CONESTOGA-ROVERS & ASSOCIATES

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TRANSMITTAL

DATE: November 20, 2008

REFERENCE NO.: 241501

PROJECT NAME: 461 8th Street, Oakland

TO: Jerry Wickham
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

RECEIVED
9:45 am, Nov 21, 2008
Alameda County
Environmental Health

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QUANTITY	DESCRIPTION
1	Insitu Chemical Oxidation Monitoring Work Plan Addendum

- ☐ As Requested
- ☐ For Your Use
- ☒ For Review and Comment
- ☐
- ☐

COMMENTS:
If you have any questions regarding the contents of this document, please call Thomas Sparrowe at (510) 420-3316.

Denis Brown
A.F. Evans Co c/o Anye Spivey
Leroy Griffin
WFB, NA Trustee of Havens
c/o John Ward
Leah Goldberg

Copy to: Grover Buhr

Completed by: Thomas Sparrowe [Please Print]

Signed: Thomas Sparrowe

Filing: **Correspondence File**

Denis L. Brown
Shell Oil Products US
HSE - Environmental Services
20945 S. Wilmington Ave.
Carson, CA 90810-1039
Tel (707) 865 0251
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Mr. Jerry Wickham
Alameda County Health Care Services Agendy
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94205-6577

Subject: Former Shell Service Station
461 8th Street
Oakland, California
SAP No. 129453
Incident No. 97093399
ACHCSA Case No. RO00000343

Dear Mr. Wickham:

The attached document is provided for your review and comment. Upon information and belief, I declare, under penalty of perjury, that the information contained in the attached document is true and correct.

As always, please feel free to contact me directly at (707) 865-0251 with any questions or concerns.

Sincerely,

Denis L. Brown
Project Manager

INSITU CHEMICAL OXIDATION MONITORING WORK PLAN ADDENDUM

FORMER SHELL SERVICE STATION
461 8th STREET
OAKLAND, CALIFORNIA

SAP CODE	129453
INCIDENT NO.	97093399
AGENCY NO.	RO0000343

Prepared by:
Conestoga-Rovers & Associates

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NOVEMBER 20, 2008
REF. NO. 241501 (3)
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(Following Text)

1.0 INTRODUCTION

Conestoga-Rovers & Associates (CRA) prepared this work plan addendum on behalf of Equilon Enterprises LLC dba Shell Oil Products US (Shell), to address the concerns raised in Alameda County Health Care Services Agency's (ACHCSA's) June 11, 2008 correspondence. This plan further details the insitu chemical oxidation (ISCO) monitoring plan presented in CRA's June 9, 2008 *Agency Response and Work Plan Addendum*. ACHSCA's approval was contingent upon CRA completing the following tasks:

- Additional monitoring along Broadway;
- Expanding the groundwater parameters monitored during the ISCO application;
- Increased groundwater monitoring before and after the ISCO applications;
- Sequencing of ISCO application; and
- Addressing contingent measures.

These items are addressed in the work plan addendum presented below.

The site is a paved parking lot located at the southwest corner of the intersection of 8th Street and Broadway in a primary commercial area of Oakland, California (Figure 1). The former station layout included an underground storage tank complex and dispenser islands (Figure 2). While the subject site is currently used as a paid public parking lot, the current property owners have submitted development to construct a mixed-use site consisting of multi-storied commercial and residential units with a subsurface parking area.

2.0 ISCO MONITORING WORK PLAN ADDENDUM

Soils and groundwater at the site are impacted by petroleum hydrocarbons. Total petroleum hydrocarbon as gasoline (TPHg) has been detected in site groundwater wells at concentrations of up to 100,000 micrograms per liter (µg/L). Benzene has been detected at 2,000 µg/L. An area 20 feet by 50 feet was excavated to 20 feet below grade (fbg) to remove residual source-impacted soil from beneath the former product piping and pump islands. Rather than perform chemical oxidation by application into an open excavation as was discussed by Shell and ACHCSA, CRA's recommended approach for sites where TPHg and BTEX will be treated by chemical oxidation is through an infiltration gallery in the excavation. This allows the treatment to be performed without the open excavation safety concerns.

