



"We Rent Most Everything"



12-28-95

Dear Eva,

Enclosed is the latest report from
Al Ridley of Woodward Clyde.

Happy New Year

Pete Sullivan

THIS IS WOODWARD CLYDE'S
PROPOSAL FOR REMEDIATION

Jo-Beth (A. Riddle)

2.0

SCOPE OF WORK

893-3600

2.1 GENERAL APPROACH

This proposal addresses the remediation of gasoline impacted soil and groundwater to levels acceptable to regulatory agencies. WCC previously performed a characterization of the soil and groundwater at this site, as detailed in the report dated June 12, 1991 (WCC 1991). This study revealed free phase (floating) liquid hydrocarbons (FPLH), in addition to significant petroleum contamination in the soil and groundwater. The study concluded that the most feasible remedial strategy included groundwater remediation by "pump and treat" and soil remediation using vapor extraction. Further review of the findings of the soil and groundwater characterization show agreement with this remedial strategy.

The Corrective Action Plan (CAP) and remedial strategy will be designed to address the contamination discussed in the previous WCC report (WCC 1991). Conclusions of this report include:

1. Gasoline contamination in soil and groundwater at the site is the result of two separate sources: (1) a pipe leak from pipes connected to former Mobil tanks between 1951 and 1968, and (2) a sudden spill into a vapor monitoring well by Petcock Petroleum in 1985.
2. Laboratory tests of samples of soil and groundwater for petroleum products indicated that soil contaminated with gasoline is located primarily on-site in the vicinity of well W-1 from a depth of about 15 to 43 feet, and near Boring B-1A from about 35 to 43 feet.
3. The location of the floating product in W-1, about 40 feet downgradient from the reported Petcock Petroleum spills, appears consistent with the estimated present location for a spill at the vapor well in 1985. Floating product appears to be located on-site in the vicinity of W-1.

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4. The estimated volume of floating product from measured thickness and diameter is approximately 200 to 500 gallons.
5. Laboratory tests of groundwater from off-site wells W-C (upgradient), W-D and W-E (downgradient) show no significant detection of gasoline or BTEX. One ppb benzene in Well W-D is most likely a result of cross contamination during transport to the laboratory. Dissolved fractions of gasoline (BTEX) extend off-site in the downgradient direction towards W-D and W-E.

2.2 SUMMARY OF PROPOSED TASKS

Our general approach to meeting the project objectives is to develop a technically feasible and economically advantageous program for accomplishing site remediation, and to present the plans clearly and concisely to all the parties as to facilitate the understanding and approval. We recognize that our client's primary concern is to achieve site remediation to the full satisfaction of all responsible agencies, at minimum cost. The proposed tasks are:

1. Preparation of CAP
2. Permitting
3. FPLH Recovery
 - 3a. System Design
 - 3b. System Installation and Start-up
4. Groundwater/Soil Remediation
 - 4a. System Design
 - 4b. System Installation and Start-up
5. Operation and Maintenance
6. Monitoring Program

The proposed tasks listed above separate the remedial strategy into two distinct phases, which are:

- FPLH recovery
- Groundwater remediation by groundwater extraction coincident with soil remediation by vapor extraction

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Recovery of the FPLH will be addressed first because the FPLH represents a primary source of the soil and groundwater contamination. The recommended FPLH recovery system is a total fluids system, which utilizes a submersible pump to simultaneously draw down the groundwater level and recover floating product through a top inlet. The drawdown of the water table will enhance the flow of product to the recovery well, while maintaining the product level within the screened interval of the well casing.

Remediation of the groundwater and soil will be addressed after the recovery of FPLH becomes negligible. The extraction of groundwater will be accomplished using the same pumping system used to recover FPLH, with three recovery wells. The design flow rates for the groundwater extraction and treatment system will be obtained from the results of the FPLH recovery phase, negating any need for pilot testing of the groundwater extraction system. A soil vapor extraction system (VES) will be used to remediate the soil in the vadose zone above the lowered water table. A two-day pilot test using WCC's mobile unit will be used to size the VES equipment.

A full description of each of the proposed tasks is given below.

