Tritium pCi/L	% Moisture by weight
812-01	4.8	<1.7E+02	9
	5	<6.6E+02	7
	23.8	<2.0E+02	5
812-02	3.9	1.97E+02	14
	23.8	3.79E+02	5
812-03	3.8	<1.7E+02	5
	5	<6.0E+02	13
	22.8	3.09E+02	5

Table A-6b. Subsurface soil and rock analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1989 and March 30, 2005.

			Tritium (pCi/L)			Tritium (pCi/g)			Moisture by Weight (percent)	
LOCATION	DEPTH feet	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	QC FLAG*
W-812-01	9	11-Apr-00				< 0.0271	± 0.0208	U	13.89	
W-812-01	9	11-Apr-00	< 168	± 129	U					
W-812-01	10.5	11-Apr-00				< 0.0133	± 0.0107	U	7.33	
W-812-01	10.5	11-Apr-00	< 168	± 135	U					
W-812-01	14.7	11-Apr-00				< 0.0615	± 0.045	U	26.8	
W-812-01	14.7	11-Apr-00	< 168	± 123	U					
W-812-01	20	12-Apr-00				< 0.00645	± 0.00488	U	2.27	
W-812-01	20	12-Apr-00	< 277	± 210	U					
W-812-01	25	12-Apr-00				< 0.0153	± 0.0118	U	5.24	
W-812-01	25	12-Apr-00	< 276	± 213	U					
W-812-01	30	12-Apr-00				< 0.0109	± 0.00836	U	3.85	
W-812-01	30	12-Apr-00	< 271	± 209	U					
W-812-01	35	12-Apr-00				< 0.00548	± 0.0045	U	0.93	
W-812-01	35	12-Apr-00	< 583	± 479	U					
W-812-01	40	12-Apr-00				< 0.00484	± 0.00372	U	1.34	
W-812-01	40	12-Apr-00	< 356	± 274	U					
W-812-01	45	12-Apr-00				< 0.0707	± 0.0523	U	20.71	
W-812-01	45	12-Apr-00	< 271	± 200	U					
W-812-01	47.4	12-Apr-00				< 0.0433	± 0.0321	U	15.29	
W-812-01	47.4	12-Apr-00	< 240	± 178	U					
W-812-01	51.2	12-Apr-00				< 0.0472	± 0.0394	U	16.6	
W-812-01	51.2	12-Apr-00	< 237	± 198	U					
W-812-01	51.2	12-Apr-00	< 253	± 150	U					
W-812-01	55.2	12-Apr-00				< 0.0471	± 0.0313	U	22.04	
W-812-01	55.2	12-Apr-00	< 167	± 111	U					
W-812-01	56	13-Apr-00				< 0.0353	± 0.0282	U	12.99	
W-812-01	56	13-Apr-00	< 236	± 189	U					
W-812-01	60.5	13-Apr-00				< 0.055	± 0.0443	U	18.66	
W-812-01	60.5	13-Apr-00	< 240	± 193	U					
W-812-01	63.5	13-Apr-00				< 0.0523	± 0.0431	U	18.12	
W-812-01	63.5	13-Apr-00	< 236	± 194	U					
W-812-02	5.3	21-Mar-00				< 0.0199	± 0.0163	U	7.66	
W-812-02	5.3	21-Mar-00	< 240	± 197	U					
W-812-02	10.3	21-Mar-00				< 0.0402	± 0.0289	U	14.36	
W-812-02	10.3	21-Mar-00	< 239	± 172	U					
W-812-02	15	21-Mar-00				< 0.0118	± 0.00924	U	4.7	
W-812-02	15	21-Mar-00	< 239	± 187	U					
W-812-02	25	21-Mar-00				< 0.0074	± 0.00544	U	2.93	
W-812-02	25	21-Mar-00	< 245	± 180	U					
W-812-02	35	21-Mar-00				< 0.00777	± 0.00654	U	3.15	
W-812-02	35	21-Mar-00	< 239	± 201	U					
W-812-02	42.5	21-Mar-00				< 0.051	± 0.0396	U	17.33	
W-812-02	42.5	21-Mar-00	< 243	± 189	U					
W-812-02	46.7	22-Mar-00	< 270	± 160	U					
W-812-02	47.1	22-Mar-00				< 0.044	± 0.0337	U	15.22	
W-812-02	47.1	22-Mar-00	< 245	± 188	U					
W-812-02	51.6	22-Mar-00				< 0.0467	± 0.0325	U	16	
W-812-02	51.6	22-Mar-00	< 245	± 171	U					
W-812-02	55.1	22-Mar-00				< 0.0569	± 0.043	U	19.44	
W-812-02	55.1	22-Mar-00	< 236	± 178	U					
W-812-03	10	16-Mar-00				< 0.0498	± 0.0399	U	17.39	
W-812-03	10	16-Mar-00	< 237	± 190	U					
W-812-03	15	16-Mar-00				0.0817	± 0.0577		21.3	
W-812-03	15	16-Mar-00	302	± 213						
W-812-03	25	20-Mar-00				< 0.0478	± 0.0358	U	16.83	
W-812-03	25	20-Mar-00	< 236	± 177	U					
W-812-03	35	20-Mar-00				< 0.0563	± 0.0469	U	19.12	
W-812-03	35	20-Mar-00	< 238	± 198	U					
W-812-03	45	20-Mar-00				< 0.058	± 0.0481	U	19.59	
W-812-03	45	20-Mar-00	< 238	± 197	U					
W-812-03	48	20-Mar-00				< 0.0504	± 0.0382	U	17.36	

Table A-6b. Subsurface soil and rock analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1989 and March 30, 2005.

			Tritium (pCi/L)			Tritium (pCi/g)			Moisture by Weight (percent)	
LOCATION	DEPTH feet	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	QC FLAG*
W-812-03	48	20-Mar-00	< 240	± 182	U					
W-812-03	53	21-Mar-00				< 0.0635	± 0.0496	U	21.06	
W-812-03	53	21-Mar-00	< 238	± 186	U					
W-812-03	58	21-Mar-00				< 0.0577	± 0.0423	U	19.4	
W-812-03	58	21-Mar-00	< 240	± 176	U					
W-812-03	61.5	21-Mar-00				< 0.0568	± 0.0395	U	19.19	
W-812-03	61.5	21-Mar-00	< 239	± 166	U					
W-812-03	62	21-Mar-00	< 223	± 130	U					
W-812-04	5	30-Mar-00				< 0.0449	± 0.0302	U	21.13	
W-812-04	5	30-Mar-00	< 167	± 113	U					
W-812-04	10	30-Mar-00				< 0.0413	± 0.0283	U	19.74	
W-812-04	10	30-Mar-00	< 168	± 115	U					
W-812-04	16	30-Mar-00				< 0.0585	± 0.0432	U	25.84	
W-812-04	16	30-Mar-00	< 168	± 124	U					
W-812-04	45	3-Apr-00				< 0.0456	± 0.0326	U	2.142	
W-812-04	45	3-Apr-00	< 167	± 120	U					
W-812-04	76	3-Apr-00				< 0.0493	± 0.0397	U	2.285	
W-812-04	76	3-Apr-00	< 166	± 134	U					
W-812-04	80	4-Apr-00				< 0.0401	± 0.0331	U	19.35	
W-812-04	80	4-Apr-00	< 167	± 138	U					
W-812-04	85	4-Apr-00				< 0.0354	± 0.0255	U	17.5	
W-812-04	85	4-Apr-00	< 167	± 120	U					
W-812-04	125	6-Apr-00				< 0.0299	± 0.0211	U	14.93	
W-812-04	125	6-Apr-00	< 170	± 120	U					
W-812-07	1	30-Mar-00				< 0.0315	± 0.0231	U	15.87	
W-812-07	1	30-Mar-00	< 167	± 122	U					
W-812-07	6	30-Mar-00				< 0.034	± 0.0265	U	16.39	
W-812-07	6	30-Mar-00	< 173	± 135	U					
W-812-07	15.3	30-Mar-00				< 0.0376	± 0.0249	U	18.37	
W-812-07	15.3	30-Mar-00	< 167	± 111	U					
W-812-07	41.1	3-Apr-00				< 0.0349	± 0.0216	U	17.22	
W-812-07	41.1	3-Apr-00	< 168	± 104	U					
W-812-07	41.1	3-Apr-00	< 240	± 140	U					
W-812-07	45.2	3-Apr-00				< 0.0338	± 0.0288	U	16.86	
W-812-07	45.2	3-Apr-00	< 167	± 142	U					

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

Table A-7. Subsurface soil and rock analyses for uranium isotopes (pCi/g) in samples collected from the Building 812 study area between January 1, 1988 and March 30, 2005.

Borehole	Depth	Uranium 235 pCi/g	Error %	Uranium 238 pCi/g	Error %
812-01	5	110[a]	NA	22630.000	1
	5	0.12	12	3.135	11
812-02	4	0.175	8	9.896	5
	9	0.096	10	1.885	13
812-03	4	0.253	6	19.580	4
	5	0.085	17	3.150	21
	9	0.147	6	5.462	4

Notes: [a] This is an approximate value for ^{235}U due to the high activity of ^{238}U in the sample.
NA = Error not reported.

Table A-8. Subsurface soil and rock analyses for thorium and radium isotopes (pCi/g) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

Borehole	Depth	Thorium 228 pCi/g	Error %	Radium 226 pCi/g	Error %	Radium 228 pCi/g	Error %
812-01	5	0.890	50	10.37	8	1.256	45
	5	0.766	2	1.058	2	0.795	4
812-02	4	0.718	4	0.837	2	0.728	4
	9	0.782	2	0.945	2	0.706	3
812-03	4	0.688	4	0.507	4	0.714	5
	5	0.800	3	0.72	3	0.779	4
	9	0.701	2	0.949	2	0.672	4

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Table A-9. Subsurface soil and rock analyses for STLC metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

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Table A-9. Subsurface soil and rock analyses for STLC metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

			Antimony mg/L		Arsenic mg/L		Barium mg/L		Beryllium mg/L		Cadmium mg/L		Chromium mg/L		Cobalt mg/L		Copper mg/L		Lead mg/L	
LOCATION	DEPTH feet	SAMPLED	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *
812-01	4	30-Aug-88			< 0.02	P	0.23	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-01	5	30-Aug-88			< 0.02	P	0.08	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-01	5	30-Aug-88			< 0.02	P	0.47	P	< 0.05	P	< 0.04	P	0.06	P					< 0.3	P
812-01	9	30-Aug-88			< 0.02	P	0.05	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-01	9.3	30-Aug-88	0.1	P	< 0.02	P	1.7	P	0.26	P	< 0.01	P	0.02	P	0.11	P	10	P	2.5	P
812-01	13	30-Aug-88			< 0.02	P	< 0.05	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-01	13.3	30-Aug-88	< 0.1	P	0.04	P	1.6	P	< 0.01	P	< 0.01	P	0.03	P.	0.13	P	3.6	P	< 0.1	P
812-01	18	30-Aug-88			< 0.02	P	< 0.05	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-01	18.2	30-Aug-88	< 0.1	P	0.05	P	3	P	< 0.01	P	< 0.01	P	0.05	P	0.29	P	1	P	< 0.1	P
812-01	23	30-Aug-88			< 0.02	P	< 0.05	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-01	23.3	30-Aug-88	< 0.1	P	0.06	P	2.4	P	< 0.01	P	< 0.01	P	0.09	P	0.16	P	25	P	19	P
812-01	23.3	30-Aug-88	< 0.1	P	0.04	P	1.9	P	< 0.01	P	< 0.01	P	0.07	P	< 0.05	P	3	P	0.8	P
812-02	3.3	31-Aug-88	< 0.1	P	< 0.02	P	3.9	P	< 0.01	P	< 0.01	P	< 0.02	P	0.22	P	0.27	P	0.4	P
812-02	5	31-Aug-88			< 0.02	P	0.7	P	< 0.05	P	< 0.04	P	< 0.05	P					< 0.3	P
812-02	8	31-Aug-88			< 0.02	P	0.06	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-02	8.3	31-Aug-88	0.1	P	< 0.02	P	4	P	0.18	P	< 0.01	P	< 0.02	P	0.2	P	0.31	P	0.4	P
812-02	13	31-Aug-88			< 0.02	P	0.09	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-02	13.3	31-Aug-88	< 0.1	P	< 0.02	P	3.3	P	0.18	P	< 0.01	P	< 0.02	P	0.18	P	2.9	P	0.4	P
812-02	18	31-Aug-88			< 0.02	P	0.08	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-02	18.3	31-Aug-88	0.1	P	0.03	P	4.5	P	< 0.01	P	< 0.01	P	0.09	P	0.24	P	0.82	P	< 0.1	P
812-02	23	31-Aug-88			< 0.02	P	0.09	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-02	23.3	31-Aug-88	0.1	P	0.03	P	3.4	P	< 0.01	P	0.02	P	0.05	P	0.16	P	0.79	P	< 0.1	P
812-03	8	31-Aug-88			< 0.02	P	0.19	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-03	8.3	31-Aug-88	0.1	P	< 0.02	P	3	P	< 0.01	P	< 0.01	P	0.03	P	0.2	P	0.4	P	< 0.1	P
812-03	13	31-Aug-88			< 0.02	P	0.09	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-03	13.3	31-Aug-88	< 0.1	P	< 0.02	P	4.5	P	0.2	P	< 0.01	P	< 0.02	P	0.25	P	2.7	P	14	P
812-03	18	31-Aug-88			< 0.02	P	0.07	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-03	18.3	31-Aug-88	< 0.1	P	0.06	P	3.3	P	< 0.01	P	< 0.01	P	< 0.02	P	0.16	P	4.9	P	0.4	P
812-03	22	31-Aug-88			< 0.02	P	0.05	P	< 0.01	P	< 0.04	P	< 0.05	P					< 0.3	P
812-03	22.3	31-Aug-88	< 0.1	P	0.02	P	3.4	P	< 0.01	P	< 0.01	P	< 0.02	P'	0.11	P	1.1	P	< 0.1	P
W-812-1926	5.5	10-Apr-03	< 0.06	U	0.29		10		< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	0.62		< 0.5	U
W-812-1926	40.4	10-Apr-03	< 0.6	U	< 0.5	U	1.7		< 0.4	U	< 0.5	U	1.1		< 0.5	U	< 0.5	U	< 0.5	U
W-812-1926	41.2	10-Apr-03	< 0.6	U	< 0.5	UE	1.1		< 0.4	U	< 0.5	U	2.2		< 0.5	U	< 0.5	U	< 0.5	U
D-812C-02	1.5	27-Jun-89	< 0.06	P			9	P	< 0.01	P	< 0.04	P	0.13	P	0.66	P	0.1	P	< 0.3	P
D-812C-02	1.5	27-Jun-89			< 0.02	P														
W-812-01	10	11-Apr-00	< 0.06	LU	< 0.1	U	1.8	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-01	15.3	11-Apr-00	< 0.06	LU	< 0.1	U	1	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-01	45.6	12-Apr-00	< 0.06	LU	< 0.1	U	0.8	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-01	47.7	12-Apr-00	< 0.06	LU	0.1		0.7	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-01	51.8	12-Apr-00	< 0.06	U	0.06		1.2		< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	51.8	12-Apr-00	< 0.06	LU	< 0.1	U	0.6	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-01	56.6	13-Apr-00	< 0.06	LU	< 0.1	U	0.6	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-01	61.1	13-Apr-00	< 0.06	LU	< 0.1	U	0.9	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-01	64.1	13-Apr-00	< 0.06	LU	< 0.1	U	0.6	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-02	5.9	21-Mar-00	< 0.06	U	0.06		1	L	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-02	43.1	21-Mar-00	< 0.06	U	0.09		1.2	L	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-02	48	22-Mar-00	< 0.06	U	0.07		< 0.5	LU	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-02	48	22-Mar-00	< 0.06	U	< 0.05	U	0.68		< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	52.2	22-Mar-00	< 0.06	U	0.12		< 0.5	LU	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-02	55.7	22-Mar-00	< 0.06	U	0.08		0.8	L	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	5	16-Mar-00	< 0.06	U	0.1		2.4	L	< 0.04	U	< 0.05	LU	< 0.5	U	0.7		< 0.5	U	< 0.5	LU
W-812-03	10	16-Mar-00	< 0.06	U	0.08		2.6	L	< 0.04	U	< 0.05	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	15	16-Mar-00	< 0.06	U	0.08		1.3	L	< 0.04	U	< 0.05	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	25	20-Mar-00	< 0.06	U	0.21		2	L	< 0.04	U	< 0.05	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	35	20-Mar-00	< 0.06	U	0.06		1.7	L	< 0.04	U	< 0.05	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	45	20-Mar-00	< 0.06	U	0.14		1.1	L	< 0.04	U	< 0.05	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	48	20-Mar-00	< 0.06	U	0.12		1.2	L	< 0.04	U	< 0.05	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	53	21-Mar-00	< 0.06	U	0.79		5.4	L	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	58	21-Mar-00	< 0.06	U	0.11		1	L	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-03	61.5	21-Mar-00	< 0.06	U	1.1	D	2.8		< 0.04	LU	< 0.05	U	< 0.5	U	1.1		< 0.5	U	< 0.5	U
W-812-03	61.5	21-Mar-00	< 0.06	U	0.09		0.8	L	< 0.04	LU	< 0.05	LU	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-04	5	30-Mar-00	< 0.06	U	0.18		13	L	< 0.04	LU	< 0.05	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU
W-812-07	1.6	30-Mar-00	< 0.06	LU	0.2		3.6	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-07	6.6	30-Mar-00	< 0.06	LU	< 0.1	U	2.3	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-07	15.9	30-Mar-00	< 0.06	LU	< 0.1	U	0.9	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-07	40.6	3-Apr-00	< 0.06	U	< 0.05	U	1.8		< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	40.6	3-Apr-00	< 0.06	LU	< 0.1	U	1.5	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-07	45	3-Apr-00	< 0.06	LU	< 0.1	U	0.8	L	< 0.04	U	< 0.05	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U

*QCFLAG DEFINITION

- B Analyte found in method blank
- D Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
- E The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
- F Analyte found in field blank, trip blank, or equipment blank
- G Quantitated using fuel calibration, but does not match-typical fuel fingerprint (gasoline, diesel, motor oil etc.)
- H Sample analyzed outside of holding time, sample results should be evaluated
- I Surrogate recoveries outside of QC limits
- J Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
- L Spike accuracy not within control limits
- O Duplicate spike or sample precision not within control limits
- P Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
- R Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
- S Analytical results for this sample are suspect
- T Analyte is tentatively identified compound; result is approximate
- U Compound was analyzed for, but not detected above detection limit

Table A-9. Subsurface soil and rock analyses for STLC metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

			Mercury mg/L		Molybdenum mg/L		Nickel mg/L		Selenium mg/L		Silver mg/L		Thallium mg/L		Vanadium mg/L		Zinc mg/L	
LOCATION	DEPTH feet	SAMPLED	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	FLAG	RESULT	QC FLAG *
812-01	4	30-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-01	5	30-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-01	5	30-Aug-88	< 0.0002	P					< 0.01	P	0.02	P						
812-01	9	30-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-01	9.3	30-Aug-88	< 0.001	P	< 0.1	P	< 0.05	P	< 0.01	P	< 0.01	P	< 0.1	P	< 0.2	P	1.6	P
812-01	13	30-Aug-88	< 0.0002	P					< 0.01	P	0.02	P						
812-01	13.3	30-Aug-88	< 0.001	P	< 0.1	P	< 0.05	P	< 0.01	P	< 0.01	P	< 0.1	P	< 0.2	P	0.58	P
812-01	18	30-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-01	18.2	30-Aug-88	< 0.001	P	< 0.1	P	0.15	P	< 0.01	P	< 0.01	P	< 0.1	P	0.3	P	0.15	P
812-01	23	30-Aug-88	< 0.0002	P					< 0.01	P	0.02	P						
812-01	23.3	30-Aug-88	< 0.001	P	< 0.1	P	0.18	P	< 0.01	P	< 0.01	P	< 0.1	P	< 0.2	P	12	P
812-01	23.3	30-Aug-88	< 0.001	P	< 0.1	P	< 0.05	P	< 0.01	P	0.02	P	< 0.1	P	< 0.2	P	0.97	P
812-02	3.3	31-Aug-88	< 0.001	P	< 0.1	P	0.05	P	< 0.01	P	< 0.01	P	< 0.1	P	0.4	P	0.06	P
812-02	5	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-02	8	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-02	8.3	31-Aug-88	< 0.001	P	< 0.1	P	0.15	P	< 0.01	P	< 0.01	P	< 0.1	P	0.4	P	0.05	P
812-02	13	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-02	13.3	31-Aug-88	< 0.001	P	< 0.1	P	< 0.05	P	< 0.01	P	< 0.01	P	< 0.1	P	< 0.2	P	0.73	P
812-02	18	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-02	18.3	31-Aug-88	< 0.001	P	< 0.1	P	0.33	P	< 0.01	P	< 0.01	P	< 0.1	P	< 0.2	P	0.14	P
812-02	23	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-02	23.3	31-Aug-88	< 0.001	P	< 0.1	P	0.17	P	< 0.01	P	< 0.01	P	< 0.1	P	< 0.2	P	0.14	P
812-03	8	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-03	8.3	31-Aug-88	< 0.001	P	< 0.1	P	0.21	P	< 0.01	P	< 0.01	P	< 0.1	P	< 0.2	P	0.04	P
812-03	13	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-03	13.3	31-Aug-88	< 0.001	P	< 0.1	P	0.09	P	< 0.01	P	< 0.01	P	< 0.1	P	0.4	P	0.31	P
812-03	18	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-03	18.3	31-Aug-88	< 0.001	P	< 0.1	P	< 0.05	P	< 0.01	P	< 0.01	P	< 0.1	P	0.6	P	0.44	P
812-03	22	31-Aug-88	< 0.0002	P					< 0.01	P	< 0.02	P						
812-03	22.3	31-Aug-88	< 0.001	P	< 0.1	P	< 0.05	P	< 0.01	P	< 0.01	P	< 0.1	P	< 0.2	P	0.15	P
W-812-1926	5.5	10-Apr-03	< 0.003	U	< 0.5	U	1.1		< 0.05	U	< 0.5	U	0.02		0.7		< 0.5	U
W-812-1926	40.4	10-Apr-03	< 0.005	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.2	U	1.8		< 0.5	U
W-812-1926	41.2	10-Apr-03	< 0.005	U	< 0.5	U	0.88		< 0.5	U	< 0.5	U	< 0.2	U	4		< 0.5	U
D-812C-02	1.5	27-Jun-89			< 0.08	P	0.5	P			< 0.02	P	< 0.2	P	0.62	P	0.14	P
D-812C-02	1.5	27-Jun-89	< 0.001	P					< 0.02	P								
W-812-01	10	11-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-01	15.3	11-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	0.06	B	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-01	45.6	12-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-01	47.7	12-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-01	51.8	12-Apr-00	< 0.005	U	< 0.5	U	0.73		< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-01	51.8	12-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-01	56.6	13-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	0.05	B	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-01	61.1	13-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	0.05	B	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-01	64.1	13-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-02	5.9	21-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	0.05	B	< 0.5	U	< 0.02	LU	< 0.5	U	< 0.5	U
W-812-02	43.1	21-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	LU	< 0.5	U	< 0.5	U
W-812-02	48	22-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	0.06	B	< 0.5	U	< 0.02	LU	< 0.5	U	< 0.5	U
W-812-02	48	22-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	DU	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-02	52.2	22-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	0.05	B	< 0.5	U	< 0.02	LU	< 0.5	U	< 0.5	U
W-812-02	55.7	22-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	LU	< 0.5	U	< 0.5	U
W-812-03	5	16-Mar-00	< 0.005	U	< 0.5	U	0.5		< 0.05	U	< 0.5	U	< 0.02	U	0.6		< 0.5	U
W-812-03	10	16-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	0.05	B	< 0.5	U	< 0.02	U	0.5		0.8	
W-812-03	15	16-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-03	25	20-Mar-00	< 0.005	U	< 0.5	U	0.5		0.06	B	< 0.5	U	< 0.02	U	< 0.5	U	1	
W-812-03	35	20-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-03	45	20-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-03	48	20-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	0.05	B	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-03	53	21-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	0.07	B	< 0.5	U	< 0.02	LU	< 0.5	U	< 0.5	U
W-812-03	58	21-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	LU	< 0.5	U	< 0.5	U
W-812-03	61.5	21-Mar-00	< 0.005	U	< 0.5	U	1.8		0.47	D	< 0.5	U	< 0.02	U	1.2		0.71	
W-812-03	61.5	21-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	LU	1		< 0.5	U
W-812-04	5	30-Mar-00	< 0.005	LU	< 0.5	U	0.7	L	0.17	B	< 0.5	U	0.45	DL	< 0.5	U	< 0.5	U
W-812-07	1.6	30-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	0.6		< 0.5	U
W-812-07	6.6	30-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	1.1		< 0.5	U
W-812-07	15.9	30-Mar-00	< 0.005	U	< 0.5	U	< 0.5	U	0.05	B	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-07	40.6	3-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-07	40.6	3-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	< 0.5	U	< 0.5	U
W-812-07	45	3-Apr-00	< 0.005	U	< 0.5	U	< 0.5	U	< 0.05	U	< 0.5	U	< 0.02	U	0.5		< 0.5	U

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Table A-10. Subsurface soil and rock analyses for high explosives compounds (mg/kg) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 High Explosives in Subsurface Soil
July 22, 2005

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Table A-10. Subsurface soil and rock analyses for high explosives compounds (mg/kg) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

			HMX mg/kg		RDX mg/kg		TNT mg/kg	
LOCATION	DEPTH feet	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
D-812C-01	1	27-Jun-89	< 0.001	P	< 0.001	P	< 0.001	P

*QC FLAG DEFINITION

B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

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Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water Tritium
July 27, 2005

Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	Tritium Activity pCi/L RESULT	ERROR	QC FLAG*
NC2-22	2-Mar-90	< 600	± 0	P
NC2-22	2-Mar-90	< 500	± 0	P
NC2-22	3-Apr-90	< 570	± 0	P
NC2-22	9-May-90	< 500	± 0	P
NC2-22	9-May-90	< 500	± 0	P
NC2-22	2-Jul-90	< 200	± 0	P
NC2-22	16-Aug-90	< 225	± 0	P
NC2-22	1-Oct-90	< 332	± 0	P
NC2-22	3-Jan-91	< 200	± 0	P
NC2-22	2-Apr-91	< 200	± 0	P
NC2-22	2-Apr-91	< 200	± 0	P
NC2-22	2-Apr-91	< 200	± 0	P
NC2-22	9-Jul-91	< 500	± 0	
NC2-22	9-Jul-91	< 200	± 0	P
NC2-22	9-Oct-91	< 100	± 100	P
NC2-22	29-Jan-92	< 123	± 89	P
NC2-22	14-Apr-92	176	± 108	P
NC2-22	19-Oct-92	< 115	± 115	P
NC2-22	6-Nov-92	< 523	± 523	U
NC2-22	6-Nov-92	< 176	± 176	P
NC2-22	14-Apr-93	< 170	± 50	U
NC2-22	10-Dec-93	< 96.9	± 29.1	U
NC2-22	7-Jun-94	< 87.3	± 26.1	U
NC2-22	22-Nov-94	< 95	± 28	U
NC2-22	20-Apr-95	< 81.7	± 24.3	U
NC2-22	2-Oct-95	< 88	± 26	U
NC2-22	22-May-96	< 98	± 78	LUO
NC2-22	21-Nov-96	< 100	± 57	OU
NC2-22	29-Apr-97	< 91	± 51	U
NC2-22	22-Apr-98	< 137	± 79.5	U
NC2-22	22-May-00	< 100	± 50	U
NC2-22	15-May-01	< 112	± 66	U
NC2-22	13-May-02	< 100	± 54	U
NC2-22	10-May-03	< 100	± 56	U
NC2-22	27-May-04	< 100	± 55	U
NC2-23	28-Feb-90	< 618	± 0	P
NC2-23	3-Apr-90	< 630	± 0	P
NC2-23	7-May-90	< 500	± 0	P
NC2-23	2-Jul-90	< 200	± 0	P
NC2-23	14-Aug-90	< 220	± 0	P

Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Tritium Activity pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*
NC2-23	1-Oct-90	< 340	± 0	P
NC2-23	3-Jan-91	< 200	± 0	P
NC2-23	2-Apr-91	< 200	± 0	P
NC2-23	9-Jul-91	< 500	± 0	
NC2-23	9-Jul-91	< 200	± 0	P
NC2-23	9-Oct-91	< 200	± 200	P
NC2-23	7-Jan-92	< 124	± 124	P
NC2-23	7-Jan-92	< 126	± 126	P
NC2-23	14-Apr-92	< 134	± 101	P
NC2-23	14-Apr-92	< 120	± 86	P
NC2-23	6-Jul-92	< 188	± 114	P
NC2-23	6-Jul-92	< 188	± 89	P
NC2-23	19-Oct-92	< 118	± 118	P
NC2-23	6-Nov-92	< 523	± 523	U
NC2-23	6-Nov-92	< 179	± 179	P
NC2-23	14-Jan-93	< 147	± 147	U
NC2-23	14-Apr-93	< 170	± 50	U
NC2-23	10-Dec-93	< 96.9	± 28.9	U
NC2-23	7-Jun-94	< 90.4	± 27.1	U
NC2-23	7-Jun-94	< 250	± 120	U
NC2-23	22-Nov-94	< 95	± 28.1	U
NC2-23	22-Nov-94	< 240	± 160	U
NC2-23	20-Apr-95	< 84.7	± 25.4	U
NC2-23	2-Oct-95	< 88	± 26	U
NC2-23	22-May-96	< 98	± 76	LUO
NC2-23	6-Dec-96	< 100	± 59	OU
NC2-23	29-Apr-97	< 92	± 52	U
NC2-23	22-Apr-98	< 137	± 80.5	U
NC2-23	19-May-99	< 200	± 41	U
NC2-23	20-Jun-00	< 100	± 54	U
NC2-23	24-Apr-01	< 100	± 53	U
NC2-23	13-May-02	< 100	± 58	U
NC2-23	3-Jun-03	< 100	± 58	U
NC2-23	27-May-04	< 100	± 55	U
W-812-01	29-Sep-00	< 100	± 52	U
W-812-01	9-Nov-00	< 100	± 52	U
W-812-01	25-Jan-01	< 100	± 57	U
W-812-01	1-Aug-01	< 100	± 59	U

Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Tritium Activity pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*
W-812-01	29-Oct-01	< 100	± 56	U
W-812-01	27-Feb-02	< 100	± 57	U
W-812-01	21-Jun-02	< 100	± 58	U
W-812-01	27-Aug-02	< 100	± 57	U
W-812-01	2-Jun-03	< 100	± 58	U
W-812-01	18-Aug-03	< 100	± 54	U
W-812-01	30-Oct-03	< 100	± 58	U
W-812-01	13-Feb-04	< 100	± 53	U
W-812-01	26-May-04	< 100	± 55	U
W-812-01	26-May-04	< 100	± 55	U
W-812-01	25-Aug-04	< 100	± 55	U
W-812-01	5-Nov-04	< 100	± 55	U
W-812-01	11-Feb-05	< 100	± 52	U
W-812-02	28-Sep-00	< 100	± 52	U
W-812-02	9-Nov-00	< 100	± 52	U
W-812-02	25-Jan-01	< 100	± 57	U
W-812-02	17-May-01	< 101	± 61	U
W-812-02	1-Aug-01	< 100	± 58	U
W-812-02	29-Oct-01	< 100	± 60	U
W-812-02	27-Feb-02	< 100	± 58	U
W-812-02	21-Jun-02	< 100	± 58	U
W-812-02	27-Aug-02	< 100	± 56	U
W-812-02	3-Jun-03	< 100	± 59	U
W-812-02	18-Aug-03	< 100	± 54	U
W-812-02	30-Oct-03	< 100	± 59	U
W-812-02	13-Feb-04	< 100	± 53	U
W-812-02	26-May-04	< 100	± 57	U
W-812-02	25-Aug-04	< 100	± 57	U
W-812-02	5-Nov-04	< 100	± 54	U
W-812-02	11-Feb-05	< 100	± 52	U
W-812-03	28-Aug-00	< 100	± 53	U
W-812-03	9-Nov-00	< 100	± 51	U
W-812-03	25-Jan-01	< 100	± 57	U
W-812-03	17-May-01	< 100	± 56	U
W-812-03	28-Aug-01	< 200	± 95.1	U
W-812-03	28-Aug-01	< 100	± 58	U
W-812-03	29-Oct-01	< 100	± 55	U
W-812-03	27-Feb-02	< 100	± 58	U
W-812-03	3-Jun-02	< 100	± 59	U
W-812-03	27-Aug-02	< 100	± 55	U
W-812-03	28-May-03	< 100	± 54	U
W-812-03	28-May-03	< 100	± 54	U
W-812-03	25-Aug-03	< 100	± 54	U

Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Tritium Activity pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*
W-812-03	13-Nov-03	< 100	± 54	U
W-812-03	30-Jan-04	< 103	± 63	U
W-812-03	30-Jan-04	< 104	± 63	U
W-812-03	26-May-04	< 100	± 55	U
W-812-03	25-Aug-04	< 100	± 53	U
W-812-03	30-Nov-04	< 100	± 52	U
W-812-03	9-Feb-05	< 100	± 55	U
W-812-03	9-Feb-05	< 100	± 54	U
W-812-04	26-Mar-01	< 100	± 54	LOU
W-812-04	17-May-01	< 101	± 60	U
W-812-04	1-Aug-01	< 100	± 58	U
W-812-04	29-Oct-01	< 100	± 57	U
W-812-04	27-Feb-02	< 100	± 56	U
W-812-04	3-Jun-02	< 101	± 59	U
W-812-04	27-Aug-02	< 100	± 56	U
W-812-04	2-Jun-03	< 100	± 57	U
W-812-04	16-Sep-03	< 100	± 52	U
W-812-04	13-Nov-03	< 100	± 53	U
W-812-04	13-Feb-04	< 100	± 52	U
W-812-04	27-May-04	< 100	± 56	U
W-812-04	25-Aug-04	< 100	± 57	U
W-812-04	19-Nov-04	< 100	± 49	U
W-812-04	9-Feb-05	< 100	± 55	U
W-812-07	28-Aug-00	< 100	± 53	U
W-812-07	9-Nov-00	< 100	± 52	U
W-812-07	25-Jan-01	< 100	± 56	U
W-812-07	27-Jun-01	< 100	± 57	U
W-812-07	1-Aug-01	< 100	± 58	U
W-812-07	29-Oct-01	< 100	± 55	U
W-812-07	27-Feb-02	< 100	± 58	U
W-812-07	3-Jun-02	< 100	± 58	U
W-812-07	27-Aug-02	< 100	± 56	U
W-812-07	30-Sep-02	< 100	± 57	U
W-812-07	28-May-03	< 100	± 56	U
W-812-07	18-Aug-03	< 100	± 53	U
W-812-07	30-Oct-03	< 100	± 58	U
W-812-07	30-Jan-04	< 101	± 61	U
W-812-07	1-Jun-04	< 100	± 53	U
W-812-07	1-Jun-04	< 100	± 53	U
W-812-07	26-Aug-04	< 100	± 50	U
W-812-07	19-Nov-04	< 100	± 48	U
W-812-07	9-Feb-05	< 100	± 55	U
W-812-08	15-Sep-00	< 100	± 52	LU

Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Tritium Activity pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*
W-812-08	9-Nov-00	< 100	± 53	U
W-812-08	25-Jan-01	< 100	± 58	U
W-812-08	17-May-01	< 100	± 58	U
W-812-08	1-Aug-01	< 100	± 57	U
W-812-08	29-Oct-01	< 100	± 61	U
W-812-08	27-Feb-02	< 100	± 59	U
W-812-08	3-Jun-02	< 113	± 67	U
W-812-08	27-Aug-02	< 100	± 57	U
W-812-08	28-May-03	< 100	± 54	U
W-812-08	25-Aug-03	< 100	± 53	U
W-812-08	13-Nov-03	< 100	± 53	U
W-812-08	30-Jan-04	< 102	± 62	U
W-812-08	1-Jun-04	< 100	± 55	U
W-812-08	26-Aug-04	< 100	± 51	U
W-812-08	30-Nov-04	< 100	± 52	U
W-812-08	9-Feb-05	< 100	± 55	U
W-812-09	24-Aug-00	< 100	± 54	U
W-812-09	17-May-01	< 100	± 58	U
W-812-09	1-Aug-01	< 100	± 57	U
W-812-09	29-Oct-01	< 100	± 56	U
W-812-09	27-Feb-02	< 101	± 60	U
W-812-09	3-Jun-02	< 100	± 58	U
W-812-09	27-Aug-02	< 100	± 55	U
W-812-09	30-Sep-02	< 100	± 56	U
W-812-09	28-May-03	< 100	± 55	U
W-812-09	25-Aug-03	< 100	± 52	U
W-812-09	13-Nov-03	< 100	± 53	U
W-812-09	13-Feb-04	< 100	± 53	U
W-812-09	1-Jun-04	< 100	± 53	U
W-812-09	26-Aug-04	< 100	± 51	U
W-812-09	19-Nov-04	< 100	± 49	U
W-812-09	9-Feb-05	< 100	± 55	U
W-812-1920	19-Dec-03	< 100	± 53	U
W-812-1920	29-Nov-04	< 100	± 54	U
W-812-1920	29-Nov-04	< 100	± 54	U
W-812-1922	6-Feb-04	< 100	± 59	U
W-812-1922	19-Nov-04	< 100	± 49	U
W-812-1923	8-Jul-03	< 100	± 58	U
W-812-1923	16-Dec-03	< 100	± 55	U
W-812-1923	19-Nov-04	< 100	± 48	U
W-812-1924	30-Nov-04	< 100	± 52	U
W-812-1925	19-Nov-04	< 100	± 48	U
W-812-1926	15-Dec-03	< 100	± 55	U

Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Tritium Activity pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*
W-812-1926	19-Nov-04	< 100	± 49	U
W-812-1929	5-Nov-04	< 100	± 54	U
W-812-1932	25-Jun-03	< 100	± 51	U
W-812-1932	29-Nov-04	< 100	± 53	U
W-812-1933	13-Feb-04	< 100	± 51	U
W-812-1933	22-Nov-04	< 100	± 48	U
W-812-1937	25-Jun-03	< 100	± 54	U
W-812-1937	22-Nov-04	< 100	± 49	U
W-812-1939	22-Nov-04	< 100	± 48	U
W-812-1939	22-Nov-04	< 100	± 49	U
W-812-2009	5-Nov-04	< 100	± 57	U
W-812-2009	22-Feb-05	< 100	± 56	U
SPRING6	29-Sep-93	< 93.6	± 28.2	U
SPRING6	10-Dec-93	< 96.9	± 28.9	U
SPRING6	21-Apr-94	< 84.9	± 25.5	U
SPRING6	19-Dec-94	< 86.2	± 26.9	U
SPRING6	28-Mar-95	< 92	± 27.2	U
SPRING6	22-May-95	< 3.48	± 100	U
SPRING6	30-Oct-95	17.4	± 20.4	
SPRING6	31-Oct-95	< 84	± 25	U
SPRING6	12-Feb-96	< 83.4	± 24.6	U
SPRING6	8-May-96	< 44.8	± 100	U
SPRING6	26-Aug-96	< 110	± 62	OU
SPRING6	19-Nov-96	< 29.8	± 100	U
SPRING6	10-Dec-96	< 99	± 57	OU
SPRING6	10-Dec-96	< 85	± 51	OU
SPRING6	6-May-97	< 87	± 51	U
SPRING6	13-May-97	< 34.5	± 100	U
SPRING6	1-Dec-97	< 38.5	± 0	U
SPRING6	23-Jun-98	< 29.3	± 29.3	U
SPRING6	7-Dec-98	< 61.1	± 49.1	U
SPRING6	24-May-99	< 47.1	± 37.9	U
SPRING6	9-Nov-99	< 71.3	± 57.9	HU
SPRING6	20-Jun-00	< 45.5	± 37.6	U
SPRING6	20-Jun-00	< 100	± 55	U
SPRING6	27-Nov-00	< 105	± 62	U
SPRING6	21-May-01	< 100	± 61	U

Table A-11. Ground and surface water analyses for tritium (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Tritium Activity pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*
SPRING6	19-Nov-01	< 100	± 56	U
SPRING6	15-May-02	< 100	± 55	U
SPRING6	10-Jun-03	< 100	± 59	U
SPRING6	11-Dec-03	< 100	± 58	U
SPRING6	27-May-04	< 100	± 56	U
SPRING6	3-Dec-04	< 100	± 52	U

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

Table A-12. Ground and surface water analyses for total uranium and uranium isotopes (pCi/L) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

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Table A-12. Ground and surface water analyses for total uranium and uranium isotopes (pCi/L) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Total Uranium pCi/L			Uranium 233+234 pCi/L			Uranium 235+236 pCi/L			Uranium 238 pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
NC2-22	2-Mar-90	< 3.6	± 0.4	**	1.9	± 0.3	P	< 0.1	± 0	P	1.6	± 0.3	P
NC2-22	2-Mar-90	< 3.4	± 0.3	**	2	± 0.2	P	< 0.1	± 0	P	1.3	± 0.2	P
NC2-22	9-May-90	< 2.6	± 0.4	**	1.5	± 0.3	P	< 0.1	± 0	P	1	± 0.2	P
NC2-22	16-Aug-90	< 1.5	± 0.2	**	0.8	± 0.2	P	< 0.1	± 0	P	0.6	± 0.1	P
NC2-22	9-Oct-90	< 3.7	± 0.4	**	2.1	± 0.3	P	< 0.1	± 0	P	1.5	± 0.3	P
NC2-22	14-Mar-91	< 5.9	± 0.5	**	3.8	± 0.4	P	< 0.2	± 0	P	1.9	± 0.3	P
NC2-22	16-Apr-91	< 5.3	± 0.5	**	3.4	± 0.4	P	< 0.2	± 0	P	1.7	± 0.3	P
NC2-22	12-Jul-91	< 2.8	± 0.4	**	1.6	± 0.3	P	< 0.2	± 0.2	P	1	± 0.2	P
NC2-22	9-Oct-91	3.4	± 0.4	**	2.1	± 0.3	P	0.2	± 0.1	P	1.1	± 0.2	P
NC2-22	17-Apr-92	2.4	± 0.2	**	1.4	± 0.2	P	0.04	± 0.04	P	0.96	± 0.13	P
NC2-22	19-Oct-92	< 2.3	± 0.3	**	1.3	± 0.24	P	< 0.1	± 0.1	P	0.9	± 0.2	P
NC2-22	6-Nov-92	< 4.1	± 0.5	**	2.5	± 0.3	P	< 0.3	± 0.3	P	1.3	± 0.2	P
NC2-22	22-Apr-93	3.35	± 0.2	**	1.87	± 0.18		0.15	± 0.05		1.33	± 0.15	
NC2-22	22-Apr-93	2.95	± 0.2	**	1.54	± 0.15		0.21	± 0.06		1.2	± 0.13	
NC2-22	10-Dec-93	4.34	± 0.3	**	2.34	± 0.21		0.1	± 0.05	B	1.9	± 0.18	
NC2-22	25-Mar-94												
NC2-22	7-Jun-94												
NC2-22	22-Nov-94	3.66	± 0.4	**	1.92	± 0.33	B	0.13	± 0.05		1.61	± 0.28	B
NC2-22	24-Mar-95												
NC2-22	22-May-96	1.75	± 0.09										
NC2-22	29-Apr-97	3.49	± 0.2	**	2.05	± 0.17	B	0.1	± 0.031		1.34	± 0.13	
NC2-22	22-Apr-98	< 2.87	± 0.6	**	1.41	± 0.43	B	< 0.37	± 0.21	U	1.09	± 0.36	B
NC2-22	22-May-00	< 1.46	± 0.2	**	0.827	± 0.13		< 0.1	± 0.024	EU	0.533	± 0.093	
NC2-22	15-May-01	< 0.429	± 0.1	**	0.185	± 0.05		< 0.1	± 0.011	U	0.144	± 0.04	
NC2-22	13-May-02	< 1.593	± 0.2	**	0.857	± 0.13		< 0.1	± 0.023	EU	0.636	± 0.1	
NC2-22	3-Jun-03	2.73777	± 0.27048										
NC2-22	11-Oct-03	0.73855	± 0.02806										
NC2-22	30-Jan-04	0.11162	± 5.80E-05										
NC2-22	27-May-04	0.337	± 0.031										
NC2-23	28-Feb-90	< 3.4	± 0.4	**	1.9	± 0.3	P	< 0.2	± 0	P	1.3	± 0.2	P
NC2-23	7-May-90	< 3.3	± 0.4	**	1.7	± 0.3	P	< 0.1	± 0	P	1.5	± 0.3	P
NC2-23	14-Aug-90	< 3	± 0.3	**	1.7	± 0.2	P	< 0.1	± 0	P	1.2	± 0.2	P
NC2-23	9-Oct-90	< 3.5	± 0.4	**	2	± 0.3	P	< 0.1	± 0	P	1.4	± 0.3	P
NC2-23	14-Mar-91	< 3.2	± 0.4	**	1.8	± 0.3	P	< 0.2	± 0	P	1.2	± 0.2	P
NC2-23	16-Apr-91	< 2.7	± 0.4	**	1.4	± 0.3	P	< 0.1	± 0	P	1.2	± 0.3	P
NC2-23	12-Jul-91	< 4.8	± 0.6	**	2.8	± 0.5	P	< 0.2	± 0.2	P	1.8	± 0.3	P
NC2-23	9-Oct-91	< 3	± 0.4	**	1.8	± 0.3	P	< 0.1	± 0.1	P	1.1	± 0.2	P
NC2-23	17-Apr-92	3.26	± 0.3	**	1.9	± 0.2	P	0.06	± 0.04	P	1.3	± 0.2	P
NC2-23	19-Oct-92	2.7	± 0.3	**	1.6	± 0.25	P	0.1	± 0.1	P	1	± 0.2	P
NC2-23	6-Nov-92	< 3.4	± 0.4	**	2.1	± 0.3	P	< 0.2	± 0.2	P	1.1	± 0.2	P
NC2-23	22-Apr-93	< 4.21	± 0.3	**	2.7	± 0.22		< 0.15	± 0.06	U	1.36	± 0.16	
NC2-23	10-Dec-93	3.31	± 0.2	**	1.93	± 0.16		0.14	± 0.05	B	1.24	± 0.13	
NC2-23	25-Mar-94												
NC2-23	7-Jun-94												
NC2-23	7-Jun-94	4.59	± 0.7	**	2.38	± 0.53	BO	0.27	± 0.18	JBOL	1.94	± 0.47	
NC2-23	22-Nov-94	3.89	± 0.5	**	2	± 0.38	B	0.16	± 0.08		1.73	± 0.34	B
NC2-23	22-Nov-94	3.07	± 0.6	**	1.89	± 0.47		0.14	± 0.14		1.04	± 0.35	
NC2-23	24-Mar-95												
NC2-23	22-May-96	2.8	± 0.1										
NC2-23	29-Apr-97	2.93	± 0.2	**	1.71	± 0.15	B	0.09	± 0.03		1.13	± 0.12	
NC2-23	22-Apr-98	2.89	± 0.7	**	1.68	± 0.55	B	0.33	± 0.23		0.88	± 0.36	B
NC2-23	19-May-99	< 2.68	± 0.3	**	1.52	± 0.2		< 0.1	± 0.03	U	1.06	± 0.15	
NC2-23	20-Jun-00	< 2.266	± 0.2	**	1.24	± 0.18		< 0.1	± 0.034	EU	0.926	± 0.14	
NC2-23	24-Apr-01	< 2.421	± 0.2	**	1.36	± 0.18		< 0.1	± 0.029	EU	0.961	± 0.14	
NC2-23	13-May-02	< 2.6	± 0.2	**	1.48	± 0.19		< 0.1	± 0.029	EU	1.02	± 0.14	
NC2-23	3-Jun-03	3.25063	± 0.30048										
NC2-23	11-Oct-03	3.24579	± 0.09379										
NC2-23	30-Jan-04	2.70867	± 0.07236										
NC2-23	27-May-04	2.652	± 0.118										
W-812-01	29-Sep-00	35.917	± 3.0	**	8.39	± 0.93		0.627	± 0.11		26.9	± 2.9	
W-812-01	21-Jun-02	30.7	± 0.8										
W-812-01	2-Jun-03	34.89833	± 1.7397										
W-812-01	18-Aug-03	26.15506	± 0.63987										
W-812-01	30-Oct-03	24.6803	± 0.30133										
W-812-01	13-Feb-04	21.23874	± 0.56336										
W-812-01	26-May-04	21.51319	± 0.00424										
W-812-01	26-May-04	21.76076	± 0.00527										
W-812-01	25-Aug-04	22.446	± 0.968										
W-812-01	5-Nov-04	20.3	± 0.3										
W-812-01	11-Feb-05	40	± 0.34										
W-812-02	28-Sep-00	10.534	± 0.9	**	5.13	± 0.6		0.254	± 0.065		5.15	± 0.6	
W-812-02	17-May-01	11.35	± 0.24										
W-812-02	21-Jun-02	16.59059	± 1.61284										
W-812-02	3-Jun-03	21.79936	± 2.1833										
W-812-02	18-Aug-03	16.70408	± 0.33875										
W-812-02	30-Oct-03	14.6278	± 0.15515										
W-812-02	13-Feb-04	14.4099	± 0.64935										
W-812-02	26-May-04	14.44903	± 0.5033										
W-812-02	25-Aug-04	17.26	± 0.323										
W-812-02	5-Nov-04	15.973	± 0.863										
W-812-02	11-Feb-05	17	± 0.16										
W-812-03	28-Aug-00	< 1.551	± 0.2	**	0.76	± 0.12		< 0.1	± 0.024	EU	0.691	± 0.11	
W-812-03	17-May-01	1.69	± 0.03										
W-812-03	3-Jun-02	< 0.06273	± 6.00E-05	EU									
W-812-03	28-May-03	< 0.06273	± 9.00E-05	EU									
W-812-03	28-May-03	< 0.06273	± 8.00E-05	EU									
W-812-03	25-Aug-03	0.09771	± 0.024										
W-812-03	13-Nov-03	0.07519	± 0.01418										
W-812-03	30-Jan-04	< 0.06273	± 0.00214	U									
W-812-03	30-Jan-04	< 0.06273	± 3.40E-05	U									
W-812-03	26-May-04	< 0.06273	± 0.00037	EU									

Table A-12. Ground and surface water analyses for total uranium and uranium isotopes (pCi/L) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Uranium 235/238 (atom ratio)			Uranium 234 by mass measurement pCi/L			Uranium 235 by mass measurement pCi/L			Uranium 236 by mass measurement pCi/L			Uranium 238 by mass measurement pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
NC2-22	2-Mar-90															
NC2-22	2-Mar-90															
NC2-22	9-May-90															
NC2-22	16-Aug-90															
NC2-22	9-Oct-90															
NC2-22	14-Mar-91															
NC2-22	16-Apr-91															
NC2-22	12-Jul-91															
NC2-22	9-Oct-91															
NC2-22	17-Apr-92															
NC2-22	19-Oct-92															
NC2-22	6-Nov-92															
NC2-22	22-Apr-93															
NC2-22	22-Apr-93															
NC2-22	10-Dec-93															
NC2-22	25-Mar-94	0.00727	± 8.00E-05		1.3	± 0.27		0.035	± 0.001		< 0.001	± 0.001	U	0.75	± 0.01	
NC2-22	7-Jun-94	0.00736	± 0.00018		2.28	± 0.76		0.065	± 0.002					1.37	± 0.03	
NC2-22	22-Nov-94															
NC2-22	24-Mar-95	0.0073	± 0.0001		1.26	± 0.27		0.041	± 0.001					0.87	± 0.01	B
NC2-22	22-May-96	0.00755	± 0.00012		1.08	± 0.09		0.0311	± 0.0005		< 0.0007	± 0	U	0.64	± 0.003	
NC2-22	29-Apr-97															
NC2-22	22-Apr-98															
NC2-22	22-May-00															
NC2-22	15-May-01															
NC2-22	13-May-02															
NC2-22	3-Jun-03	0.00728	± 7.30E-05		1.67	± 0.27		0.04777	± 0.00088		< 0.0007	± 0.00489	U	1.02	± 0.016	
NC2-22	11-Oct-03	0.00705	± 7.10E-05		0.479	± 0.028		0.01126	± 0.00014		< 0.007	± 0.00014	U	0.24829	± 0.00183	
NC2-22	30-Jan-04	0.00631	± 7.60E-05		< 0.274	± 0	U	0.00435	± 5.20E-05		< 0.00095	± 0	U	0.10726	± 2.50E-05	
NC2-22	27-May-04	0.00724	± 0.00014		0.183	± 0.031		0.007	± 0		< 0.0001		U	0.147	± 0.002	
NC2-23	28-Feb-90															
NC2-23	7-May-90															
NC2-23	14-Aug-90															
NC2-23	9-Oct-90															
NC2-23	14-Mar-91															
NC2-23	16-Apr-91															
NC2-23	12-Jul-91															
NC2-23	9-Oct-91															
NC2-23	17-Apr-92															
NC2-23	19-Oct-92															
NC2-23	6-Nov-92															
NC2-23	22-Apr-93															
NC2-23	10-Dec-93															
NC2-23	25-Mar-94	0.00743	± 0.00018		1.36	± 0.55		0.047	± 0.002		< 0.001	± 0.001	U	0.99	± 0.02	
NC2-23	7-Jun-94	0.00719	± 0.00017		1.33	± 0.34		0.056	± 0.002					1.21	± 0.03	
NC2-23	7-Jun-94															
NC2-23	22-Nov-94															
NC2-23	22-Nov-94															
NC2-23	24-Mar-95	0.0073	± 8.00E-05		1.44	± 0.3		0.05	± 0.001					1.08	± 0.01	B
NC2-23	22-May-96	0.00724	± 0.00011		1.61	± 0.15		0.0524	± 0.0008		< 0.0007	± 0	U	1.126	± 0.007	
NC2-23	29-Apr-97															
NC2-23	22-Apr-98															
NC2-23	19-May-99															
NC2-23	20-Jun-00															
NC2-23	24-Apr-01															
NC2-23	13-May-02															
NC2-23	3-Jun-03	0.00733	± 7.30E-05		1.97	± 0.3		0.05763	± 0.001		< 0.0007	± 0.00305	U	1.223	± 0.017	
NC2-23	11-Oct-03	0.00728	± 4.90E-05		1.96	± 0.093		0.05749	± 0.00069		< 0.007	± 0.00024	U	1.2283	± 0.0121	
NC2-23	30-Jan-04	0.00715	± 2.80E-05		1.595	± 0.072		0.04895	± 0.00019		< 0.00058	± 0	U	1.06455	± 9.00E-06	
NC2-23	27-May-04	0.00724	± 7.80E-05		1.544	± 0.118		0.049	± 0.001		< 0.0001		U	1.058	± 0.008	
W-812-01	29-Sep-00															
W-812-01	21-Jun-02	0.00286	± 2.00E-05		9.2	± 0.7		0.387	± 0.005		0.097	± 0.01		21	± 0.2	
W-812-01	2-Jun-03	0.00299	± 3.00E-05		11.18	± 1.72		0.44611	± 0.00664		0.10222	± 0.02225		23.17	± 0.26	
W-812-01	18-Aug-03	0.00317	± 3.60E-05		9.208	± 0.62		0.33727	± 0.00501		0.06979	± 0.00638		16.54	± 0.158	
W-812-01	30-Oct-03	0.00326	± 1.10E-05		9.052	± 0.288		0.31977	± 0.00214		0.06433	± 0.00586		15.2442	± 0.0884	
W-812-01	13-Feb-04	0.00334	± 2.60E-05		6.809	± 0.563		0.30191	± 0.00234		0.05668	± 0.00061		14.07152	± 9.00E-06	
W-812-01	26-May-04	0.003	± 3.10E-05		< 3.716		U	0.40661	± 0.00424		< 0.03732		U	21.10658	± 1.00E-05	
W-812-01	26-May-04	0.00298	± 3.80E-05		< 3.267		U	0.40975	± 0.00527		< 0.03499		U	21.35101	± 1.30E-05	
W-812-01	25-Aug-04	0.00335	± 3.90E-05		7.346	± 0.952		0.317	± 0.005		0.0631	± 0.0009		14.719	± 0.175	
W-812-01	5-Nov-04	0.0034	± 2.90E-05		6.5	± 0.3		0.294	± 0.003		0.0575	± 0.0002		13.47	± 0.09	
W-812-01	11-Feb-05	0.00339	± 1.80E-05		13	± 0.33		0.56	±.0.0039		0.11	± 0.0001		26	± 0.11	
W-812-02	28-Sep-00															
W-812-02	17-May-01	0.00573	± 6.00E-05		5.936	± 0.2324		0.19218	± 0.00272		0.01037	± 0.00172		5.21189	± 0.05212	
W-812-02	21-Jun-02	0.00445	± 4.50E-05		8.483	± 1.611		0.22559	± 0.00318		< 0.0007	± 0.03326	U	7.882	± 0.077	
W-812-02	3-Jun-03	0.00384	± 4.00E-05		9.79	± 2.18		0.28936	± 0.00419		< 0.0007	± 0.07867	U	11.72	± 0.12	
W-812-02	18-Aug-03	0.00412	± 3.50E-05		7.387	± 0.337		0.23948	± 0.00223		0.0295	± 0.00174		9.0481	± 0.0343	
W-812-02	30-Oct-03	0.00424	± 1.30E-05		6.384	± 0.151		0.21835	± 0.00118		0.02455	± 0.00154		8.0009	± 0.0356	
W-812-02	13-Feb-04	0.00416	± 3.40E-05		5.797	± 0.649		0.22372	± 0.00186		0.02007	± 0.00166		8.36865	± 1.20E-05	
W-812-02	26-May-04	0.00385	± 4.00E-05		4.603	± 0.503		0.2375	± 0.00247		0.01887	± 0.00104		9.58926	± 1.30E-05	
W-812-02	25-Aug-04	0.00383	± 4.30E-05		6.101	± 0.291		0.267	± 0.005		0.0408	± 0.0005		10.851	± 0.14	
W-812-02	5-Nov-04	0.00381	± 5.50E-05		6.002	± 0.854		0.238	± 0.005		0.0347	± 0.0005		9.699	± 0.121	
W-812-02	11-Feb-05	0.00377	± 2.30E-05		6.1	± 0.16		0.25	± 0.0017		0.038	± 7.00E-05		10	± 0.034	
W-812-03	28-Aug-00															
W-812-03	17-May-01	0.007	± 4.00E-05		0.8963	± 0.0339		0.03427	± 0.00041		< 0.00021	± 0.00021	U	0.76118	± 0.00765	
W-812-03	3-Jun-02	< 0.00805	± 0	U	< 0.062	± 0.083	U	< 2.20E-05	± 0.5231	U	< 0.0007	± 0.00074	U	0.0035	± 6.40E-05	
W-812-03	28-May-03	< 0.00784	± 0	U	< 0.062	± 0.274	U	< 2.20E-05	± 0.62284	U	< 0.0007	± 0.00118	U	0.00428	± 9.40E-05	
W-812-03	28-May-03	< 0.00691	± 0	U	< 0.062	± 0.075	U	< 2.20E-05	± 0.56571	U	< 0.0007	± 0.00024	U	0.00441	± 7.70E-05	
W-812-03	25-Aug-03	0.00623	± 0.00022		0.088	± 0.024		0.00037	± 2.00E-05		< 0.007	± 0.00037	U	0.00933	± 0.00023	
W-812-03	13-Nov-03	0.00658	± 0.00018		0.07	± 0.014		0.00023	± 7.00E-06		< 0.00031	± 0	U	0.00534	± 6.10E-05	
W-812-03	30-Jan-04	< 0.00637	± 0	U	< 0.034	± 0	U	< 0.00019	± 0	U	< 0.00032	± 0	U	0.00453	± 0.00214	
W-812-03	30-Jan-04	0.00671	± 0.0001		< 0.01	± 0	U	0.00027	± 4.00E-06		< 0.00012	± 0	U	0.00621	± 3.30E-05	
W-812-03	26-May-04	0.00461	± 0.00022		< 0.012	±	U	0.0003	± 2.00E-05		< 4.90E-05		U	0.011	± 0	

