City and County of San Francisco
DEPARTMENT OF PUBLIC HEALTH
ENVIRONMENTAL HEALTH

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June 8, 2015

Marty Glick
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Subject: **PHASE 2 SUBSURFACE INVESTIGATION APPROVAL**
GOLDEN STATE WARRIORS ARENA
BLOCKS 29 - 32, SAN FRANCISCO, CA 94158
EHB-SAM No.: SMED 1154

Dear Mr. Glick:

In accordance with the San Francisco Health Code, Article 22A and the Building Code, Section 106.3.2.4 – Hazardous Substances; the San Francisco Department of Public Health, Environmental Health Branch, Site Assessment and Mitigation (EHB-SAM) has reviewed the following documents:

- Phase 2 Environmental Site Assessment, Golden State Warriors Arena, Blocks 29 Through 32 - Mission Bay, San Francisco CA, prepared by Langan Treadwell Rollo, June 2015

Site Description and Proposed Project

The site is located within an area bound by Third Street on the west, South Street on the north, Terry A. Francois Boulevard on the east and 16th Street on the south. The project area has approximate plan dimensions of 760 by 620 feet and encompasses approximately 10.9 acres.

The proposed development will consist of three main areas. Additionally, Terry A. Francois Boulevard will be re-aligned to run north to south on the east side of Blocks 30 and 32, in accordance with the Mission Bay master infrastructure plan following arena construction.

- Arena – The arena structure will be approximately eight stories high. The arena has a total planned excavation depth of 12 feet bgs.

- Parking and Plaza – The parking and plaza will consist of parking, restaurants, retail and office buildings up to 11 stories high. The parking and plaza areas have a total planned excavation depth of 24.5 feet bgs. Some portions of the plaza area will not include subgrade parking and have a total excavation depth to approximately 14 feet bgs.

- Practice Courts – The practice court has a total planned excavation depth of 18.5 feet bgs.

The property is identified as San Francisco County Assessor's Parcel Number: Block 8722, Lot 001.

Historical Site Usage

Originally, the site was below water in a shallow bay known as Mission Bay. The tip of historic Point San Quentin was located just south of the site, along the 1852 San Francisco shoreline. Starting in the late 1860s, Mission Bay was reclaimed by placing fill. A review of historic maps and documents indicates that the site was reclaimed starting around 1869 with soil and rock from nearby Irish Hill and the Second Street cut. Filling of the site was completed between 1906 and 1910 with fill and building rubble from the 1906 San Francisco earthquake. In addition, a structure named Long Bridge was constructed along what is now 3rd Street; this structure was a timber pile-supported bridge that crossed Mission Bay from north to south.

The 10.9 acre site is vacant with paved parking areas (portions of Blocks 29 through 31) and an unpaved vacant lot (Block 32). With the exception of an area in the southern portion of the site, the ground surface is relatively flat, with elevations ranging from about 99 to 103 feet. There is a depressed area in the southern portion where an excavation was performed for an environmental cleanup and partially backfilled.

The site is located at the Pier 64 area of Mission Bay, historically used for a variety of industrial purposes primarily related to bulk oil storage and transfer operations. Former operations included the following:

- Bulk fuel storage and distribution (approximately 1902 to 1966).
- Railroad operations (approximately 1904 to 1939).
- A machine shop (approximately 1904 to 1927).
- A boiler house (approximately 1904 to 1927).
- Steel mill (approximately 1906 to 1928).
- Well casing manufacturer (1907 to 1975).
- Warehousing, shipping, and receiving operations for a variety of products including agricultural chemicals, lumber, food, automobiles, metals, etc. (approximately 1910 to 2006).
- A fruit cannery (approximately 1935 to 1961).
- Junk yards, vehicle parking, and vehicle maintenance facilities (approximately 1950 to 2004).
- Ready-mix concrete facilities (approximately 1972 to 2010).