2.3 DESCRIPTION OF PROPOSED TASKS

2.3.1 Task 1 Preparation of CAP

Woodward-Clyde will prepare a CAP suitable for submission to the Alameda County Department of Environmental Health. This document will describe the workplan as presented in this proposal and will comply with requirements of the Regional Water Quality Control Board, Tri-Regional Board Staff's Recommendations for Preliminary Investigation and Evaluation of Underground Tank Sites, Appendix A, 30 August 1991.

2.3.2 Task 2 Permitting

It is expected that the Vapor Extraction System proposed will operate under a permit from the Bay Area Air Quality Management District (BAAQMD), and the proposed groundwater recovery system will discharge to the City of Livermore sewage treatment system, which will also require a permit. While preparing this proposal, Woodward-Clyde contacted the sewage

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treatment plant and verified permit requirements and fees. Although permits are issued by the sewage treatment plant on a case-by-case basis for treatment systems of this type, they indicated that permit issuance is quite likely. This allows a significant cost savings to Arrow Rentals over the alternative of obtaining an NPDES permit to discharge to the storm drain system; both in costs to obtain the permit, and the cost savings in significantly reduced sampling and analysis requirements.

As a part of this task, Woodward-Clyde will prepare required permit applications and pay the permit fees for both phases of the work as described in Tasks 3 and 4.

2.3.3 Task 3 FPLH Recovery

It is WCC's intent to address the recovery of FPLH as expeditiously as possible, using an inexpensive pneumatic pump which will not require an initial pilot test. Since FPLH has only been detected in one monitoring well, W-1, this well will be the only one used for FPLH recovery. The pumping rate will be adjusted during the first day of startup to provide product recovery while maintaining approximately five feet of drawdown. It is expected that the pumping rate will be approximately 0.1 to 0.5 gpm.

The duration of the FPLH recovery phase of remediation will be established by the actual volume of product at the site and actual recovery rates. The previous report (WCC, 1991) estimated that approximately 200-500 gallons of FPLH are floating atop the water table, using an apparent thickness in monitoring well W-1 of four inches. Using Woodward-Clyde's experience with correlations validated in the literature (de Pastrovich et al., 1979; Kramer, 1982; Hampton and Miller, 1988) the actual thickness of FPLH atop the water table is about one inch and the volume of product which could be recovered under ideal conditions is approximately 60% of the total volume, or 120 - 300 gallons. It is estimated that the bulk of the recoverable free product will be extracted within the first six months of operation.

2.3.3.1 Task 3a System Design

The proposed FPLH recovery system has been designed based on the available site data and WCC's experience with FPLH recovery systems. It is understood that the proposed design may be modified during the development of the CAP. WCC proposes to prepare design plans

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and specifications which can be incorporated into bid documents for the manufacture and installation of the FPLH recovery system. A draft of the design document will be submitted to Arrow Rentals for review prior to finalizing the design. WCC has extensive experience in preparing bid documents and has worked on many remediation projects with qualified local equipment manufacturers and remediation contractors. The bid documents will be prepared with bid schedules attached for the bidders to submit with the required unit price and lump sum bid amounts.

For the given site constraints, the recommended pump is a pneumatic submersible pump which will recover both groundwater and product through a top inlet. The submersible pump has a design flow rate of 0 - 2.5 gpm, with adjustable controls which will be located in the wellhead vault at the ground surface. A new well vault will be installed at well W-1 sized to accommodate the wellcap, fittings, and controls for the pump.

The pump will be controlled using air supplied by an air compressor located at a centrally located treatment area. Air requirements for the pump are 2 cubic feet per minute (cfm) at a pressure of 100 psig. The fluid extracted from the well will be routed to an oil water separator which will also be located at the treatment area. The oil water separator will separate the product, which will be collected in a storage container, and the groundwater, which will be treated using granular activated carbon (GAC). It is estimated that approximately 5-20 pounds of carbon will be needed per day to provide adequate treatment of the groundwater. The carbon replacement fees are not included in the cost estimate because this carbon usage rate will vary as remediation progresses. The treated groundwater will be discharged to the City of Livermore's sanitary sewer system.

