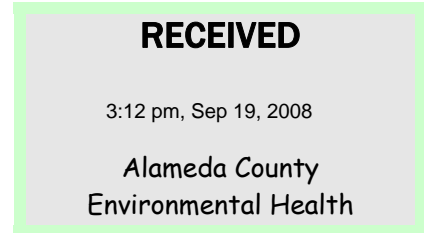




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18 September 2008  
Project No. 01LV



Jerry Wickham  
Hazardous Materials Specialist  
Alameda County Environmental Health  
1131 Harbor Bay Parkway, Suite 250  
Alameda, California 94502-6577

**Subject: Work Plan for Additional Well Installation  
1619 1st Street, Livermore, California  
Tesoro No. 67076 (Former Beacon 3604); ACEH Case No. RO0000434**

Dear Mr. Wickham:

Arctos Environmental (Arctos), on behalf of Tesoro Companies, Inc., is submitting this work plan for your approval. The work plan describes the installation of two dual-casing oxygen injection wells and one shallow monitoring/soil vapor extraction (SVE) well at the subject site (Figure 1).

### Executive Summary

Arctos prepared this work plan following the installation and baseline sampling of oxygen injection wells at the site as described in the Interim Remedial Action Plan (IRAP) for Groundwater submitted to Alameda County Environmental Health (ACEH) on 21 March 2008, and approved by ACEH on 22 April 2008. Injection wells were installed along the western and northern property boundaries in May and June 2008 and baseline sampling of the injection wells was performed on 23 July 2008. Injection well IP-1 (located furthest southwest; Figure 2) had the highest total petroleum hydrocarbons as gasoline (TPHg) and benzene concentrations of 62,000 and 2,100 micrograms per liter ( $\mu\text{g/l}$ ), respectively (Figure 3). Installation of two proposed injection wells will increase the oxygen injection system area of influence approximately 30 feet to the southwest of injection well IP-1. A proposed shallow monitoring well will be incorporated into the SVE system described in Arctos's IRAP to assist in remediation of the hydrocarbon-impacted saturated soils exposed during periods of low groundwater levels southwest of IP-1. The proposed shallow monitoring well will also provide additional source area groundwater data during

periods of high groundwater levels. Field data and analytical data from the installation will be included in the fourth quarter status report.

### **Site Background**

The site description and background are included in Arctos's IRAP dated 21 March 2008 (Arctos, 2008).

### **Objective and Scope of Work**

The objective of the planned activities is to install two dual-casing oxygen injection wells to increase the oxygen injection system area of influence by approximately 30 feet to the southwest of injection well IP-1, and to install one shallow monitoring/SVE well to assist in remediation of hydrocarbon-impacted saturated soils southwest of IP-1. To meet this objective, Arctos will perform the following scope of work:

- Mobilize for well installation including (1) marking for underground service alert (USA), (2) obtaining well permits from Zone 7 Water Agency, and (3) preparing a site-specific health and safety plan (HSP).
- Drill soil boring for oxygen injection well, designated as IP-8 (Figure 2), and collect soil samples 5 feet below grade and at 5-foot intervals for visual logging using the Unified Soil Classification System (USCS) and field headspace measurements using a photoionization detector (PID).
- Over-drill existing air sparge/soil vapor extraction well cluster RW-3 to install oxygen injection well, designated as IP-9 (Figure 2). No samples will be collected.
- Install and develop dual-casing oxygen injection wells IP-8 and IP-9, (Figure 2). Each well will be constructed as dual-casing injection/monitoring wells using 1-inch Schedule 40 polyvinyl chloride (PVC) pipe for the injection well and 2-inch Schedule 40 PVC pipe for the monitoring well. The wells shall be screened from approximately 60 to 65 feet below grade using 0.020-inch slotted screen (Figure 3)
- Drill soil boring for shallow monitoring/SVE well, designated as MW-11 (Figure 2). No samples will be collected.

- Install and develop shallow monitoring/SVE well. The well will be constructed using 4-inch Schedule 40 PVC pipe. The well shall be screened from approximately 28 to 43 feet below grade using 0.020-inch slotted screen.
- Collect groundwater samples from the new wells for laboratory analysis.
- Submit the water samples and selected soil samples to a State-certified laboratory for analysis of total petroleum hydrocarbons as gasoline (TPHg), benzene, toluene, ethylbenzene, xylenes, methyl tert-butyl ether, tert-butyl alcohol, other oxygenates, lead scavengers, methanol, and ethanol analyses using EPA Method 8260B.
- Survey the new wells.