Subsurface Conditions

Langan and others have completed previous geotechnical and environmental investigations at the site. A profile location map showing historical boring locations and two idealized subsurface

profiles (Appendix A, Figures A-1 through A-3 in the report) illustrate the general subsurface conditions, consisting of fill, Bay Mud, Colma Formation sand, sand layers, Old Bay Clay, and bedrock (Langan, 2011). Boring logs from the December 2014 and January 2015 investigation are presented in Appendix A in the report. Where explored, the site is blanketed by approximately 7 to 25 feet of fill overlying Bay Mud. The fill consists of gravel, sand, and clay mixtures, with brick, rock (including serpentinite), and other rubble. The sand and gravel are loose to very dense, and the clay is soft to stiff. The fill likely also includes cobble- and boulder-sized pieces of serpentinite and other materials that were apparent from the drilling but could not be recovered from the samplers. The Bay Mud is a weak and compressible marine clay deposit. This layer ranges from about 2.5 to 46.5 feet thick, generally becoming thicker to the north. Based on the physical setting of Mission Bay, the elevation of the Bay Mud varies across the site, hence the fill thickness also varies.

A medium dense to very dense clayey sand, silty sand and sand with clay and stiff to hard sandy clay, clay with sand and clay was encountered below the Bay Mud. Where encountered the sand and clay layers total 3 to 31 feet thick. A medium dense to very dense sand, sand with clay, clayey sand, silty sand and sand with silt, known as the Colma Formation, was encountered below the sand and clay in portions of the site. The top of the Colma formation was encountered about 19 to 70 feet bgs. Where encountered, the sand is approximately 5 to 35 feet thick. The Colma Formation generally becomes thicker to the north and west.

A stiff to hard clay known as Old Bay Clay, very stiff to hard sandy clay, clay, gravelly clay with sand and clay with gravel and dense to very dense sand with silt and clayey sand were encountered below the Colma Formation to bedrock. Bedrock was encountered at depths ranging from 32 to 130 feet. Bedrock generally becomes deeper to the northwest and consists of serpentinite, greenstone, shale, and claystone of the Franciscan Complex. The rock is crushed to intensely fractured, soft to moderate hardness, and friable to weak, with deep to moderate weathering.

As part of data collection for construction dewatering and structural design efforts, three piezometers (PZ-01 through PZ-03) were installed on 18 September 2014 by Langan. Groundwater has been measured in PZ-01, PZ-02, and PZ-03 on site at approximately 6.5 to 12 feet bgs. In PZ-01, depth to groundwater has been influenced by a periodic dewatering system located to the south and adjacent to the Site at 16th and Terry A. Francois Boulevard. Local groundwater flow patterns vary in this area due to the heterogeneous nature of the fill and tidal fluctuations, but the overall direction of shallow groundwater flow at the site is generally southeast toward San Francisco Bay.

Previous Investigations and Remedial Actions

Past activities within the Pier 64 area, specifically at the former petroleum terminals and related pipelines, significantly impacted environmental conditions at the site. On 15 June 2005, the Water Board adopted Order No. R2-2005-0028, which set forth the final cleanup requirements and redefined the Pier 64 area into six OUs. Portions of the site within the North Terminal OU include the southeastern portion of Block 29, southern portion of Block 30, eastern half of Block 31, and entirety of Block 32. Responsible parties for the investigation and cleanup of the Pier 64

area, including North Terminal OU, are ARCO, Chevron, Phillips, UNOCAL, and Texaco (collectively referred to as the "Pier 64 Group" - primary dischargers) and the City and County of San Francisco and Esprit (secondary dischargers).

One 13,500-gallon diesel underground storage tank (UST), formerly operated by the Pacific Coast Bus/Franciscan Bus Line, was removed from Block 31 in 1987, and one 1,000-gallon gasoline UST, formerly operated by Filbert Warehouse Corporation, was removed from Block 32 in 1997. These USTs were located within the area of the separate phase hydrocarbons (SPH) plume in the North Terminal OU. Free product was present near the water table during removal of both USTs.

One 4,000-gallon diesel UST, one 10,000-gallon UST, and one 5,000-gallon gasoline UST were formerly located at the portions of Blocks 29 and 31. The USTs were permanently removed in 1995, followed by sampling and removal actions for localized soil and groundwater impacts. Tank closures were conducted under the authority of the SFDPH Local Oversight Program (LOP) and the Water Board. The LOP and Water Board issued case closure for these USTs in February 1995.

