Mr. Mark Detterman
Alameda County Environmental Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Re: Former Olympic Service Station
1436 Grant Avenue
San Lorenzo, California
ACEHD Case No. RO0000373, GeoTacker No. T0600102256

Dear Mr. Detterman:

I declare, under penalty of perjury, that the information and or recommendations contained in the attached document are true and correct to the best of my knowledge.

Sincerely,
George and Frida Jaber 1989 Family Trust

Philip Jaber, Trustee

STRATUS
ENVIRONMENTAL, INC.

3330 Cameron Park Drive, Ste 550
Cameron Park, California 95682
**(530) 676-6004** ~ Fax: (530) 676-6005

April 22, 2011
Project No. 2115-1436-01

Mr. Mark Detterman
Alameda County Health Care Services Agency
Environmental Health Department
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

Re: **Interim Remedial Action Plan Addendum**
Former Olympic Station
1436 Grant Avenue
San Lorenzo, California
ACEHD Case No. RO0000373, GeoTracker No. T0600102256

Dear Mr. Detterman:

Stratus Environmental, Inc. (Stratus), on behalf of Mr. Phillip Jaber and the George and Frida Jaber 1989 Family Trust, has prepared this *Interim Remedial Action Plan Addendum* (Addendum) for the former Olympic Station located at 1436 Grant Avenue in San Lorenzo, California (the site). The scope of work presented herein was developed to amend the scope of work proposed in the original *Feasibility Analysis/Interim Remedial Action Plan* (FA/IRAP)[1]. These amendments were discussed in a telephone conversation between Stratus and Alameda County Environmental Health Department (ACEHD) on April 20, 2011.

The FA/IRAP proposed to evaluate the effectiveness of dual-phase extraction (DPE) as a remedial technology for reducing dissolved hydrocarbon concentrations in the groundwater beneath the site. The FA/IRAP proposed installation of three DPE extraction wells, and a month-long DPE test. Pending approval of the FA/IRAP, Stratus initiated contact with the Bay Area Air Quality Management District (BAAQMD) to obtain a permit to perform the DPE test. Due to the proximity of Arroyo High School, BAAQMD cannot issue a permit for a test period greater than 5 continuous days without an extensive period of public comment and dispersion modeling.

As discussed in the telephone conversation and outlined in this Addendum, Stratus now proposes to shorten the DPE pilot test period to 5 days. The general scope of work outlined in the FA/RAP will still be performed, including installation of the three extraction wells. However, we now also propose to augment pilot testing to include an ozone ($O_3$) injection test. This $O_3$ injection test will consist of installing two injection wells and injecting $O_3$ for a 30-day period.

[1] *Feasibility Analysis/Interim Remedial Action Plan*, Stratus Environmental, Inc., dated March 15, 2011.

Existing groundwater monitoring wells will be used as observation wells for the $O_3$ pilot test. To minimize costs, the three extraction wells for the DPE pilot test and the two injection wells for the $O_3$ test will be installed during the same site mobilization. Well installation will be followed by the 5-day DPE pilot test, which will, in turn, be followed by the 30-day $O_3$ injection pilot test. The specific scope of work to install the injection wells and perform the $O_3$ injection test is outlined below.

## SCOPE OF WORK

The proposed scope of work (installation of the injection wells and the 30-day $O_3$ injection pilot test) has been subdivided into four tasks, as outlined below. All work will be conducted under the direct supervision of a State of California Professional Geologist or Professional Engineer, and will be conducted in accordance with standards established by ACEHD guidelines. Stratus' Field Practices and Procedures are included as Appendix A in the FA/IRAP. Proposed injection well locations are shown on Figure 1.

Injection well IW-1 will be installed approximately 15 feet upgradient of monitoring well MW-4. Well MW-4 is only installed to a depth of 10 feet below ground sureface (bgs). So that $O_3$ is being injected in the same zone that well MW-4 monitors, injection well IW-1 will be installed to a depth of 11.5 feet bgs, and will be screened from 10 to 11.5 feet bgs.