Field procedures for the proposed field program will be conducted as described in the approved IRAP dated 21 March 2008 (Arctos, 2008). A well construction diagram for the proposed injection wells and for the proposed shallow monitoring/SVE well are shown on Figures 4 and 5, respectively. Field personnel may adjust the actual well depth and screen placement as required by the field conditions encountered. Arctos will evaluate the field and analytical data and incorporate the results into the fourth quarter status report. The report will include the following:

- Field activities and sampling procedures (including boring/well construction log, development log, sampling log, and a figure showing the well location)
- Laboratory analytical results presented in tables.

### **Schedule**

To include the proposed wells in the planned treatment system construction, Arctos is requesting approval to conduct the well installation activities in October 2008.

Jerry Wickham  
Alameda County Environmental Health  
18 September 2008  
Page 4

If you have any questions or comments, please call Mike Purchase at 510/525-2180 or Matthew Nelson at 562/988-2755.

Very truly yours,

**ARCTOS ENVIRONMENTAL**



Matthew Nelson  
Senior Staff Engineer



Michael P. Purchase, P.E.  
Senior Project Manager

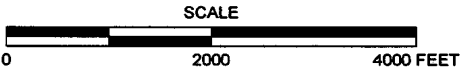
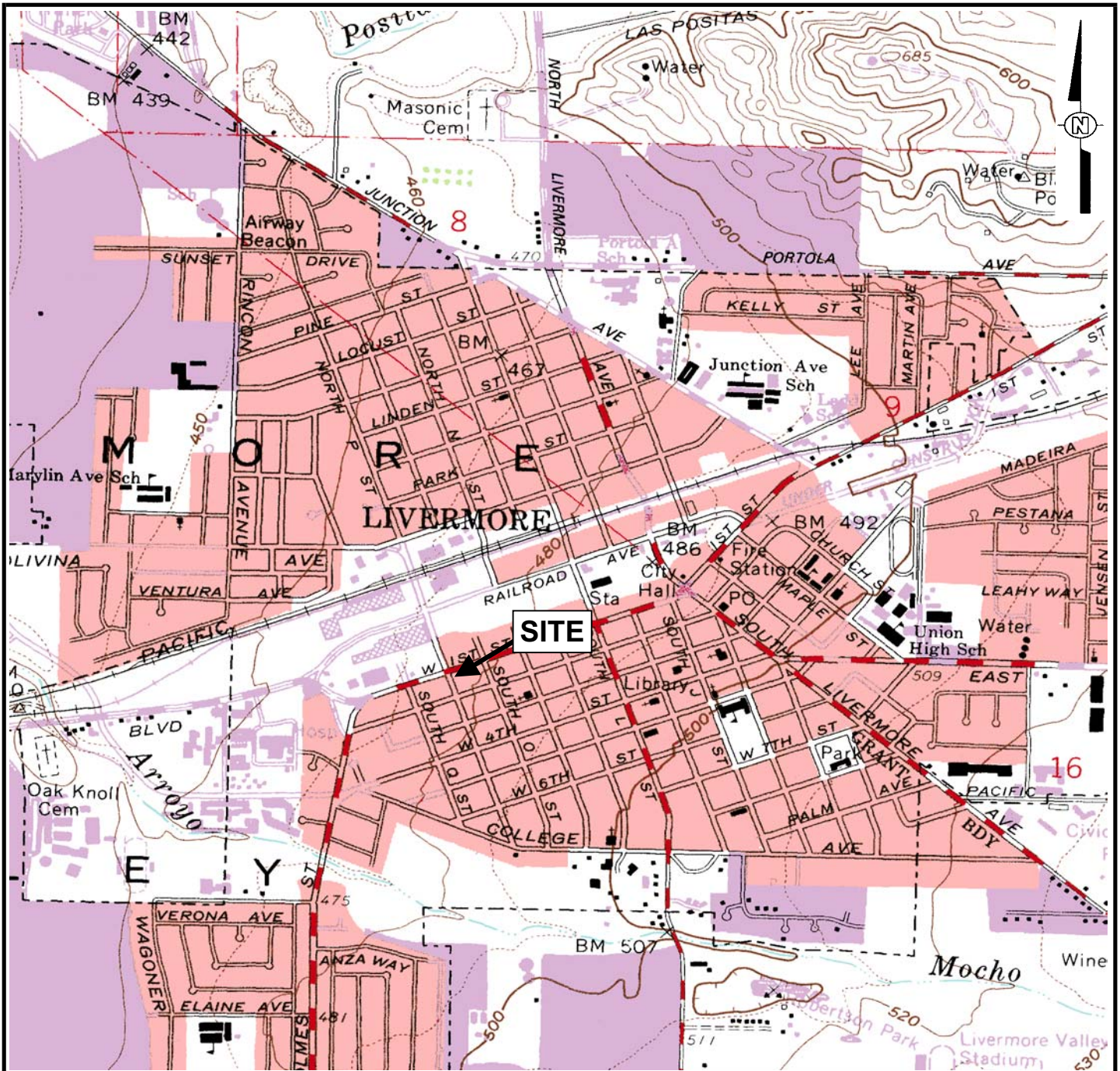


