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RESULTS
QUARTERLY MONITORING
DECEMBER 30, 1997
TONY'S EXPRESS AUTO SERVICE
3609 EAST 14TH STREET
OAKLAND, CALIFORNIA

FOR

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1 INTRODUCTION

The following Report documents the performance of a groundwater monitoring round and slug test at Tony's Express Auto Services, 3609 East 14th Street, Oakland, California. The property is primarily used as a service station.

During the groundwater monitoring round the following information and samples were gathered:

1. Depth to water
2. Groundwater samples for TPHg and BTEX, certified analysis.
3. Field analysis for the following electron acceptors:
   - Dissolved Oxygen, O_2
   - Nitrate, NO_3^-
   - Sulfate, SO_4^{--}
   - Ferrous iron, Fe^{++}. The actual electron acceptor is Ferric iron Fe^{+++} but it is insoluble, so the reaction product Fe^{++} was measured.
4. Redox potential.
5. Bail/slug test well recovery data.
6. Groundwater samples from MW01, MW02, MW05, MW07 and MW08 for:
   - Ammonia Nitrogen.
   - Carbon Dioxide.
   - Methane.
   - Orthophosphate

This report includes the following:

1. Depth to water measurements and the resulting groundwater elevations and gradient.
2. The results of sampling the wells for TPHg and BTEX.
3. Results bioremediation sampling, see sampling items 3 and 6 above.

4. Calculated results of the bail/slug test.

5. Results of Tier 2 Risk Based Corrective Action (RBCA) screening calculations.

2 SITE HISTORY

In July 1993, Alpha Geo Services removed three fuel tanks and a waste oil tank from the site. During the tank pull, Soil Tech Engineering Inc. (STE) collected soil samples from the tank excavation area and the old piping associated with the tanks. Soil samples from the tank area were taken at approximately 12 feet below the surface and range in TPHg concentration from 2.1 to 640 mg/kg . The soil samples from the beneath the old piping, 2 to 5 feet below grade, range in concentration from 75 to 4,100 mg/kg TPHg. No gasoline range hydrocarbons were found in the sample from the waste oil tank excavation.

Since the initial tank pull, STE has installed a total of 11 groundwater monitor wells including MW09, which has been destroyed (see figure 3 for location of wells). MW09 was destroyed to allow for construction.

In addition to the borings completed as monitor wells, a number of other soil borings have been performed in order to determine the extent of contaminated soil at the site.

3 GROUNDWATER MONITOR ROUND

A groundwater monitoring round was performed on December 30, 1997, see Appendix A for methods and procedures. During the monitoring round the following were performed:

Depth to water, in all groundwater monitoring wells.

A slug test on all groundwater wells, except MW03, which contained a floating product sheen.

All of the wells except MW03 were purged and water samples for TPHg/BTEX and bioremediation (election acceptors and byproducts) were collected, see appendix A for methods.

3.1 SLUG TEST

During the monitoring round, we performed a slug tests on each of the wells, except MW03, in order to determine Hydraulic Conductivity (K).

To perform the slug test, a pressure transducer was placed in the well to measure the groundwater depth, over time. A bailer of water was extracted from the water column and periodic measurements of depth to water were recorded along with elapsed time since extraction, until the water level had returned to its initial elevation. These measurements were recorded automatically by the pressure transducer and data logger.

3.2 BIOREMEDATION SAMPLING

Bacteria native to the soil at hydrocarbon contamination sites normally degrade hydrocarbons. The most effective hydrocarbon degraders (eaters) are the aerobic (oxygen using) bacteria. The amount of available dissolved oxygen is usually the factor controlling the rate that these bacteria degrade the gasoline.

A much slower degradation process starts when the dissolved oxygen is used. The plume begins to become anaerobic and the bacterium commences to reduce nitrate, ferric iron, and sulfate to further degrade the hydrocarbons. Eventually, as these compounds and the oxygen are used, the bacteria begin methogenesis, in which the hydrocarbons are converted to methane.

In order to determine this site's potential for natural Bioremedation, the wells were sampled for the following electron acceptors or reaction byproducts:

- Dissolved Oxygen, O_2
- Nitrate, NO_3^-
- Sulfate, SO_4^{--}
- Ferrous iron, Fe^{++}. The actual electron acceptor is Ferric iron Fe^{+++} but it is insoluble, so the reaction product Fe^{++} was measured.

To further define the bio-activity or the potential for bio-activity of the site, the following samples were taken from five of the on-site wells, MW01, MW02, MW05, MW07, and MW08. These sample results provide the natural base line concentrations of the compounds of interest.

- Methane, end product of methogenesis.
- Carbon Dioxide, end product for all biodegradation of hydrocarbons.
- Hydrocarbon degraders, the bacteria that consume gasoline.
- Ammonia nitrogen, a nutrient used by bacteria.
- Orthophosphate, another nutrient used by bacteria.

4 RESULTS

4.1 DEPTH TO WATER, GROUNDWATER GRADIENT.

The groundwater at this site is shallow and unconfined. During the initial construction of monitor wells MW01, MW02 and MW03, groundwater was encountered at 15 feet below the surface. The current depth to groundwater in the wells is between 8.65 and 10.2 feet below the surface and the groundwater gradient is to the south, see Figure 4. The groundwater is above the slots in MW01, MW02 and MW03, the original groundwater monitor wells, probably due to recovery recharge of the aquifer after the drought. The hydraulic gradient for the site has a slope of 0.019 ft/ft.

4.2 WATER SAMPLES

4.2.1 TPHg/BTEX

The water samples from all of the wells contained significant levels of TPHg and BTEX, see Table 2.

4.2.2 BIOREMEDIATION SAMPLES

The concentrations of bio-indicators are as follows:

- Dissolved Oxygen, O_2. The oxygen concentration in the wells ranged from <0.1 mg/l, the majority of the wells to a maximum of 2.5 ppm, see table 3. A saturated concentration would be 8 mg/l.

- Nitrate, NO_3^-. The concentration of NO_3^- ranged from <0.1 mg/l in the wells with the highest TPHg values to 4.5 mg/l in MW04, see table 3.

- Sulfate, SO_4^{--}. The sulfate concentration ranged from <1 mg/l in four of the wells to 42 mg/l in MW04, see table 3.

- Ferrous iron, Fe^{++}. The concentration of ferrous iron ranged from 0.23 to greater than 3.30 mg/l, see table 3.

The following analyte concentrations were measured in samples from five of the on-site wells, MW01, MW02, MW05, MW07, and MW08.

- Methane, the end product of methogenesis, ranged from 0.0113 to 3.5 mg/l.

- Carbon Dioxide, end product for all biodegradation of hydrocarbons, ranged from 64.2 to 117 mg/l.

- Hydrocarbon degraders, the bacteria that consume gasoline, the population counts ranged from 60 to 300 cfu/ml.

- Ammonia nitrogen, a nutrient for bacteria, ranged from 0.2 to 1.3 mg/l.

- Orthophosphate, another bacteria nutrient, ranged from 0.1 to 0.3 mg/l.

These results are consistent with the bioremediation models for dissolved gasoline sites, i.e. depressed levels of Dissolved Oxygen, Nitrate and Sulfate and elevated levels of Ferrous iron in the presence of dissolved TPHg.

4.3 HYDRAULIC CONDUCTIVITY (K)

The hydraulic conductivity (K) for the wells ranged from 0.4 feet per day to 10.42 feet per day, with an average K of 3.6 feet per day. This is consistent with the results expected for the silt and silty clay aquifers encountered while drilling the monitor wells, see table 4.

5 DISCUSSION

5.1 HYDROCARBONS

Significant levels of TPHg and BTEX continue to exist at this site. MW03 contained a thin film of floating product. The benzene and TPHg plumes continue offsite, see Figures 5 and 6.

5.2 BIOREMEDIATION

The results of the bioremediation sampling indicate that natural attenuation/bioremediation is active at this site.

All of the wells show the impact of active biodegradation. It is not therefore possible to develop a background level of the compounds. The closest approximation for background levels at this site is the highest concentrations of electron acceptors and the lowest levels of byproducts.

Compound	Function	Concentration	Well
Dissolved Oxygen (O_2)	Electron Acceptor	2.5 mg/l	MW08
Nitrate	Electron Acceptor	4.5 mg/l	MW04
Sulfate	Electron Acceptor	42 mg/l	MW04
Ferrous Iron	Byproduct	0.23 mg/l	MW07
Methane	Byproduct	0.0113 mg/l	MW05
Carbon Dioxide	Byproduct	62.7 mg/l	MW05

All of the tested wells have reduced levels of dissolved oxygen . Six of the nine wells have less than 0.1 mg/l of dissolve oxygen.