Mission Bay Subsurface Investigations in 1997 and 1998

Environ conducted several subsurface investigations in Mission Bay Blocks 29 through 32 in 1997 and 1998. Total petroleum hydrocarbons as diesel (TPHd) and TPH as motor oil (TPHmo) were detected in soil and groundwater, in areas of former bulk petroleum storage, pipelines and transfer facilities. A measureable amount of SPH was observed at the groundwater table in two areas within Blocks 29 and 32. Metals were detected in soil at concentrations typically associated with Mission Bay fill materials. Asbestos was detected in soil and was attributed to the likely presence of Serpentinite bedrock, a common constituent in Mission Bay fill material.

Phase I Remedial Excavation in 2001

The Phase I remedial action was implemented by Clayton in 2001. Approximately 14,020 tons of visibly stained soil was excavated to a depth of 2 feet below the groundwater surface (to approximately 9 feet bgs). SPH was removed from the exposed groundwater surface within the excavation and an SPH collection trench and high-density polyethylene (HDPE) sheeting was installed along the western edge of the excavation to minimize the lateral migration of floating SPH. Soil containing residual oil below the target zone was left in place.

Phase II Remedial Excavation in 2005

A Phase II remedial action was completed within the Pier 64, including portions of the site, in 2005 through 2006. On-site activities included demolition and disposal of above ground structures, excavation and stockpiling of overburden soils, excavation of 90,000 tons of SPH impacted soils to a depth of approximately 2 feet below the ground water level (to approximately 9 feet bgs), dewatering, removal of SPH from the exposed groundwater surface, and backfilling the excavation. The excavation was backfilled using crushed concrete from on-site demolition activities and overburden from the respective operable units that met the Mission Bay RMP reuse criteria. On 22 December 2006, the Water Board issued a no further action letter to the Pier 64 Group for soil remediation activities within the Pier 64 OUs, including portions of the site.

Groundwater Monitoring

The Water Board required the Pier 64 Group to develop and implement a Groundwater Monitoring Program (GMP) to continue to assess groundwater quality. The GMP comprised approximately 20 active monitoring wells for the Pier 64 area. The Water Board approved ARCADIS' site closure request on 31 May 2013. Based on post-remediation groundwater monitoring results, the Water Board rescinded Order R2-2005-0028 and approved destruction of all on site monitoring wells. In June 2013, ARCADIS abandoned 20 monitoring wells at the Pier 64 area (ARCADIS, 2013).

Strata Phase I Environmental Site Assessment (ESA), September 2010

The significant findings identified in Strata's Phase I ESA report are related to the historic fill materials underlying the site and the past industrial site activities including oil bulk storage and transfer operations, railroad operations, warehousing, and vehicle maintenance operations. However, extensive soil and groundwater remediation activities have taken place at the site and the remaining environmental conditions can be effectively managed by the Mission Bay RMP.

Langan Phase I ESA Update, April 2010

Langan completed a Phase I ESA update on behalf of Strada in April 2014. Based the review of regulatory files, the site history, and site reconnaissance, this assessment revealed no substantial changes, or additional recognized environmental concerns (RECs) at the site since the September 2010 Phase I ESA report was completed.

Phase 2 Subsurface Investigation (December 2014)

The initial phase investigation was completed in December 2014. The initial sampling also included the collection of groundwater samples from the three existing piezometers (PZ-1, PZ-2 and PZ-3).

In January 2015, the second step-out phase was conducted to further characterize hazardous waste types proposed for excavation and to facilitate off-site disposal and/or on-site treatment prior to off-site disposal. Additional borings and samples were collected near the initial phase borings at depths where chromium, lead, and nickel were present at levels that exceeded hazardous waste criteria. To assist with the dewatering and to evaluate if groundwater pretreatment will be required prior to discharge to the sanitary sewer and to confirm detections reported in December, PZ-01, P-02 and PZ-03 were sampled in March 2015 for pH, chloride and nickel.

As discussed on November 14, 2014, during a meeting with SFDPH regarding the draft Work Plan and based on the design plans that the structural slabs will be below the groundwater table, soil gas samples were not collected because methane vapor intrusion would not be a concern. The groundwater volatile organic compound (VOC) and total petroleum hydrocarbons as gasoline (TPHg) sampling results conducted as part of the initial investigation phase were compared to Water Board vapor intrusion Environmental Screening Levels.

On 22 and 23 December 2014, Gregg Drilling & Testing, Inc. (Gregg) of Martinez California, a C-57 licensed drilling company, advanced 15 borings using a combination direct push/hollow

stem auger drill rig for the collection of soil samples within the three proposed areas of development (Arena, Parking and Plaza, and Practice Facility). On December 10, 2014, groundwater samples were collected from the three piezometers (PZ-1, PZ-2 and PZ-3).