Between June 3 and June 10, 2008 Gettler-Ryan Inc. (GRI) of Dublin, California conducted excavation to remove hydrocarbon impacted soil to approximately 20 fbg and installed an ISCO infiltration gallery (Figure 3). The ISCO infiltration gallery consists of three sets of injection points that were placed in the excavation backfill. Each injection point consists of a vertical riser connected to 4 horizontal pipes radiating out in four directions from the base of the riser. Approximately 6 inches of gravel base was placed in the bottom of the excavation, the injection piping was put in place, and approximately 3 feet of gravel pack was placed over the piping. Filter fabric was placed over the gravel pack and the remaining excavation was backfilled to grade with compactable Class II backfill and compacted to at least 90% compaction.

2.1 PRE-INJECTION ACTIVITIES

2.1.1 MONITORING WELL INSTALLATION

Wells S-14R and S-19 were installed to provide adequate monitoring points along Broadway. CRA will submit a report documenting these activities under separate cover.

2.1.2 BASELINE SAMPLING

Groundwater Sampling: Prior to chemical injection, baseline groundwater samples will be collected from monitoring wells S-8, S-9, S-13, S-14R, S-19, S-21A, S-21B, S-22A, and S-22B. Groundwater samples collected during the pre-injection sampling event will be analyzed for the following parameters/compounds:

- TPHg (EPA Method 8260B);
- Benzene, ethylbenzene, toluene, xylenes (BTEX) (EPA Method 8260B);
- Nitrate (EPA Method 300 series) ;
- Sulfate (EPA Method 300 series);
- Chloride (EPA Method 300 series);
- Total and Dissolved Metals;
    - Bromide (EPA Method 300 series);
    - Ferrous and Ferric Iron (EPA Method 300 series);
    - Manganese (Mn) (EPA Method 6000/7000 series);
    - Arsenic (As) (EPA Method 6000/7000 series);
    - Nickel (Ni) (EPA Method 6000/7000 series);
    - Chromium (Cr), Total (EPA Method 6000/7000 series);
    - Chromium VI (EPA Method 6000/7000 series);
- Dissolved Oxygen (DO) (field instrument);
- Oxygen Reduction Potential (ORP) (field instrument);
- Total Suspended Solids;
- Conductivity;
- Temperature; and
- Static water level.

Soil Vapor Sampling: Prior to the first injection event soil vapor probes SV-1 through SV-3 and SVP-1 through SVP-3 will be sampled and analyzed for TPHg using EPA Method TO-2 Modified and for BTEX by EPA Method TO-14A Modified.

2.2 INJECTION ACTIVITIES

2.2.1 HEALTH AND SAFETY PLAN (HASP)

Pursuant to Occupational Safety and Health Administration (OSHA) and Shell requirements, CRA will prepare a HASP to protect site workers. The plan will be kept on site during field activities and will be reviewed and signed by each site worker. Air monitoring will be conducted using a photo-ionization detector (PID) during injection events. Appropriate personal [protective equipment (PPE) will be used to ensure that

the treatment chemicals do not come into contact with bare skin or the eyes during mixing or injection as it can produce irritation or burns. If frothing, bubbling, or steam production occurs as the oxidant solution is injected, injection will be slowed or halted until the reaction subsides and all risks are mitigated.

2.2.2 REAGENT INJECTION

Based on CRA's review of the available data, dose estimates were prepared for ISCO treatment using Fenton's Reagent and sodium persulfate catalyzed with hydrogen peroxide. Treatment of the groundwater with Fenton's Reagent would require a dose of approximately 20,266 pounds (lbs) of hydrogen peroxide and 881 lbs of ferrous sulfate. For sodium persulfate treatment, 10,252 lbs of sodium persulfate and 1,464 lbs of hydrogen peroxide catalyst would be required. Based on the TPHg concentrations at the subject site and experience at similar sites, CRA intends to use sodium persulfate at this site.