Both Nitrate and Sulfate have been reduced from the levels found in MW04, with Nitrate being reduced to non-detectable levels in three wells and Sulfate in four wells, see table 3.

The presence of Ferrous iron in the wells indicates that biodegradation has progressed to the point that the system is oxygen deficient and the bacteria have started to reduce the iron to provide oxygen for the degradation.

Biodegradation in MW02, which is in the heart of the plume, has consumed all of the available electron acceptors.

The carbon dioxide (CO_2) levels in the groundwater indicate that a portion of the hydrocarbons have been degraded. CO_2 and water are the final byproducts of biodegradation of hydrocarbons. The carbon in CO_2 results from the oxidation of the hydrocarbon radical CH_2 and as such 1 mg of $CO2 = 0.41$ mg of CH_2 (CH_2 (12+1+1 = 14) / (CO_2 (12+16+16=34). The amount of CO_2 in MW08, 153 mg/l, indicates that at least 62.73 mg/l of hydrocarbons have been oxidized. The presence of methane (CH_4) indicates that a number of the wells have progressed into methogenesis.

The levels of electron acceptors present and the presence of the reaction products, carbon dioxide, methane and ferrous iron indicate that the bacteria in the soil and the compounds in the groundwater have the capability to consume a significant amount of hydrocarbons.

Introducing ambient air (O_2) into the system during vapor vacuum extraction and/or sparging will increase this bioactivity.

Comparison of the hydrocarbon degrader counts (amount of bacteria) to the TPHg concentration, electron acceptors, byproducts, and nutrients, indicate that the orthophosphate concentration and ammonia concentration can have a significant effect on the bio-activity. As shown in table 3, just a small change in the orthophosphate level from 0.1 mg/l in MW01 to 0.4 mg/l in MW02 increased the hydrocarbon degraders count from 60 to 220 cfu/ml. This indicates that the addition of a small amount of phosphate to the system should increase the biodegradation rate.

A RBCA Tier Two risk assessment was run on the site in order to develop a further understanding of the risk to be expected from this site. The biodegradation capacity of the groundwater was also determined as part of the risk assessment. The water was found to have the capacity to consume 15.53 mg/l of hydrocarbons. Four of the wells contain greater than 20 mg/l of TPHg. This indicates that it would be beneficial to increase the biodegradation capacity of the aquifer. The most cost beneficial way to do this is by adding dissolved oxygen.

5.3 CALCULATED VELOCITIES OF CONTAMINANTS IN GROUNDWATER

The hydraulic conductivity (K) of the aquifer in the vicinity of the monitor wells was calculated from the data derived from the slug tests performed at the monitor wells on October 13 1997 using

the Bouwer and Rice Slug Test Model (Appendix D). Calculated K values ranged from a maximum of 10.42 feet/day at MW06 to 0.4 feet/day at MW01. Calculated K values averaged 3.6 feet/day over the site (Table 4).

Expected groundwater velocities were calculated from the K values and average groundwater elevation gradient over the site of 0.019ft/ft. Groundwater velocities ranged from 361.3feet/year in the vicinity of MW06 to 13.9 feet/year in the vicinity of MW01. The groundwater velocity calculated from the average K is 124.8 feet/year (Table 4).

The expected velocities of petroleum hydrocarbon constituents in groundwater at the site were calculated from calculated groundwater velocities and the concentrations of organic carbon in the aquifer materials (Appendix D). N-octane, representing total gasoline, showed velocities ranging from 2.3 feet/year at MW06 to 0.1 feet/year at MW01. The calculated velocity of n-octane migration through the aquifer averaged 0.8 feet/year over the site (Table 4). The velocity of Benzene in groundwater ranged from 113.5 feet/year at MW06 to 4.4 feet/year at MW01. The velocity of Benzene migration through the aquifer calculated from the average K was 39.2feet/year. The velocities of diesel and oil and grease range hydrocarbons through the aquifer, though not calculated, can be assumed to be slower than the average velocity of n-octane at 0.8 feet/year.

5.4 TIER TWO RISK ASSESSMENT

In order to help determine the risks associated with this site a Tier Two Risk calculation was performed.

During the Tier Two Assessment, Risk Based Screening Levels SSTL were calculated for the following compounds:

- Benzene — using the current EPA Cancer Slope Factors (SF) for Benzene.
- Toluene
- Ethylbenzene
- Xylenes

Two potential pathways were considered during the Tier Two investigation of this site: Vapor Inhalation and Groundwater Ingestion. The third major pathway, soil ingestion, was not considered because there is no documented contamination in the upper three feet of soil and the site is paved, limiting the probability of the ingestion of contaminated soil.

Vapor Inhalation was divided into three categories:

1. Volatilization to on-site inside air.
2. Volatilization to on-site outside air.
3. Volatilization to off-site outside air.

Groundwater ingestion was divided into two categories:

1. On-site groundwater ingestion, commercial.
2. Off-site groundwater ingestion, residential.

The off-site groundwater ingestion was calculated using the screening distance of 700 ft.

The values used to perform the Tier Two study were the worst case values from the soil sampling and the last groundwater sampling.

5.4.1 Vapor Inhalation

The following compounds exceeded the SSTL for Volatilization to inside air.

- Benzene in Subsurface soil.
- Benzene in groundwater.

The result probably overstates the hazard, due to the nature of the air diffusion model.

The following compounds exceeded the SSTL for Volatilization to outside air.

- Benzene in Subsurface soil.
- Benzene in groundwater.

The following compounds exceeded the SSTL for Volatilization to off-site air.

- Benzene in Subsurface soil.

5.4.2 Ground Water Ingestion

The following compounds exceeded the SSTL levels for on-site groundwater ingestion (see Worksheets 9.1 and 9.2, appendix C).

- Benzene in Subsurface soils.
- Benzene in Groundwater.
- Toluene in subsurface soil
- Toluene in Groundwater
- Ethylbenzene in Groundwater.

The possibility of completion of this path is very low because it would require that someone drills a well on the site and complete it in the shallow surface aquifer and proceeded to drink the water therefrom.

The following compounds exceeded the SSTL levels for off-site groundwater ingestion (see Worksheets 9.2 and 9.3, appendix C).

- Benzene in Subsurface soils.
- Benzene in groundwater.

Please see Appendix C, RBCA results for tables and concentrations.

Additionally a Tier Two risk was calculated for the results of the EPA Method 8260 analysis run on the May 21, 1997 sampling. As in the gasoline range hydrocarbon Tier Two risk the primary driver of risk at this site is Benzene in the subsurface soil and in the groundwater.

5.5 EPA METHOD 8260 RESULTS

EPA Method 8260 was run on the samples taken on May 21, 1997. A number of compounds were detected in this analysis see appendix F 8260 Analysis. Many of the compounds detected are a natural component of Gasoline or have been used as additives of gasoline in the past. Other compounds are the intermediate byproducts of biodegradation.

Compound	TYPE	Maximum Concentration mg/l	MCL
Acetone	byproduct	11	Not listed
Benzene	component	9.2	0.001
chloroform		0.0075	0.1
1,2 dichloroethane	additive	0.0066	0.0005
2,2 dichloropropane	additive	0.0061	No MCL listed for 2,2 MCL for 1,2 = 0.005
Trans 1,3 dichloropropene	additive	0.084	0.0005
Ethlybenzene	component	2.1	0.700
2-Hexanone MBK ketone	additive	0.053	Not listed
Isopropylbenzene	component	0.038	Not listed
Methyl Chloride, Chloromethane	Byproduct degradation chlorinated hydrocarbons	0.078	Not listed
4-methyl-2-pentanone, Methyl isobutyl Ketone (MIBK)		0.0095	Not listed
N-butylbenzene	component	0.031	Not listed
N-propylbenzene	component	0.049	Not listed
Naphtalene	component	0.63	Not listed
p-isopropyltoluene	component	0.0068	Not listed
Tert-Butylbenzene	component	0.23	Not listed
Toluene	component	14.0	1
1,2,4-trimethylbenzene	component	0.86	Not listed
1,3,5-trimethylbenzene	component	0.55	Not listed
Xylenes	component	10	1.750

MCL are from CRWQCBCVR, Water quality Goals, February 1991.

6 CONCLUSIONS

1. Continue site monitoring for one year to evaluate this site for low risk closure, plume stability.

7 Concerned Parties

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8 LIMITATIONS

This report is based upon the following:

- The observations of field personnel.
- The results of laboratory analyses performed by a state certified laboratory.
- Referenced documents.
- Our understanding of the regulations of the State of California and Alameda County, Hazardous Materials Section and/or City of Oakland, California.

Changes in groundwater conditions can occur due to variations in rainfall, temperature, local and regional water usage and local construction practices. In addition, variations in the soil and groundwater conditions could exist beyond the points explored in this investigation.