Table A-12. Ground and surface water analyses for total uranium and uranium isotopes (pCi/L) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Total Uranium pCi/L			Uranium 233+234 pCi/L			Uranium 235+236 pCi/L			Uranium 238 pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
W-812-03	25-Aug-04	< 0.06273	± 0.0001	EU									
W-812-03	30-Nov-04	< 0.06273	± 0	EU									
W-812-03	9-Feb-05	< 0.0627	± 2.10E-05	U									
W-812-03	9-Feb-05	< 0.0627	± 9.20E-06	U									
W-812-04	26-Mar-01	3.64879	± 0.27021										
W-812-04	26-Mar-01	2.65	± 0.05										
W-812-04	26-Mar-01	< 2.47	± 0.2	**	1.33	± 0.19	LO	< 0.1	± 0.022	UELO	1.04	± 0.16	LO
W-812-04	3-Jun-02	< 0.06273	± 0.00047	EU									
W-812-04	2-Jun-03	< 0.06273	± 0.0012	EU									
W-812-04	16-Sep-03	< 0.06273	± 0.00154	U									
W-812-04	13-Nov-03	0.15078	± 0.022										
W-812-04	13-Feb-04	< 0.06273	± 0.00013	U									
W-812-04	27-May-04	< 0.06273	±	EU									
W-812-04	25-Aug-04	< 0.06273	± 0.001	EU									
W-812-04	19-Nov-04	< 0.06273	± 0	EU									
W-812-04	9-Feb-05	0.11	± 0.0044										
W-812-07	28-Aug-00	34.159	± 3.3	**	17.4	± 2.4		0.759	± 0.26		16	± 2.2	
W-812-07	27-Jun-01	63.8	± 1.6										
W-812-07	3-Jun-02	50.2198	± 3.80928										
W-812-07	30-Sep-02	142.87	± 10.2	**	69.3	± 7.3		6.37	± 0.72		67.2	± 7.1	
W-812-07	28-May-03	45.9328	± 2.22206										
W-812-07	28-May-03	40.87	± 3.0	**	21.1	± 2.2		1.27	± 0.18		18.5	± 2	
W-812-07	18-Aug-03	55.6451	± 1.35186										
W-812-07	18-Aug-03	46.454	± 3.4	**	23.6	± 2.5		0.954	± 0.15		21.9	± 2.3	
W-812-07	30-Oct-03	51.94131	± 0.82763										
W-812-07	30-Jan-04	48.6698	± 1.37143										
W-812-07	1-Jun-04	23.0088	± 0.01026										
W-812-07	1-Jun-04	40.47922	± 2.55353										
W-812-07	26-Aug-04	47.3	± 2.45										
W-812-07	19-Nov-04	46.7	± 1.1										
W-812-07	9-Feb-05	47	± 0.29										
W-812-08	15-Sep-00	20.882	± 1.9	**	3.82	± 0.45	L	0.662	± 0.12	L	16.4	± 1.8	L
W-812-08	17-May-01	19.59	± 0.16										
W-812-08	3-Jun-02	17.54	± 0.15										
W-812-08	28-May-03	49.16956	± 1.48845										
W-812-08	25-Aug-03	30.4899	± 0.85954										
W-812-08	13-Nov-03	26.45076	± 0.4015										
W-812-08	30-Jan-04	29.56829	± 0.656										
W-812-08	1-Jun-04	18.94712	± 0.00365										
W-812-08	26-Aug-04	18.606	± 0.613										
W-812-08	30-Nov-04	19.5	± 0.2										
W-812-08	9-Feb-05	56	± 0.38										
W-812-09	24-Aug-00	26.42	± 1.9	**	13.6	± 1.5		1.32	± 0.19		11.5	± 1.2	
W-812-09	17-May-01	41.33	± 1.7										
W-812-09	3-Jun-02	38.3	± 0.9										
W-812-09	30-Sep-02	50.11	± 3.7	**	26	± 2.8		1.71	± 0.23		22.4	± 2.4	
W-812-09	28-May-03	48.84018	± 1.91751										
W-812-09	28-May-03	45.42	± 3.3	**	23	± 2.4		1.62	± 0.23		20.8	± 2.2	
W-812-09	25-Aug-03	51.0524	± 1.23018										
W-812-09	25-Aug-03	49.46	± 3.7	**	25.7	± 2.8		1.26	± 0.18		22.5	± 2.4	
W-812-09	13-Nov-03	48.25078	± 0.7878										
W-812-09	13-Feb-04	53.02994	± 1.04284										
W-812-09	1-Jun-04	45.48602	± 2.45401										
W-812-09	26-Aug-04	55.182	± 1.838										
W-812-09	19-Nov-04	52.798	± 1.22										
W-812-1920	19-Dec-03	23.96394	± 0.27317										
W-812-1920	13-Feb-04	33.73658	± 0.79185										
W-812-1920	29-Nov-04	32.097	± 0.853										
W-812-1920	29-Nov-04	33.06	± 1.26										
W-812-1920	29-Nov-04	33.9	± 0.4										
W-812-1920	29-Nov-04	33	± 0.8										
W-812-1920	14-Feb-05	35	± 0.5										
W-812-1921	13-Feb-04	42.2365	± 1.47086										
W-812-1922	6-Feb-04	1.20451	± 0.09189										
W-812-1922	6-Feb-04	< 1.509	± 0.1	**	0.805	± 0.1		< 0.1	± 0.015	UE	0.604	± 0.083	
W-812-1922	13-May-04	0.30038	± 0.00015										
W-812-1922	26-Aug-04	0.542	± 0.022										
W-812-1922	19-Nov-04	0.51	± 0.03										
W-812-1922	14-Feb-05	0.52	± 0.0057										
W-812-1923	17-Dec-03	17.4879	± 0.20234										
W-812-1923	13-Feb-04	19.20354	± 0.895										
W-812-1923	13-Feb-04	18.79772	± 0.75236										
W-812-1923	20-May-04	20.26834	± 0.42501										
W-812-1923	26-Aug-04	19.95	± 0.343										
W-812-1923	19-Nov-04	19.921	± 0.965										
W-812-1923	14-Feb-05	21	± 0.17										
W-812-1924	6-Feb-04	0.59232	± 0.02415										
W-812-1924	13-May-04	0.3144	± 0.00024										
W-812-1924	26-Aug-04	1.539	± 0.074										
W-812-1924	30-Nov-04	1.48	± 0.05										
W-812-1924	14-Feb-05	1.5	± 0.012										
W-812-1925	6-Feb-04	0.13595	± 0.00011										
W-812-1925	20-May-04	0.193	± 0.003										
W-812-1925	1-Sep-04	0.398	± 0.017										
W-812-1925	19-Nov-04	0.37	± 0.02										
W-812-1925	11-Feb-05	0.36	± 0.0045										
W-812-1926	15-Dec-03	1.91607	± 0.0553										
W-812-1926	6-Feb-04	1.23941	± 0.05933										
W-812-1926	13-May-04	0.4391	± 0.00026										
W-812-1926	1-Sep-04	1.795	± 0.117										
W-812-1926	19-Nov-04	2.02	± 0.09										

Table A-12. Ground and surface water analyses for total uranium and uranium isotopes (pCi/L) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Uranium 235/238 (atom ratio)			Uranium 234 by mass measurement pCi/L			Uranium 235 by mass measurement pCi/L			Uranium 236 by mass measurement pCi/L			Uranium 238 by mass measurement pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
W-812-03	25-Aug-04	0.00679	± 0.00033		< 0.014	±	U	0.0004	± 2.00E-05		< 0.0001		U	0.01	± 0	
W-812-03	30-Nov-04	< 0.00501		U	< 0.062	±	EU	< 0.0004		U	< 5.00E-05		U	0.01319	± 7.00E-05	
W-812-03	9-Feb-05	0.00559	± 4.10E-05		< 0.0029	±	U	0.00015	± 1.40E-06		< 8.40E-06		U	0.0043	± 2.10E-05	
W-812-03	9-Feb-05	0.00602	± 6.90E-05		< 0.0036	±	U	0.00013	± 1.50E-06		< 0.007		U	0.0033	± 9.00E-06	
W-812-04	26-Mar-01	0.00709	± 0.0001		2.26679	± 0.26988		0.06027	± 0.00106		< 0.00256	± 0.00256	U	1.32173	± 0.01322	
W-812-04	26-Mar-01				1.3546	± 0.0461		0.05382	± 0.00064		< 0.00039	± 0.00039	U	1.24074	± 0.01172	
W-812-04	26-Mar-01															
W-812-04	3-Jun-02	0.007	± 0.00014		< 0.062	± 0.258	U	0.00177	± 4.00E-05		< 0.0007	± 0.00123	U	0.03924	± 0.00047	
W-812-04	2-Jun-03	0.00619	± 0.00023		< 0.062	± 0.15	U	0.00213	± 9.00E-05		< 0.0007	± 0.0018	U	0.0536	± 0.0012	
W-812-04	16-Sep-03	< 0.00783	± 0	U	< 0.062	± 0.106	U	< 2.20E-05	± 0.00144	U	< 0.007	± 0.00055	U	0.02863	± 0.00154	
W-812-04	13-Nov-03	0.00714	± 0.00012		0.127	± 0.022		0.00104	± 2.00E-05		< 0.007	± 0.00033	U	0.02273	± 0.00018	
W-812-04	13-Feb-04	0.00741	± 0.00027		< 0.163	± 0	U	0.00243	± 8.80E-05		< 0.00222	± 0	U	0.05089	± 9.00E-05	
W-812-04	27-May-04	0.00604	± 0.00015		< 0.085		U	0.002	± 0		< 0.0001		U	0.043	± 0	
W-812-04	25-Aug-04	0.00735	± 0.00026		< 0.08		U	0.001	± 0		< 0.0001		U	0.027	± 0.001	
W-812-04	19-Nov-04	0.00708	± 0.00022		< 0.13		U	0.0014	± 4.00E-05		< 7.00E-05		U	0.0307	± 0.0002	
W-812-04	9-Feb-05	0.00729	± 5.00E-05		0.074	± 0.0044		0.0015	± 1.50E-05		< 8.60E-06		U	0.032	± 0.00023	
W-812-07	28-Aug-00															
W-812-07	27-Jun-01	0.00722	± 7.00E-05		33.505	± 1.5731		1.34474	± 0.01902		< 0.0141	± 0.0141	U	28.95083	± 0.28951	
W-812-07	3-Jun-02	0.00722	± 7.20E-05		28.83	± 3.804		0.9498	± 0.01343		< 0.0007	± 0.05097	U	20.44	± 0.2	
W-812-07	30-Sep-02															
W-812-07	28-May-03	0.00722	± 7.30E-05		25.276	± 2.213		0.9168	± 0.01306		< 0.0007	± 0.03786	U	19.74	± 0.2	
W-812-07	28-May-03															
W-812-07	18-Aug-03	0.00724	± 7.30E-05		30.618	± 1.344		1.1141	± 0.0131		< 0.007	± 0.01376	U	23.913	± 0.145	
W-812-07	18-Aug-03															
W-812-07	30-Oct-03	0.00732	± 2.40E-05		29.296	± 0.819		1.01831	± 0.00653		< 0.007	± 0.0083	U	21.627	± 0.119	
W-812-07	30-Jan-04	0.00712	± 3.00E-05		25.711	± 1.371		1.00575	± 0.00428		< 0.01986	± 0	U	21.95304	± 1.00E-05	
W-812-07	1-Jun-04	0.0071	± 7.30E-05		< 12.542		U	1.00508	± 0.01026		< 0.05486		U	22.00372	± 2.40E-05	
W-812-07	1-Jun-04	0.00706	± 6.30E-05		17.073	± 2.554		1.01684	± 0.00905		< 0.03006		U	22.38892	± 2.10E-05	
W-812-07	26-Aug-04	0.00731	± 8.00E-05		24.526	± 2.427		1.022	± 0.019		< 0.0017		U	21.752	± 0.334	
W-812-07	19-Nov-04	0.00727	± 5.30E-05		24.5	± 1.1		0.994	± 0.011		< 0.0041		U	21.27	± 0.19	
W-812-07	9-Feb-05	0.00722	± 2.90E-05		25	± 0.28		0.99	± 0.0052		< 0.0041		U	21	± 0.072	
W-812-08	15-Sep-00															
W-812-08	17-May-01	0.00241	± 2.00E-05		< 6.7565	± 6.7565	U	0.29702	± 0.00361		0.10195	± 0.008		19.19161	± 0.16056	
W-812-08	3-Jun-02	0.00251	± 2.00E-05		< 0.062	± 6.5	U	0.277	± 0.004		0.092	± 0.007		17.2	± 0.2	
W-812-08	28-May-03	0.00241	± 2.40E-05		9.401	± 1.449		0.60421	± 0.00796		0.19435	± 0.01504		38.97	± 0.34	
W-812-08	25-Aug-03	0.00249	± 3.20E-05		7.198	± 0.848		0.36549	± 0.0052		0.10941	± 0.00878		22.817	± 0.14	
W-812-08	13-Nov-03	0.0025	± 1.30E-05		6.518	± 0.366		0.31396	± 0.00311		0.1048	± 0.00385		19.514	± 0.165	
W-812-08	30-Jan-04	0.00244	± 9.00E-06		5.552	± 0.656		0.36855	± 0.00143		0.12047	± 0.00044		23.52743	± 3.00E-06	
W-812-08	1-Jun-04	0.0025	± 3.00E-05		< 2.853		U	0.29973	± 0.00365		< 0.03056		U	18.64739	± 1.00E-05	
W-812-08	26-Aug-04	0.00265	± 3.40E-05		3.598	± 0.565		0.25	± 0.005		0.0759	± 0.0007		14.682	± 0.236	
W-812-08	30-Nov-04	0.00261	± 3.20E-05		3.83	± 0.19		0.258	± 0.004		0.0746	± 0.0002		15.34	± 0.12	
W-812-08	9-Feb-05	0.00242	± 9.00E-06		9.9	± 0.083		0.7	± 0.0064		0.23	± 0.00016		45	± 0.37	
W-812-09	24-Aug-00															
W-812-09	17-May-01	0.00698	± 6.00E-05		21.8295	± 1.6929		0.83798	± 0.0108		< 0.00987	± 0.00987	U	18.66453	± 0.18637	
W-812-09	3-Jun-02	0.00716	± 6.00E-05		20.5	± 0.9		0.781	± 0.008		< 0.007	± 0.0105	U	16.95	± 0.11	
W-812-09	30-Sep-02		±													
W-812-09	28-May-03	0.00729	± 7.30E-05		27.547	± 1.907		0.95318	± 0.01354		< 0.0007	± 0.0156	U	20.34	± 0.2	
W-812-09	28-May-03															
W-812-09	25-Aug-03	0.00723	± 7.50E-05		28.092	± 1.227		1.0202	± 0.01134		< 0.007	± 0.00842	U	21.9402	± 0.0877	
W-812-09	25-Aug-03															
W-812-09	13-Nov-03	0.00724	± 1.90E-05		26.375	± 0.783		0.97368	± 0.00478		< 0.007	± 0.00802	U	20.9021	± 0.0867	
W-812-09	13-Feb-04	0.00726	± 3.00E-05		28.041	± 1.043		1.11389	± 0.00466		< 0.01038	± 0	U	23.87463	± 1.00E-05	
W-812-09	1-Jun-04	0.00705	± 5.80E-05		19.765	± 2.454		1.11601	± 0.0091		< 0.03303		U	24.60479	± 1.90E-05	
W-812-09	26-Aug-04	0.00729	± 6.80E-05		29.134	± 1.805		1.166	± 0.019		< 0.0009		U	24.882	± 0.344	
W-812-09	19-Nov-04	0.00724	± 8.80E-05		27.827	± 1.177		1.111	± 0.02		< 0.0015		U	23.86	± 0.32	
W-812-1920	19-Dec-03	0.0073	± 4.10E-05		13.297	± 0.273		0.47802	± 0.0027		< 0.00122	± 0	U	10.18932	± 1.40E-05	
W-812-1920	13-Feb-04	0.00727	± 4.50E-05		18.427	± 0.792		0.68412	± 0.00422		< 0.00785	± 0	U	14.62497	± 1.50E-05	
W-812-1920	29-Nov-04	0.0072	± 0.00015		17.341	± 0.8		0.653	± 0.019		< 0.0012		U	14.102	± 0.298	
W-812-1920	29-Nov-04	0.00717	± 0.00024		18.121	± 1.17		0.659	± 0.031		< 0.0007		U	14.281	± 0.465	
W-812-1920	29-Nov-04	0.00727	± 6.90E-05		18.4	± 0.4		0.694	± 0.009		< 0.0028		U	14.84	± 0.14	
W-812-1920	29-Nov-04	0.00721	± 4.80E-05		17.6	± 0.8		0.682	± 0.009		< 0.0028		U	14.7	± 0.16	
W-812-1920	14-Feb-05	0.00722	± 4.30E-05		19	± 0.49		0.73	± 0.0065		< 0.003		U	16	± 0.1	
W-812-1921	13-Feb-04	0.00523	± 4.10E-05		17.659	± 1.471		0.79723	± 0.00622		0.05833	± 0.00315		23.72172	± 1.40E-05	
W-812-1922	6-Feb-04	0.00729	± 4.80E-05		0.719	± 0.092		0.02174	± 0.00014		< 0.00113	± 0	U	0.46371	± 1.60E-05	
W-812-1922	6-Feb-04															
W-812-1922	13-May-04	0.00715	± 8.00E-05		< 0.117	±	U	0.01321	± 0.00015		< 0.0011		U	0.28718	± 2.70E-05	
W-812-1922	26-Aug-04	0.00732	± 7.30E-05		0.336	± 0.022		0.009	± 0		< 0.0001		U	0.196	± 0.002	
W-812-1922	19-Nov-04	0.00731	± 6.00E-05		0.34	± 0.03		0.00776	± 9.00E-05		< 4.00E-05		U	0.165	± 0.0014	
W-812-1922	14-Feb-05	0.00727	± 4.80E-05		0.34	± 0.0056		0.0081	± 7.10E-05		< 3.30E-05		U	0.17	± 0.001	
W-812-1923	17-Dec-03	0.00731	± 4.10E-05		9.329	± 0.202		0.36645	± 0.00207		< 0.00135	± 0	U	7.7926	± 1.40E-05	
W-812-1923	13-Feb-04	0.00724	± 6.30E-05		10.518	± 0.895		0.38649	± 0.00335		< 0.00802	± 0	U	8.29873	± 2.10E-05	
W-812-1923	13-Feb-04	0.00721	± 6.10E-05		10.076	± 0.752		0.3864	± 0.00325		< 0.01045	± 0	U	8.33487	± 2.00E-05	
W-812-1923	20-May-04	0.00697	± 3.70E-05		10.313	± 0.425		0.42723	± 0.00229		< 0.00366		U	9.52843	± 1.30E-05	
W-812-1923	26-Aug-04	0.00726	± 4.70E-05		10.293	± 0.333		0.431	± 0.005		< 0.0003		U	9.225	± 0.081	
W-812-1923	19-Nov-04	0.00718	± 0.0002		10.479	± 0.938		0.417	± 0.016		< 0.0008		U	9.025	± 0.225	
W-812-1923	14-Feb-05	0.00728	± 2.80E-05		11	± 0.16		0.45	± 0.003		< 0.0019		U	9.7	± 0.051	
W-812-1924	6-Feb-04	0.00714	± 6.20E-05		0.401	± 0.024		0.00841	± 7.30E-05		< 0.00033	± 0	U	0.1831	± 2.10E-05	
W-812-1924	13-May-04	0.00697	± 0.00012		< 0.44		U	0.01349	± 0.00024		< 0.00439		U	0.3009	± 4.20E-05	
W-812-1924	26-Aug-04	0.00722	± 0.00013		1.079	± 0.074		0.02	± 0		< 0.0001		U	0.44	± 0.007	
W-812-1924	30-Nov-04	0.00719	± 5.00E-05		1.01	± 0.05		0.0205	± 0.0002		< 0.00019		U	0.444	± 0.002	
W-812-1924	14-Feb-05	0.00722	± 1.50E-05		1.1	± 0.011		0.02	± 9.40E-05		< 8.10E-05		U	0.42	± 0.0018	
W-812-1925	6-Feb-04	0.00724	± 0.00012		< 0.311	± 0	U	0.00605	± 0.0001		< 0.00137	± 0	U	0.1299	± 4.10E-05	
W-812-1925	20-May-04	0.00728	± 0.00016		< 0.103		U	0.009	± 0		< 0.0002		U	0.184	± 0.003	
W-812-1925	1-Sep-04	0.00728	± 9.60E-05		0.225	± 0.017		0.008	± 0		< 4.00E-05		U	0.165	± 0.002	
W-812-1925	19-Nov-04	0.00722	± 8.00E-05		0.21	± 0.02		0.00707	± 0.0001		< 4.00E-05		U	0.1523	± 0.0014	
W-812-1925	11-Feb-05	0.00717	± 4.10E-05		0.21	± 0.0045		0.0056	± 5.00E-05		< 2.70E-05		U	0.14	± 0.00071	
W-812-1926	15-Dec-03	0.00731	± 5.40E-05		1.226	± 0.055		0.03098	± 0.00023		< 0.00024	± 0	U	0.65955	± 1.80E-05	
W-812-1926	6-Feb-04	0.00728	± 3.30E-05		0.829	± 0.059		0.01837	± 8.40E-05		< 0.00051	± 0	U	0.39245	± 1.10E-05	
W-812-1926	13-May-04	0.0071	± 9.70E-05		< 0.529		U	0.01917	± 0.00026		< 0.00532		U	0.41992	± 3.20E-05	
W-812-1926	1-Sep-04	0.00728	± 5.10E-05		1.141	± 0.117		0.029	± 0		< 0.0001		U	0.624	± 0.006	
W-812-1926	19-Nov-04	0.00725	± 9.00E-05		1.3	± 0.09		0.032	± 0.0004		< 0.00029		U	0.686	± 0.004	

Table A-12. Ground and surface water analyses for total uranium and uranium isotopes (pCi/L) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

LOCATION	SAMPLED	Total Uranium pCi/L RESULT	ERROR	QC FLAG*	Uranium 233+234 pCi/L RESULT	ERROR	QC FLAG*	Uranium 235+236 pCi/L RESULT	ERROR	QC FLAG*	Uranium 238 pCi/L RESULT	ERROR	QC FLAG*
W-812-1926	11-Feb-05	1.9	± 0.022										
W-812-1929	13-Feb-04	6.82462	± 0.35577										
W-812-1929	20-May-04	6.09854	± 0.34775										
W-812-1929	1-Sep-04	6.731	± 0.306										
W-812-1929	5-Nov-04	5.751	± 0.275										
W-812-1929	11-Feb-05	6.5	± 0.067										
W-812-1932	6-Feb-04	6.84606	± 0.43471										
W-812-1932	27-May-04	8.26587	± 0.33852										
W-812-1932	1-Sep-04	9.021	± 0.377										
W-812-1932	29-Nov-04	8.19	± 0.15										
W-812-1932	11-Feb-05	8	± 0.049										
W-812-1933	13-Feb-04	0.83526	± 0.09674										
W-812-1933	27-May-04	0.63	± 0.033										
W-812-1933	7-Sep-04	0.866	± 0.034										
W-812-1933	22-Nov-04	0.852	± 0.015										
W-812-1933	11-Feb-05	0.95	± 0.03										
W-812-1937	6-Feb-04	1.66653	± 0.08156										
W-812-1937	27-May-04	3.602	± 0.178										
W-812-1937	27-May-04	3.528	± 0.212										
W-812-1937	7-Sep-04	4.97	± 0.07										
W-812-1937	22-Nov-04	4.92	± 0.05										
W-812-1937	14-Feb-05	4.5	± 0.031										
W-812-1939	13-Feb-04	4.78616	± 0.58687										
W-812-1939	20-May-04	39.4	± 0.642										
W-812-1939	7-Sep-04	41.029	± 0.725										
W-812-1939	22-Nov-04	43.4	± 0.8										
W-812-1939	22-Nov-04	47.9	± 1.1										
W-812-1939	14-Feb-05	53	± 0.42										
W-812-2009	5-Nov-04	4.549	± 0.091										
SPRING6	20-Jul-93	71.63	± 1.3	**	22.2	± 0.71	B	1.63	± 0.19	B	47.8	± 1.04	B
SPRING6	10-Dec-93	6.26	± 0.3	**	3.24	± 0.23		0.2	± 0.06	B	2.82	± 0.21	
SPRING6	21-Apr-94	< 5.75	± 0.2	**	3.34	± 0.18		< 0.12	± 0.04	U	2.29	± 0.15	
SPRING6	19-Dec-94												
SPRING6	28-Mar-95												
SPRING6	22-May-95												
SPRING6	4-Aug-95	6.321	± 0.4	**	3.38	± 0.3	B	0.211	± 0.068	B	2.73	± 0.26	B
SPRING6	30-Oct-95	5.99	± 0.24										
SPRING6	30-Oct-95	< 5.783	± 0.7	**	3.54	± 0.52		< 0.093	± 0.071	U	2.15	± 0.4	
SPRING6	12-Feb-96	5.07	± 0.41										
SPRING6	8-May-96				3.35	± 0.27	OB	0.23	± 0.06	O	2.52	± 0.23	O
SPRING6	26-Aug-96	5.78	± 0.39										
SPRING6	19-Nov-96	6.22	± 0.4										
SPRING6	10-Dec-96	4.68	± 0.28										
SPRING6	13-May-97	6.179	± 0.4	**	3.34	± 0.27	B	0.129	± 0.043	B	2.71	± 0.24	
SPRING6	1-Dec-97	6.818	± 0.4	**	3.84	± 0.31	F	0.208	± 0.059	F	2.77	± 0.25	F
SPRING6	23-Jun-98	< 6.39	± 1.4	**	3.4	± 1.04	B	< 0.29	± 0.23	U	2.7	± 0.87	B
SPRING6	7-Dec-98	6.35	± 1.0	**	3.52	± 0.79		0.17	± 0.1		2.66	± 0.61	
SPRING6	24-May-99	7.8	± 0.2	H									
SPRING6	24-May-99	5.576	± 0.5	**	3.11	± 0.36		0.146	± 0.042		2.32	± 0.28	
SPRING6	9-Nov-99	< 3.94	± 0.3	**	2.17	± 0.26		< 0.1	± 0.033	EU	1.67	± 0.21	
SPRING6	20-Jun-00	2.11649	± 0.03705										
SPRING6	20-Jun-00	4.536	± 0.4	**	2.58	± 0.33		0.116	± 0.044		1.84	± 0.24	
SPRING6	27-Nov-00	5.062	± 0.4	**	2.86	± 0.33		0.132	± 0.041		2.07	± 0.25	
SPRING6	21-May-01	5.05922	± 0.09622										
SPRING6	21-May-01	< 4.75	± 0.4	**	2.69	± 0.32		< 0.1	± 0.029	EU	1.96	± 0.25	
SPRING6	19-Nov-01	4.882	± 0.4	**	2.74	± 0.32		0.102	± 0.032		2.04	± 0.24	
SPRING6	15-May-02	5.154	± 0.4	**	2.93	± 0.35		0.134	± 0.042		2.09	± 0.26	
SPRING6	10-Jun-03	5.14942	± 0.21956										
SPRING6	10-Jun-03	5.501	± 0.5	**	3.06	± 0.36		0.101	± 0.039		2.34	± 0.28	
SPRING6	11-Dec-03	6.886	± 0.6	**	3.7	± 0.43		0.106	± 0.037		3.08	± 0.36	
SPRING6	27-May-04	1.723	± 0.00051										
SPRING6	27-May-04	< 4.62	± 0.4	**	2.55	± 0.31		< 0.1	± 0.034	UE	1.97	± 0.25	
SPRING6	3-Dec-04	6.096	± 0.5	**	3.42	± 0.41		0.146	± 0.051		2.53	± 0.32	

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit
**	Total Uranium calculated outside of database just for this data table

