

WORK PLAN
FOR
REMEDICATION SYSTEM INSTALLATION

Xtra Oil Company Service Station (dba Shell)
1701 Park Street
Alameda, California

Project No. 10-210-12-004

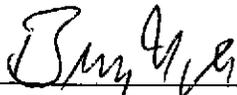
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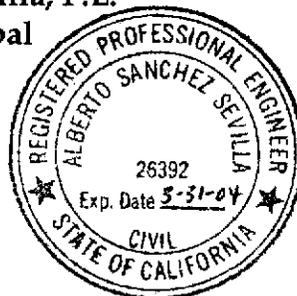
April 17, 2001



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Project Manager



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Principal



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INTRODUCTION

In October 1999, a corrective action plan (CAP) was submitted to the Alameda County Health Care Services Agency (ACHCSA) for the Xtra Oil service station at 1701 Park Street, Alameda, California. Based on results of the previous site investigation and remedial feasibility study, including a cost-effectiveness analysis, it was recommended that a remediation system consisting of air sparging and vapor extraction with thermal treatment be implemented at this site. As part of the proposed corrective action plan, it was also recommended that pilot testing of the recommended technologies be performed to obtain additional site information before the final engineering design of the recommended remediation system:

With concurrence of the ACHCSA, the air sparging and vapor extraction pilot testing was performed in October 2000. The report, presenting the results of the pilot testing, was submitted to the ACHCSA in February 2001. The results of the pilot testing indicated that both air sparging and vapor extraction technologies are applicable to the site. In a letter dated March 1, 2001, the ACHCSA concurred that the recommended air sparging and vapor extraction technologies would be effective to remediate the residual hydrocarbons in the subsurface at the site.

RECOMMENDED DESIGN PARAMETERS

Based on evaluation of field test data and site geology, following is a summary of parameters and values recommended for use in the design of the proposed vapor extraction and air sparging system for this site.

<u>Parameter</u>	<u>Design Value</u>
Vapor Extraction	
Minimum Vacuum:	40 inches of water
Radius of Influence:	>50 feet
Expected Flow Rate:	100 - 125 cfm
Estimated Initial Hydrocarbons Concentration:	120,000 ppmv



<u>Parameter</u>	<u>Design Value</u>
Air Sparging	
Injection Pressure:	10 psi
Radius of Influence:	30 feet
Injection Level:	20 feet below static water level
Minimum Air Flow per Point:	2 cfm per well
Number of Injection Points:	7
Total Design Flow Rate:	14 cfm at 10 psi

DESCRIPTION OF RECOMMENDED REMEDIATION SYSTEM

The proposed remediation system will consist of the following components:

1. An existing horizontal 4-inch-diameter perforated pipe within a "U"-shaped trench, installed in 1994 during station renovation, will be used for vapor extraction. As shown on the enclosed site layout, the horizontal pipe will be connected to the vapor extraction unit, each fitted with a throttling valve and vacuum gauge. The piping layout would allow for future expansion of the system.
2. In April 1999, seven air sparging points, ASP-1 through ASP-7, were installed onsite at the locations shown on the enclosed site plan. The air sparging points were installed to depths of between 26 and 30 feet using ¾-inch-diameter PVC blank casing and pre-pack screened interval for the bottom two feet.
3. Soil gas vapor will be extracted by a 250-cfm regenerative vacuum blower and treated through a catalytic oxidation unit before discharge to the atmosphere to comply with applicable regulations. The vapor extraction system, which is capable of removing or oxidizing the hydrocarbon vapor, also include a knockout drum for moisture removal and a microprocessor-based, electronic control system for automatic operation. An aboveground tank will also be installed for storage of propane as supplemental fuel to maintain the operating temperature and destruction efficiency of the system.
4. A 5-horsepower air compressor will be used to supply air to the sparging points.
5. The treatment compound will include a reinforced concrete pad with a 6-foot chain-link fence for security and visual screening of the aboveground equipment.

The subsurface piping for the remediation has already been installed onsite during station renovation in 1994. Before installation of the other system components, approvals and permits for the construction and operation of the remediation system will be obtained from the appropriate regulatory agencies. The layout of the proposed remediation system is shown on Figure 1. The process flow diagram for the recommended system is shown on Figure 2.