Using sodium persulfate, a total of 6,144 gallons of 20% sodium persulfate and 1,754 gallons of 10% hydrogen peroxide will be applied. We recommend that this dose be divided and applied in two applications, each consisting of 877 gallons of 10% hydrogen peroxide mixed with 3,072 gallons of 20% sodium persulfate. The two solutions would be mixed immediately before injection. Based on CRA's experience at other sites and the usage rate of the chemicals, the optimum injection events would be one month apart.

2.2.3 INJECTION SEQUENCE

Injection wells IP-1, IP-2, and IP-3 were installed in the excavation backfill (Figure 3). As requested, the oxidant solution will first be introduced into injection well IP-1, furthest from Broadway, to monitor the chemical reactions near the center of the site prior to moving the injection eastward to IP-2, followed by IP-3.

2.2.4 INJECTION EVENT MONITORING

During each injection event, in addition to visual monitoring of the injection wells, observation wells S-8, S-9, S-13, S-14R, S-19, and S-20 will be measured continuously or near continuously during the initial application of reagent solution and for at least 2 hours after the last application of the day. Field measurement of DO, temperature, pH,

ORP, well head percent oxygen, well head volatile organic compounds (VOCs), well head pressure, lower explosive limit (LEL), and water levels will be collected from the observation wells listed above and recorded.

The soil vapor probes will be monitored using a PID meter prior to each injection event, each day during the injection events.

2.2.5 CONTINGENT MEASURES

In the event frothing, bubbling, or steam production occurs as reagent solution is injected, the application will be slowed or halted until the reaction subsides. If downhole temperature or wellhead pressure rises rapidly, a hose will be secured to the wellhead(s) and trapped gasses will be delivered to a water drum for passive vapor filtration. If the groundwater temperature and pressures persist, extraction pumps will be used to route groundwater and chemical oxidants from the injection points and observation wells and to drums or a tank for temporary storage and/or proper disposal.

2.3 POST-INJECTION ACTIVITIES

2.3.1 POST-INJECTION EVENT GROUNDWATER MONITORING

Post-injection groundwater monitoring will be conducted one week following the first injection event and will consist of monitoring the constituents listed in Section 2.1.2, above.

2.3.2 POST-INJECTION EVENT SOIL VAPOR MONITORING

Three days after the first injection event, all soil vapor probes will be sampled and analyzed for TPHg using EPA Method TO-2 Modified and for BTEX by EPA Method TO-14A Modified. The number and frequency of soil vapor sampling and analysis during the second injection event will be based upon the results of the first injection event.

2.3.3 MONTHLY GROUNDWATER SAMPLING EVENTS

Groundwater sampling will be performed on a monthly basis beginning one month after the first injection event, and scheduled to occur just prior to each subsequent injection event. The monthly sampling events will continue for three months after the final injection. These sampling events will include purging and sampling of the three injection wells, the two observation wells, and monitoring wells S-6, S-11, S-2, S-4, S-9, and S-15 for the same parameters as the post-injection groundwater sampling event.

2.3.4 QUARTERLY GROUNDWATER MONITORING PLAN

Monitoring will take place at three, six, and nine months after the final injection event. DO, pH, ORP, sulfate, BTEX, and TPHg will be analyzed at each monitoring event. Since this corresponds with the existing quarterly monitoring program, all of the on-site wells will be analyzed for these parameters.

2.4 DATA EVALUATION AND REPORTING

Upon completion of the field injection, field and analytical data will be compiled and tabulated. The percent reduction of TPH as a result of the oxidation treatments will be calculated to assess the effectiveness of the tested oxidant. A report describing the tests conducted and the results obtained will be prepared and submitted to the ACHCSA following the final post-injection monitoring event and receipt of the analytical data. Periodic status updates will be provided in the ongoing quarterly groundwater monitoring reports for this site.