2.3.3.2 Task 3b System Installation and Startup

It is expected that the FPLH recovery system will be installed shortly after receiving agency approval. Installation of the system will include the replacement of the wellhead vault for well W-1; installation of the air compressor and treatment equipment at the location shown in Figure 2-2, underground installation of the electrical supply, air supply, and fluid discharge lines between the recovery well and the treatment system; and installation of the pump in well W-1. Each of these activities will be completed without disrupting the normal operation of the Arrow Rental site.

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WCC will procure the major system equipment specified in the design document. WCC will order equipment directly from the manufacturer or manufacturer representative and track the shipment, delivery, and invoicing of such equipment to track adherence to the project budget and schedule. This equipment will be delivered to WCC's Pleasant Hill warehouse for storage until the commencement of system installation.

Required on-site trenching will be conducted by a licensed general contractor holding a hazardous substance removal license. Unattended trenches will be covered to minimize safety hazards and permit normal operation of the facility. Excavated material will be stored on-site at a location to be approved by Arrow Rentals until it is decided whether or not the material may be returned to the excavation or if it requires treatment and/or disposal. Disposal of contaminated soil is not included in the cost estimate.

Upon completion of system installation, WCC will inspect the final installation and will notify the relevant regulatory agencies and the client as to the start-up date. WCC will arrange for initial inspection and sampling to be performed in accordance with any permit conditions.

Startup of the system will consist primarily of monitoring the system during the first two days of operation. During this time, the pumping rate of the pump will be adjusted to an optimal rate, lines will be checked for leaks, the air compressor's air supply rate will be adjusted, and necessary modifications will be performed. The operating parameters of the system, such as air supply pressure, total fluid discharge rate, product discharge rate, and effluent concentrations will be recorded frequently during the initial startup. After startup, the FPLH recovery system will be checked by WCC on a weekly basis to verify proper operation. The FPLH recovery phase of site remediation will be terminated after the FPLH recovery rate becomes negligible. It is estimated that the duration of this phase should be on the order of 6 months.

2.3.4 Task 4 Groundwater/soil remediation

Remediation of the groundwater and soil at the Arrow Rentals site will be addressed after the recovery of FPLH in well W-1 becomes negligible. Commencement of groundwater/soil remediation phase will be expedited by initiating the design and installation of equipment

while the FPLH recovery system is operating. During this second phase, remediation of groundwater will be achieved by groundwater extraction while remediation of soil will be achieved using a soil vapor extraction system (VES).

The groundwater extraction system will include pneumatic submersible pumps similar to the one utilized earlier for FPLH recovery. The parameters monitored during the FPLH recovery phase will be used to make any appropriate modifications to the equipment sizing for the groundwater extraction system. It is estimated that a groundwater extraction rate of 0.1 to 0.5 gpm is achievable from each extraction well. It is desired that existing wells be used for groundwater extraction as much as possible.

The vapor extraction system will include a skid-mounted vacuum blower and associated equipment which WCC has used successfully at numerous other sites. A two-day pilot test will be used to design the VES system and select the appropriate spacing of the vapor extraction wells. It is assumed in this proposal that three vapor extraction wells will be used, which will require the installation of two additional wells.

2.3.4.1 Task 4a System Design

WCC proposes to prepare design plans and specifications which can be incorporated into bid documents for the manufacture and installation of the groundwater and vapor extraction systems. A draft of the design document will be submitted to Arrow Rentals for review prior to finalizing the design. The bid document will include the following activities:

- Installation of vapor extraction wells similar to the existing monitoring wells
- Modification of the wellhead vaults for the groundwater extraction wells
- Installation of submersible pneumatic pumps
- Trenching and piping to the extraction wells
- Installation of the system piping and instrumentation
- Installation of equipment, including the VES, at the treatment area

WCC will prepare bid documents for the installation of the extraction and treatment system. WCC has extensive experience in preparing bid documents and has worked on many remediation projects with qualified local equipment manufacturers and remediation

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contractors. The bid documents will be prepared with bid schedules attached for the bidders to submit with the required unit price and lump sum bid amounts.