Injection well IW-2 will be installed approximately 15 feet upgradient of monitoring well MW-3. Well MW-3 is screened from 5 to 20 feet bgs, with the bottom 3.5 feet of screen in a sandy unit. Injection well IW-2 will be installed with the screen interval placed at 14.5 to 16 feet bgs, within the silty, clayey unit that overlies the sandy layer. This configuration will provide a greater opportunity for the $O_3$-enriched water to infuse the silty, clayey layer, where more hydrocarbon mass is likely to be sorbed onto soil particles.

### Task 1: Pre-Field Activities

Following approval of this Addendum, Stratus will initiate the following activities in conjunction with the tasks outlined in the FA/IRAP for the DPE pilot test:

- Initiate Alameda County permitting process for installation and operation of proposed remediation system,
- Obtain well installation permits from Alameda County Public Works Department,
- Mark the drilling locations and contract a private utility locating company to verify the locations of subsurface utilities in the vicinity, and
- Notify Underground Service Alert of the proposed drilling activities, as required by law.

## Task 2: Well Installation

Injection Well Construction Details

Borings for injection wells IW-1 and IW-2 will be drilled at the locations shown on Figure 2. Borings IW-1 and IW-2 will be advanced to depths of approximately 11.5 and 16 feet bgs, respectfully, using 8-inch diameter hollow-stem augers. The well borings will be sampled and logged as described in the FA/IRAP.

Well IW-1 will be installed to a depth of 11.5 feet bgs, and well IW-2 will be will be installed to 16 feet bgs. Each well will be constructed of ¾-inch diameter Schedule 80 polyvinyl chloride (PVC) well casing with a ceramic diffuser tip. In well IW-1 the ceramic diffuser will be placed from approximately 10 to 11.5 feet bgs, and in well IW-2 the ceramic diffuser will be placed from approximately 14.5 to 16 feet bgs. In each well, a sand filter-pack (Lonestar #3 or equivalent) will be placed around the ceramic diffuser. A bentonite transition seal will be placed above the filter pack, and the remaining annular space around the well casings will be backfilled with neat cement. The details of the proposed wells are shown in Figures 2 and 3. Actual well construction may be modified by the supervising Professional based on conditions encountered at the time installation.

Drilling Waste Management

Drilling wastes will be handles as outlined in the FA/IRAP.

Site Surveying

The injection wells will be surveyed as outlined in the FA/IRAP.

Soil Sample Chemical Analyses

Soil samples from the injection well borings may be submitted for chemical analysis, at the discretion of the supervising Professional. Samples submitted for analysis will be analyzed as outlined in the FA/IRAP.

## Task 3: 30-Day Ozone Injection Pilot Test

Stratus proposes to conduct the 30-day $O_3$ injection pilot test to evaluate the effectiveness on reducing dissolved concentrations of petroleum hydrocarbons, and to evaluate potential changes in groundwater geochemistry that could be attributed to the injection. In addition, data will be collected to establish the radius of influence (ROI) for $O_3$ injection, and to identify optimum injection rates. The 30-day injection period will be followed by a 30-day monitoring period to monitor for rebound and post-injection geochemical changes.

Equipment

The proposed pilot test will be conducted using an H2O Engineering, Inc. model OSU10-26 (or similar) to inject $O_3$ at wells IW-1 and IW-2. The system consists of a self-contained cabinet housing an oxygen ($O_2$) concentrator, an $O_3$ generation system, compressors to inject air and $O_3$, and associated instrumentation. The $O_3$ generation system is capable of generating up to 1.3 pounds of $O_3$ per day (lbs/day) at a concentration of 6% by weight of $O_3$, which can be injected at flow rates of up to 24 standard cubic feet per hour (scfh) at 20 pounds per square inch (psi) pressure. The system also incorporates a booster compressor rated at approximately 225 cfh (3.75 cubic feet per minute [cfm]) to deliver air enriched with $O_3$ to the injection wells. Manufacturer's specification sheet for the proposed equipment is attached.

