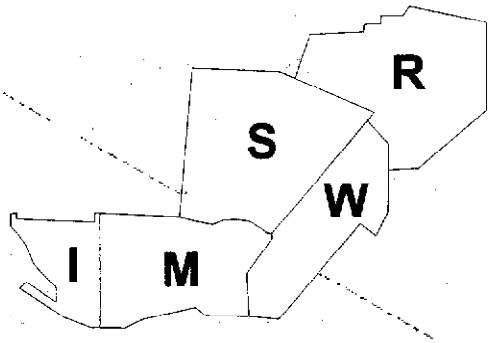
FIELD SITE INVESTIGATION



Technical Memorandum Letter
Piezometer Installation and Sampling for the Site Hydrogeologic Model

FOR THE BENICIA ARSENAL

January 2003

Prepared for:
US Army Corps of Engineers
Sacramento District

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31 January 2003

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U.S. Army Corps of Engineers
1325 J Street
Sacramento, California 95814

017-00726-008

Subject: Final Technical Memorandum Letter – Piezometer Installation and Sampling for the Site Hydrogeologic Model at the Former Benicia Arsenal, Benicia, California

Dear Mr. Mitchener:

This Technical Memorandum (TM) letter documents piezometer installation, including groundwater and soil sampling, performed during January 2002 and February 2002 in support of the Site Hydrogeologic Model (SHM) at the Former Benicia Arsenal (Arsenal), Benicia, California. The work described herein is part of the Benicia Arsenal Environmental Restoration Program, conducted for the U.S. Army Corps of Engineers (USACE) Sacramento District under the Formerly Used Defense Sites (FUDS) program.

Development of the SHM is a voluntary effort on the part of USACE to better understand geologic and hydrogeologic conditions at the former Arsenal. Seventeen piezometers were installed and sampled to fill data gaps identified in the draft SHM (Forsgren Associates/Brown and Caldwell [FA/BC], 2001b. The revised SHM resulting from this work will be used to focus future site investigations and minimize the number of borings, wells, and sampling events that directly impact current landowners and users of the property.

The activities described in this TM letter were performed in accordance with the following documents: Arsenal-Wide Quality Assurance Project Plan (QAPP) (FA/BC, 2001a), Draft SHM (FA/BC, 2001b), Benicia Arsenal General Site Safety and Health Plan (FA/BC 1999a), Corporate Health and Safety Program Manual (FA/BC, 1998), Safety and Health Requirements Manual EM 385-1-1 (USACE, 1996) and Final Letter Workplan – Piezometer Installation and Sampling for the Site Hydrogeologic Model at the Former Benicia Arsenal, Benicia, California (Workplan) (FA/BC, 2001c).

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The following sections of this TM letter describe the piezometer installations and document variations from the Workplan. A summary of analytical results and a preliminary assessment of data quality are provided. Also included is a tabulation of groundwater levels measured to date, boring and well completion logs, and appropriate figures or plates. Our detailed interpretation of the data collected from these 17 piezometers (e.g., soil and groundwater water analytical results, geologic and hydrogeologic data) is not included in this TM letter but will be discussed in detail in the final SHM, which is planned for publication in late 2002 or early 2003.

This TM letter is organized into eight sections. Section 1.0 is an introduction that presents background information and describes the purpose for this investigation. Borehole drilling and soil sampling procedures are documented in Section 2.0, including details on piezometer installation and development. Section 3.0 summarizes the regional and local geologic setting. A summary of local hydrogeology at the former Arsenal is included as Section 4.0. Analytical results are presented in Section 5.0. Details regarding the generation, storage, and disposal of Investigation Derived Waste (IDW) are included in Section 6.0. Section 7.0 summarizes this TM letter, and references are provided in Section 8.0.

1.0 INTRODUCTION

Activities documented in this TM letter include drilling, installation, and sampling of 17 piezometers at the former Arsenal. The purpose of this work was to supplement hydrogeologic data collected at the site to date and provide baseline information on groundwater levels and water chemistry.

Information obtained from the piezometer installations included lithology/soil type, depth to groundwater, and chemical data from the analysis of groundwater and soil samples. This data will be used to assess general hydrogeologic conditions throughout the formal Arsenal and improve USACE's understanding of the presence of groundwater, depth to groundwater, groundwater gradients, stratigraphy, and groundwater chemistry. Soil samples from selected borehole locations were also analyzed to supplement currently available information on ambient metals concentrations in soil. All these data will be used to plan and focus future environmental investigations at the site.

The following activities were completed during execution of this project:

- Drilled, installed, developed and surveyed the location of 17 new piezometers.
- Collected two soil samples from 14 of the 17 borings for purposes of evaluating ambient metals concentrations in different stratigraphic units above the water table. Soil samples were not collected from three borings (PZ-13, PZ-14, and PZ-18) per the right-of-entry agreement negotiated between USACE and the current landowner.
- Collected groundwater samples from 14 of the 17 piezometers and submitted samples for chemical testing. Groundwater in three piezometers (PZ-13, PZ-14, and PZ-18) was not sampled per the right-of-entry agreement between USACE and the current landowner.

2.0 PROCEDURES

Table 1 summarizes the locations and depths of the 17 piezometers installed for this project. Hydrologic and geologic data are also included on Table 1, and piezometer locations are illustrated on Plate 1.

Originally, 20 piezometers were proposed to support development of the SHM. However, PZ-8 could not be installed because the property owner did not grant access to USACE. Piezometers PZ-15 and PZ-16 were not installed because shallow bedrock was encountered at these locations.

2.1 Drilling, Soil Sampling, and Piezometer Construction

As shown on Table 1, PZ-1 through PZ-7, PZ-9 through PZ-14, and PZ-17 through PZ-20 were installed between January 14, 2002 and January 24, 2002. Except for proposed PZ-8, PZ-15 and PZ-16, all piezometers were installed at the locations specified in the Workplan. Additionally, all piezometers were screened across planned hydrologic intervals (e.g., water table, alluvium/fill, base of bedrock), except for PZ-10. The screen interval of PZ-10 was planned across the middle or base of alluvial material. However, bedrock was encountered at a shallower depth than anticipated and this piezometer was constructed across the boundary between the bedrock and alluvium.

2.1.1 Drilling and Soil Sampling. Soil borings were completed using a Mobile B-61 and B-80 truck-mounted drill rig equipped with 8-inch outer diameter hollow-stem augers. Borings were drilled to approximately 5 feet below first encountered groundwater, as measured during drilling. Gregg Drilling, Martinez, California (C-57 License #485165) provided subcontractor drilling services.

Relatively undisturbed soil samples were collected continuously during piezometer installation. Samples were collected for lithologic evaluation and for preparation of field geologic boring logs. Soil samples were obtained by split spoon sampler or continuous core. After the drive sampler or core barrel was removed from the borehole, the sampler was opened and the field geologist examined the exposed soil. Soils were described by the geologist using the Unified Soil Classification System.

During drilling, two discrete-depth soil samples were collected for metals analyses from 14 of the 17 borings. As described above, soil samples were not collected from PZ-13, PZ-14 and PZ-18 at the landowner's request. One soil sample was collected by hand at the surface (in the first 6 inches below any paving materials). The second soil sample targeted a different lithology of significance (greater than 2 feet thick) between the surface and 10 feet below ground surface (bgs), or between the surface and saturated soil, whichever was encountered first. If the lithology did not change significantly or saturated materials were not encountered above 10 feet bgs, then the second soil sample was collected at 8 feet bgs. The second soil sample from PZ-7 was inadvertently collected at 17.5 feet bgs to 18 feet bgs, which represented a significant change in soil type. The sample should have been collected at 8 feet bgs.

Soil samples were collected at the selected depths by inserting a clean stainless steel sleeve into the exposed soil core. Each sleeve was covered with 2-mil Teflon® sheets, capped with plastic end caps, placed in a zipped resealable plastic bag, and then placed in a cooler containing ice. In some cases, the paving materials were a few feet thick and the surface sample could not be collected by hand. For these situations, a split spoon sampler lined with stainless steel sleeves was driven into the soil and the desired sleeve was removed from the sampler.

Soil samples selected for laboratory analysis were kept in the ice chest as they were collected. Fresh ice was added as necessary and a chain-of-custody record was maintained. Because the holding time allowed for metals analyses is six months, the soil samples were kept cold at the site and shipped under chain-of-custody documentation in two batches. Each shipment included samples taken over approximately one week.

2.1.2 Piezometer Installation. The field geologic boring logs were used to confirm specific piezometer construction details at each location. Design parameters included screen interval, total depth of screen, screen size, filter pack size, bentonite seal thickness, and well construction materials. This information is documented in the boring logs presented in Appendix A, summarized on Table 2, and discussed below.

The piezometers were constructed using 2-inch diameter, flush-threaded, Schedule 40 polyvinyl chloride casing with 10 feet of 0.020-inch machine slotted screen. Once the desired depth of the borehole was reached, the piezometers were constructed through the augers following the procedures outlined below:

- The casing, including the bottom cap and screen, was suspended in the borehole at the desired depth. The screen was placed so that approximately 5 feet of the screen was below the top of the groundwater surface as measured during drilling. However, PZ-3, PZ-6 and PZ-10 were screened across deeper water bearing units, entirely below the water table.

- After placement of the casing, the filter pack (consisting of washed, graded No. 3 sand supplied by RMC Lonestar) was poured or "tremmied" through the augers to the bottom of the borehole until it extended to approximately 2 feet above the top of the well screen.

- After the filter pack was installed to the desired depth, the screen interval was surged to settle the filter pack around the well screen (preliminary development). Additional sand was then added to bring the filter pack back up to the desired depth.

- A bentonite seal (minimum thickness of 1 foot to 2 feet) was placed immediately above the filter pack using 3/8-inch bentonite chips. Water was added and the chips were allowed to hydrate for 10 to 15 minutes before the remaining annulus was grouted.

- The remaining annular space was filled to approximately 1 foot bgs with a neat cement grout mix. The top foot of the annulus was filled with a concrete mix used to secure a flush-mounted traffic-rated box and protect the casing. For additional security, the top of each

piezometer casing was also closed with a lockable sanitary sealing well cap including an expandable O-ring that formed an airtight seal.

- A licensed surveyor located the ground surface and the top-of-well casing (TOC) elevation for each of the piezometers (Table 2).

2.1.3 Piezometer Development. Preliminary and final development were completed at each piezometer installation. The purpose was to remove fines deposited within the borehole and casing during drilling.

As discussed above, preliminary development was conducted after installation of the screen, casing, and filter pack, but prior to installation of the bentonite seal and grout. Final development of each piezometer began no earlier than 48 hours after the grout had been placed. This development consisted of bailing, surging, bailing, and then pumping. Development continued until groundwater from the well was clear and relatively free of sediment, and measurements of pH, electrical conductivity, and temperature were stabilized. Dissolved oxygen, oxidation-reduction (redox) potential, turbidity, color, and odor were also recorded during final piezometer development. This information, along with the time of each measurement, the approximate volume of water removed, and the time intervals during which development was conducted, was recorded in the field notebook. Field instruments were calibrated prior to daily sampling activities according to the manufacturer's guidelines. Table 3 summarizes the final field instrument readings collected during piezometer development.

2.2 Groundwater Sampling

An understanding of groundwater gradients and groundwater quality at the former Arsenal is an integral part of the SHM. Data compiled at the site to date includes sparse or infrequent information on concentrations of general water quality parameters and potential contaminants. Most of the available groundwater chemistry data is related to past investigations for the presence or absence of contamination at specific locations. The groundwater quality data collected during this investigation will supplement the limited available data and is focused on localized groundwater basins within the former Arsenal property.

Groundwater flow conditions were assessed by measuring water elevations within the piezometers. Chemical testing of samples collected from the piezometers was used to assess groundwater quality. The methods used to obtain this information are presented in the following sections.

2.2.1 Water Level Measurements. Monthly water level measurements have been collected to the nearest 0.01 foot using an electric well sounder since the piezometers were installed in January 2002. Water levels were measured from the surveyed TOC elevation points and recorded in the field notebook. This data is summarized on Table 4, which also includes groundwater elevation data from three monitoring points installed prior to the work described in this TM letter. Monthly water level measurements will continue at all monitoring points until November 2002, at which point no further water level measurements are planned.

2.2.2 Groundwater Samples. After development, groundwater samples were collected from 14 of the 17 piezometers. PZ-13, PZ-14, and PZ-18 were not sampled per agreement between USACE and the current landowner. Groundwater samples were collected between February 5, 2002 and February 13, 2002.

Normally, groundwater samples are collected no sooner than 48 hours after piezometer development. In this case, however, low recharge rates were expected in the slightly permeable soils characteristic of the former Arsenal site. Such low recharge rates would have greatly increased the amount of time required to purge each piezometer completely. Therefore, to eliminate the need for multiple mobilizations of field staff and to reduce costs, groundwater samples for this investigation were collected immediately after piezometer development.

Monitoring wells are typically purged of three casing volumes of water before samples are collected. However, PZ-1, PZ-2, PZ-4, PZ-6, and PZ-11 were slow to recover (refill with water) after purging. These five piezometers were bailed dry during development and allowed to recover in order to remove three casing volumes of water. The piezometers were then allowed to recover again prior to sampling, but in some cases, such recovery required several days.

Field instruments were calibrated prior to daily sampling activities according to manufacturers' guidelines. All instrumental measurements were recorded in the field notebook.

Groundwater samples were collected using a disposable bailer and placed into containers supplied by the analytical laboratory, with the appropriate preservative already added. Sample fractions for metals and other inorganic analyses were filtered in the field using a disposable 0.45-micron filter. Labels were affixed to each sample bottle to record sample number, piezometer number, date, time, analysis required, preservative used, and the collector's initials. A chain-of-custody form accompanied the samples to document possession during transit to the analytical laboratory. Copies of the completed chain-of-custody forms are presented in Appendix B.

2.2.3 Chemical Analyses. Groundwater samples from the piezometers were submitted for the following chemical analyses:

- Volatile organic compounds (VOCs) by U.S. Environmental Protection Agency (EPA) Method 8260B.
- Total petroleum hydrocarbons as gasoline (TPH-g) by EPA Method 8015B.
- Total petroleum hydrocarbons as diesel fuel/motor oil (TPH-d/mo) by EPA Method 8015B.
- Project metals list/cations by EPA Method 6010B and 7000 series*.

* The project metals list consists of antimony (soil), barium, beryllium, cadmium, total chromium, cobalt, copper, lead, manganese, molybdenum, nickel, silver, tin, vanadium and zinc by EPA Method 6010B, antimony by EPA Method 7041 (water), arsenic by EPA Method 7060A, selenium by EPA Method 7740, thallium by EPA Method 7841 and mercury by EPA Method 7471A (soil) and EPA Method 7470 (water). Cation analyses included calcium, magnesium, sodium and

- Anions (chloride, nitrate/nitrite as nitrogen, and sulfate) by EPA Method 300.0.
- Total dissolved solids (TDS) by EPA Method 160.1.

Soil samples were also submitted to the laboratory for project metals list* analyses using the methods identified above.

3.0 REGIONAL AND LOCAL GEOLOGIC SETTING

The former Arsenal is located at the southern end of California's Northern Coast Range, a region where geologic history has been complicated by episodes of compression and the San Andreas strike-slip fault system. The report prepared by Graymer et. al. (1999) is used in this document as the most recent geologic interpretation published for the Benicia area (Figure 1). A summary of the regional geologic setting is presented below, focused on structural geology (physical geology) and stratigraphy. A more detailed geologic description will be included in the final SHM report. Local lithologic data obtained from the piezometer installations is also discussed in this document, and a detailed assessment of this information will be incorporated into the final SHM as well.

3.1 Regional Geology

Throughout the San Francisco Bay Area (including Benicia), the Mesozoic-age Franciscan Assemblage probably forms the structural basement in the eastern portion of the Coast Range below the Cretaceous-age Great Valley Sequence (Bailey et. al., 1964). The Franciscan Assemblage is a mixture of different rock types jumbled together in enormous complexity. The most abundant rock types are sandstone and shale (or mudstone). The Great Valley Sequence consists of sandstone, shale, mudstone, and conglomerate. Marine fossils and characteristic sedimentary features indicate that the Great Valley Sequence accumulated in an ocean basin that lay west of the Mesozoic North American margin (Harden, 1997).

The Great Valley Sequence and Franciscan Assemblage are overlain by a diverse sequence of sedimentary and volcanic rocks of Cenozoic age (Figure 1). Estuarine-deposited Bay Mud forms the upper layer of sediment along the southern part of San Francisco Bay. This dense clay-rich mud is an effective aquitard. In contrast, alluvial deposits in the area are typically coarser in grain size. Such deposits are found in small channels and uphill from locations where Bay Mud is present. Artificial fill in the Benicia area usually consists of a mixture of clay, silt, sand, and gravel. The older fill beneath the surficial fill can be firm and very stiff beneath the Sulphur Springs Creek channel (Harding Lawson Associates, 1990).

Active faulting in the Benicia area seems to be confined to the Green Valley Fault zone and associated faults north of Cordelia, several miles north of Lake Herman (Graymer et. al., 1999).

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potassium by EPA Method 6010B. Occasional method changes were required for some water samples due to high TDS concentrations. Additional details on analytical methods are provided in Section 5.1.

Although there are no active faults listed locally, Benicia is within the 50-kilometer radius of damage from historical seismic activity of the San Andreas fault to the west (California Department of Conservation, Division of Mines and Geology, 1996). Two new fault names were introduced in the Benicia area by Graymer et. al. (1999), the Sky Valley Fault, and the Lake Herman Fault. The broad synformal structure west of the Benicia area is broken at the core by the Southampton Fault. The Southampton Fault is probably a steep, west dipping reverse fault that places west-dipping Cretaceous strata up, over, and against east-dipping Tertiary strata in the Benicia area (Graymer et. al., 1999).

3.2 Local Geology at the Former Arsenal

The local geology at the former Arsenal follows regional pattern described in Section 3.1. Franciscan Assemblage basement rocks are overlain by the Great Valley Sequence, with the Tertiary-age (Paleocene) Vine Hill Sandstone as the youngest formation with outcrops in the area (Figure 1). A material, which may be alluvium, Bay Mud, and/or fill covers the bedrock units in most of the low-lying areas. It varies in thickness from a few inches to several hundred feet. Further geologic interpretation to distinguish Bay Mud from alluvium will be included in the final SHM. A more detailed summary of the lithology encountered in borings drilled within the Sulphur Springs Creek drainage and within the southern Arsenal (Area I) is presented below.

3.2.1 Sulphur Springs Creek Drainage. The Sulphur Springs Creek drainage area extends from Lake Herman Road along the northern boundary of the former Arsenal property to Suisun Bay. The subsurface lithology in this drainage consists of fill and alluvium overlying sandstone bedrock. The fill consists of gravel and road base up to 5 feet thick, and is characterized by a sharp lower contact and a dramatic change in color. The alluvium mostly consists of mixtures of clay and silt with minor amounts of sand, and is usually more than 20 feet thick. The clay grades from lean clay in the northern portion of the former Arsenal to organic clays near Suisun Bay. Sand was predominant at one location (PZ-12), which was uncharacteristic of the lithology encountered in all of the other piezometers installed for this project. The location of PZ-12 may coincide with a former drainage channel.

Within the Sulphur Springs Creek drainage, sandstone bedrock was encountered in only two borings, PZ-14 (at 22 feet bgs) and PZ-10 (at 20 feet bgs). In the northern portion of the former Arsenal at PZ-14, the weathered sandstone is approximately 3 feet thick. At PZ-10, approximately midway between PZ-14 and Suisun Bay, the weathered sandstone bedrock is at least 14 feet thick. Our estimate of the thickness of the weathered sandstone is based on the depth at which the decomposed sandstone material began and the depth at which refusal was encountered using a hollow stem drilling rig. The lithology encountered during the installation of the piezometers within the Sulphur Springs Creek drainage (PZ-7, PZ-9, PZ-10, PZ-11, PZ-12, PZ-13, PZ-14, and PZ-18) is consistent with regional and local interpretations in the area.

3.2.2 Southern Arsenal (Area I). The southern part of the former Arsenal rises from the Carquinez Strait and is covered by fill and alluvium (Figure 1). Vine Hill Sandstone outcrops are present just north of the lowlands along the Carquinez Strait. The low lying foothills in this area

consist of southwesterly, steeply dipping beds of massive sandstone, siltstone, and shale from the Great Valley Sequence. The alluvium varies from a few feet thick to more than 80 feet thick.

Piezometers PZ-1 through PZ-6 were drilled in the southern point of the Arsenal, and were placed in areas with asphalt cover and up to three feet of road base. The road base overlies material that appears to have been placed by the military to fill a marsh that was present in historic times within the low-lying area west and south of Lincoln Street to Suisun Bay. The fill material was distinguished from the road base and the underlying alluvial material through field observations such as stratigraphic position, grain size, and color change, as well as by a review of boring logs. The fill encountered in the piezometer borings ranges from 1 foot to 8 feet thick and consists of silts, silty sands, and sands. Material beneath the fill is alluvial sediment consisting of clay, silt and fine-grained sand. The clay is very dark brown to greenish black, highly organic, with a mild to strong organic odor and is at least 40 feet thick. At PZ-6, the organic–rich clay is present to a depth of 32 feet bgs. Below the organic-rich clay, a low to medium plastic olive-brown clay is encountered. In one boring, PZ-3, sandstone bedrock was encountered approximately 63 feet bgs.

4.0 HYDROGEOLOGY OF THE FORMER ARSENAL

This section summarizes available information regarding the hydrogeology of the former Arsenal, and is based on the water level data collected from the 17 piezometers between January 2002 and May 2002. This is only a preliminary hydrogeologic evaluation. A more thorough analysis will be included in the final SHM.

The former Arsenal is within the Suisun Basin (Basin Number 7) and is on the western edge of the Suisun-Fairfield valley groundwater basin (California Regional Water Quality Control Board, San Francisco Bay Region, 1995). The local groundwater system consists of brackish water to salt water in the lowlands along the Carquinez Strait and at the southern outlet of Sulphur Springs Creek to the Carquinez Strait. Precipitation and surface water infiltration contribute to local groundwater.

The water table along the margins of the former Arsenal near the Carquinez Strait may be tidally influenced. The elevation of the shallow groundwater encountered in the piezometers is approximately equal to the elevation of water in the Carquinez Strait. This groundwater is mostly brackish.

Table 4 summarizes water level information collected to date. Water levels in some piezometers (PZ-1, PZ-2, and PZ-3) have been equal to ground surface, indicating semi-confined to confined conditions. Measurements collected to date also indicate that water levels rise during the spring months.

5.0 ANALYTICAL RESULTS

This section summarizes results from the chemical analyses of the groundwater and soil samples collected during this investigation. A preliminary data quality assessment is also presented. More

detailed discussions of analytical results and data quality will be provided in the final SHM. Analytical results for the soil samples are presented in Appendix C. Groundwater analytical data is provided in Appendix D.

5.1 Data Quality Assessment

Soil and groundwater samples collected during this investigation were submitted in nine sample delivery groups (SDGs) to EMAX Laboratories (EMAX), Torrance, California. These SDGs were identified by EMAX as 02A083, 02A152, 02B038, 02B051, 02B065, 02B069, 02B080, 02B083, and 02B093. Analytical results were received in both electronic and hard copy format.

All data collected in support of the SHM at the Arsenal are considered usable for the intended purposes. Some data were estimated but none were rejected. The following anomalies in the data set are worth noting.

Several groundwater samples contained very high levels of TDS, ranging from 565 milligrams per liter (mg/L) to 65,900 mg/L. These dissolved solids consisted primarily of sodium (up to 20,300 mg/L), calcium (up to 1,940 mg/L), magnesium (up to 3,340 mg/L), chloride (up to 40,100 mg/L), and sulfate (up to 3,390 mg/L). High TDS concentrations (greater than ~5,000 mg/L) caused interferences during some of the other analyses.

Due to the high chloride concentrations, analyses for arsenic, selenium, and thallium in groundwater samples could not be performed by graphite furnace atomic absorption (GFAA) methods for nine of the 14 piezometers sampled. The presence of high chloride concentrations led to low recoveries of target analytes by GFAA; therefore arsenic, selenium, and thallium were reported from the inductively coupled plasma (ICP) analysis of these samples. This resulted in a slight elevation of the associated method detection limits (MDLs). The arsenic MDL was raised from 0.0012 mg/L to 0.0036 mg/L; the selenium MDL was raised from 0.001 mg/L to 0.0042 mg/L; and the thallium MDL was raised from 0.0012 mg/L to 0.006 mg/L.

For the analysis of anions by ion chromatography, the first group of groundwater samples which had high anion concentrations (SDG 02B051) was analyzed undiluted and as a result caused column failure and instrument downtime in the laboratory. The groundwater samples from this SDG (from PZ-7, PZ-9, and PZ-10) had to be preserved with sulfuric acid (H_2SO_4) to extend the holding time for nitrite and nitrate analyses from 48 hours to 28 days. This required EMAX to report a combined value for nitrite and nitrate (The reported value can be assumed to be primarily nitrate, since nitrite has not been detected in any samples from this site.). Unfortunately, the laboratory only re-analyzed the preserved samples within holding time. This analysis cannot provide useful information concerning sulfate (SO_4^{-2}) concentrations due to the addition of the H_2SO_4 preservative. EMAX later re-analyzed aliquots of the unpreserved samples, but the severe holding time violation caused the results to be estimated.

To eliminate the instrument problems caused by the high chloride and sulfate concentrations, EMAX had to analyze all of the remaining groundwater samples at a dilution factor of 5 or higher.

Dilution of the groundwater samples caused most of the nitrite and nitrate values to be reported as not-detectable at elevated detection limits. The analytical problems encountered due to high chloride concentrations, and alternative techniques to be used to overcome those problems, should be addressed during the next periodic update of the QAPP.

With one exception, field duplicate precision was good. The field duplicate pair of soil samples collected from PZ-6 (2.5 feet bgs to 3.5 feet bgs) exceeded 50 percent relative percent difference for nine of 17 analytes detected above the method quantification limit. This relatively poor precision may be explained by the fact that these samples were collected from non-native fill material that appears to be very heterogeneous.

5.2 Soil Analytical Results

A total of 34 soil samples was collected from 17 borings. Quality control (QC) samples (e.g., duplicates) were also collected per QAPP requirements. Results of QC samples are included in Appendix C. Soil samples were collected to augment the Arsenal-wide database and assist in calculating ambient metals concentrations for this site. The soil samples were collected from both fill and native materials, ranging in grain size from clays to sands. Table 5 summarizes analytical results for the soil samples.

5.3 Groundwater Analytical Results

Table 6 summarizes analytical data for the groundwater samples. A brief discussion of these results is presented below. A more thorough evaluation of the groundwater analytical data will be presented in the final SHM.

5.3.1 Volatile Organic Compounds. At least one VOC was detected in 13 of the 14 groundwater samples collected. Figure 2 summarizes the results of the VOC analyses. VOCs were detected in all of the piezometers located in the industrial area (Area I) of the former Arsenal. VOCs were also identified in groundwater samples from piezometers in the Sulphur Springs Creek drainage (PZ-9, PZ-10, PZ-11, PZ-12 and PZ-7). Outside of the major drainage systems, PZ-17 and PZ-20 also showed small but detectable amounts of tetrachlroroethylene (PCE). In addition, 1,1,2-trichloro-1,2,2-triflouroethane (also known as Freon 113) was detected at 11 micrograms per liter (µg/L) in PZ-20. No VOCs were detected in the groundwater sample from PZ-19.

5.3.2 Total Petroleum Hydrocarbons as Gasoline. TPH-g was detected in four of the 14 groundwater samples analyzed. Figure 3 summarizes analytical results for TPH-g in groundwater. Three of the four detections of TPH-g were found in groundwater from piezometers (PZ-2, PZ-3 and PZ-6) located in Area I. The other detection of TPH-g (21 µg/L) was found in PZ-11, which is located in the southern portion of the Sulphur Springs Creek drainage area. Detectable concentrations of gasoline components (benzene, toluene, ethylbenzene, and xylenes) were also detected in the groundwater samples from these four piezometers.

5.3.3 Total Petroleum Hydrocarbons as Diesel Fuel/Motor Oil. Figure 3 summarizes the results for TPH-d/mo in groundwater. TPH-d was not detected in any of the 14 groundwater samples collected. However, TPH-mo was identified in PZ-10 and PZ-20 at concentrations of 64 µg/L and 85 µg/L, respectively. A review of the chromatograms for these analyses confirmed that the detected compounds were representative of a petroleum product.

5.3.4 Metals/Cations. Metals and cations were detected in all of the groundwater samples collected. Differences and similarities in metal/cation compositions may be used to identify different sources of groundwater or contamination.

5.3.5 Anions. Figure 4 summarizes the anion analytical results for the groundwater samples collected. Differences and similarities in anion composition may be used to identify different sources of groundwater (e.g., salt water versus fresh water).

5.3.6 Total Dissolved Solids. TDS values ranged from 599 mg/L at PZ-7 to 65,900 mg/L at PZ-10. Figure 4 summarizes the TDS values in groundwater at the former Arsenal. The analysis of TDS, along with anions and cations, can be used to determine differences in groundwater quality. A preliminary evaluation of the TDS and anion data presented on Figure 4 indicates three areas with distinct groundwater composition: PZ-9/PZ-10, PZ-17/PZ-20/PZ-19, and Area I (PZ-1 through PZ-6). A more thorough evaluation of this data will be included in the final SHM.

6.0 INVESTIGATION DERIVED WASTE

The IDW for this project consisted of 16.15 tons of soil cuttings (soil IDW) and 1,000 gallons of development, decontamination, and purge water (water IDW) generated during piezometer installation. The soil IDW was placed in 55-gallon drums and transported as non-hazardous waste by Integrated Wastestream Management (IWM) to Chemical Waste Management, Kettleman Hills, California. The water IDW was transported by IWM as non- hazardous waste to D/K Environmental, Vernon, California. Copies of the IDW manifests are included in Appendix E.

7.0 SUMMARY

Seventeen piezometers were installed to support development of the SHM at the former Arsenal. All piezometers were screened across planned hydrologic intervals (e.g., water table, alluvium/fill, base of bedrock), except for PZ-10. The screen interval of PZ-10 was planned across the middle or base of the alluvium. However, bedrock was encountered at a shallower depth than anticipated and PZ-10 was constructed across the boundary between the bedrock and alluvium. Subsurface soil encountered during piezometer installation included fill material and mixtures of clay and silt with minor amounts of sand. Sandstone bedrock was encountered in three piezometers, PZ-3 (depth of 63 feet bgs), PZ-14 (depth of 22 feet bgs) and PZ-10 (depth of 20 feet bgs). First encountered groundwater occurred within the alluvial material overlying the bedrock.

Thirty-four soil samples were collected and analyzed for metals. Groundwater samples were collected from 14 of the 17 piezometers. The remaining three piezometers (PZ-13, PZ-14 and PZ-18) were not sampled per landowner request. VOCs, TPH-g, and TPH-mo were detected in groundwater. Primarily, these chemicals were identified in piezometers located in the industrial area (Area I). The presence of these chemicals is consistent with past Department of Defense activities in Area I. In addition to these chemicals, various metals were detected in groundwater. The data included in this report will be used as baseline information to prepare the final SHM report for the former Arsenal property.

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If you have any questions, please call me or Wendy Linck at (916) 444-0123.