IMPLEMENTATION PLAN

Implementation of the recommended remedial plan will involve the following tasks:

Task 1: Engineering Design and Permitting

The final engineering design of the proposed remediation system will be prepared and submitted to the appropriate permitting agencies for approval. System design will include equipment selection and sizing and layout of system components and preparation of plans and specifications.

An air discharge permit application for the vapor extraction and treatment system will be prepared and submitted to Bay Area Air Quality Management District (BAAQMD). The building and construction permit applications that are necessary to install the proposed remediation system will also be prepared and submitted to appropriate agencies.

Task 2: Pre-Construction Activities

Pre-construction activities will include development of a site-specific safety plan, liaison with appropriate agencies to review the work plan (if necessary), scheduling of construction and field activities and subcontractors, and location of underground utility lines and piping.

Task 3: Treatment System Installation and Startup

Equipment and hardware for the remediation system will be installed in accordance with the final engineering design. Startup of recovery system equipment includes troubleshooting and adjustment of operating parameters.

Task 4: Startup, Operation, and Maintenance

After initial startup testing, the remediation system will be operated and maintained on a scheduled basis. At a minimum, influent and effluent samples will be analyzed and collected in accordance with the discharge permit issued by the regulatory agency and a monthly progress report prepared for submittal to the regulatory agencies. An operation and maintenance (O&M) plan will be followed to ensure continued safe and reliable system operation and compliance with regulatory requirements.

IMPLEMENTATION SCHEDULE

The site activities proposed herein will be completed within approximately 180 work days after work plan approval and acquisition of the air quality permits. The schedule for completion of the major tasks is as follows:



Activity	Estimated Work Days after Work Plan Approval	
Engineering Design and Permitting	90	Aug 9, 2001
Pre-Construction Activities	120	Sep 2001
Equipment Installation	160	Nov 2001
Startup and Troubleshooting	180	Dec 2001

Due to the nature and logistics involved in extraction/treatment system permitting and installation, this schedule may be subject to revision. Any changes to the schedule will be communicated in advance to the appropriate agencies and parties involved.

SITE SAFETY PLAN

All field procedures and activities related to the performance of site work will be in accordance with the site-specific safety plan. The site safety plan will be developed in compliance with applicable requirements of the Federal Occupational Safety and Health Administration (OSHA) and California OSHA.