Table A-12. Ground and surface water analyses for total uranium and uranium isotopes (pCi/L) and 235U/238U atom ratios in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Uranium 235/238 (atom ratio)			Uranium 234 by mass measurement pCi/L			Uranium 235 by mass measurement pCi/L			Uranium 236 by mass measurement pCi/L			Uranium 238 by mass measurement pCi/L		
LOCATION	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
W-812-1926	11-Feb-05	0.00728	± 4.70E-05		1.2	± 0.021		0.031	± 0.00026		< 0.00013		U	0.67	± 0.0034	
W-812-1929	13-Feb-04	0.00728	± 7.70E-05		4.051	± 0.356		0.12402	± 0.0013		< 0.00414	± 0	U	2.64996	± 2.60E-05	
W-812-1929	20-May-04	0.00713	± 5.80E-05		3.159	± 0.348		0.12886	± 0.00105		< 0.00431		U	2.81108	± 2.00E-05	
W-812-1929	1-Sep-04	0.00729	± 0.00012		3.778	± 0.303		0.132	± 0.003		< 0.0004		U	2.821	± 0.042	
W-812-1929	5-Nov-04	0.00716	± 0.00011		3.195	± 0.273		0.113	± 0.002		< 0.0004		U	2.444	± 0.038	
W-812-1929	11-Feb-05	0.00729	± 5.10E-05		3.7	± 0.059		0.12	± 0.0017		< 0.00051		U	2.7	± 0.031	
W-812-1932	6-Feb-04	0.00698	± 8.10E-05		4.32	± 0.435		0.10848	± 0.00126		< 0.00438	± 0	U	2.41753	± 2.70E-05	
W-812-1932	27-May-04	0.00688	± 7.70E-05		4.944	± 0.339		0.14066	± 0.00157		< 0.00431		U	3.18105	± 2.60E-05	
W-812-1932	1-Sep-04	0.0071	± 0.00017		5.864	± 0.372		0.138	± 0.004		< 0.007	± 3.00E-05	EU	3.019	± 0.062	
W-812-1932	29-Nov-04	0.007	± 4.50E-05		5.16	± 0.15		0.1308	± 0.0011		< 0.007	± 1.30E-05	EU	2.9	± 0.02	
W-812-1932	11-Feb-05	0.00704	± 2.20E-05		5	± 0.048		0.13	± 0.00067		< 0.0011		U	2.8	± 0.012	
W-812-1933	13-Feb-04	0.00722	± 0.00011		0.563	± 0.097		0.01206	± 0.00018		< 0.00135	± 0	U	0.25996	± 3.70E-05	
W-812-1933	27-May-04	0.00728	± 0.00031		0.401	± 0.032		0.01	± 0.001		< 2.00E-05		EU	0.219	± 0.01	
W-812-1933	7-Sep-04	0.00727	± 6.80E-05		0.553	± 0.033		0.014	± 0		< 0.0001		U	0.3	± 0.004	
W-812-1933	22-Nov-04	0.00726	± 3.90E-05		0.542	± 0.015		0.01386	± 0.00011		< 6.00E-05		U	0.297	± 0.002	
W-812-1933	11-Feb-05	0.00734	± 9.20E-05		0.62	± 0.03		0.015	± 0.00022		< 0.00011		U	0.32	± 0.0024	
W-812-1937	6-Feb-04	0.00703	± 6.30E-05		1.034	± 0.082		0.02734	± 0.00024		< 0.00087	± 0	U	0.60514	± 2.10E-05	
W-812-1937	27-May-04	0.00715	± 9.10E-05		2.131	± 0.177		0.065	± 0.001		< 0.0004		U	1.406	± 0.02	
W-812-1937	27-May-04	0.00716	± 7.20E-05		2.05	± 0.211		0.065	± 0.001		< 0.0003		U	1.413	± 0.02	
W-812-1937	7-Sep-04	0.00718	± 5.30E-05		3.11	± 0.06		0.0819	± 0.0014		< 0.0005		U	1.77	± 0.03	
W-812-1937	22-Nov-04	0.00706	± 3.30E-05		3.04	± 0.05		0.0815	± 0.0006		< 0.0003		U	1.794	± 0.01	
W-812-1937	14-Feb-05	0.00717	± 2.00E-05		2.8	± 0.029		0.075	± 0.00048		< 0.00031		U	1.6	± 0.0094	
W-812-1939	13-Feb-04	0.00725	± 6.10E-05		2.37	± 0.587		0.10761	± 0.0009		< 0.00797	± 0	U	2.30837	± 2.00E-05	
W-812-1939	20-May-04	0.00685	± 6.00E-05		19.887	± 0.587		0.823	± 0.014		< 0.0036		U	18.691	± 0.26	
W-812-1939	7-Sep-04	0.00724	± 5.30E-05		21.929	± 0.712		0.85	± 0.009		< 0.0003		U	18.25	± 0.134	
W-812-1939	22-Nov-04	0.00726	± 6.00E-05		23.1	± 0.7		0.909	± 0.01		< 0.0037		U	19.46	± 0.15	
W-812-1939	22-Nov-04	0.00723	± 2.90E-05		25.2	± 1.1		1.009	± 0.009		< 0.0042		U	21.7	± 0.18	
W-812-1939	14-Feb-05	0.00724	± 4.70E-05		28	± 0.4		1.1	± 0.0098		< 0.0045		U	24	± 0.14	
W-812-2009	5-Nov-04	0.00716	± 6.50E-05		2.604	± 0.088		0.086	± 0.001		< 0.0001		U	1.86	± 0.022	
SPRING6	20-Jul-93															
SPRING6	10-Dec-93															
SPRING6	21-Apr-94															
SPRING6	19-Dec-94	0.00717	± 8.00E-05		3.21	± 0.49		0.117	± 0.002					2.54	± 0.02	
SPRING6	28-Mar-95	0.00673	± 8.00E-05		3.13	± 0.65		0.126	± 0.004		0.003	± 0.003		2.91	± 0.05	B
SPRING6	22-May-95	0.00691	± 0.00013		3.24	± 0.5		0.109	± 0.004			±		2.46	± 0.05	
SPRING6	4-Aug-95															
SPRING6	30-Oct-95	0.00647	± 6.00E-05		3.33	± 0.22		0.107	± 0.003		< 0.0007	± 0	U	2.56	± 0.02	
SPRING6	30-Oct-95															
SPRING6	12-Feb-96	0.00684	± 6.00E-05		2.7	± 0.38		0.1	± 0.003		< 0.0007	± 0	U	2.27	± 0.03	
SPRING6	8-May-96															
SPRING6	26-Aug-96	0.00709	± 7.00E-05		3.52	± 0.33		0.098	± 0.003		< 0.0007	± 0	U	0.216	± 0.05	
SPRING6	19-Nov-96	0.00616	± 7.00E-05		3.3	± 0.37		0.111	± 0.002		0.0027	± 0.0011		2.8	± 0.03	
SPRING6	10-Dec-96	0.00621	± 7.00E-05		2.62	± 0.26		0.079	± 0.001		< 0.0007	± 0	U	1.98	± 0.02	
SPRING6	13-May-97															
SPRING6	1-Dec-97															
SPRING6	23-Jun-98															
SPRING6	7-Dec-98															
SPRING6	24-May-99	0.00736	± 6.00E-05	H	5	± 0.2	H	0.1277	± 0.0012	H	< 0.0007	± 0.0014	HU	2.698	± 0.009	H
SPRING6	24-May-99															
SPRING6	9-Nov-99															
SPRING6	20-Jun-00	0.00695	± 8.40E-05		< 0.062	± 5.827	U	0.09049	± 0.00198		< 0.0007	± 0.01632	U	2.026	± 0.037	
SPRING6	20-Jun-00															
SPRING6	27-Nov-00															
SPRING6	21-May-01	0.00685	± 6.90E-05		2.874	± 0.09		0.09222	± 0.00175		< 0.0007	± 0.00241	U	2.093	± 0.034	
SPRING6	21-May-01															
SPRING6	19-Nov-01															
SPRING6	15-May-02															
SPRING6	10-Jun-03	0.00703	± 8.00E-05		2.99	± 0.21		0.09342	± 0.00308		< 0.0007	± 0.00277	U	2.066	± 0.064	
SPRING6	10-Jun-03															
SPRING6	11-Dec-03															
SPRING6	27-May-04	0.00697	± 4.80E-05		< 0.706		U	0.07396	± 0.00051		< 0.00697		U	1.64904	± 1.60E-05	
SPRING6	27-May-04															
SPRING6	3-Dec-04															

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Table A-13. Ground and surface water analyses for nitrogenous compounds (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water Nitrogenous Compounds
July 27, 2005

Table A-13. Ground and surface water analyses for nitrogenous compounds (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Ammonia Nitrogen as N mg/L		Nitrate and Nitrite as N mg/L		Nitrate and Nitrite as NO3 mg/L		Nitrate as N mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *
NC2-22	2-Mar-90			0.1	P	0.6	P		
NC2-22	9-May-90			0.3	P	1.2	P		
NC2-22	16-Aug-90			< 0.1	P	< 0.4	P		
NC2-22	9-Oct-90	0.5	P			2.7	P		
NC2-23	28-Feb-90			3.1	P	14	P		
NC2-23	7-May-90			2.6	P	11	P		
NC2-23	15-Aug-90			2	P	8.6	P		
NC2-23	9-Oct-90	0.12	P			4.9	P		
NC2-23	20-Jun-00			4.1	L			4.1	
NC2-23	24-Apr-01							4.3	H
NC2-23	13-May-02							5.8	
NC2-23	3-Jun-03							4.6	
W-812-01	29-Sep-00							13	D
W-812-01	30-Oct-03								
W-812-01	13-Feb-04								
W-812-01	26-May-04								
W-812-01	26-May-04							9.6	L
W-812-01	26-May-04								
W-812-01	26-May-04							9	L
W-812-01	25-Aug-04								
W-812-01	5-Nov-04							15	D
W-812-01	11-Feb-05								
W-812-02	28-Sep-00							11	D
W-812-02	30-Oct-03								
W-812-02	13-Feb-04								
W-812-02	26-May-04								
W-812-02	26-May-04							7.6	L
W-812-02	25-Aug-04								
W-812-02	5-Nov-04								
W-812-02	11-Feb-05								
W-812-03	28-Aug-00							0.8	
W-812-03	13-Nov-03								
W-812-03	30-Jan-04								
W-812-03	26-May-04								
W-812-03	26-May-04							0.1	L
W-812-03	25-Aug-04								
W-812-03	30-Nov-04								
W-812-03	9-Feb-05								
W-812-03	9-Feb-05								
W-812-04	26-Mar-01							< 0.1	HLU
W-812-04	13-Nov-03								
W-812-04	13-Feb-04								
W-812-04	27-May-04								
W-812-04	27-May-04							< 0.1	LU
W-812-04	25-Aug-04								
W-812-04	9-Feb-05								
W-812-07	28-Aug-00							3.4	
W-812-07	30-Sep-02			1.5	HL			1.2	H
W-812-07	28-May-03							26	
W-812-07	18-Aug-03							10	DH
W-812-07	30-Oct-03								
W-812-07	30-Jan-04								
W-812-07	1-Jun-04								
W-812-07	1-Jun-04								
W-812-07	26-Aug-04								
W-812-07	9-Feb-05								
W-812-08	28-Aug-00							7.3	
W-812-08	13-Nov-03								
W-812-08	30-Jan-04								
W-812-08	1-Jun-04								
W-812-08	1-Jun-04							11	D

Table A-13. Ground and surface water analyses for nitrogenous compounds (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Nitrite as N mg/L		Nitrite as NO2 mg/L		Nitrate as NO3 mg/L		Total Kjeldahl Nitrogen mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *
NC2-22	2-Mar-90								
NC2-22	9-May-90								
NC2-22	16-Aug-90								
NC2-22	9-Oct-90							< 0.5	P
NC2-23	28-Feb-90								
NC2-23	7-May-90								
NC2-23	15-Aug-90								
NC2-23	9-Oct-90							< 0.5	P
NC2-23	20-Jun-00	< 0.02	U			18			
NC2-23	24-Apr-01	< 0.1	HU			20	H		
NC2-23	13-May-02	< 0.1	U			26			
NC2-23	3-Jun-03	< 0.1	U			20			
W-812-01	29-Sep-00	0.7				58	D		
W-812-01	30-Oct-03					82	D		
W-812-01	13-Feb-04					< 0.1	U		
W-812-01	26-May-04					43			
W-812-01	26-May-04	< 0.1	U						
W-812-01	26-May-04					40			
W-812-01	26-May-04	< 0.1	U						
W-812-01	25-Aug-04					64	D		
W-812-01	5-Nov-04					65	D		
W-812-01	11-Feb-05					73	D		
W-812-02	28-Sep-00	< 0.1	U			49	D		
W-812-02	30-Oct-03					66	D		
W-812-02	13-Feb-04					74	D		
W-812-02	26-May-04					34			
W-812-02	26-May-04	< 0.1	U						
W-812-02	25-Aug-04					61	D		
W-812-02	5-Nov-04					53	D		
W-812-02	11-Feb-05					57	D		
W-812-03	28-Aug-00	< 0.1	U			3.6			
W-812-03	13-Nov-03					34			
W-812-03	30-Jan-04					3			
W-812-03	26-May-04					0.6			
W-812-03	26-May-04	< 0.1	U						
W-812-03	25-Aug-04					< 0.1	U		
W-812-03	30-Nov-04					0.74			
W-812-03	9-Feb-05					1.1			
W-812-03	9-Feb-05					0.75			
W-812-04	26-Mar-01	< 0.1	U			< 0.4	HU		
W-812-04	13-Nov-03					< 0.1	U		
W-812-04	13-Feb-04					< 0.1	U		
W-812-04	27-May-04					< 0.1	U		
W-812-04	27-May-04	< 0.1	U						
W-812-04	25-Aug-04					< 0.1	U		
W-812-04	9-Feb-05					1.1			
W-812-07	28-Aug-00	< 0.1	U			15			
W-812-07	30-Sep-02	0.22				5.5	H		
W-812-07	28-May-03	< 0.1	U			26			
W-812-07	18-Aug-03	< 0.1	HU			46	DH		
W-812-07	30-Oct-03					< 0.1	U		
W-812-07	30-Jan-04					< 0.1	U		
W-812-07	1-Jun-04					21			
W-812-07	1-Jun-04					20			
W-812-07	26-Aug-04					21	D		
W-812-07	9-Feb-05					27			
W-812-08	28-Aug-00	< 0.1	U			33			
W-812-08	13-Nov-03					53	D		
W-812-08	30-Jan-04					< 0.1	U		
W-812-08	1-Jun-04					49	D		
W-812-08	1-Jun-04	< 0.5	DU						

Table A-13. Ground and surface water analyses for nitrogenous compounds (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Ammonia Nitrogen as N mg/L		Nitrate and Nitrite as N mg/L		Nitrate and Nitrite as NO3 mg/L		Nitrate as N mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *
W-812-08	26-Aug-04								
W-812-08	30-Nov-04								
W-812-08	9-Feb-05								
W-812-09	24-Aug-00							6.7	
W-812-09	30-Sep-02			1.4	HL			1.1	H
W-812-09	28-May-03							34	
W-812-09	25-Aug-03							8.3	H
W-812-09	13-Nov-03							13	D
W-812-09	13-Feb-04								
W-812-09	13-Feb-04							7.4	
W-812-09	1-Jun-04								
W-812-09	1-Jun-04							6.4	
W-812-09	26-Aug-04								
W-812-09	9-Feb-05								
W-812-1920	18-Dec-03								
W-812-1920	18-Dec-03							4	
W-812-1920	13-Feb-04								
W-812-1920	13-May-04								
W-812-1920	26-Aug-04								
W-812-1920	29-Nov-04							6.4	D
W-812-1920	29-Nov-04							6.4	
W-812-1921	13-Feb-04								
W-812-1922	6-Feb-04								
W-812-1922	6-Feb-04							< 0.1	U
W-812-1922	13-May-04								
W-812-1922	26-Aug-04								
W-812-1922	19-Nov-04								
W-812-1923	16-Dec-03								
W-812-1923	16-Dec-03							17	D
W-812-1923	13-Feb-04								
W-812-1923	20-May-04								
W-812-1923	26-Aug-04								
W-812-1923	19-Nov-04							13	D
W-812-1924	6-Feb-04								
W-812-1924	13-May-04								
W-812-1924	26-Aug-04								
W-812-1924	30-Nov-04							1.2	
W-812-1925	6-Feb-04								
W-812-1925	20-May-04								
W-812-1925	1-Sep-04								
W-812-1925	19-Nov-04							< 0.1	U
W-812-1925	11-Feb-05								
W-812-1926	15-Dec-03								
W-812-1926	15-Dec-03							< 0.1	U
W-812-1926	6-Feb-04								
W-812-1926	13-May-04								
W-812-1926	1-Sep-04								
W-812-1926	19-Nov-04							0.45	
W-812-1926	11-Feb-05							0.331	
W-812-1929	13-Feb-04								
W-812-1929	20-May-04								
W-812-1929	1-Sep-04								
W-812-1929	5-Nov-04							12	D
W-812-1929	11-Feb-05								
W-812-1932	6-Feb-04								
W-812-1932	27-May-04								
W-812-1932	1-Sep-04								
W-812-1932	29-Nov-04								
W-812-1932	11-Feb-05								
W-812-1933	13-Feb-04								
W-812-1933	13-Feb-04							< 0.1	U

Table A-13. Ground and surface water analyses for nitrogenous compounds (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Nitrite as N mg/L		Nitrite as NO2 mg/L		Nitrate as NO3 mg/L		Total Kjeldahl Nitrogen mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *
W-812-08	26-Aug-04					50	D		
W-812-08	30-Nov-04					45	D		
W-812-08	9-Feb-05					55			
W-812-09	24-Aug-00	< 0.1	U			30			
W-812-09	30-Sep-02	0.23				5	H		
W-812-09	28-May-03	< 0.1	U			34			
W-812-09	25-Aug-03	< 0.1	UH			37	H		
W-812-09	13-Nov-03					58	D		
W-812-09	13-Feb-04					33			
W-812-09	13-Feb-04	< 0.1	U						
W-812-09	1-Jun-04					28			
W-812-09	1-Jun-04	< 0.1	U						
W-812-09	26-Aug-04					26	D		
W-812-09	9-Feb-05					35			
W-812-1920	18-Dec-03					18			
W-812-1920	18-Dec-03	< 0.1	U						
W-812-1920	13-Feb-04					40			
W-812-1920	13-May-04					24			
W-812-1920	26-Aug-04					29	D		
W-812-1920	29-Nov-04	< 0.1	LU			28	D		
W-812-1920	29-Nov-04	< 0.1	LU			28			
W-812-1921	13-Feb-04					< 0.1	U		
W-812-1922	6-Feb-04					< 0.1	U		
W-812-1922	6-Feb-04	< 0.1	U						
W-812-1922	13-May-04					< 0.1	U		
W-812-1922	26-Aug-04					3.5			
W-812-1922	19-Nov-04	< 0.1	LOU			0.58			
W-812-1923	16-Dec-03					75	D		
W-812-1923	16-Dec-03	< 0.1	U						
W-812-1923	13-Feb-04					< 0.1	U		
W-812-1923	20-May-04					64	DL		
W-812-1923	26-Aug-04					71	D		
W-812-1923	19-Nov-04	< 0.1	LOU			56	D		
W-812-1924	6-Feb-04					1.8			
W-812-1924	13-May-04					11			
W-812-1924	26-Aug-04					9.5			
W-812-1924	30-Nov-04	< 0.1	U						
W-812-1925	6-Feb-04					3			
W-812-1925	20-May-04					< 0.1	LU		
W-812-1925	1-Sep-04					0.1	L		
W-812-1925	19-Nov-04	< 0.1	LOU			0.15			
W-812-1925	11-Feb-05					0.26			
W-812-1926	15-Dec-03					< 0.1	U		
W-812-1926	15-Dec-03	0.2							
W-812-1926	6-Feb-04					2.3			
W-812-1926	13-May-04					2.8			
W-812-1926	1-Sep-04					1.8	L		
W-812-1926	19-Nov-04	< 0.1	LOU			2			
W-812-1926	11-Feb-05					1.466			
W-812-1929	13-Feb-04					77			
W-812-1929	20-May-04					44	DL		
W-812-1929	1-Sep-04					43	DL		
W-812-1929	5-Nov-04	< 0.1	U						
W-812-1929	11-Feb-05					53	D		
W-812-1932	6-Feb-04					23			
W-812-1932	27-May-04					25	HL		
W-812-1932	1-Sep-04					12	L		
W-812-1932	29-Nov-04	< 0.1	LU			19	D		
W-812-1932	11-Feb-05					22			
W-812-1933	13-Feb-04					< 0.1	U		
W-812-1933	13-Feb-04	< 0.1	U						

Table A-13. Ground and surface water analyses for nitrogenous compounds (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Ammonia Nitrogen as N mg/L		Nitrate and Nitrite as N mg/L		Nitrate and Nitrite as NO3 mg/L		Nitrate as N mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *
W-812-1933	27-May-04								
W-812-1933	7-Sep-04								
W-812-1933	22-Nov-04							1.5	
W-812-1933	11-Feb-05							1.513	
W-812-1937	6-Feb-04								
W-812-1937	27-May-04								
W-812-1937	27-May-04								
W-812-1937	7-Sep-04								
W-812-1937	22-Nov-04							3.7	
W-812-1939	13-Feb-04								
W-812-1939	20-May-04								
W-812-1939	7-Sep-04								
W-812-1939	22-Nov-04							2.6	
W-812-1939	22-Nov-04								
W-812-2009	5-Nov-04								
W-812-2009	22-Feb-05							9	
SPRING6**	11-Jul-89					18	P		
SPRING6	29-Sep-93							3.7	
SPRING6	21-Apr-94							< 5	DU
SPRING6**	25-Jan-95							4.3	
SPRING6	22-May-95								
SPRING6	4-Aug-95								
SPRING6	30-Oct-95								
SPRING6	1-Dec-97								
SPRING6	23-Jun-98								
SPRING6	7-Dec-98								
SPRING6	24-May-99								
SPRING6	9-Nov-99								
SPRING6	20-Jun-00								
SPRING6	27-Nov-00								
SPRING6	21-May-01								
SPRING6	15-May-02								
SPRING6	11-Dec-03								

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

** Sample stored with location name 812CRK.

Table A-13. Ground and surface water analyses for nitrogenous compounds (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Nitrite as N mg/L		Nitrite as NO2 mg/L		Nitrate as NO3 mg/L		Total Kjeldahl Nitrogen mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *	RESULT	QC FLAG *
W-812-1933	27-May-04					3.5	HL		
W-812-1933	7-Sep-04					7			
W-812-1933	22-Nov-04	< 0.1	U			6.4			
W-812-1933	11-Feb-05					6.702			
W-812-1937	6-Feb-04					69	D		
W-812-1937	27-May-04					75	DHL		
W-812-1937	27-May-04					38	DHL		
W-812-1937	7-Sep-04					35			
W-812-1937	22-Nov-04	< 0.1	U						
W-812-1939	13-Feb-04					7			
W-812-1939	20-May-04					14	DL		
W-812-1939	7-Sep-04					14			
W-812-1939	22-Nov-04	< 0.1	U						
W-812-1939	22-Nov-04	< 0.1	U						
W-812-2009	5-Nov-04					34			
W-812-2009	22-Feb-05	< 0.1	U						
SPRING6**	11-Jul-89								
SPRING6	29-Sep-93					16.391			
SPRING6	21-Apr-94					< 22.15	DU		
SPRING6**	25-Jan-95					19.049			
SPRING6	22-May-95					19	D		
SPRING6	4-Aug-95					19	DH		
SPRING6	30-Oct-95					18			
SPRING6	1-Dec-97					21			
SPRING6	23-Jun-98					43			
SPRING6	7-Dec-98					25			
SPRING6	24-May-99					< 0.5	SU		
SPRING6	9-Nov-99					48	DS		
SPRING6	20-Jun-00					23.9			
SPRING6	27-Nov-00					21	D		
SPRING6	21-May-01					11			
SPRING6	15-May-02					28			
SPRING6	11-Dec-03					12.8			

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Table A-14. Ground and surface water analyses for perchlorate (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water Perchlorate
July 27, 2005

Table A-14. Ground and surface water analyses for perchlorate (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Perchlorate (ug/L)	
LOCATION	SAMPLED	RESULT	QC FLAG*
W-812-01	29-Sep-00	8.1	
W-812-01	13-Feb-04	< 4	U
W-812-01	26-May-04	6	
W-812-01	26-May-04	6	
W-812-01	25-Aug-04	< 4	U
W-812-01	5-Nov-04	< 4	U
W-812-01	11-Feb-05	< 4	U
W-812-02	28-Sep-00	< 4	U
W-812-02	13-Feb-04	< 4	U
W-812-02	26-May-04	< 4	U
W-812-02	25-Aug-04	< 4	U
W-812-02	5-Nov-04	< 4	U
W-812-02	11-Feb-05	< 4	U
W-812-03	28-Aug-00	< 4	U
W-812-03	26-May-04	< 4	U
W-812-03	25-Aug-04	< 4	U
W-812-03	30-Nov-04	< 4	U
W-812-03	9-Feb-05	< 4	U
W-812-03	9-Feb-05	< 4	U
W-812-04	26-Mar-01	< 4	U
W-812-04	27-May-04	< 4	U
W-812-04	25-Aug-04	< 4	U
W-812-04	19-Nov-04	< 4	U
W-812-04	9-Feb-05	< 4	U
W-812-07	28-Aug-00	< 4	U
W-812-07	30-Sep-02	< 3	U
W-812-07	28-May-03	< 4	U
W-812-07	18-Aug-03	< 4	HLU
W-812-07	30-Oct-03	< 4	HU
W-812-07	30-Jan-04	< 4	U
W-812-07	1-Jun-04	< 4	U
W-812-07	1-Jun-04	< 4	U
W-812-07	26-Aug-04	< 4	U
W-812-07	19-Nov-04	< 4	U
W-812-07	9-Feb-05	21	
W-812-08	28-Aug-00	< 4	U
W-812-08	1-Jun-04	< 4	U
W-812-08	26-Aug-04	< 4	U
W-812-08	30-Nov-04	< 4	U
W-812-08	9-Feb-05	< 4	U
W-812-09	24-Aug-00	< 4	U
W-812-09	28-May-03	< 4	U
W-812-09	25-Aug-03	< 4	HU
W-812-09	13-Nov-03	< 4	U
W-812-09	13-Feb-04	< 4	U
W-812-09	1-Jun-04	< 4	U

Table A-14. Ground and surface water analyses for perchlorate (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Perchlorate (ug/L)	
LOCATION	SAMPLED	RESULT	QC FLAG*
W-812-09	26-Aug-04	< 4	U
W-812-09	19-Nov-04	< 4	U
W-812-09	9-Feb-05	< 4	U
W-812-1920	18-Dec-03	< 4	U
W-812-1920	13-Feb-04	< 4	U
W-812-1920	13-May-04	< 4	U
W-812-1920	26-Aug-04	< 4	U
W-812-1920	29-Nov-04	< 4	U
W-812-1920	29-Nov-04	< 4	U
W-812-1920	14-Feb-05	< 4	U
W-812-1921	13-Feb-04	< 4	U
W-812-1922	13-May-04	< 4	U
W-812-1922	26-Aug-04	< 4	U
W-812-1922	19-Nov-04	< 4	U
W-812-1922	14-Feb-05	< 4	U
W-812-1923	16-Dec-03	10	
W-812-1923	13-Feb-04	11	
W-812-1923	20-May-04	10	
W-812-1923	26-Aug-04	< 4	U
W-812-1923	19-Nov-04	10	
W-812-1923	14-Feb-05	10	
W-812-1924	13-May-04	< 4	U
W-812-1924	26-Aug-04	10	
W-812-1924	30-Nov-04	< 4	U
W-812-1924	14-Feb-05	< 4	U
W-812-1925	20-May-04	< 4	U
W-812-1925	1-Sep-04	< 4	U
W-812-1925	19-Nov-04	< 4	U
W-812-1925	11-Feb-05	< 4	U
W-812-1926	15-Dec-03	< 4	U
W-812-1926	13-May-04	< 4	U
W-812-1926	1-Sep-04	< 4	U
W-812-1926	19-Nov-04	< 4	U
W-812-1926	11-Feb-05	< 4	U
W-812-1929	13-Feb-04	< 4	U
W-812-1929	20-May-04	< 4	U
W-812-1929	1-Sep-04	< 4	U
W-812-1929	5-Nov-04	< 4	U
W-812-1929	11-Feb-05	< 4	U
W-812-1932	27-May-04	< 4	U
W-812-1932	1-Sep-04	< 4	U
W-812-1932	29-Nov-04	< 4	U
W-812-1932	11-Feb-05	< 4	U
W-812-1933	13-Feb-04	< 4	U
W-812-1933	27-May-04	< 4	U
W-812-1933	7-Sep-04	< 4	U
W-812-1933	22-Nov-04	< 4	U
W-812-1933	11-Feb-05	< 4	U
W-812-1937	27-May-04	< 4	U
W-812-1937	27-May-04	< 4	U
W-812-1937	7-Sep-04	< 4	U
W-812-1937	22-Nov-04	4.4	
W-812-1937	14-Feb-05	< 4	U
W-812-1939	13-Feb-04	< 4	U

Table A-14. Ground and surface water analyses for perchlorate (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Perchlorate (ug/L)	
LOCATION	SAMPLED	RESULT	QC FLAG*
W-812-1939	20-May-04	< 4	U
W-812-1939	7-Sep-04	< 4	U
W-812-1939	22-Nov-04	< 4	U
W-812-1939	22-Nov-04	< 4	U
W-812-1939	14-Feb-05	< 4	U
W-812-2009	5-Nov-04	< 4	U
W-812-2009	22-Feb-05	< 4	U
SPRING6	20-Jun-00	< 4	U
SPRING6	15-May-02	< 4	U
SPRING6	10-Jun-03	< 4	U
SPRING6	11-Dec-03	< 4	U
SPRING6	27-May-04	< 4	U
SPRING6	3-Dec-04	< 4	EU

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

Table A-15. Ground and surface water analyses for high explosive compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water High Explosive Compounds
July 27, 2005