2.5 SCHEDULE OF ACTIVITIES

Monitoring well installations (S-14R and S-19) are complete. CRA will submit the well installation report under separate cover.

Baseline groundwater sampling was conducted on November 11, 2008, and baseline soil vapor will be completed by November 21, 2008.

Pending work plan addendum approval, we are tentatively scheduling the initial application of the chemical oxidants to the subsurface via the infiltration gallery piping December 1 through 5, 2008, with a subsequent event the week of January 5

through 9, 2009. The quarterly groundwater monitoring program at this site will be adjusted such that monitoring occurs approximately three, six, and nine months following the final injection (i.e.; April, July, and October 2009). A report of findings for the ISCO activities will be prepared and submitted approximately 60 days following completion of the third post-remediation monitoring event (December 2009).

All of Which is Respectfully Submitted,
CONESTOGA-ROVERS & ASSOCIATES

Peter Schaefer FOR
Sophia Dore
Environmental Scientist

Thomas A. Sparrowe, PG
Project Manager

11/10/08

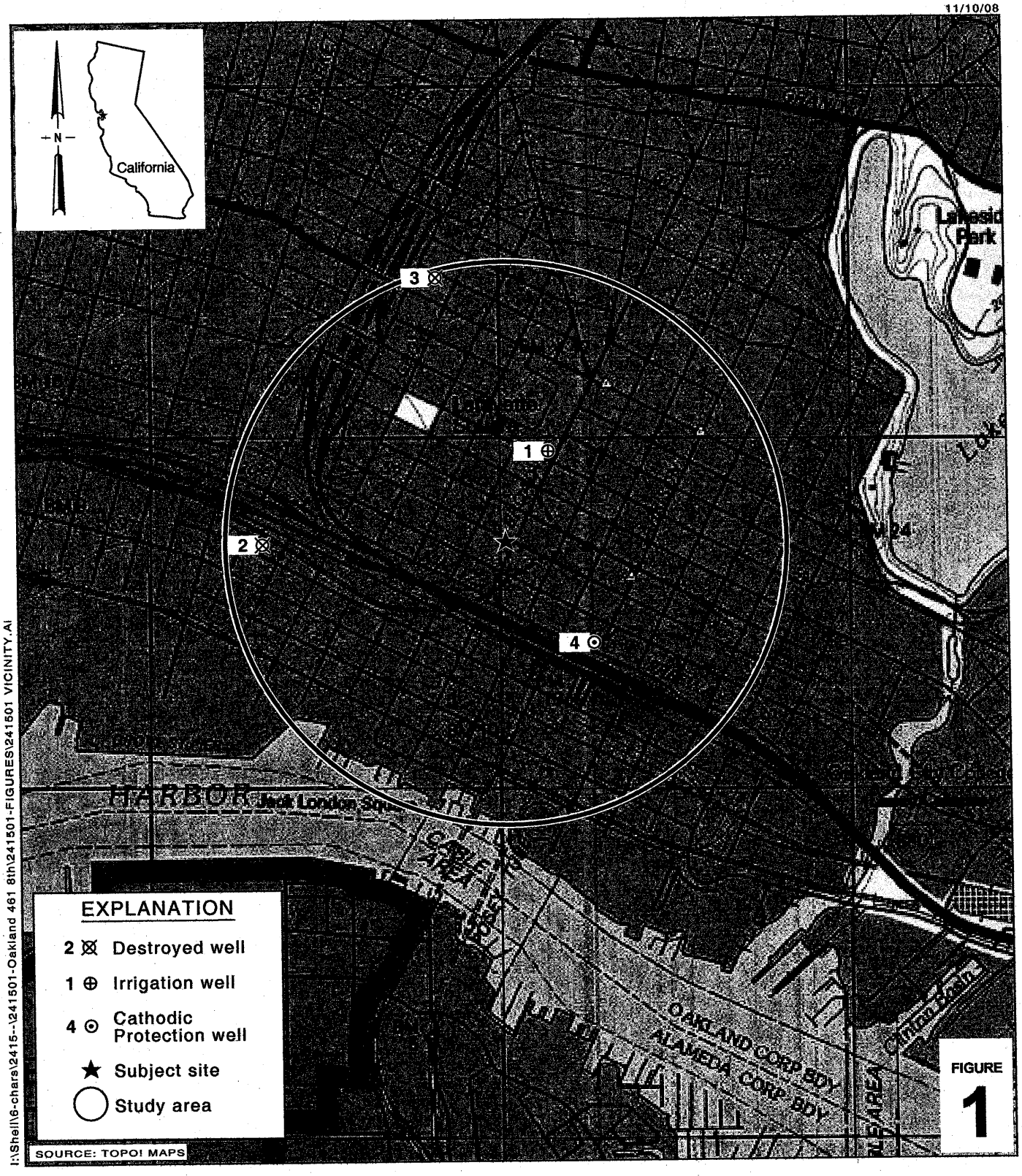

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FIGURE 1