The proposed remediation equipment operates on 240V, single phase, 30 amp power. Stratus intends to obtain power for the remediation equipment from the existing electrical service supplying the site structure. The remediation equipment will be connected to the injection wells by conveyance piping installed on the ground surface. The piping will be protected by temporary rubber speed bumps to safeguard the piping and facilitate normal traffic flow at the site. The remediation equipment will be isolated from the public with temporary construction fencing.

Pilot Test Procedure

The system will be set to inject $O_3$ into each well for 30 minutes (totaling a one hour cycle) on a continuous (24 hours/day) basis. Based on these timing parameters programmed into the system, and since the unit is capable of producing up to 1.3 pounds of $O_3$ per day, each well will receive up to 0.65 pounds of $O_3$ each day. During the 30-day pilot test, weekly site visits will be conducted to verify system operation, conduct verification monitoring and sampling, and perform required maintenance activities.

Monitoring Plan

Of the four monitoring wells installed at the site, well MW-2 exhibits the least amount of dissolved hydrocarbon impact, and will serve as the background monitoring point. Wells EX-1, MW-3, and MW-4 are designated performance indicator wells, and are situated to monitor the geochemical changes during the pilot test. These wells will also serve as compliance points to monitor for the presence of undesirable breakdown/byproducts of the treatment. The monitoring program may be altered at the discretion of the supervising Professional.

*Baseline Monitoring*

To establish baseline conditions, Stratus will collect groundwater samples from wells EX-1, MW-2, MW-3, and MW-4. These samples will be collected subsequent to completion of the DPE pilot test, but prior to initiating the $O_3$ pilot test. Groundwater samples will be analyzed as described in Table 1.

*Field Parameters*

The following parameters will be measured using field equipment: depth to water, pH, temperature, dissolved oxygen, ORP, specific conductivity, and $O_3$ readings in the headspace of the wells. These measurements will be collected weekly during the pilot test.

*Laboratory Parameters*

Groundwater samples will be collected from wells EX-1, MW-2, MW-3, and MW-4 prior to the start of the $O_3$ injection, two weeks after test startup, and 1 week after $O_3$ injection has ceased. Groundwater samples will be collected and handled as described in the FA/IRAP. The samples will be analyzed as described in Table 1. The sample schedule and analytical suite may be amended during the pilot test at the discretion of the supervising Professional.

Contingency Plan

Baseline monitoring and sampling conducted prior to $O_3$ injection will provide information on the current geochemistry of groundwater in the area. Data collected during and after the test will enable evaluation of changes in the groundwater geochemistry that may be attributed to the injection of $O_3$, and enable evaluation of the potential for specific undesirable byproducts to form and/or migrate outside the intended treatment area. In a longer duration $O_3$ pilot test, the analytes/parameters that would be evaluated include Fe, Mn, $Cr^{+6}$, Na, bromate, and pH. However, for this short-duration pilot test we will monitor only pH, which is a reliable indicator of potential adverse conditions. Should the pH vary outside the range of $6.5<pH<8.5$ during implementation of the pilot test, $O_3$ injection will be immediately suspended and ACEHD notified. The pH will be monitored to verify that it returns to background levels. If pH does not return to background levels in a reasonable time period, Stratus will work with ACEHD to develop mitigation measures.

## Task 4: Reporting

Separate reports will be prepared and submitted to ACEHD and GeoTracker after each phase of the pilot test (well installation, DPE pilot test, and ozone injection pilot test). The reports will include descriptions of the work performed, summaries of the physical and analytical data collected, interpretations of the test results, and recommendations based of the data. The reports will also discuss any deviations from the approved work plan made by the supervising Professional.