Arena – Six borings (LB-6 through LB-9, LB-11 and LB-12 were drilled between 13 feet bgs and 22 feet bgs. Approximately four to six soil samples were collected from each boring at 2.5 to 5 foot intervals.

Parking and Plaza – Eight borings (LB-1 through LB-5, LB-10, LB-13 and LB-15) were drilled between approximately 12 feet bgs and 33 feet bgs. Approximately four to ten samples were collected from each boring at 2.5 to 5 feet intervals. Two groundwater grab samples were collected from the existing temporary piezometers PZ-1 and PZ-2.

Practice Facility - One boring (LB-14) was drilled to approximately 25 feet bgs. Approximately nine soil samples were collected from the boring at 2.5 to 5 foot intervals. One groundwater grab sample was collected from existing temporary piezometer PZ-3.

Soil Sampling

Soil samples were collected using dual-tube direct push drilling technology. Continuous soil cores were collected inside a sample barrel, lined with 5-foot-long clear acetate sample liners. The soil cores were visually logged by Langan's SBE sub consultant Albion Partners personnel in general accordance with the Unified Soil Classification System (USCS), using ASTM D-2488-09a, visual/manual procedure, working under the supervision of a Langan California professional geologist. Soil was screened for organic vapors using a calibrated photoionization detector (PID).

The selected soil sampling interval was cut from the acetate sample liner. The ends of each sample liner were covered with Teflon sheets, capped at each end, appropriately labeled, and placed in an ice filled chest cooled to 4°. The samples were submitted under chain-of-custody protocol to Curtis & Tompkins Laboratories (C&T) of Berkeley, California, a State of California certified laboratory. After the final sample was collected at each boring location, each soil boring was backfilled with neat cement grout delivered via a tremie pipe, under the oversight of an SFDPH inspector.

Soil samples were analyzed for some or all of the compounds listed below based on Table 1 of the Work Plan, visual observations, and PID readings:

- TPHg, TPH as diesel (TPHd), and TPH as motor oil (TPHmo) by Modified Environmental Protection Agency (EPA) Method 8015B;
- VOCs by EPA Method 8260B;
- Semi-volatile organic compounds (SVOCs) by EPA Method 8270C;
- Polychlorinated biphenyls (PCBs) by EPA Method 8082;
- California assessment manual (CAM) 17 metals by EPA Method 6010 and EPA Method 7471A;
- Leaking Underground Fuel Tank (LUFT) 5 Metals (6010B);
- Total lead by EPA Method 6010;

- Asbestos by California AIR Resources Board (CARB 435);
- pH by EPA Method 9045D;
- Cyanide by Standard Method SM4500CN-E.

If metal concentrations exceeded the Total Threshold Limit Concentrations (TTLC) or if total metal concentrations exceeded the soluble threshold limit concentration (STLC) by 10 times, soil samples were analyzed by the California Waste Extraction (WET) Method to evaluate if the results exceed the State of California Class I hazardous waste criteria. If a soluble metal result exceeded the STLC, the sample was analyzed by Toxicity Characteristic Leaching Procedure (TCLP), to evaluate if the concentration exceeds the Resource Conservation and Recovery Act (RCRA) or federal hazardous waste criteria.

Groundwater Sampling

In December 2014, three on site piezometers (PZ-1 through PZ-3) were sampled to facilitate obtaining a batch waste water discharge permit for disposal of groundwater pumped during construction and to satisfy the Maher Ordinance requirements. Groundwater samples were collected in accordance with the low flow groundwater sampling procedures as outlined in the Work Plan. Groundwater samples were collected directly into laboratory-supplied and preserved sample containers, appropriately labeled, and stored in an ice-cooled chest until delivery to C&T.

Groundwater samples collected from piezometers PZ-1 through PZ-3 were analyzed for some or all of the compounds listed below:

- TPHd, and TPHmo by EPA Method 8015B following silica gel preparation by EPA Method 3630C;
- TPHg by EPA Method 8015B;
- VOCs by EPA Method 8260B;
- SVOCs by EPA Method 8270C SIM;
- CAM 17 Metals by EPA Method 6020 and EPA Method 7470A;
- LUFT 5 Metals by EPA Method 6010B;
- pH by EPA Method 9040C;
- Cyanide by Standard Method SM4500CN-E;
- Dissolved Sulfides by Standard Method SM4500S2-D;
- Total Suspended Solids by Standard Method SM5220D;
- Chemical Oxygen Demand by Standard Method SM5220D;
- Phenols by EPA Method 420.1; and
- Flashpoint by ASTM D-93.