State certified analytical results are included in this report. This laboratory follows EPA and State of California approved procedures; however, WEGE is not responsible for errors in these laboratory results.

The services performed by Western Geo-Engineers, a corporation, under California Registered Geologist #3037 and/or Contractors License #513857, have been conducted in a manner consistent with the level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions in the State of California and the Woodland area. Our work and/or supervision of remediation and/or abatement operations, active or preliminary, at this site is in no way meant to imply that we are owners or operators of this site. Please note that known

contamination of soil and/or groundwater must be reported to the appropriate agencies in a timely manner. No other warranty, expressed or implied, is made.

If you have any questions concerning this report or if we can be of further assistance, please don't hesitate to contact us at (530) 668-5300.

Respectfully,

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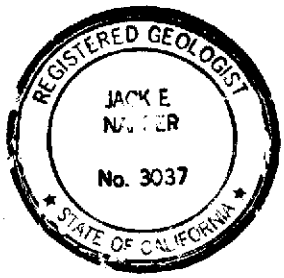


Table 1, Tony's Express, Groundwater Elevations						
	DEPTH TO TOP SLOTS	DEPTH TO WATER				
DATE		12/30/97				
MW01	10	9.3				
MW02	10	9.05				
MW03	10	9.74				
MW04	7	9.43				
MW05	6	9.15				
MW06	6	9.3				
MW07	6	8.65				
MW08	7	8.95				
MW09	8	DESTROYED				
MW10	8	8.78				
MW11	8	10.2				
	CASING ELEVATION	GROUND-WATER ELEVATION				
MW01	97.99	88.69				
MW02	98.58	89.53				
MW03	97.78	88.04				
MW04	97.85	88.42				
MW05	99.04	89.89				
MW06	98.77	89.47				
MW07	97.83	89.18				
MW08	97.25	88.3				
MW09	95.94					
MW10	94.54	85.76				
MW11	95.94	85.74				

Table 2, ug/l, Gasoline Range Hydrocarbons in Groundwater								
DATE	10/5/94	12/2/94	3/6/95	6/5/95	10/2/95	1/3/96	4/3/96	9/12/96
MW01, TPHg	320000	80000	32000	21000	5900	30000	31000	
MW01, Benzene	24000	3800	190	950	140	71	98	
MW01, Toluene	21000	6600	150	650	130	73	120	
MW01, Ethylbenzene	2600	2300	150	570	140	50	63	
MW01, Xylene	15000	11000	490	1500	390	120	170	
MW02, TPHg	260000	42000	490	8000	46000	3400	27000	19000
MW02, Benzene	17000	1700	3.2	220	160	7.6	100	210
MW02, Toluene	19000	2200	2.6	330	130	13	92	220
MW02, Ethylbenzene	570	1200	1.6	350	93	7.4	44	110
MW02, Xylene	15000	3600	5.9	660	240	26	130	400
MW03, TPHg	3000000	250000	21000	350000	15000	19000	70000	66000
MW03, Benzene	190000	19000	80	20000	510	290	310	430
MW03, Toluene	740000	22000	73	42000	410	270	260	420
MW03, Ethylbenzene	310000	4400	35	5800	210	97	89	210
MW03, Xylene	13000	28000	130	36000	650	890	280	510
MW04, TPHg					9300	1100	1900	2100
MW04, Benzene					23	4	12	46
MW04, Toluene					11	1.3	7.5	24
MW04, Ethylbenzene					9.9	0.9	5.2	31
MW04, Xylene					29	3.3	14	73
MW05, TPHg					1500	830	780	
MW05, Benzene					1.1	<0.5	1.3	
MW05, Toluene					1.3	<0.5	1	
MW05, Ethylbenzene					3.9	1.3	4.8	
MW05, Xylene					5.3	2.2	3.8	
MW06, TPHg					12000	68000	48000	23000
MW06, Benzene					350	60	140	150
MW06, Toluene					310	61	110	160
MW06, Ethylbenzene					200	27	62	110
MW06, Xylene					610	180	170	310
MW07, TPHg					3300	1500	1900	
MW07, Benzene					8.9	1.5	2.1	
MW07, Toluene					12	0.9	2.6	
MW07, Ethylbenzene					17	3	5.1	
MW07, Xylene					45	4.1	6.9	
MW08, TPHg					94000	23000	58000	46000
MW08, Benzene					310	19	250	210
MW08, Toluene					250	12	170	150
MW08, Ethylbenzene					180	8.8	140	160
MW08, Xylene					480	47	330	360
MW10, TPHg								26000
MW10, Benzene								46
MW10, Toluene								37
MW10, Ethylbenzene								63
MW10, Xylene								99
MW11, TPHg								2300
MW11, Benzene								7
MW11, Toluene								7.2
MW11, Ethylbenzene								12
MW11, Xylene								31

Table 2, ug/l, Gasoline Range Hydrocarbons in Groundwater			
DATE	12/9/96	4/10/97	12/30/97
MW01, TPHg			27000
MW01, Benzene			2300
MW01, Toluene			2100
MW01, Ethylbenzene			1400
MW01, Xylene			5100
MW02, TPHg	6200	53000	35000
MW02, Benzene	110	150	4900
MW02, Toluene	6.6	110	4900
MW02, Ethylbenzene	2.1	37	1600
MW02, Xylene	14	1120	7000
MW03, TPHg	54000	54000	
MW03, Benzene	320	130	
MW03, Toluene	280	120	
MW03, Ethylbenzene	90	38	
MW03, Xylene	250	120	
MW04, TPHg	4000	<50	2300
MW04, Benzene	14	<0.5	410
MW04, Toluene	6.3	<0.5	270
MW04, Ethylbenzene	4.2	<0.5	100
MW04, Xylene	12	<0.5	1500
MW05, TPHg			790
MW05, Benzene			82
MW05, Toluene			66
MW05, Ethylbenzene			59
MW05, Xylene			160
MW06, TPHg	57000	29000	36000
MW06, Benzene	480	60	660
MW06, Toluene	450	70	7600
MW06, Ethylbenzene	160	24	1500
MW06, Xylene	460	71	7700
MW07, TPHg			1400
MW07, Benzene			130
MW07, Toluene			98
MW07, Ethylbenzene			75
MW07, Xylene			200
MW08, TPHg	27000	24000	28000
MW08, Benzene	88	86	6000
MW08, Toluene	43	55	1600
MW08, Ethylbenzene	44	50	2100
MW08, Xylene	80	100	4700
MW10, TPHg	3000	1000	10000
MW10, Benzene	8.1	21	5300
MW10, Toluene	2.2	9.3	76
MW10, Ethylbenzene	1.5	3.3	1100
MW10, Xylene	5.1	33	780
MW11, TPHg	650	<50	710
MW11, Benzene	1.8	<0.5	66
MW11, Toluene	0.5	<0.5	97
MW11, Ethylbenzene	0.8	<0.5	59
MW11, Xylene	0.42	<0.5	190

Table 3. Bioremediation Sampling

WELL	TPHg	Dissolved Oxygen	Nitrate as Nitrogen	Ferrous Iron	Sulfate	Methane	Carbon Dioxide	Ammonia Nitrogen	Ortho-Phosphate	Hydro-carbon degraders	ORP	K
UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	cfu/ml		feet/day
MW01	27	0.5	<0.1	3.04	<1	3.2	99.1	1.3	0.1	60	-110	0.4
MW02	35	<0.1	<0.1	>3.30	<1	1.24	117	1.3	0.4	220	-81	0.47
MW03	FLOATING PRODUCT NOT SAMPLED											
MW04	2.3	<0.1	4.5	0.39	42						72	2.01
MW05	0.79	<0.1	0.3	0.94	18	0.0113	62.7	0.8	0.4	160	46	2.01
MW06	36	<0.1	<0.1	0.30	5						14	10.42
MW07	1.4	1.2	0.2	0.23	32	0.449	64.2	0.2	0.2	60	-82	3.86
MW08	28	2.5	0.1	>3.30	0	3.54	153	0.8	0.3	300	1	1.16
MW09	WELL DESTROYED											
MW10	10	<0.1	0.3	2.21	<1						4	9.66
MW11	0.71	<0.1	3.5	0.32	35						66	2.54