Copy: Jeffrey M. Baker, P.E. – Tesoro Companies, Inc.  
Colleen Winey – Zone 7 Water Agency

Attachments: Figure 1 – Site Location Map  
Figure 2 – Site Plan  
Figure 3 – Geologic Cross Section A-A'  
Figure 4 – Injection Well Construction Diagram  
Figure 5 – Monitoring Well Construction Diagram

### References

Arctos Environmental, 2008. *Interim Remedial Action Plan for Groundwater, 1619 1st Street, Livermore, California, Tesoro Station No. 67076, Former Beacon Station No. 3604, ACEH Case No. RO0434*, 21 March.

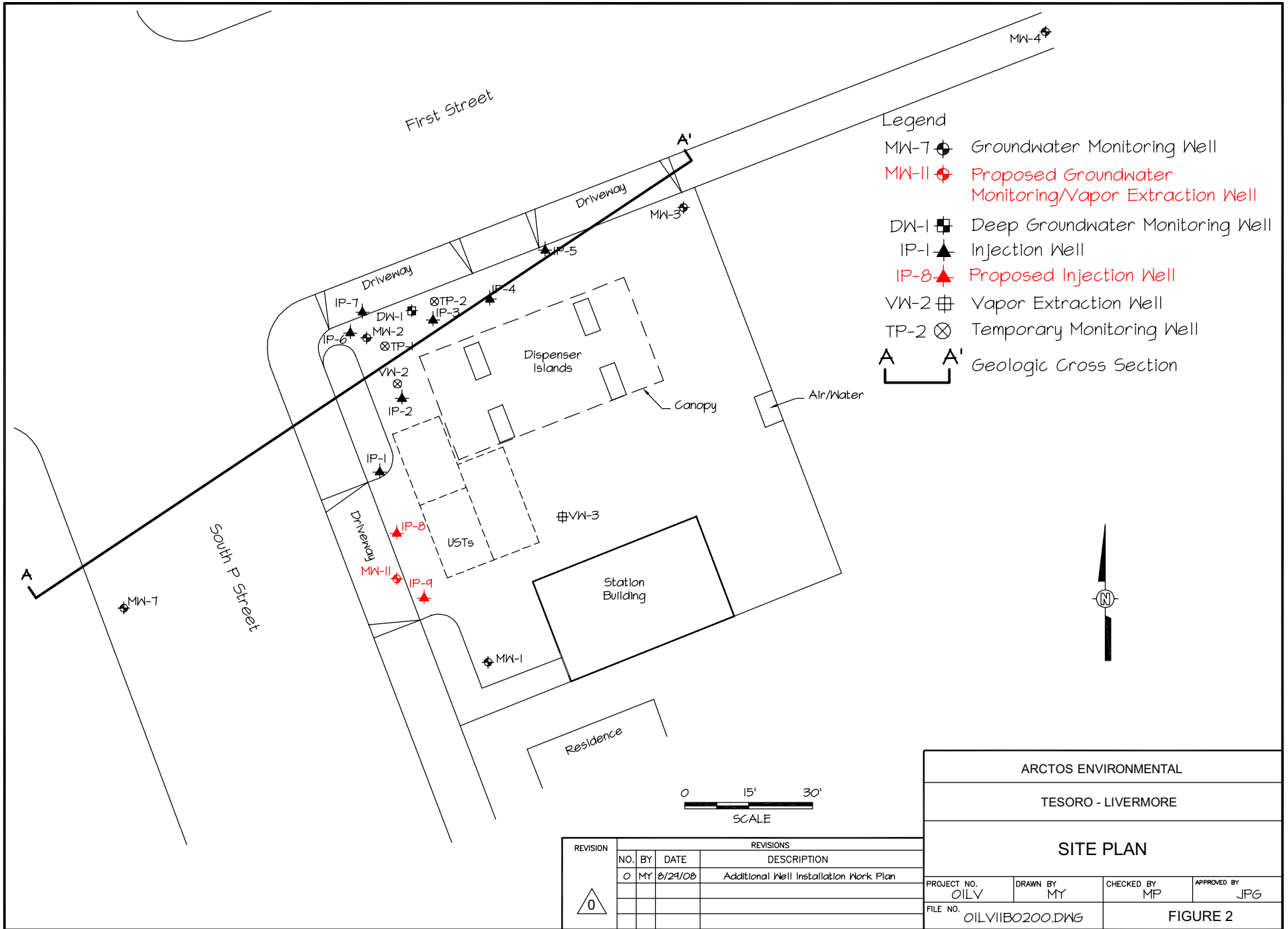


**REFERENCE**  
 7.5 MINUTE USGS TOPOGRAPHIC MAP OF  
 LIVERMORE, CALIFORNIA QUADRANGLE  