January 2015 Field Investigation

From January 26 - 28, 2015, Gregg of Martinez California, a C-57 licensed drilling company, advanced 15 additional step-out borings using a combination direct push/hollow stem auger drill rig to facilitate the collection of soil samples. The purpose of the step-out boring program was to further profile the anticipated waste types identified in the December 2014 initial investigation and to delineate the top and thickness of the Bay Mud lithologic unit.

- Arena – Seven borings (LB-19 through LB-21, and LB-26 through LB-28 and LB-31) were drilled to total depths of between 15.5 feet bgs to 17 feet bgs. Two to five soil samples were collected from each boring.
- Parking and Plaza – Nine borings (LB-16 through LB-18 and LB-22 through LB-25 and LB-29 through 30) were drilled to total depths of between approximately 12 feet and 30 feet bgs. One to four samples were collected from each boring.
- Practice Facility - Two borings (LB-32 and LB-33) were drilled to a total depth of approximately 22 feet bgs. One soil sample was collected from each boring location.

March 2015 Groundwater Sampling

In March 2015, to assist with the evaluation of construction dewatering options and groundwater pre-treatment prior to discharge, piezometers PZ-1 through PZ-3 were sampled for pH, chloride and total nickel using the same methods discussed.

Analytical Results

Non Metal Compounds

TPHg was present above the laboratory reporting limit in 5 of the 44 samples analyzed at concentrations ranging from 1.5 milligrams per kilogram (mg/kg) to 9.9 mg/kg. TPHd was present above the laboratory reporting limit in 41 of the 44 samples analyzed at concentrations ranging from 1.0 mg/kg to 1,300 mg/kg. TPHmo was present above the laboratory reporting limit in 35 of the 44 samples analyzed at concentrations ranging from 8.2 mg/kg to 1,800 mg/kg.

- 1.2.4-Trimethylbenzene was detected in 1 of 28 samples analyzed at a concentration of 0.0078 mg/kg;
- Acetone was detected in 11 of 28 samples analyzed at concentrations ranging from 0.019 to 0.17 mg/kg;
- Carbon disulfide was detected in 2 of 28 samples analyzed at concentrations ranging from 0.0079 to 0.0083 mg/kg;
- Ethylbenzene was detected in 1 of 28 samples analyzed at a concentration of 0.007 mg/kg;
- 2-Butanone was detected in 1 of 28 samples analyzed at a concentration of 0.032 mg/kg;
- o-xylene was detected in 1 of 28 samples analyzed at a concentration of 0.0068 mg/kg;
- m, p- xylenes was detected in 1 of 28 samples analyzed at a concentration of 0.011mg/kg.
- All other VOCs were not present above laboratory detection limits.

The following SVOCs were present above laboratory detection limits:

- Acenaphthene was detected in 1 of 29 samples analyzed at a concentration of 0.028 mg/kg;
- Acenaphthylene was detected in 5 of 29 samples analyzed at concentrations ranging from 0.011 mg/kg to 0.18 mg/kg;
- Anthracene was detected in 10 of 29 samples analyzed at concentrations of 0.012mg/kg to 0.14 mg/kg;
- Benzo(a)anthracene was detected in 12 of 29 samples analyzed at concentrations of 0.0058 mg/kg to 0.53 mg/kg;