TABLE 4
HYDRAULIC CONDUCTIVITY, GROUNDWATER VELOCITY, COMPOUND VELOCITY
TONY'S SERVICE STATION, OCKLAND, CALIFORNIA

GROUNDWATER ELEVATION GRADIENT (I) =				0.019						
WELL	K	COMPOUND	Koc	Oc	Kd	Pb	ne	n	v	vc
									feet/year	feet/year
MW1	0.4	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	13.9	10.9
MW2	0.47	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	16.3	12.8
MW4	2.01	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	69.7	54.9
MW5	2.01	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	69.7	54.9
MW6	10.42	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	361.3	284.4
MW7	3.86	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	133.8	105.4
MW8	1.16	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	40.2	31.7
MW10	9.66	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	335.0	263.7
MW11	2.54	MTBE	12.02	0.005	0.0601	1.8	0.2	0.4	88.1	69.3
MW1	0.4	BENZENE	97	0.005	0.485	1.8	0.2	0.4	13.9	4.4
MW2	0.47	BENZENE	97	0.005	0.485	1.8	0.2	0.4	16.3	5.1
MW4	2.01	BENZENE	97	0.005	0.485	1.8	0.2	0.4	69.7	21.9
MW5	2.01	BENZENE	97	0.005	0.485	1.8	0.2	0.4	69.7	21.9
MW6	10.42	BENZENE	97	0.005	0.485	1.8	0.2	0.4	361.3	113.5
MW7	3.86	BENZENE	97	0.005	0.485	1.8	0.2	0.4	133.8	42.1
MW8	1.16	BENZENE	97	0.005	0.485	1.8	0.2	0.4	40.2	12.6
MW10	9.66	BENZENE	97	0.005	0.485	1.8	0.2	0.4	335.0	105.3
MW11	2.54	BENZENE	97	0.005	0.485	1.8	0.2	0.4	88.1	27.7
MW1	0.4	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	13.9	2.2
MW2	0.47	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	16.3	2.5
MW4	2.01	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	69.7	10.8
MW5	2.01	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	69.7	10.8
MW6	10.42	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	361.3	56.1
MW7	3.86	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	133.8	20.8
MW8	1.16	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	40.2	6.2
MW10	9.66	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	335.0	52.0
MW11	2.54	TOLUENE	242	0.005	1.21	1.8	0.2	0.4	88.1	13.7
MW1	0.4	XYLENE	552	0.005	2.76	1.8	0.2	0.4	13.9	1.0
MW2	0.47	XYLENE	552	0.005	2.76	1.8	0.2	0.4	16.3	1.2
MW4	2.01	XYLENE	552	0.005	2.76	1.8	0.2	0.4	69.7	5.2
MW5	2.01	XYLENE	552	0.005	2.76	1.8	0.2	0.4	69.7	5.2
MW6	10.42	XYLENE	552	0.005	2.76	1.8	0.2	0.4	361.3	26.9
MW7	3.86	XYLENE	552	0.005	2.76	1.8	0.2	0.4	133.8	10.0
MW8	1.16	XYLENE	552	0.005	2.76	1.8	0.2	0.4	40.2	3.0
MW10	9.66	XYLENE	552	0.005	2.76	1.8	0.2	0.4	335.0	25.0
MW11	2.54	XYLENE	552	0.005	2.76	1.8	0.2	0.4	88.1	6.6
MW1	0.4	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	13.9	0.9
MW2	0.47	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	16.3	1.1
MW4	2.01	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	69.7	4.6
MW5	2.01	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	69.7	4.6
MW6	10.42	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	361.3	24.1
MW7	3.86	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	133.8	8.9
MW8	1.16	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	40.2	2.7
MW10	9.66	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	335.0	22.3
MW11	2.54	ETHYLBENZNE	622	0.005	3.11	1.8	0.2	0.4	88.1	5.9
MW1	0.4	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	13.9	0.1
MW2	0.47	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	16.3	0.1
MW4	2.01	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	69.7	0.5

TABLE 4
HYDRAULIC CONDUCTIVITY, GROUNDWATER VELOCITY, COMPOUND VELOCITY
TONY'S SERVICE STATION, OCKLAND, CALIFORNIA

GROUNDWATER ELEVATION GRADIENT (I) = 0.019

WELL	K	COMPOUND	Koc	Oc	Kd	Pb	ne	n	v	vc
									feet/year	feet/year
MW5	2.01	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	69.7	0.5
MW6	10.42	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	361.3	2.3
MW7	3.86	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	133.8	0.9
MW8	1.16	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	40.2	0.3
MW10	9.66	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	335.0	2.2
MW11	2.54	N-OCTANE	6800	0.005	34	1.8	0.2	0.4	88.1	0.6
Average	3.6	MTBE	12	0.005	0.06	1.8	0.2	0.4	125.3	98.7
Average	3.6	benzene	97	0.005	0.485	1.8	0.2	0.4	124.8	39.2
Average	3.6	toluene	242	0.005	1.21	1.8	0.2	0.4	124.8	19.4
Average	3.6	xylene	552	0.005	2.76	1.8	0.2	0.4	124.8	9.3
Average	3.6	ethylbenzene	622	0.005	3.11	1.8	0.2	0.4	124.8	8.3
Average	3.6	n-octane	6800	0.005	34	1.8	0.2	0.4	124.8	0.8

K = Hydraulic Conductivity in feet/day
Koc = organic carbon-water partition coefficient
Oc = organic carbon
Kd = retardation factor
vc = retarded velocity of compound =v/[1+(Pb/n)Kd]

Pb = dry bulk density in gm/ml
ne = effective porosity
n = volumetric moisture content
I = groundwater elevation gradient
v = groundwater velocity = KI/ne