Sincerely,

FORSGREN ASSOCIATES/BROWN AND CALDWELL

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Ms. DaVeta Cooper, Benicia Public Library
Mr. Pete Goodson, Camel Barn Museum
Mr. Mike Mitchener, U.S. Army Corps of Engineers
Ms. Chris Parent, California Department of Toxic Substances Control, Region I
Mr. Mike Rees, Solano County Department of Environmental Management
Mr. Gary Riley, California Regional Water Quality Control Board, San Francisco Bay Region

TABLES

Table 1
SHM Piezometer Summary
Former Benicia Arsenal, Benicia, California

Location	APN #	Landowner	General Location	Boring Depth (feet bgs)	Well Depth (feet bgs)	Screen Interval* - Hydrologic	Screen Interval* - Geologic	Thickness of Fill (feet)	Depth to Bedrock (feet)	Sampled? (VOCs, TPH, Metals, TDS, Anions)	Depth to First Water during drilling (feet)	Estimate of pumping rate (gpm)
PZ-1	0080-140-450	Amports, Inc.	Area I, west	16	15	Across water table	Organic clay/old marsh	2.5	>62 (based on PZ-3)	Yes	7	bailed dry
PZ-2	0080-140-450	Amports, Inc.	Area I, west	20	20	Across water table	Organic clay/old marsh	2.5	62 (based on PZ-3)	Yes	8	bailed dry
PZ-3	0080-140-450	Amports, Inc.	Area I, west	64	63.5	Across second water bearing unit at base of sandstone bedrock	Clay/sandstone boundary	2.5	62	Yes	8	4
PZ-4	0080-130-020	City of Benicia	Area I, central	20	15	Across water table	Organic clay/old marsh	6	>62 (based on PZ-3)	Yes	12	bailed dry
PZ-5	0080-140-140	Amports, Inc.	Area I, central	15	15	Across water table	Organic clay/old marsh	11	~60 (based on PZ-3)	Yes	11	1.2
PZ-6	0080-140-140	Amports, Inc.	Area I, central	34.5	34	Middle of alluvium	Clay (beneath old marsh)	11	~60 (based on PZ-3)	Yes	11	bailed dry
PZ-7	0080-250-350	KSR Development	Area W, north	20	18	Across water table	Clay	2.5	>20	Yes	12	>1
PZ-8 (not installed)	0080-250-130 or 0080-040-240	Union Pacific or Spieker Properties?	Area W, north	Not installed due to lack of Right-of Entry permission.								
PZ-9	0080-080-270	E Waken	Area W, north	20	20	Across water table	Clay/sandstone boundary	1	20	Yes	12	0.9
PZ-10	0080-080-270	E Waken	Area W, central	34	34	Across sandstone bedrock/alluvial boundary	Weathered sandstone/ siltstone/claystone	1	21	Yes	12	0.9
PZ-11	0080-340-110	Bayshore Associates	Area W, western side of Sulphur Springs Creek	20	20	Across water table	Clay	6.5	>20	Yes	12	bailed dry
PZ-12	0080-340-110	Amports, Inc.	Area W, eastern side of Sulphur Springs Creek	19	16	Across water table	Alluvium (sand)	2.5	>20	Yes	9	1.8
PZ-13	0080-010-020	Steven David	Area R, central	20	20	Across water table	Alluvium (sandy clay)	0	>20	No (ROE agreement)	15	>2
PZ-14	0080-010-250	Steven David	Area R, south	25.5	25.5	Across water table	Clay/sandstone boundary	2	23.5	No (ROE agreement)	19	>1
PZ-15 (not installed)	0080-010-250	Steven David	Area R, south	Not installed due to shallow bedrock.								
PZ-16 (not installed)	0080-010-250	Steven David	Area R, south	Not installed due to shallow bedrock.								
PZ-17	080-110-480	Valero	Area S, west of Valero	23.5	15.5	Across water table	Alluvium (interbedded clay and sand)	3	22	Yes	11.5	1.6
PZ-18	0080-010-020	Steven David	Area R, north-central	20	20	Across water table	Alluvium (sandy clay)	5	>20	No (ROE agreement)	15	>2
PZ-19	0080-120-220	Amports, Inc.	Area M, Camel Barn Area	35	31	Across water table	Alluvium/weathered claystone	11.5	>35	Yes	26	1
PZ-20	0080-020-210	Amports, Inc.	Area M, 500 feet northeast of Pine Lake	34.5	34.5	Across water table	Alluvium (silt with gravel)	2.5	>35	Yes	27	2.1

* Piezometer screens are 10 foot long.

Table 2
SHM Piezometer Construction Summary
Former Benicia Arsenal, Benicia, California

Location	APN #	Landowner	General Location	Screen Interval - Hydrologic	Borehole Depth (feet bgs)	Depth (feet bgs)	Borehole Diameter (inches)	Casing Diameter/ Type	Screen Interval (feet bgs)	Slot size (inches)	Filter pack (feet bgs)	Filter pack material (inches)	Bentonite (feet bgs)	Neat cement (feet bgs)	Completion Type	TOC Elevation (feet msl)	Northing	Easting
PZ-1	0080-140-450	Amports, Inc.	Area I, west	Across water table	16	15	8	2" Schedule 40 PVC	5-15	0.020	4-15	#3 sand	3-4 and 15-16	1-3	flush mounted traffic-rated box	6.09	6521237.5	1777879.6
PZ-2	0080-140-450	Amports, Inc.	Area I, west	Across water table	20	20	8	2" Schedule 40 PVC	10-20	0.020	8-20	#3 sand	5-8	1-5	flush mounted traffic-rated box	8.02	6520795.5	1778703.3
PZ-3	0080-140-450	Amports, Inc.	Area I, west	Across second water bearing unit at base of sandstone bedrock	64	64	8	2" Schedule 40 PVC	54-64	0.020	52-64	#3 sand	49-52	1-49	flush mounted traffic-rated box	8.05	6520798.9	1778699.1
PZ-4	0080-130-020	City of Benicia	Area I, central	Across water table	20	15	8	2" Schedule 40 PVC	5-15	0.020	3.5-17	#3 sand	2.5-3.5 and 17-20	1-2.5	flush mounted traffic-rated box	5.7	6521936.5	1777578.4
PZ-5	0080-140-140	Amports, Inc.	Area I, central	Across water table	15	15	8	2" Schedule 40 PVC	5-15	0.020	4-15	#3 sand	2.5-4	1-2.5	flush mounted traffic-rated box	8.75	6522448.6	1777967.7
PZ-6	0080-140-140	Amports, Inc.	Area I, central	Middle of alluvium	34.5	34	8	2" Schedule 40 PVC	24-34	0.020	22-34.5	#3 sand	19-22	1-19	flush mounted traffic-rated box	8.45	6522437.7	1777969.1
PZ-7	0080-250-350	KSR Development	Area W, north	Across water table	20	18	8	2" Schedule 40 PVC	8-18	0.020	6-20	#3 sand	4-6	1-4	flush mounted traffic-rated box	24.73	6524253.4	1789664.3
PZ-8 (not installed)	0080-250-130 or 0080-040-240	Union Pacific or Spieker Properties?	Area W, north		Not installed due to lack of Right-of Entry permission.													
PZ-9	0080-080-270	E Waken	Area W, north	Across water table	20	20	8	2" Schedule 40 PVC	10-20	0.020	8-20	#3 sand	6-8	1-6	flush mounted traffic-rated box	15.45	6524003.0	1787724.5
PZ-10	0080-080-270	E Waken	Area W, central	Across sandstone bedrock/alluvial boundary	34	34	8	2" Schedule 40 PVC	24-34	0.020	21.5-34	#3 sand	20-21.5	1-20	flush mounted traffic-rated box	15.47	6524000.7	1787728.9
PZ-11	0080-340-110	Bayshore Associates	Area W, western side of Sulphur Springs Creek	Across water table	20	20	8	2" Schedule 40 PVC	10-20	0.020	8-20	#3 sand	5-8	1-5	flush mounted traffic-rated box	11.99	6525094.3	1784465.7
PZ-12	0080-340-110	Amports, Inc.	Area W, eastern side of Sulphur Springs Creek	Across water table	19	16	8	2" Schedule 40 PVC	5-15	0.020	4-16	#3 sand	2.5-4 and 16-19	1-2.5	flush mounted traffic-rated box	14.59	6526006.9	1786267.4
PZ-13	0080-010-020	Steven David	Area R, central	Across water table	20	20	8	2" Schedule 40 PVC	10-20	0.020	8.5-20	#3 sand	5-8.5	1-5	flush mounted traffic-rated box	40.05	6521185.6	1793410.7
PZ-14	0080-010-250	Steven David	Area R, south	Across water table	25.5	25.5	8	2" Schedule 40 PVC	15.5-25.5	0.020	13.5-25.5	#3 sand	11-13.5	1-11	flush mounted traffic-rated box	30.01	6521421.2	1792014.6
PZ-15 (not installed)	0080-010-250	Steven David	Area R, south		Not installed due to shallow bedrock.													
PZ-16 (not installed)	0080-010-250	Steven David	Area R, south		Not installed due to shallow bedrock.													
PZ-17	080-110-480	Valero	Area S, west of Valero	Across water table	23.5	15.5	8	2" Schedule 40 PVC	5.5-15.5	0.020	3.5-16	#3 sand	2.5-3.5 and 16-23	1-2.5	flush mounted traffic-rated box	163.32	6519808.3	1786695.7
PZ-18	0080-010-020	Steven David	Area R, north-central	Across water table	20	20	8	2" Schedule 40 PVC	10-20	0.020	8-20	#3 sand	5-8	1-5	flush mounted traffic-rated box	44.63	6520918.1	1794225.0
PZ-19	0080-120-220	Amports, Inc.	Area M, Camel Barn Area	Across water table	35	31	8	2" Schedule 40 PVC	20.5-30.5	0.020	18.5-31	#3 sand	15.5-18.5 and 31-35	1-15.5	flush mounted traffic-rated box	91.28	6523640.9	1780949.2
PZ-20	0080-020-210	Amports, Inc.	Area M, 500 feet northeast of Pine Lake	Across water table	34.5	34.5	8	2" Schedule 40 PVC	24.5-34.5	0.020	21-34.5	#3 sand	18-21	1-18	flush mounted traffic-rated box	163.54	6522409.6	1781549.9

APN - assessor's parcel number
PVC - poly vinyl chloride
TOC - top of casing
Northings and eastings are based in California Stateplane coordinates, zone 2.

Table 3
Summary of Well Development Data
Former Benicia Arsenal, Benicia, CA

Location	pH	Electrical Conductivity (microsiemens/centimeter)	Temperature (degrees Celcius)	Dissolved oxygen (milligrams per liter)*	Redox (millivolts)*	Turbidity (NTUs)	Volume of Water Removed (gallons)	Volume of Water Added (gallon)	Approximate Recharge Rates (feet/minute)***
PZ-1	7.02	17,500	18.60	**	**	>999	3.5	0	0.001
PZ-2	6.60	24,000	18.6	**	**	>999	12	0	0.5
PZ-3	6.20	70,600	19.4	Not collected	Not collected	27	280	0	
PZ-4	6.58	57,000	17.7	**	**	>999	15	0	0.001
PZ-5	7.04	8,710	16.4	0.10	-165	54	35	0	
PZ-6	6.86	16,500	18.2	**	**	>999	32	0	0.003
PZ-7	7.16	920	20.0	4.02	167	29.6	20	0	
PZ-9	6.51	26,200	20.0	1.04	120	25	25	0	
PZ-10	6.30	89,000	20.4	3.86	120	12	50	0	
PZ-11	6.84	15,900	18.8	**	**	>999	8	0	0.002
PZ-12	7.37	1,500	20.1	3.00	235	11.3	20	0	
PZ-13	7.33	1,200	17.8	3.01	82	32.5	35	0	
PZ-14	6.98	1,020	19.9	0.11	100	83	60	0	
PZ-17	6.86	1,140	17.7	5.02	-11	390	42	0	
PZ-18	7.25	1,150	18.3	4.01	74	22	30	0	
PZ-19	7.16	1,090	18.2	2.06	142	60.1	40	0	
PZ-20	7.11	1,160	20.6	Not collected	Not collected	12	90	0	

* Measured using a flow through cell.
** due to the high turbidity of water, flow through cell not used.
NTU = nephelometric turbidity unit
*** Recharge data is qualatative and estimated for those piezometers that went dry. Not enough data to estimate for the other piezometers.

Table 4
Summary of Historical Groundwater Elevation Data
Former Benicia Arsenal, Benicia, CA

Name	Measurement date	Ground surface elevation (ft-msl)	Reference elevation (TOC, ft-msl)	Depth-to-groundwater (ft below TOC)	Groundwater elevation (ft-msl)	Change since last measurement (ft)	Notes
B057AHP003	4/17/2000	26.97	26.66	8.01	18.65	--	
	5/5/2000			9.92	16.74	-1.91	
	5/30/2000			10.09	16.57	-0.17	
	6/19/2000			10.82	15.84	-0.73	
	1/14/2002			10.54	16.12	0.28	
	1/28/2002			11.07	15.59	-0.53	
	3/15/2002			11.03	15.63	0.04	
	4/25/2002			10.97	15.69	0.06	
	5/24/2002			10.98	15.68	-0.01	
	6/27/2002			10.61	16.05	0.37	
	7/24/2002			10.93	15.73	-0.32	
	8/28/2002			12.05	14.61	-1.12	
	9/25/2002			12.21	14.45	-0.16	
	11/26/2002			11.56	15.10	0.65	
B057AHP005	4/17/2000	10.46	10.19	3.34	6.85	--	
	5/5/2000			3.45	6.74	-0.11	
	5/30/2000			3.53	6.66	-0.08	
	6/19/2000			3.57	6.62	-0.04	
	1/14/2002			4.25	5.94	-0.68	
	1/28/2002			4.05	6.14	0.20	
	3/15/2002			4.02	6.17	0.03	
	4/25/2002			3.99	6.20	0.03	
	5/24/2002			4.18	6.01	-0.19	
	6/27/2002			3.77	6.42	0.41	
	7/24/2002			4.26	5.93	-0.49	
	8/28/2002			4.37	5.82	-0.11	
	9/25/2002			3.20	6.99	1.17	
	11/26/2002			4.40	5.79	-1.20	
B057AHP006	4/17/2000	9.54	9.31	2.01	7.30	--	
	5/5/2000			2.88	6.43	-0.87	
	5/30/2000			3.17	6.14	-0.29	
	6/19/2000			3.09	6.22	0.08	
	1/14/2002			2.86	6.45	0.23	
	1/28/2002			3.03	6.28	-0.17	
	3/15/2002			2.99	6.32	0.04	
	4/25/2002			2.94	6.37	0.05	
	5/24/2002			2.69	6.62	0.25	
	6/27/2002			2.12	7.19	0.57	
	7/24/2002			2.41	6.90	-0.29	
	8/28/2002			3.16	6.15	-0.75	
	9/25/2002			3.15	6.16	0.01	
	11/26/2002			2.69	6.62	0.46	

Table 4
Summary of Historical Groundwater Elevation Data
Former Benicia Arsenal, Benicia, CA

Name	Measurement date	Ground surface elevation (ft-msl)	Reference elevation (TOC, ft-msl)	Depth-to-groundwater (ft below TOC)	Groundwater elevation (ft-msl)	Change since last measurement (ft)	Notes
PZ-1	1/14/2002	6.40	6.09	dry	--	--	1
	1/17/2002			13.02	-6.93	--	1
	1/18/2002			12.02	-5.93	1.00	1
	1/28/2002			7.71	-1.62	4.31	1
	3/15/2002			7.68	-1.59	0.03	
	4/11/2002			6.56	-0.47	1.12	
	4/25/2002			6.47	-0.38	0.09	
	5/24/2002			2.22	3.87	4.25	
	6/27/2002			3.47	2.62	-1.25	
	7/24/2002			3.00	3.09	0.47	
	8/28/2002			3.87	2.22	-0.87	
	9/25/2002			3.90	2.19	-0.03	
	10/29/2002			4.39	1.70	-0.49	
	11/26/2002			3.20	2.89	1.19	
PZ-2	1/18/2002	8.57	8.02	4.12	3.90	--	1
	1/28/2002			3.93	4.09	0.19	1
	3/15/2002			3.90	4.12	0.03	
	4/11/2002			0.00	>8.02	--	2
	4/25/2002			0.00	>8.02	--	2
	5/24/2002			2.26	5.76	--	
	6/27/2002			0.00	>8.02	--	2
	7/24/2002			2.63	5.39	--	
	8/28/2002			5.10	2.92	-2.47	
	9/25/2002			5.87	2.15	-0.77	
	10/29/2002			5.34	2.68	0.53	
	11/26/2002			3.90	4.12	1.44	
PZ-3	1/17/2002	8.55	8.05	6.35	1.70	--	1
	1/18/2002			4.02	4.03	2.33	1
	1/28/2002			3.60	4.45	0.42	1
	3/15/2002			3.60	4.45	0.00	
	4/11/2002			0.00	>8.05	--	2
	4/25/2002			0.00	>8.05	--	2
	5/24/2002			0.00	>8.05	--	2
	6/27/2002			0.00	>8.05	--	2
	7/24/2002			0.00	>8.05	--	2
	8/28/2002			0.00	>8.05	--	2
	9/25/2002			0.00	>8.05	--	2
	10/29/2002			0.00	8.6	--	3
	11/26/2002			0.00	>8.05	--	2
PZ-4	1/18/2002	6.25	5.70	13.44	-7.74	--	1
	1/28/2002			7.93	-2.23	5.51	1
	3/15/2002			7.91	-2.21	0.02	
	4/11/2002			5.31	0.39	2.60	
	4/25/2002			5.22	0.48	0.09	
	5/24/2002			0.00	>5.70	--	2
	6/27/2002			1.36	4.34	--	
	7/24/2002			0.00	>5.70	--	2
	8/28/2002			0.03	5.67	--	
	9/25/2002			0.50	5.20	-0.47	
	10/29/2002			1.05	4.65	-0.55	
	11/26/2002			1.20	4.50	-0.15	

Table 4
Summary of Historical Groundwater Elevation Data
Former Benicia Arsenal, Benicia, CA

Name	Measurement date	Ground surface elevation (ft-msl)	Reference elevation (TOC, ft-msl)	Depth-to-groundwater (ft below TOC)	Groundwater elevation (ft-msl)	Change since last measurement (ft)	Notes
PZ-5	1/17/2002	9.11	8.75	2.81	5.94	--	1
	1/18/2002			3.83	4.92	-1.02	1
	1/28/2002			4.83	3.92	-1.00	1
	3/15/2002			3.00	5.75	1.83	
	4/11/2002			2.96	5.79	0.04	
	4/25/2002			2.91	5.84	0.05	
	5/24/2002			2.87	5.88	0.09	
	6/27/2002			2.41	6.34	0.50	
	7/24/2002			2.99	5.76	-0.12	
	8/28/2002			4.37	4.38	-1.96	
	9/25/2002			3.31	5.44	-0.32	
	10/29/2002			3.45	5.30	0.92	
	11/26/2002			3.09	5.66	0.36	
PZ-6	1/17/2002	9.11	8.45	3.48	4.97	--	1
	1/18/2002			2.98	5.47	0.50	1
	1/28/2002			3.21	5.24	-0.23	1
	3/15/2002			3.20	5.25	0.01	
	4/11/2002			3.00	5.45	0.20	
	4/25/2002			2.96	5.49	0.04	
	5/24/2002			2.75	5.70	0.25	
	6/27/2002			2.67	5.78	0.29	
	7/24/2002			2.62	5.83	0.13	
	8/28/2002			2.74	5.71	-0.07	
	9/25/2002			2.71	5.74	-0.09	
	10/29/2002			2.87	5.58	-0.13	
	11/26/2002			2.84	5.61	0.30	
PZ-7	1/28/2002	25.17	24.73	10.59	14.14	--	1
	3/15/2002			10.55	14.18	0.04	
	4/11/2002			11.11	13.62	-0.56	
	4/25/2002			11.04	13.69	0.07	
	5/24/2002			11.17	13.56	-0.13	
	6/27/2002			10.72	14.01	0.45	
	7/24/2002			11.34	13.39	-0.62	
	8/28/2002			7.77	16.96	3.57	
	9/25/2002			11.90	12.83	-4.13	
	10/29/2002			11.94	12.79	-0.04	
	11/26/2002			11.81	12.92	0.13	
PZ-9	1/28/2002	15.87	15.45	5.43	10.02	--	1
	3/15/2002			5.41	10.04	0.02	
	4/11/2002			5.80	9.65	-0.39	
	4/25/2002			5.82	9.63	-0.02	
	5/24/2002			5.51	9.94	0.31	
	6/27/2002			4.97	10.48	0.54	
	7/24/2002			5.80	9.65	-0.83	
	8/28/2002			6.02	9.43	-0.22	
	9/25/2002			5.98	9.47	0.04	
	10/29/2002			5.80	9.65	0.18	
	11/26/2002			5.98	9.47	-0.18	

Table 4
Summary of Historical Groundwater Elevation Data
Former Benicia Arsenal, Benicia, CA

Name	Measurement date	Ground surface elevation (ft-msl)	Reference elevation (TOC, ft-msl)	Depth-to-groundwater (ft below TOC)	Groundwater elevation (ft-msl)	Change since last measurement (ft)	Notes
PZ-10	1/28/2002	15.85	15.47	5.13	10.34	--	1
	3/15/2002			5.10	10.37	0.03	
	4/11/2002			6.40	9.07	-1.30	
	4/25/2002			6.42	9.05	-0.02	
	5/24/2002			6.57	8.90	-0.15	
	6/27/2002			6.96	8.51	-0.39	
	7/24/2002			7.01	8.46	-0.05	
	8/28/2002			7.10	8.37	-0.09	
	9/25/2002			7.11	8.36	-0.01	
	10/29/2002			7.01	8.46	0.10	
	11/26/2002			6.80	8.67	0.21	
PZ-11	1/28/2002	12.38	11.99	7.50	4.49	--	1
	3/15/2002			7.49	4.50	0.01	
	4/11/2002			8.43	3.56	-0.94	
	4/25/2002			8.39	3.60	0.04	
	5/24/2002			7.80	4.19	0.59	
	6/27/2002			6.82	5.17	0.98	
	7/24/2002			7.45	4.54	-0.63	
	8/28/2002			7.35	4.64	0.10	
	9/25/2002			7.62	4.37	-0.27	
	10/29/2002			7.85	4.14	-0.23	
	11/26/2002			7.68	4.31	0.17	
PZ-12	1/18/2002	14.93	14.59	6.52	8.07	--	1
	1/28/2002			6.69	7.90	-0.17	1
	3/15/2002			6.66	7.93	0.03	
	4/11/2002			6.89	7.70	-0.23	
	4/25/2002			6.82	7.77	0.07	
	5/24/2002			7.09	7.50	-0.27	
	6/27/2002			7.89	6.70	-0.80	
	7/24/2002			7.50	7.09	0.39	
	8/28/2002			7.65	6.94	-0.15	
	9/25/2002			7.77	6.82	-0.12	
	10/29/2002			7.89	6.70	-0.12	
	11/26/2002			7.70	6.89	0.19	
PZ-13	1/28/2002	40.52	40.05	9.30	30.75	--	1
	3/15/2002			9.21	30.84	0.09	
	4/11/2002			10.12	29.93	-0.91	
	4/25/2002			10.06	29.99	0.06	
	5/24/2002			10.43	29.62	-0.37	
	6/27/2002			11.21	28.84	-0.78	
	7/24/2002			11.08	28.97	0.13	
	8/28/2002			11.17	28.88	-0.09	
	9/25/2002			11.26	28.79	-0.09	
	10/29/2002			11.23	28.82	0.03	
	11/26/2002			11.02	29.03	0.21	

Table 4
Summary of Historical Groundwater Elevation Data
Former Benicia Arsenal, Benicia, CA

Name	Measurement date	Ground surface elevation (ft-msl)	Reference elevation (TOC, ft-msl)	Depth-to-groundwater (ft below TOC)	Groundwater elevation (ft-msl)	Change since last measurement (ft)	Notes
PZ-14	1/28/2002	30.47	30.01	8.62	21.39	--	1
	3/15/2002			8.59	21.42	0.03	
	4/11/2002			8.66	21.35	-0.07	
	4/25/2002			8.61	21.40	0.05	
	5/24/2002			8.78	21.23	-0.17	
	6/27/2002			8.16	21.85	0.62	
	7/24/2002			9.00	21.01	-0.84	
	8/28/2002			8.96	21.05	0.04	
	9/25/2002			8.99	21.02	-0.03	
	10/29/2002			9.06	20.95	-0.07	
	11/26/2002			8.97	21.04	0.09	
PZ-17	1/28/2002	163.85	163.32	0.72	162.60	--	1
	3/15/2002			0.64	162.68	0.08	
	4/11/2002			3.79	159.53	-3.15	
	4/25/2002			3.67	159.65	0.12	
	5/24/2002			6.21	157.11	-2.54	
	6/27/2002			10.68	152.64	-4.47	
	7/24/2002			10.70	152.62	-0.02	
	8/28/2002			10.93	152.39	-0.23	
	9/25/2002			11.10	152.22	-0.17	
	10/29/2002			11.42	151.90	-0.32	
	11/26/2002			11.31	152.01	0.11	
PZ-18	1/28/2002	45.07	44.63	10.04	34.59	--	1
	3/15/2002			10.01	34.62	0.03	
	4/11/2002			10.31	34.32	-0.30	
	4/25/2002			10.26	34.37	0.05	
	5/24/2002			10.57	34.06	-0.31	
	6/27/2002			11.03	33.60	-0.46	
	7/24/2002			11.29	33.34	-0.26	
	8/28/2002			11.48	33.15	-0.19	
	9/25/2002			11.61	33.02	-0.13	
	10/29/2002			11.66	32.97	-0.05	
	11/26/2002			11.50	33.13	0.16	
PZ-19	1/28/2002	91.68	91.28	16.57	74.71	--	1
	3/15/2002			16.54	74.74	0.03	
	4/25/2002			16.22	75.06	0.32	
	5/24/2002			16.45	74.83	-0.23	
	6/27/2002			15.33	75.95	1.12	
	8/28/2002			17.11	74.17	-1.78	
	9/25/2002			17.19	74.09	0.08	
	10/29/2002			17.31	73.97	-0.12	
	11/26/2002			17.20	74.08	0.11	

Table 4
Summary of Historical Groundwater Elevation Data
Former Benicia Arsenal, Benicia, CA

Name	Measurement date	Ground surface elevation (ft-msl)	Reference elevation (TOC, ft-msl)	Depth-to-groundwater (ft below TOC)	Groundwater elevation (ft-msl)	Change since last measurement (ft)	Notes
PZ-20	1/18/2002	164.18	163.54	13.88	149.66	--	1
	1/28/2002			14.46	149.08	-0.58	1
	3/15/2002			14.45	149.09	0.01	
	4/25/2002			14.10	149.44	0.35	
	5/24/2002			18.45	145.09	-4.35	
	6/27/2002			17.82	145.72	0.63	
	8/28/2002			20.89	142.65	-3.07	
	9/25/2002			21.41	142.13	-0.52	
	10/29/2002			21.82	141.72	-0.41	
	11/26/2002			21.67	141.87	0.15	

Notes:
1 Measured before development.
2 Water flowing out of casing.
3 Water rose 0.6 feet above TOC

Acronyms:
ft = feet msl = mean sea level TOC = top of casing

Table 5
Detected Analytes in Soil
Metals (mg/kg)
Former Benicia Arsenal, Benicia, CA