## LIMITATIONS

This document was prepared in general accordance with accepted standards of care that existed at the time this document was prepared. No other warranty, expressed or implied, is made. Conclusions and recommendations are based on field observations and data obtained from this work and previous investigations. It should be recognized that definition and evaluation of geologic conditions is a difficult and somewhat inexact science. Judgments leading to

conclusions and recommendations are generally made with an incomplete knowledge of the subsurface conditions present. More extensive studies may be performed to reduce uncertainties. This document is solely for the use and information of our client, unless otherwise noted.

If you have any questions or comments concerning this document, please contact Steve Carter at scarter@stratusinc.net or (530) 676-6008.

Sincerely,

STRATUS ENVIRONMENTAL, INC.

PROFESSIONAL GEOLOGIST
Stephen J. Carter
No. 5577
STATE OF CALIFORNIA

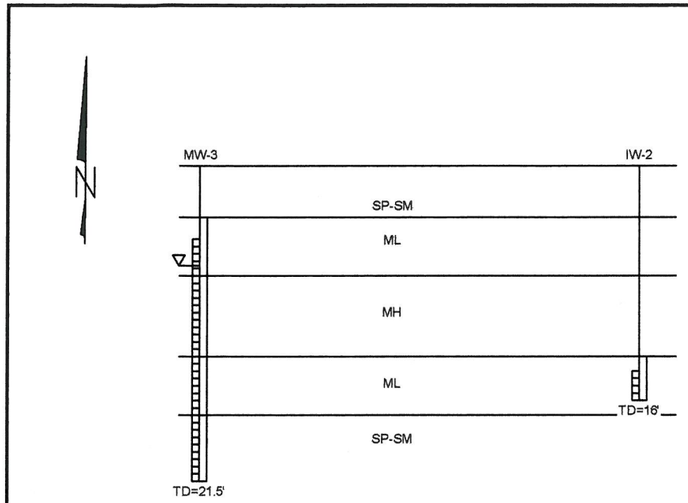
Stephen J. Carter, P.G.
Project Manager

Gowri S. Kowtha, P.E.
Principal Engineer

Attachments:

| | |
|---|---|
| Figure 1 | Site Plan |
| Figure 2 | Injection Well IW-1 Details |
| Figure 3 | Injection Well IW-2 Details |
| Table 1 | Analytical Methods |
| Manufacturer's Literature | |

cc: Mr. Phillip Jaber



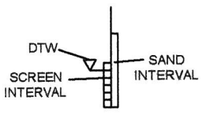

NOT TO SCALE

LEGEND

- MW-1 MONITORING WELL LOCATION
- SV-1 VAPOR EXTRACTION WELL LOCATION
- B-1 SOIL BORING LOCATION
- EX-1 PROPOSED EXTRACTION WELL LOCATION
- IW-1 PROPOSED OZONE INJECTION WELL LOCATION
- ASSUMED RADIUS OF INFLUENCE = 25' (DPE)
- ASSUMED RADIUS OF INFLUENCE = 20' (OZONE)
- COMMUNICATIONS LINE
- OVERHEAD ELECTRICAL LINE
- ELECTRICAL LINE
- WATER LINE
- SANITARY SEWER LINE
- GAS LINE
- STORM DRAIN
- UTILITY FLOW DIRECTION

GRO/BENZENE/MTBE CONCENTRATIONS IN µg/L
DTW = DEPTH TO GROUNDWATER
WELLS SAMPLED ON 2/04/11

HISTORICAL GROUNDWATER FLOW




GRANT AVENUE
VIA SECO
CHANNEL STREET
DRIVEWAY
DRIVEWAY
DRIVEWAY
PROPERTY LINE
PLANTER
BUILDING
ARROYO CENTER BUILDINGS
ARROYO CENTER PARKING LOT
OFFICE & GARAGE
FORMER UNDERGROUND FUEL PIPING
FORMER PUMP ISLANDS
FORMER UST EXCAVATION
FORMER WASTE OIL UST EXCAVATION
PROPOSED PIPING TRENCH
PROPOSED TREATMENT SYSTEM
OHE
GAS