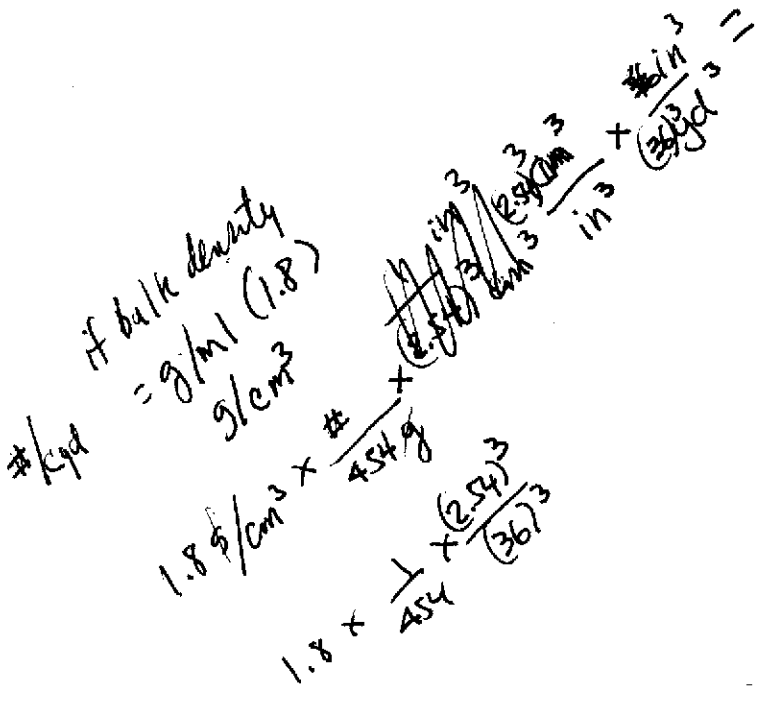
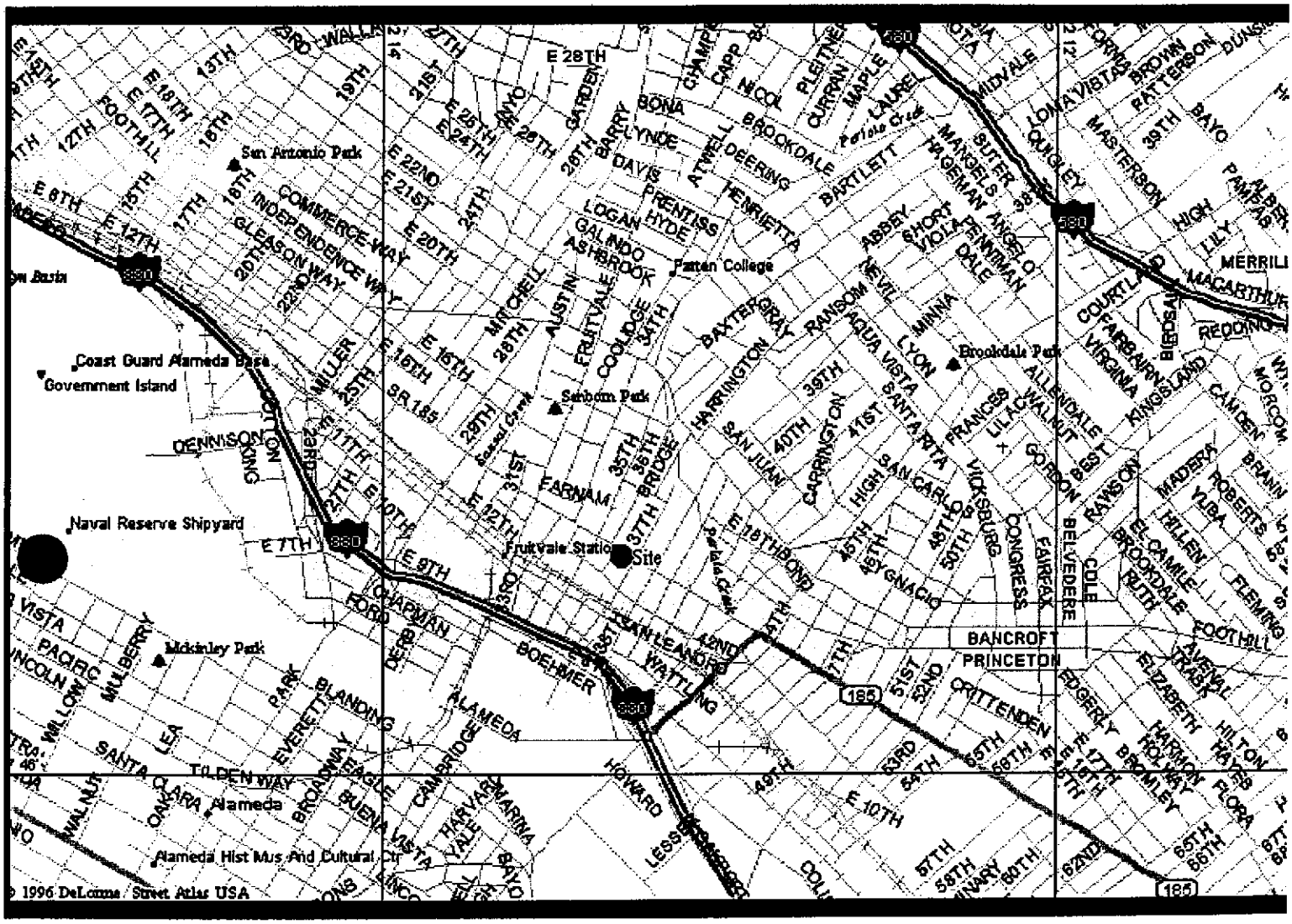
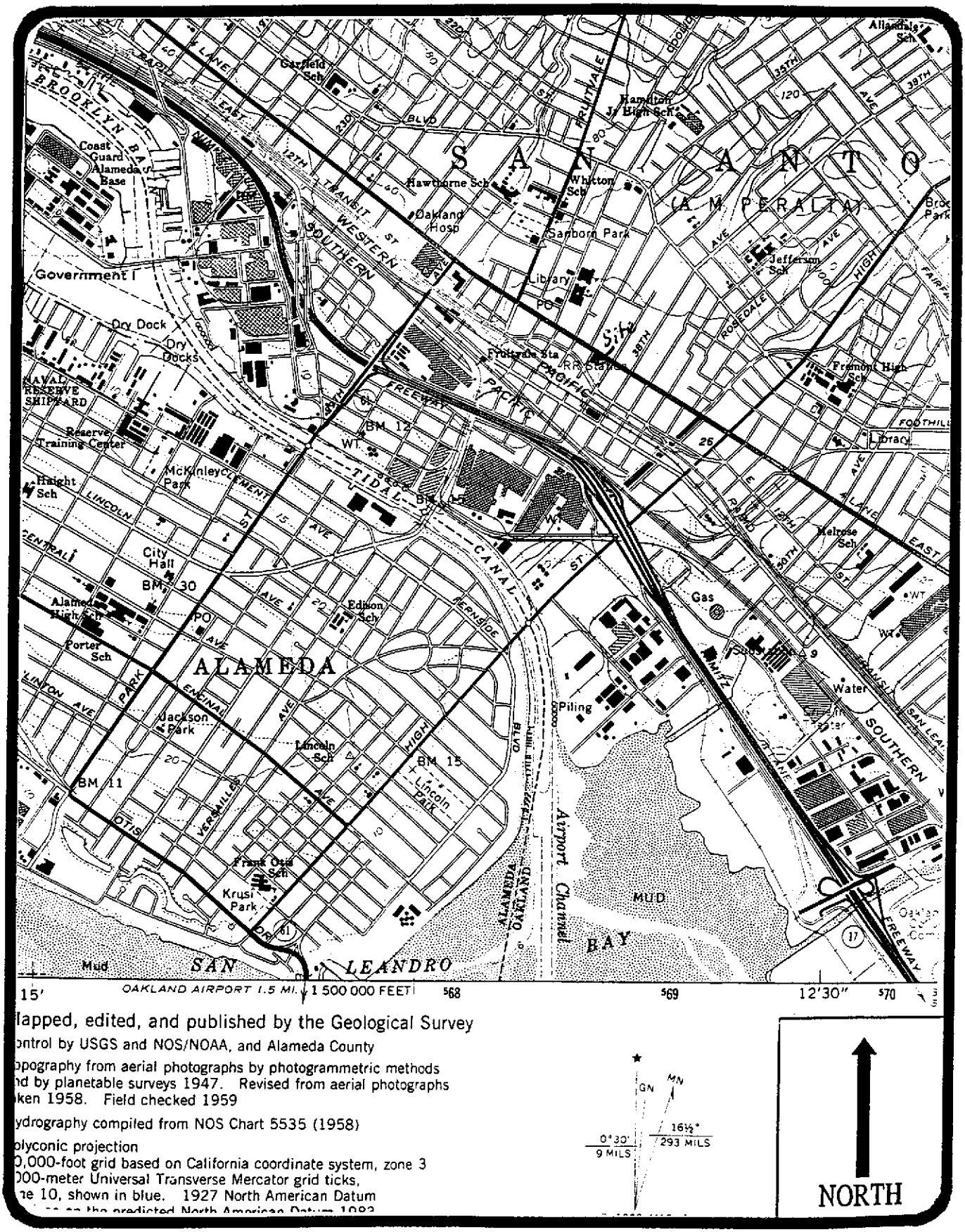


Figure 1, Location Map





lapped, edited, and published by the Geological Survey

ontrol by USGS and NOS/NOAA, and Alameda County

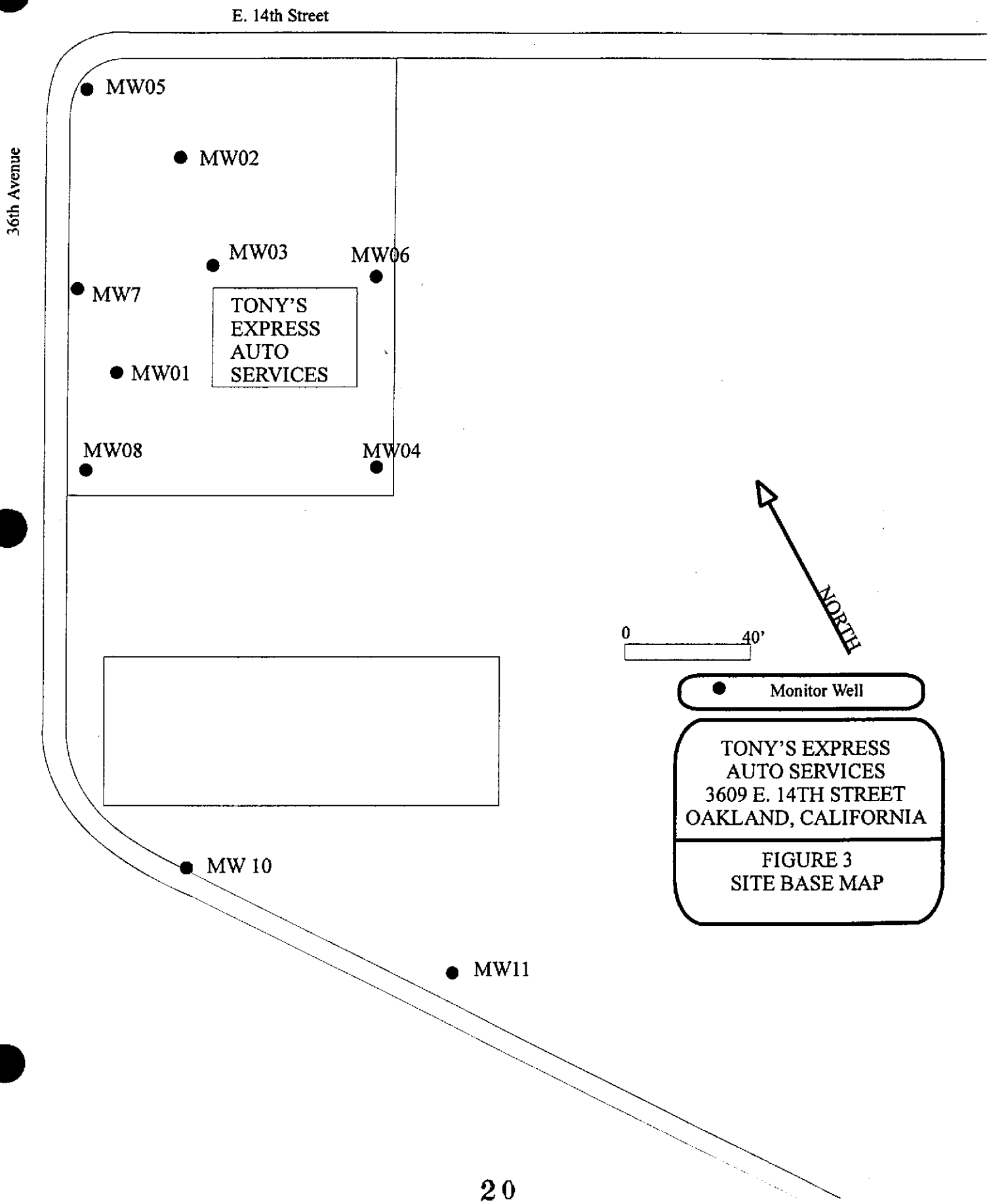
opography from aerial photographs by photogrammetric methods
nd by planetable surveys 1947. Revised from aerial photographs
ken 1958. Field checked 1959