It is estimated that an extraction pump which provides an extraction rate from 0 to 2.5 gpm will be appropriate to maintain 5 to 10 feet of drawdown and groundwater capture zone radius of 40 feet. For this radius, three to five wells will be needed for groundwater extraction. This proposal assumes that three existing wells (W-3, W-A, W-B) will be used. The air supply for the pneumatic pumps in each extraction well will be provided from the previously-installed air compressor. The extracted groundwater will be treated using liquid-phase GAC, which will be sized after the FPLH recovery phase. The treated groundwater will be discharged to the City of Livermore's sanitary sewer.

The soil vapor extraction system will be centrally located at the treatment area and connected to each of the vapor extraction wells using buried piping. The sizing of the VES equipment and the appropriate number of extraction wells will be determined using the results of a two-day pilot test with WCC's mobile VES unit. For this proposal, it is assumed that three vapor extraction wells will be appropriate. These wells will include well W-1 and two new wells at the locations shown on Figure 2-1. The two new vapor extraction wells will be similar to previous wells installed by WCC, with four-inch diameters and screened across the water table. The extracted vapor will be treated using a thermal oxidizer, followed by vapor-phase GAC and discharged to the atmosphere.

2.3.4.2 Task 4b System Installation and Startup

Installation of the soil/groundwater remediation system will consist of installing the extraction and treatment equipment, installing new wells, installing appropriate piping and controls, and providing startup. Each of these activities will be completed without disrupting the normal operation of the Arrow Rental site.

WCC will procure the major system equipment specified in the design document. WCC will order equipment directly from the manufacturer or manufacturer representative and track the shipment, delivery, and invoicing of such equipment to track adherence to the project budget and schedule. This equipment will be delivered to WCC's Pleasant Hill warehouse for

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storage until the commencement of system installation. The skid-mounted VES unit will be delivered to the site by the manufacturer complete with all controls and instrumentation.

Any trenching and subsurface work will be performed as specified for the FPLH recovery phase. The new wells will be installed using the same procedure used by WCC for the previous wells. It is assumed in the cost estimate that one soil sample from each of the two new wells will be analyzed by modified EPA method 8015 for detection of petroleum hydrocarbons. Further analysis may be performed as requested by the client. Upon completion of system installation, WCC will inspect the final installation and will notify the relevant regulatory agencies and the client as to the start-up date. WCC will arrange for initial inspection and sampling to be performed in accordance with any permit conditions.

Startup of the system will consist primarily of monitoring the system during the first two days of operation. During this time, the pumping rate of the groundwater extraction pumps will be adjusted to an optimal rate, all lines will be checked for leaks, the air compressor's air supply rate will be adjusted, operation of the VES unit will be optimized, and any necessary modifications will be performed. The operating parameters of the system, such as air supply pressure, fluid discharge rates, and vapor effluent concentrations will be recorded frequently during the initial startup. The concentrations of vapor in the effluent stream will be monitored using a photoionization detector (PID) or flame ionization detector (FID).

2.3.5 Task 5 Operation and Maintenance

After the initial startup period, the extraction and treatment systems will be checked by WCC on a weekly basis to verify proper operation and to perform any required maintenance. It is estimated that the duration of this phase will be greater than one year.

2.3.6 Task 6 Monitoring Program

Task 6.1 Remediation System Performance Evaluation

The remediation system will likely be operated under a Bay Area Air Quality Management District (BAAQMD) Authority to Construct/Permit to Operate and a water discharge permit issued by the City of Livermore Sewage Treatment Plant. These permits will largely

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determine the frequency of monitoring and level of reporting required for the system. Based on our experience with similar systems permitted with these agencies, the permit conditions will likely include daily field monitoring of the VES until we can calculate carbon usage, monthly reporting to the BAAQMD, quarterly sampling and analysis of groundwater in accordance with the sewage treatment plant permit, start up report and quarterly reports to the Alameda County Department of Environmental Health and the RWQCB.

While preparing this proposal, we were in contact with the City of Livermore Sewage Treatment Plant, who confirmed permit and analysis requirements and fees.

Task 6.1a VES Monitoring

We propose quarterly sampling and laboratory analysis of the extracted vapors for TPH(g), BTEX, and atmospheric gases (oxygen, carbon dioxide and nitrogen). This will allow us to monitor the progress of the remediation.