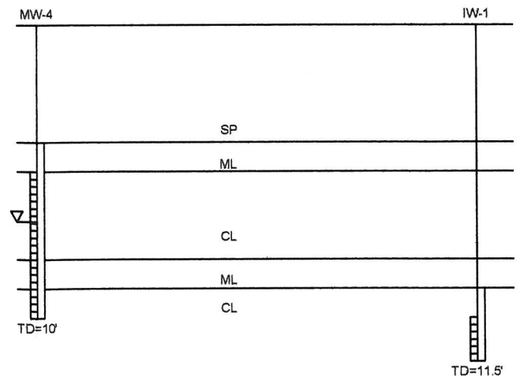
B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8 B-9 B-10 B-11 B-12 B-13 B-13A B-13B B-13C
BH-A BH-B BH-C
MW-1 MW-2 MW-3 MW-4
SV-1 SV-2 SV-3 SV-4
EX-1 EX-2 EX-3
IW-1 IW-2

4,800/350/440
DTW: 6.71'

220/64/36
DTW: 6.80'

ND/0.90/62
DTW: 7.20'

ND/ND/4.4
DTW: 6.79'




NOT TO SCALE

STRATUS ENVIRONMENTAL, INC.

0 40 FT
APPROXIMATE SCALE

FORMER OLYMPIC SERVICE STATION
1436 GRANT AVENUE
SAN LORENZO, CALIFORNIA

SITE PLAN

FIGURE
1

PROJECT NO.
2115-1436-01

Olympic Service Station JMP REV March 15, 2011 Olympic Siteplan

# PROPOSED WELL DETAILS

PROJECT NUMBER: 2115-1436-01

PROJECT NAME: Former Olympic Service Station

LOCATION: 1436 Grant Avenue, San Lorenzo, CA

WELL PERMIT NO.: _____

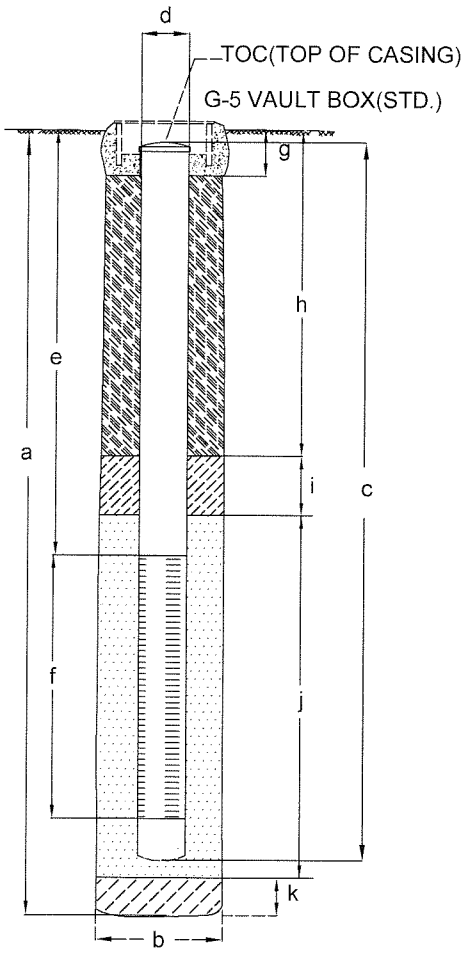
BORING/WELL NO.: IW-1

TOP OF CASING ELEV.: _____

GROUND SURFACE ELEV.: _____

DATUM _____

INSTALLATION DATE: _____




BENTONITE

CEMENT

CONCRETE

SAND

PERFORATION

NOT TO SCALE

## EXPLORATORY BORING

a. TOTAL DEPTH 11.5 ft.

b. DIAMETER 8 in.

DRILLING METHOD Hollow Stem Auger

## WELL CONSTRUCTION

c. TOTAL CASING LENGTH 11.5 ft.

MATERIAL Schedule 80 PVC

d. DIAMETER 3/4 in.

e. DEPTH TO TOP PERFORATIONS 10 ft.

f. PERFORATED

INTERVAL FROM 10 TO 11.5 ft.