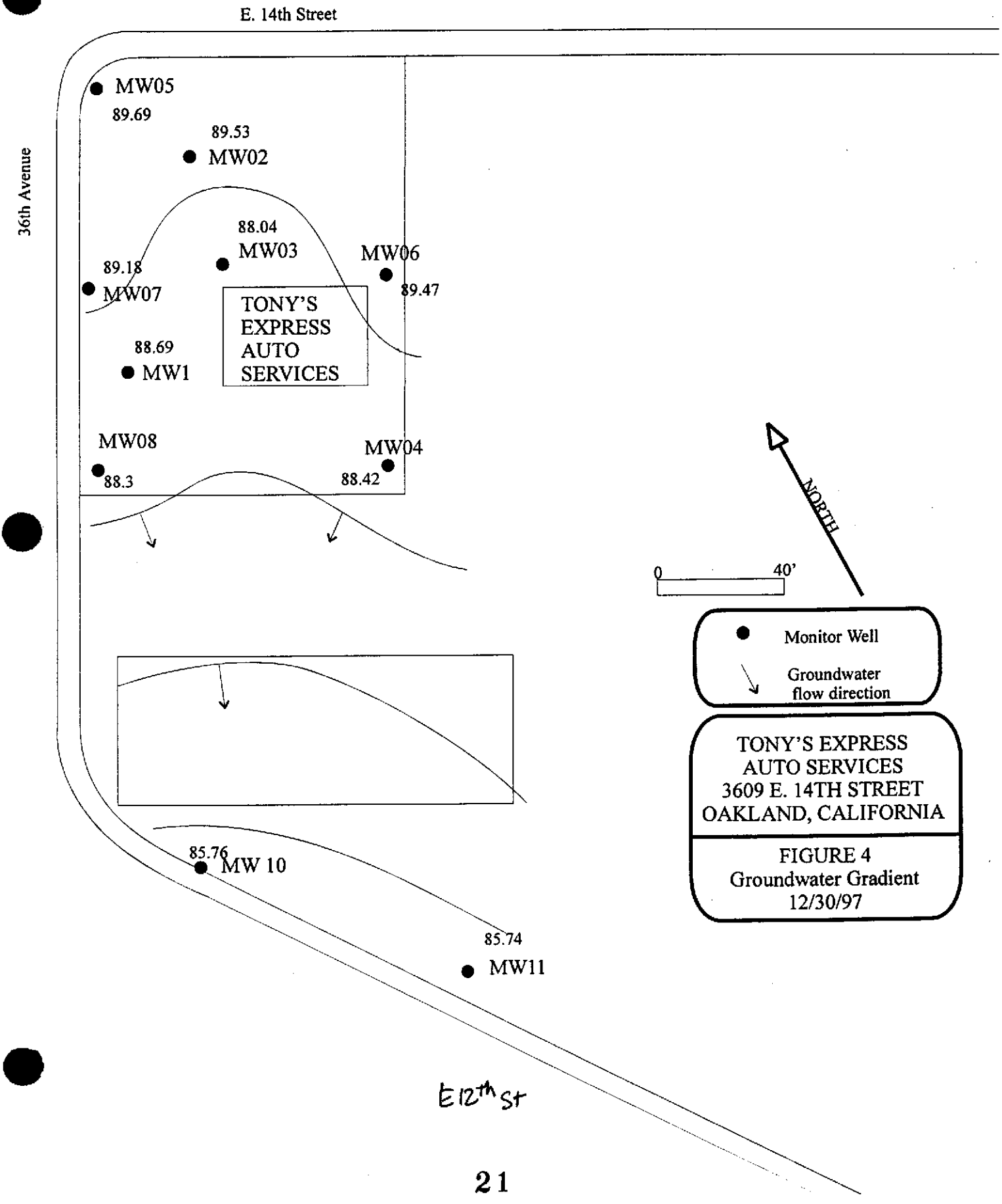
ydrography compiled from NOS Chart 5535 (1958)

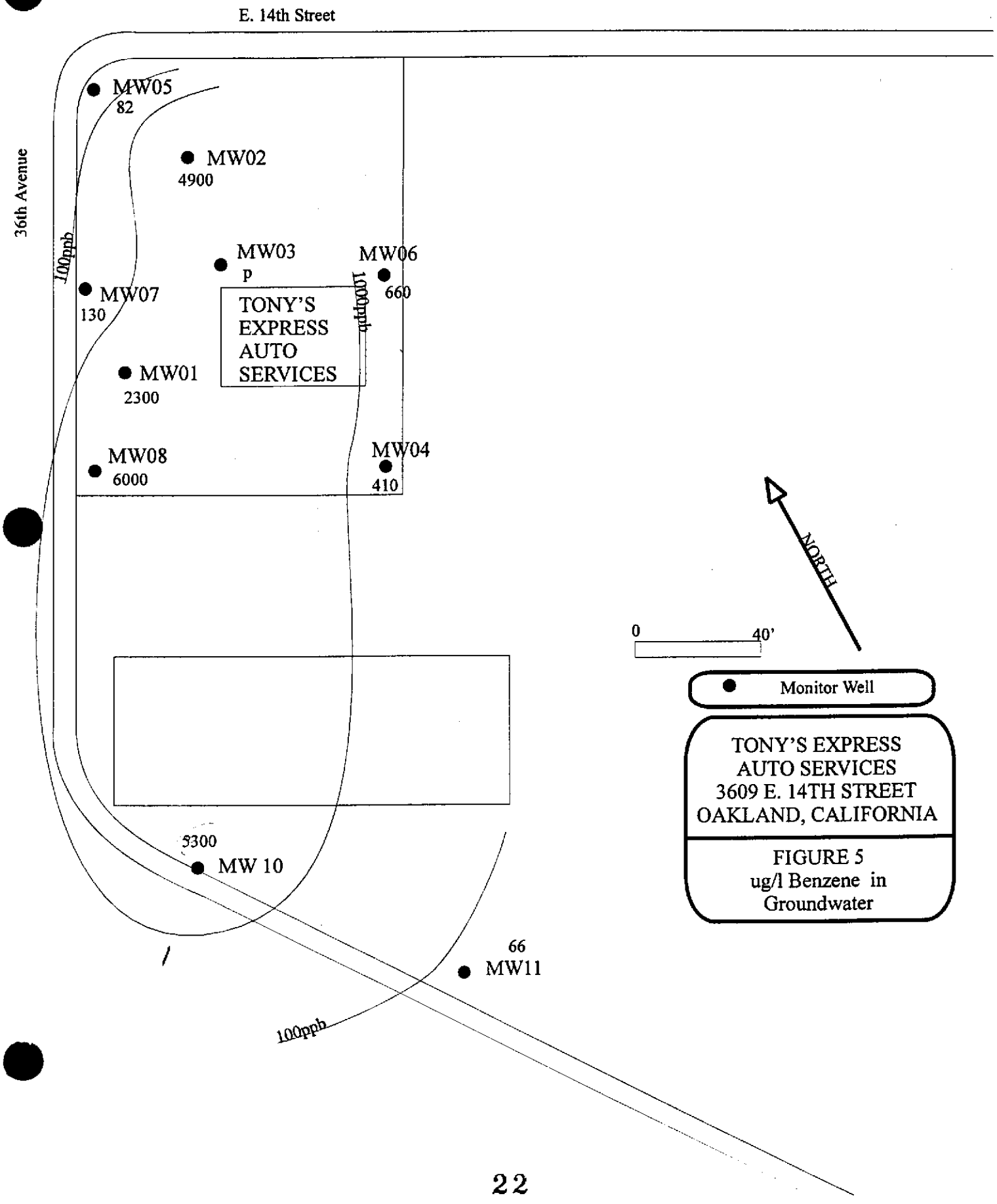
olyconic projection
0,000-foot grid based on California coordinate system, zone 3
000-meter Universal Transverse Mercator grid ticks,
ne 10, shown in blue. 1927 North American Datum