- Benzo(a)pyrene was detected in 15 of 29 samples analyzed at concentrations of 0.005 mg/kg to 2.1 mg/kg;
- Benzo(b)fluoranthene was detected in 17 of 29 samples analyzed at concentrations of 0.0071 mg/kg to 1.9 mg/kg;
- Benzo(g,h,i)perylene was detected in 12 of 29 samples analyzed at concentrations of 0.0074 mg/kg to 1.8 mg/kg;
- Benzo(k)fluoranthene was detected in 9 of 29 samples analyzed at concentrations of 0.018 mg/kg to 0.42 mg/kg;
- Chrysene was detected in 15 of 29 samples analyzed at concentrations of 0.0069 mg/kg to 0.71 mg/kg;
- Dibenz(a,h)anthracene was detected in 5 of 29 samples analyzed at concentrations of 0.019 mg/kg to 0.53 mg/kg;
- Fluoranthene was detected in 16 of 29 samples analyzed at concentrations of 0.0087 mg/kg to 0.72 mg/kg;
- Fluorene was detected in 6 of 29 samples analyzed at concentrations of 0.012 mg/kg to 0.085 mg/kg;
- Indeno(1,2,3-c,d)pyrene was detected in 10 of 29 samples analyzed at concentrations of 0.0054 mg/kg to 1.7 mg/kg;
- Naphthalene was detected in 5 of 29 samples analyzed at concentrations of 0.0098 mg/kg to 0.74 mg/kg;
- Phenanthrene was detected in 17 of 29 samples analyzed at concentrations of 0.0078 mg/kg to 0.39 mg/kg; and
- Pyrene was detected in 17 of 29 samples analyzed at concentrations of 0.0074 mg/kg to 0.9 mg/kg.

All other SVOCs were not detected above laboratory reporting limits.

The PCB Aroclor 1254 was detected in 1 of 7 samples analyzed at a concentration of 0.016 mg/kg. All other PCBs were not present above laboratory detection limits. Cyanide and sulfide were not detected above laboratory limits in any of the samples analyzed.

Metals

- Antimony was detected in seven out of 17 samples analyzed at concentrations ranging from 0.28 mg/kg to 5 mg/kg
- Arsenic was detected in 15 out of 17 samples analyzed at concentrations ranging from 0.3 mg/kg to 13 mg/kg
- Barium was detected in 17 out of 17 samples analyzed at concentrations ranging from 3.9 mg/kg to 360 mg/kg
- Beryllium was detected in 11 out of 17 samples analyzed at concentrations ranging from 0.26 mg/kg to 0.45 mg/kg;
- Cadmium was detected in 31 out of 44 samples analyzed at concentrations ranging from 0.31 mg/kg to 1.7 mg/kg
- Cobalt was detected in 17 out of 17 samples analyzed at concentrations ranging from 3.9 mg/kg to 93 mg/kg
- Copper was detected in 17 out of 17 samples analyzed at concentrations ranging from 5.6 mg/kg to 110 mg/kg

- Mercury was detected in 12 out of 17 samples analyzed at concentrations ranging from 0.033 mg/kg to 0.58 mg/kg
- Molybdenum was detected in 9 out of 17 samples analyzed at concentrations ranging from 0.45 mg/kg to 6.7 mg/kg
- Silver was detected in 3 out of 17 samples analyzed at concentrations ranging from 0.31 mg/kg to 0.99 mg/kg
- Vanadium was detected in 17 out of 17 samples analyzed at concentrations ranging from 17 mg/kg to 50 mg/kg
- Zinc was detected in 44 out of 44 samples analyzed at concentrations ranging from 15mg/kg to 420 mg/kg.

Selenium and thallium were not detected above laboratory reporting limits. The detected metal concentrations discussed above were within normal background ranges found in northern California soils as stated by the consultant.

Total chromium was detected in 59 out of 59 samples analyzed at concentrations ranging from 27 mg/kg to 1,800 mg/kg. Forty two soil samples were analyzed for soluble chromium using the STLC by WET method. Soluble chromium was detected in 36 out of 42 samples analyzed at concentrations ranging between 0.25 milligrams per liter (mg/L) and 16 mg/L. Of the samples analyzed eight failed the California Hazardous Waste Criteria of 5 mg/L. Twenty two soil samples were analyzed for soluble chromium using the TCLP method. TCLP chromium was detected in four of the 22 samples analyzed at concentrations ranging from 0.051 mg/L to 0.12 mg/L. Of the samples analyzed by the TCLP method, none were above the Federal Hazardous Waste Criteria of 5 mg/L.

Total lead was detected in 107 out of 114 samples analyzed at concentrations ranging from 0.29 mg/kg to 1,500 mg/kg. Fifty eight soil samples were analyzed for soluble lead using the WET method Soluble lead was detected in 56 out of the 58 samples analyzed at concentrations ranging between 0.51 mg/L and 77 mg/L. Of the samples analyzed for soluble lead, 30 results the STLC of 5 mg/L. Thirty seven soil samples were analyzed for soluble lead using the TCLP method. Soluble was detected in 29 of the 37 samples analyzed at concentrations ranging from 0.063 mg/L to 3 mg/L. Of the samples analyzed by the TCLP method, none were detected above the 5 mg/L Federal hazardous waste criteria.