PERFORATION TYPE Ceramic Diffuser

PERFORATION SIZE 0.01 in.

g. SURFACE SEAL 0 to 1 ft.

SEAL MATERIAL Concrete

h. BACKFILL 1 to 8 ft.

BACKFILL MATERIAL Neat Cement

i. SEAL 8 to 9 ft.

SEAL MATERIAL Bentonite

j. FILTER PACK 9 to 11.5 ft.

FILTER PACK MATERIAL Lonestar #3

k. BOTTOM SEAL None

SEAL MATERIAL _____

FIGURE 2

PREPARED BY _____ DATE _____

REVIEWED BY _____ DATE _____

# PROPOSED WELL DETAILS

PROJECT NUMBER: 2115-1436-01

PROJECT NAME: Former Olympic Service Station

LOCATION: 1436 Grant Avenue, San Lorenzo, CA

WELL PERMIT NO.: _____

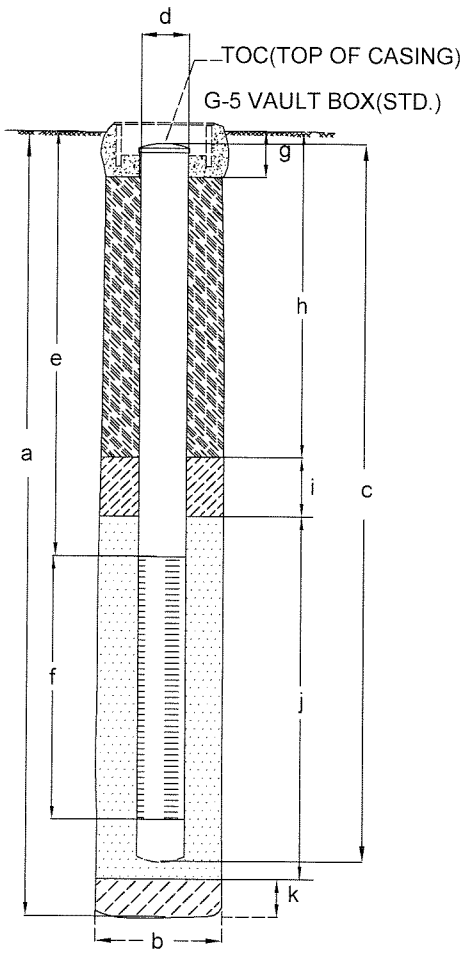
BORING/WELL NO.: IW-2

TOP OF CASING ELEV.: _____

GROUND SURFACE ELEV.: _____

DATUM _____

INSTALLATION DATE: _____




BENTONITE

CEMENT

CONCRETE

SAND

PERFORATION

NOT TO SCALE

## EXPLORATORY BORING

a. TOTAL DEPTH 16 ft.

b. DIAMETER 8 in.

DRILLING METHOD Hollow Stem Auger

## WELL CONSTRUCTION

c. TOTAL CASING LENGTH 16 ft.

MATERIAL Schedule 80 PVC

d. DIAMETER 3/4 in.

e. DEPTH TO TOP PERFORATIONS 14.5 ft.

f. PERFORATED

INTERVAL FROM 14.5 TO 16 ft.

PERFORATION TYPE Ceramic Diffuser

PERFORATION SIZE 0.01 in.

g. SURFACE SEAL 0 to 1 ft.

SEAL MATERIAL Concrete

h. BACKFILL 1 to 12.5 ft.

BACKFILL MATERIAL Neat Cement

i. SEAL 12.5 to 13.5 ft.

SEAL MATERIAL Bentonite

j. FILTER PACK 13.5 to 16 ft.