Field monitoring of the VES (extracted vapors before and after treatment) will be performed by WCC using portable field instruments such as a photoionization detector (PID) and/or a flame ionization detector (FID). The BAAQMD Permit to Operate will likely require daily monitoring for the first month of operation, with weekly monitoring thereafter to ensure that the system is operating properly. Costs for this activity are included in Task 5 (Operation and Maintenance).

Task 6.1b Groundwater Remediation System Monitoring

Monitoring of the groundwater treatment system will be performed in accordance with the schedule established in the sewage discharge permit. The effluent of the treatment system will be sampled and analyzed quarterly for TPH(g) by modified EPA 8015 and BTEX by EPA 8020. One startup analysis for 13 metals by EPA 6010/7000 will also be required. The cost for the startup analyses is included in Task 3b.

Task 6.1c Groundwater Monitoring Program

It is assumed that the lead regulatory agency will require quarterly groundwater monitoring of existing monitoring wells which are not being used as extraction wells during the operation of the groundwater remediation system. This monitoring will aid in the evaluation of the effectiveness of the groundwater remediation system. It is assumed that 3 existing groundwater monitoring wells will be included in this program. Groundwater will be analyzed at a state-certified laboratory for TPH(g) and BTEX. The quarterly groundwater monitoring analytical laboratory test results will be submitted to the Alameda County Department of Environmental Health and the RWQCB.

Table 3-2 contains an estimate of the cost of each quarter of performance monitoring for the VES and groundwater remediation system at this site.

Task 6.2 Post-Closure Monitoring

It is assumed that the lead regulatory agency will require a quarterly groundwater monitoring program to be performed for up to two years following the shut down of the groundwater remediation system. This program will aid in the evaluation of the long-term effectiveness of the previously instituted remediation system. It is assumed that all of the existing groundwater monitoring wells associated with the site (5 onsite and 3 off site wells) will be included in this program. Groundwater will be analyzed at a state-certified laboratory for TPH(g) and BTEX. A quarterly groundwater monitoring letter report presenting the analytical laboratory test results will be prepared for submittal to the lead regulatory agency.

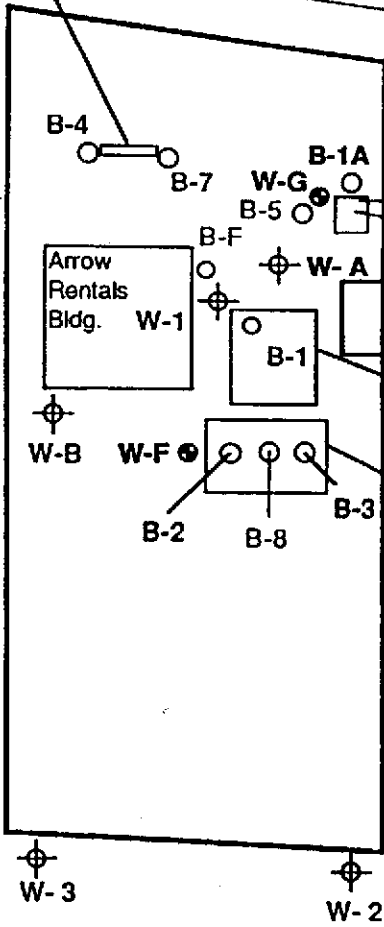
Table 3-2 contains an estimate of the cost of each quarter of post-closure monitoring at this site. Please note that if certain of the wells never show an indication of contamination, it is possible that they could be excluded from the monitoring program, and the costs would be reduced accordingly. Costs include labor, sample analysis, disposal of purge water, and the preparation of a letter report.

Former Pump Island

W-C

North L Street

Railroad Tracks



Vapor well (associated w/Arrow Rentals tank) fuel spill of 1985

Existing 1,000 gallon Chevron regular gasoline underground storage tank (Arrow Rentals)

Former 4,000 gallon and 6,000 gallon Mobil gasoline underground storage tanks

Three former 1,500 gallon Mobil gasoline underground storage tanks

LEGEND

- Approximate Soil Boring Location
- ⊕ Approximate Monitoring Well Location
- Approximate Location Proposed for Additional Vapor Extraction Wells

Proposal No. 93P0276	Arrow Rentals 187 North L Street Livermore, California	SITE PLAN	Figure 2-1
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