 DATE: 1961, PHOTOREVISED 1980  
 SCALE = 1:24,000

<b>ARCTOS ENVIRONMENTAL</b>			
<b>TESORO - LIVERMORE</b>			
<b>SITE LOCATION MAP</b>			
PROJECT NO. 01LV	DRAWN BY MP	CHECKED BY MP	APPROVED BY JG
FILE NO. Site Map.xls		<b>FIGURE 1</b>	

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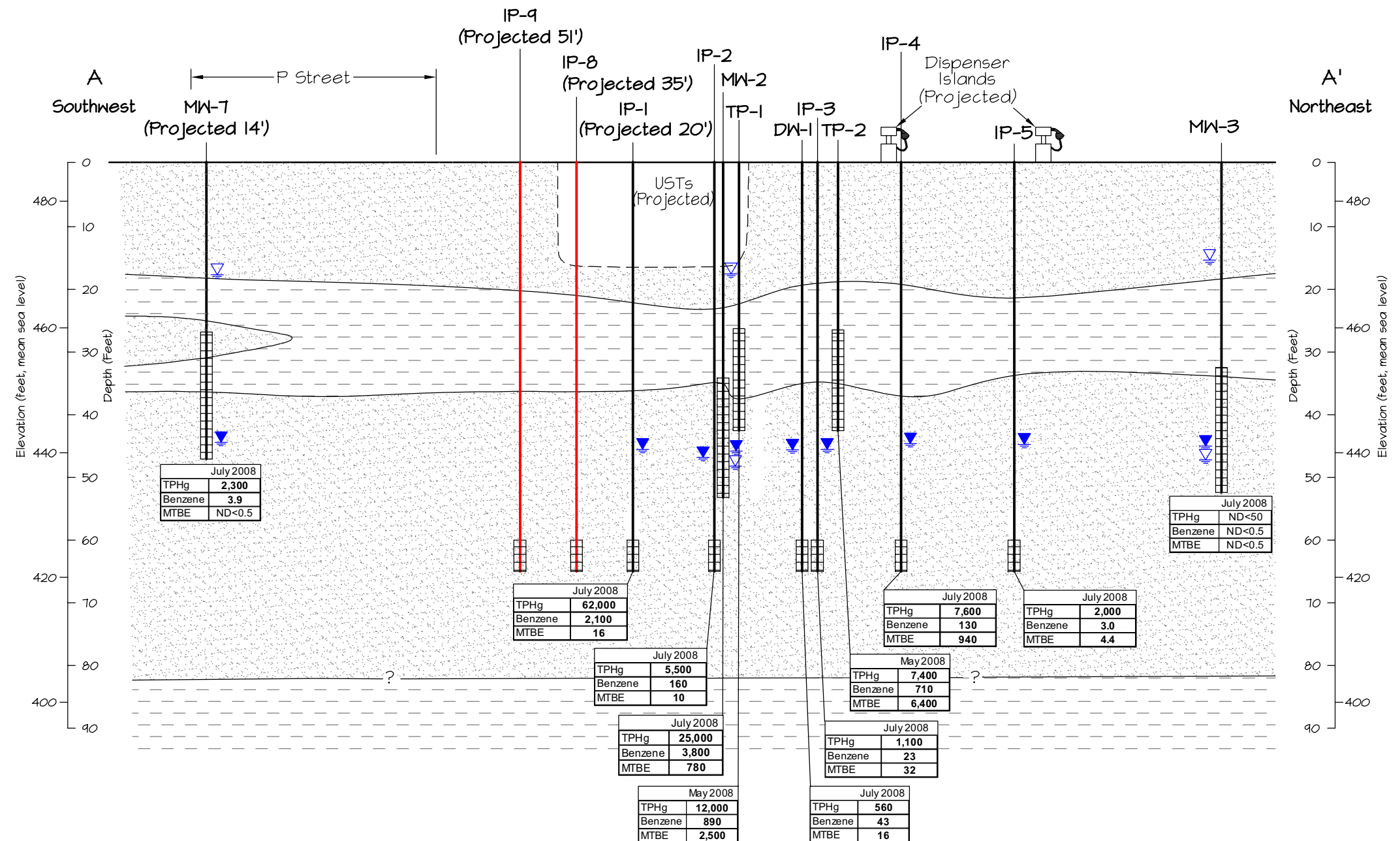
- Legend
- MW-7 Groundwater Monitoring Well
  - MW-8 Proposed Groundwater Monitoring/Vapor Extraction Well
  - DW-1 Deep Groundwater Monitoring Well
  - IP-1 Injection Well
  - IP-8 Proposed Injection Well
  - VW-2 Vapor Extraction Well
  - TP-2 Temporary Monitoring Well
  - A A' Geologic Cross Section