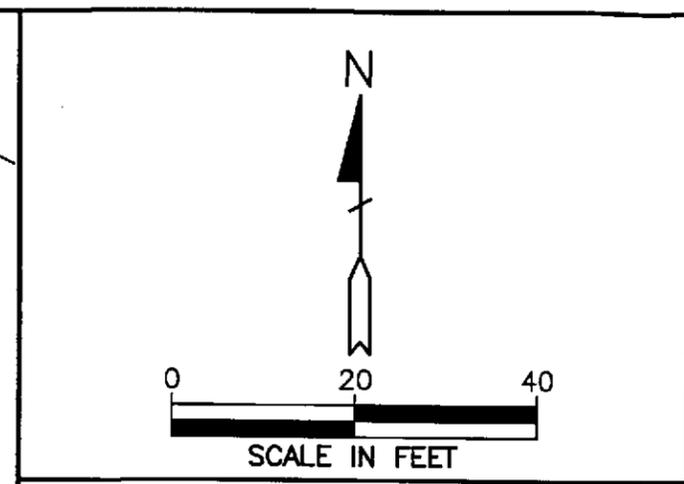
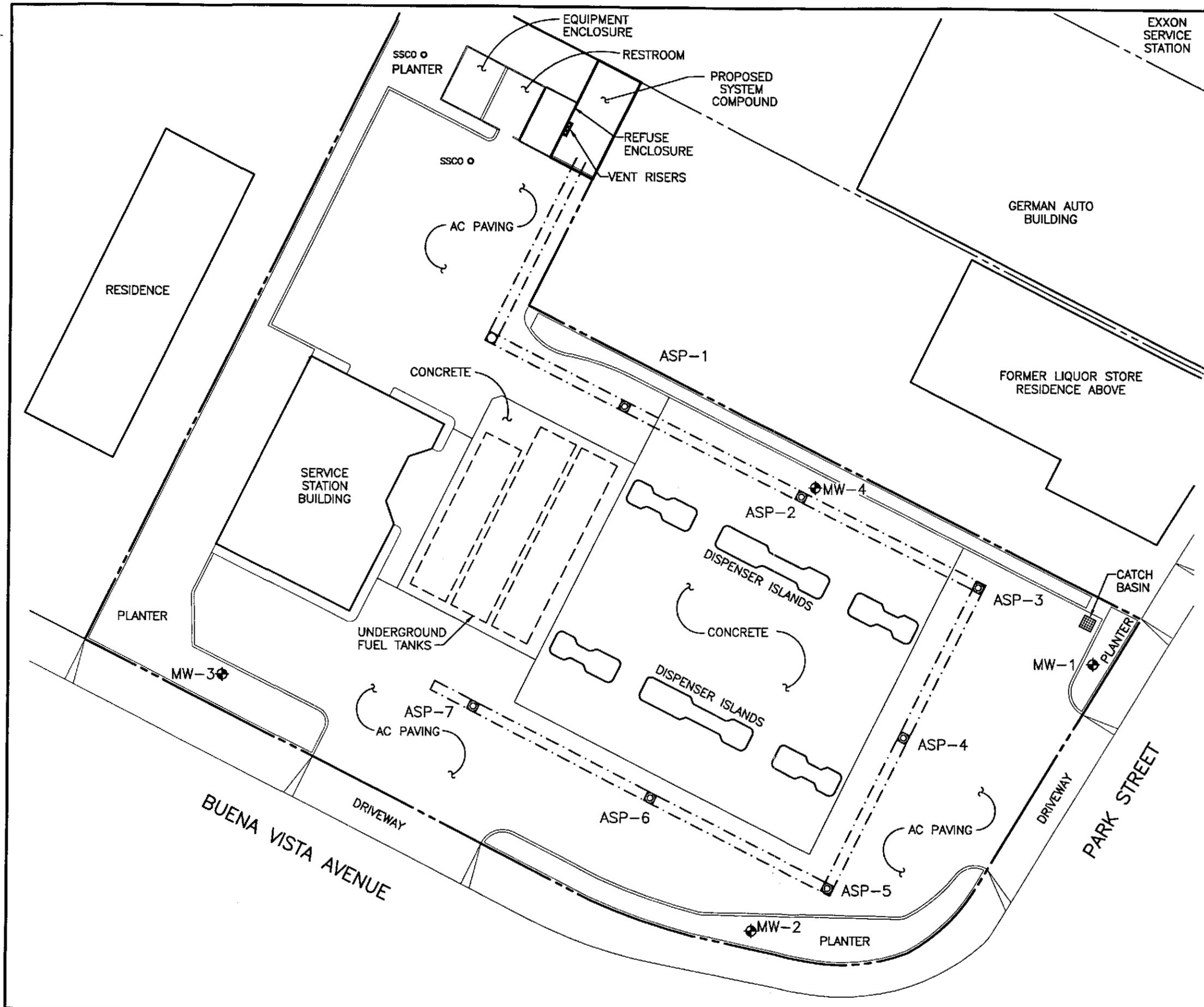
1/10/02 Per B Nagle:

At Permit stage as of Jan 2002

BAAQMD - Yes

City Bldg - No





LEGEND

- ◆ EXISTING GROUNDWATER MONITORING WELL
- EXISTING AIR SPARGING POINT WITH WELL VAULT
- PROPOSED PIPING VAULT
- SSCO ○ SEWER SERVICE CLEANOUT
- PROPERTY LINE
- - - EXISTING HORIZONTAL VAPOR EXTRACTION TRENCHING