Sample-ID	Sample Date	Depth (feet)	ANTIMONY	ARSENIC	BARIUM	BERYLLIUM	CADMIUM	CHROMIUM	COBALT	COPPER	LEAD	MANGANESE	MERCURY	MOLYBDENUM	NICKEL	SELENIUM	SILVER	THALLIUM	VANADIUM	ZINC
SHMPZ001-A-S01A	01/14/2002	3 - 3.5	< 2.01 UJ	6.62	51.3	0.411 J	0.207 J	19.4	6.58	15.9	6.8	177	0.0383 J	< 0.704 UJ	18.6	0.246 J	0.801 J	0.667	33.7	42.5
SHMPZ001-A-S02A	01/14/2002	7.5 - 8.5	3.13 J	14.5	132	0.562 J	0.069 J	79.3	10.7	54.7	18.6	243	0.257	2.17 J	57.6	0.449 J	1.49 J	1.04	93.3	74.3
SHMPZ001-B-S02A	01/14/2002	7.5 - 8.5	< 2.73	16.7	233	0.564 J	0.0866 J	80.8	10.9	53.9	30.8	225	0.24	2.44 J	58.4	0.408 J	2.03 J	0.942	94.1	70.2
SHMPZ002-A-S01A	01/16/2002	2 - 2.5	2.91 J	8.02	73.8	0.445 J	0.294 J	30.1	9.28	25.3	84.9	290	0.0381 J	< 0.709 UJ	25.6	0.159 J	1.07 J	0.665	40.8	64.1
SHMPZ002-A-S02A	01/16/2002	8 - 8.5	< 2.11	6.51	64.2	0.449 J	0.0624 J	19.4	6.98	17.7	5.73	143	< 0.0302	< 0.741 UJ	16.6	0.108 J	0.803 J	0.495 J	43.5	53.9
SHMPZ003-A-S01A	01/14/2002	2 - 2.5	2.03 J	2.76	45.3	0.739 J	0.202 J	7.8	2.9	11.3	30.7	349	0.0527 J	1.64 J	6.36	0.133 J	1.03 J	0.529	17	69.4
SHMPZ003-A-S02A	01/14/2002	8 - 8.5	2.84 J	4.98	75.6	0.452 J	0.159 J	24.3	9.8	20.5	26.8	325	< 0.0305	< 0.748 UJ	17.6	0.163 J	1.24 J	0.562	50.7	57.6
SHMPZ004-A-S01A	01/17/2002	2 - 2.5	5.48 J	4.7	84.9	0.426 J	0.434 J	36.2	15	25.1	62.8	515	0.207	< 0.726 UJ	40	0.213 J	1.84 J	0.641	69.7	68.8
SHMPZ004-A-S02A	01/17/2002	6 - 6.5	< 3.42	17.2	99.4	0.977 J	0.368 J	102	22.6	73.6	25.7	270	0.498	3.01 J	102	0.22 J	1.76 J	0.817	109	109
SHMPZ005-A-S01A	01/16/2002	3 - 3.5	< 2.31	2.23	39.7	0.518 J	0.0603 J	25.2	7.75	15.8	4.04	132	0.123	< 0.81 UJ	29.3	< 0.108	1.24 J	0.684	42.2	43
SHMPZ005-A-S02A	01/16/2002	6.5 - 7	< 2.48	4.89	119	0.956 J	0.0902 J	79.6	30.5	48.6	8.52	284	0.123	< 0.871	104	< 0.117	2.15 J	1.03	51.6	49.8
SHMPZ006-A-S01A	01/16/2002	2.5 - 3.5	< 2.34	1.16	41.3	0.595 J	0.0716 J	25.3	7.99	18.6	4.44	99.2	0.0583 J	< 0.821 UJ	31.9	< 0.11	1.46 J	0.749	44.7	46.2
SHMPZ006-A-S02A	01/16/2002	7 - 7.5	< 2.1	9.95	88.1	0.671 J	0.28 J	54.6	6.98	16.4	15.1	293	0.293	< 0.735 UJ	13.5	0.373 J	1.5 J	0.664	70.7	73.2
SHMPZ006-B-S01A	01/16/2002	2.5 - 3.5	< 2.27	3.56	77.5	0.378 J	0.701	36.4	8.46	24.4	65	203	0.0766 J	< 0.797 UJ	60.8	< 0.107	0.975 J	0.691	52.3	103
SHMPZ007-A-S01A	01/18/2002	2.5 - 3	3.75 J	8.54	308	0.591 J	< 0.0366	39.9	16.3	44.5	10.2	1040	0.192	< 0.733 UJ	44.2	< 0.0981	1.04 J	0.68	66	67
SHMPZ007-A-S02A	01/18/2002	17.5 - 18	3.08 J	11.3	393	0.605 J	< 0.0389	35.6	20.4	50.1	10.3	1400	0.185	< 0.778 UJ	61.7	0.165 J	1.24 J	0.759	67.9	72.6
SHMPZ009-A-S01A	01/24/2002	1 - 1.5	< 2.15	7.26	305	0.726 J	0.178 J	53.5	16.1	57.1	12.5	721	0.33	< 0.753 UJ	54	0.246 J	1.1 J	0.744	90.3	88.3
SHMPZ009-A-S02A	01/24/2002	8 - 8.5	< 2.1	8.87	639	0.708 J	< 0.0368	64.1	16.6	55.8	8.8	1000	1.16	< 0.735 UJ	61	0.149 J	1.08 J	0.682	88.3	81.7
SHMPZ010-A-S01A	01/24/2002	1 - 1.5	2.2 J	7.91	268	0.701 J	0.226 J	48.2	14.9	57.5	19.2	713	0.28	< 0.752 UJ	48.5	< 0.101	0.84 J	0.73	78.2	89.4
SHMPZ010-A-S02A	01/24/2002	8 - 8.5	2.59 J	6.14	369	0.644 J	< 0.037	41	18.9	48.5	9.07	1090	0.286	< 0.74 UJ	50.6	< 0.099	1.02 J	0.596	72.8	74
SHMPZ011-A-S01A	01/18/2002	2 - 3	< 2.13	7.46	152	0.513 J	< 0.0373	47.4	15.8	57.5	9.18	555	0.139	< 0.747 UJ	44.6	< 0.1	1.15 J	0.873	76.5	89.8
SHMPZ011-A-S02A	01/18/2002	6.5 - 7	< 2.09	7.31	226	0.68 J	0.18 J	56.3	18.1	75.7	11.5	681	0.128	< 0.734	51.2	< 0.0983	1.49 J	0.802	95.8	100
SHMPZ011-B-S01A	01/18/2002	2 - 3	3.59 J	8.54	134	0.536 J	< 0.0375	52.8	17.4	63.1	9.88	644	0.149	< 0.75 UJ	49.9	< 0.1	1.61 J	0.783	87	91.7
SHMPZ012-A-S01A	01/18/2002	2.5 - 3	2.3 J	4.68	232	0.662 J	< 0.0375	68	25.6	58.9	7.88	1450	0.0436 J	< 0.751 UJ	65.8	0.158 J	1.48 J	0.685	95	70.3
SHMPZ012-A-S02A	01/18/2002	9 - 9.5	< 2.03	4.03 J-	85.4	0.212 J	< 0.0356	53.2 J-	9.14	14.3	2.64	223 J+	0.0573 J	< 0.712 UJ	54.4	< 0.0953 UJ	1.05 J	0.563	34.2	28.3
SHMPZ017-A-S01A	01/23/2002	3 - 4	< 2.13	7.84	128	0.568 J	< 0.0373	79.7	19.4	54.9	8.5	990	0.0926	< 0.746 UJ	66.8	< 0.0999	1.74 J	0.696	98.2	75.9
SHMPZ017-A-S02A	01/23/2002	8 - 8.5	3.52 J	6.7	220	0.882 J	< 0.0383	73	27.2	71.1	11.7	1130	0.0577 J	< 0.766 UJ	65.7	< 0.102	1.68 J	0.801	96.5	91.4
SHMPZ017-B-S01A	01/23/2002	3 - 4	< 2.14	5.37	124	0.57 J	< 0.0375	89	20.3	50.8	6.99	537	0.096	< 0.75 UJ	72.4	< 0.1	1.67 J	0.681	102	67.8
SHMPZ019-A-S01A	01/22/2002	5 - 5.5	< 2.05	8.5	185	0.849 J	< 0.0359	51.4	19.8	91.6	12.6	534	0.104	< 0.718 UJ	49.4	< 0.0961	1.11 J	0.73	84.3	112
SHMPZ019-A-S02A	01/22/2002	8 - 8.5	< 2.13	8.69	402	0.82 J	< 0.0373	57.7	18.2	64.7	11.4	738	0.0881 J	< 0.745 UJ	53.4	< 0.0997	1.32 J	0.784	88.1	93.9
SHMPZ020-A-S01A	01/17/2002	1.5 - 2	2.62 J	11	171	0.766 J	0.415 J	63.3	11.1	26.7	95.7	763	0.111	1.5 J	24.4	0.34 J	1.24 J	0.521	94	66.2
SHMPZ020-A-S02A	01/17/2002	5 - 5.5	3.97 J	11.4	379	0.857 J	0.0882 J	57.8	20.3	72.5	11.1	778	0.049 J	2 J	57	< 0.102	1.07 J	0.676	92.7	98.1
Number of Detects:			14	32	32	32	19	32	32	32	32	32	30	6	32	15	32	32	32	32
Total Number of Analyses:			32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
Maximum Concentration:			5.48	17.2	639	0.977	0.701	102	30.5	91.6	95.7	1450	1.16	3.01	104	0.449	2.15	1.04	109	112

QUALIFIER LEGEND:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J- — The analyte was positively identified with low bias; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ — The analyte was positively identified with high bias; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ — The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Table 6
Detected Analytes in Water
Metals (mg/L)
Former Benicia Arsenal, Benicia, CA

Sample-ID	Sample Date	Depth (feet)*	ALUMINUM	ARSENIC	BARIUM	CADMIUM	CHROMIUM	COBALT	MANGANESE	MOLYBDENUM	NICKEL	SELENIUM	TIN	VANADIUM	ZINC
SHMPZ001-A-W01	February 13, 2002	10	< 0.0612	0.0186	0.196	< 0.0007	< 0.0059 UJ	0.00619 J	1.85	< 0.0056 UJ	0.0105 J	< 0.0042	< 0.0334	0.00844 J	0.0548 J+
SHMPZ002-A-W01	February 12, 2002	15	< 0.0612	0.0121	0.282	< 0.0007	< 0.0059 UJ	0.00868 J+	2.82	< 0.0056	< 0.0079	< 0.0042	< 0.0334	< 0.0035	< 0.0023 UJ
SHMPZ002-B-W01	February 12, 2002	15	< 0.0612	0.0115	0.264	< 0.0007	< 0.0059 UJ	< 0.0059 UJ	2.64	< 0.0056	< 0.0079	< 0.0042	< 0.0334	< 0.0035	< 0.0023 UJ
SHMPZ003-A-W01	February 12, 2002	59	< 0.0612	0.0107	0.26	< 0.0007	< 0.0059 UJ	0.00686 J+	2.57	< 0.0056	< 0.0079	< 0.0042	< 0.0334	< 0.0035	< 0.0023 UJ
SHMPZ004-A-W01	February 13, 2002	10	< 0.0612	0.0514	0.512	< 0.0007	< 0.0059 UJ	< 0.0059	3.94	< 0.0056	< 0.0079	< 0.0042	< 0.0334	0.0169	< 0.0023
SHMPZ005-A-W01	February 8, 2002	10	< 0.0612	0.0353	1.34	< 0.0007	< 0.0059 UJ	< 0.0059 UJ	5.75	0.0128 J	< 0.0079	< 0.0042	< 0.0334	< 0.0035	0.044 J+
SHMPZ006-A-W01	February 12, 2002	29	< 0.0612	0.0188	0.265	< 0.0007	< 0.0059 UJ	< 0.0059 UJ	1.76	0.0211 J	< 0.0079	< 0.0042	< 0.0334	0.0292 J	< 0.0023 UJ
SHMPZ007-A-W01	February 6, 2002	13	< 0.0612	< 0.0012	0.41	< 0.0007	< 0.0059	< 0.0059	0.00168 J	< 0.0056	< 0.0079	< 0.001 UJ	< 0.0334	< 0.0035	0.00439 J
SHMPZ009-A-W01	February 6, 2002	15	1.62	0.00999 J	0.151	< 0.0007	< 0.0059 UJ	0.0357 J-	21.3	0.028 J+	0.0292 J	< 0.0042	< 0.0334	0.00995 J	0.412
SHMPZ010-A-W01	February 6, 2002	29	< 0.0612	< 0.0036	0.0508	0.00407 J	< 0.0059 UJ	0.0169 J+	30.7	0.0565 J	0.0177 J	< 0.0042	0.037 J+	0.00596 J	0.561
SHMPZ011-A-W01	February 11, 2002	15	0.559	0.0119	0.169	< 0.0007	< 0.0059 UJ	< 0.0059 UJ	3.42	< 0.0056 UJ	0.0193 J	< 0.0042	< 0.0334	0.014 J	< 0.0023 UJ
SHMPZ012-A-W01	February 7, 2002	10	< 0.0612	0.00449	0.0494	< 0.0007	0.0151 J	< 0.0059	0.0271 J	< 0.0056	0.0104 J	< 0.001	< 0.0334	0.012 J	0.0408
SHMPZ017-A-W01	February 5, 2002	10.5	< 0.0612	< 0.0012	0.111	< 0.0007	< 0.0059 UJ	< 0.0059 UJ	0.416	< 0.0056	< 0.0079	< 0.001	< 0.0334	< 0.0035	0.0365 J+
SHMPZ019-A-W01	February 7, 2002	25.5	< 0.0612	< 0.0012	0.157	< 0.0007	< 0.0059	< 0.0059	0.0427 J	< 0.0056	< 0.0079	< 0.001	< 0.0334	< 0.0035	0.00865 J
SHMPZ020-A-W01	February 7, 2002	29.5	< 0.0612	< 0.0012	0.188	< 0.0007	< 0.0059 UJ	< 0.0059 UJ	0.112	< 0.0056	< 0.0079	< 0.001	< 0.0334	< 0.0035	0.0278 J
SHMPZ020-B-W01	February 7, 2002	29.5	0.449	< 0.0012	0.185	< 0.0007	< 0.0059 UJ	< 0.0059 UJ	0.154	< 0.0056	< 0.0079	0.00139 J	< 0.0334	0.00359 J	0.0495 J
Number of Detects:			3	10	16	1	1	5	16	4	5	1	1	8	10
Total Number of Analyses:			16	16	16	16	16	16	16	16	16	16	16	16	16
Maximum Concentration:			1.62	0.0514	1.34	0.00407	0.0151	0.0169	30.7	0.0565	0.0292	0.00139	0.037	0.0292	0.561

QUALIFIER LEGEND:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J- — The analyte was positively identified with low bias; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ — The analyte was positively identified with high bias; the associated numerical value is the approximate concentration of the analyte in the sample.

UJ — The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

* — Depth shown is the midpoint of each piezometer's screened interval.

Table 6
Detected Analytes in Water
TPHs (ug/L)
Former Benicia Arsenal, Benicia, CA

Sample-ID	Sample Date	Depth (feet)*	GASOLINE (~C6-C10)	MOTOR OIL (C20-C36)
SHMPZ002-A-W01	February 12, 2002	15	10 J	< 60
SHMPZ002-B-W01	February 12, 2002	15	8.5 J	< 61
SHMPZ003-A-W01	February 12, 2002	59	6.1 J	< 63
SHMPZ006-A-W01	February 12, 2002	29	9.6 J	< 69
SHMPZ010-A-W01	February 6, 2002	29	< 6	64 J
SHMPZ011-A-W01	February 11, 2002	15	21 J	< 62
SHMPZ020-B-W01	February 7, 2002	29.5	< 6	85 J
Number of Detects:			6	7
Total Number of Analyses:			16	16
Maximum Concentration:			21	85

QUALIFIER LEGEND:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

* — Depth shown is the midpoint of each piezometer's screened interval.

Table 6
Detected Analytes in Water
VOCs (ug/L)
Former Benicia Arsenal, Benicia, CA

Sample-ID	Sample Date	Depth (feet)*	1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHA	1,1-DICHLOROETHENE	1,2,4-TRIMETHYLBENZENE	ACETONE	BENZENE	CARBON DISULFIDE	CHLOROFORM	cis-1,2-DICHLOROETHENE	ETHYLBENZENE	ISOPROPYL ETHER	m,p-XYLENE	METHYL ETHYL KETONE	METHYL MERCAPTAN	METHYL tert-BUTYL ETHER	NAPHTHALENE	o-XYLENE	P-CYMENE (p-ISOPROPYLTOLUENE)	TETRACHLOROETHENE	TOLUENE	trans-1,2-DICHLOROETHENE	TRICHLOROETHENE	VINYL CHLORIDE
SHMPZ001-A-W01	February 13, 2002	10	< 0.2	< 0.15	< 0.14	< 1.9	< 0.18	< 0.13	< 0.12	< 0.13	< 0.11	< 0.13	< 0.24	< 1.8	ND	< 0.13	8.5 J+	< 0.12	< 0.18	< 0.18	< 0.12	< 0.15	< 0.15	< 0.25
SHMPZ002-A-W01	February 12, 2002	15	< 0.2	0.69 J	0.21 J	< 1.9	< 0.18	< 0.13	< 0.12	130	< 0.11	< 0.13	0.57 J	< 1.8	ND	< 0.13	< 0.27	< 0.12	< 0.18	< 0.18	0.34 J	63	1.8	0.74 J
SHMPZ002-B-W01	February 12, 2002	15	< 0.2	0.7 J	0.27 J	< 1.9	< 0.18	< 0.13	< 0.12	150	< 0.11	< 0.13	0.66 J	< 1.8	ND	< 0.13	< 0.27	0.23 J	< 0.18	< 0.18	0.49 J	72	1.8	0.77 J
SHMPZ003-A-W01	February 12, 2002	59	< 0.2	0.74 J	< 0.14	< 1.9	< 0.18	< 0.13	< 0.12	140	< 0.11	< 0.13	0.28 J	< 1.8	ND	< 0.13	< 0.27	< 0.12	< 0.18	< 0.18	0.24 J	72	1.7	0.72 J
SHMPZ004-A-W01	February 13, 2002	10	< 0.2	< 0.15	< 0.14	22	< 0.18	3.9	< 0.12	< 0.13	< 0.11	2.8 J	< 0.24	9.2 J	11 NJ	< 0.13	< 0.27	< 0.12	< 0.18	< 0.18	< 0.12	< 0.15	< 0.15	< 0.25
SHMPZ005-A-W01	February 8, 2002	10	< 0.2	< 0.15	< 0.14	< 1.9	< 0.18	< 0.13	< 0.12	< 0.13	< 0.11	< 0.13	< 0.24	< 1.8	ND	< 0.13	< 0.27	< 0.12	9.6	< 0.18	< 0.12	< 0.15	< 0.15	< 0.25
SHMPZ006-A-W01	February 12, 2002	29	< 0.2	< 0.15	0.4 J	9.4 J	0.27 J	< 0.13	< 0.12	< 0.13	0.29 J	< 0.13	1.2 J	3.2 J	ND	< 0.13	< 0.27	0.49 J	< 0.18	< 0.18	1.1	< 0.15	< 0.15	< 0.25
SHMPZ007-A-W01	February 6, 2002	13	< 0.2	< 0.15	< 0.14	< 1.9 UJ	< 0.18	< 0.13	0.49 J	< 0.13	< 0.11	< 0.13	< 0.24	< 1.8	ND	< 0.13	< 0.27	< 0.12	< 0.18	0.21 J	< 0.12	< 0.15	5.7	< 0.25
SHMPZ010-A-W01	February 6, 2002	29	< 0.2	< 0.15	< 0.14	< 1.9	< 0.18	< 0.13	< 0.12	< 0.13	< 0.11	< 0.13	< 0.24	3.4 J	ND	0.48 J	< 0.27	< 0.12	< 0.18	0.5 J	< 0.12	< 0.15	< 0.15	< 0.25
SHMPZ011-A-W01	February 11, 2002	15	< 0.2	< 0.15	0.75 J	3.8 J	< 0.18	< 0.13	< 0.12	< 0.13	0.52 J	< 0.13	2.5	< 1.8	ND	1.1	< 0.27	1	< 0.18	< 0.18	2.3	< 0.15	< 0.15	< 0.25
SHMPZ012-A-W01	February 7, 2002	10	< 0.2	< 0.15	< 0.14	< 1.9	< 0.18	< 0.13	2.7	< 0.13	< 0.11	< 0.13	< 0.24	< 1.8	ND	< 0.13	< 0.27	< 0.12	< 0.18	0.37 J	< 0.12	< 0.15	15	< 0.25
SHMPZ017-A-W01	February 5, 2002	10.5	< 0.2	< 0.15	< 0.14	< 1.9	< 0.18	< 0.13	< 0.12	< 0.13	< 0.11	< 0.13	< 0.24	< 1.8	ND	< 0.13	< 0.27	< 0.12	< 0.18	0.33 J	< 0.12	< 0.15	< 0.15	< 0.25
SHMPZ020-A-W01	February 7, 2002	29.5	11 J	< 0.15	< 0.14	< 1.9 UJ	< 0.18	< 0.13	< 0.12	< 0.13	< 0.11	< 0.13	< 0.24	< 1.8	ND	< 0.13	< 0.27	< 0.12	< 0.18	0.24 J	< 0.12	< 0.15	< 0.15	< 0.25
SHMPZ020-B-W01	February 7, 2002	29.5	13 J	< 0.15	< 0.14	< 1.9 UJ	< 0.18	< 0.13	< 0.12	< 0.13	< 0.11	< 0.13	< 0.24	< 1.8	ND	< 0.13	< 0.27	< 0.12	< 0.18	0.27 J	< 0.12	< 0.15	< 0.15	< 0.25
Number of Detects:			3	4	4	3	1	1	2	3	2	1	5	3	1	2	1	3	1	6	5	3	5	3
Total Number of Analyses:			16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Maximum Concentration:			13	0.74	0.75	22	0.27	3.9	2.7	150	0.52	2.8	2.5	9.2	11	1.1	8.5	1	9.6	0.5	2.3	72	15	0.77

QUALIFIER LEGEND:

J The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

J+ The analyte was positively identified with high bias; the associated numerical value is the approximate concentration of the analyte in the

NJ The analyte identification is presumptive. Reported value is an estimated concentration.

UJ The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

ND Not Detected

* Depth shown is the midpoint of each piezometer's screened interval.

Table 6
Detected Analytes in Water
Wet Chemistry (mg/L)
Former Benicia Arsenal, Benicia, CA

Sample-ID	Sample Date	Depth (feet)*	CALCIUM	CHLORIDE	IRON	MAGNESIUM	NITRATE (AS N)	POTASSIUM	SODIUM	SULFATE	TOTAL DISSOLVED SOLIDS
SHMPZ001-A-W01	February 13, 2002	10	215	5930	1.07	454	< 0.27	101	3950	23.8	12100
SHMPZ002-A-W01	February 12, 2002	15	170	4760	11.1	250	< 0.27	56.1	3090	46.3	8830
SHMPZ002-B-W01	February 12, 2002	15	159	4710	10.3	235	< 0.27	52.6	2820	47.9	9250
SHMPZ003-A-W01	February 12, 2002	59	157	4680	10.2	233	< 0.27	52.7	2870	48.9	9270
SHMPZ004-A-W01	February 13, 2002	10	542	11300	17.6	1280	< 0.27	135	6770	262	26000
SHMPZ005-A-W01	February 8, 2002	10	247	2190	34	229	< 0.27	20.1	1370	66.5	4940
SHMPZ006-A-W01	February 12, 2002	29	197	5760	0.706 J	405	< 0.27	110	3290	72.7	10600
SHMPZ007-A-W01	February 6, 2002	13	110	49	< 0.025	34	9.38**	1.07 J	93	91.4 J	599
SHMPZ009-A-W01	February 6, 2002	15	747	11700	10.2	933	< 0.27**	84.2	5850	658 J	20300
SHMPZ010-A-W01	February 6, 2002	29	1940	40100	< 0.025	3340	0.7 J**	134	20300	3390 J	65900
SHMPZ011-A-W01	February 11, 2002	15	255	4440	1.81	389	< 0.27	86.5	3140	23.7	9820
SHMPZ012-A-W01	February 7, 2002	10	36.7	122	0.0369 J	32.7	7.98	3.44 J	314	132	906
SHMPZ017-A-W01	February 5, 2002	10.5	144	27.3	0.0311 J	78.9	1.37	1.72 J	79.8	125	724
SHMPZ019-A-W01	February 7, 2002	25.5	96.9	63.5	< 0.025	51	4.49	1.92 J	72.9	77.8	565
SHMPZ020-A-W01	February 7, 2002	29.5	144	97	< 0.025	67.5	15.2	2.7 J	55.8	45.8	769
SHMPZ020-B-W01	February 7, 2002	29.5	146	98.5	0.631 J	67.8	15.1	2.99 J	57.9	46	745
Number of Detects:			16	16	12	16	7	16	16	16	16
Total Number of Analyses:			16	16	16	16	16	16	16	16	16
Maximum Concentration:			1940	40100	34	3340	15.2	135	20300	3390	65900

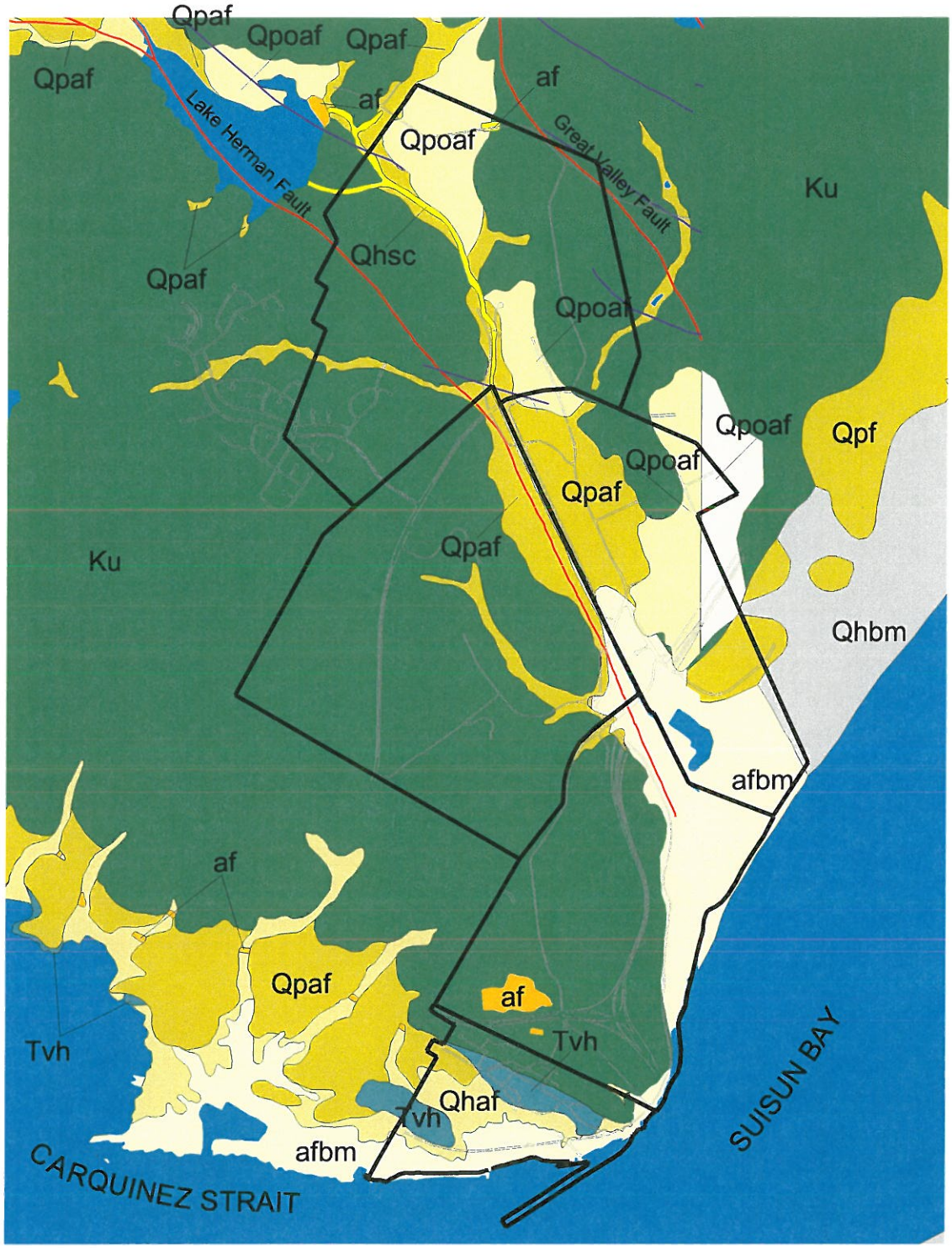
QUALIFIER LEGEND:

J — The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.

* — Depth shown is the midpoint of each piezometer's screened interval.

** — Value measured as the sum of nitrate plus nitrite. Only nitrate is assumed to be present based on site history.

FIGURES



Legend

Water
Main roads
Faults
Anticline

Surficial Geologic Units (Graymere, 1999 and Knudsen, 2000)

- Artificial fill - af (Historic)
- Artificial fill over Bay Mud- afbm (Historic)
- Stream channel deposits - Qhsc (Holocene)
- Bay mud - Qhbm (Holocene)
- Alluvial fan and fluvial deposits - Qhaf (Holocene)
- Alluvial fan and fluvial deposits - Qpaf and Qpf (Pleistocene)
- Older alluvial fan deposits - Qpoaf (Pleistocene)
- Vine Hill Sandstone of Weaver (1953) Tvh (Paleocene)
- Great Valley Sequence - undivided sandstone and shale - Ku (Early and Late Cretaceou

Interpreted from aerial photo (1997)

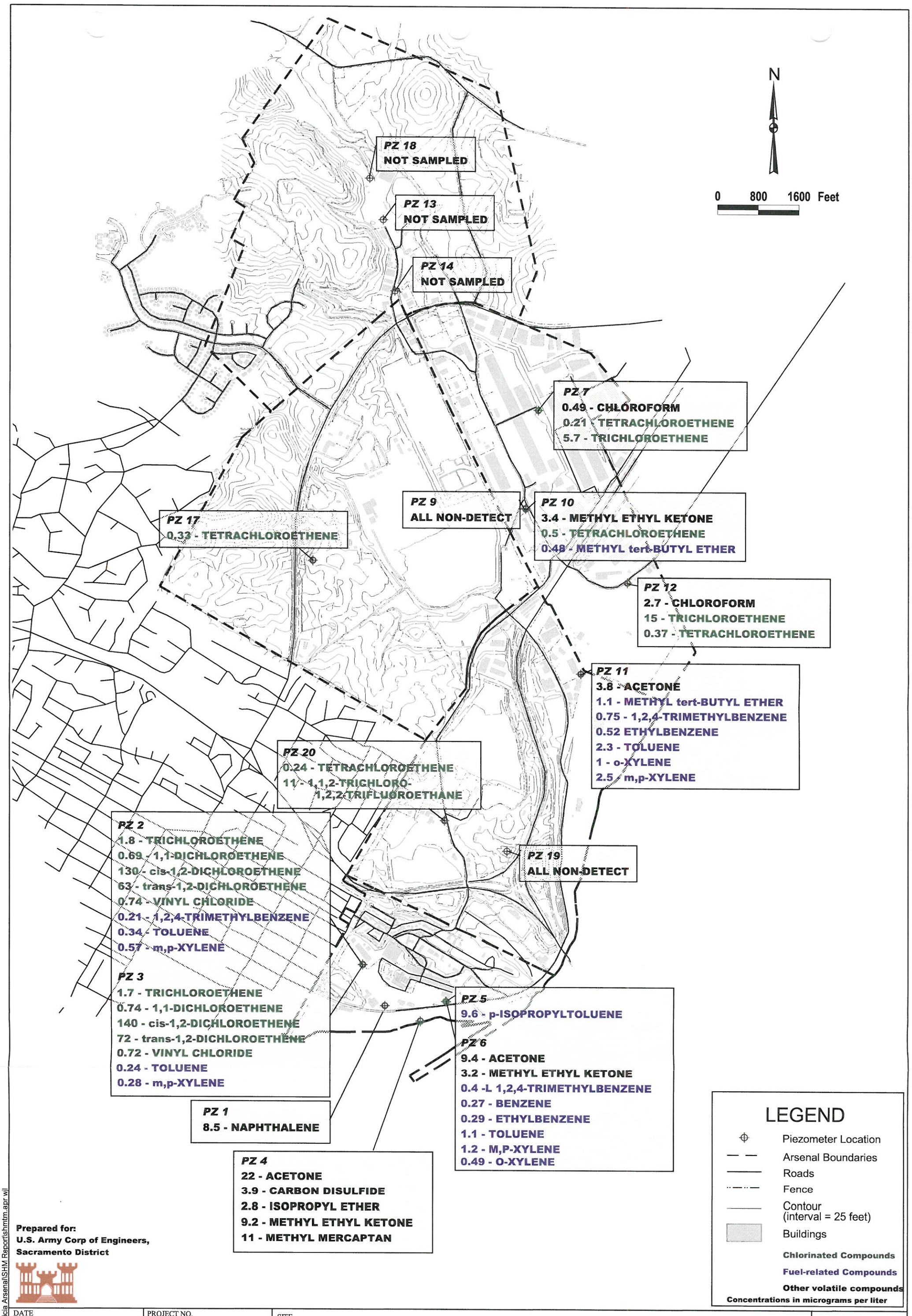
- Older alluvial fan deposits - Qpoaf (Pleistocene)

N

0 1000 2000 Feet

Figure 1
Geologic Map of the Benicia Area

Site Hydrogeologic Model TM
Benicia Arsenal, Benicia CA



Prepared for:
U.S. Army Corp of Engineers,
Sacramento District

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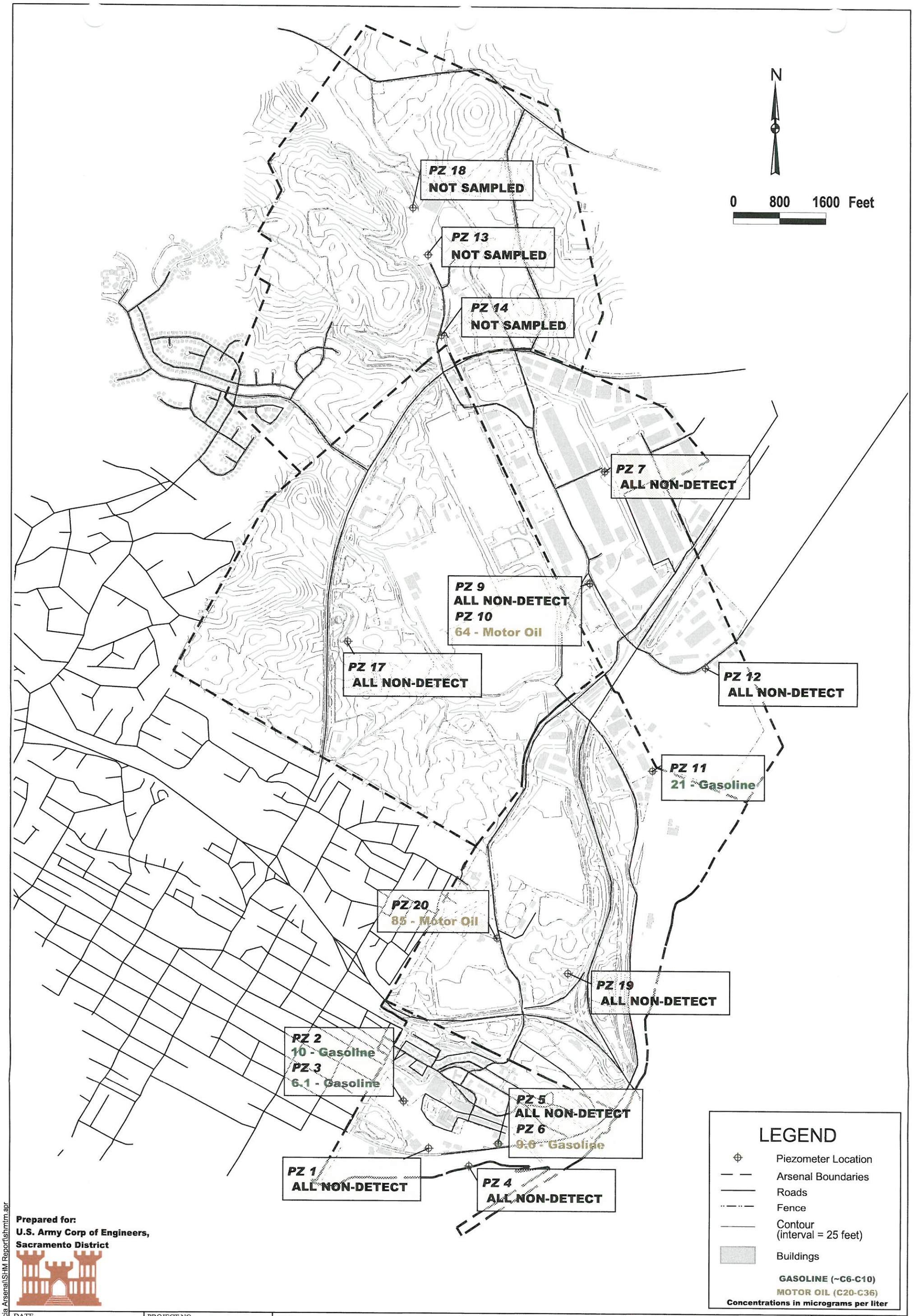
DATE	PROJECT NO.	SITE
06-12-02	00726	Former Benicia Arsenal, Benicia, California