Total nickel was detected in 62 out of 62 samples analyzed at concentrations ranging from 16 mg/kg to 2,400 mg/kg. Twenty two soil samples were analyzed for soluble nickel using the WET method. Soluble nickel was detected in 21 out of 22 samples analyzed at concentrations ranging between 0.7 mg/L and 86 mg/L. Of the samples analyzed for soluble nickel, seven exceeded the STLC of 20 mg/L. There is no TCLP established for nickel.

Groundwater Results

In the groundwater samples collected from PZ-1, PZ-2 and PZ-3, the following compounds were detected:

- Benzene was detected in PZ-1 at a concentration of 4.4 micrograms per liter (µg/L). No other VOCs were detected above laboratory reporting limits.

- Naphthalene was detected in PZ-1 at a concentration of 2.8 µg/L. No other SVOCs were detected above laboratory reporting limits.
- Chemical oxygen demand was detected in PZ-1 and PZ-2 at a concentration of 480,000 µg/L and 1,100,000 µg/L, respectively.
- Chlorides were detected in PZ-1, PZ-2 and PZ-3 at concentrations of 7,200 µg/L, 1,600 µg/L and 15,000 µg/L, respectively.
- Cyanide was detected in PZ-1 at a concentration of 10 µg/L.
- TPHg and TPHd were detected in PZ-1 at concentrations of 140 and 440 µg/L, respectively. TPHmo was not detected above the laboratory reporting limit.
- Total recoverable phenolics were detected in PZ-1 at a concentration of 330 µg/L.
- Sulfide was detected in PZ-1 at a concentration of 530 µg/L.
- Total suspended solids were detected in PZ-1 and PZ-2 at concentrations of 17,000 and 8,000 µg/L, respectively.
- The flashpoint of the water in PZ-1 and PZ-2 was 150 degrees Fahrenheit.
- pH ranged from a high of 11.8 in PZ-1 in December 2014 to a low of 7.1 in PZ-1 in March 2015.

Total Metals

In the groundwater samples collected from PZ-1, PZ-2 and PZ-3, the following total metals were detected:

- Antimony was detected in 1 out of 2 samples analyzed at a concentration of 1.3 µg/L.
- Arsenic was detected in 2 out of 2 samples analyzed at concentrations ranging from 2.2 µg/L to 8.1 µg/L.
- Barium was detected in 2 out of 2 samples analyzed at concentrations ranging from 68 µg/L to 1,600 µg/L.
- Beryllium was not detected in the samples collected from PZ-1 and PZ-3.
- Cadmium was not detected in the samples collected from PZ-1, PZ-2 or PZ-3.
- Chromium was detected in 1 of 3 samples analyzed at a concentration of 1.1 µg/L.
- Cobalt was detected in 1 out of 2 samples analyzed at a concentration of 1 µg/L.
- Copper was detected in 1 out of 2 samples analyzed at a concentration of 1.5 µg/L.
- Lead was detected in 1 of 3 samples analyzed at a concentration of 2.2 µg/L.
- Mercury was not detected in the samples collected from PZ-1 and PZ-3.
- Molybdenum was detected in 2 out of 2 samples analyzed at concentrations ranging from 6.6 µg/L to 39 µg/L.
- Nickel was detected in 6 out of 6 samples at concentrations ranging from 20 µg/L to 510 µg/L.
- Selenium was detected in 1 out of 2 samples analyzed at a concentration of 1.7 µg/L.
- Silver was not detected in the samples collected from PZ-1 and PZ-3.
- Thallium was not detected in the samples collected from PZ-1 and PZ-3.
- Vanadium was detected in 1 out of 2 samples analyzed at a concentration of 7.7 µg/L.
- Zinc was detected in 1 out of 3 samples analyzed at a concentration of 6.3 µg/L.