GN MN
0°30' 9 MILS
16½° 293 MILS

FIGURE 2, USGS TOPOGRAPHIC MAP

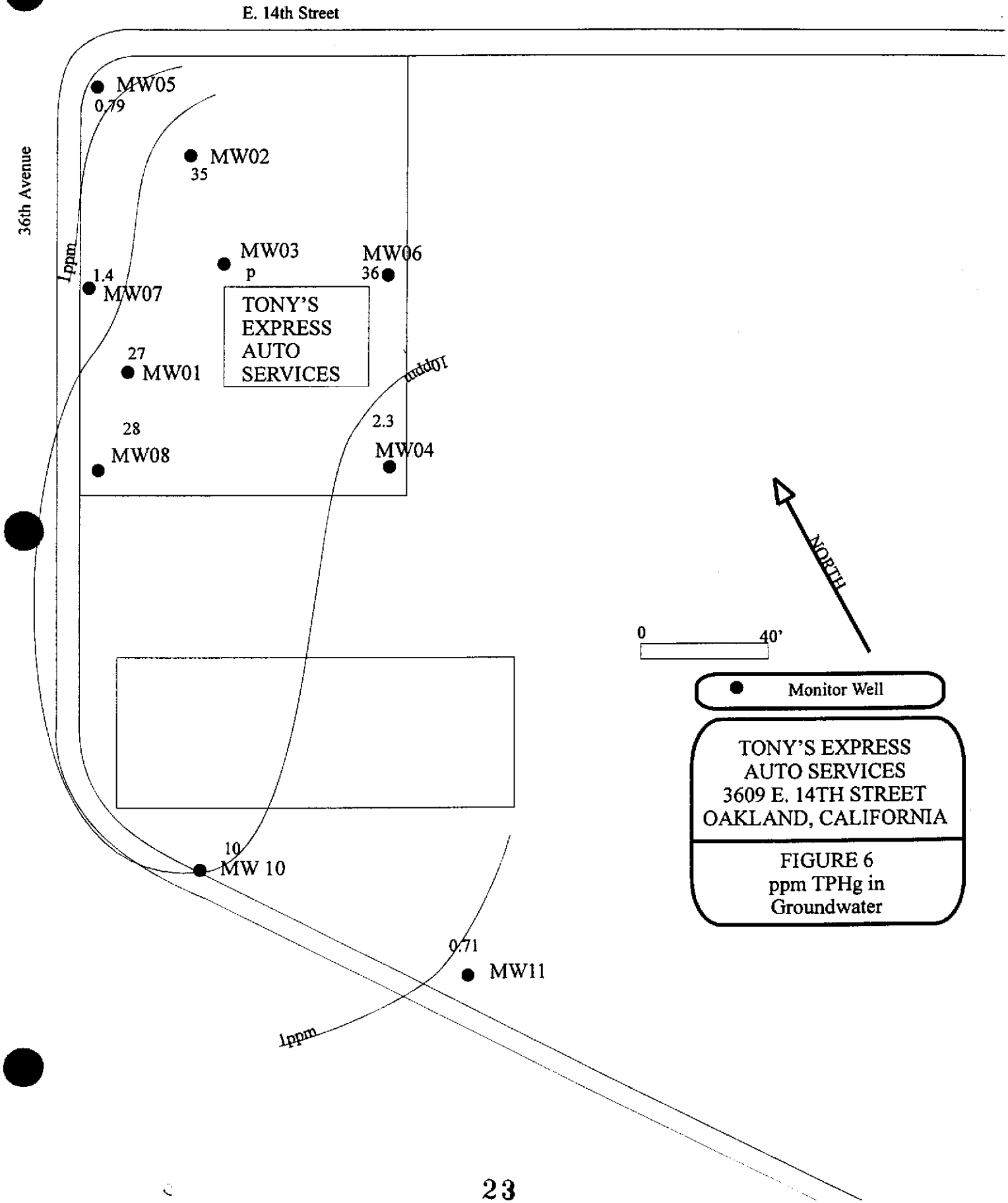

E. 14th Street
36th Avenue
MW05
MW02
MW03
MW06
MW7
TONY'S EXPRESS AUTO SERVICES
MW01
MW08
MW04
MW 10
MW11
NORTH
0
40'
Monitor Well
TONY'S EXPRESS AUTO SERVICES
3609 E. 14TH STREET
OAKLAND, CALIFORNIA
FIGURE 3
SITE BASE MAP


E. 14th Street
36th Avenue
MW05
89.69
89.53
MW02
88.04
MW03
MW06
89.47
89.18
MW07
TONY'S EXPRESS AUTO SERVICES
88.69
MW1
MW08
88.3
MW04
88.42
NORTH
0
40'
Monitor Well
Groundwater flow direction
TONY'S EXPRESS AUTO SERVICES
3609 E. 14TH STREET
OAKLAND, CALIFORNIA
FIGURE 4
Groundwater Gradient
12/30/97
85.76
MW 10
85.74
MW11
E 12th St