FA/BC *FORSGREN ASSOCIATES/ BROWN AND CALDWELL*
A Joint Venture

TITLE
SUMMARY OF DETECTED
VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Figure 2



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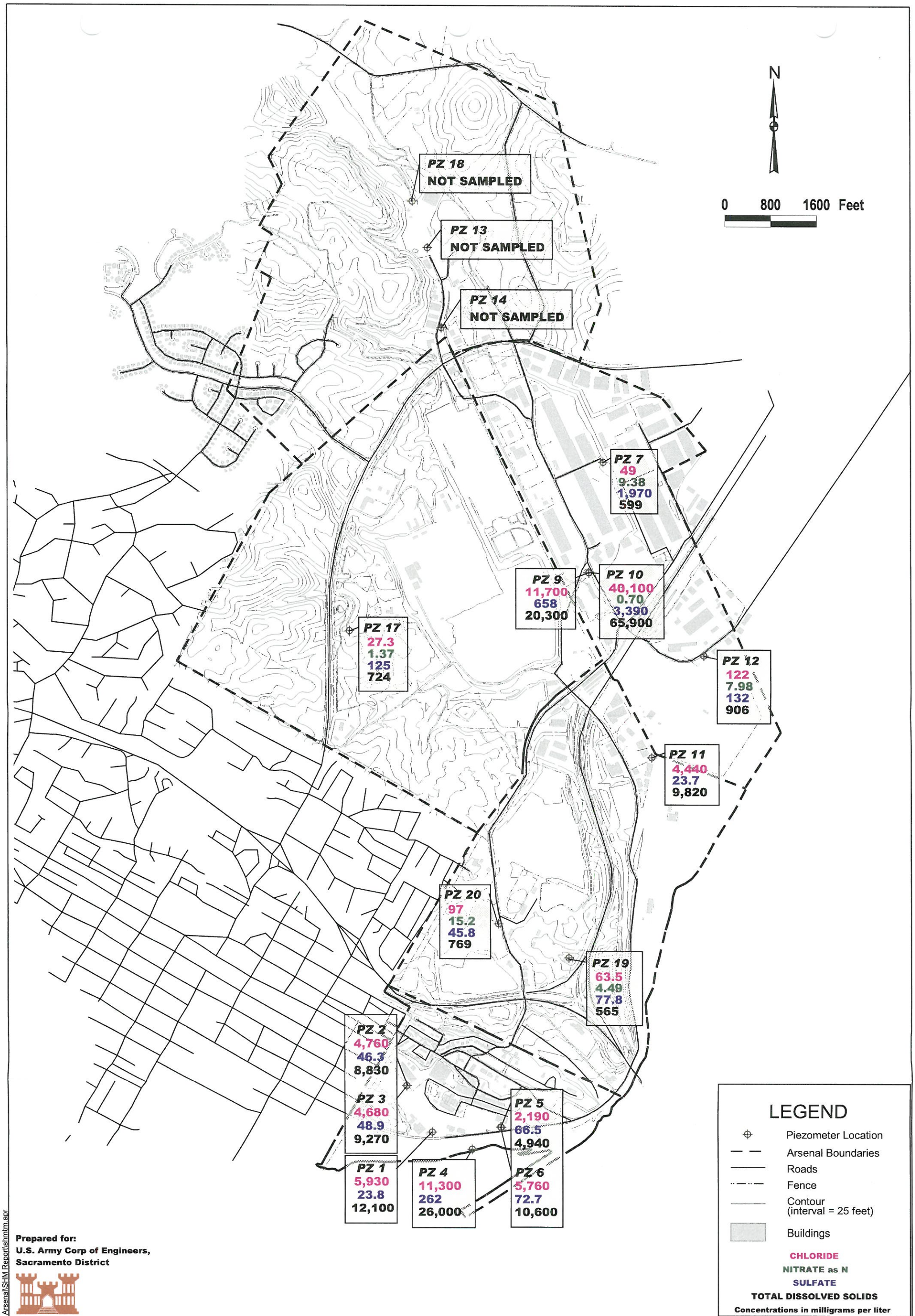
DATE	PROJECT NO.	SITE
06-12-02	00726	Former Benicia Arsenal, Benicia, California

FA/BC FORSGREN ASSOCIATES/ BROWN AND CALDWELL A Joint Venture

TITLE: SUMMARY OF DETECTED TOTAL PETROLEUM HYDROCARBONS

Figure 3



Prepared for:
U.S. Army Corp of Engineers,
Sacramento District

P:\U.S. Army Corps\Benicia Arsenal\SHM Report\shmtm.apr

DATE	PROJECT NO.	SITE	
06-12-02	00726	Former Benicia Arsenal, Benicia, California	Figure 4
FA/BC *FORSGREN ASSOCIATES/ BROWN AND CALDWELL* *A Joint Venture*		TITLE: SUMMARY OF DETECTED MISCELLANEOUS WATER QUALITY PARAMETERS	

AVAILABLE FOR VIEWING IN THE CITY ATTORNEY'S OFFICE.

US ARMY CORPS OF ENGINEERS	Date: 05-25-02	Project No.: 00726	SITE Former Benicia Arsenal, Benicia, CA	Plate 1
	FORSGREN ASSOCIATES/ BROWN AND CALDWELL A Joint Venture		TITLE SHM Piezometer Locations	

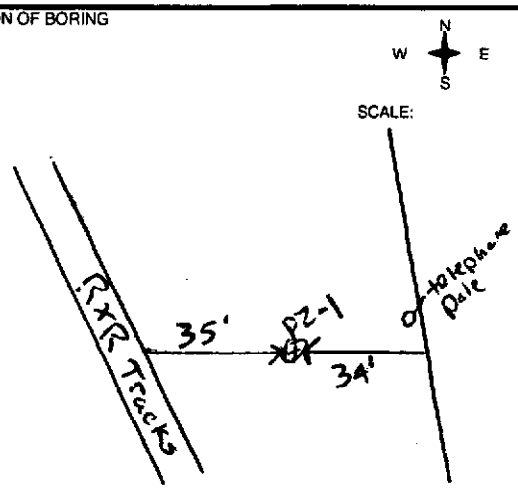
APPENDIX A

BOREHOLE LOGS

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	00701
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	HSA DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT SPOON CC ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	PID FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-1

SHEET 1 OF 1

DRILLING	START	FINISH
TIME	11:45	12:20
DATE	011402	011402

WELL CONSTRUCTION	START	FINISH
TIME	12:20	1330
DATE	011402	011402

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL
Neat Cement Grout	2" Sch 40 PVC Blank							0		
			11							CL
			15			A				
			8							ML
			7							
			10					5		
			10							
							ML			~~CL~~ CH
						B				
						C				
									0ppm	
			2/4/2					10	0ppm	
			2/4/1						0ppm	
			2/4/3						0ppm	
			3/4/4					15	0ppm	
Bentonite	Bentonite									
								20		

Detonite Chips

#3 SAND

2" slotted .020 Sch 40

SAMPLE TYPE: INTERVAL: DESCRIPTION

0-8" asphalt surface

8"-2.5' road base material

2.5-4 CL - clay with silt, greenish black (2.5/1 5GY) yellow mottling, moist

4-7 ML - silt dark gray (4/10Y) low plasticity (15, 35, 50) mottled with yellowish brown (10 YR 4/6)

7-16 CH - clay, Olive (5Y4/3), (15, 25, 60) moist ~~wet~~, ~~low~~ plasticity med-high, dark gray (5Y4/1) ~~etc~~ color change @ 7.5ft, some gravel pieces angular ~1cm dia, some organics, high ratio of organics @ 12ft - 16ft, strong organic odor

Total Depth @ 16ft

Materials Used:

Sand: 3.5 bags Concrete: 3 bags

bet chips: 1/2 bag

cement: 1 bag

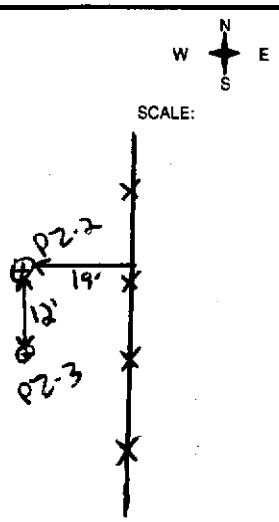
ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A	SHMPZ001-A-S01A	D	
B	SHMPZ001-A-S02A	E	
C	SHMPZ001-B-S02A	F	

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia SHM

JOB NUMBER: 007.26.005

DRILLING CONTRACTOR:

RIG TYPE (CIRCLE ONE): HSA DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED:

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-2

SHEET 1 OF 1

DRILLING	
START	FINISH
TIME 1505	TIME 1545
DATE 01/16/02	DATE 01/16/02

WELL CONSTRUCTION	
START	FINISH
TIME 1550	TIME 1700
DATE 01/16/02	DATE 01/16/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/t), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
Bentonite Chips; Neat Cement Grout	2" SCH40 PVC Blank							0			0-2.0 Asphalt and road base material
			50			A					- For lithologic description see adjacent boring log for PZ-3.
			5 9				▼	5			TD boring = 20' bgs
			4 9								PZ set @ 20' bgs
			4 2								
			3 3			B					
			6				11.0	10			
#3 SAND		.020 Slotted PVC						15			
								20			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SHMPZ002-A-501A

B SHMPZ002-A-502A

C

D

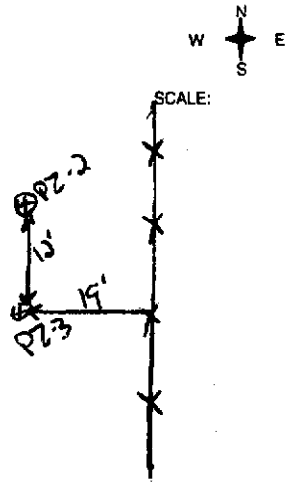
E

F

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	00701
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	~~HSA~~ DP MUD ARCH NONE — OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	~~SPLIT SPOON~~ CC ACETATE NONE — OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE — OTHER
SURFACE CONDITIONS (CIRCLE ONE)	~~ASPHALT~~ CONCRETE DIRT ~~DRY~~ WET — OTHER

BORING NUMBER: PZ-3

SHEET 1 OF 3 48

DRILLING	START	FINISH
TIME	1420	1110
DATE	011402	011502

WELL CONSTRUCTION	START	FINISH
TIME	1200	1630
DATE	011502	011502

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
Neat cement grout	2" sch 40 PVC Black							0			0- 6" Asphalt
			80			A				CL	6"-2.5 CL - clay with silt (5,10,85) greenish black (2.5/10Y)
			11/12/17								
			8 12 17					5		ML	3.5-4 CL - Clay with silt (5,10,85) yellowish brown (5/8 10YR) low plasticity
			6 3 3								
			4 7 7			B					4-8 ~~SM~~ ML - silt with sand (5,30,65) yellowish brown (5/8 10YR) dry, soft, grayish @ 6.5 moist @ 8 ft
								10	0 ppm		
			3 4 5								
			2 2 2						0 ppm		8-11 CL - clay (0,5,95) yellowish brown (5/6 10YR) wet, high plasticity, soft, sharp color change @ 10ft dark bluish gray (GIEY2 3/5B) mild organic odor.
			2 3 4					15	0 ppm	CL	
			2 2 2								11-15.5 CL - same as above moist, strong odor @ 15.5ft, high presence of organics, wet @ 17ft 50% organics @ 18.5
			2 4 4						0 ppm		
			2 4 5						0 ppm		
								20			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SHMPZ003-A-S01A

B SHMPZ003-A S02A

C

D

E

F

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia SHM

JOB NUMBER: 00701

DRILLING CONTRACTOR: Gregg

RIG TYPE (CIRCLE ONE): OTHER ____ HSA DP MUD ARCH NONE

DRILLING METHOD, FLUID USED

SOIL SAMPLING METHOD (CIRCLE ONE): OTHER ____ SPLIT SPOON CC ACETATE NONE

MONITORING INSTRUMENT (CIRCLE ONE): OTHER ____ PID FID LEL RAD NONE

SURFACE CONDITIONS (CIRCLE ONE): OTHER ____ ASPHALT CONCRETE DIRT WET

BORING NUMBER: PZ-3

SHEET 2 OF ~~3~~ 4

DRILLING	
START	FINISH
TIME 011402	TIME 011502
DATE 1420	DATE 1110

WELL CONSTRUCTION	
START	FINISH
TIME 1200	TIME 1630
DATE 011502	DATE 011502

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/l), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	SOIL SAMPLING: INTERVAL SAMPLED	SOIL SAMPLING: RECOVERY	SOIL SAMPLING: ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
Neat cement grout	2" SCH40 PVC Blank		2 3 3					20	0ppm	CL	20-27.5 CL - clay (0,0,100) greenish black (2.5/1 10Y) high organic content of reddish wood chips, strong odor, soft, moist, high plasticity, wet @ 23 organics ~5% @ 24.5 ft,
			2 1 2						0ppm		
			2 2 2						0		
			2 3 3					25			27.5-31 CL - clay same as above high organics 50%, moist
			2 3 3						0		
			2 3 3						0		31-40 CL - clay Same as above, increase in organics moist-wet
			3 3 3					30	0		
			2 2 4						0		
			2 2 2								
			2 4 4					35	0		
			4 4 4				▼ 11				
			3 3 2						0		
			2 2 2		0				0		
								40			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A ____ D ____

B ____ E ____

C F

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT	USACE
LOCATION	Bemicia, CA
PROJECT NAME	Bemicia SHM
JOB NUMBER	00701
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	~~HSA~~ DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT ~~SPOON~~ CC ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	ASP~~HALT~~ CONCRETE DIRT ~~DRY~~ WET OTHER

BORING NUMBER: PZ-3

SHEET 3 OF 4

DRILLING	START	FINISH
TIME	1420	1110
DATE	011402	011502

WELL CONSTRUCTION	START	FINISH
TIME	1200	1630
DATE	011502	011502

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
Betonite Chips; Neat Cement grout; #3 SAND	2" Sch 40 PVC Blank	0.020 Slotted 2" Sch 40 PVC	4 7					40	0	CL	41.5-46 Same As above except decrease in presence of organics
			4 5 6						0		Boring stopped 011402 @ 46' bgs due to darkness
			6 6 7								Will resume 011502
			6 6 8					45	0		011502 - Boring resumed @ 0845
			5 5 7						0		46-48 Same as above except no organics present
			4 6 18						0		48-50 Change in color to dark olive brown (2.5Y, 3/3) Firm-hard consistency
			12 20 25					50	0		50-60 Same as above except change in color to olive brown (2.5Y, 4/4)
			10 12 20								
			16 18 25						0		
			10 15 28					55	0		
			8 14 20						0		
			12 20 20								
			15 20 22						0		
			15					60			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

B _____ E _____

C _____ F _____

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia SHM

JOB NUMBER: 00701

DRILLING CONTRACTOR: Gregg

RIG TYPE (CIRCLE ONE): HSA DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-3

SHEET 4 OF 4

DRILLING	
START	FINISH
TIME 1420	TIME 1110
DATE 011402	DATE 011502

WELL CONSTRUCTION	
START	FINISH
TIME 1200	TIME 1630
DATE 011502	DATE 011502

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	SOIL SAMPLING: INTERVAL SAMPLED	SOIL SAMPLING: RECOVERY	SOIL SAMPLING: ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
#2 Sand		30	25 50 50 50 50 50 50 11					60	0	CL	60-63 CL, clay (0, 10, 90), olive brown (2.5Y 4/4), high plasticity, wet-moist, no odor, homogeneous, firm-hard consistency, low perm
									0		
									0		63-64 weathered siltstone bedrock
								65			64 competent sandstone bedrock
								0			
								5			
								0			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

B _____ E _____

C F

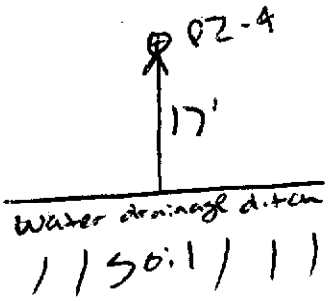
FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	00726
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	X HA DP MUD ARCH NONE — OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT SPOON X CC ACETATE NONE — OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	PID X FID LEL RAD NONE — OTHER
SURFACE CONDITIONS (CIRCLE ONE)	ASPHALT X CONCRETE DIRT DRY X WET — OTHER

BORING NUMBER: PZ-4

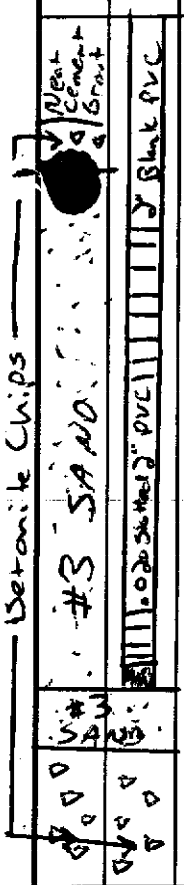
SHEET 1 OF 1

DRILLING	START	FINISH
TIME	0945	1050
DATE	01/17/02	01/17/02

WELL CONSTRUCTION	START	FINISH
TIME	1055	1230
DATE	01/17/02	01/17/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION



SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
						0			0-2 Asphalt + road base material
	62			A				ML	2-6 ML Sandy, silt w/ gravel, very dark gray (1GLEY, 3/N), (10, 40, 50), nonplastic, dry, no odor, hard, well graded (Fill material)
						5	0	CL	
				B					6-10 CH, clay, dark bluish gray (2GLEY, 3/10B) med plasticity, low toughness, moist, organic odor, very soft, ~25% organics (marsh material)
							0		
						10	0		10-20 CH, clay, same color as above, med plasticity low toughness, moist-wet (wet b/t 12-13') no odor, very soft, no organics present (bay mud)
							0		
						15			TD= 20'
							0		Well set @ 15.5' bgs
							0		
						20			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A X SHMPZ004-A-S01A

B SHMPZ004-A-S02A

C

D

E

F

P:\Special\DACW05-97-D-0035A_E\Field Activities\boringlogform

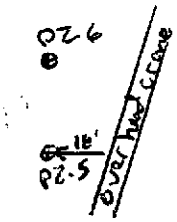
FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:



CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia SHM

JOB NUMBER: 00726

DRILLING CONTRACTOR: Gregg

RIG TYPE (CIRCLE ONE): HSA DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-5

SHEET 1 OF 1

DRILLING	
START	FINISH
TIME 1230	TIME 1315
DATE 01/16/02	DATE 01/16/02

WELL CONSTRUCTION	
START	FINISH
TIME 1315	TIME 1430
DATE 01/16/02	DATE 01/16/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS | CASING

SOIL SAMPLING: SAMPLER USED | BLOWS/6" | INTERVAL | INTERVAL SAMPLED | RECOVERY | ANALYTICAL SAMPLE (A,B,C) | WATER LEVEL (INITIAL/STATIC) | DEPTH (FEET) | INSTRUMENT READING (ppm) | USCS GROUP SYMBOL

SAMPLE TYPE: INTERVAL: DESCRIPTION

0-3 Asphalt + road base material

3-6.5 Silty sand w/ gravel, brown (7.5YR, 5/4) (15, 50, 35) nonplastic, well graded, dry, moderate cementation, med perm (Fill material)

6.5-8 silty sand, bluish black (2.5GLEY, 2.5/5B) (5, 70, 25) nonplastic, subrounded, moist, no odor, weak cementation, high-med perm, well graded (Fill material)

(See boring log @ adjacent PZ-6 for remaining litho description)

TD = 15' bgs

well set @ 15' bgs

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SHMPZ005-A-S01A

B SHMPZ005-A-S02A

C

D

E

F

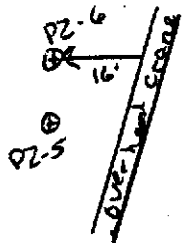
FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:



CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia SHM

JOB NUMBER: 00726

DRILLING CONTRACTOR: Gregg

RIG TYPE (CIRCLE ONE): HSA DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED:

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-6

SHEET 1 OF 2

DRILLING	
START	FINISH
TIME 0845	TIME 1030
DATE 01/16/02	DATE 01/16/02

WELL CONSTRUCTION	
START	FINISH
TIME 1045	TIME 1200
DATE 01/16/02	DATE 01/16/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	SOIL SAMPLING: INTERVAL SAMPLED	SOIL SAMPLING: RECOVERY	SOIL SAMPLING: ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INITIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
								0			0-2.5 Asphalt + road base material
											2.5-7 SM, Silty sand (15, 60, 25) (Fill material)
			18 22 25			A B			0 0	SM	bluish gray (2GLEY, 5/5B), no-low plasticity, dry, no odor, well graded
								5			
											7-11 ML Sandy silt (10, 30, 60), Brown (7.5YR, 5/4), no-low plasticity, dry, no odor, well graded (fill material)
						C			0	ML	
									0		
								10			11-20 CL, Clay (0, 15, 85) dark bluish gray (2GLEY, 3/1), med-high plasticity, med toughness, moist/wet, organic odor, soft consistency, high presence of organics
									0	CL	
									0		
								15			
									0		
									0		
Neat Cement Grout	2" SCH 40 PVC Blank							20			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SHMPZ006-A-S01

B SHMPZ006-B-S01

C SHMPZ006-A-S02

D

E

F

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia SHM

JOB NUMBER: 007216

DRILLING CONTRACTOR: Gregg

RIG TYPE (CIRCLE ONE): HSA DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-6

SHEET 2 OF 2

DRILLING	
START	FINISH
TIME 0845	TIME 1030
DATE 01/16/02	DATE 01/16/02
WELL CONSTRUCTION	
START	FINISH
TIME 1045	TIME 1200
DATE 01/16/02	DATE 01/16/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INITIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
Bentonite Chips	2" PVC Blank							20		CL	20-24 Same as above except increase in presence of organics and organic odor, wet
									0		
									0		24-32 ~~brown~~ Same as above except increase in presence of organics to 50%, moist-wet
								25			
									0		32-33 Same as above except decrease in presence of organics to ~25%, moist-wet
									0		
#3 SAND		0.020 Slotted 2" PVC	3 5					30	0		33-34.5 CL, clay (2.5GY 5/1) bluish gray, no organics present
			5 7						0		
			7 7						0		Total depth: 34.5' bgs
			4 6						0		
			0 0					35			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

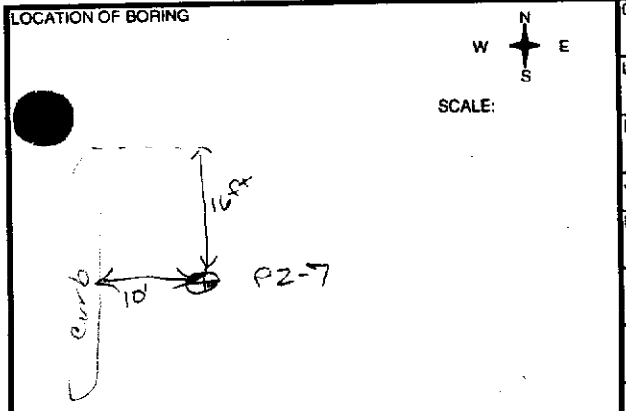
B _____ E _____

C _____ F _____

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	007246
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	(HSA) B-80 DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT SPOON (CC) ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	(PID) FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	(ASPHALT) CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-7

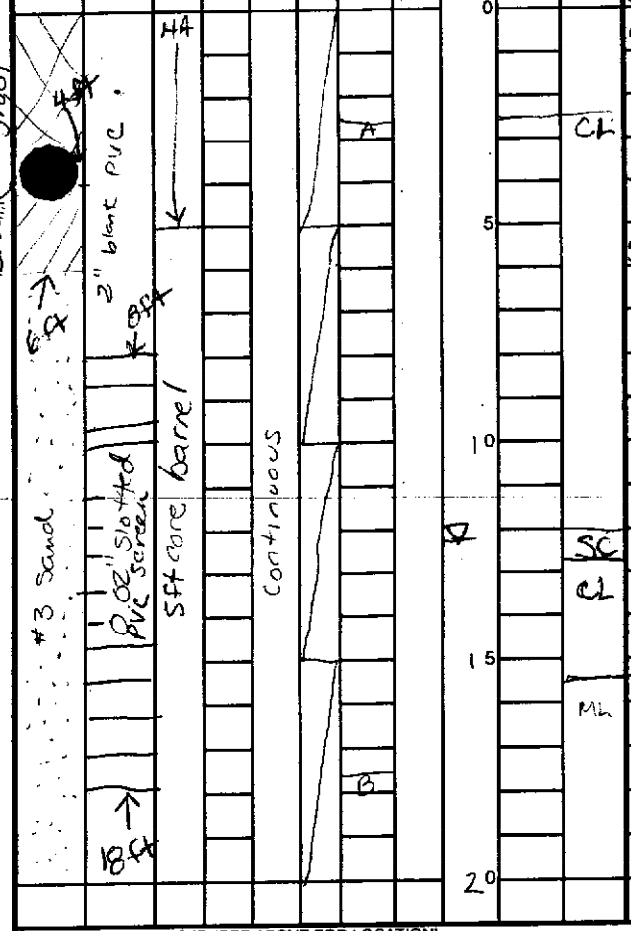
SHEET 1 OF 1

DRILLING	START	FINISH
TIME	1300	1415
DATE	1/18/02	1/18/02

WELL CONSTRUCTION	START	FINISH
TIME	1415	1630
DATE	1/18/02	1/18/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/t), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION



SAMPLE TYPE: INTERVAL: DESCRIPTION

0-2.5' Asphalt & road base

2.5-5' Lean Clay; dark yellowish brown (10YR 4/4) (5,5,90); low to medium plasticity; Medium stiff to soft; dry to moist

~4.0' color change to dark brown (7.5YR 3/2)

5.0-12' Lean clay with sand; dark yellowish brown (10YR 3/4); (5,15,80); low plasticity; Medium stiff to soft; slightly moist; subangular to subrounded fine sand grains.

12'-12.5' clayey sand w/ gravel; dark brown (10YR 3/3); (5,60,45); low plastic clay; (10,55,35) subangular to subrounded sand and gravel; medium dense; wet/saturated

12.5'-15.5' Lean clay; yellowish brown (10YR 5/6); (5,5,90); low plasticity; medium stiff to hard. wet.

15.5'-EOB Silt with fine sand (ML); yellowish brown (10YR 5/6); (0,10,90); non plastic fines; medium soft; wet

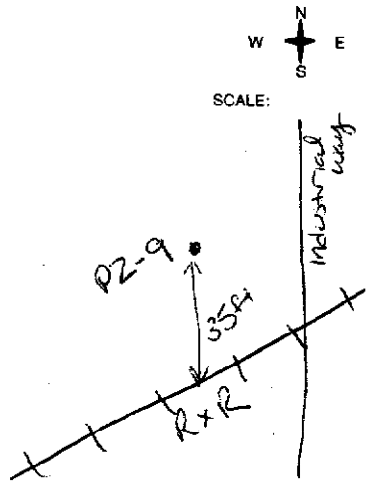
ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A	SHMPZ007-A-S01A	D	
B	SHMPZ007-A-S02A	E	
C		F	

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	007216
DRILLING CONTRACTOR	Greg
RIG TYPE (CIRCLE ONE)	X DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT SPOON X ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	X FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	X ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-9

SHEET 1 OF 1

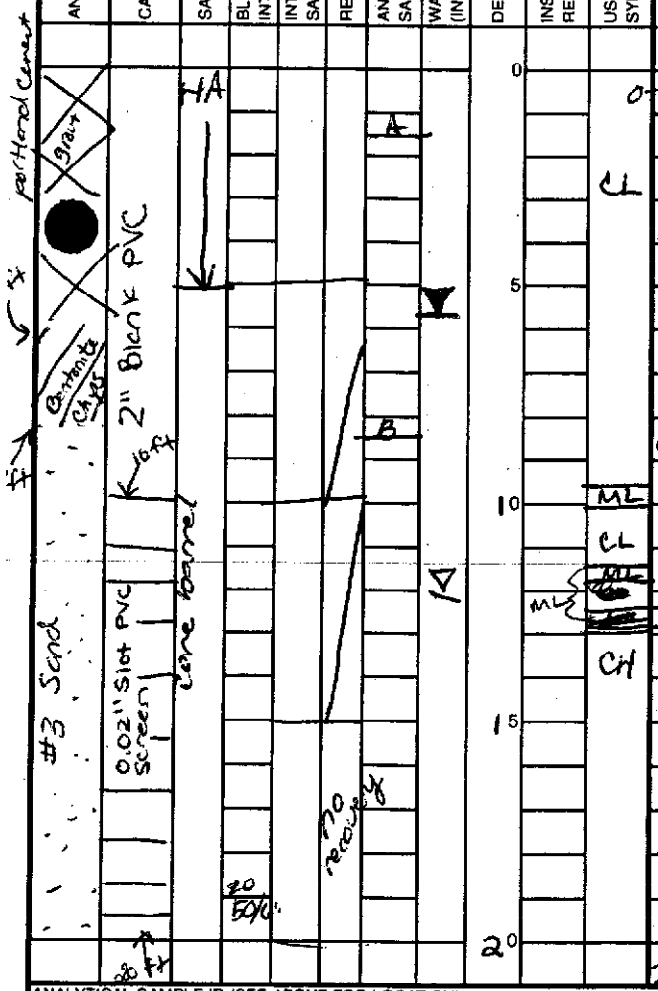
DRILLING	START	FINISH
TIME	1400	1455
DATE	1/24/02	1/24/02

WELL CONSTRUCTION	START	FINISH
TIME	1455	1645
DATE	1/24/02	1/24/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS, CASING — SOIL SAMPLING: SAMPLER USED, BLOWS/6" INTERVAL, INTERVAL SAMPLED, RECOVERY, ANALYTICAL SAMPLE (A,B,C) — WATER LEVEL (INITIAL/STATIC) — DEPTH (FEET) — INSTRUMENT READING (ppm) — USCS GROUP SYMBOL



SAMPLE TYPE: INTERVAL: DESCRIPTION

0-1' Asphalt & base

1.0-9.7' lean clay with sand; very dark grayish brown (10YR 3/2); (5,20,75); fine to coarse sand; low plasticity; medium soft; moist

~ 8.5-9 gravel content increases to 10% subangular to subrounded; fine to med. gravel

9.7'-10' Sandy silt; very dark grayish brown (10YR 3/2); (8,35,65); nonplastic fines; fine grain sand; med soft; moist to wet

10-11.5 lean clay; very dark grayish brown (10YR 3/2); (0,10,90); low plasticity; med soft; moist

11.5-12.5 Sandy silt with clay; dark grayish brown (2.5Y 4/2); nonplastic and low plastic fines; (0,35,65); fine grain sand; med soft; very moist; gradational contact

12.5-EOB fat clay; very dark gray (2.5Y N3); (0,10,90); med-high plasticity; med soft to stiff; moist; plant roots; organic order; sharp contact

20' End of Boring - ran split spoon 18.5-20 to see sample weathered sandstone; very hard.