Former Shell Service Station
461 8th Street
Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

Vicinity Map

11/18/08

Site Plan

EXPLANATION

- B-28 — Soil boring location
- SVP-1 — Soil vapor probe location
- S-4 — Monitoring well location
- S-21B — Deeper monitoring well location
- OW-1 — Observation well location
- IP-1 — Injection point
- B-25/ VP-2 — Soil boring/vapor probe location
- S-1 — Destroyed well location
- Storm drain line
- Water line
- Sanitary sewer line
- Telecommunications line
- Gas line
- Electrical line
- M.H. — Manhole
- C.B. — Catch basin
- FL = 16.50' — Flow line depth below ground surface

8TH STREET

7TH STREET

BROADWAY

Building

Former Shell Station
461 8th St.

Former USTs

Former Dispenser Island (typ.)

Former Fuel Lines

Excavation Area

Driveway

Freight Elevator

S-1, S-10, S-8, S-23, S-16, IP-1, S-15, AS-1, S-21A, IP-3, S-14, B-28, IP-2, S-12, OW-1, S-21B, S-14R, B-27/ VP-4, B-29, S-17, S-22B, S-22A, S-13, S-18, S-19, SVP-2, B-26/ VP-3, S-20, B-25/ VP-2, S-9, SVP-1, SVP-3, S-5, S-6, S-4

M.H., C.B., FL = 19.12', FL = 17.55', FL = 16.50', FL = 13.47', FL = 13.25', FL = 13.00', FL = 17.00'

N

0 20 40 80

Scale (ft)