Dissolved Metals

- In the groundwater samples collected from PZ-1, PZ-2 and PZ-3, the following dissolved metals were detected:
- Antimony was not detected in the samples collected from PZ-1 and PZ-3.
- Arsenic was detected in 2 out of 2 samples analyzed at concentrations ranging from 1.8 µg/L to 7.6 µg/L.
- Barium was detected in 2 out of 2 samples analyzed at concentrations ranging from 58 µg/L to 1,500 µg/L.
- Beryllium was not detected in the samples collected from PZ-1 and PZ-3.
- Cadmium was not detected in the samples collected from PZ-1, PZ-2 or PZ-3.
- Chromium was not detected in the samples collected from PZ-1, PZ-2 or PZ-3.
- Cobalt was not detected in the samples collected from PZ-1 and PZ-3.
- Copper was detected in 1 out of 2 samples analyzed at a concentration of 1.2 µg/L.
- Lead was not detected in the samples collected from PZ-1, PZ-2 or PZ-3.
- Mercury was detected in 1 out of 2 samples analyzed at a concentration of 0.77 µg/L.
- Molybdenum was detected in 2 out of 2 samples analyzed at concentrations ranging from 5.5 µg/L to 38 µg/L.
- Nickel was detected in 3 of 3 samples at concentrations ranging from 18 µg/L to 510 µg/L.
- Selenium was detected in 1 out of 2 samples analyzed at a concentration of 1.9 µg/L.
- Silver was not detected in the samples collected from PZ-1 and PZ-3.
- Thallium was not detected in the samples collected from PZ-1 and PZ-3.
- Vanadium was detected in 1 out of 2 samples analyzed at a concentration of 6.3 µg/L.
- Zinc was not detected in the samples collected from PZ-1, PZ-2 or PZ-3.

Conclusions and Recommendations by the Consultant

The fill unit was characterized as either a State of California Class I hazardous material based on soluble chromium, lead, and nickel concentrations or a Class II non-hazardous material, likely related to debris from the 1906 earthquake and resulting fire. Generally, the Class I California hazardous material extends from the surface to 24.5 feet bgs (the deepest layer is observed in the northeast corner of site adjacent to Terry Francois Boulevard). The areas of fill material containing soluble chromium, lead, and nickel concentrations exceeding the State of California hazardous waste criteria will be disposed of off-site at a Class-I non-RCRA regulated landfill. The current developer is also exploring soil treatment options to treat the Class I hazardous soil to a Class II non-hazardous soil. Additional fill material that will be excavated and disposed of off-site will most likely be disposed of as Class-II non-hazardous waste. Native material beneath the fill layer is typically disposed of as Class-III waste and/or unrestricted material.

In some boring locations (at depths greater than 6.0 feet bgs) within the former remedial excavation footprints, TPHmo and TPHd were detected at concentrations ranging between 800 mg/kg and 1,800 mg/kg. The TPH concentrations are likely associated with the historical fuel bulk storage and distribution terminal. A few volatile and semi-volatile organic compounds were

detected at low concentrations that would not be a health concern to construction workers. Since soil with hazardous concentrations of chromium, lead, and nickel was identified during the Phase II ESA, soil excavation tasks carried out during redevelopment activities need to be completed in accordance with a SMP. The SMP will outline proper soil handling and disposal procedures to be implemented during construction.

Construction activities will require dewatering and the groundwater contains TPHd and TPHmo, low concentrations of benzene, naphthalene, metals and elevated chloride concentrations. The groundwater quality and anticipated discharge rates and volumes are currently being discussed with the San Francisco Public Utilities Commission (SFPUC) and Regional Water Quality Control Board to determine the appropriate discharge authorization, oversight agency and required treatment prior to discharge.

Based upon the submitted documentation, the Phase 2 Subsurface Investigation has been **approved**. Review of the information provided by the documents submitted to date, further investigation is warranted.

1. The submitted Site Mitigation Plan and Dust Control Plan will be addressed in a separate letter.

2. Please submit a Final Report at completion of the project.

3. Ensure that all Maher fees and invoices are paid and up to date, otherwise the final No Further Action letter will not be issued.

4. Please submit all documents as a .pdf and open word document on a CD, otherwise your information will be returned to you.

Should you have any questions please contact Martita Lee M Weden, Sr. Environmental Health Inspector at (415) 252-3938 / martita.lee.m.weden@sfdph.org or Stephanie Cushing, Principal Environmental Health Inspector at (415) 252-3926 / stephanie.cushing@sfdph.org .

Sincerely,

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