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SNMPZ009-A-S01A

B SNMPZ009-A-S02A

C

D

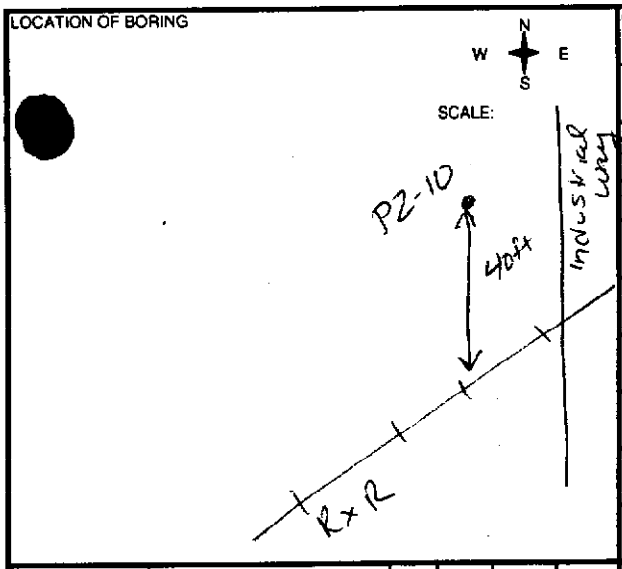
E

F

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	00726
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	~~HSA~~ DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT SPOON ~~SC~~ ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	~~ASPHALT~~ CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-10

SHEET 1 OF 2

DRILLING	START	FINISH
TIME	0855	1130
DATE	1/24/02	1/24/02

WELL CONSTRUCTION	START	FINISH
TIME	1130	1330
DATE	1/24/02	1/24/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
		HA						0			0-1 Asphalt and base
						A					1'-11' Clay; Very dark grayish brown (10YR 3/2); (5,5,90); low plasticity, medium soft; moist
						~~A~~					
								5	0	CL	~5' Size distribution changes to (10,10,80)
							▼				
						B					
								10	0	ML	11'-11.5' Sandy silt; very dark grayish brown (10YR 3/2); (0,40,60); non plastic fines; fine grained sand; medium soft; ~~to stiff~~ wet; sharp contact
							▽			CH	11.5'-20' Fat Clay; very dark grayish brown (10YR 3/2); (0,10,90); Mod plasticity; medium soft to stiff; moist; sharp contact
								15	0		~15' color change to black (10YR 2/1); plant roots; organic odor
								20			20'-21' ~~Clayey Sand Sandstone~~ Clayey Weathered bedrock ~~with clay~~; dark

Neat cement

2" PVC Blank

Continuous core barrel

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SHMPZ~~009~~ 010 RE-A-S01A

B SHMPZ 010-A-S02A

C

D

E

F

P:\Special\DACW05-97-D-0035A_E\Field Activities\boringlogform

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	00726
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	~~HSA~~ DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT ~~SPOON~~ ~~X~~ ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	~~ASPHALT~~ CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-10

SHEET 2 OF 2

DRILLING	
START	FINISH
TIME	TIME
DATE	DATE

WELL CONSTRUCTION	
START	FINISH
TIME	TIME
DATE	DATE

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	SOIL SAMPLING: INTERVAL SAMPLED	SOIL SAMPLING: RECOVERY	SOIL SAMPLING: ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
								20			olive brown (2.5Y 3/3); ~40% clay low plasticity; ~60% fine grained sand and weathered sandstone; severely weathered; very soft; gradational contact
	2" blank PVC casing	2" split spoon	50/6"						0		
			30 50/6"								
	24'		50/6"								
			50/4"					25			21'-24.5' weathered siltstone/claystone; dark grayish brown (2.5Y 4/2); severely weathered; very soft; gradational contact - wet when broken apart
			50/6"								
			50/5"								24.5'-26' weathered sandstone; yellowish brown (10YR 5/6); fine grained; severely to moderately weathery; soft to very soft; gradational contact
#3 Sand	0.02" Slot PVC		20 30 50/6"						0		
			20 30 50/6"					30			
	Screen		20 30 50 50/5"								26'-EOB weathered ~~siltstone~~/claystone; dark grayish brown (2.5Y 4/2); severely-mod weathered; moderately soft; gradational contact
	34'							35			34' End of boring
								0			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

B _____ E _____

C _____ F _____

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia- SHM

JOB NUMBER: 00726

DRILLING CONTRACTOR:

RIG TYPE (CIRCLE ONE): HSA (X) DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED:

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON (X) CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID (X) FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT (X) CONCRETE DIRT DRY (X) WET OTHER

BORING NUMBER: PZ-11

SHEET 1 OF 1

DRILLING	
START	FINISH
TIME 0900	TIME 1015
DATE 01/18/02	DATE 01/18/02

WELL CONSTRUCTION	
START	FINISH
TIME 1045	TIME 1245
DATE 01/18/02	DATE 01/18/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS, CASING

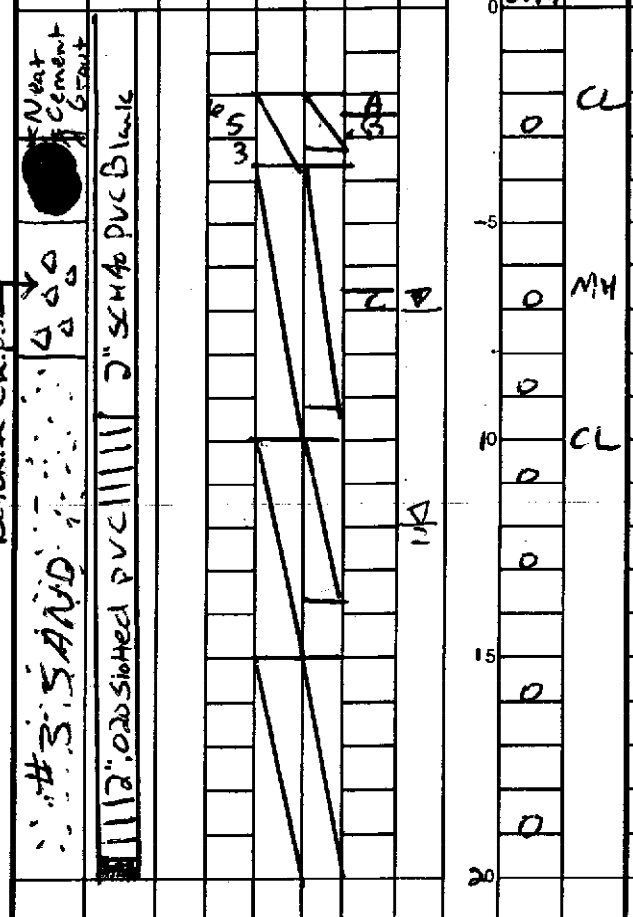
SOIL SAMPLING: SAMPLER USED, BLOWS/6" INTERVAL, INTERVAL SAMPLED, RECOVERY, ANALYTICAL SAMPLE (A,B,C)

WATER LEVEL (INTIAL/STATIC)

DEPTH (FEET)

INSTRUMENT READING (ppm)

USCS GROUP SYMBOL



SAMPLE TYPE: INTERVAL: DESCRIPTION

0-2 Asphalt + road base material

CL 2-6.5 CL, Silty clay, (5, 15, 80), dark yellowish brown (10YR, 3/4), med plasticity, low toughness, dry, no odor, well graded (fill material)

MH 6.5-10, MH, Silt, (15, 10, 75) light yellowish brown (10YR, 6/4) nonplastic, dry, no odor, Siltstone present Fissured + Subangular

CL 10-15 CL, Clay, (0, 10, 90), dark bluish gray (2.5GLEY, 3/10B), med plasticity, low-med toughness, dry (moist-wet @ 12'), slight organic odor, Soft, few organics present (moist-wet from 12'-13' bgs then moist 13-) (bay mud)

15-17 Same as above except increase in presence of organics to ~25%-50%.

17-20 Same as 10-15

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SHMPZ011-A-S01A

B SHMPZ011-B-S01A

C SHMPZ011-A-S02A

D

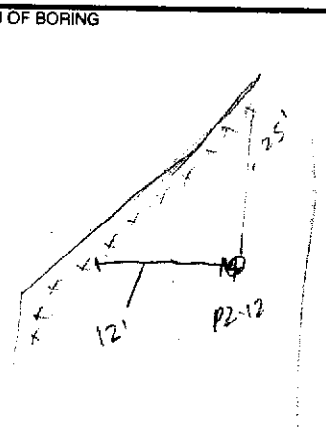
E

F

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SWM
JOB NUMBER	007216
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	HSA B-80 DP OTHER MUD ARCH NONE
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT SPOON CC ACETATE OTHER NONE
MONITORING INSTRUMENT (CIRCLE ONE)	PID FID LEL OTHER RAD NONE
SURFACE CONDITIONS (CIRCLE ONE)	ASPHALT CONCRETE DIRT OTHER DRY WET

BORING NUMBER: PZ-12

SHEET 1 OF 1

DRILLING	
START	FINISH
TIME 0845	TIME 1015
DATE 1/18/02	DATE 1/18/02

WELL CONSTRUCTION	
START	FINISH
TIME 1020	TIME 1215
DATE 1/18/02	DATE 1/18/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/l), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INITIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
		HA						0			0-2.5' Asphalt and road base
										CL	2.5'-8.5' Lean clay; dark olive brown (2.5Y 3/3); (0,5,95); low-med plasticity; soft; dry to moist; trace angular pebbles up to 1" diameter
						B			0		
								5			~5.0' color change to very dark brown (10YR 2/2) mottled with yellowish brown (10YR 5/6)
									0		
											8.5'-9.0' Sandy clay (CL); brown-dark brown (10YR 4/3) (5,40,55); low-med plasticity; soft; moist
									0	CL	
						A		10		SM	9.0'-11' Silty Sand (SM) dark yellowish brown (10YR 3/4); (5,70,25); well graded-subangular grains; loose to medium dense; wet/saturated
										SW/SM	
									0		11'-12' Well graded sand with silt dark yellowish brown (10YR 3/4); (5,85,10); angular to subrounded; loose-med dense; wet/saturated
								15		SP	12'-EOB Poorly graded sand dark yellowish brown (10YR 3/4); (5,95,5); subangular to subrounded; loose-med dense; wet/saturated
									0		
								20			19' End of Boring

Bentonite; Portland Grout; 2" PVC Blank; 3ft; 4ft; 3/4 Bags; #3 Sand; 0.02" PVC Slotted; 5' foot core barrel Sampler; 15ft; Bentonite; 16ft

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SHMPZ012-A-S01A

B SHMPZ012-A-S02A

C

SUBMITTED TO EAB on 1/25/02

NOTE: All SAMPLE IDs AS MARKED ON THIS LOG AS SHOWN: SHMPZ012-A-S01A @ 2.5-3', SHMPZ012-A-S02A @ 9-9.5

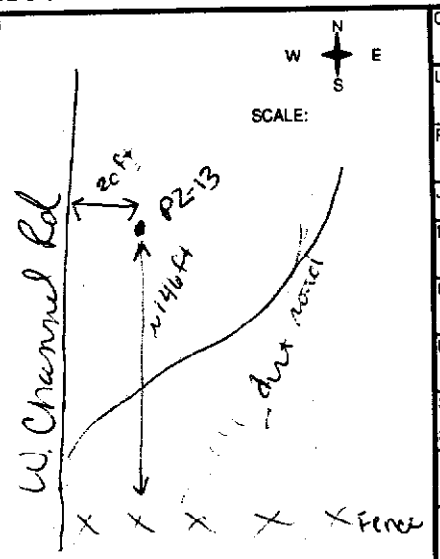
2/21/02

P:\Special\DACW05-97-D-0035A_E\Field Activities\boringlogform

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	007216
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	OTHER ____ HSA B-61 DP MUD ARCH NONE
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	OTHER ____ SPLIT SPOON CC ACETATE NONE
MONITORING INSTRUMENT (CIRCLE ONE)	OTHER ____ PID FID LEL RAD NONE
SURFACE CONDITIONS (CIRCLE ONE)	OTHER ____ ASPHALT CONCRETE DIRT DRY WET

BORING NUMBER: PZ-13

SHEET 1 OF 1

DRILLING	
START	FINISH
TIME 1125	TIME 1220
DATE 1/21/02	DATE 1/21/02
WELL CONSTRUCTION	
START	FINISH
TIME 1220	TIME 1350
DATE 1/21/02	DATE 1/21/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
								0			
		HA								CL	0-3.5' Clay (CL) dark yellowish brown (10YR 4/4); (10,10,80); subangular to subrounded sand + gravel; low plasticity; medium soft; dry to moist; plant roots
									0		
								5			3.5'-5' Clay with trace diagenite; hard; dark gray (2.5 Y 4/1) to dark olive brown (2.5Y 3/2); (30,20,50) angular to subrounded shale fragments; low plasticity; hard; moist
									0		
								10	0	CL	5.0'-10' Sandy clay dark grayish brown (2.5Y 4/2); (10,30,60) fine to coarse sand; subrounded to subangular; trace angular to subangular gravel; low plasticity; medium hard; moist
											10'-BOH Clay dark olive brown (2.5 Y 3/3); (0,5,95); low plasticity; medium hard; moist
								15	0		
											20' BOH
								20			

Bentonite chips 85ft; 2" PVC Blank 10ft; #3 Sand; 30ft

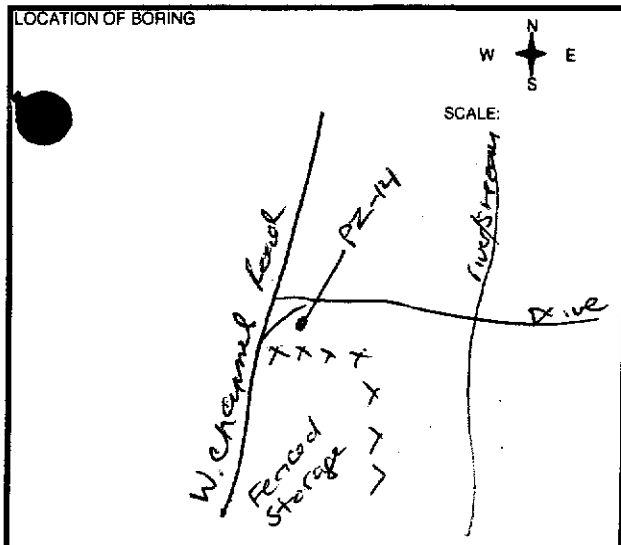
ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A ____ B ____ C ____ D ____ E ____ F ____

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHW
JOB NUMBER	007266
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	~~HSA~~ DP MUD ARCH NONE — OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	~~SPLIT SPOON~~ CC ACETATE NONE — OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE — OTHER
SURFACE CONDITIONS (CIRCLE ONE)	~~ASPHALT~~ CONCRETE DIRT DRY WET — OTHER

BORING NUMBER: PZ-14

SHEET 1 OF 2

DRILLING	START	FINISH
TIME	1410	1635
DATE	01/21/02	1/21/02

WELL CONSTRUCTION	START	FINISH
TIME	1535	1700
DATE	1/22/02	1/22/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL
		HA						0		
										CL
								5		
	2" PVC Blank Casing	continuous core barrel					▼			
								10		
										CL
	15.5 ft							15		
							▽			
								20		

SAMPLE TYPE: INTERVAL: DESCRIPTION

0-2.0 Asphalt + road base

2.0-5.0 Sandy clay with gravel; dark brown (10YR 3/3); (15,35,50); fine to coarse sand subangular to subrounded sand & gravel; fine gravel; low plastic fines; medium soft; moist;

~2.5 ft large cobble

5.0'-22.5' Lean clay; dark olive gray (5Y 3/2); (5,10,85); low plasticity; medium soft to hard; moist

~8.5' lense of sandy clay fine sand; low plastic fines

~9.0 Color change to dark olive brown (2.5Y 3/3)

~10.0 becoming (0,5,95)

~20' ground water slowly rising about 1" 0/2 min.; Sandstone cobble; wet; subangular to subrounded.

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

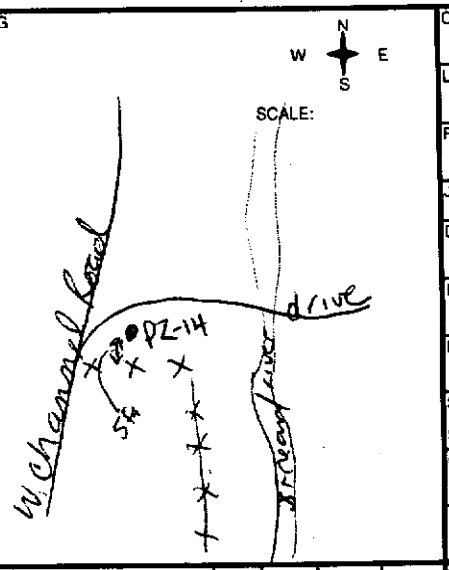
B _____ E _____

C _____ F _____

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	00726
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	~~RSA~~ DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT ~~SPOON~~ ~~CC~~ ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	~~ASPHALT~~ CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-14

SHEET 2 OF 2

DRILLING	START	FINISH
TIME	1410	1635
DATE	1/21/02	1/21/02

WELL CONSTRUCTION	START	FINISH
TIME	1535	1700
DATE	1/22/02	1/22/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	SOIL SAMPLING: INTERVAL SAMPLED	SOIL SAMPLING: RECOVERY	SOIL SAMPLING: ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
								20			~22' Sandstone, cobbles increasing
	0.02" Slot screen		50/6"							SP	22'-23.5 Poorly graded sand with rock frag. Olive (5Y 4/3) (5,90,5); fine grained sand; very dense; w Sandstone rock fragments up to 1" diameter;
			100/6"							Bedrock	
	↑ 25.5ft							25			23.5' ~~EOB~~ Sandstone cobbles with clay and sand; olive (5Y 4/3); subangular to subrounded gravel size particles; hard; maximum size about 1 inch; wet; no reaction with HCl.
								30			~25' some shale fragments; lost split spoon in hole; very hard.
											25.5 EOB End of boring
								35			
								40			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

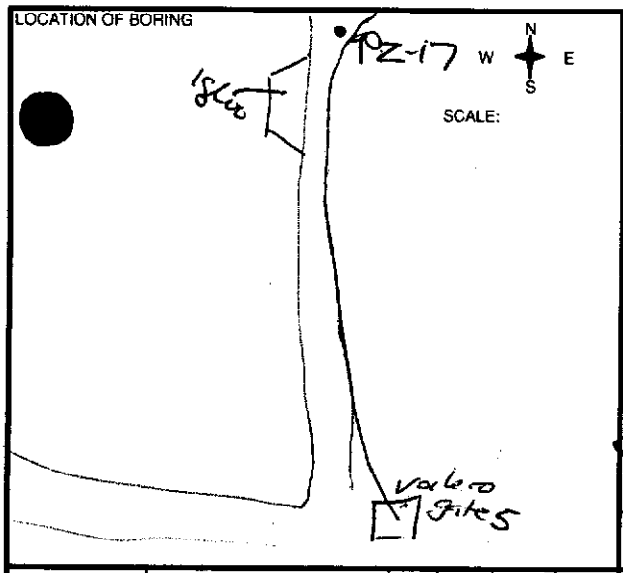
B _____ E _____

C _____ F _____

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	007216
DRILLING CONTRACTOR	Groggy
RIG TYPE (CIRCLE ONE)	~~N/A~~ DP MUD ARCH NONE — OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	~~SPLIT SPOON~~ ACETATE NONE — OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE — OTHER
SURFACE CONDITIONS (CIRCLE ONE)	~~ASPHALT~~ CONCRETE DIRT DRY WET — OTHER

BORING NUMBER: PZ-17

SHEET 1 OF 2

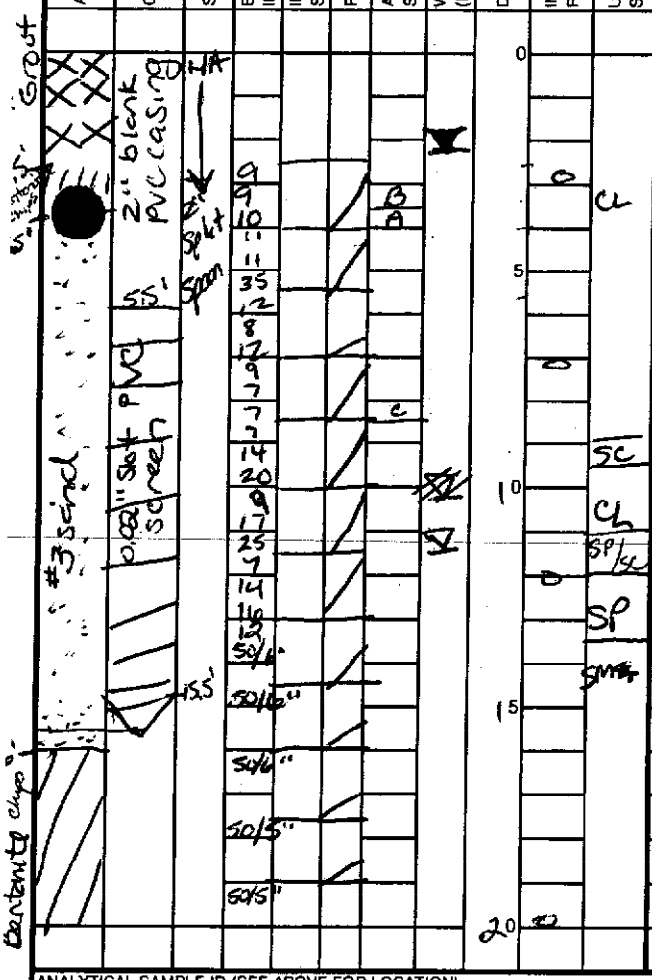
DRILLING	START	FINISH
TIME	0930	1240
DATE	1/23/02	1/23/02

WELL CONSTRUCTION	START	FINISH
TIME	1240	1520
DATE	1/23/02	1/23/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS, CASING — SOIL SAMPLING: SAMPLER USED, BLOWS/6" INTERVAL, INTERVAL SAMPLED, RECOVERY, ANALYTICAL SAMPLE (A,B,C) — WATER LEVEL (INITIAL/STATIC) — DEPTH (FEET) — INSTRUMENT READING (ppm) — USCS GROUP SYMBOL



SAMPLE TYPE: INTERVAL: DESCRIPTION

0-3.0 Asphalt and base rock

3.0'-9.0' Clay with Sand; dark grayish brown (10YR 4/2); (5,20,75); low plasticity; fine to coarse sand grains; stiff; moist

~5.0' cobble size shale fragment up to 1" diameter

~6.0' several cobble size shale fragments up to 1.5" diameter

~8.0' color change to very dark gray (2.5YN3); sandstone rounded cobbles - up to 1.5-2" diameter fine grain sand ~~Gradational contact~~

9.0'-9.5' Clayey Sand; dark yellowish brown (10YR 3/4); (0,25,75); low plastic fines; fine grained sand; ~~moist~~ loose to med dense; moist

9.5'-11' Clay with sand; dark yellowish brown (10YR 3/4); (0,15,85); low plasticity; very stiff; moist; fine grained sand; gwa roses rapidly; gradational contact

11'-12' ~~Sand~~ Poorly graded sand with clay; Dark yellowish brown (10YR 4/4); (0,20,80); low plastic fines; fine grain sand; med dense; starting to cement; ~~moist~~ saturated; gradational contact

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A	SHMPZ017-A-S01A	D	
B	SHMPZ017-B-S01A	E	
C	SHMPZ017-A-S02A	F	

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	00726
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	~~HSA~~ DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT ~~SPOON~~ CC ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	ASP~~HALT~~ CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-17

SHEET 2 OF 2

DRILLING	START	FINISH
TIME	0930	1240
DATE	1/23/02	1/23/02

WELL CONSTRUCTION	START	FINISH
TIME	1240	1520
DATE	1/23/02	1/23/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	SOIL SAMPLING: INTERVAL SAMPLED	SOIL SAMPLING: RECOVERY	SOIL SAMPLING: ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
Bentonite chips		2" Split Spoon	5/6"					20		SM	~~~12.0' Clay content decreases~~
	23 ft		50/1"								12'-13.5 Poorly graded sand; Dark brown (10YR 3/3); (0, 100, 0); fine grained sand; loose-med
			50/3"								~~13~~ dense; wet silty sand with clay
								25			13.5'-20.5 ~~[illegible]~~ ~~SM~~; very dark gray (2.5Y/N3); (0.75, 25); nonplastic fines; ~20% low plastic fines; very dense ~~hard~~; beginning cement; wet; fine grained sand poorly graded; sharp contact
1/2 ft cave in natural fill											~~~20.5 Clay content decreases~~
								30			20.5-~~[illegible]~~ 20.5 Silty sand very dark ~~Dark~~ gray (2.5Y/N3); (0, 75, 25); nonplastic fines; fine grain sand; ~~wet~~ very dense; moist to wet; some cementation, breaks up easily; gradational contact
											~22' Some Bedrock fragments ~~Sandstone~~; dark gray (2.5Y/N4) some calcs veins, HCl effervescent; very hard
								35			
											23.5' ~~Bott~~ End of boring; auger refusal.
								40			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

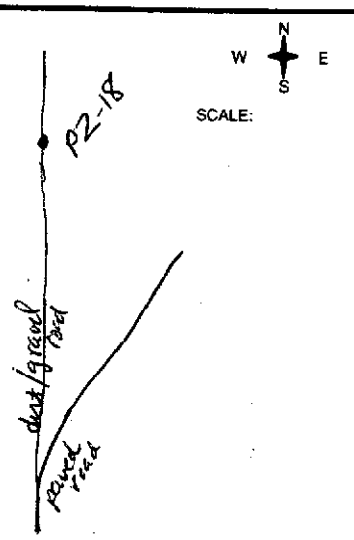
B _____ E _____

C _____ F _____

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	007266
DRILLING CONTRACTOR	Greggs
RIG TYPE (CIRCLE ONE)	HSA DP MUD ARCH NONE OTHER
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT SPOON CC ACETATE NONE OTHER
MONITORING INSTRUMENT (CIRCLE ONE)	PID FID LEL RAD NONE OTHER
SURFACE CONDITIONS (CIRCLE ONE)	ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-18

SHEET 1 OF 1

DRILLING	START	FINISH
TIME	0910	1000
DATE	1/21/02	1/21/02

WELL CONSTRUCTION	START	FINISH
TIME	1000	1100
DATE	1/21/02	1/21/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SOIL SAMPLING: SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
Portland cement grout								0		Fill	0-5 Gravel road - road base becoming more sandy, less gravel at 3-5 ft
		Hand Auger									
									0		5-6 sandy clay; dark yellowish brown 10YR 3/6); (10, 45, 55); subrounded to subangular sand & gravel; low plasticity; medium soft to soft; moist
2ft	2" Blank PVC							5		CL	
Bentonite chips											6'-Bot clay; dark olive brown (2.5Y 3/3); (5, 10, 85); low plasticity; medium soft; moist
8ft	10ft	continuous core barrel						10	0		
							▼				10-11 ft color change to olive brown (2.5Y 4/4)
#3 sand	0.02" Slot PVC screen						▽	15	0		~15' clay becomes blocky/sticky wet/saturated
	20ft							20	0		20' End of boring

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

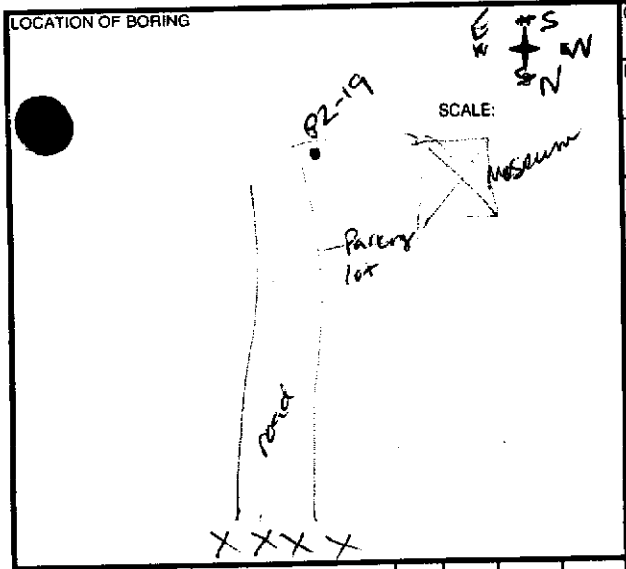
B _____ E _____

C _____ F _____

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT	USACE
LOCATION	Benicia, CA
PROJECT NAME	Benicia SHM
JOB NUMBER	007212
DRILLING CONTRACTOR	Gregg
RIG TYPE (CIRCLE ONE)	~~HSA~~ DP MUD ARCH NONE — OTHER ____
DRILLING METHOD, FLUID USED	
SOIL SAMPLING METHOD (CIRCLE ONE)	SPLIT SPOON ~~DC~~ ACETATE NONE — OTHER ____
MONITORING INSTRUMENT (CIRCLE ONE)	~~PID~~ FID LEL RAD NONE — OTHER ____
SURFACE CONDITIONS (CIRCLE ONE)	~~ASPHALT~~ CONCRETE DIRT DRY WET — OTHER ____

BORING NUMBER: PZ-19

SHEET 1 OF 2

DRILLING	START	FINISH
TIME	0910	1200
DATE	1/22/02	1/22/02

WELL CONSTRUCTION	START	FINISH
TIME	1200	1500
DATE	1/22/02	1/22/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/l), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	CASING	SAMPLER USED	BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
								0			0.0-4 Asphalt and road base -
		HA									
										(Fill) CL	4-6' Gravelly clay with sand; Dark yellowish brown (10YR 4/4); (25, 15, 60); low plasticity; stiff moist. (Fill)
		2" split spoon	12 16 12		∅	A		5	0		pushed split spoon back to get sample
		continuous core barrel				B				CL (Fill)	6-10' Lean Clay with sand; dark olive brown (2.5Y 3/3); (0, 15, 85); low plasticity; fine to med sand grains; ~~moist~~ very stiff; moist (Fill)
								10	0		
	PVC	2" split spoon	50/4"							weathered bedrock	10'-11.5' Lean Clay with shale fragments; yellowish brown (10YR 5/6); ~40% shale fragments, 60% lean clay; low plasticity; ~~dry~~ very stiff; dry to slightly moist (Fill)
			50/6"								
			50/4"					15			11.5' Weathered bedrock - shale/claystone; light olive gray (5Y 6/2), very hard; dry; no reaction with HCl; gradational contact
			50/5"				▼				218.5' very small pore space with water color change to dark gray (5Y 4/1)
Bentonite chips			25 50/6"								
			50/5"					20			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A	SHMPZ019-A-S01A	D	
B	SHMPZ019-A-S02A	E	
C		F	