FIGURE 1
SITE PLAN

XTRA OIL COMPANY SERVICE STATION
 1701 PARK STREET
 ALAMEDA, CALIFORNIA
 PROJECT NO. 10-210

1021031-DWG 02-18-01 CME 1/20

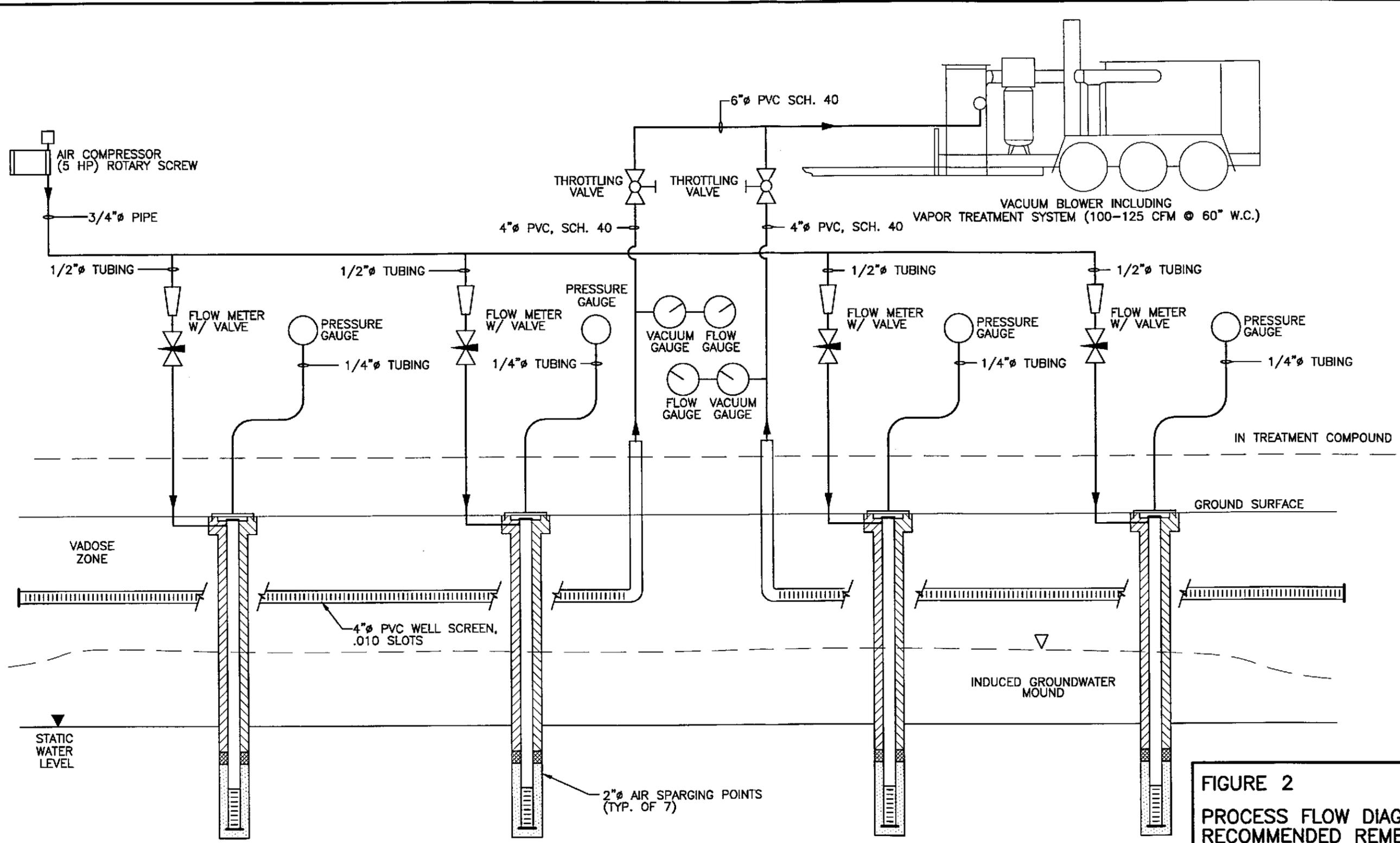


FIGURE 2
PROCESS FLOW DIAGRAM OF
RECOMMENDED REMEDIATION SYSTEM
 XTRA OIL COMPANY SERVICE STATION
 1701 PARK STREET
 ALAMEDA, CALIFORNIA
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