FILTER PACK MATERIAL Lonestar #3

k. BOTTOM SEAL None

SEAL MATERIAL _____

FIGURE 3

PREPARED BY _____ DATE _____

REVIEWED BY _____ DATE _____

TABLE 1
ANALYTICAL METHODS
Former Olympic Station
1436 Grant Avenue, San Lorenzo, California

| | USEPA Method | |
|---|---|---|
| | Soil Samples | Groundwater samples |
| **Organic Compounds** | | |
| Gasoline Range Organics (GRO) | 8015 Modified/DHS LUFT | 8015 Modified/DHS LUFT |
| BTEX Compounds | 8260B | 8260B |
| Benzene | | |
| Toluene | | |
| Ethylbenzene | | |
| Xylenes | | |
| Fuel Oxygenates | 8260B | 8260B |
| Methyl tert butyl ether (MTBE) | | |
| Tert amyl methyl ether (TAME) | | |
| Di-isopropyl ether (DIPE) | | |
| Ethyl tert butyl ether (ETBE) | | |
| Tert butyl alcohol (TBA) | | |
| Lead scavanging compounds | 8260B | 8260B |
| 1,2-dichlorethane (1,2-DCA) | | |
| **Inorganic Compunds** | | |
| Total organic carbon (TOC) | | SM5310 D |
| Ferrous Iron | | SM3500-FeD |
| Ferric Iron | | 200.7/SM3500-FeD |
| Dissolved Iron | | 200.7 |
| Hexavalent chromium ($Cr^{6+}$) - total and dissolved | | 218.6 |
| Total phosporus as P | | SM4500-P E |
| Bromate | | 317.0 IC |
| Metals - Be, Ca, Cd, Cr, Co, Cu, Fe, Pb, Mg, Mn, Ni, Na,V, and Zn | | 200.7 |

# Ozone Sparge System

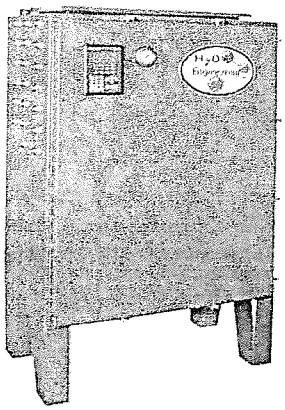
$H_2O$ Engineering, Inc.'s ozone sparge technology is designed to deliver ozone gas directly to the contaminated subsurface. Ozone gas is delivered in controlled time duration sequences to the subsurface via injection points to oxidize the contaminant. The time duration sequence can be programmed and accumulated by the panel view controller.

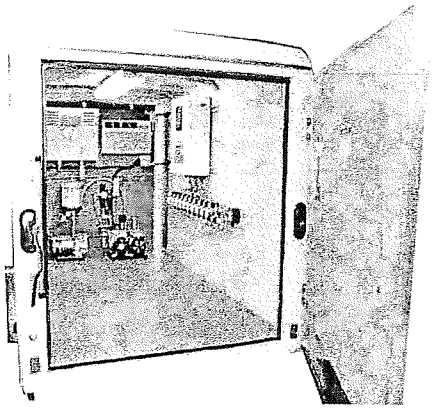
The ozone sparge system can be trailer-mounted, skid-mounted, or fully enclosed. $H_2O$ Engineering, Inc.'s ozone sparge system can be designed for short-term "hot spot" remediation or full scale site clean-ups. Our ozone sparge systems have successfully oxidized gasoline components BTEX, MTBE, and TBA in contaminated groundwater and saturated soils.

**Standard Ozone Sparge Units Contain*:**

- Ozone Generator – 1.3 lbs/day up to 30lbs/day ozone output @ 6% by weight
- Oxygen concentrator air-prep
- Ozone delivery pump
- Air booster compressor at 1.5 SCFM up to 8 SCFM @ 50 PSI
- Panel View controller
- 10 or 20 sparge point delivery system
- Ambient ozone sensor for safety shutdown
- Pressure/vacuum switch safety interlock

* System may vary based on client needs. Contact H2O Engineering, Inc. for details and prices.





**H2O Engineering, Inc.**
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**Fax: (805) 547-0113**
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