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia SWM

JOB NUMBER: 00726

DRILLING CONTRACTOR: Gregg

RIG TYPE (CIRCLE ONE): HSA DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-19

SHEET 2 OF 2

DRILLING	START	FINISH
TIME	0910	1200
DATE	1/22/02	1/22/02

WELL CONSTRUCTION	START	FINISH
TIME	1200	1500
DATE	1/22/02	1/22/02

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL
		2" split spoon	45 45 50 40 50			45 45 50 40 50		20	0	weathered bedrock
	3 sand		14 28 35 30 42 45 30			14 28 35 30 42 45 30		25		
2"-0.02" slot PVC screen			50/4" 50/3"			50/4" 50/3"			0	
	31 ft		50/5"			50/5"		30		
30.5 ft	Bentonite 2 bags		50/5"			50/5"				
			50/5"			50/5"				
								35		
								0		

SAMPLE TYPE: INTERVAL: DESCRIPTION

~21.5'-22' small clay layer low plasticity, very hard, moist

23.5'- Clayey, weathered bedrock, dark grayish brown (10YR 4/2); ~60% clay ~40% weathered bedrock, ~~moist~~ low plasticity; very stiff; moist; gradational contact

~~~25-26.5 sample~~

Sample wet at 26-26.5

~28' color change to very dark gray (2.5YN3) dry

35' End of Boring

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

B _____ E _____

C _____ F _____

P:\Special\DACW05-97-D-0035A_E\Field Activities\boringlogform
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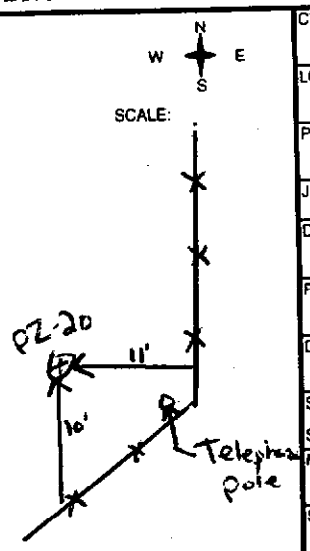
FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING



CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: 00726

JOB NUMBER: Benicia - SHM

DRILLING CONTRACTOR: Gregg

RIG TYPE (CIRCLE ONE): HSA DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-20

SHEET 1 OF 2

DRILLING	
START	FINISH
TIME 1300	TIME 1620
DATE 01/17/02	DATE 01/17/02

WELL CONSTRUCTION	
START	FINISH
TIME 1625	TIME
DATE 01/17/02	DATE

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS, CASING — Neat Cement Grout; 2" SCH 80 PVC Blank; Bentonite Chips

SOIL SAMPLING: SAMPLER USED, BLOWS/6" INTERVAL, INTERVAL SAMPLED, RECOVERY, ANALYTICAL SAMPLE (A,B,C)

WATER LEVEL (INTIAL/STATIC)

DEPTH (FEET): 0, 5, 10, 15, 20

INSTRUMENT READING (ppm): 0, 0, 0, 0, 0, 0

USCS GROUP SYMBOL: ML, CL, MH, MH

SAMPLE TYPE: INTERVAL: DESCRIPTION

0-1.5' Asphalt + road base material

1.5-2.5 ML Sandy silt w/ gravel (10,35,55), pale brown (10YR, 6/3), nonplastic, dry, no odor, soft, well graded (Fill material)

2.5-9 CL, silty clay (5,25,70), dark brown (7.5YR, 3/2), low-med plasticity, high toughness, dry, Firm consistency, low perm

9-15 MH, silt, pale brown (10YR, 6/3), nonplastic, dry, no odor, Stratified, hard, low perm

15-18 MH, silt w/ gravel, same color as above, (25,10,65), non-plastic, dry, no odor, fissured, hard, low-med perm.; moist for 2" @ 18', then dry

~~18 Same as above except moist~~

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A SHMPZ020-A-S01A

B SHMPZ020-A-S02A

C

D

E

F

FORSGREN ASSOCIATES/BROWN AND CALDWELL

BOREHOLE/WELL LOG

LOCATION OF BORING

N W E S

SCALE:

CLIENT: USACE

LOCATION: Benicia, CA

PROJECT NAME: Benicia SHM

JOB NUMBER: 00726

DRILLING CONTRACTOR: Gregg

RIG TYPE (CIRCLE ONE): HSA DP MUD ARCH NONE OTHER

DRILLING METHOD, FLUID USED

SOIL SAMPLING METHOD (CIRCLE ONE): SPLIT SPOON CC ACETATE NONE OTHER

MONITORING INSTRUMENT (CIRCLE ONE): PID FID LEL RAD NONE OTHER

SURFACE CONDITIONS (CIRCLE ONE): ASPHALT CONCRETE DIRT DRY WET OTHER

BORING NUMBER: PZ-20

SHEET 2 OF 2

DRILLING	
START	FINISH
TIME 1300	TIME 1620
DATE 01/17/02	DATE 01/17/02

WELL CONSTRUCTION	
START	FINISH
TIME 1625	TIME
DATE 01/17/02	DATE

FINE GRAINED AND ORGANIC SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, SIZE DISTRIBUTION, PLASTICITY, DRY STRENGTH, DILATANCY, TOUGHNESS, MOISTURE, ODOR, STRUCTURE, CONSISTENCY, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, CONTACT DESCRIPTION

COARSE GRAINED SOIL DESCRIPTION: GROUP NAME, MUNSELL COLOR, COLOR, GRADATION (g/s/f), SIZE DISTRIBUTION, PLASTICITY, SHAPE, ANGULARITY, MOISTURE, ODOR, STRUCTURE, CEMENTATION, RELATIVE PERMEABILITY, LOCAL GEOLOGIC NAME, MINERALOGY, CONTACT DESCRIPTION

WELL CONSTRUCTION: ANNULUS	WELL CONSTRUCTION: CASING	SAMPLER USED	SOIL SAMPLING: BLOWS/6" INTERVAL	INTERVAL SAMPLED	RECOVERY	ANALYTICAL SAMPLE (A,B,C)	WATER LEVEL (INTIAL/STATIC)	DEPTH (FEET)	INSTRUMENT READING (ppm)	USCS GROUP SYMBOL	SAMPLE TYPE: INTERVAL: DESCRIPTION
	SCH 80							20		MH	19-23 MH, Silt w/ gravel (20, 0, 80), nonplastic, dry, no odor, homogeneous, hard, low perm, gravel is angular/subangular (silt stone); same color as above
#3 SAND	2" PVC Blank		50						0		
			30								
			50						0		
			50						0		23-24 Same as 15-19' bgs
			50					25	0		
			50				▽		0		24-26 MH Silt w/ gravel (same as 19-23 except color change to 5 bluish gray (2 GLEY, 4/5B)) moist lense @ 25.5-26' ~ 3" thick
	1.020 Slotted 2" PVC		50						0		
			50					30	0		26-29 Same as 19-23 moist-wet @ 28.5' bgs
			50						0		
			50						0		29-34.5 Same as 24-26 except moist-wet
								35			
								0			

ANALYTICAL SAMPLE ID (SEE ABOVE FOR LOCATION)

A _____ D _____

B _____ E _____

C _____ F _____

APPENDIX B

CHAIN-OF-CUSTODY DOCUMENTATION

FA/BC
FORSGREN ASSOCIATES/BROWN AND CALDWELL
A JOINT VENTURE
2701 PROSPECT PARK DRIVE • RANCHO CORDOVA, CA 95670
916-444-0123 • FAX 916-635-8805

CHAIN OF CUSTODY RECORD

COC No. BEO[illegible]H1

G5

02A083

1003

PROJECT NAME: Benicia SHM

PROJECT NUMBER: 00726-005

LABORATORY NAME & ADDRESS: EMAX Laboratories
1835 205th Street
Torrance, CA 90501

✓ 01	SHMPZ001-A-S01A	01/14/02	1145	BZ	1	2"x6"	Gld	S	6010B 7060A 7471A 7740 7841 CATIONS*	N	M	20 days	SS	3 / 3.5	Ø
✓ 02	SHMPZ001-A-S02A		1215		1				6010B 7060A 7471A 7740 7841 CATIONS*					7.5 / 8	Ø
✓ 03	SHMPZ001-B-S02A		1215		1				6010B 7060A 7471A 7740 7841 CATIONS*					8 / 8.5	Ø
✓ 04	SHMPZ003-A-S01A		1435		1				6010B 7060A 7471A 7740 7841 CATIONS*					2 / 2.5	Ø
✓ 05	SHMPZ003-A-S02A		1500		1				6010B 7060A 7471A 7740 7841 CATIONS*					8 / 8.5	Ø
✓ 06	SHMPZ006-A-S01A	01/16/02	0900		1				6010B 7060A 7471A 7740 7841 CATIONS*					2.5 / 3	Ø
✓ 07	SHMPZ006-B-S01A		0900		1				6010B 7060A 7471A 7740 7841 CATIONS*					3 / 3.5	Ø
✓ 08	SHMPZ006-A-S02A		0915		1				6010B 7060A 7471A 7740 7841 CATIONS*					7 / 7.5	Ø
✓ 09	SHMPZ005-A-S01A		1235		1				6010B 7060A 7471A 7740 7841 CATIONS*					3 / 3.5	Ø
✓ 10	SHMPZ005-A-S02A		1300		1				6010B 7060A 7471A 7740 7841 CATIONS*					6.5 / 7	Ø

COLLECTED & RELEASED BY: Brad Ziegler BZ	DATE 01/17/02	TIME 19:00	COOLER I.D.: A	Qc'd by WVL 1/18/02	1330
RECEIVED BY: [signature]	DATE 1/17/02	TIME 19:00	RELINQUISHED BY: [signature]	DATE 1/18/02	TIME 13:40
SITNIKOV	1.19.02	8:30			
RECORD RETURNED BY:	DATE / /	TIME :			
COURIER: GSA			SHIPPING NUMBER: 9919131110		

COMMENTS (see note on back):
* Ca, Mg, Na, K

LEVEL IV DATA PACKAGE REQUIRED

DISTRIBUTION: WHITE - PROJECT FILE • CANARY - LAB RECEIPT • PINK - DATA MANAGEMENT • [illegible]NROD - FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

T = 3.4°C

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CHAIN OF CUSTODY RECORD

COC No. BE00142

G5 02A083

PROJECT NAME: Benicia SHM
PROJECT NUMBER: 00726.005

LABORATORY NAME & ADDRESS: EMAX Laboratories
1835 205th Street
Torrance, CA 90501

1004

✓ 11	SHMPZ002-A-S01A	01/16/02	1515	BZ	1	2"x6"	Cold	S	6010B 7060A 7471A 7740 7841 CATIONS*	N		20 days	SS	2 / 2.5	Ø
✓ 12	SHMPZ002-A-S02A	01/16/02	1535	↓	1	↓	↓	↓	6010B 7060A 7471A 7740 7841 CATIONS*	↓		↓	↓	8 / 8.5	Ø
✓ 13	SHMPZ004-A-S01A	01/17/02	0950	↓	1	↓	↓	↓	6010B 7060A 7471A 7740 7841 CATIONS*	↓		↓	↓	2 / 2.5	Ø
✓ 14	SHMPZ004-A-S02A	↓	1010	↓	1	↓	↓	↓	6010B 7060A 7471A 7740 7841 CATIONS*	↓		↓	↓	6 / 6.5	Ø
✓ 15	SHMPZ020-A-S01A	↓	1315	↓	1	↓	↓	↓	6010B 7060A 7471A 7740 7841 CATIONS*	↓		↓	↓	1.5 / 2	Ø
✓ 16	SHMPZ020-A-S02A	↓	1345	↓	1	↓	↓	↓	6010B 7060A 7471A 7740 7841 CATIONS*	↓		↓	↓	5 / 5.5	Ø
07														----	
08														----	
09														----	
10														----	

B 01/17/02

Qc'd by WJL 1/18/02 1330

COLLECTED & RELEASED BY: Brad Ziegler BZ	DATE 01/17/02	TIME 19:00	COOLER I.D.: A			COMMENTS (see note on back):
RECEIVED BY: [signature]	DATE 1/17/02	TIME 19:00	RELINQUISHED BY: [signature]	DATE 1/18/02	TIME 13:40	* Ca, Mg, Na, K
SITVIROV	1.19.02	8:30				
						LEVEL IV DATA
						PACKAGE REQUIRED
RECORD RETURNED BY:	DATE / /	TIME :				
COURIER: GSA			SHIPPING NUMBER: 9919131110			* TEMP BLANK INCLUDED *

DISTRIBUTION: WHITE - PROJECT FILE • CANARY - LAB RECEIPT • PINK - DATA MANAGEMENT • GOLDENROD - [illegible]

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

T=3.4°C

FA/BC

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CHAIN OF CUSTODY RECORD

COC No. BE[redacted]13

02A152 65

PROJECT NAME: Benicia-SHM
PROJECT NUMBER: 00726.005

LABORATORY NAME & ADDRESS: EMAX Laboratories
1835 205th Street
Torrance, CA 90501

01	SHMPZ011-A-S01A	01/18/02	0940	BZ	1	2"x6" SS Sleeve	cold	S	6010B 7060A 7471A 7740 7841			20days	SS	2.0 2.5	Ø
02	SHMPZ011-B-S01A	↓	0940	BZ	1	↓	↓	↓	6010B 7060A 7471A 7740 7841			↓	↓	2.5 3	Ø
03	SHMPZ011-A-S02A	↓	1000	BZ	1	↓	↓	↓	6010B 7060A 7471A 7740 7841			↓	↓	6.5 7	Ø
04	SHMPZ019-A-S01A	1/22/02	0930	RG	1	↓	↓	↓	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B			↓	↓	5.0 5.5	Ø
05	SHMPZ019-A-S02A	↓	0950	RG	1	↓	↓	↓	6010B/3050B, 7060A/3050B, 7471A 7740/3050B, 7841/3050B			↓	↓	8.0 8.5	Ø
06	SHMPZ017-A-S01A	1/23/02	0950	RG	1	↓	↓	↓	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B			↓	↓	3.0 3.5	Ø
07	SHMPZ017-A-S02A	↓	1020	RG	1	↓	↓	↓	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B			↓	↓	8.0 8.5	Ø
08	SHMPZ017-B-S01A	↓	0950	RG	1	↓	↓	↓	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B			↓	↓	3.5 4.0	Ø
09	SHMPZ010-A-S01A	1/24/02	0930	RG	1	↓	↓	↓	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B			↓	↓	1.0 1.5	Ø
10	SHMPZ010-A-S02A	↓	1000	RG	1	↓	↓	↓	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B			↓	↓	8.0 8.5	Ø

COLLECTED & RELEASED BY: Rachel Gilley	DATE 1/25/02	TIME 15:30	COOLER I.D.: A			COMMENTS (see note on back): T = 4.3°C
RECEIVED BY: [signature]	DATE 1/26/02	TIME 11:00	RELINQUISHED BY:	DATE / /	TIME :	
RECORD RETURNED BY:	DATE / /	TIME :				
COURIER:			SHIPPING NUMBER:			

1002

DISTRIBUTION: WHITE – PROJECT FILE • CANARY – LAB RECEIPT • PINK – DATA MANAGEMENT • [illegible]NROD – FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

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CHAIN OF CUSTODY RECORD

COC No. BE 00144

02A152 GJ

PROJECT NAME: Benicia SHM
PROJECT NUMBER: 00726.005

LABORATORY NAME & ADDRESS: EMax Lab
1835 205th St
Torrance, CA 70501

			COLLECTION DATE	COLLECTION TIME	SAMPLE TYPE	CONTAINERS	SAMPLE MATRIX	PRESERVATIVE	ANALYSES REQUESTED	FILTERED	PO#	TURNAROUND TIME	DEPTH (FT) BEGIN	DEPTH (FT) END	QC TYPE
11	01	SHMPZ012-A-S02A	1/18/02	1000 0905	RG	1	SS Sleeve 2x6"	-	S	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B	N	M	20 Days	2.5-3.0	55	Ø
12	02	SHMPZ012-A-S01A	1/18/02	0905	RG	1		-	S	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B				9.0-9.5	55	Ø
13	03	SHMPZ007-A-S01A	1/18/02	1330	RG	1		-	S	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B				2.5-3.0	55	Ø
14	04	SHMPZ007-A-S02A	1/18/02	1415	RG	1		-	S	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B				17.5-18	55	Ø
15	05	SHMPZ009-A-S01A	1/24/02	1400	RG	1		-	S	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B				1.0-1.5	55	Ø
16	06	SHMPZ009-A-S02A		1430	RG	1		-	S	6010B/3050B, 7060A/3050B, 7471A, 7740/3050B, 7841/3050B				8.0-8.5	55	Ø
	07															
	08															
	09															
	10															

RG

COLLECTED & RELEASED BY: Rachel Gedling	DATE 1/25/02	TIME 15:30	COOLER I.D.: A			COMMENTS (see note on back): T = 4.3°C
RECEIVED BY: [signature]	DATE 1/26/02	TIME 11:00	RELINQUISHED BY:	DATE / /	TIME :	
RECORD RETURNED BY:	DATE / /	TIME :				
COURIER:			SHIPPING NUMBER:			

1003

DISTRIBUTION: WHITE - PROJECT FILE • CANARY - LAB RECEIPT • PINK - DATA MANAGEMENT • GOLDENROD - FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

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CHAIN OF CUSTODY RECORD

COC No. BE001

G5/VW04-07 02B038 COOLER A

PROJECT NAME: BENICIA ARSENIAL
PROJECT NUMBER: 00726-006

LABORATORY NAME & ADDRESS: EMAX LAB. ATTN - SAMPLE CONTROL
1835 205th ST.
TORRANCE, CA. 90501

01	SHMP2017-A-W01	02-05-02	1115	JR	1	1LT Poly	HNO3	GW	6010B 7041, 7060A, 7470, 7740, 7841	Y		STAND	SB	----
02	" "				1	1LT Poly	NP	GW	300.0 160.3	Y			SP	----
03	" "				2	1LT AMB	NP	GW	8015B (TPH-E)	N			B	----
04	" "				6	40ML VOA	HCL	GW	8260B (VOC's & TPH-V)	N			B	----
05	TEMP		—	—	1	VOA	NP	—	TEMP					----
06	~~TEMP~~													
02	SHMP2017-D-W01	02-05-02	800	JR	2	40ML VOA	HCL		8260			STAND		----
08														----
09														----
10														----

02.06.02 S.S.

JR 02-05-02

T = 2.8°C

COLLECTED & RELEASED BY: Johnie Tomlin / John Tomlin	DATE 02/05/02	TIME 17:00	COOLER I.D.: COOLER A			COMMENTS (see note on back):
RECEIVED BY: GSO	DATE 02/05/02	TIME 17:00	RELINQUISHED BY: JOHNIE TOMLIN	DATE 02/05/02	TIME 17:00	
SITNIKOV	02.06.02	8:00				
RECORD RETURNED BY:	DATE / /	TIME :				
COURIER: GSO			SHIPPING NUMBER: CONF - 1016980			

DISTRIBUTION: WHITE – PROJECT FILE • CANARY – LAB RECEIPT • PINK – DATA MANAGEMENT • GOLDENROD – FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

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CHAIN OF CUSTODY RECORD

COC No. BE00147

02B051 B8/VW01-01 COOLER A

PROJECT NAME: BENICIA ARSENIAL
PROJECT NUMBER: 00726-006

LABORATORY NAME & ADDRESS: EMAX LAB
1835 205th ST.
TORRANCE, CA. 90501

01	SHMP2007-A-W01	02060	1500	JZ	3	1LT Poly	HNO3	GW	6010B, 7041, 7060A, 7470, 7740, 7841	Y	M	STAND	SP ~~SB~~ JZ	1089 11.05
02	" "				3	1LT Poly	NP	GW	300.0, 160.1	Y	M		SP	----
03	" "				6	1LT AMB.	NP	GW	8015 B (TPH-E)	N	M		B	----
04	" "				15	40ml VOA	HCL	GW	8260B (VOCs & TPH-V)	N	M		B	----
05	TEMP		—	—	1	VOA	NP	—	TEMP					----
06	SHMP2007-D-W01		700	JZ	2	VOA	HCL	—	8260 (8015B)					----
07														----
08														----
09														----
10														----

1

2

Jol Tal 02-06-02

COLLECTED & RELEASED BY: Johnie Tomlin / Jol Tal	DATE 02/04/02	TIME 17:00	COOLER I.D.: COOLER A			COMMENTS (see note on back): T = 2.8°C
RECEIVED BY: GSO	DATE 02/06/02	TIME 17:00	RELINQUISHED BY:	DATE / /	TIME :	
[signature]	2-7-02	0930				
RECORD RETURNED BY:	DATE / /	TIME :				
COURIER: GSO			SHIPPING NUMBER: 101888			

1002

DISTRIBUTION: WH[illegible] PROJECT FILE • CANARY – LAB RECEIPT • PINK – DATA MANAGEMENT • GOLDENROD – [illegible]

USE A BALLPOINT PEN, BLACK INK, AND PRES[illegible]IRMLY. INSTRUCTIONS ARE ON THE BACK.

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CHAIN OF CUSTODY RECORD

COC No. BE001

02B051 B8/VW01-01

PROJECT NAME: BENICIA ARSENAL
PROJECT NUMBER: 00726-006

LABORATORY NAME & ADDRESS: EMAX LAB
1835 205th ST.
TORRANCE, CA. 90501

01	SHMP2009-A-W01	02-06-02	1230	JL	1	LT Poly	HNO3	GW	6010B, 7041, 7060A, 7470, 7740, 7841	Y		STAND	SP	~~7.84~~ JL ~~7.84~~ JL	
02	" "				1	LT Poly	NP		300.0, 160.1	Y			SP	6.57 7.31	
3 03	" "				2	LT AMB.	NP		8015 B (TPH-E)	N			B	----	
04	" "				6	40ml VOA	HCL		8260 B (VOC & TPH-V)	N			B	----	
05	SHMP2010-A-W01		1200		1	LT Poly	HNO3		6010B, 7041, 7060A, 7470, 7740, 7841	Y			SP	7.34 7.84	
06	" "				1	LT Poly	NP		300.0, 160.1	Y			SP	----	
4 07	" "				2	LT AMB.	NP		8015B (TPH-E)	N			B	----	
08	" "				6	40 ml VOA	HCL		8260B (VOC & TPH-V)	N			B	----	
09	TEMP		—	—	1	VOA	NP	—	TEMP	—		—		----	
5 10	SHMP2010-D-W01	—	700	JL	2	VOA	HCL	—	8260 (8015B)	—		STAND.		----	

COLLECTED & RELEASED BY: Johnie Tomlin / JL	DATE 02/06/02	TIME 17:00	COOLER I.D.: Cooler B			COMMENTS (see note on back): T = 3.0°C
RECEIVED BY: GSO	DATE 02/06/02	TIME 17:00	RELINQUISHED BY:	DATE / /	TIME :	
[illegible]	2/7/02	0930				
RECEIVED BY:	DATE / /	TIME :				
COURIER: GSO			SHIPPING NUMBER: 101 8188			

DISTRIBUTION: WHITE - PROJECT FILE • CANARY - LAB RECEIPT • PINK - DATA MANAGEMENT • GOLDENROD - FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

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CHAIN OF CUSTODY RECORD

COC No. BE00150

I-18/VW01-04 02B065

PROJECT NAME: Benicia Arsenal
PROJECT NUMBER: 00726-086

LABORATORY NAME & ADDRESS: EMAX LAB
1835 205th St.
Torrance, CA 90501

1	01	SHMPZ012-A-W01	02-07-02	750	JT	1	1L Poly	HNO_3	GW	6010B, 7041, 7060A, 7470, 7740, 7841	Y		Stand	SP	----	
	02	" "				1	1L Poly	NP		300.0, 160.1	Y			SP	----	
	03	" "				2	1L Amb	NP		8015B (TPH-E)	N			B	----	
	04	" "				6	40mL VOA	HCL		8260B (VOC + TPH-V)	N			B	----	
2	05	SHMPZ019-A-W01	02-07-02	1148		1	1L Poly	HNO_3		6010B, 7041, 7060A, 7470, 7740, 7841	Y			SP	----	
	06	" "				1	1L Poly	NP		300.0, 160.1	Y			SP	----	
	07	" "				2	1L Amb	NP		8015B (TPH-E)	N			B	----	
	08	" "				6	40mL VOA	HCL		8260B (VOC + TPH-V)	N			B	----	
	09	TEMP	—	—	—	1	VOA	NP	—	TEMP	—		—		----	
3	10	SHMPZ012-D-W01	02-07-02	600	—	2	VOA	HCL	—	8260 (8015B)	—		Stand		----	

COLLECTED & RELEASED BY: Johnie Tonin / Johnie Tonin	DATE 02/07/02	TIME 17:00	COOLER I.D.: Cooler B			COMMENTS (see note on back):	
RECEIVED BY: GSO	DATE 02/07/02	TIME :	RELINQUISHED BY:	DATE / /	TIME :	T=3.8°C	
[signature]	02/08/02	10:45					
RECORD RETURNED BY:	DATE / /	TIME :					
COURIER: GSO			SHIPPING NUMBER: 1019671				

DISTRIBUTION: WHITE - PROJECT FILE • CANARY - LAB RECEIPT • PINK - DATA MANAGEMENT • GOLDENROD - FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

FA/BC

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CHAIN OF CUSTODY RECORD

COC No. BE0[illegible]9

I-18 / VW01-04 02B065

PROJECT NAME: Benicia Arsenal
PROJECT NUMBER: 00726-006

LABORATORY NAME & ADDRESS: EMAX LAB
1835 205th St.
Torrance, Ca 90501

4	01	SHMPZ020-A-W01	02-07-02	1530	JT	1	1L Poly	HNO3	GW	6010B, 7041, 7060A, 7470, 7740, 7841	Y		Stand	SP	----	
	02	" "				1	1L Poly	NONE	GW	300.0, 160.1	Y			SP	----	
	03	" "				2	1L Amb	NP		8015B (TPH-E)	N			B	----	
	04	" "				6	40mL VOA	HCL		8260B (VOC + TPH-V)	N			B	----	
5	05	SHMPZ020-B-W01		1540		1	1L Poly	HNO3		6010B, 7041, 7060A, 7470, 7740, 7841	Y			SP	----	
	06	" "				1	1L Poly	NP		300.0, 160.1	Y			SP	----	
	07	" "				2	1L Amb	NP		8015B (TPH-E)	N			B	----	
	08	" "				6	40mL VOA	HCL		8260B (VOC + TPH-V)	N			B	----	
	09	Temp		—	—	1	VOA	NP	—	TEMP	—		—	—	----	
6	10	SHMPZ020-D-W01		600	JT	2	VOA	HCL	—	8260 (8015B)	—		Stand	—	----	

COLLECTED & RELEASED BY: [signature] / Johnie Tonlin	DATE 02/07/02	TIME 17:00	COOLER I.D.: Cooler A				COMMENTS (see note on back):
RECEIVED BY: GSO [signature]	DATE 02/07/02 02-08-02	TIME 17:00 10:45	RELINQUISHED BY:	DATE / /	TIME :		T=3.5°C
RECORD RETURNED BY:	DATE / /	TIME :					
COURIER: GSO			SHIPPING NUMBER: 1019671				

DISTRIBUTION: WHITE – PROJECT FILE • CANARY – LAB RECEIPT • PINK – DATA MANAGEMENT • GOLDENROD – FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

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CHAIN OF CUSTODY RECORD

COC No. BE00151

I19/VW04-02

02B069

PROJECT NAME: BENICIA ARSENAL
PROJECT NUMBER: 00726-006

LABORATORY NAME & ADDRESS: EMAX LAB.
1835 205th ST
TORRANCE CA 90501

1	01	SHMP2005-A-W01	02-08-02	805	JR	1	1LT Poly	HNO_3	GW	6010, 7041, 7060A, 7470, 7740, 7841	Y		STAND	SP	----	
	02	" "				1	1LT Poly	NP		300.0, 160.1	Y			SP	----	
	03	" "				2	1LT Amb.	NP		8015B (TPH-D)	N			B	----	
	04	" "				6	40mL VOA	HCL		8260B (VOC & TPH-V)	N			B	----	
	05	~~SHMP2006-A-W01~~	JR 02-08-02			1	1LT Poly	~~HCL~~		~~6010, 7041, 7060A, 7470, 7740, 7841~~	~~Y~~			~~SP~~	----	
	06	~~" JR 02-08-02 "~~				1	1LT Poly	~~NP~~		~~300.0, 160.1~~	~~Y~~			~~SP~~	----	
	07	~~" JR 02-08-02 "~~				2	1LT Amb.	~~NP~~		~~8015B (TPH-D)~~	~~N~~			~~B~~	----	
	08	~~" JR 02-08-02 "~~				6	40mL VOA	~~NP~~ HCL		~~8260B (VOC & TPH-V)~~	~~N~~			~~B~~	----	
	09	TEMP	02-08-02	600	—	1	VOA	NP	—	TEMP	—		—	—	----	
2	10	SHMP2005-D-W01	02-08-02	600	JR	2	VOA	HCL	—	8260 (8015B)	—		STAND	—	----	

COLLECTED & RELEASED BY: Johnie Tomlin / John Ford	DATE 02/08/02	TIME 10:00	COOLER I.D.: Cooler A T=2.2°C				COMMENTS (see note on back):
RECEIVED BY: GSO	DATE 02/08/02	TIME 10:00	RELINQUISHED BY: John Ford / Johnie Tomlin	DATE / /	TIME :		
[signature]	02-09-02	10:45 A					
RECORD RETURNED BY:	DATE / /	TIME :					
COURIER: GSO			SHIPPING NUMBER: 1010299				

DISTRIBUTION: WHITE – PROJECT FILE • CANARY – LAB RECEIPT • PINK – DATA MANAGEMENT • GOLDENROD – FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

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916-444-0123 • FAX 916-635-8805

CHAIN OF CUSTODY RECORD

COC No. BE0015

028080 I3/VW01-07

PROJECT NAME: BENICIA ARSENAL
PROJECT NUMBER: 00726.006

LABORATORY NAME & ADDRESS: EMAX LAB
1835 205TH ST.
TORRANCE CA. 90501

	SAMPLE NUMBER	DATE	TIME	COLLECTED BY	# CONTAINERS	CONTAINER TYPE	PRESERVATIVE	FILTERED	ANALYSES REQUIRED	RESULTS			DISPOSAL	DATA QUALIFIER
01	SIMPE-11-A-W01	02-11-02	1115	JL	1	1LT Poly	HNO3	GW	6010, 7041, 7000A, 7470, 7740, 7841	Y		STAND.	NS	----
02	" "				1	1LT Poly	NP		300.0, 160.1	Y			NS	----
03	" "				2	1LT Amb.	NP		8015 B (TPH-E)	N			B	----
04	" "				6	40ml VOA	HCL		8260 B (VOC & TPH-V)	N			B	----
05	TEMP	02-11-02	—	JL	1	1L VOA	NP		TEMP	—			—	----
06	SIMPE-11-D-W01	02-11-02	700	JL	2	VOA	HCL		8260 (8015B) (E.C. was @ 16)	—			—	----
07														----
08														----
09														----
10														----

1
2

JL 02-11-02

COLLECTED & RELEASED BY: Jolene Tomlin / JL	DATE 02/11/02	TIME 14:00	COOLER I.D.: COOLER A		COMMENTS (see note on back): T = 3.4°C
RECEIVED BY: GSO	DATE / /	TIME :	RELINQUISHED BY: JL	DATE / /	TIME :
[illegible]	2/12/02	0930			
RECORD RETURNED BY:	DATE / /	TIME :			
COURIER: GSO			SHIPPING NUMBER: 1021888		

DISTRIBUTION: WHITE – PROJECT FILE • CANARY – LAB RECEIPT • PINK – DATA MANAGEMENT • GOLDENROD – FIELD

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CHAIN OF CUSTODY RECORD

COC No. BE00153

02B083 I22/VW01-17

PROJECT NAME: BENICIA ARSENAL
PROJECT NUMBER: 00726-006

LABORATORY NAME & ADDRESS: EMAX LAB
1835 205th ST.
TORRANCE CA. 90501

01	SHMP2002-A-W01	02-12-02	1000	JL	1	1LT Poly	HNO3	GW	6010, 7041, 7060A, 7470, 7740, 7841	Y		STAND	NS	----
02	" "				1		NP		300.0, 160.1	Y			NS	----
03	" "				2	1LT AMB	NP		8015 B (TPH-E)	N			B	----
04	" "				6	VOA	HCL		8260 B (VOC & TPH-V)	N			B	----
05	SHMP2002-B-W01	02-12-02	1010		1	1LT Poly	HNO3		6010, 7041, 7060A, 7470, 7740, 7841	Y			NS	----
06	" "				1		NP		300.0, 160.1	Y			NS	----
07	" "				2	1LT AMB	NP		8015 B (TPH-E)	N			B	----
08	" "				6	VOA	HCL		8260 B (VOC & TPH-V)	N			B	----
09	TEMP	02-12-02	—		1	VOA	NP		TEMP	—				----
10	SHMP2002-D-W01	02-12-02 ~~700~~	700		2	VOA	HCL		8260 (8015B	—				----

COLLECTED & RELEASED BY: Johnie Tomlin	DATE 02/12/02	TIME 16:00	COOLER I.D.: Cooler A		
RECEIVED BY: GSO	DATE 02/12/02	TIME 16:00	RELINQUISHED BY: John S Tomlin	DATE / /	TIME :
[signature]	2-13-02	0830			
RECORD RETURNED BY:	DATE / /	TIME :			
COURIER: GSO			SHIPPING NUMBER: 1013189		

COMMENTS (see note on back): T = 3.2°C
* E.C IS ABOUT 27 FOR BOTH.

DISTRIBUTION: WHITE - PROJECT FILE • CANARY - LAB RECEIPT • PINK - DATA MANAGEMENT • GOLDENROD - [illegible]

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

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CHAIN OF CUSTODY RECORD

COC No. B00157

02B083 I22/VW01-17

PROJECT NAME: BENICIA ARSENAL
PROJECT NUMBER: 00726-006

LABORATORY NAME & ADDRESS: EMAX LAB
1835 205th ST.
TORRANCE CA, 90501

01	SHMPC003-A-W01	02-12-02	1320	X	1	1LT Poly	HNO_3	60	6010, 7041, 7060A, 7470, 7740, 7841	Y		STAND	N5	----	
02	" "				1		NP		300.0, 160.1	Y			N5	----	
4 03	" "				2	1LT Amb	NP		8015B (TPH-E)	N			B	----	
04	" "				6	VOA	HCL		8260B (VOC + TPH-V)	N			B	----	
05	SHMPC006-A-W01		1200		1	1LT Poly	HNO_3		6010, 7041, 7060A, 7470, 7740, 7841	Y			N5	----	
06	" "				1		NP		300.0, 160.1	Y			N5	----	
5 07	" "				2	1LT Amb	NP		8015B (TPH-E)	N			B	----	
08	" "				6	VOA	HCL		8260B (VOC + TPH-V)	N			B	----	
09	TEMP		—		1		—	—	TEMP	—			—	----	
6 10	SHMPC010-D-W01		700		2		HCL	—	8260 (8015)	—			—	----	

COLLECTED & RELEASED BY: Johnie Tomlin	DATE 02/12/02	TIME 16:00	COOLER I.D.: Cooler B				COMMENTS (see note on back): T = 3.0°C
RECEIVED BY: GSO	DATE 02/12/02	TIME 16:00	RELINQUISHED BY: [signature]	DATE / /	TIME :		*E.C. IS @ 45 FOR BOTH
[signature]	2-13-02	0830					
RECORD RETURNED BY:	DATE / /	TIME :					
COURIER: GSO			SHIPPING NUMBER: 1013189				

DISTRIBUTION: WHITE - PROJECT FILE • CANARY - LAB RECEIPT • PINK - DATA MANAGEMENT • GOLDENROD - FIELD

USE A BALLPOINT PEN, BLACK INK, AND PRESS FIRMLY. INSTRUCTIONS ARE ON THE BACK.

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CHAIN OF CUSTODY RECORD

COC No. B200154

I10/VW01-27 02B093

PROJECT NAME: BENICIA
PROJECT NUMBER: 00726-006

LABORATORY NAME & ADDRESS: ENVIRO LAB.
1835 205th ST.
TORRANCE CA. 90501

02.14.02.

	01	SHMP2004-A-W01	02-13-02	1215	JZ	1	1LT Poly	HNO_3	GW	6010, 7041, 7060A, 7470, 7841	Y		STAND	N5	----	
	02	" "				1	1LT Poly	NP		300.0, 160.1	Y			N5	----	
1.	03	" "				2	1LT Amb.	NP		8015B (TPH-E)	N			B	----	
	04	" "				6	VOA	HCL		8260B (VOC & TPH-V)	N			B	----	
	05	SHMP2001-A-W01		1245		1	1LT Poly	HNO_3		6010, 7041, 7060A, 7470, 7841	Y			N5	----	
	06	" "				1	1LT Poly	NP		300.0, 160.1	Y			N5	----	
2.	07	" "				2	1LT Amb.	NP		8015B (TPH-E)	N			B	----	
	08	" "				6	VOA	HCL		8260B (VOC & TPH-V)	N			B	----	
	09	TEMP		—		1	VOA	NP	—	TEMP	—			—	----	
3.	10	SHMP2004-D-W01		1100		2	VOA	HCL	—	8260 (8015B)	—			—	----	

COLLECTED & RELEASED BY:	DATE 02/13/02	TIME 16:00	COOLER I.D.: COOLER A				COMMENTS (see note on back):
RECEIVED BY: GSO	DATE 02/13/02	TIME 16:00	RELINQUISHED BY: Joshua Tomlin	DATE / /	TIME :		* BOTH HAD E.C BELOW 50
SITNIKOV	02.14.02.	9:30					MS/CM
RECORD RETURNED BY:	DATE / /	TIME :					
COURIER: GSO			SHIPPING NUMBER: 1024440				

DISTRIBUTION: W[illegible] PROJECT FILE • CANARY – LAB RECEIPT • PINK – DATA MANAGEMENT • GOLDENROD [illegible]LD

USE A BALLPOINT PEN, BLACK INK, AND PRE[illegible] FIRMLY. INSTRUCTIONS ARE ON THE BACK.

$T_1 = 3.4°C$
$T_2 = 3.2°C$

1003

APPENDIX C

ANALYTICAL RESULTS FOR SOIL SAMPLES

Appendix C

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	ALUMINUM	10000	MG/KG	4.28	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	ALUMINUM	35100	MG/KG	5.77	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	ALUMINUM	35400	MG/KG	5.82	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	ALUMINUM	12000	MG/KG	4.31	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	ALUMINUM	11300	MG/KG	4.5	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	ALUMINUM	4450	MG/KG	4.07	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	ALUMINUM	13000	MG/KG	4.55	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	ALUMINUM	13100	MG/KG	4.41	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	ALUMINUM	47600	MG/KG	7.29	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	ALUMINUM	17700	MG/KG	4.92	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	ALUMINUM	42800	MG/KG	5.29	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	ALUMINUM	20500	MG/KG	4.99	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	ALUMINUM	13800	MG/KG	4.85	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	ALUMINUM	20600	MG/KG	4.47	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	ALUMINUM	24400	MG/KG	4.45	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	ALUMINUM	22000	MG/KG	4.73	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	ALUMINUM	33000	MG/KG	4.58	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	ALUMINUM	31000	MG/KG	4.47	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	ALUMINUM	27900	MG/KG	4.57	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	ALUMINUM	24600	MG/KG	4.5	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	ALUMINUM	25700	MG/KG	4.54	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	ALUMINUM	29100	MG/KG	4.56	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	ALUMINUM	33900	MG/KG	4.46	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	ALUMINUM	36000	MG/KG	4.56	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	ALUMINUM	9420	MG/KG	4.33	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	ALUMINUM	31100	MG/KG	4.53	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	ALUMINUM	30100	MG/KG	4.56	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	ALUMINUM	**41000**	MG/KG	4.65	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	ALUMINUM	**33000**	MG/KG	4.36	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	ALUMINUM	**34400**	MG/KG	4.53	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	ALUMINUM	**18800**	MG/KG	4.37	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	ALUMINUM	**40100**	MG/KG	4.62	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	ANTIMONY	< 2.01	MG/KG	2.01	ND	U	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	ANTIMONY	**3.13**	MG/KG	2.71	TR	J	T
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	ANTIMONY	< 2.73	MG/KG	2.73	ND	U	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	ANTIMONY	**2.91**	MG/KG	2.02	TR	J	T
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	ANTIMONY	< 2.11	MG/KG	2.11	ND	U	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	ANTIMONY	**2.03**	MG/KG	1.91	TR	J	T
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	ANTIMONY	**2.84**	MG/KG	2.13	TR	J	T
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	ANTIMONY	**5.48**	MG/KG	2.07	TR	J	T
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	ANTIMONY	< 3.42	MG/KG	3.42	ND	U	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	ANTIMONY	< 2.31	MG/KG	2.31	ND	U	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	ANTIMONY	< 2.48	MG/KG	2.48	ND	U	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	ANTIMONY	< 2.34	MG/KG	2.34	ND	U	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	ANTIMONY	< 2.27	MG/KG	2.27	ND	U	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	ANTIMONY	< 2.1	MG/KG	2.1	ND	U	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	ANTIMONY	**3.75**	MG/KG	2.09	TR	J	T
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	ANTIMONY	**3.08**	MG/KG	2.22	TR	J	T
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	ANTIMONY	< 2.15	MG/KG	2.15	ND	U	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	ANTIMONY	< 2.1	MG/KG	2.1	ND	U	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	ANTIMONY	**2.2**	MG/KG	2.14	TR	J	T
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	ANTIMONY	**2.59**	MG/KG	2.11	TR	J	T
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	ANTIMONY	< 2.13	MG/KG	2.13	ND	U	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	ANTIMONY	**3.59**	MG/KG	2.14	TR	J	T

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	ANTIMONY	< 2.09	MG/KG	2.09	ND	U	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	ANTIMONY	**2.3**	MG/KG	2.14	TR	J	T
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	ANTIMONY	< 2.03	MG/KG	2.03	ND	U	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	ANTIMONY	< 2.13	MG/KG	2.13	ND	U	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	ANTIMONY	< 2.14	MG/KG	2.14	ND	U	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	ANTIMONY	**3.52**	MG/KG	2.18	TR	J	T
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	ANTIMONY	< 2.05	MG/KG	2.05	ND	U	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	ANTIMONY	< 2.13	MG/KG	2.13	ND	U	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	ANTIMONY	**2.62**	MG/KG	2.05	TR	J	T
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	ANTIMONY	**3.97**	MG/KG	2.17	TR	J	T