REVISION	REVISIONS			
	NO.	BY	DATE	DESCRIPTION
0	0	MY	8/29/08	Additional Well Installation Work Plan

ARCTOS ENVIRONMENTAL			
TESORO - LIVERMORE			
<b>SITE PLAN</b>			
PROJECT NO. OILV	DRAWN BY MY	CHECKED BY MP	APPROVED BY JPG
FILE NO. OILV11B0200.DWG		<b>FIGURE 2</b>	

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**Legend**

**Soil Classification**

- Clayey and silty gravels, and gravelly sands with clay
- Silty clays, clayey sands, and silty clays with gravel

**Well Identification**

- MW-3 Well identification
- IP-1 Injection Well
- IP-8 Proposed Injection Well

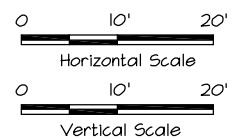
**Groundwater Elevation**

- Groundwater elevation on 12 November 2007
- Historical low and high groundwater elevation reported in November 2007 and March 1996, respectively

Screened interval groundwater wells sampled on 8 May 2008 and 23 July 2008

**Groundwater Results**

TPHg	5,500	Total Petroleum Hydrocarbons As Gasoline ( $\mu\text{g/l}$ )
Benzene	160	Benzene ( $\mu\text{g/l}$ )
MTBE	10	Methyl Tert-Butyl Ether (MTBE) ( $\mu\text{g/l}$ )