Table A-15. Ground and surface water analyses for high explosive compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		HMX ug/L		RDX ug/L		TNT ug/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
NC2-22	9-Oct-90	< 20	P	< 30	P	< 30	P
NC2-22	9-Oct-91	< 20	P	< 30	P	< 30	P
NC2-23	9-Oct-90	< 20	P	< 30	P	< 30	P
NC2-23	9-Oct-91	< 20	P	< 30	P	< 30	P
NC2-23	20-Jun-00	< 5	U	< 5	U		
NC2-23	24-Apr-01	< 1	U	< 1	U		
NC2-23	13-May-02	< 1	LOU	< 1	LOU		
NC2-23	3-Jun-03	< 1	U	< 1	U		
W-812-01	29-Sep-00	< 2	OU	< 2	OU		
W-812-01	30-Oct-03	< 1	U	< 1	U		
W-812-01	13-Feb-04	< 1	U	< 1	U		
W-812-01	26-May-04	< 1	U	< 1	U		
W-812-01	26-May-04	< 1	U	< 1	U		
W-812-02	28-Sep-00	3	O	< 1	OU		
W-812-02	30-Oct-03	4		< 1	U		
W-812-02	13-Feb-04	4		< 1	U		
W-812-02	26-May-04	< 1	U	< 1	U		
W-812-03	28-Aug-00	< 1	U	< 1	U		
W-812-03	26-May-04	< 1	U	< 1	U		
W-812-04	26-Mar-01	< 1	U	< 1	U		
W-812-04	27-May-04	< 1	U	< 1	U		
W-812-07	28-Aug-00	< 1	U	< 1	U		
W-812-07	30-Sep-02	< 5	U	< 5	U		
W-812-07	28-May-03	< 1	U	< 1	U		
W-812-07	18-Aug-03	< 1	U	< 1	U		
W-812-07	30-Oct-03	< 1	U	< 1	U		
W-812-07	30-Jan-04	< 1	U	< 1	U		
W-812-07	1-Jun-04	< 1	U	< 1	U		
W-812-07	1-Jun-04	< 1	U	< 1	U		
W-812-08	28-Aug-00	< 1	U	< 1	U		
W-812-08	1-Jun-04	< 1	U	< 1	U		
W-812-09	24-Aug-00	< 1	U	< 1	U		
W-812-09	28-May-03	< 1	U	< 1	U		
W-812-09	25-Aug-03	< 1	U	< 1	U		
W-812-09	13-Nov-03	< 1	U	< 1	U		
W-812-09	13-Feb-04	< 1	U	< 1	U		
W-812-09	1-Jun-04	< 1	U	< 1	U		
W-812-1920	18-Dec-03	< 1	U	< 1	U		
W-812-1920	29-Nov-04	< 1	U	< 1	U		
W-812-1920	29-Nov-04	< 1	U	< 1	U		
W-812-1922	6-Feb-04	< 1	U	< 1	U		
W-812-1922	19-Nov-04	< 1	U	< 1	U		
W-812-1923	17-Dec-03	< 1	U	< 1	U		
W-812-1923	19-Nov-04	< 1	U	< 1	U		
W-812-1924	30-Nov-04	< 1	U	< 1	U		
W-812-1925	19-Nov-04	< 1	U	< 1	U		
W-812-1926	15-Dec-03	< 1	U	< 1	U		
W-812-1926	19-Nov-04	< 1	U	< 1	U		
W-812-1929	5-Nov-04	< 1	U	< 1	U		
W-812-1932	29-Nov-04	< 1	U	< 1	U		
W-812-1933	13-Feb-04	< 1	U	< 1	U		

Table A-15. Ground and surface water analyses for high explosive compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		HMX ug/L		RDX ug/L		TNT ug/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-1933	22-Nov-04	< 1	U	< 1	U		
W-812-1937	22-Nov-04	< 1	U	< 1	U		
W-812-1939	22-Nov-04	< 1	U	< 1	U		
W-812-1939	22-Nov-04	< 1	U	< 1	U		
SPRING6**	11-Jul-89	< 20	P	< 20	P	< 20	P
SPRING6	29-Sep-93	< 20	U	< 30	U	< 30	U
SPRING6	21-Apr-94	< 10	U	< 10	U	< 5	U
SPRING6**	24-Jan-95	< 10	U	< 15	U	< 15	U
SPRING6	22-May-95	< 5	U	< 5	U	< 5	U
SPRING6	4-Aug-95	< 5	U	< 5	U		
SPRING6	30-Oct-95	< 5	U	< 5	U	< 5	U
SPRING6	19-Nov-96	< 5	U	< 5	U		
SPRING6	13-May-97	< 5	U	< 5	U		
SPRING6	1-Dec-97	< 5	U	< 5	U		
SPRING6	23-Jun-98	< 5	U	< 5	U		
SPRING6	7-Dec-98	< 5	U	< 5	U		
SPRING6	24-May-99	< 1	U	< 1	U		
SPRING6	9-Nov-99	< 1	U	< 1	U		
SPRING6	20-Jun-00	< 5	U	< 5	U		
SPRING6	27-Nov-00	< 1	LU	< 1	LU		
SPRING6	21-May-01	< 1	U	< 1	U		
SPRING6	19-Nov-01	< 2	LOU	< 2	LOU		
SPRING6	15-May-02	< 1	LOU	< 1	LOU		
SPRING6	10-Jun-03	< 5	U	< 5	U		
SPRING6	11-Dec-03	< 5	U	< 5	U		
SPRING6	27-May-04	< 5	U	< 5	U		
SPRING6	3-Dec-04	< 5	U	< 5	U		

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

** Sample stored with location name 812CRK.

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Table A-16a. Ground and surface water analyses for metals and cations (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water Cations
July 27, 2005

Table A-16a. Ground and surface water analyses for metals and cations (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Sodium mg/L		Potassium mg/L		Calcium mg/L		Magnesium mg/L		Iron mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
NC2-22	2-Mar-90	150	P	13	P	20	P	8.5	P	1.8	P
NC2-22	2-Mar-90										
NC2-22	9-May-90	150	P	9	P	20	P	7.8	P	< 0.04	P
NC2-22	9-May-90										
NC2-22	16-Aug-90	160	P	6	P	18	P	6.8	P	< 0.1	P
NC2-22	9-Oct-90	160	P								
NC2-22	7-Jun-94										
NC2-23	28-Feb-90	100	P	5.2	P	31	P	18	P	0.2	P
NC2-23	28-Feb-90										
NC2-23	7-May-90	90	P	5	P	34	P	19	P	< 0.04	P
NC2-23	7-May-90										
NC2-23	15-Aug-90	89	P	5	P	34	P	19	P	< 0.1	P
NC2-23	9-Oct-90	96	P								
NC2-23	7-Jun-94										
NC2-23	20-Jun-00	91		5.2		34		20		< 0.05	U
NC2-23	24-Apr-01	83	H	7	H	31	H	17	H	< 0.1	HU
NC2-23	13-May-02	87		8		31		17		< 0.1	LU
NC2-23	3-Jun-03	93	H	8	H	32	H	18	H	< 0.1	HU
W-812-01	29-Sep-00	79		8		30		23		< 0.1	U
W-812-01	13-Feb-04										
W-812-01	26-May-04	80		8		33		25		< 0.1	U
W-812-01	26-May-04	79		8		33		25		< 0.1	U
W-812-02	28-Sep-00	55		7		30		24		< 0.1	U
W-812-02	13-Feb-04										
W-812-02	26-May-04	45		12		29		21		< 0.1	U
W-812-03	28-Aug-00	85		15		14		13		< 0.1	LU
W-812-03	30-Jan-04										
W-812-03	26-May-04	61		7		65		< 0.5	U	< 0.1	U
W-812-04	26-Mar-01	220	DH	15	H	39	H	5.8	H	< 0.1	HU
W-812-04	13-Feb-04										
W-812-04	27-May-04	250	D	15		47		7.1		< 0.1	U
W-812-07	28-Aug-00	310	D	18		17		13		< 0.1	LU
W-812-07	30-Sep-02	330		5.3		29		11		< 0.05	U
W-812-07	28-May-03	250	D	8		17		7		< 0.1	LU
W-812-07	18-Aug-03	240	DHL	8	LH	19	H	7.6	H	< 0.1	HU
W-812-07	30-Jan-04										
W-812-08	28-Aug-00	55		2		41		21		< 0.1	LU
W-812-08	30-Jan-04										
W-812-08	1-Jun-04	52	L	2	L	47		23		< 0.1	U
W-812-09	24-Aug-00	280	DL	12	L	17		9.8		< 0.1	U
W-812-09	30-Sep-02	280		4.1		15		7.6		< 0.05	U
W-812-09	28-May-03	240	D	7		12		6.1		< 0.1	LU
W-812-09	25-Aug-03	230	DLH	7	LH	12	H	6.2	H	< 0.1	UH
W-812-09	13-Nov-03	240	D	8	L	13		6.4		< 0.1	U
W-812-09	13-Feb-04	240	D	8	L	12		6.4		0.3	
W-812-09	13-Feb-04										
W-812-09	1-Jun-04	230	DL	8	L	13		6.3		< 0.1	U
W-812-1920	18-Dec-03	290	D	15		29	B	13		1	
W-812-1920	13-Feb-04										
W-812-1920	29-Nov-04	330	D	14		35		11		0.82	
W-812-1920	29-Nov-04	340	D	15		38		12		5.2	
W-812-1921	13-Feb-04										
W-812-1922	6-Feb-04	120	D	12	L	71		20		< 0.1	U
W-812-1922	6-Feb-04										
W-812-1922	19-Nov-04	130	DLO	10		51		9.8		< 0.1	U
W-812-1923	16-Dec-03	500	D	26	BL	81		29		< 0.1	U
W-812-1923	13-Feb-04										
W-812-1923	19-Nov-04	520	DLO	26		82		28		< 0.1	U
W-812-1924	6-Feb-04										
W-812-1924	30-Nov-04	270	D	10		25		5.8		< 0.1	U
W-812-1925	6-Feb-04										
W-812-1925	19-Nov-04	86	LO	7.4		36		17		< 0.1	U
W-812-1926	15-Dec-03	260	D	14	BL	25		15		< 0.1	U

Table A-16a. Ground and surface water analyses for metals and cations (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Manganese mg/L		Copper mg/L		Zinc mg/L		Strontium mg/L		Aluminum mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
NC2-22	2-Mar-90	0.12	P	0.22	P	0.11	P				
NC2-22	2-Mar-90							0.17	P	1	P
NC2-22	9-May-90	< 0.04	P	< 0.08	P	< 0.05	P				
NC2-22	9-May-90							< 0.05	P	2.7	P
NC2-22	16-Aug-90	0.04	P	< 0.05	P	< 0.05	P				
NC2-22	9-Oct-90										
NC2-22	7-Jun-94			0.0047		0.0134					
NC2-23	28-Feb-90	0.06	P	0.12	P	0.11	P				
NC2-23	28-Feb-90							0.17	P	0.8	P
NC2-23	7-May-90	< 0.04	P	< 0.08	P	< 0.05	P				
NC2-23	7-May-90							< 0.05	P	1.6	P
NC2-23	15-Aug-90	< 0.04	P	< 0.05	P	< 0.05	P				
NC2-23	9-Oct-90										
NC2-23	7-Jun-94			0.009		0.0683					
NC2-23	20-Jun-00	< 0.01	U	< 0.01	U	< 0.05	U			< 0.05	U
NC2-23	24-Apr-01	< 0.03	HLU	< 0.05	HU	< 0.05	HU			< 0.2	HU
NC2-23	13-May-02	< 0.03	LU	< 0.05	U	< 0.05	U			< 0.2	U
NC2-23	3-Jun-03	0.04	H	< 0.05	HU	< 0.05	HU			< 0.2	HU
W-812-01	29-Sep-00	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-01	13-Feb-04			< 0.01	U	< 0.02	U				
W-812-01	26-May-04	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-01	26-May-04	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-02	28-Sep-00	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-02	13-Feb-04			< 0.01	U	< 0.02	U				
W-812-02	26-May-04	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-03	28-Aug-00	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-03	30-Jan-04			< 0.01	U	< 0.02	U				
W-812-03	26-May-04	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-04	26-Mar-01	0.05	H	< 0.05	HU	< 0.05	HU			< 0.2	HU
W-812-04	13-Feb-04			< 0.01	U	< 0.02	U				
W-812-04	27-May-04	0.09		< 0.05	U	< 0.05	U			< 0.2	U
W-812-07	28-Aug-00	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-07	30-Sep-02	0.011		< 0.01	U	< 0.05	U			< 0.05	U
W-812-07	28-May-03	< 0.03	LU	< 0.05	U	< 0.05	LU			< 0.2	U
W-812-07	18-Aug-03	< 0.03	HU	< 0.05	HU	< 0.05	HU			< 0.2	HU
W-812-07	30-Jan-04			< 0.01	U	< 0.02	U				
W-812-08	28-Aug-00	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-08	30-Jan-04			< 0.01	U	< 0.02	U				
W-812-08	1-Jun-04	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-09	24-Aug-00	< 0.03	U	< 0.05	LU	< 0.05	U			< 0.2	U
W-812-09	30-Sep-02	< 0.01	U	< 0.01	U	< 0.05	U			< 0.05	U
W-812-09	28-May-03	< 0.03	LU	< 0.05	U	< 0.05	LU			< 0.2	U
W-812-09	25-Aug-03	< 0.03	UH	< 0.05	LUH	< 0.05	UH			< 0.2	UH
W-812-09	13-Nov-03	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-09	13-Feb-04	< 0.03	U	< 0.05	U	< 0.05	U			0.5	
W-812-09	13-Feb-04			< 0.01	U	< 0.02	U				
W-812-09	1-Jun-04	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-1920	18-Dec-03	0.04		< 0.05	U	< 0.05	U			1.6	
W-812-1920	13-Feb-04			< 0.01	U	0.04					
W-812-1920	29-Nov-04	< 0.03	U	< 0.01	U	0.021				0.97	J
W-812-1920	29-Nov-04	0.11		< 0.01	U	0.036				6.2	J
W-812-1921	13-Feb-04			< 0.01	U	< 0.02	U				
W-812-1922	6-Feb-04	0.06		< 0.05	U	< 0.05	U			< 0.2	U
W-812-1922	6-Feb-04			< 0.01	U	< 0.02	U				
W-812-1922	19-Nov-04	< 0.03	U	< 0.01	U	0.029					
W-812-1923	16-Dec-03	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-1923	13-Feb-04			< 0.01	U	< 0.02	U				
W-812-1923	19-Nov-04	< 0.03	U	< 0.01	U	< 0.02	U				
W-812-1924	6-Feb-04			< 0.01	U	< 0.02	U				
W-812-1924	30-Nov-04	< 0.03	U	< 0.01	U	0.021				0.08	J
W-812-1925	6-Feb-04			< 0.01	U	< 0.02	U				
W-812-1925	19-Nov-04	< 0.03	U	< 0.01	U	< 0.02	U				
W-812-1926	15-Dec-03	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U

Table A-16a. Ground and surface water analyses for metals and cations (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Sodium mg/L		Potassium mg/L		Calcium mg/L		Magnesium mg/L		Iron mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-1926	6-Feb-04										
W-812-1926	19-Nov-04	250	DLO	13		26		13		< 0.1	U
W-812-1929	13-Feb-04										
W-812-1929	5-Nov-04	100		8.7		27		17		< 0.1	U
W-812-1932	6-Feb-04										
W-812-1932	29-Nov-04	68		6.5		51		25		< 0.1	U
W-812-1933	13-Feb-04	150	D	13	L	16		7.8		< 0.1	U
W-812-1933	13-Feb-04										
W-812-1933	22-Nov-04	160	D	19		15		7.4		0.26	
W-812-1937	6-Feb-04										
W-812-1937	22-Nov-04	120	D	9.6		40		20		< 0.1	U
W-812-1939	13-Feb-04										
W-812-1939	22-Nov-04	370	D	21		77		20		< 0.1	U
W-812-1939	22-Nov-04	370	D	20		84		21		< 0.1	U
W-812-2009	2-Mar-04										
W-812-2009	22-Feb-05	29		4.2		48		25		< 0.1	U
SPRING6**	13-Jan-88										
SPRING6**	11-May-88										
SPRING6**	12-Oct-88										
SPRING6**	19-Jan-89										
SPRING6**	12-Apr-89										
SPRING6**	11-Jul-89	78	P	4.8	P	50	P	24	P	0.15	P
SPRING6**	17-Oct-89										
SPRING6**	8-Jan-90										
SPRING6**	20-Apr-90										
SPRING6**	18-Jul-90										
SPRING6**	3-Oct-90										
SPRING6**	7-Jan-91										
SPRING6**	4-Apr-91										
SPRING6**	3-Oct-91										
SPRING6**	14-Jan-92										
SPRING6**	30-Apr-92										
SPRING6**	21-Jul-92										
SPRING6**	6-Oct-92										
SPRING6**	17-Feb-93										
SPRING6**	21-Apr-93										
SPRING6**	13-Aug-93										
SPRING6	29-Sep-93	84		6.1		48		27		< 0.1	U
SPRING6**	12-Oct-93										
SPRING6**	19-Jan-94										
SPRING6**	8-Apr-94										
SPRING6	21-Apr-94	78		6		51		28		< 0.1	U
SPRING6**	16-Aug-94										
SPRING6**	26-Oct-94										
SPRING6**	25-Jan-95	72		6.6		46		23		< 0.1	U
SPRING6	22-May-95	80		5.6		49		28		< 0.1	U
SPRING6	4-Aug-95	81	H	5.7	H	53	H	29	H	< 0.1	UH
SPRING6	30-Oct-95	89		6.3		53		30		< 0.1	U
SPRING6	16-Sep-96										
SPRING6	19-Nov-96										
SPRING6	13-May-97										
SPRING6	1-Dec-97										
SPRING6	23-Jun-98			5.3							
SPRING6	23-Jun-98										
SPRING6	7-Dec-98			4.5							
SPRING6	7-Dec-98										
SPRING6	24-May-99			6.7							
SPRING6	24-May-99										
SPRING6	9-Nov-99			4.8							
SPRING6	9-Nov-99										
SPRING6	20-Jun-00			5.8							
SPRING6	20-Jun-00										
SPRING6	27-Nov-00			7							

Table A-16a. Ground and surface water analyses for metals and cations (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Manganese mg/L		Copper mg/L		Zinc mg/L		Strontium mg/L		Aluminum mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-1926	6-Feb-04			< 0.01	U	< 0.02	U				
W-812-1926	19-Nov-04	< 0.03	U	< 0.01	U	< 0.02	U				
W-812-1929	13-Feb-04			< 0.01	U	< 0.02	U				
W-812-1929	5-Nov-04	< 0.03	U	< 0.01	U	< 0.02	U			0.06	J
W-812-1932	6-Feb-04			< 0.01	U	0.03					
W-812-1932	29-Nov-04	< 0.03	U	< 0.01	U	< 0.02	U			0.14	J
W-812-1933	13-Feb-04	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
W-812-1933	13-Feb-04			< 0.01	U	< 0.02	U				
W-812-1933	22-Nov-04	< 0.03	U	< 0.01	U	< 0.02	U			0.07	J
W-812-1937	6-Feb-04			< 0.01	U	< 0.02	U				
W-812-1937	22-Nov-04	< 0.03	U	< 0.01	U	< 0.02	U				
W-812-1939	13-Feb-04			0.03		0.05					
W-812-1939	22-Nov-04	< 0.03	U	0.016		< 0.02	U			0.06	J
W-812-1939	22-Nov-04	< 0.03	U	0.024		< 0.02	U			0.14	J
W-812-2009	2-Mar-04			< 0.01	U	< 0.02	U				
W-812-2009	22-Feb-05	< 0.03	U	< 0.01	U	< 0.02	U			0.07	
SPRING6**	13-Jan-88			< 0.02	P						
SPRING6**	11-May-88			< 0.02	P						
SPRING6**	12-Oct-88			< 0.08	P						
SPRING6**	19-Jan-89			< 0.02	P						
SPRING6**	12-Apr-89			< 0.02	P						
SPRING6**	11-Jul-89	1.6	P	< 0.02	P	< 0.01	P				
SPRING6**	17-Oct-89			< 0.02	P						
SPRING6**	8-Jan-90			< 0.02	P						
SPRING6**	20-Apr-90			< 0.08	P						
SPRING6**	18-Jul-90			< 0.05	P						
SPRING6**	3-Oct-90			< 0.05	P						
SPRING6**	7-Jan-91			< 0.05	P						
SPRING6**	4-Apr-91			< 0.05	P						
SPRING6**	3-Oct-91			< 0.05	P						
SPRING6**	14-Jan-92			0.009	P						
SPRING6**	30-Apr-92			< 0.05	P						
SPRING6**	21-Jul-92			< 0.05	P						
SPRING6**	6-Oct-92			< 0.05	P						
SPRING6**	17-Feb-93			< 0.05	U						
SPRING6**	21-Apr-93			< 0.05	U						
SPRING6**	13-Aug-93			< 0.01	U						
SPRING6	29-Sep-93	< 0.03	U	< 0.05	U	0.49				< 0.2	U
SPRING6**	12-Oct-93			< 0.01	U						
SPRING6**	19-Jan-94			< 0.01	U						
SPRING6**	8-Apr-94			< 0.01	U						
SPRING6	21-Apr-94	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
SPRING6**	16-Aug-94			< 0.01	U						
SPRING6**	26-Oct-94			< 0.01	U						
SPRING6**	25-Jan-95	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
SPRING6	22-May-95	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
SPRING6	4-Aug-95	< 0.03	UH	< 0.05	UH	< 0.05	UH			< 0.2	UH
SPRING6	30-Oct-95	< 0.03	U	< 0.05	U	< 0.05	U			< 0.2	U
SPRING6	16-Sep-96			< 0.01	U	< 0.02	U				
SPRING6	19-Nov-96			< 0.01	U	< 0.02	U				
SPRING6	13-May-97			< 0.01	U	0.032					
SPRING6	1-Dec-97			< 0.01	U	< 0.02	U				
SPRING6	23-Jun-98										
SPRING6	23-Jun-98			< 0.01	U	< 0.02	UL				
SPRING6	7-Dec-98										
SPRING6	7-Dec-98			< 0.01	U	0.02					
SPRING6	24-May-99										
SPRING6	24-May-99			< 0.01	U	< 0.02	U				
SPRING6	9-Nov-99										
SPRING6	9-Nov-99			< 0.01	LU	< 0.02	LU				
SPRING6	20-Jun-00										
SPRING6	20-Jun-00			< 0.01	U	< 0.02	U				
SPRING6	27-Nov-00										

Table A-16a. Ground and surface water analyses for metals and cations (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Sodium mg/L		Potassium mg/L		Calcium mg/L		Magnesium mg/L		Iron mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
SPRING6	27-Nov-00										
SPRING6	21-May-01			8							
SPRING6	21-May-01										
SPRING6	19-Nov-01			8							
SPRING6	19-Nov-01										
SPRING6	15-May-02			12	L						
SPRING6	15-May-02										
SPRING6	10-Jun-03			5.9							
SPRING6	10-Jun-03										
SPRING6	11-Dec-03			7.3							
SPRING6	11-Dec-03										
SPRING6	27-May-04			5.9							
SPRING6	27-May-04										
SPRING6	3-Dec-04										

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

** Sample stored with location name 812CRK.

Table A-16a. Ground and surface water analyses for metals and cations (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Manganese mg/L		Copper mg/L		Zinc mg/L		Strontium mg/L		Aluminum mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
SPRING6	27-Nov-00			< 0.01	U	< 0.02	U				
SPRING6	21-May-01										
SPRING6	21-May-01			< 0.01	U	< 0.02	U				
SPRING6	19-Nov-01										
SPRING6	19-Nov-01			< 0.01	U	< 0.02	U				
SPRING6	15-May-02										
SPRING6	15-May-02			0.01		0.04	L				
SPRING6	10-Jun-03										
SPRING6	10-Jun-03			< 0.01	U	< 0.02	U				
SPRING6	11-Dec-03										
SPRING6	11-Dec-03			< 0.01	U	< 0.02	U				
SPRING6	27-May-04										
SPRING6	27-May-04			< 0.01	U	< 0.02	U				
SPRING6	3-Dec-04			< 0.01	U	< 0.02	EU				

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Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water Metals
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Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Arsenic mg/L		Barium mg/L		Beryllium mg/L		Cadmium mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG
NC2-22	2-Mar-90					< 0.0005	P		
NC2-22	9-May-90					< 0.0005	P		
NC2-22	9-Oct-90	0.005	P	< 0.05	P	< 0.0005	P	< 0.0005	P
NC2-22	9-Oct-91	0.006	P	< 0.05	P	< 0.0005	P	< 0.0005	P
NC2-22	9-Feb-94					< 0.0005	U		
NC2-22	9-Feb-94					< 0.0005	U		
NC2-22	7-Jun-94	0.0031		0.113		< 0.0001	U	< 0.0001	U
NC2-22	24-Mar-95					< 0.0005	U		
NC2-22	22-May-96					< 0.0005	U		
NC2-23	28-Feb-90					< 0.0005	P		
NC2-23	7-May-90					< 0.0005	P		
NC2-23	9-Oct-90	0.03	P	< 0.05	P	< 0.0005	P	< 0.0005	P
NC2-23	9-Oct-91	0.027	P	< 0.05	P	< 0.0005	P	< 0.0005	P
NC2-23	9-Feb-94					< 0.0005	U		
NC2-23	7-Jun-94	0.0376		0.0377		< 0.0001	U	0.00033	
NC2-23	24-Mar-95					< 0.0005	U		
NC2-23	22-May-96					< 0.0005	U		
NC2-23	29-Apr-97	0.036		0.029				< 0.0005	U
NC2-23	22-Apr-98	0.03		0.027				< 0.0005	U
NC2-23	19-May-99	0.035		0.026				< 0.0005	UL
NC2-23	20-Jun-00	0.048	D	0.03				< 0.0005	U
NC2-23	24-Apr-01	0.039	L	0.026				< 0.0005	U
NC2-23	13-May-02	0.033	D	0.027				< 0.0005	U
NC2-23	3-Jun-03	0.025		0.027				< 0.0005	U
NC2-23	27-May-04	0.028		0.027				< 0.0005	U
W-812-01	29-Sep-00	0.044		0.025				< 0.0005	U
W-812-01	21-Jun-02	0.044		< 0.025	U			< 0.0005	U
W-812-01	27-Aug-02	0.04		< 0.025	U			< 0.0005	U
W-812-01	2-Jun-03	0.04		< 0.025	U			< 0.0005	U
W-812-01	18-Aug-03	0.044		< 0.025	U			< 0.0005	U
W-812-01	30-Oct-03	0.043		0.027				< 0.0005	U
W-812-01	13-Feb-04	0.044	L	0.02		< 0.002	DU	< 0.005	U
W-812-01	26-May-04	0.04		< 0.025	U			< 0.0005	U
W-812-01	26-May-04	0.04		< 0.025	U			< 0.0005	U
W-812-01	25-Aug-04	0.042		0.027				< 0.0005	U
W-812-01	5-Nov-04			< 0.02	U			< 0.0005	U
W-812-01	11-Feb-05	0.042		< 0.02	U			< 0.0005	U
W-812-02	28-Sep-00	0.035		< 0.025	U			< 0.0005	U
W-812-02	21-Jun-02	0.023		< 0.025	U			< 0.0005	U
W-812-02	27-Aug-02	0.024		< 0.025	U			< 0.0005	U
W-812-02	3-Jun-03	0.024		< 0.025	U			< 0.0005	U
W-812-02	18-Aug-03	0.025		< 0.025	U			< 0.0005	U
W-812-02	30-Oct-03	0.025		< 0.025	U			0.0008	
W-812-02	13-Feb-04	0.025	L	0.01		< 0.002	U	< 0.005	U
W-812-02	26-May-04	0.026		< 0.025	U			< 0.0005	U
W-812-02	25-Aug-04	0.024		< 0.025	U			< 0.0005	U
W-812-02	5-Nov-04			< 0.02	U			< 0.0005	U
W-812-02	11-Feb-05	0.024		< 0.02	U			< 0.0005	U
W-812-03	28-Aug-00	0.011		0.066				< 0.0005	U
W-812-03	3-Jun-02			0.26				< 0.0005	U
W-812-03	3-Jun-02	< 0.002	U						
W-812-03	27-Aug-02	< 0.002	U	0.3				< 0.0005	U
W-812-03	28-May-03	< 0.002	U	0.23				< 0.0005	U
W-812-03	28-May-03	< 0.002	U	0.23				< 0.0005	U
W-812-03	25-Aug-03	< 0.002	U	0.24				< 0.0005	U
W-812-03	13-Nov-03	< 0.002	U	0.22				< 0.0005	U
W-812-03	30-Jan-04	< 0.005	U	0.29		< 0.002	U	< 0.005	U
W-812-03	26-May-04	< 0.002	U	0.22				< 0.0005	U
W-812-03	25-Aug-04	< 0.002	U	0.25				< 0.0005	U
W-812-03	30-Nov-04	0.0029		0.21	D			< 0.5	U
W-812-03	9-Feb-05	< 0.002	U	0.2	D			< 0.0005	U
W-812-03	9-Feb-05	< 0.002	U	0.2	D			< 0.0005	U
W-812-04	26-Mar-01	0.004		< 0.025	U			< 0.0005	U
W-812-04	3-Jun-02	0.002		< 0.025	U			< 0.0005	U
W-812-04	27-Aug-02	< 0.002	U	< 0.025	U			< 0.0005	U
W-812-04	2-Jun-03	0.003		< 0.025	U			< 0.0005	U
W-812-04	16-Sep-03	0.003		< 0.025	U			< 0.0005	U
W-812-04	13-Nov-03	0.002		< 0.025	U			< 0.0005	U

Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Chromium mg/L		Lead mg/L		Mercury mg/L		Selenium mg/L		Silver mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG
NC2-22	2-Mar-90			0.014	P						
NC2-22	9-May-90			0.004	P						
NC2-22	9-Oct-90	< 0.005	P	< 0.002	P	< 0.0005	P	< 0.002	P	< 0.05	P
NC2-22	9-Oct-91	< 0.005	P	< 0.002	P	< 0.0005	P	0.006	P	< 0.05	P
NC2-22	9-Feb-94										
NC2-22	9-Feb-94										
NC2-22	7-Jun-94	0.00237		0.00931							
NC2-22	24-Mar-95										
NC2-22	22-May-96										
NC2-23	28-Feb-90			0.002	P						
NC2-23	7-May-90			0.006	P						
NC2-23	9-Oct-90	< 0.005	P	< 0.002	P	< 0.0005	P	< 0.002	P	< 0.05	P
NC2-23	9-Oct-91	< 0.005	P	0.003	P	< 0.0005	P	< 0.002	P	< 0.05	P
NC2-23	9-Feb-94										
NC2-23	7-Jun-94	0.0107		0.01249							
NC2-23	24-Mar-95										
NC2-23	22-May-96										
NC2-23	29-Apr-97	0.0015		< 0.002	U	< 0.0002	U	< 0.002	U	< 0.001	U
NC2-23	22-Apr-98	0.0024		< 0.002	U	< 0.0002	U	< 0.002	U	< 0.001	U
NC2-23	19-May-99	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
NC2-23	20-Jun-00	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
NC2-23	24-Apr-01	0.001		< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
NC2-23	13-May-02	0.002		< 0.005	U	< 0.0002	U			< 0.001	U
NC2-23	3-Jun-03	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
NC2-23	27-May-04	0.017		< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-01	29-Sep-00	0.001		< 0.005	U	< 0.0002	U	0.008		< 0.001	LU
W-812-01	21-Jun-02	< 0.002	DU	< 0.005	U	< 0.0002	U	0.01		< 0.001	U
W-812-01	27-Aug-02	< 0.005	DU	< 0.005	U	< 0.0002	U	0.009		< 0.001	U
W-812-01	2-Jun-03	< 0.001	U	< 0.005	U	< 0.0002	U	0.009		< 0.001	U
W-812-01	18-Aug-03	0.001		< 0.005	U	< 0.0002	U	0.009		< 0.001	U
W-812-01	30-Oct-03	< 0.001	U	< 0.005	U	< 0.0002	U	0.01	L	< 0.001	U
W-812-01	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	0.01		< 0.005	U
W-812-01	26-May-04	< 0.001	U	< 0.005	U	< 0.0002	U	0.01		< 0.001	U
W-812-01	26-May-04	< 0.001	U	< 0.005	U	< 0.0002	U	0.01		< 0.001	U
W-812-01	25-Aug-04	< 0.001	U	< 0.005	U	< 0.0002	U	0.009		< 0.001	U
W-812-01	5-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-01	11-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	0.008		< 0.001	U
W-812-02	28-Sep-00	0.002		< 0.005	U	< 0.0002	U	0.005		< 0.001	LU
W-812-02	21-Jun-02	< 0.005	DU	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-02	27-Aug-02	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-02	3-Jun-03	0.002		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-02	18-Aug-03	0.002		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-02	30-Oct-03	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	LU	< 0.001	U
W-812-02	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-02	26-May-04	0.002		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-02	25-Aug-04	0.002		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-02	5-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-02	11-Feb-05	0.002		< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-03	28-Aug-00	0.008		< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-03	3-Jun-02	0.016	D	< 0.005	U	< 0.0002	U	< 0.005	LU	< 0.001	U
W-812-03	3-Jun-02										
W-812-03	27-Aug-02	0.024		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-03	28-May-03	0.029		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-03	28-May-03	0.03		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-03	25-Aug-03	0.028		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-03	13-Nov-03	0.027		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-03	30-Jan-04	0.03		< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-03	26-May-04	0.027		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-03	25-Aug-04	0.025		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-03	30-Nov-04	< 1	U	< 0.002	U	< 0.005	U	< 5	U	< 1	U
W-812-03	9-Feb-05	0.03		< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-03	9-Feb-05	0.03		< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-04	26-Mar-01	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-04	3-Jun-02	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	LU	< 0.001	U
W-812-04	27-Aug-02	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-04	2-Jun-03	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-04	16-Sep-03	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-04	13-Nov-03	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U

Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Arsenic mg/L		Barium mg/L		Beryllium mg/L		Cadmium mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG
W-812-04	13-Feb-04	< 0.005	U	0.02		< 0.002	U	< 0.005	U
W-812-04	27-May-04	0.002		< 0.025	U			< 0.0005	U
W-812-04	25-Aug-04	< 0.002	U	< 0.025	U			< 0.0005	U
W-812-04	19-Nov-04			< 0.02	LU			< 0.0005	U
W-812-04	9-Feb-05	0.0023		< 0.02	U			< 0.0005	U
W-812-07	28-Aug-00	0.009		< 0.025	U			< 0.0005	U
W-812-07	3-Jun-02	0.009		< 0.025	U			< 0.0005	U
W-812-07	27-Aug-02	0.006		< 0.025	U			< 0.0005	DU
W-812-07	30-Sep-02	0.0047		< 0.025	U			< 0.0005	U
W-812-07	28-May-03	0.007		< 0.025	U			< 0.0005	U
W-812-07	18-Aug-03	0.007		< 0.025	U			0.0005	
W-812-07	30-Oct-03	0.008		< 0.025	U			0.0007	
W-812-07	30-Jan-04	0.007		< 0.01	U	< 0.002	U	< 0.005	U
W-812-07	1-Jun-04	0.006		< 0.025	U			< 0.0005	U
W-812-07	1-Jun-04	0.006		< 0.025	U			< 0.0005	U
W-812-07	26-Aug-04	0.007		< 0.025	U			< 0.0005	U
W-812-07	19-Nov-04			< 0.02	LU			< 0.0005	U
W-812-07	9-Feb-05	0.0069		< 0.02	U			0.0006	
W-812-08	28-Aug-00	0.017		0.038				< 0.0005	U
W-812-08	3-Jun-02	0.017		0.048				< 0.0005	U
W-812-08	27-Aug-02	0.016		0.049				< 0.0005	U
W-812-08	28-May-03	< 0.002	U	0.057				< 0.0005	U
W-812-08	25-Aug-03	0.016		0.051				< 0.0005	U
W-812-08	13-Nov-03	0.015		0.12				0.0007	
W-812-08	30-Jan-04	0.014		0.06		< 0.002	DU	< 0.005	U
W-812-08	1-Jun-04	0.015		0.05				< 0.0005	U
W-812-08	26-Aug-04	0.015		0.056				< 0.0005	U
W-812-08	30-Nov-04	0.013		0.067	D			< 0.5	U
W-812-08	9-Feb-05	0.011		0.07				< 0.0005	U
W-812-09	24-Aug-00	0.007		< 0.025	U			< 0.0005	U
W-812-09	3-Jun-02	0.013		< 0.025	U			< 0.0005	U
W-812-09	27-Aug-02	0.011		< 0.025	U			< 0.0005	U
W-812-09	30-Sep-02	0.01		< 0.025	U			0.0017	
W-812-09	28-May-03	0.013		< 0.025	U			< 0.0005	U
W-812-09	25-Aug-03	0.011		< 0.025	U			< 0.0005	U
W-812-09	13-Nov-03	0.009		< 0.025	U			0.0008	
W-812-09	13-Feb-04	0.012		< 0.01	U	< 0.002	U	< 0.005	U
W-812-09	1-Jun-04	0.012		< 0.025	U			< 0.0005	U
W-812-09	26-Aug-04	0.009		< 0.025	U			< 0.0005	U
W-812-09	19-Nov-04			< 0.02	LU			< 0.0005	U
W-812-09	9-Feb-05	0.0092		< 0.02	U			< 0.0005	U
W-812-1920	19-Dec-03	0.0088		< 0.025	U			< 0.0005	U
W-812-1920	13-Feb-04	0.005	L	0.01		< 0.002	U	< 0.005	U
W-812-1920	13-May-04	0.007		< 0.025	U			< 0.0005	U
W-812-1920	26-Aug-04	0.005		< 0.025	U			< 0.0005	U
W-812-1920	29-Nov-04			< 0.02	U			< 0.0005	U
W-812-1920	29-Nov-04			0.07	D			< 0.0005	U
W-812-1920	14-Feb-05	0.0047		< 0.02	U			< 0.0005	U
W-812-1921	13-Feb-04	0.009	L	0.02		< 0.002	U	< 0.005	U
W-812-1922	6-Feb-04	0.008		0.03				< 0.0005	U
W-812-1922	6-Feb-04	0.008		0.03		< 0.002	U	< 0.005	U
W-812-1922	13-May-04	0.006		< 0.025	U			< 0.0005	U
W-812-1922	26-Aug-04	0.005		< 0.025	U			< 0.0005	U
W-812-1922	19-Nov-04			< 0.02	LU			< 0.0005	U
W-812-1922	14-Feb-05	0.0048		< 0.02	U			< 0.0005	U
W-812-1923	16-Dec-03	0.007	D	< 0.025	U			< 0.0005	U
W-812-1923	13-Feb-04	0.007		0.02		< 0.002	U	< 0.005	U
W-812-1923	20-May-04	0.007		< 0.025	U			< 0.0005	U
W-812-1923	26-Aug-04	0.006		< 0.025	U			0.0025	
W-812-1923	19-Nov-04			< 0.02	LU			< 0.0005	U
W-812-1923	14-Feb-05	0.0063		< 0.02	U			< 0.0005	U
W-812-1924	6-Feb-04	< 0.005	U	< 0.01	U	< 0.002	U	< 0.005	U
W-812-1924	13-May-04	0.006		< 0.025	U			< 0.0005	U
W-812-1924	26-Aug-04	0.006		< 0.025	U			< 0.0005	U
W-812-1924	30-Nov-04	0.0071		0.0098				< 0.5	U
W-812-1924	14-Feb-05	0.007		< 0.02	U			< 0.0005	U
W-812-1925	6-Feb-04	0.056		0.04		< 0.002	U	< 0.005	U
W-812-1925	20-May-04	0.04		0.027				< 0.0005	U

Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Chromium mg/L		Lead mg/L		Mercury mg/L		Selenium mg/L		Silver mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG
W-812-04	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-04	27-May-04	< 0.001	U	< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-04	25-Aug-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-04	19-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-04	9-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-07	28-Aug-00	0.003		< 0.005	U	< 0.0002	U	0.003		< 0.001	U
W-812-07	3-Jun-02	0.002		< 0.005	U	< 0.0002	U	< 0.005	LU	< 0.001	U
W-812-07	27-Aug-02	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	DU
W-812-07	30-Sep-02	< 0.001	U	< 0.005	U	< 0.0002	U	0.0045		< 0.001	U
W-812-07	28-May-03	0.001		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-07	18-Aug-03	0.002		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-07	30-Oct-03	0.001		< 0.005	U	< 0.0002	U	< 0.005	LU	< 0.001	U
W-812-07	30-Jan-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-07	1-Jun-04	0.003		< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-07	1-Jun-04	0.003		< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-07	26-Aug-04	0.003		< 0.005	U	< 0.0002	U	0.005		< 0.001	U
W-812-07	19-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-07	9-Feb-05	0.003		< 0.005	U	< 0.0002	U	0.006		< 0.001	U
W-812-08	28-Aug-00	0.001		< 0.005	U	< 0.0002	U	0.003		< 0.001	U
W-812-08	3-Jun-02	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	LU	< 0.001	U
W-812-08	27-Aug-02	< 0.001	U	< 0.005	U	< 0.0002	U	0.007		< 0.001	U
W-812-08	28-May-03	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-08	25-Aug-03	< 0.001	U	< 0.005	U	< 0.0002	U	0.006		< 0.001	U
W-812-08	13-Nov-03	0.007		< 0.005	U	< 0.0002	U	0.006		< 0.001	U
W-812-08	30-Jan-04	< 0.01	U	< 0.003	U	< 0.0002	U	0.006		< 0.005	U
W-812-08	1-Jun-04	< 0.001	U	< 0.005	U	< 0.0002	HU	0.006		< 0.001	U
W-812-08	26-Aug-04	< 0.001	U	< 0.005	U	< 0.0002	U	0.007		< 0.001	U
W-812-08	30-Nov-04	< 1	U	< 0.002	U	< 0.005	U	< 5	U	< 1	U
W-812-08	9-Feb-05	0.007		< 0.005	U	< 0.0002	U	0.008		< 0.001	U
W-812-09	24-Aug-00	0.003		< 0.005	U	< 0.0002	U	0.003		< 0.001	U
W-812-09	3-Jun-02	0.003		< 0.005	U	< 0.0002	U	< 0.005	LU	< 0.001	U
W-812-09	27-Aug-02	0.003		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-09	30-Sep-02	0.0035		< 0.005	U	< 0.0002	U	0.006		< 0.001	U
W-812-09	28-May-03	0.003		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-09	25-Aug-03	0.003		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-09	13-Nov-03	0.003		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-09	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-09	1-Jun-04	0.003		< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-09	26-Aug-04	0.003		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-09	19-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-09	9-Feb-05	0.002		< 0.005	U	< 0.0002	U	0.005		< 0.001	U
W-812-1920	19-Dec-03	0.0085		< 0.005	U	< 0.0002	U	0.01	L	< 0.001	U
W-812-1920	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	0.006		< 0.005	U
W-812-1920	13-May-04	0.007		< 0.005	U	< 0.0002	U	0.007		< 0.001	U
W-812-1920	26-Aug-04	0.006		< 0.005	U	< 0.0002	U	0.007		< 0.001	U
W-812-1920	29-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1920	29-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1920	14-Feb-05	0.005		< 0.005	U	< 0.0002	U	0.006		< 0.001	U
W-812-1921	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-1922	6-Feb-04	< 0.001	U	< 0.005	U					< 0.001	U
W-812-1922	6-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-1922	13-May-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1922	26-Aug-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1922	19-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1922	14-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1923	16-Dec-03	0.003	D	< 0.005	U	< 0.0002	U	0.026	D	< 0.001	U
W-812-1923	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	0.029		< 0.005	U
W-812-1923	20-May-04	0.002		< 0.005	U	< 0.0002	U	0.029		< 0.001	U
W-812-1923	26-Aug-04	0.002		< 0.005	U	< 0.0002	U	0.029		< 0.001	U
W-812-1923	19-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1923	14-Feb-05	0.002		< 0.005	U	< 0.0002	U	0.03		< 0.001	U
W-812-1924	6-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-1924	13-May-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1924	26-Aug-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1924	30-Nov-04	< 1	U	< 0.002	U	< 0.005	U	< 5	U	< 1	U
W-812-1924	14-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1925	6-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-1925	20-May-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U

Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Arsenic mg/L		Barium mg/L		Beryllium mg/L		Cadmium mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG
W-812-1925	1-Sep-04	0.043		0.03				< 0.0005	U
W-812-1925	19-Nov-04	< 0.002	U	0.03	L			< 0.0005	U
W-812-1925	11-Feb-05	0.046		0.03				< 0.0005	U
W-812-1926	15-Dec-03	0.005		< 0.025	U			< 0.0005	U
W-812-1926	6-Feb-04	< 0.005	U	< 0.01	U	< 0.002	U	< 0.005	U
W-812-1926	13-May-04	0.005		< 0.025	U			< 0.0005	U
W-812-1926	1-Sep-04	0.004		< 0.025	U			< 0.0005	U
W-812-1926	19-Nov-04	< 0.002	U	< 0.02	LU			< 0.0005	U
W-812-1926	11-Feb-05	0.0042		< 0.02	U			< 0.0005	U
W-812-1929	13-Feb-04	0.051	L	0.02		< 0.002	U	< 0.005	U
W-812-1929	20-May-04	0.048		< 0.025	U			< 0.0005	U
W-812-1929	1-Sep-04	0.048		< 0.025	U			< 0.0005	U
W-812-1929	5-Nov-04			< 0.02	U			< 0.0005	U
W-812-1929	11-Feb-05	0.05		< 0.02	U			< 0.0005	U
W-812-1932	6-Feb-04	0.009		0.01		< 0.002	U	< 0.005	U
W-812-1932	27-May-04	0.007		< 0.025	U			< 0.0005	U
W-812-1932	1-Sep-04	0.008		< 0.025	U			< 0.0005	U
W-812-1932	29-Nov-04			< 0.02	U			< 0.0005	U
W-812-1932	11-Feb-05	0.0084		< 0.02	U			< 0.0005	U
W-812-1933	13-Feb-04	0.005		< 0.01	U	< 0.002	U	< 0.005	U
W-812-1933	13-Feb-04	0.006		< 0.025	U			< 0.0005	U
W-812-1933	27-May-04	0.006		< 0.025	U			< 0.0005	U
W-812-1933	7-Sep-04	0.009		< 0.025	U			< 0.0005	U
W-812-1933	22-Nov-04	< 0.002	U	< 0.02	U			< 0.0005	U
W-812-1933	11-Feb-05	0.012		< 0.02	U			< 0.0005	U
W-812-1937	6-Feb-04	0.006		0.02		< 0.002	U	< 0.005	U
W-812-1937	27-May-04	0.005		< 0.025	U			< 0.0005	U
W-812-1937	27-May-04	0.005		< 0.025	U			< 0.0005	U
W-812-1937	7-Sep-04	0.004		< 0.025	U			< 0.0005	U
W-812-1937	22-Nov-04	< 0.002	U	< 0.02	U			< 0.0005	U
W-812-1937	14-Feb-05	0.0041		< 0.02	U			< 0.0005	U
W-812-1939	13-Feb-04	0.007	L	0.08		< 0.002	U	< 0.005	U
W-812-1939	20-May-04	0.009		< 0.025	U			< 0.0005	U
W-812-1939	7-Sep-04	0.007		< 0.025	U			< 0.0005	U
W-812-1939	22-Nov-04	< 0.002	U	< 0.02	U			< 0.0005	U
W-812-1939	22-Nov-04	< 0.002	U	< 0.02	U			< 0.0005	U
W-812-1939	14-Feb-05	0.0049		< 0.02	U			< 0.0005	U
W-812-2009	2-Mar-04	0.02		0.02		< 0.002	U	< 0.005	U
W-812-2009	5-Nov-04			< 0.02	U			< 0.0005	U
W-812-2009	22-Feb-05	0.016		0.03				< 0.0005	U
SPRING6*	13-Jan-88					< 0.0001	P		
SPRING6*	11-May-88					0.0008	P		
SPRING6*	18-Aug-88					0.0004	P		
SPRING6*	12-Oct-88					0.0001	P		
SPRING6*	19-Jan-89					< 0.0001	P		
SPRING6*	12-Apr-89					< 0.0001	P		
SPRING6*	11-Jul-89	0.024	P	< 0.1	P	< 0.0001	P	< 0.001	P
SPRING6*	17-Oct-89					< 0.0005	P		
SPRING6*	8-Jan-90					< 0.0005	P		
SPRING6*	20-Apr-90					< 0.01	P		
SPRING6*	18-Jul-90					< 0.0005	P		
SPRING6*	3-Oct-90					< 0.0005	P		
SPRING6*	7-Jan-91					< 0.0005	P		
SPRING6*	4-Apr-91					< 0.0005	P		
SPRING6*	3-Oct-91					< 0.0005	P		
SPRING6*	14-Jan-92					< 0.0005	P		
SPRING6*	30-Apr-92					< 0.0005	P		
SPRING6*	21-Jul-92					< 0.0005	P		
SPRING6*	6-Oct-92					< 0.0002	P		
SPRING6*	17-Feb-93					< 0.0002	U		
SPRING6*	21-Apr-93					< 0.0002	U		
SPRING6*	13-Aug-93					< 0.0005	U		
SPRING6	29-Sep-93	0.032		0.054				< 0.001	U
SPRING6	29-Sep-93					< 0.0005	U		
SPRING6*	12-Oct-93					< 0.0005	U		
SPRING6*	19-Jan-94					< 0.0005	U		
SPRING6*	8-Apr-94					< 0.0005	U		
SPRING6	21-Apr-94	0.034		0.046		< 0.0005	U	< 0.0005	U

Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Chromium mg/L		Lead mg/L		Mercury mg/L		Selenium mg/L		Silver mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG
W-812-1925	1-Sep-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1925	19-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1925	11-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1926	15-Dec-03	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1926	6-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-1926	13-May-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1926	1-Sep-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1926	19-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1926	11-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1929	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	0.008		< 0.005	U
W-812-1929	20-May-04	< 0.001	U	< 0.005	U	< 0.0002	U	0.008		< 0.001	U
W-812-1929	1-Sep-04	< 0.001	U	< 0.005	U	< 0.0002	U	0.009		< 0.001	U
W-812-1929	5-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1929	11-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	0.008		< 0.001	U
W-812-1932	6-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-1932	27-May-04	< 0.001	U	< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-1932	1-Sep-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1932	29-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1932	11-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	0.002		< 0.001	U
W-812-1933	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-1933	13-Feb-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1933	27-May-04	0.002		< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-1933	7-Sep-04	0.003		< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1933	22-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1933	11-Feb-05	0.003		< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1937	6-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	< 0.005	U	< 0.005	U
W-812-1937	27-May-04	0.001		< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-1937	27-May-04	< 0.001	U	< 0.005	U	< 0.0002	HU	< 0.005	U	< 0.001	U
W-812-1937	7-Sep-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.005	U	< 0.001	U
W-812-1937	22-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1937	14-Feb-05	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1939	13-Feb-04	< 0.01	U	< 0.003	U	< 0.0002	U	0.012		< 0.005	U
W-812-1939	20-May-04	0.006		< 0.005	U	< 0.0002	U	0.017		< 0.001	U
W-812-1939	7-Sep-04	0.008		< 0.005	U	< 0.0002	U	0.014		< 0.001	U
W-812-1939	22-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1939	22-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-1939	14-Feb-05	0.001		< 0.005	U	< 0.0002	U	0.01		< 0.001	U
W-812-2009	2-Mar-04	< 0.01	U	< 0.003	U	< 0.0002	LU	< 0.005	U	< 0.005	U
W-812-2009	5-Nov-04	< 0.001	U	< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
W-812-2009	22-Feb-05	0.003		< 0.005	U	< 0.0002	U	< 0.002	U	< 0.001	U
SPRING6*	13-Jan-88	< 0.02	P	0.003	P						
SPRING6*	11-May-88	0.007	P	0.01	P						
SPRING6*	18-Aug-88			0.013	P						
SPRING6*	12-Oct-88	< 0.02	P	0.002	P						
SPRING6*	19-Jan-89	< 0.001	P	< 0.001	P						
SPRING6*	12-Apr-89	< 0.02	P	0.002	P						
SPRING6*	11-Jul-89	< 0.01	P	< 0.001	P			< 0.002	P	< 0.01	P
SPRING6*	17-Oct-89	< 0.005	P	0.003	P						
SPRING6*	8-Jan-90	< 0.005	P	< 0.002	P						
SPRING6*	20-Apr-90	< 0.05	P	< 0.3	P						
SPRING6*	18-Jul-90	< 0.005	P	< 0.002	P						
SPRING6*	3-Oct-90	< 0.005	P	< 0.002	P						
SPRING6*	7-Jan-91	< 0.005	P	< 0.002	P						
SPRING6*	4-Apr-91	< 0.005	P	< 0.002	P						
SPRING6*	3-Oct-91	< 0.005	P	< 0.002	P						
SPRING6*	14-Jan-92	< 0.005	P	< 0.002	P						
SPRING6*	30-Apr-92			< 0.002	P						
SPRING6*	21-Jul-92	< 0.005	P	< 0.002	P						
SPRING6*	6-Oct-92	< 0.005	P	< 0.002	P						
SPRING6*	17-Feb-93	0.0051		< 0.002	U						
SPRING6*	21-Apr-93	< 0.005	U	< 0.002	U						
SPRING6*	13-Aug-93	< 0.01	U	< 0.002	U						
SPRING6	29-Sep-93	< 0.01	U	< 0.005	U	< 0.0005	U	< 0.005	U	< 0.001	U
SPRING6	29-Sep-93										
SPRING6*	12-Oct-93	< 0.01	U	< 0.002	U						
SPRING6*	19-Jan-94	< 0.01	U	< 0.002	U						
SPRING6*	8-Apr-94	< 0.01	U	< 0.002	U						
SPRING6	21-Apr-94	< 0.01	U	< 0.002	U	< 0.0002	U	0.0048		< 0.001	U

Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Arsenic mg/L		Barium mg/L		Beryllium mg/L		Cadmium mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG
SPRING6	16-Aug-94					< 0.0005	U		
SPRING6*	26-Oct-94					< 0.0005	U		
SPRING6*	25-Jan-95	0.025		0.21		< 0.0005	ULO	< 0.0005	U
SPRING6	22-May-95	0.025		0.03		< 0.0005	ULO	< 0.0005	U
SPRING6	4-Aug-95	0.034		< 0.025	U	< 0.0005	LOU	< 0.0005	U
SPRING6	30-Oct-95	0.023		0.047		< 0.0005	U	< 0.0005	U
SPRING6	16-Sep-96	0.031		< 0.025	U	< 0.0005	U	< 0.0005	U
SPRING6	19-Nov-96	0.023		0.091		< 0.0005	U	< 0.0005	U
SPRING6	13-May-97	0.016		0.13		< 0.0005	ULO	< 0.0005	U
SPRING6	1-Dec-97	0.026		0.056		< 0.0005	U	< 0.0005	U
SPRING6	23-Jun-98	0.025		0.046		< 0.0005	UL	< 0.0005	U
SPRING6	7-Dec-98	0.027		0.051		< 0.0005	U	< 0.0005	U
SPRING6	24-May-99	0.024		0.078		< 0.0005	U	< 0.0005	UL
SPRING6	9-Nov-99	0.03	D	0.056		< 0.0005	U	< 0.0005	U
SPRING6	20-Jun-00	0.04	D	0.05		< 0.0005	U	< 0.0005	U
SPRING6	27-Nov-00	0.027		0.042		< 0.0005	U	< 0.0005	U
SPRING6	21-May-01	0.028		0.045		< 0.0005	U	< 0.0005	U
SPRING6	19-Nov-01	0.025		0.045		< 0.0005	U	< 0.0005	U
SPRING6	15-May-02	0.033	L	0.14		0.0007		< 0.0005	LU
SPRING6	10-Jun-03	0.028		0.064		< 0.0005	U	< 0.0005	U
SPRING6	11-Dec-03	0.028		0.087		< 0.0005	U	< 0.0005	U
SPRING6	27-May-04	0.029		0.059		< 0.0005	U	< 0.0005	U
SPRING6	3-Dec-04	0.024		0.062		0.00068	B	< 0.0005	U

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

** Sample stored with location name 812CRK.

Table A-16b. Ground and surface water analyses for metals (mg/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Chromium mg/L		Lead mg/L		Mercury mg/L		Selenium mg/L		Silver mg/L	
LOCATION	SAMPLED	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG	RESULT	QC FLAG
SPRING6	16-Aug-94	< 0.01	U	< 0.002	U						
SPRING6*	26-Oct-94	< 0.01	U	< 0.002	U						
SPRING6*	25-Jan-95	< 0.01	U	< 0.002	ULO	< 0.0002	U	0.0042	LO	< 0.0005	ULO
SPRING6	22-May-95			< 0.002	U	< 0.0002	U	0.0034		< 0.01	U
SPRING6	4-Aug-95	< 0.01	U	< 0.002	U	< 0.0002	U	0.0026		< 0.01	U
SPRING6	30-Oct-95	< 0.01	U	< 0.002	U	< 0.0002	HU	< 0.002	U	< 0.01	U
SPRING6	16-Sep-96	< 0.001	U	< 0.002	U	< 0.0002	U	< 0.002	U	< 0.0005	U
SPRING6	19-Nov-96	< 0.001	U	< 0.002	U	< 0.0002	U	< 0.002	LOU	< 0.0005	U
SPRING6	13-May-97	0.0025		< 0.002	U	< 0.0002	U	< 0.002	U	< 0.0005	U
SPRING6	1-Dec-97	< 0.001	U	< 0.002	U	< 0.0002	U	0.0038			
SPRING6	23-Jun-98	0.0022		< 0.002	U	< 0.0002	U	< 0.002	U	< 0.0005	UL
SPRING6	7-Dec-98	< 0.001	U	< 0.002	U	< 0.0002	U	< 0.002	UL	< 0.0005	U
SPRING6	24-May-99	0.001		< 0.002	U	< 0.0002	U	0.002		< 0.0005	U
SPRING6	9-Nov-99	< 0.001	U	< 0.002	U	< 0.0002	U	0.004		< 0.0005	U
SPRING6	20-Jun-00	< 0.001	U	< 0.002	U	< 0.0002	U	0.002		< 0.0005	U
SPRING6	27-Nov-00	< 0.001	U	< 0.002	LU	< 0.0002	U	0.003		< 0.0005	U
SPRING6	21-May-01	< 0.001	U	< 0.002	U	< 0.0002	U	< 0.002	U	< 0.0005	U
SPRING6	19-Nov-01	< 0.001	U	< 0.002	U	< 0.0002	U			< 0.0005	U
SPRING6	15-May-02	0.011		0.003		< 0.0002	U			< 0.0005	LU
SPRING6	10-Jun-03	< 0.001	U	< 0.002	U	< 0.0002	U	0.0042		< 0.0005	U
SPRING6	11-Dec-03	< 0.001	U	< 0.002	U	< 0.0002	U	0.0037		< 0.0005	U
SPRING6	27-May-04	< 0.001	U	< 0.002	U	< 0.0002	U	0.0036		< 0.0005	U
SPRING6	3-Dec-04	< 0.001	EU	< 0.002	U	< 0.0002	U	0.0024		< 0.0005	U