FIGURE

2

Former Shell Service Station

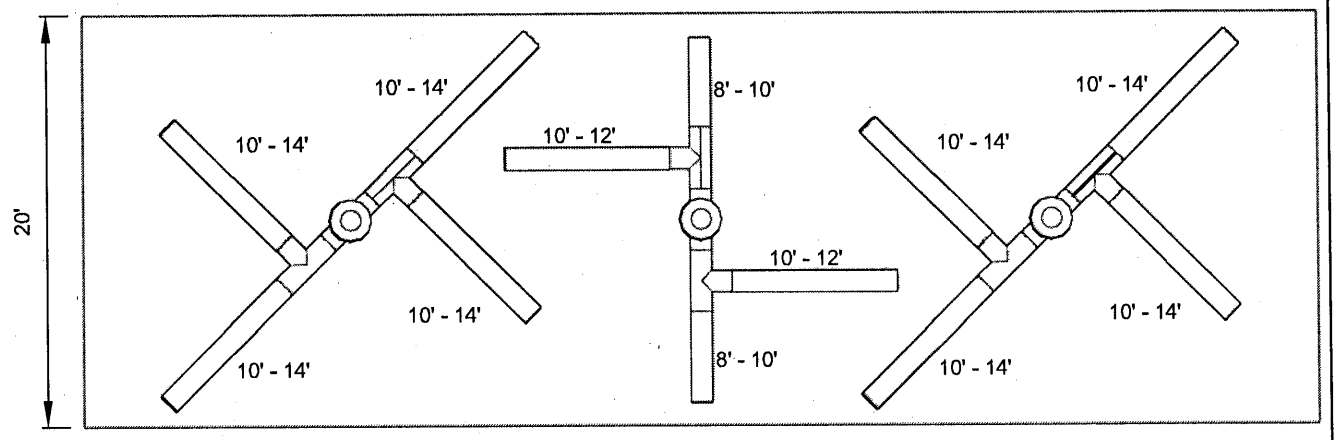
461 8th Street

Oakland, California

CONESTOGA-ROVERS & ASSOCIATES

Base map modified from 6-25-08 Virgil Chavez Land Survey map.

I:\Shell\6-chars\2415--1241501-Oakland 461 8th\1241501-FIGURES\241501 SITE PLAN.DWG



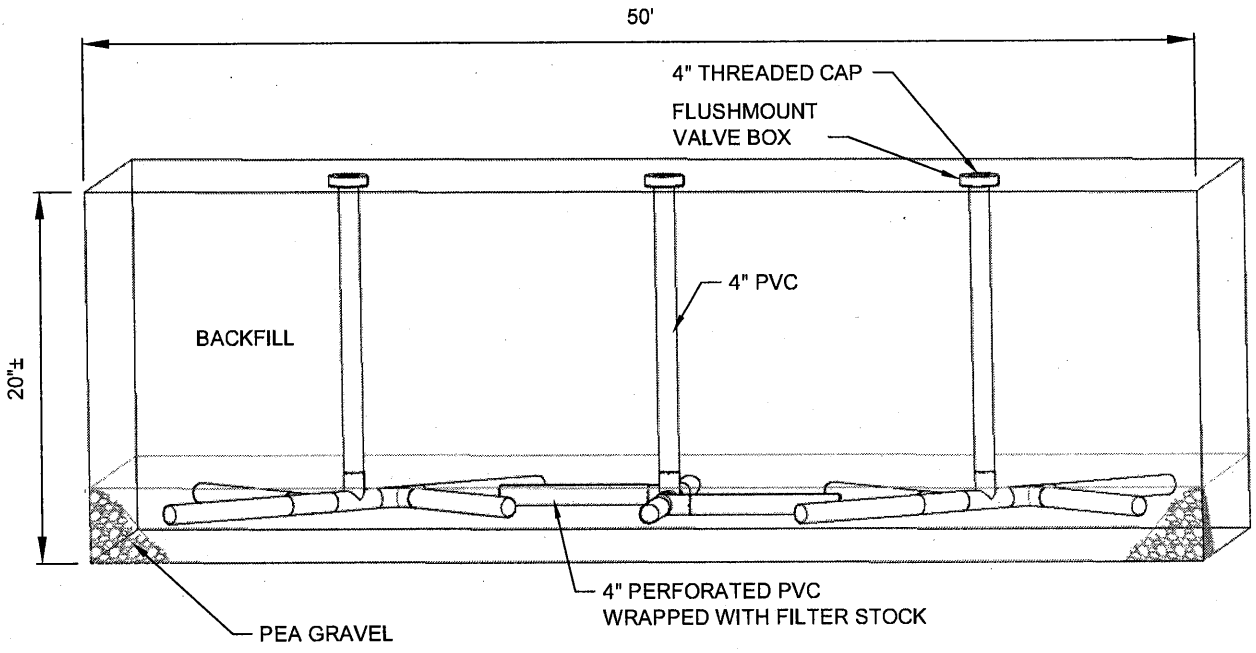


Figure 3

INJECTION PIPE LAYOUT AND CONSTRUCTION
ISCO TREATMENT
FORMER SHELL SERVICE STATION
461 8th Street, Oakland, California