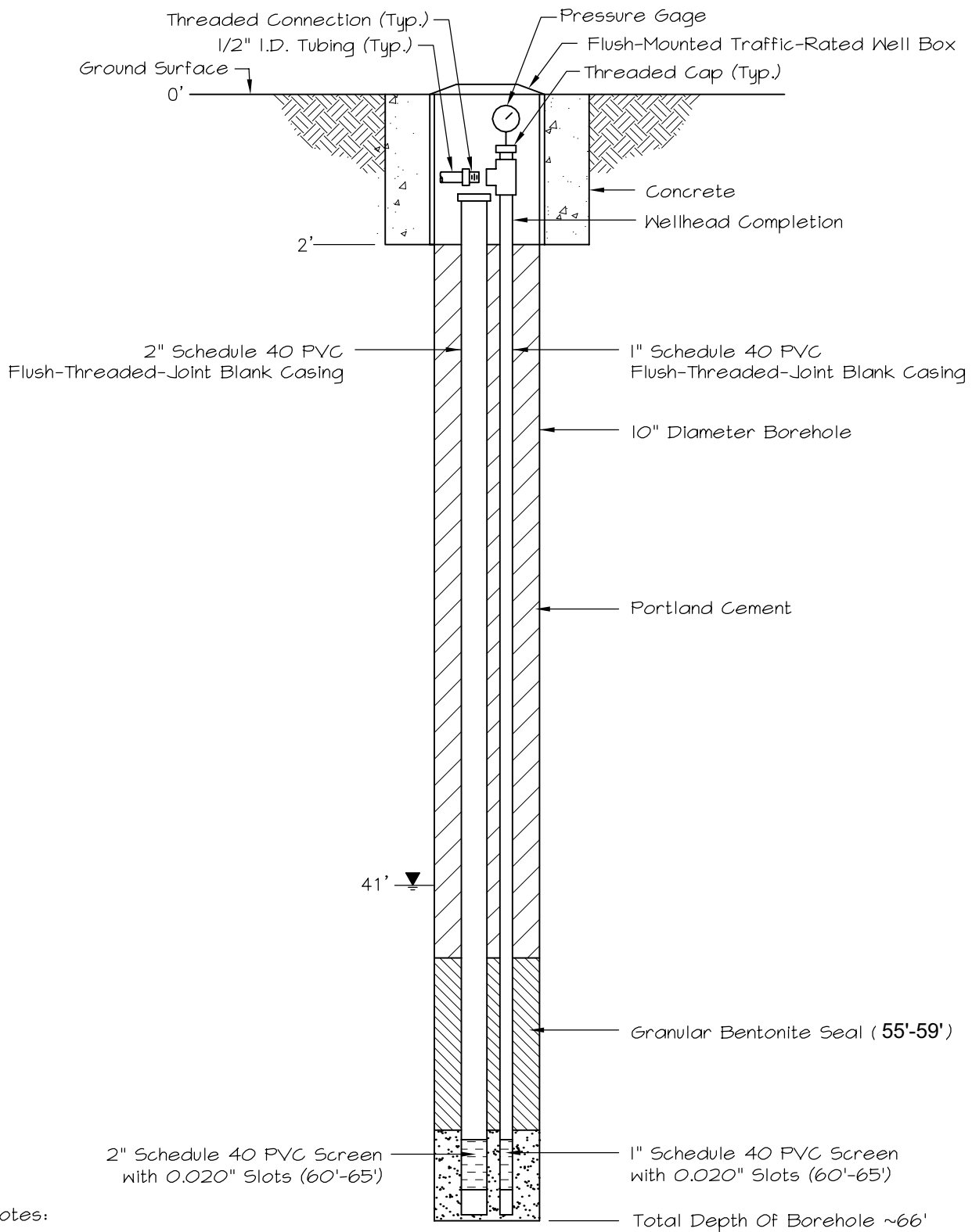
Note: Depth of clay aquitard is estimated from soil lithology at the Livermore Arcade Shopping Center to the northwest.

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0	MY	8/29/08		Additional Injection Well Installation Work Plan

ARCTOS ENVIRONMENTAL  
 TESORO - LIVERMORE

**GEOLOGIC CROSS SECTION A-A'**

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Notes:

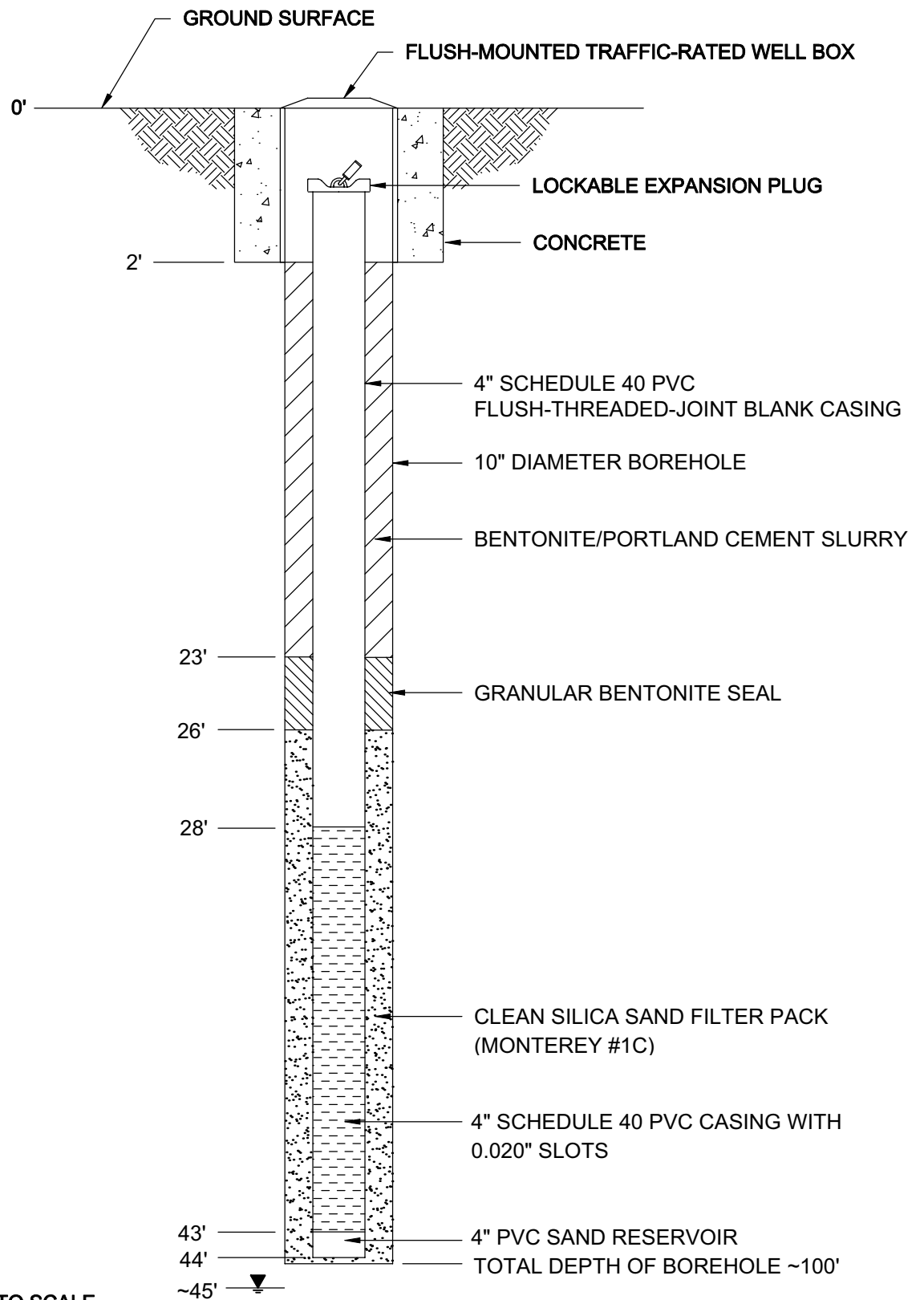
1. Drawing not to scale.
2. Actual well construction may vary based on field investigation.

REVISION	REVISIONS			
	NO.	BY	DATE	DESCRIPTION
1	0	MY	3/21/08	IRAP
	1	MY	8/29/08	Additional Well Installation Work Plan

ARCTOS ENVIRONMENTAL			
TESORO - LIVERMORE			
<b>INJECTION WELL CONSTRUCTION DIAGRAM</b>			
PROJECT NO. OILV	DRAWN BY MY	CHECKED BY MP	APPROVED BY JPG
FILE NO. OILVD40200.DWG		FIGURE 4	

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- NOTES:**
1. DRAWING NOT TO SCALE.
  2. ACTUAL WELL CONSTRUCTION MAY VARY BASED ON FIELD INVESTIGATION.

ARCTOS ENVIRONMENTAL			
TESORO - LIVERMORE			
<b>MONITORING WELL CONSTRUCTION DIAGRAM</b>			
PROJECT NO. 01LV	DRAWN BY MY	CHECKED BY MN	APPROVED BY MP
FILE NO. MW11 const.pdf		FIGURE 5	

REVISION	REVISIONS		
	NO.	BY	DATE
1	MN	8/29/08	Additional Well Installation Work Plan