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW7060A	ARSENIC	**6.62**	MG/KG	1.02	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW7060A	ARSENIC	**14.5**	MG/KG	0.691	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW7060A	ARSENIC	**16.7**	MG/KG	0.697	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW7060A	ARSENIC	**8.02**	MG/KG	0.412	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW7060A	ARSENIC	**6.51**	MG/KG	0.539	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW7060A	ARSENIC	**2.76**	MG/KG	0.195	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW7060A	ARSENIC	**4.98**	MG/KG	0.218	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW7060A	ARSENIC	**4.7**	MG/KG	0.528	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW7060A	ARSENIC	**17.2**	MG/KG	0.873	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW7060A	ARSENIC	**2.23**	MG/KG	0.236	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW7060A	ARSENIC	**4.89**	MG/KG	0.254	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW7060A	ARSENIC	**1.16**	MG/KG	0.119	=	-	8
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW7060A	ARSENIC	**3.56**	MG/KG	0.232	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW7060A	ARSENIC	**9.95**	MG/KG	0.535	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW7060A	ARSENIC	**8.54**	MG/KG	1.07	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW7060A	ARSENIC	**11.3**	MG/KG	1.13	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW7060A	ARSENIC	**7.26**	MG/KG	1.1	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW7060A	ARSENIC	8.87	MG/KG	1.07	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW7060A	ARSENIC	7.91	MG/KG	1.09	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW7060A	ARSENIC	6.14	MG/KG	1.08	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW7060A	ARSENIC	7.46	MG/KG	1.09	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW7060A	ARSENIC	8.54	MG/KG	1.09	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW7060A	ARSENIC	7.31	MG/KG	1.07	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW7060A	ARSENIC	4.68	MG/KG	0.546	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW7060A	ARSENIC	4.03	MG/KG	0.518	=	J-	4L
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW7060A	ARSENIC	7.84	MG/KG	0.543	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW7060A	ARSENIC	5.37	MG/KG	0.546	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW7060A	ARSENIC	6.7	MG/KG	1.11	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW7060A	ARSENIC	8.5	MG/KG	1.05	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW7060A	ARSENIC	8.69	MG/KG	1.08	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW7060A	ARSENIC	11	MG/KG	1.05	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW7060A	ARSENIC	11.4	MG/KG	1.11	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	BARIUM	51.3	MG/KG	0.118	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	BARIUM	132	MG/KG	0.159	=	-	8
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	BARIUM	233	MG/KG	0.161	=	-	8
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	BARIUM	73.8	MG/KG	0.119	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	BARIUM	64.2	MG/KG	0.124	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	BARIUM	45.3	MG/KG	0.112	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	BARIUM	75.6	MG/KG	0.125	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	BARIUM	84.9	MG/KG	0.122	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	BARIUM	99.4	MG/KG	0.201	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	BARIUM	39.7	MG/KG	0.136	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	BARIUM	119	MG/KG	0.146	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	BARIUM	41.3	MG/KG	0.138	=	-	8

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	BARIUM	**77.5**	MG/KG	0.134	=	-	8
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	BARIUM	**88.1**	MG/KG	0.123	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	BARIUM	**308**	MG/KG	1.23	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	BARIUM	**393**	MG/KG	1.31	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	BARIUM	**305**	MG/KG	1.26	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	BARIUM	**639**	MG/KG	1.23	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	BARIUM	**268**	MG/KG	1.26	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	BARIUM	**369**	MG/KG	1.24	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	BARIUM	**152**	MG/KG	0.125	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	BARIUM	**134**	MG/KG	0.126	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	BARIUM	**226**	MG/KG	1.23	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	BARIUM	**232**	MG/KG	1.26	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	BARIUM	**85.4**	MG/KG	0.119	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	BARIUM	**128**	MG/KG	0.125	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	BARIUM	**124**	MG/KG	0.126	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	BARIUM	**220**	MG/KG	1.28	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	BARIUM	**185**	MG/KG	0.12	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	BARIUM	**402**	MG/KG	1.25	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	BARIUM	**171**	MG/KG	0.121	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	BARIUM	**379**	MG/KG	1.27	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	BERYLLIUM	**0.411**	MG/KG	0.112	TR	J	T
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	BERYLLIUM	**0.562**	MG/KG	0.151	TR	J	T
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	BERYLLIUM	**0.564**	MG/KG	0.153	TR	J	T
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	BERYLLIUM	**0.445**	MG/KG	0.113	TR	J	T
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	BERYLLIUM	**0.449**	MG/KG	0.118	TR	J	T
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	BERYLLIUM	**0.739**	MG/KG	0.107	TR	J	T
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	BERYLLIUM	**0.452**	MG/KG	0.119	TR	J	T

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	BERYLLIUM	**0.426**	MG/KG	0.116	TR	J	T
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	BERYLLIUM	**0.977**	MG/KG	0.191	TR	J	T
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	BERYLLIUM	**0.518**	MG/KG	0.129	TR	J	T
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	BERYLLIUM	**0.956**	MG/KG	0.139	TR	J	T
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	BERYLLIUM	**0.595**	MG/KG	0.131	TR	J	T
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	BERYLLIUM	**0.378**	MG/KG	0.127	TR	J	T
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	BERYLLIUM	**0.671**	MG/KG	0.117	TR	J	T
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	BERYLLIUM	**0.591**	MG/KG	0.117	TR	J	T
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	BERYLLIUM	**0.605**	MG/KG	0.124	TR	J	T
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	BERYLLIUM	**0.726**	MG/KG	0.12	TR	J	T
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	BERYLLIUM	**0.708**	MG/KG	0.117	TR	J	T
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	BERYLLIUM	**0.701**	MG/KG	0.12	TR	J	T
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	BERYLLIUM	**0.644**	MG/KG	0.118	TR	J	T
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	BERYLLIUM	**0.513**	MG/KG	0.119	TR	J	T
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	BERYLLIUM	**0.536**	MG/KG	0.12	TR	J	T
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	BERYLLIUM	**0.68**	MG/KG	0.117	TR	J	T
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	BERYLLIUM	**0.662**	MG/KG	0.12	TR	J	T
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	BERYLLIUM	**0.212**	MG/KG	0.114	TR	J	T
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	BERYLLIUM	**0.568**	MG/KG	0.119	TR	J	T
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	BERYLLIUM	**0.57**	MG/KG	0.12	TR	J	T
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	BERYLLIUM	**0.882**	MG/KG	0.122	TR	J	T
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	BERYLLIUM	**0.849**	MG/KG	0.115	TR	J	T
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	BERYLLIUM	**0.82**	MG/KG	0.119	TR	J	T
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	BERYLLIUM	**0.766**	MG/KG	0.115	TR	J	T
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	BERYLLIUM	**0.857**	MG/KG	0.121	TR	J	T
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	CADMIUM	**0.207**	MG/KG	0.0352	TR	J	T
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	CADMIUM	**0.069**	MG/KG	0.0474	TR	J	T

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	CADMIUM	**0.0866**	MG/KG	0.0479	TR	J	T
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	CADMIUM	**0.294**	MG/KG	0.0355	TR	J	T
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	CADMIUM	**0.0624**	MG/KG	0.037	TR	J	T
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	CADMIUM	**0.202**	MG/KG	0.0334	TR	J	T
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	CADMIUM	**0.159**	MG/KG	0.0374	TR	J	T
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	CADMIUM	**0.434**	MG/KG	0.0363	TR	J	T
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	CADMIUM	**0.368**	MG/KG	0.06	TR	J	T
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	CADMIUM	**0.0603**	MG/KG	0.0405	TR	J	T
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	CADMIUM	**0.0902**	MG/KG	0.0435	TR	J	T
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	CADMIUM	**0.0716**	MG/KG	0.041	TR	J	8,T
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	CADMIUM	**0.701**	MG/KG	0.0399	=	-	8
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	CADMIUM	**0.28**	MG/KG	0.0368	TR	J	T
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	CADMIUM	< 0.0366	MG/KG	0.0366	ND	U	2
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	CADMIUM	< 0.0389	MG/KG	0.0389	ND	U	2
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	CADMIUM	**0.178**	MG/KG	0.0377	TR	J	T
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	CADMIUM	< 0.0368	MG/KG	0.0368	ND	U	2
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	CADMIUM	**0.226**	MG/KG	0.0376	TR	J	T
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	CADMIUM	< 0.037	MG/KG	0.037	ND	U	2
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	CADMIUM	< 0.0373	MG/KG	0.0373	ND	U	2
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	CADMIUM	< 0.0375	MG/KG	0.0375	ND	U	2
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	CADMIUM	**0.18**	MG/KG	0.0367	TR	J	T
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	CADMIUM	< 0.0375	MG/KG	0.0375	ND	U	2
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	CADMIUM	< 0.0356	MG/KG	0.0356	ND	U	2
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	CADMIUM	< 0.0373	MG/KG	0.0373	ND	U	2
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	CADMIUM	< 0.0375	MG/KG	0.0375	ND	U	2
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	CADMIUM	< 0.0383	MG/KG	0.0383	ND	U	2
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	CADMIUM	< 0.0359	MG/KG	0.0359	ND	U	2

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	CADMIUM	< 0.0373	MG/KG	0.0373	ND	U	2
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	CADMIUM	**0.415**	MG/KG	0.0359	TR	J	T
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	CADMIUM	**0.0882**	MG/KG	0.038	TR	J	T
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	CALCIUM	**2910**	MG/KG	6.49	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	CALCIUM	**3780**	MG/KG	8.75	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	CALCIUM	**3510**	MG/KG	8.83	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	CALCIUM	**4470**	MG/KG	6.54	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	CALCIUM	**1210**	MG/KG	6.83	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	CALCIUM	**1180**	MG/KG	6.17	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	CALCIUM	**4540**	MG/KG	6.9	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	CALCIUM	**10900**	MG/KG	6.69	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	CALCIUM	**3660**	MG/KG	11.1	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	CALCIUM	**3450**	MG/KG	7.47	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	CALCIUM	**5280**	MG/KG	8.03	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	CALCIUM	**4050**	MG/KG	7.57	=	-	8
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	CALCIUM	**16700**	MG/KG	7.35	=	-	8
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	CALCIUM	**3340**	MG/KG	6.78	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	CALCIUM	**14400**	MG/KG	6.76	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	CALCIUM	**4360**	MG/KG	7.17	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	CALCIUM	**9480**	MG/KG	6.95	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	CALCIUM	**5550**	MG/KG	6.78	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	CALCIUM	**13600**	MG/KG	6.93	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	CALCIUM	**10900**	MG/KG	6.82	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	CALCIUM	**10800**	MG/KG	6.89	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	CALCIUM	**11800**	MG/KG	6.91	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	CALCIUM	**12600**	MG/KG	6.77	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	CALCIUM	**7760**	MG/KG	6.92	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	CALCIUM	**5360**	MG/KG	6.57	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	CALCIUM	**6830**	MG/KG	6.88	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	CALCIUM	**7690**	MG/KG	6.91	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	CALCIUM	**6450**	MG/KG	7.06	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	CALCIUM	**9540**	MG/KG	6.62	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	CALCIUM	**6000**	MG/KG	6.87	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	CALCIUM	**6140**	MG/KG	6.63	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	CALCIUM	**7410**	MG/KG	7.01	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	CHROMIUM	**19.4**	MG/KG	0.586	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	CHROMIUM	**79.3**	MG/KG	0.79	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	CHROMIUM	**80.8**	MG/KG	0.797	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	CHROMIUM	**30.1**	MG/KG	0.59	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	CHROMIUM	**19.4**	MG/KG	0.616	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	CHROMIUM	**7.8**	MG/KG	0.557	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	CHROMIUM	**24.3**	MG/KG	0.622	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	CHROMIUM	**36.2**	MG/KG	0.604	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	CHROMIUM	**102**	MG/KG	0.998	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	CHROMIUM	**25.2**	MG/KG	0.674	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	CHROMIUM	**79.6**	MG/KG	0.725	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	CHROMIUM	**25.3**	MG/KG	0.683	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	CHROMIUM	**36.4**	MG/KG	0.664	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	CHROMIUM	**54.6**	MG/KG	0.612	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	CHROMIUM	**39.9**	MG/KG	0.61	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	CHROMIUM	**35.6**	MG/KG	0.648	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	CHROMIUM	**53.5**	MG/KG	0.627	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	CHROMIUM	**64.1**	MG/KG	0.612	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	CHROMIUM	**48.2**	MG/KG	0.625	=	-	-

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	CHROMIUM	**41**	MG/KG	0.616	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	CHROMIUM	**47.4**	MG/KG	0.622	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	CHROMIUM	**52.8**	MG/KG	0.624	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	CHROMIUM	**56.3**	MG/KG	0.611	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	CHROMIUM	**68**	MG/KG	0.625	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	CHROMIUM	**53.2**	MG/KG	0.593	=	J-	4L
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	CHROMIUM	**79.7**	MG/KG	0.621	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	CHROMIUM	**89**	MG/KG	0.624	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	CHROMIUM	**73**	MG/KG	0.637	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	CHROMIUM	**51.4**	MG/KG	0.598	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	CHROMIUM	**57.7**	MG/KG	0.62	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	CHROMIUM	**63.3**	MG/KG	0.598	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	CHROMIUM	**57.8**	MG/KG	0.632	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	COBALT	**6.58**	MG/KG	0.659	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	COBALT	**10.7**	MG/KG	0.889	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	COBALT	**10.9**	MG/KG	0.897	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	COBALT	**9.28**	MG/KG	0.664	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	COBALT	**6.98**	MG/KG	0.694	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	COBALT	**2.9**	MG/KG	0.626	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	COBALT	**9.8**	MG/KG	0.7	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	COBALT	**15**	MG/KG	0.68	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	COBALT	**22.6**	MG/KG	1.12	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	COBALT	**7.75**	MG/KG	0.759	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	COBALT	**30.5**	MG/KG	0.816	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	COBALT	**7.99**	MG/KG	0.769	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	COBALT	**8.46**	MG/KG	0.747	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	COBALT	**6.98**	MG/KG	0.689	=	-	-

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	COBALT	16.3	MG/KG	0.686	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	COBALT	20.4	MG/KG	0.729	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	COBALT	16.1	MG/KG	0.706	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	COBALT	16.6	MG/KG	0.689	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	COBALT	14.9	MG/KG	0.704	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	COBALT	18.9	MG/KG	0.693	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	COBALT	15.8	MG/KG	0.7	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	COBALT	17.4	MG/KG	0.702	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	COBALT	18.1	MG/KG	0.688	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	COBALT	25.6	MG/KG	0.703	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	COBALT	9.14	MG/KG	0.667	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	COBALT	19.4	MG/KG	0.699	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	COBALT	20.3	MG/KG	0.702	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	COBALT	27.2	MG/KG	0.717	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	COBALT	19.8	MG/KG	0.673	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	COBALT	18.2	MG/KG	0.698	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	COBALT	11.1	MG/KG	0.673	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	COBALT	20.3	MG/KG	0.712	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	COPPER	15.9	MG/KG	0.451	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	COPPER	54.7	MG/KG	0.607	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	COPPER	53.9	MG/KG	0.613	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	COPPER	25.3	MG/KG	0.454	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	COPPER	17.7	MG/KG	0.474	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	COPPER	11.3	MG/KG	0.428	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	COPPER	20.5	MG/KG	0.479	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	COPPER	25.1	MG/KG	0.465	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	COPPER	73.6	MG/KG	0.768	=	-	-

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	COPPER	**15.8**	MG/KG	0.518	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	COPPER	**48.6**	MG/KG	0.557	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	COPPER	**18.6**	MG/KG	0.525	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	COPPER	**24.4**	MG/KG	0.51	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	COPPER	**16.4**	MG/KG	0.471	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	COPPER	**44.5**	MG/KG	0.469	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	COPPER	**50.1**	MG/KG	0.498	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	COPPER	**57.1**	MG/KG	0.482	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	COPPER	**55.8**	MG/KG	0.471	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	COPPER	**57.5**	MG/KG	0.481	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	COPPER	**48.5**	MG/KG	0.473	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	COPPER	**57.5**	MG/KG	0.478	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	COPPER	**63.1**	MG/KG	0.48	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	COPPER	**75.7**	MG/KG	0.47	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	COPPER	**58.9**	MG/KG	0.48	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	COPPER	**14.3**	MG/KG	0.456	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	COPPER	**54.9**	MG/KG	0.478	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	COPPER	**50.8**	MG/KG	0.48	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	COPPER	**71.1**	MG/KG	0.49	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	COPPER	**91.6**	MG/KG	0.46	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	COPPER	**64.7**	MG/KG	0.477	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	COPPER	**26.7**	MG/KG	0.46	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	COPPER	**72.5**	MG/KG	0.486	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	IRON	**17300**	MG/KG	1.46	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	IRON	**45700**	MG/KG	1.96	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	IRON	**45300**	MG/KG	1.98	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	IRON	**22300**	MG/KG	1.47	=	-	-

Appendix C, continued

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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	IRON	23700	MG/KG	1.53	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	IRON	21100	MG/KG	1.38	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	IRON	25800	MG/KG	1.55	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	IRON	34100	MG/KG	1.5	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	IRON	40100	MG/KG	2.48	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	IRON	25900	MG/KG	1.68	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	IRON	41400	MG/KG	1.8	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	IRON	27700	MG/KG	1.7	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	IRON	20600	MG/KG	1.65	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	IRON	29500	MG/KG	1.52	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	IRON	34900	MG/KG	1.52	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	IRON	39000	MG/KG	1.61	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	IRON	43400	MG/KG	1.56	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	IRON	52300	MG/KG	1.52	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	IRON	42400	MG/KG	1.56	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	IRON	38400	MG/KG	1.53	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	IRON	41000	MG/KG	1.55	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	IRON	44400	MG/KG	1.55	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	IRON	56000	MG/KG	1.52	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	IRON	44500	MG/KG	1.55	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	IRON	18200	MG/KG	1.47	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	IRON	42100	MG/KG	1.54	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	IRON	42800	MG/KG	1.55	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	IRON	49200	MG/KG	1.58	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	IRON	46100	MG/KG	1.49	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	IRON	45700	MG/KG	1.54	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	IRON	44500	MG/KG	1.49	=	-	-

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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	IRON	**45700**	MG/KG	1.57	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	LEAD	**6.8**	MG/KG	0.166	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	LEAD	**18.6**	MG/KG	0.224	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	LEAD	**30.8**	MG/KG	0.226	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	LEAD	**84.9**	MG/KG	0.167	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	LEAD	**5.73**	MG/KG	0.175	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	LEAD	**30.7**	MG/KG	0.158	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	LEAD	**26.8**	MG/KG	0.177	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	LEAD	**62.8**	MG/KG	0.171	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	LEAD	**25.7**	MG/KG	0.283	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	LEAD	**4.04**	MG/KG	0.191	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	LEAD	**8.52**	MG/KG	0.206	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	LEAD	**4.44**	MG/KG	0.194	=	-	8
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	LEAD	**65**	MG/KG	0.188	=	-	8
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	LEAD	**15.1**	MG/KG	0.174	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	LEAD	**10.2**	MG/KG	0.173	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	LEAD	**10.3**	MG/KG	0.184	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	LEAD	**12.5**	MG/KG	0.178	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	LEAD	**8.8**	MG/KG	0.174	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	LEAD	**19.2**	MG/KG	0.177	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	LEAD	**9.07**	MG/KG	0.175	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	LEAD	**9.18**	MG/KG	0.176	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	LEAD	**9.88**	MG/KG	0.177	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	LEAD	**11.5**	MG/KG	0.173	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	LEAD	**7.88**	MG/KG	0.177	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	LEAD	**2.64**	MG/KG	0.168	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	LEAD	**8.5**	MG/KG	0.176	=	-	-

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	LEAD	**6.99**	MG/KG	0.177	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	LEAD	**11.7**	MG/KG	0.181	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	LEAD	**12.6**	MG/KG	0.17	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	LEAD	**11.4**	MG/KG	0.176	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	LEAD	**95.7**	MG/KG	0.17	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	LEAD	**11.1**	MG/KG	0.179	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	MAGNESIUM	**4380**	MG/KG	7.64	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	MAGNESIUM	**10300**	MG/KG	10.3	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	MAGNESIUM	**9630**	MG/KG	10.4	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	MAGNESIUM	**4740**	MG/KG	7.69	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	MAGNESIUM	**4480**	MG/KG	8.03	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	MAGNESIUM	**1160**	MG/KG	7.25	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	MAGNESIUM	**4270**	MG/KG	8.11	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	MAGNESIUM	**5590**	MG/KG	7.87	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	MAGNESIUM	**12200**	MG/KG	13	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	MAGNESIUM	**3020**	MG/KG	8.78	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	MAGNESIUM	**4610**	MG/KG	9.44	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	MAGNESIUM	**3230**	MG/KG	8.9	=	-	8
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	MAGNESIUM	**7170**	MG/KG	8.65	=	-	8
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	MAGNESIUM	**5950**	MG/KG	7.97	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	MAGNESIUM	**6750**	MG/KG	7.95	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	MAGNESIUM	**6640**	MG/KG	8.44	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	MAGNESIUM	**10100**	MG/KG	8.17	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	MAGNESIUM	**9050**	MG/KG	7.97	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	MAGNESIUM	**9360**	MG/KG	8.15	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	MAGNESIUM	**7280**	MG/KG	8.02	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	MAGNESIUM	**10300**	MG/KG	8.1	=	-	-

Appendix C, continued

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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	MAGNESIUM	**12800**	MG/KG	8.13	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	MAGNESIUM	**12800**	MG/KG	7.96	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	MAGNESIUM	**8410**	MG/KG	8.14	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	MAGNESIUM	**6950**	MG/KG	7.72	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	MAGNESIUM	**14400**	MG/KG	8.09	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	MAGNESIUM	**13900**	MG/KG	8.13	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	MAGNESIUM	**11500**	MG/KG	8.3	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	MAGNESIUM	**14400**	MG/KG	7.79	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	MAGNESIUM	**10500**	MG/KG	8.08	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	MAGNESIUM	**4460**	MG/KG	7.8	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	MAGNESIUM	**12500**	MG/KG	8.24	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	MANGANESE	**177**	MG/KG	0.431	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	MANGANESE	**243**	MG/KG	0.581	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	MANGANESE	**225**	MG/KG	0.587	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	MANGANESE	**290**	MG/KG	0.434	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	MANGANESE	**143**	MG/KG	0.454	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	MANGANESE	**349**	MG/KG	0.41	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	MANGANESE	**325**	MG/KG	0.458	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	MANGANESE	**515**	MG/KG	0.444	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	MANGANESE	**270**	MG/KG	0.734	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	MANGANESE	**132**	MG/KG	0.496	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	MANGANESE	**284**	MG/KG	0.533	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	MANGANESE	**99.2**	MG/KG	0.503	=	-	8
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	MANGANESE	**203**	MG/KG	0.488	=	-	8
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	MANGANESE	**293**	MG/KG	0.45	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	MANGANESE	**1040**	MG/KG	0.449	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	MANGANESE	**1400**	MG/KG	0.477	=	-	-

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	MANGANESE	**721**	MG/KG	0.461	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	MANGANESE	**1000**	MG/KG	0.45	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	MANGANESE	**713**	MG/KG	0.46	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	MANGANESE	**1090**	MG/KG	0.453	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	MANGANESE	**555**	MG/KG	0.457	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	MANGANESE	**644**	MG/KG	0.459	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	MANGANESE	**681**	MG/KG	0.45	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	MANGANESE	**1450**	MG/KG	0.46	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	MANGANESE	**223**	MG/KG	0.436	=	J+	4H