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Table A-17. Ground and surface water analyses for volatile organic compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water Votatile Organic Compounds
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Table A-17. Ground and surface water analyses for volatile organic compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		1,1-DCE ug/L		cis-1,2-DCE ug/L		trans-1,2-DCE ug/L		Total 1,2-DCE ug/L		TCE ug/L		PCE ug/L		1,1-DCA ug/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
NC2-22	2-Mar-90	< 1	P	< 1	P	< 1	P	< 1	P	< 1	P	< 1	P	< 1	P
NC2-22	9-May-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-22	16-Aug-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-22	9-Oct-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-22	17-Apr-92	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-22	19-Oct-92	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-22	22-Apr-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-22	22-Apr-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-22	10-Dec-93	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-22	22-Dec-93	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-22	25-Mar-94	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	28-Feb-90	< 1	P	< 1	P	< 1	P	< 1	P	60	P	4	P	< 1	P
NC2-23	7-May-90	< 0.5	P	0.5	P	< 0.5	P	0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-23	15-Aug-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-23	9-Oct-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-23	10-Feb-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	10-Dec-93	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	25-Mar-94	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	29-Apr-97	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	22-Apr-98	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	19-May-99	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
NC2-23	20-Jun-00	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	24-Apr-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	13-May-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	3-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	29-Sep-00	< 1	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U
W-812-01	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-01	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-01	21-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	2-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	18-Aug-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	30-Oct-03	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-01	13-Feb-04	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	26-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	26-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	28-Sep-00	< 1	LOU	< 1	LOU	< 1	LOU	< 0.5	LOU	< 1	LOU	< 1	LOU	< 1	LOU
W-812-02	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	17-May-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-02	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-02	21-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	3-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	18-Aug-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	30-Oct-03	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-02	13-Feb-04	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	26-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	28-Aug-00	< 1	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U
W-812-03	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	17-May-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	28-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-03	28-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-03	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-03	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	28-May-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	28-May-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	25-Aug-03							< 0.5	U			< 0.5	U	< 0.5	U
W-812-03	13-Nov-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
W-812-03	30-Jan-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	26-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	26-Mar-01	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU
W-812-04	17-May-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table A-17. Ground and surface water analyses for volatile organic compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		1,2-DCA ug/L		1,1,1-TCA ug/L		Chloro-form ug/L		Freon 11 ug/L		Freon 113 ug/L		Methylene chloride ug/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
NC2-22	2-Mar-90	< 1	P	< 1	P	< 1	P	< 1	P	< 1	P	< 1	P
NC2-22	9-May-90	< 0.5	P	1	P	< 0.5	P	< 0.5	P	< 0.5	P	5	P
NC2-22	16-Aug-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 2	P
NC2-22	9-Oct-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 2	P
NC2-22	17-Apr-92	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-22	19-Oct-92	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-22	22-Apr-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
NC2-22	22-Apr-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U
NC2-22	10-Dec-93	< 0.5	U	3.8		< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-22	22-Dec-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-22	25-Mar-94	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	28-Feb-90	< 1	P	< 1	P	< 1	P	< 1	P	< 1	P	< 1	P
NC2-23	7-May-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P
NC2-23	15-Aug-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 2	P
NC2-23	9-Oct-90	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 0.5	P	< 2	P
NC2-23	10-Feb-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	10-Dec-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	25-Mar-94	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	29-Apr-97	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	22-Apr-98	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	19-May-99	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
NC2-23	20-Jun-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
NC2-23	24-Apr-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	13-May-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
NC2-23	3-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-01	29-Sep-00	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-01	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.7	B	< 0.5	U
W-812-01	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-01	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-01	21-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-01	2-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-01	18-Aug-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-01	30-Oct-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-01	13-Feb-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-01	26-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-01	26-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-02	28-Sep-00	< 1	LOU	< 1	LOU	< 1	LOU	< 1	LOU	< 1	LOU	< 3	LOU
W-812-02	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.8	B	< 0.5	U
W-812-02	17-May-01	< 0.5	OU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-02	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-02	21-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-02	3-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-02	18-Aug-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-02	30-Oct-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-02	13-Feb-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-02	26-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-03	28-Aug-00	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-03	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.7	B	< 0.5	U
W-812-03	17-May-01	< 0.5	OU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	28-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	28-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-03	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-03	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-03	28-May-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-03	28-May-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-03	25-Aug-03									< 0.5	U		
W-812-03	13-Nov-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-03	30-Jan-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-03	26-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-04	26-Mar-01	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 3	HU
W-812-04	17-May-01	< 0.5	OU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U

Table A-17. Ground and surface water analyses for volatile organic compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		1,1-DCE ug/L		cis-1,2-DCE ug/L		trans-1,2-DCE ug/L		Total 1,2-DCE ug/L		TCE ug/L		PCE ug/L		1,1-DCA ug/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-04	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-04	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-04	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	2-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	16-Sep-03	< 0.5	LU	< 0.5	U	< 0.5	U			< 0.5	LU	< 0.5	U	< 0.5	U
W-812-04	13-Nov-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
W-812-04	13-Feb-04	< 0.5	LOU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	27-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	28-Aug-00	< 1	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U
W-812-07	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	27-Jun-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-07	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-07	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	30-Sep-02	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	28-May-03	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 1	LU
W-812-07	18-Aug-03	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU
W-812-07	30-Oct-03	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU
W-812-07	30-Jan-04	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
W-812-07	1-Jun-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	1-Jun-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	28-Aug-00	< 1	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U
W-812-08	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	17-May-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-08	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-08	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	28-May-03	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-08	25-Aug-03	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-08	13-Nov-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	30-Jan-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	1-Jun-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	24-Aug-00	< 1	U	< 1	U	< 1	U	< 0.5	U	< 1	U	< 1	U	< 1	U
W-812-09	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	17-May-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-09	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-09	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	30-Sep-02	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	28-May-03	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 1	LU
W-812-09	25-Aug-03	< 10	DHU	< 10	DHU	< 10	DHU	< 10	DHU	< 10	DHU	< 10	DHU	< 10	DHU
W-812-09	13-Nov-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
W-812-09	13-Feb-04	< 1	HLOU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU
W-812-09	1-Jun-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-1920	18-Dec-03	< 1	LU	< 1	U	< 1	U	< 1	U	< 1	LU	< 1	U	< 1	U
W-812-1920	13-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-1920	29-Nov-04	< 0.5	LU	< 0.5	U	< 0.5	U			< 0.5	LU	< 0.5	U	< 0.5	U
W-812-1920	29-Nov-04	< 0.5	LU	< 0.5	U	< 0.5	U			< 0.5	LU	< 0.5	U	< 0.5	U
W-812-1922	6-Feb-04	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U
W-812-1922	19-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-1923	16-Dec-03	< 1	U	< 1	U	< 1	U			< 1	U	< 1	U	< 1	U
W-812-1923	19-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-1924	30-Nov-04	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-1925	13-Feb-04	< 0.5	LOU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-1925	19-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-1926	15-Dec-03	< 1	LOU	< 1	U	< 1	U	< 1	U	< 1	LOU	< 1	U	< 1	U
W-812-1926	19-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-1929	5-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-1932	29-Nov-04	< 0.5	LU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	LU	< 0.5	U	< 0.5	U
W-812-1933	13-Feb-04	< 1	HLOU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU
W-812-1933	13-Feb-04	< 0.5	LOU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-1933	26-Feb-04	< 1	LU	< 1	U	< 1	U	< 1	U	< 1	LU	< 1	U	< 1	U

Table A-17. Ground and surface water analyses for volatile organic compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		1,2-DCA ug/L		1,1,1-TCA ug/L		Chloro-form ug/L		Freon 11 ug/L		Freon 113 ug/L		Methylene chloride ug/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-04	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-04	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-04	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-04	2-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-04	16-Sep-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-04	13-Nov-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-04	13-Feb-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-04	27-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-07	28-Aug-00	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-07	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.7	B	< 0.5	U
W-812-07	27-Jun-01	< 0.5	U	< 0.5	U	< 0.5	OU	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-07	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-07	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-07	30-Sep-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-07	28-May-03	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 3	LU
W-812-07	18-Aug-03	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 3	HU
W-812-07	30-Oct-03	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 3	HU
W-812-07	30-Jan-04	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-07	1-Jun-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-07	1-Jun-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-08	28-Aug-00	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-08	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.7	B	< 0.5	U
W-812-08	17-May-01	< 0.5	OU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-08	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-08	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-08	28-May-03	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 3	LU
W-812-08	25-Aug-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-08	13-Nov-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-08	30-Jan-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-08	1-Jun-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-09	24-Aug-00	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-09	9-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	25-Jan-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	1.7	B	< 0.5	U
W-812-09	17-May-01	< 0.5	OU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	1-Aug-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	29-Oct-01	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU	< 0.5	LU
W-812-09	27-Feb-02	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
W-812-09	3-Jun-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	27-Aug-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-09	30-Sep-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
W-812-09	28-May-03	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 1	LU	< 3	LU
W-812-09	25-Aug-03	< 10	DHU	< 10	DHU	< 10	DHU	< 10	DHU	< 10	DHU	< 30	DHU
W-812-09	13-Nov-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-09	13-Feb-04	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 3	HU
W-812-09	1-Jun-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-1920	18-Dec-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-1920	13-May-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-1920	29-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1920	29-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1922	6-Feb-04	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-1922	19-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1923	16-Dec-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-1923	19-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1924	30-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1925	13-Feb-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-1925	19-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1926	15-Dec-03	< 1	U	< 1	U	< 1	U	< 1	U	< 1	U	< 3	U
W-812-1926	19-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1929	5-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 3	U
W-812-1932	29-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1933	13-Feb-04	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 1	HU	< 3	HU
W-812-1933	13-Feb-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 3	U
W-812-1933	26-Feb-04	< 1	U	< 1	U	4		< 1	U	< 1	U	< 3	U

Table A-17. Ground and surface water analyses for volatile organic compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		1,1-DCE ug/L		cis-1,2-DCE ug/L		trans-1,2-DCE ug/L		Total 1,2-DCE ug/L		TCE ug/L		PCE ug/L		1,1-DCA ug/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-1933	22-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-1937	22-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-1939	22-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
W-812-1939	22-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U
SPRING6**	14-Jan-92	< 0.2	P	< 0.2	P	< 0.2	P			< 0.2	P	< 0.2	P	< 0.2	P
SPRING6	29-Sep-93	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	21-Apr-94	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6**	25-Jan-95	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	22-May-95	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	4-Aug-95	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	30-Oct-95	< 0.5	U					< 0.5	U	0.76		0.57		< 0.5	U
SPRING6	29-Jan-96	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	8-May-96	< 0.5	U					< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	26-Aug-96	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	19-Nov-96	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	6-May-97	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	13-May-97	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	1-Dec-97	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	23-Jun-98	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	7-Dec-98	< 0.5	U	< 0.5	U	< 0.5	U			< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	24-May-99	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
SPRING6	9-Nov-99	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	20-Jun-00	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	27-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	21-May-01	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	JU	< 0.5	U	< 0.5	U
SPRING6	19-Nov-01	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
SPRING6	15-May-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	10-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	11-Dec-03	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 0.5	U	< 0.5	U	< 0.5	U

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	The analyte was detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

** Sample stored with location name 812CRK.

Table A-17. Ground and surface water analyses for volatile organic compounds (ug/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		1,2-DCA ug/L		1,1,1-TCA ug/L		Chloro-form ug/L		Freon 11 ug/L		Freon 113 ug/L		Methylene chloride ug/L	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-1933	22-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1937	22-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1939	22-Nov-04	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U	< 3	U
W-812-1939	22-Nov-04	< 0.5	U	< 0.5	U			< 0.5	U	< 1	U	< 3	U
SPRING6**	14-Jan-92	< 0.2	P	< 0.2	P	< 0.2	P	< 0.2	P			< 1	P
SPRING6	29-Sep-93	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	21-Apr-94	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6**	25-Jan-95	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	22-May-95	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	4-Aug-95	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	30-Oct-95	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	29-Jan-96	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	8-May-96	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	26-Aug-96	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	19-Nov-96	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	6-May-97	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	13-May-97	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	1-Dec-97	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	23-Jun-98	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	7-Dec-98	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	24-May-99	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
SPRING6	9-Nov-99	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	20-Jun-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
SPRING6	27-Nov-00	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	21-May-01	< 0.5	OU	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	19-Nov-01	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU	< 0.5	LOU
SPRING6	15-May-02	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U
SPRING6	10-Jun-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U
SPRING6	11-Dec-03	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 0.5	U	< 1	U

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Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water Anions
July 27, 2005

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Fluoride (mg/L)		Silica as (SiO2) (mg/L)		Nitrate as (NO3) (mg/L)		Chloride (mg/L)		Sulfate (mg/L)	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
NC2-22	2-Mar-90							69	P	160	P
NC2-22	2-Mar-90			32	P						
NC2-22	9-May-90							66	P	140	P
NC2-22	9-May-90			23	P						
NC2-22	16-Aug-90							62	P	150	P
NC2-22	9-Oct-90	0.5	P					66	P	120	P
NC2-22	9-Oct-90										
NC2-23	28-Feb-90							56	P	130	P
NC2-23	28-Feb-90			66	P						
NC2-23	7-May-90							54	P	120	P
NC2-23	7-May-90			70	P						
NC2-23	15-Aug-90							60	P	150	P
NC2-23	9-Oct-90	0.4	P					57	P	130	P
NC2-23	9-Oct-90										
NC2-23	20-Jun-00	0.45				18		44		102	
NC2-23	24-Apr-01	0.47	H			20	H	62	DH	110	DH
NC2-23	13-May-02	0.54				26		54	D	110	D
NC2-23	3-Jun-03	0.64				20		57	DL	100	DL
W-812-01	29-Sep-00	0.32				58	D	69	D	31	D
W-812-01	30-Oct-03					82	D				
W-812-01	13-Feb-04					< 0.1	U				
W-812-01	26-May-04					43					
W-812-01	26-May-04	0.29	L					45	DL	19	L
W-812-01	26-May-04					40					
W-812-01	26-May-04	0.24	L					44	DL	18	L
W-812-01	25-Aug-04					64	D				
W-812-01	5-Nov-04					65	D				
W-812-01	11-Feb-05					73	D				
W-812-02	28-Sep-00	0.3				49	D	39	D	29	D
W-812-02	30-Oct-03					66	D				
W-812-02	13-Feb-04					74	D				
W-812-02	26-May-04					34					
W-812-02	26-May-04	0.14	L					15	L	15	L
W-812-02	25-Aug-04					61	D				
W-812-02	5-Nov-04					53	D				
W-812-02	11-Feb-05					57	D				
W-812-03	28-Aug-00	0.2				3.6		60	D	90	D
W-812-03	13-Nov-03					34					
W-812-03	30-Jan-04					3					
W-812-03	26-May-04					0.6					
W-812-03	26-May-04	0.09	L					42	DL	44	DL
W-812-03	25-Aug-04					< 0.1	U				
W-812-03	30-Nov-04					0.74					
W-812-03	9-Feb-05					1.1					
W-812-03	9-Feb-05					0.75					
W-812-04	26-Mar-01			< 0.2	U						
W-812-04	26-Mar-01	0.49	H			< 0.4	HU	110	DHL	140	DHL
W-812-04	13-Nov-03					< 0.1	U				
W-812-04	13-Feb-04					< 0.1	U				
W-812-04	27-May-04					< 0.1	U				
W-812-04	27-May-04	0.28	L					150	DL	170	DHL
W-812-04	25-Aug-04					< 0.1	U				
W-812-04	9-Feb-05					1.1					
W-812-07	28-Aug-00	0.9				15		160	D	60	D
W-812-07	30-Sep-02	0.97				5.5	H	67		84	
W-812-07	28-May-03	1				26		40	D	80	D
W-812-07	18-Aug-03	1.5	DH			46	DH	50	DH	100	DH
W-812-07	30-Oct-03					< 0.1	U				
W-812-07	30-Jan-04					< 0.1	U				
W-812-07	1-Jun-04					21					

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Carbonate (mg/L)		Bicar-bonate (mg/L)		TDS (mg/L)		Spec Cond (umhos/cm)		pH (Units)	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
NC2-22	2-Mar-90	44	P	180	P	580	P	960	P	8.4	P
NC2-22	2-Mar-90										
NC2-22	9-May-90	10	P	210	P	640	P	950	P	8.3	P
NC2-22	9-May-90										
NC2-22	16-Aug-90	< 1	P	210	P	530	P	970	P	8.2	P
NC2-22	9-Oct-90	< 1	P	210	P						
NC2-22	9-Oct-90					510	P	820	P	7.4	P
NC2-23	28-Feb-90	< 1	P	170	P	510	P	740	P	7.6	P
NC2-23	28-Feb-90										
NC2-23	7-May-90	< 1	P	170	P	570	P	780	P	7.7	P
NC2-23	7-May-90										
NC2-23	15-Aug-90	< 1	P	160	P	530	P	720	P	8	P
NC2-23	9-Oct-90	< 1	P	160	P						
NC2-23	9-Oct-90					460	P	680	P	7.3	P
NC2-23	20-Jun-00	< 10	DU	165	D	480	D	684		7.68	
NC2-23	24-Apr-01	< 1	HU	150	H	520	H	690	H	7.9	H
NC2-23	13-May-02	< 1	U	160		470	H	670	H	7.8	
NC2-23	3-Jun-03	< 1	HU	160	H	490	H	710	H	7.8	
W-812-01	29-Sep-00	< 1	U	180		520	D	700		8	
W-812-01	30-Oct-03										
W-812-01	13-Feb-04										
W-812-01	26-May-04										
W-812-01	26-May-04	< 1	HU	180	H	480	H	730	H	8.1	
W-812-01	26-May-04										
W-812-01	26-May-04	< 2	DHU	180	DH	490	H	720	H	8.1	
W-812-01	25-Aug-04										
W-812-01	5-Nov-04										
W-812-01	11-Feb-05										
W-812-02	28-Sep-00	< 1	U	170		410		590		7.8	
W-812-02	30-Oct-03										
W-812-02	13-Feb-04										
W-812-02	26-May-04										
W-812-02	26-May-04	4	DH	160	DH	360	H	520	H	8.5	
W-812-02	25-Aug-04										
W-812-02	5-Nov-04										
W-812-02	11-Feb-05										
W-812-03	28-Aug-00	40		160		330	D	570		9.4	
W-812-03	13-Nov-03										
W-812-03	30-Jan-04										
W-812-03	26-May-04										
W-812-03	26-May-04	20	DH	< 2	DHU	340	H	870	H	11.4	
W-812-03	25-Aug-04										
W-812-03	30-Nov-04										
W-812-03	9-Feb-05										
W-812-03	9-Feb-05										
W-812-04	26-Mar-01										
W-812-04	26-Mar-01	< 1	HU	220	H	870	H	1300	H	8	
W-812-04	13-Nov-03										
W-812-04	13-Feb-04										
W-812-04	27-May-04										
W-812-04	27-May-04	< 2	DHU	230	DH	890	H	1400	H	7.8	
W-812-04	25-Aug-04										
W-812-04	9-Feb-05										
W-812-07	28-Aug-00	< 1	U	420		920		1500		8.2	
W-812-07	30-Sep-02	< 10	DU	530	D	825	D	1260		7.86	
W-812-07	28-May-03	40	H	410	H	760	H	1100	H	8.7	
W-812-07	18-Aug-03	< 2	DHU	460	DH	770	H	1200	H	8.6	H
W-812-07	30-Oct-03										
W-812-07	30-Jan-04										
W-812-07	1-Jun-04										

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Fluoride (mg/L)		Silica as (SiO2) (mg/L)		Nitrate as (NO3) (mg/L)		Chloride (mg/L)		Sulfate (mg/L)	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-07	1-Jun-04					20					
W-812-07	26-Aug-04					21	D				
W-812-07	9-Feb-05					27					
W-812-08	28-Aug-00	0.5				33		40	D	27	
W-812-08	13-Nov-03					53	D				
W-812-08	30-Jan-04					< 0.1	U				
W-812-08	1-Jun-04					49	D				
W-812-08	1-Jun-04	0.76						53	D	33	D
W-812-08	26-Aug-04					50	D				
W-812-08	30-Nov-04					45	D				
W-812-08	9-Feb-05					55					
W-812-09	24-Aug-00	1				30		230	D	70	D
W-812-09	30-Sep-02	0.93				5	H	71		88	
W-812-09	28-May-03	1.5				34		97	D	50	D
W-812-09	25-Aug-03	1.5	H			37	H	86	DH	53	DH
W-812-09	13-Nov-03	1.3	D			58	D	62	D	43	D
W-812-09	13-Feb-04					33					
W-812-09	13-Feb-04	1.6						73	D	50	D
W-812-09	1-Jun-04					28					
W-812-09	1-Jun-04	1.8						95	D	71	D
W-812-09	26-Aug-04					26	D				
W-812-09	9-Feb-05					35					
W-812-1920	18-Dec-03					18					
W-812-1920	18-Dec-03	0.76						220	D	250	D
W-812-1920	19-Dec-03			25							
W-812-1920	13-Feb-04					40					
W-812-1920	13-May-04					24					
W-812-1920	26-Aug-04					29	D				
W-812-1920	29-Nov-04			29							
W-812-1920	29-Nov-04	0.63	H			28	D	170	D	280	D
W-812-1920	29-Nov-04			55							
W-812-1920	29-Nov-04	0.02	H			28		170	D	270	
W-812-1921	13-Feb-04					< 0.1	U				
W-812-1922	6-Feb-04					< 0.1	U				
W-812-1922	6-Feb-04	0.85						93	D	190	D
W-812-1922	6-Feb-04			55							
W-812-1922	13-May-04					< 0.1	U				
W-812-1922	26-Aug-04					3.5					
W-812-1922	19-Nov-04			18	LO						
W-812-1922	19-Nov-04	0.79				0.58		80	DLO	180	DLO
W-812-1923	16-Dec-03			33							
W-812-1923	16-Dec-03					75	D				
W-812-1923	16-Dec-03	0.64						580	D	300	D
W-812-1923	13-Feb-04					< 0.1	U				
W-812-1923	20-May-04					64	DL				
W-812-1923	26-Aug-04					71	D				
W-812-1923	19-Nov-04			37	LO						
W-812-1923	19-Nov-04	0.46				56	D	570	DLO	270	DLO
W-812-1924	6-Feb-04					1.8					
W-812-1924	13-May-04					11					
W-812-1924	26-Aug-04					9.5					
W-812-1924	30-Nov-04			18							
W-812-1924	30-Nov-04	0.76						110	D	300	DH
W-812-1925	6-Feb-04					3					
W-812-1925	20-May-04					< 0.1	LU				
W-812-1925	1-Sep-04					0.1	L				
W-812-1925	19-Nov-04			43	LO						
W-812-1925	19-Nov-04	0.29				0.15		49	DLO	80	DLO
W-812-1925	11-Feb-05					0.26					
W-812-1926	15-Dec-03			18							

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Carbonate (mg/L)		Bicar-bonate (mg/L)		TDS (mg/L)		Spec Cond (umhos/cm)		pH (Units)	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-07	1-Jun-04										
W-812-07	26-Aug-04										
W-812-07	9-Feb-05										
W-812-08	28-Aug-00	< 1	U	180		360	D	560		7.8	
W-812-08	13-Nov-03										
W-812-08	30-Jan-04										
W-812-08	1-Jun-04										
W-812-08	1-Jun-04	< 2	DHU	180	DH	390	D	630	H	7.7	
W-812-08	26-Aug-04										
W-812-08	30-Nov-04										
W-812-08	9-Feb-05										
W-812-09	24-Aug-00	< 1	U	360		970	D	1900	D	8.2	
W-812-09	30-Sep-02	< 10	DU	510	D	835	D	1280		7.85	
W-812-09	28-May-03	20	H	360	H	740	H	1200	H	8.6	
W-812-09	25-Aug-03	< 2	DHU	400	HD	740	H	1200	H	8.5	H
W-812-09	13-Nov-03	< 2	DHU	390	DH	740	H	1100	H	8.2	
W-812-09	13-Feb-04										
W-812-09	13-Feb-04	< 2	DHU	410	DH	700	H	1200	H	8.5	H
W-812-09	1-Jun-04										
W-812-09	1-Jun-04	20	DH	390	DH	700		1100	H	8.6	
W-812-09	26-Aug-04										
W-812-09	9-Feb-05										
W-812-1920	18-Dec-03										
W-812-1920	18-Dec-03	< 2	DHU	270	DH	1100	H	1500	H	8.2	
W-812-1920	19-Dec-03										
W-812-1920	13-Feb-04										
W-812-1920	13-May-04										
W-812-1920	26-Aug-04										
W-812-1920	29-Nov-04										
W-812-1920	29-Nov-04	42	H	300	H	1100	H	1800	H	8.1	
W-812-1920	29-Nov-04										
W-812-1920	29-Nov-04	36	H	300	H	1100	H	1800	H	8.2	
W-812-1921	13-Feb-04										
W-812-1922	6-Feb-04										
W-812-1922	6-Feb-04	< 2	DHU	210	DH	660	H	1000	H	8.3	H
W-812-1922	6-Feb-04										
W-812-1922	13-May-04										
W-812-1922	26-Aug-04										
W-812-1922	19-Nov-04										
W-812-1922	19-Nov-04	< 10	UH	91	H	560	H	940	H	8	
W-812-1923	16-Dec-03										
W-812-1923	16-Dec-03										
W-812-1923	16-Dec-03	< 2	DU	180	D	1900		3000	H	7.8	
W-812-1923	13-Feb-04										
W-812-1923	20-May-04										
W-812-1923	26-Aug-04										
W-812-1923	19-Nov-04										
W-812-1923	19-Nov-04	< 10	UH	200	H	1900	H	3100	H	7.9	
W-812-1924	6-Feb-04										
W-812-1924	13-May-04										
W-812-1924	26-Aug-04										
W-812-1924	30-Nov-04										
W-812-1924	30-Nov-04	14	H	190	H	970		1400	H	8	
W-812-1925	6-Feb-04										
W-812-1925	20-May-04										
W-812-1925	1-Sep-04										
W-812-1925	19-Nov-04										
W-812-1925	19-Nov-04	< 10	UH	190	H	410	H	700	H	8.2	
W-812-1925	11-Feb-05										
W-812-1926	15-Dec-03										

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Fluoride (mg/L)		Silica as (SiO2) (mg/L)		Nitrate as (NO3) (mg/L)		Chloride (mg/L)		Sulfate (mg/L)	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-1926	15-Dec-03					< 0.1	U				
W-812-1926	15-Dec-03	0.51						220	D	100	D
W-812-1926	6-Feb-04					2.3					
W-812-1926	13-May-04					2.8					
W-812-1926	1-Sep-04					1.8	L				
W-812-1926	19-Nov-04			22	LO						
W-812-1926	19-Nov-04	0.26				2		120	DLO	83	DLO
W-812-1926	11-Feb-05					1.466					
W-812-1929	13-Feb-04					77					
W-812-1929	20-May-04					44	DL				
W-812-1929	1-Sep-04					43	DL				
W-812-1929	5-Nov-04			62							
W-812-1929	5-Nov-04	0.56						80	D	49	D
W-812-1929	11-Feb-05					53	D				
W-812-1932	6-Feb-04					23					
W-812-1932	27-May-04					25	HL				
W-812-1932	1-Sep-04					12	L				
W-812-1932	29-Nov-04			38							
W-812-1932	29-Nov-04	0.53	H			19	D	65	D	83	D
W-812-1932	11-Feb-05					22					
W-812-1933	13-Feb-04					< 0.1	U				
W-812-1933	13-Feb-04	0.71						74	D	110	D
W-812-1933	13-Feb-04			51							
W-812-1933	27-May-04					3.5	HL				
W-812-1933	7-Sep-04					7					
W-812-1933	22-Nov-04			41							
W-812-1933	22-Nov-04	0.52				6.4		75	D	120	D
W-812-1933	11-Feb-05					6.702					
W-812-1937	6-Feb-04					69	D				
W-812-1937	27-May-04					75	DHL				
W-812-1937	27-May-04					38	DHL				
W-812-1937	7-Sep-04					35					
W-812-1937	22-Nov-04			12							
W-812-1937	22-Nov-04	0.55						88	D	150	DH
W-812-1939	13-Feb-04					7					
W-812-1939	20-May-04					14	DL				
W-812-1939	7-Sep-04					14					
W-812-1939	22-Nov-04			32							
W-812-1939	22-Nov-04	0.48						260	D	360	DH
W-812-1939	22-Nov-04			28							
W-812-1939	22-Nov-04	0.45						260	D	440	DH
W-812-2009	5-Nov-04					34					
W-812-2009	22-Feb-05			77							
W-812-2009	22-Feb-05	0.17						48	D	69	D
SPRING6**	11-Jul-89										
SPRING6**	11-Jul-89	0.4	P					57	P	140	P
SPRING6	29-Sep-93	0.49				16.391		27		56	
SPRING6	29-Sep-93			31							
SPRING6	21-Apr-94	0.62				< 22.15	DU	54	D	120	D
SPRING6**	25-Jan-95	0.33				19.049		48	D	85	D
SPRING6	22-May-95	0.43				19	D	54	D	130	D
SPRING6	4-Aug-95	0.46	H			19	DH	57	DH	120	DH
SPRING6	30-Oct-95	0.57				18		57	D	110	D
SPRING6	1-Dec-97					21					
SPRING6	23-Jun-98					43					
SPRING6	7-Dec-98					25					
SPRING6	24-May-99					< 0.5	SU				
SPRING6	9-Nov-99					48	DS				
SPRING6	20-Jun-00					23.9					
SPRING6	27-Nov-00					21	D				

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Carbonate (mg/L)		Bicar-bonate (mg/L)		TDS (mg/L)		Spec Cond (umhos/cm)		pH (Units)	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
W-812-1926	15-Dec-03										
W-812-1926	15-Dec-03	< 2	DHU	340	DH	820		1400	H	7.9	
W-812-1926	6-Feb-04										
W-812-1926	13-May-04										
W-812-1926	1-Sep-04										
W-812-1926	19-Nov-04										
W-812-1926	19-Nov-04	< 10	UH	400	H	790	H	1300	H	8.2	
W-812-1926	11-Feb-05										
W-812-1929	13-Feb-04										
W-812-1929	20-May-04										
W-812-1929	1-Sep-04										
W-812-1929	5-Nov-04										
W-812-1929	5-Nov-04	< 10	UH	180	H	520	H	780	H	8.1	H
W-812-1929	11-Feb-05										
W-812-1932	6-Feb-04										
W-812-1932	27-May-04										
W-812-1932	1-Sep-04										
W-812-1932	29-Nov-04										
W-812-1932	29-Nov-04	16	H	210	H	480	H	750	H	7.9	
W-812-1932	11-Feb-05										
W-812-1933	13-Feb-04										
W-812-1933	13-Feb-04	< 2	DHU	220	DH	540	H	910	H	8.6	H
W-812-1933	13-Feb-04										
W-812-1933	27-May-04										
W-812-1933	7-Sep-04										
W-812-1933	22-Nov-04										
W-812-1933	22-Nov-04	46	H	200	H	590	H	910	H	8.8	
W-812-1933	11-Feb-05										
W-812-1937	6-Feb-04										
W-812-1937	27-May-04										
W-812-1937	27-May-04										
W-812-1937	7-Sep-04										
W-812-1937	22-Nov-04										
W-812-1937	22-Nov-04	< 10	UH			610	H	960	H	8.1	
W-812-1939	13-Feb-04										
W-812-1939	20-May-04										
W-812-1939	7-Sep-04										
W-812-1939	22-Nov-04										
W-812-1939	22-Nov-04	24	H	200	H	1500	H	2200	H	8.1	
W-812-1939	22-Nov-04										
W-812-1939	22-Nov-04	26	H	210	H	1500	H	2300	H	8	
W-812-2009	5-Nov-04										
W-812-2009	22-Feb-05										
W-812-2009	22-Feb-05	< 10	U	130		420		590	H	7.4	
SPRING6**	11-Jul-89	< 1	P	210	P						
SPRING6**	11-Jul-89					530	P	830	P	7.3	P
SPRING6	29-Sep-93	< 1	U	270		530		730		8.4	
SPRING6	29-Sep-93										
SPRING6	21-Apr-94	< 1	U	200		560		750		7.8	
SPRING6**	25-Jan-95	< 1	U	160		490		630		8	
SPRING6	22-May-95	< 1	U	200		510		760		7.9	
SPRING6	4-Aug-95	10	H	180	H	550	H	700	H	7.9	H
SPRING6	30-Oct-95	< 1	U	200		530		790		8	
SPRING6	1-Dec-97										
SPRING6	23-Jun-98										
SPRING6	7-Dec-98										
SPRING6	24-May-99										
SPRING6	9-Nov-99										
SPRING6	20-Jun-00										
SPRING6	27-Nov-00										

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Fluoride (mg/L)		Silica as (SiO2) (mg/L)		Nitrate as (NO3) (mg/L)		Chloride (mg/L)		Sulfate (mg/L)	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
SPRING6	21-May-01					11					
SPRING6	15-May-02					28					
SPRING6	11-Dec-03					12.8					

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	Analyte detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte postively identified; the associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

** Sample stored with location name 812CRK.

Table A-18. Ground and surface water analyses for anions, TDS, specific conductance, and pH in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Carbonate (mg/L)		Bicar-bonate (mg/L)		TDS (mg/L)		Spec Cond (umhos/cm)		pH (Units)	
LOCATION	SAMPLED	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*	RESULT	QC FLAG*
SPRING6	21-May-01										
SPRING6	15-May-02										
SPRING6	11-Dec-03										

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Table A-19. Ground and surface water analyses for gross alpha and beta radioactivity (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

B812 Ground Water Gross Alpha and Gross Beta
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Table A-19. Ground and surface water analyses for gross alpha and beta radioactivity (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Gross Alpha pCi/L			Gross Beta pCi/L		
LOC_ID	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
NC2-22	2-Mar-90	2	± 3	P	13	± 2	P
NC2-22	2-Mar-90	6	± 3	P	16	± 3	P
NC2-22	9-May-90	2	± 3	P	9	± 2	P
NC2-22	9-May-90	3	± 3	P	9	± 2	P
NC2-22	16-Aug-90	5	± 3	P	6	± 2	P
NC2-22	9-Oct-90	3	± 3	P	8	± 2	P
NC2-22	14-Mar-91	5	± 4	P	24	± 3	P
NC2-22	16-Apr-91	2	± 3	P	33	± 3	P
NC2-22	12-Jul-91	7	± 5	P	29	± 3	P
NC2-22	9-Oct-91	1	± 1	P	51	± 2	P
NC2-22	17-Apr-92	< 4	± 4	U	12	± 2	P
NC2-22	19-Oct-92	5	± 5	P	29	± 3	P
NC2-22	22-Apr-93	7.73	± 0.78		14.2	± 0.58	
NC2-22	22-Apr-93	7.7	± 0.99		18	± 0.68	
NC2-22	10-Dec-93	6.86	± 0.67		16.1	± 0.4	
NC2-22	7-Jun-94	< 1.84	± 0.47	U	7.3	± 0.35	
NC2-22	22-Nov-94	1.81	± 0.88		6.19	± 0.96	
NC2-23	28-Feb-90	5	± 4	P	8	± 2	P
NC2-23	7-May-90	3	± 3	P	6	± 2	P
NC2-23	14-Aug-90	2	± 2	P	5	± 2	P
NC2-23	9-Oct-90	2	± 3	P	8	± 2	P
NC2-23	14-Mar-91	2	± 3	P	9	± 2	P
NC2-23	16-Apr-91	1	± 3	P	6	± 2	P
NC2-23	12-Jul-91	2	± 4	P	8	± 2	P
NC2-23	9-Oct-91	2	± 2	P	5	± 1	P
NC2-23	17-Apr-92	2	± 3	P	4	± 2	P
NC2-23	19-Oct-92	1	± 3	P	9	± 2	P
NC2-23	22-Apr-93	13.8	± 1.2		15.7	± 0.68	
NC2-23	10-Dec-93	6.4	± 0.99		7.21	± 0.61	
NC2-23	7-Jun-94	7.85	± 0.6		6.22	± 0.35	
NC2-23	7-Jun-94	< 5.2	± 3.2	UO	4.3	± 2.4	
NC2-23	22-Nov-94	1.5	± 0.92		3.44	± 0.72	
NC2-23	22-Nov-94	< 4.4	± 3	U	7.3	± 2.3	
W-812-01	29-Sep-00	23.3	± 5.1		19.6	± 3.2	
W-812-02	28-Sep-00	9.59	± 2.4		5.54	± 1.2	
W-812-03	28-Aug-00	< 2	± 1	U	8.44	± 2.1	
W-812-04	26-Mar-01	< 2.85	± 1.6	LOU	5.08	± 1.6	LO
W-812-07	28-Aug-00	25	± 7.8	B	17.3	± 3.9	
W-812-07	30-Sep-02	39	± 9.1		31.6	± 5.1	
W-812-07	28-May-03	37.9	± 11		15.9	± 3.2	
W-812-07	18-Aug-03	21.1	± 5.8		33.5	± 5.6	
W-812-07	30-Oct-03	53.8	± 12	U	17.5	± 3.1	
W-812-07	30-Jan-04	49.2	± 14		15	± 4.4	
W-812-07	1-Jun-04	35.5	± 8.5		18.9	± 3.7	
W-812-07	1-Jun-04	37.1	± 8.8		18.3	± 3.6	
W-812-08	15-Sep-00	16.8	± 3.8	L	14.1	± 2.3	L
W-812-09	24-Aug-00	23.5	± 6.2	B	17.5	± 3.2	
W-812-09	30-Sep-02	20.4	± 5.2		13.8	± 2.4	
W-812-09	28-May-03	62.8	± 14		16.9	± 3.4	
W-812-09	25-Aug-03	45.8	± 10		15.2	± 3.2	
W-812-09	13-Nov-03	21.9	± 7		9.87	± 1.8	
W-812-09	13-Feb-04	42.5	± 11		7.91	± 3.3	
W-812-09	1-Jun-04	49.4	± 11		19.2	± 3.4	

Table A-19. Ground and surface water analyses for gross alpha and beta radioactivity (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Gross Alpha pCi/L				Gross Beta pCi/L			
LOC_ID	SAMPLED		RESULT	ERROR	QC FLAG*		RESULT	ERROR	QC FLAG*
W-812-1920	19-Dec-03		29.5	± 11			12.5	± 5.5	
W-812-1920	29-Nov-04		22.4	± 5.9			25.6	± 4.3	
W-812-1920	29-Nov-04		12.3	± 4.1			21.4	± 3.8	
W-812-1922	6-Feb-04		4.16	± 1.9			9.85	± 2.3	
W-812-1922	19-Nov-04	<	2	± 0.95	EU		6.54	± 1.3	
W-812-1923	17-Dec-03		23.5	± 7.9			17.2	± 4.7	
W-812-1923	19-Nov-04		16.1	± 6.3			11.4	± 5.2	
W-812-1924	30-Nov-04	<	2	± 1	U		5.09	± 1.3	
W-812-1925	19-Nov-04	<	2	± 0.75	U		5.16	± 1.1	
W-812-1926	15-Dec-03	<	3.62	± 2.4	U	<	5.4	± 3.4	U
W-812-1926	19-Nov-04		2.03	± 1.4			4.14	± 1.1	
W-812-1929	5-Nov-04		2.44	± 1.1		<	3	± 0.88	EU
W-812-1932	29-Nov-04		2.8	± 1.4			5.52	± 1.9	
W-812-1933	13-Feb-04	<	2	± 0.96	U		6.16	± 2.1	
W-812-1933	22-Nov-04	<	2	± 0.69	U		7.93	± 1.5	
W-812-1937	22-Nov-04	<	2	± 0.8	EU		6.35	± 1.3	
W-812-1939	22-Nov-04		12.6	± 4.6			25.8	± 4.6	
W-812-1939	22-Nov-04		10.9	± 4.5			26.1	± 4.8	
SPRING6**	13-Jan-88		7	± 6			19	± 6	
SPRING6**	11-May-88		4	± 3			11	± 4	
SPRING6**	18-Aug-88	<	3	± 0	P		12	± 6	P
SPRING6**	21-Oct-88		8	± 5	P		12	± 5	P
SPRING6**	19-Jan-89	<	5	± 0	P		15	± 7	P
SPRING6**	12-Apr-89	<	9	± 0	P	<	7	± 0	P
SPRING6**	11-Jul-89		9	± 6	P		21	± 8	P
SPRING6**	11-Jul-89		9	± 6	P		21	± 8	P
SPRING6**	19-Oct-89		5	± 7	P		26	± 7	P
SPRING6**	8-Jan-90		3	± 3	P		5	± 2	P
SPRING6**	18-Jul-90		6	± 3	P		9	± 2	P
SPRING6**	7-Jan-91		1	± 4	P		1	± 2	P
SPRING6**	5-Apr-91		20.25	± 8.953	P		22.76	± 3.836	P
SPRING6**	3-Oct-91		21.58	± 11.3	P		27.28	± 5.223	P
SPRING6**	14-Jan-92		6.924	± 4.457	P		10.15	± 2.178	P
SPRING6**	30-Apr-92	<	7.17	± 4.969	P		12.74	± 2.383	P
SPRING6**	21-Jul-92	<	6.41	± 4.639	P		7.971	± 2.113	P
SPRING6**	6-Oct-92		11.4	± 8.05	P		12.9	± 3.65	P
SPRING6**	17-Feb-93	<	3.81	± 2.79	U		6.59	± 1.42	P
SPRING6**	21-Apr-93		8.22	± 3.35			1.08	± 3.14	
SPRING6**	13-Aug-93		5.11	± 0.7			8.31	± 0.44	
SPRING6	29-Sep-93		5.1	± 0.7			6.9	± 0.4	
SPRING6**	12-Oct-93		6.27	± 0.78			9.1	± 0.45	
SPRING6**	19-Jan-94		3.19	± 0.65			4.04	± 0.36	
SPRING6**	8-Apr-94		4.29	± 1.42			7.29	± 1.04	
SPRING6	21-Apr-94		1.23	± 0.16			4.57	± 0.52	
SPRING6**	16-Aug-94	<	3.12	± 0.92	U		2.9	± 0.49	
SPRING6**	26-Oct-94		4.3	± 0.92			6.92	± 0.45	
SPRING6**	25-Jan-95		7.12	± 0.52			7.53	± 0.4	
SPRING6	22-May-95		5.52	± 0.42			6.77	± 0.3	
SPRING6	4-Aug-95	<	4.5	± 3.3	U		5.7	± 2.8	
SPRING6	30-Oct-95	<	4.7	± 2.7	U		5.2	± 2.1	
SPRING6	8-May-96		9.7	± 4.8			6.9	± 3.6	O
SPRING6	26-Aug-96	<	6.1	± 3.7	UOL		6.2	± 3	
SPRING6	19-Nov-96		6.3	± 2.8			9.8	± 2.4	F

Table A-19. Ground and surface water analyses for gross alpha and beta radioactivity (pCi/L) in samples collected from the Building 812 study area between January 1, 1988 and March 31, 2005.

		Gross Alpha pCi/L			Gross Beta pCi/L		
LOC_ID	SAMPLED	RESULT	ERROR	QC FLAG*	RESULT	ERROR	QC FLAG*
SPRING6	13-May-97	< 4.8	± 3.4	UL	5.7	± 3.2	
SPRING6	1-Dec-97	< 5.2	± 3.5	U	8.3	± 3.3	
SPRING6	23-Jun-98	3.34	± 1.55		6.99	± 1.49	
SPRING6	7-Dec-98	4.25	± 1.13		4.48	± 0.84	
SPRING6	24-May-99	2.31	± 0.94		6.8	± 1.3	
SPRING6	9-Nov-99	2.63	± 1		6.67	± 1.6	
SPRING6	20-Jun-00	2.12	± 0.75		< 3	± 0.83	EU
SPRING6	27-Nov-00	2.13	± 1.1		8.35	± 1.6	
SPRING6	21-May-01	< 3.74	± 2.4	U	4.83	± 1.9	
SPRING6	19-Nov-01	3.79	± 1.5		6.98	± 1.5	
SPRING6	15-May-02	2.95	± 1.4		7.76	± 1.7	
SPRING6	10-Jun-03	3.94	± 1.7		7.15	± 3	
SPRING6	11-Dec-03	2.87	± 1.7		7.67	± 2.5	
SPRING6	27-May-04	3.44	± 1.7		5.8	± 2.1	
SPRING6	3-Dec-04	4.84	± 1.6		6.19	± 1.3	

*QC FLAG	DEFINITION
B	Analyte found in method blank
D	Analysis performed at a secondary dilution or concentration (i.e., vapor samples)
E	Analyte detected below LLNL reporting limit, but above analytical laboratory minimum detection limit
F	Analyte found in field blank, trip blank, or equipment blank
G	Quantitated using fuel calibration, but does not match typical fuel fingerprint (gasoline, diesel, motor oil etc.)
H	Sample analyzed outside of holding time, sample results should be evaluated
I	Surrogate recoveries outside of QC limits
J	Analyte was postively identified; associated numerical value is approximate concentration of the analyte
L	Spike accuracy not within control limits
O	Duplicate spike or sample precision not within control limits
P	Indicates that the absence of a data qualifier flag does not mean that the data does not need qualification, but that the implementation of electronic data qualifier flags was not yet established
R	Sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet QC criteria. The presence or absence of the analyte cannot be verified
S	Analytical results for this sample are suspect
T	Analyte is tentatively identified compound; result is approximate
U	Compound was analyzed for, but not detected above detection limit

** Sample stored with location name 812CRK.

Attachment B

Unsaturated Zone Chemical Modeling

Attachment B

Unsaturated Zone Chemical Modeling

1. Introduction

Screening-level unsaturated (vadose) zone modeling was conducted to assess the potential impact of residual contaminants present in surface and subsurface soil and rock that could migrate downward through the vadose zone and eventually reach ground water. A conservative quantitative approach was followed using one-dimensional (1-D) unsaturated flow and transport modeling to determine if contaminants could adversely impact ground water. The results of numerical simulations are not intended to predict actual future concentrations at the water table. Instead, these analyses are intended to represent a conservative worst-case scenario to be used as a screening tool.

This modeling analysis was conducted for metals, total uranium, and thorium-232 detected in surface soil samples at Building 812. A modeling analysis was also performed for metals, thorium-228, radium-226 and -228, total uranium, trichloroethylene (TCE) and 1,1,1-trichloroethane (TCA) detected in subsurface soil samples. The analysis of metals in surface soil and subsurface soil and rock were limited to those constituents with Soluble Threshold Limit Concentration (STLC) analytical results that exceeded drinking water maximum contaminant levels (MCLs).

2. Methodology

One-dimensional vertical vadose zone column modeling was selected as the screening methodology to assess potential impact to ground water from constituents detected in surface soil and unsaturated subsurface soil and rock. LLNL has selected the numerical code NUFT (Non-isothermal, Unsaturated-Saturated Flow and Transport) (Nitao, 1998) for this type of assessment. NUFT is a multi-phase, multi-component flow and contaminant transport code that was primarily developed to simulate flow and transport in the unsaturated zone. NUFT is capable of simulating all relevant unsaturated and saturated zone processes such as advection, dispersion, diffusion, adsorption, volatilization, and degradation for aqueous, gaseous, and non-aqueous phases under non-isothermal conditions. The extensive capabilities of the NUFT code allow for the incorporation of all relevant factors for which representative site data exist. This approach is similar to that described in the Regional Water Quality Control Board-Central Valley Region (1989) document for determining designated levels for soil contamination. All factors controlling the migration of a chemical in a 1-D column are considered and conservative assumptions are used when adequate site data are not available. The modeling approach and input parameters are discussed in Sections 2.1 and 2.2.

2.1. Modeling Approach

The most important step in screening-level modeling is the development of a representative conceptual model of the source area. The approach used in developing representative conceptual models for contaminant sources at the Building 812 study area is as follows:

- Gather all available surface and subsurface data for the source area.
- Develop a representative soil/rock profile using borehole lithologic and geophysical data.
- Assign soil/rock hydraulic flow properties.
- Assign the elevation of the ground water table at the bottom of the column.
- Assign the infiltration rate at the top of the column.
- Run and calibrate the flow model until a representative soil moisture profile is obtained.
- Assign the initial contaminant distribution as a profile for subsurface soil evaluations or assign the initial contaminant value within the top 1 foot of the model for surface soil evaluations.
- Run the transport model and determine the maximum concentration/activity reaching the ground water and the elapsed time to reach the peak concentration/activity.

2.2. Model Input Parameters

Multiple data sets were used in determining model input parameters. Boring logs, geophysical logs, and information from shallow borings were used to characterize the geology and develop representative soil profiles for each source area. The development of the soil profiles used in the Building 812 model is discussed in Section 2.2.1. Long-term ground water elevation data from wells were used to determine the highest ground water elevation observed beneath each site (Section 2.2.2). Laboratory analytical data for soil/rock physical parameters and unsaturated flow parameters were used as model input. Meteorological data from Site 300 and the city of Tracy weather stations were used in determining the infiltration rate. Soil moisture data from borings were used to evaluate the soil moisture profiles, where available. The development of the infiltration rate and soil moisture profile used in the model is described in Section 2.2.3. Literature information was used to assign basic transport parameters for each chemical. A conservative approach was taken in assigning each input parameter. The transport parameters for constituents in soil/rock that were modeled are discussed in Section 2.2.4. All soil samples collected in the immediate vicinity of each source area were used to determine the chemical concentration distribution. The initial distribution of contamination used in the model area is discussed in Section 2.2.5.

2.2.1. Soil/Rock profile

A representative soil profile was developed for the Building 812 Firing Table area based on geological and geophysical information obtained from well W-812-01. Discontinuous layers of low permeability fine-grained soil/rock units were disregarded. The maximum encountered thickness of high permeability layers and minimum encountered thickness of adjacent low permeability units were used in developing a conservative soil profile from the perspective of unsaturated flow and transport. Experience gained during the remedial investigation and laboratory analysis of the unsaturated flow properties of the soils and rocks at Site 300 allowed categorizing soils/rocks into six different types (Ferry et al., 1999).

The six types were based on 23 soil samples that were analyzed in a geotechnical laboratory for intrinsic and unsaturated flow properties. The moisture retention curves of each soil sample were defined using the Van Genuchten (1980) model parameters. The curves span a narrow range, one end representing the relatively less permeable materials and the other representing the highly permeable materials within each group. Six soil/rock types were defined using these upper and lower boundaries:

1. Coarse artificial fill.
2. Fine artificial fill.
3. Coarse soil.
4. Fine soil.
5. Coarse-grained bedrock.
6. Fine-grained bedrock.

For each of the six soil/rock types, all NUFT input parameters were based on the laboratory analysis results. Care was taken to select conservative permeability, porosity, and moisture retention parameter values. The resulting soil profile is 30% to 40% wetter and more permeable than what was measured during borehole sampling. Therefore, modeled contaminant migration occurs at a faster rate and at higher concentrations than in the actual conditions at Building 812. This approach was specifically used to account for localized heterogeneity. The initial estimates of input parameters were further refined during the flow calibration step. Soil moisture profiles resulting from these set of input parameters represent typical conditions for a rainy season. The complete set of input parameters is listed in Table B-1.

2.2.2. Ground water elevation and the unsaturated zone thickness

A long-term ground water elevation hydrograph from well W-812-01, which is completed in the uppermost water bearing zone beneath the firing table ($Tnbs_0$ hydrostratigraphic unit [HSU]), was examined and the highest historical ground water elevation was used in the model as the receptor location. The depth to water directly beneath the Building 812 Firing Table in the $Tnbs_0$ HSU is approximately 37 ft below ground surface and typically fluctuates less than 1 ft.

2.2.3. Infiltration rate

A water balance analysis was conducted to determine an average infiltration rate for Site 300 (Ferry et al., 1999). The Green and Ampt (1911) model to predict net infiltration was used as the basis of the analysis. In addition, time-dependent rainfall data were incorporated into the analysis using the Chu (1978) model.

Twenty years of historical precipitation data from Site 300 was supplemented with daily precipitation intensity, temperature, solar radiation, and wind data from the Tracy weather station. Transpiration from vegetation cover was ignored and the evaporation depth was set to 3.28 ft (1 meter) below ground level. The topsoil type was selected from relatively permeable sandy materials and five different soils representing five different permeability values were used in the analysis. Initial saturation in the topsoil was assumed to be 60%. This is extremely conservative because even after heavy precipitation events the topsoil at Site 300 becomes very dry after a short period. The average annual precipitation at Site 300 is 319 millimeters (mm) (12.6 inches). The net infiltration rate is expected to be less than 10% of average annual precipitation, based on previous studies and calibrated analytical models used in the past at Site 300 (Demir and Ferry, 1999). However, for the purposes of this screening-level study, the infiltration rate was conservatively determined as 10% of annual average rainfall at 31.9 mm (1.26 inches).

2.2.4. Transport parameters

The transport parameters required in the NUFT model include physical properties, partitioning coefficients, decay rates, diffusion, and dispersivity constants for chemicals.

Physical properties of chemicals such as molecular weight or half-life are readily available in the literature. Partitioning coefficients between the solid, air, and water phases are well studied and there are large databases (e.g., Thiboult, 1990) for some of the chemicals with a range of reported values. The smallest reported number for soil-water partitioning coefficients were selected for this study (Table B-2) resulting in less sorptive (more mobile) behavior. Volatilization of chemicals was not allowed by using a negligible water-air partitioning coefficient. Other than the half-life of radioisotopes, none of the chemicals were assigned a decay rate. Dispersion was not used in the model, essentially simulating a plug-flux of chemicals towards the water table at the maximum possible peak concentration.

2.2.5. Initial Distribution of Residual Contamination

The potential impact to ground water from surface soil and subsurface soil and rock were evaluated separately. An adequate number of surface soil sample results allowed calculation of a 95-percentile Upper Confidence Level value for each chemical. This value was then assigned to the first 1 foot in the model to represent the current surface soil contamination at the Building 812 study area.

For the residual soil contamination in the subsurface, only STLC results were available for the metals. To most conservatively convert STLC concentrations in milligrams per liter (mg/L) of leachate to representative soil concentrations in milligrams per kilogram (mg/kg), it was assumed that the metal completely partitioned into the solid phase. Metals that did not yield STLC concentrations in excess of drinking water MCLs were not modeled.

3. Computational runs and results

Prior to modeling the transport of constituents from unsaturated soil and rock to ground water, the model was calibrated to existing moisture content distribution data. There are adequate and representative soil moisture data for the Building 812 study area, therefore, the unsaturated hydraulic properties of soil and rock types were calibrated using this data set. The resulting moisture profiles were shifted towards a wetter profile to account for extended durations of heavy precipitation.

Dilution due to ground water flow at the water table was conservatively neglected. Concentrations reported for each constituent represent the maximum value that reaches the top 1 ft of the saturated zone. Assuming a simple box-model to account for the mixing and assuming conservative ground water flow properties typical of water bearing zones at Site 300, the maximum reported values could be conservatively reduced by 30% to 50% due to ground water dilution.

Simulation results for each contaminant are presented in Table B-3. The highest concentration/activity to reach the ground water and the arrival time along with background and MCL concentrations/activities are presented for comparison. Based on the modeling results, only uranium in subsurface soil and rock shows any future potential to impact ground water at concentrations above MCLs. Modeling predicted that uranium in subsurface soil could reach ground water at peak activities of 17,000 pCi/L after 90,000 years.

4. References

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Table B-1. Soil/rock properties used in NUFT.

Parameter	Unit	Coarse artificial fill	Fine artificial fill	Coarse soil	Fine soil	Coarse bedrock	Fine bedrock
Solid density	kg/m^3	2,690	2,740	2,730	2,750	2,750	2,690
Bulk density	kg/m^3	1,840	1,820	1,240	1,370	1,690	1,490
Vertical hydraulic conductivity (Kz)	m^2	2.55E-08	1.33E-09	1.02E-09	1.33E-10	1.02E-11	3.57E-12
Porosity	%	0.30	0.32	0.30	0.38	0.32	0.35
Total organic carbon	%	0.1	0.1	0.1	0.1	0.1	0.1
Van Genuchten Parameters							
N		1.40	1.30	1.20	1.15	1.50	1.60
m = 1 - (1/n)		0.2857	0.2308	0.1667	0.1304	0.3333	0.3750
α	1/Pa	2.855E-03	1.224E-03	4.079E-04	1.020E-04	1.632E-04	2.040E-05
Residual saturation	%	0.2167	0.3125	0.2667	0.3158	0.4688	0.5714
Maximum saturation	%	0.9133	0.9375	0.9667	0.9737	0.9063	0.9714
Tortuosity[a]	%	Millington	Millington	Millington	Millington	Millington	Millington

Notes:

kg/m^3 = Kilogram per meter cubed.
m^2 = Meters squared.

NUFT = Non-isothermal, Unsaturated-Saturated Flow and Transport.

[a] Millington (1961) tortuosity factor = Saturation$^{(7/3)}$ • n$^{(1/3)}$.

Table B-2. Transport parameters used in NUFT.

	Partitioning Coefficient (K_d) (mL/g)	Half-life (years)
Barium	60	–
Beryllium	250	–
Chromium (total)	30	–
Copper	35	–
Lead	270	–
Zinc	200	–
Radium-226	100	1,602
Radium-228	100	6.7
Thorium-228	1,000	1.9
Thorium-232	1,000	1.4e+10
Uranium	10	–
TCE	0.5	–
1,1,1-TCA	0.5	–

Notes:

mL/g = Milliliter per gram.
NUFT = Non-isothermal, Unsaturated-Saturated Flow and Transport.
1,1,1-TCA = Trichloroethane.
TCE = Trichloroethene.

Table B-3. Potential impact to ground water from chemicals detected in surface and subsurface soil and rock at the Building 812 study area.

Media for residual contamination	COC	Soil concentration in initial contaminant distribution	Maximum concentration reaching ground water	Time to reach maximum concentration	Maximum contaminant level (CA DHS MCLs)	Predicted time to reach MCLs
Surface Soil	*Metals*	mg/kg (UCL95)	(mg/L)	(years)	(mg/L)	(years)
	Barium	114.9	3	500,000	1,000	–
	Beryllium	1.7	0.01	2.3 million	4	–
	Chromium (total)	14.3	0.75	300,000	50	–
	Copper	322.5	14	300,000	1,000	–
	Lead	41.0	0.2	2.5 million	15	–
	Zinc	63.6	0.45	1.8 million	5,000	–
	Radionuclides	pCi/g (UCL95)	(pCi/L)	(years)	(pCi/L)	(years)
	Thorium-232	0.8	0.0012	9.0 million	15	–
	Uranium (total)	21.8	3.5	90,000	20	
Subsurface Soil	*Metals*	mg/kg (maximum STLC)	(mg/L)	(years)	(mg/L)	(years)
	Barium	9.0	3	400,000	1,000	–
	Beryllium	0.26	0.015	1.8 million	4	–
	Chromium (total)	0.12	0.06	200,000	50	–
	Copper	25.0	12	95,000	1,000	–
	Lead	19.0	1.2	800,000	15	–
	Zinc	11.0	0.9	500,000	5,000	–
	Radionuclides	pCi/g (maximum)	(pCi/L)	(years)	(pCi/L)	(years)
	Thorium-228	0.89	Does not reach ground water	N/A	15	–
	Radium-226 and Radium-228	10.4 + 1.3	Does not reach ground water	N/A	5	–
	Uranium (total)	22,740	17,000	90,000	20	25,000
	VOCs	mg/kg (maximum)	mg/L	(year)	(mg/L)	(years)
	TCE	0.0048	0.01	6,000	5	–
	1,1,1-TCA	0.0003	0.0007	6,000	200	–

Notes:
COC = Contaminant of concern.
DHS = State Department of Health Services.
mg/kg = Milligram per kilogram.
mg/L = Milligram per liter.
NA = Not applicable.
pCi/g = PicoCuries per gram.
STLC = Soluble Threshold limit Concentration.
TCA = Trichloroethane.
TCE = Trichloroethene.
UCL95 = 95% upper confidence level.
VOCs = Volatile organic compounds.

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