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	MANGANESE	**990**	MG/KG	0.457	=	-	8
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	MANGANESE	**537**	MG/KG	0.459	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	MANGANESE	**1130**	MG/KG	0.469	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	MANGANESE	**534**	MG/KG	0.44	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	MANGANESE	**738**	MG/KG	0.456	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	MANGANESE	**763**	MG/KG	0.44	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	MANGANESE	**778**	MG/KG	0.465	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW7471A	MERCURY	**0.0383**	MG/KG	0.0287	TR	J	T
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW7471A	MERCURY	**0.257**	MG/KG	0.0386	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW7471A	MERCURY	**0.24**	MG/KG	0.039	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW7471A	MERCURY	**0.0381**	MG/KG	0.0289	TR	J	T
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW7471A	MERCURY	< 0.0302	MG/KG	0.0302	ND	U	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW7471A	MERCURY	**0.0527**	MG/KG	0.0272	TR	J	T
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW7471A	MERCURY	< 0.0305	MG/KG	0.0305	ND	U	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW7471A	MERCURY	**0.207**	MG/KG	0.0296	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW7471A	MERCURY	**0.498**	MG/KG	0.0488	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW7471A	MERCURY	**0.123**	MG/KG	0.033	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW7471A	MERCURY	**0.123**	MG/KG	0.0355	=	-	-

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW7471A	MERCURY	**0.0583**	MG/KG	0.0334	TR	J	T
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW7471A	MERCURY	**0.0766**	MG/KG	0.0325	TR	J	T
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW7471A	MERCURY	**0.293**	MG/KG	0.0299	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW7471A	MERCURY	**0.192**	MG/KG	0.0298	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW7471A	MERCURY	**0.185**	MG/KG	0.0317	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW7471A	MERCURY	**0.33**	MG/KG	0.0307	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW7471A	MERCURY	**1.16**	MG/KG	0.0299	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW7471A	MERCURY	**0.28**	MG/KG	0.0306	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW7471A	MERCURY	**0.286**	MG/KG	0.0301	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW7471A	MERCURY	**0.139**	MG/KG	0.0304	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW7471A	MERCURY	**0.149**	MG/KG	0.0305	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW7471A	MERCURY	**0.128**	MG/KG	0.0299	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW7471A	MERCURY	**0.0436**	MG/KG	0.0306	TR	J	T
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW7471A	MERCURY	**0.0573**	MG/KG	0.029	TR	J	T
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW7471A	MERCURY	**0.0926**	MG/KG	0.0304	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW7471A	MERCURY	**0.096**	MG/KG	0.0305	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW7471A	MERCURY	**0.0577**	MG/KG	0.0312	TR	J	T
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW7471A	MERCURY	**0.104**	MG/KG	0.0292	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW7471A	MERCURY	**0.0881**	MG/KG	0.0303	TR	J	T
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW7471A	MERCURY	**0.111**	MG/KG	0.0293	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW7471A	MERCURY	**0.049**	MG/KG	0.0309	TR	J	T
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	MOLYBDENUM	< 0.704	MG/KG	0.704	ND	UJ	4L,M
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	MOLYBDENUM	**2.17**	MG/KG	0.949	TR	J+	M,T
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	MOLYBDENUM	**2.44**	MG/KG	0.958	TR	J+	M,T
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	MOLYBDENUM	< 0.709	MG/KG	0.709	ND	UJ	M
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	MOLYBDENUM	< 0.741	MG/KG	0.741	ND	UJ	M
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	MOLYBDENUM	**1.64**	MG/KG	0.669	TR	J+	M,T

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Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	MOLYBDENUM	< 0.748	MG/KG	0.748	ND	UJ	M
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	MOLYBDENUM	< 0.726	MG/KG	0.726	ND	UJ	M
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	MOLYBDENUM	**3.01**	MG/KG	1.2	TR	J+	M,T
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	MOLYBDENUM	< 0.81	MG/KG	0.81	ND	UJ	M
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	MOLYBDENUM	< 0.871	MG/KG	0.871	ND	U	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	MOLYBDENUM	< 0.821	MG/KG	0.821	ND	UJ	M
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	MOLYBDENUM	< 0.797	MG/KG	0.797	ND	UJ	M
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	MOLYBDENUM	< 0.735	MG/KG	0.735	ND	UJ	M
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	MOLYBDENUM	< 0.733	MG/KG	0.733	ND	UJ	M
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	MOLYBDENUM	< 0.778	MG/KG	0.778	ND	UJ	M
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	MOLYBDENUM	< 0.753	MG/KG	0.753	ND	UJ	M
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	MOLYBDENUM	< 0.735	MG/KG	0.735	ND	UJ	M
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	MOLYBDENUM	< 0.752	MG/KG	0.752	ND	UJ	M
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	MOLYBDENUM	< 0.74	MG/KG	0.74	ND	UJ	M
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	MOLYBDENUM	< 0.747	MG/KG	0.747	ND	UJ	M
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	MOLYBDENUM	< 0.75	MG/KG	0.75	ND	UJ	M
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	MOLYBDENUM	< 0.734	MG/KG	0.734	ND	U	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	MOLYBDENUM	< 0.751	MG/KG	0.751	ND	UJ	M
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	MOLYBDENUM	< 0.712	MG/KG	0.712	ND	UJ	M
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	MOLYBDENUM	< 0.746	MG/KG	0.746	ND	UJ	M
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	MOLYBDENUM	< 0.75	MG/KG	0.75	ND	UJ	M
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	MOLYBDENUM	< 0.766	MG/KG	0.766	ND	UJ	M
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	MOLYBDENUM	< 0.718	MG/KG	0.718	ND	UJ	M
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	MOLYBDENUM	< 0.745	MG/KG	0.745	ND	UJ	M
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	MOLYBDENUM	**1.5**	MG/KG	0.719	TR	J+	M,T
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	MOLYBDENUM	**2**	MG/KG	0.76	TR	J+	M,T
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	NICKEL	**18.6**	MG/KG	0.525	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	NICKEL	**57.6**	MG/KG	0.708	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	NICKEL	**58.4**	MG/KG	0.715	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	NICKEL	**25.6**	MG/KG	0.529	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	NICKEL	**16.6**	MG/KG	0.552	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	NICKEL	**6.36**	MG/KG	0.499	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	NICKEL	**17.6**	MG/KG	0.558	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	NICKEL	**40**	MG/KG	0.541	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	NICKEL	**102**	MG/KG	0.895	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	NICKEL	**29.3**	MG/KG	0.604	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	NICKEL	**104**	MG/KG	0.65	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	NICKEL	**31.9**	MG/KG	0.612	=	-	8
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	NICKEL	**60.8**	MG/KG	0.595	=	-	8
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	NICKEL	**13.5**	MG/KG	0.549	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	NICKEL	**44.2**	MG/KG	0.547	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	NICKEL	**61.7**	MG/KG	0.58	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	NICKEL	**54**	MG/KG	0.562	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	NICKEL	**61**	MG/KG	0.549	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	NICKEL	**48.5**	MG/KG	0.561	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	NICKEL	**50.6**	MG/KG	0.552	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	NICKEL	**44.6**	MG/KG	0.557	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	NICKEL	**49.9**	MG/KG	0.559	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	NICKEL	**51.2**	MG/KG	0.548	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	NICKEL	**65.8**	MG/KG	0.56	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	NICKEL	**54.4**	MG/KG	0.531	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	NICKEL	**66.8**	MG/KG	0.557	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	NICKEL	**72.4**	MG/KG	0.559	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	NICKEL	**65.7**	MG/KG	0.571	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	NICKEL	**49.4**	MG/KG	0.536	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	NICKEL	**53.4**	MG/KG	0.556	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	NICKEL	**24.4**	MG/KG	0.536	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	NICKEL	**57**	MG/KG	0.567	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	POTASSIUM	**1190**	MG/KG	68.4	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	POTASSIUM	**3110**	MG/KG	92.1	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	POTASSIUM	**3160**	MG/KG	93	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	POTASSIUM	**1270**	MG/KG	68.8	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	POTASSIUM	**1680**	MG/KG	71.9	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	POTASSIUM	**395**	MG/KG	64.9	TR	J	T
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	POTASSIUM	**1400**	MG/KG	72.6	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	POTASSIUM	**918**	MG/KG	70.5	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	POTASSIUM	**4310**	MG/KG	116	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	POTASSIUM	**816**	MG/KG	78.6	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	POTASSIUM	**691**	MG/KG	84.6	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	POTASSIUM	**901**	MG/KG	79.7	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	POTASSIUM	**1460**	MG/KG	77.4	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	POTASSIUM	**2620**	MG/KG	71.4	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	POTASSIUM	**1970**	MG/KG	71.1	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	POTASSIUM	**1600**	MG/KG	75.6	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	POTASSIUM	**2850**	MG/KG	73.1	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	POTASSIUM	**1690**	MG/KG	71.4	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	POTASSIUM	**2130**	MG/KG	73	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	POTASSIUM	**1950**	MG/KG	71.8	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	POTASSIUM	**1680**	MG/KG	72.5	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	POTASSIUM	**1750**	MG/KG	72.8	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	POTASSIUM	**2160**	MG/KG	71.3	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	POTASSIUM	**1880**	MG/KG	72.9	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	POTASSIUM	**502**	MG/KG	69.2	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	POTASSIUM	**1610**	MG/KG	72.4	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	POTASSIUM	**1120**	MG/KG	72.8	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	POTASSIUM	**3180**	MG/KG	74.3	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	POTASSIUM	**2500**	MG/KG	69.7	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	POTASSIUM	**2560**	MG/KG	72.3	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	POTASSIUM	**2590**	MG/KG	69.8	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	POTASSIUM	**2140**	MG/KG	73.8	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW7740	SELENIUM	**0.246**	MG/KG	0.0943	TR	J-	4L,T
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW7740	SELENIUM	**0.449**	MG/KG	0.127	TR	J	T
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW7740	SELENIUM	**0.408**	MG/KG	0.128	TR	J	T
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW7740	SELENIUM	**0.159**	MG/KG	0.0949	TR	J	T
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW7740	SELENIUM	**0.108**	MG/KG	0.0991	TR	J	T
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW7740	SELENIUM	**0.133**	MG/KG	0.0895	TR	J	T
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW7740	SELENIUM	**0.163**	MG/KG	0.1	TR	J	T
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW7740	SELENIUM	**0.213**	MG/KG	0.0972	TR	J	T
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW7740	SELENIUM	**0.22**	MG/KG	0.161	TR	J	T
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW7740	SELENIUM	< 0.108	MG/KG	0.108	ND	U	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW7740	SELENIUM	< 0.117	MG/KG	0.117	ND	U	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW7740	SELENIUM	< 0.11	MG/KG	0.11	ND	U	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW7740	SELENIUM	< 0.107	MG/KG	0.107	ND	U	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW7740	SELENIUM	**0.373**	MG/KG	0.0984	TR	J	T
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW7740	SELENIUM	< 0.0981	MG/KG	0.0981	ND	U	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW7740	SELENIUM	**0.165**	MG/KG	0.104	TR	J	T
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW7740	SELENIUM	**0.246**	MG/KG	0.101	TR	J	T
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW7740	SELENIUM	**0.149**	MG/KG	0.0984	TR	J	T

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW7740	SELENIUM	< 0.101	MG/KG	0.101	ND	U	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW7740	SELENIUM	< 0.099	MG/KG	0.099	ND	U	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW7740	SELENIUM	< 0.1	MG/KG	0.1	ND	U	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW7740	SELENIUM	< 0.1	MG/KG	0.1	ND	U	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW7740	SELENIUM	< 0.0983	MG/KG	0.0983	ND	U	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW7740	SELENIUM	**0.158**	MG/KG	0.1	TR	J	T
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW7740	SELENIUM	< 0.0953	MG/KG	0.0953	ND	UJ	4L
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW7740	SELENIUM	< 0.0999	MG/KG	0.0999	ND	U	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW7740	SELENIUM	< 0.1	MG/KG	0.1	ND	U	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW7740	SELENIUM	< 0.102	MG/KG	0.102	ND	U	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW7740	SELENIUM	< 0.0961	MG/KG	0.0961	ND	U	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW7740	SELENIUM	< 0.0997	MG/KG	0.0997	ND	U	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW7740	SELENIUM	**0.34**	MG/KG	0.0962	TR	J	T
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW7740	SELENIUM	< 0.102	MG/KG	0.102	ND	U	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	SILVER	**0.801**	MG/KG	0.6	TR	J	T
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	SILVER	**1.49**	MG/KG	0.808	TR	J	T
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	SILVER	**2.03**	MG/KG	0.816	TR	J	T
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	SILVER	**1.07**	MG/KG	0.604	TR	J	T
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	SILVER	**0.803**	MG/KG	0.631	TR	J	T
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	SILVER	**1.03**	MG/KG	0.57	TR	J	T
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	SILVER	**1.24**	MG/KG	0.637	TR	J	T
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	SILVER	**1.84**	MG/KG	0.618	TR	J	T
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	SILVER	**1.76**	MG/KG	1.02	TR	J	T
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	SILVER	**1.24**	MG/KG	0.69	TR	J	T
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	SILVER	**2.15**	MG/KG	0.742	TR	J	T
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	SILVER	**1.46**	MG/KG	0.699	TR	J	T
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	SILVER	**0.975**	MG/KG	0.679	TR	J	T

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	SILVER	**1.5**	MG/KG	0.626	TR	J	T
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	SILVER	**1.04**	MG/KG	0.624	TR	J	T
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	SILVER	**1.24**	MG/KG	0.663	TR	J	T
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	SILVER	**1.1**	MG/KG	0.642	TR	J	T
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	SILVER	**1.08**	MG/KG	0.626	TR	J	T
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	SILVER	**0.84**	MG/KG	0.64	TR	J	T
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	SILVER	**1.02**	MG/KG	0.63	TR	J	T
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	SILVER	**1.15**	MG/KG	0.636	TR	J	T
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	SILVER	**1.61**	MG/KG	0.639	TR	J	T
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	SILVER	**1.49**	MG/KG	0.626	TR	J	T
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	SILVER	**1.48**	MG/KG	0.639	TR	J	T
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	SILVER	**1.05**	MG/KG	0.607	TR	J	T
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	SILVER	**1.74**	MG/KG	0.635	TR	J	T
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	SILVER	**1.67**	MG/KG	0.639	TR	J	T
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	SILVER	**1.68**	MG/KG	0.652	TR	J	T
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	SILVER	**1.11**	MG/KG	0.612	TR	J	T
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	SILVER	**1.32**	MG/KG	0.635	TR	J	T
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	SILVER	**1.24**	MG/KG	0.612	TR	J	T
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	SILVER	**1.07**	MG/KG	0.647	TR	J	T
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	SODIUM	**202**	MG/KG	6.69	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	SODIUM	**6590**	MG/KG	9.02	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	SODIUM	**6680**	MG/KG	9.11	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	SODIUM	**651**	MG/KG	6.74	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	SODIUM	**1780**	MG/KG	7.04	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	SODIUM	**264**	MG/KG	6.36	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	SODIUM	**1370**	MG/KG	7.11	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	SODIUM	**410**	MG/KG	6.9	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	SODIUM	**5900**	MG/KG	11.4	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	SODIUM	**567**	MG/KG	7.7	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	SODIUM	**3070**	MG/KG	8.28	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	SODIUM	**453**	MG/KG	7.8	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	SODIUM	**440**	MG/KG	7.58	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	SODIUM	**510**	MG/KG	6.99	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	SODIUM	**233**	MG/KG	6.97	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	SODIUM	**248**	MG/KG	7.4	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	SODIUM	**1110**	MG/KG	7.16	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	SODIUM	**1340**	MG/KG	6.99	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	SODIUM	**846**	MG/KG	7.15	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	SODIUM	**1520**	MG/KG	7.03	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	SODIUM	**414**	MG/KG	7.1	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	SODIUM	**451**	MG/KG	7.13	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	SODIUM	**349**	MG/KG	6.98	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	SODIUM	**453**	MG/KG	7.14	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	SODIUM	**436**	MG/KG	6.77	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	SODIUM	**259**	MG/KG	7.09	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	SODIUM	**237**	MG/KG	7.13	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	SODIUM	**302**	MG/KG	7.28	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	SODIUM	**171**	MG/KG	6.83	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	SODIUM	**215**	MG/KG	7.08	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	SODIUM	**397**	MG/KG	6.84	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	SODIUM	**1160**	MG/KG	7.23	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW7841	THALLIUM	**0.667**	MG/KG	0.0477	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW7841	THALLIUM	**1.04**	MG/KG	0.0643	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW7841	THALLIUM	**0.942**	MG/KG	0.0649	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW7841	THALLIUM	**0.665**	MG/KG	0.048	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW7841	THALLIUM	**0.495**	MG/KG	0.0502	TR	J	T
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW7841	THALLIUM	**0.529**	MG/KG	0.0453	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW7841	THALLIUM	**0.562**	MG/KG	0.0507	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW7841	THALLIUM	**0.641**	MG/KG	0.0492	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW7841	THALLIUM	**0.817**	MG/KG	0.0813	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW7841	THALLIUM	**0.684**	MG/KG	0.0549	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW7841	THALLIUM	**1.03**	MG/KG	0.059	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW7841	THALLIUM	**0.749**	MG/KG	0.0556	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW7841	THALLIUM	**0.691**	MG/KG	0.054	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW7841	THALLIUM	**0.664**	MG/KG	0.0498	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW7841	THALLIUM	**0.68**	MG/KG	0.0496	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW7841	THALLIUM	**0.759**	MG/KG	0.0527	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW7841	THALLIUM	**0.744**	MG/KG	0.051	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW7841	THALLIUM	**0.682**	MG/KG	0.0498	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW7841	THALLIUM	**0.73**	MG/KG	0.0509	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW7841	THALLIUM	**0.596**	MG/KG	0.0501	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW7841	THALLIUM	**0.873**	MG/KG	0.0506	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW7841	THALLIUM	**0.783**	MG/KG	0.0508	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW7841	THALLIUM	**0.802**	MG/KG	0.0498	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW7841	THALLIUM	**0.685**	MG/KG	0.0509	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW7841	THALLIUM	**0.563**	MG/KG	0.0483	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW7841	THALLIUM	**0.696**	MG/KG	0.0505	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW7841	THALLIUM	**0.681**	MG/KG	0.0508	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW7841	THALLIUM	**0.801**	MG/KG	0.0519	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW7841	THALLIUM	**0.73**	MG/KG	0.0487	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW7841	THALLIUM	**0.784**	MG/KG	0.0505	=	-	-

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW7841	THALLIUM	**0.521**	MG/KG	0.0487	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW7841	THALLIUM	**0.676**	MG/KG	0.0515	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	TIN	< 2	MG/KG	2	ND	UJ	2,M
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	TIN	**14.3**	MG/KG	2.7	=	J+	M
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	TIN	< 2.72	MG/KG	2.72	ND	UJ	2,M
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	TIN	**13.6**	MG/KG	2.02	=	J+	M
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	TIN	**13.5**	MG/KG	2.11	=	J+	M
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	TIN	< 1.9	MG/KG	1.9	ND	UJ	2,M
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	TIN	< 2.13	MG/KG	2.13	ND	UJ	2,M
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	TIN	**14.8**	MG/KG	2.06	=	J+	M
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	TIN	**19.4**	MG/KG	3.41	=	J+	M
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	TIN	< 2.3	MG/KG	2.3	ND	UJ	2,M
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	TIN	**16.6**	MG/KG	2.48	=	J+	M
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	TIN	**14.6**	MG/KG	2.33	=	J+	8,M
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	TIN	< 2.27	MG/KG	2.27	ND	UJ	2,8,M
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	TIN	< 2.09	MG/KG	2.09	ND	UJ	2,M
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	TIN	< 2.08	MG/KG	2.08	ND	UJ	2,M
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	TIN	< 2.21	MG/KG	2.21	ND	UJ	2,M
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	TIN	< 2.14	MG/KG	2.14	ND	UJ	2,M
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	TIN	< 2.09	MG/KG	2.09	ND	UJ	2,M
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	TIN	< 2.14	MG/KG	2.14	ND	UJ	2,M
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	TIN	< 2.1	MG/KG	2.1	ND	UJ	2,M
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	TIN	< 2.12	MG/KG	2.12	ND	UJ	2,M
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	TIN	< 2.13	MG/KG	2.13	ND	UJ	2,M
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	TIN	< 2.09	MG/KG	2.09	ND	UJ	2,M
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	TIN	< 2.13	MG/KG	2.13	ND	UJ	2,M
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	TIN	< 2.03	MG/KG	2.03	ND	UJ	2,M

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	TIN	< 2.12	MG/KG	2.12	ND	UJ	2,M
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	TIN	< 2.13	MG/KG	2.13	ND	UJ	2,M
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	TIN	< 2.18	MG/KG	2.18	ND	UJ	2,M
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	TIN	< 2.04	MG/KG	2.04	ND	UJ	2,M
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	TIN	< 2.12	MG/KG	2.12	ND	UJ	2,M
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	TIN	**15.5**	MG/KG	2.04	=	J+	M
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	TIN	**16.1**	MG/KG	2.16	=	J+	M
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	VANADIUM	**33.7**	MG/KG	0.419	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	VANADIUM	**93.3**	MG/KG	0.564	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	VANADIUM	**94.1**	MG/KG	0.569	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	VANADIUM	**40.8**	MG/KG	0.421	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	VANADIUM	**43.5**	MG/KG	0.44	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	VANADIUM	**17**	MG/KG	0.398	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	VANADIUM	**50.7**	MG/KG	0.445	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	VANADIUM	**69.7**	MG/KG	0.431	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	VANADIUM	**109**	MG/KG	0.713	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	VANADIUM	**42.2**	MG/KG	0.482	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	VANADIUM	**51.6**	MG/KG	0.518	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	VANADIUM	**44.7**	MG/KG	0.488	=	-	-
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	VANADIUM	**52.3**	MG/KG	0.474	=	-	-
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	VANADIUM	**70.7**	MG/KG	0.437	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	VANADIUM	**66**	MG/KG	0.436	=	-	-
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	VANADIUM	**67.9**	MG/KG	0.463	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	VANADIUM	**90.3**	MG/KG	0.448	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	VANADIUM	**88.3**	MG/KG	0.437	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	VANADIUM	**78.2**	MG/KG	0.447	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	VANADIUM	**72.8**	MG/KG	0.44	=	-	-

Appendix C, continued

Analytical Results in Soil
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Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	VANADIUM	76.5	MG/KG	0.444	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	VANADIUM	87	MG/KG	0.446	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	VANADIUM	95.8	MG/KG	0.437	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	VANADIUM	95	MG/KG	0.446	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	VANADIUM	34.2	MG/KG	0.423	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	VANADIUM	98.2	MG/KG	0.443	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	VANADIUM	102	MG/KG	0.446	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	VANADIUM	96.5	MG/KG	0.455	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	VANADIUM	84.3	MG/KG	0.427	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	VANADIUM	88.1	MG/KG	0.443	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	VANADIUM	94	MG/KG	0.427	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	VANADIUM	92.7	MG/KG	0.452	=	-	-
SHMPZ001	SHMPZ001-A-S01A	N	1/14/2002	SW6010B	ZINC	42.5	MG/KG	0.274	=	-	-
SHMPZ001	SHMPZ001-A-S02A	N	1/14/2002	SW6010B	ZINC	74.3	MG/KG	0.369	=	-	-
SHMPZ001	SHMPZ001-B-S02A	FD	1/14/2002	SW6010B	ZINC	70.2	MG/KG	0.373	=	-	-
SHMPZ002	SHMPZ002-A-S01A	N	1/16/2002	SW6010B	ZINC	64.1	MG/KG	0.276	=	-	-
SHMPZ002	SHMPZ002-A-S02A	N	1/16/2002	SW6010B	ZINC	53.9	MG/KG	0.288	=	-	-
SHMPZ003	SHMPZ003-A-S01A	N	1/14/2002	SW6010B	ZINC	69.4	MG/KG	0.26	=	-	-
SHMPZ003	SHMPZ003-A-S02A	N	1/14/2002	SW6010B	ZINC	57.6	MG/KG	0.291	=	-	-
SHMPZ004	SHMPZ004-A-S01A	N	1/17/2002	SW6010B	ZINC	68.8	MG/KG	0.283	=	-	-
SHMPZ004	SHMPZ004-A-S02A	N	1/17/2002	SW6010B	ZINC	109	MG/KG	0.467	=	-	-
SHMPZ005	SHMPZ005-A-S01A	N	1/16/2002	SW6010B	ZINC	43	MG/KG	0.315	=	-	-
SHMPZ005	SHMPZ005-A-S02A	N	1/16/2002	SW6010B	ZINC	49.8	MG/KG	0.339	=	-	-
SHMPZ006	SHMPZ006-A-S01A	N	1/16/2002	SW6010B	ZINC	46.2	MG/KG	0.32	=	-	8
SHMPZ006	SHMPZ006-B-S01A	FD	1/16/2002	SW6010B	ZINC	103	MG/KG	0.31	=	-	8
SHMPZ006	SHMPZ006-A-S02A	N	1/16/2002	SW6010B	ZINC	73.2	MG/KG	0.286	=	-	-
SHMPZ007	SHMPZ007-A-S01A	N	1/18/2002	SW6010B	ZINC	67	MG/KG	0.285	=	-	-

Appendix C, continued

Analytical Results in Soil
Benicia Arsenal

Soil Results:

Location	Sample ID	Sample Type	Sample Date	Analytical Method	Analyte	Result	Units	Detect Limit	Parvq	QC Flag	Reason Code
SHMPZ007	SHMPZ007-A-S02A	N	1/18/2002	SW6010B	ZINC	**72.6**	MG/KG	0.303	=	-	-
SHMPZ009	SHMPZ009-A-S01A	N	1/24/2002	SW6010B	ZINC	**88.3**	MG/KG	0.293	=	-	-
SHMPZ009	SHMPZ009-A-S02A	N	1/24/2002	SW6010B	ZINC	**81.7**	MG/KG	0.286	=	-	-
SHMPZ010	SHMPZ010-A-S01A	N	1/24/2002	SW6010B	ZINC	**89.4**	MG/KG	0.293	=	-	-
SHMPZ010	SHMPZ010-A-S02A	N	1/24/2002	SW6010B	ZINC	**74**	MG/KG	0.288	=	-	-
SHMPZ011	SHMPZ011-A-S01A	N	1/18/2002	SW6010B	ZINC	**89.8**	MG/KG	0.291	=	-	-
SHMPZ011	SHMPZ011-B-S01A	FD	1/18/2002	SW6010B	ZINC	**91.7**	MG/KG	0.292	=	-	-
SHMPZ011	SHMPZ011-A-S02A	N	1/18/2002	SW6010B	ZINC	**100**	MG/KG	0.286	=	-	-
SHMPZ012	SHMPZ012-A-S01A	N	1/18/2002	SW6010B	ZINC	**70.3**	MG/KG	0.292	=	-	-
SHMPZ012	SHMPZ012-A-S02A	N	1/18/2002	SW6010B	ZINC	**28.3**	MG/KG	0.277	=	-	-
SHMPZ017	SHMPZ017-A-S01A	N	1/23/2002	SW6010B	ZINC	**75.9**	MG/KG	0.29	=	-	-
SHMPZ017	SHMPZ017-B-S01A	FD	1/23/2002	SW6010B	ZINC	**67.8**	MG/KG	0.292	=	-	-
SHMPZ017	SHMPZ017-A-S02A	N	1/23/2002	SW6010B	ZINC	**91.4**	MG/KG	0.298	=	-	-
SHMPZ019	SHMPZ019-A-S01A	N	1/22/2002	SW6010B	ZINC	**112**	MG/KG	0.28	=	-	-
SHMPZ019	SHMPZ019-A-S02A	N	1/22/2002	SW6010B	ZINC	**93.9**	MG/KG	0.29	=	-	-
SHMPZ020	SHMPZ020-A-S01A	N	1/17/2002	SW6010B	ZINC	**66.2**	MG/KG	0.28	=	-	-
SHMPZ020	SHMPZ020-A-S02A	N	1/17/2002	SW6010B	ZINC	**98.1**	MG/KG	0.296	=	-	-