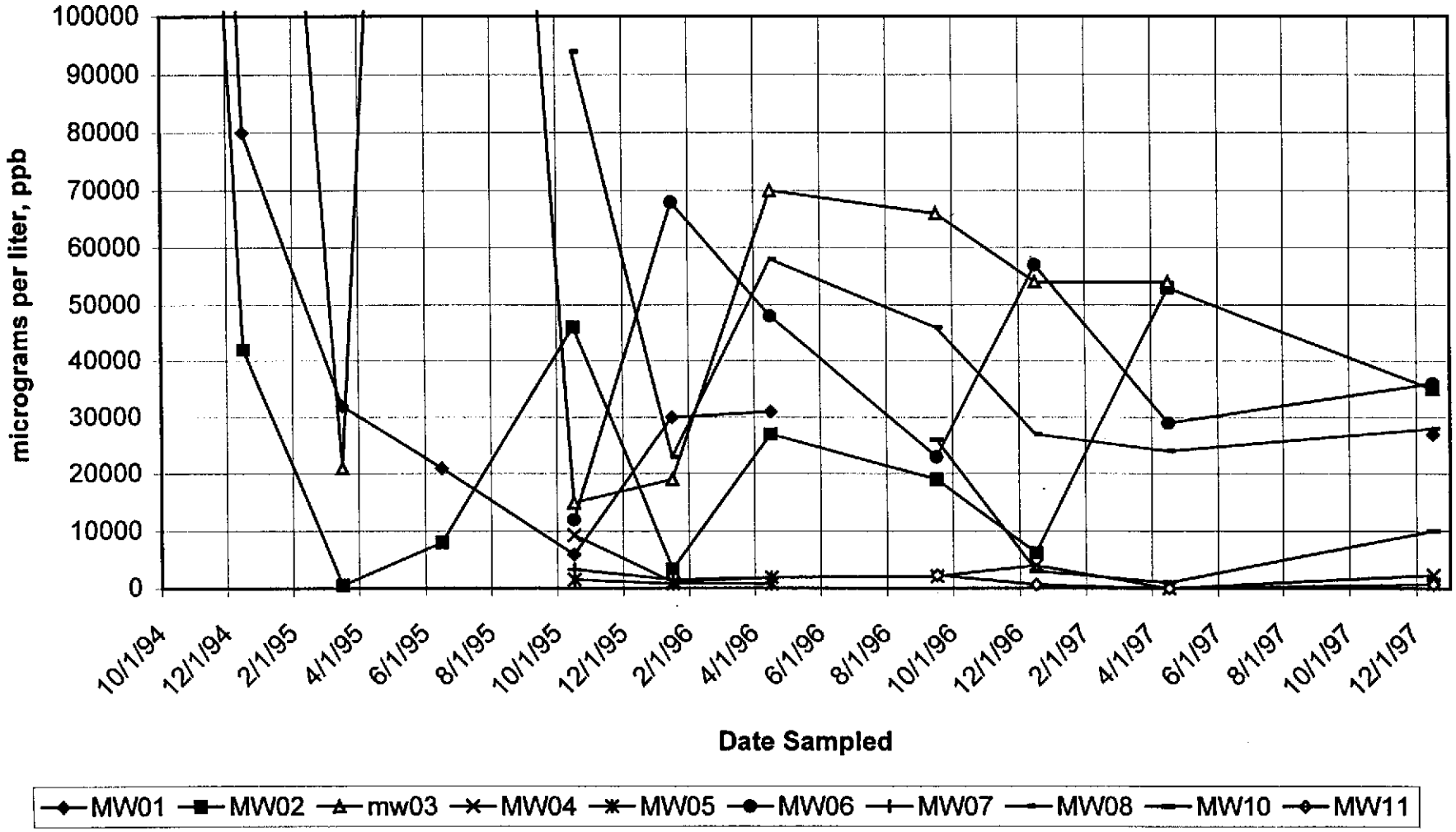


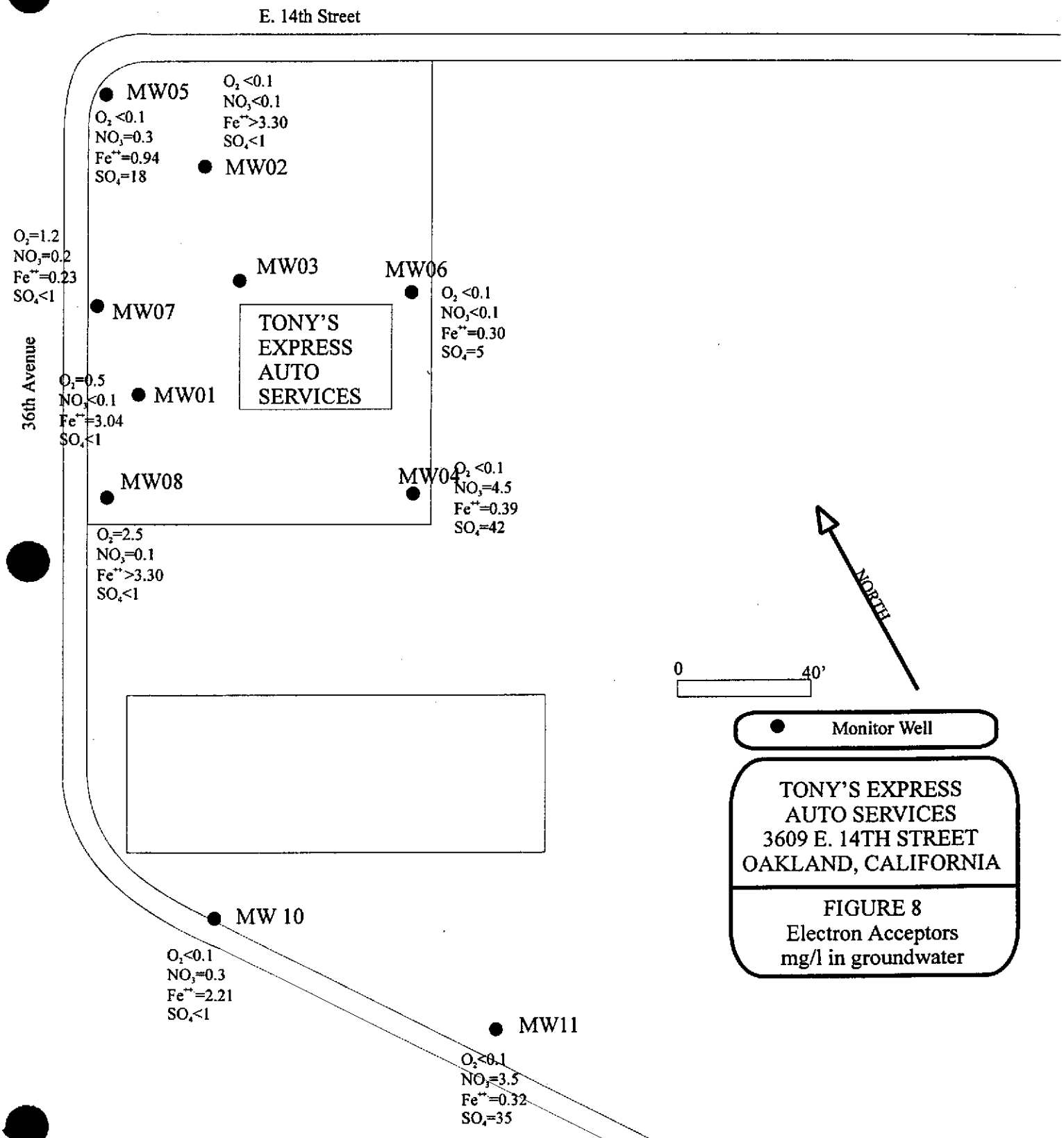
TONY'S EXPRESS AUTO SERVICES
3609 E. 14TH STREET
OAKLAND, CALIFORNIA

FIGURE 5
ug/l Benzene in Groundwater


E. 14th Street
36th Avenue
MW05
0.79
MW02
35
MW03
p
MW06
36
1.4
MW07
1ppm
TONY'S
EXPRESS
AUTO
SERVICES
27
MW01
10ppm
28
MW08
2.3
MW04
NORTH
0
40'
Monitor Well
TONY'S EXPRESS
AUTO SERVICES
3609 E. 14TH STREET
OAKLAND, CALIFORNIA
FIGURE 6
ppm TPHg in
Groundwater
10
MW 10
0.71
MW11
1ppm

Tony's Express Auto Services, Micrograms per liter TPHg
Figure 7




E. 14th Street
MW05
O_2 <0.1
NO_3<0.1
Fe^{++}>3.30
SO_4<1
O_2 <0.1
NO_3=0.3
Fe^{++}=0.94
SO_4=18
MW02
O_2=1.2
NO_3=0.2
Fe^{++}=0.23
SO_4<1
MW03
MW06
O_2 <0.1
NO_3<0.1
Fe^{++}=0.30
SO_4=5
MW07
TONY'S EXPRESS AUTO SERVICES
36th Avenue
O_2=0.5
NO_3<0.1
Fe^{++}=3.04
SO_4<1
MW01
MW08
MW04
O_2 <0.1
NO_3=4.5
Fe^{++}=0.39
SO_4=42
O_2=2.5
NO_3=0.1
Fe^{++}>3.30
SO_4<1
NORTH
0
40'
Monitor Well
TONY'S EXPRESS
AUTO SERVICES
3609 E. 14TH STREET
OAKLAND, CALIFORNIA
FIGURE 8
Electron Acceptors
mg/l in groundwater
MW 10
O_2<0.1
NO_3=0.3
Fe^{++}=2.21
SO_4<1
MW11
O_2<0.1
NO_3=3.5
Fe^{++}=0.32
SO_4=35

APPENDIX A
QA/QC
METHODS AND PROCEDURES

APPENDIX A.

METHODS AND PROCEDURES, QA/QC

This Appendix documents the specific methods, procedures, and materials used to collect and analyze ground water samples and monitoring the vapor recovery system.

Gauging and Measuring Monitor Wells.

Prior to sampling a well, WEGE personnel obtain three measurements: the depth to ground water (DTW) and the product thickness using a battery powered depth to water-product interface probe and or by using a specially designed bailer. And the vacuum influence at the well head, using a water manometer that is attached to a sample port in the well head. The DTW probe is lowered into the well casing until the instrument signals that the top of water has been reached. The distance from the top of water to the top of casing is read from the tape that is attached to the probe. The tape is calibrated in 0.01 foot intervals for accuracy to 0.01 foot. The measured distance is subtracted from the established elevation at the top of casing to determine the elevation of ground water with respect to mean sea level. The probe is washed with TSP (Tri Sodium Phosphate) and rinsed in distilled water before each measurement. WEGE has designed and built bailers that will collect a sample of the contents of a well to show the exact thickness of any floating product. Some of the abbreviations used in water sampling and or measuring or monitoring are: DTW, Depth to Water (from surface reference ie usually TOC); TOC, Top of Casing; MSL, Mean Sea Level; AMSL and BMSL, Above and Below MSL; BS, Below Surface; TOW, Top of Water; TSP, Tri Sodium Phosphate.

Purging Standing Water from Monitor Wells

If no product is present, WEGE personnel purge the well. This is accomplished by removing ground water from the well until the water quality parameters (temperature, pH, and conductivity) stabilize, or until the well is emptied of water. Periodic measurements of ground water temperature, pH, and conductivity were taken with a Hydac Monitor or other meter and recorded along with the volume of ground water removed from the well. Purging is done by one or more methods singularly or in combination. Bailers, pneumatic or electric sample pumps, or vacuum pump tanks or trucks may be used. The usual amount of water removed is three well volumes. The water collected during purging is either safely stored onsite for later disposition, transported to an approved onsite or offiste sewer discharge system, or an approved onsite or offsite treatment system.

Collection of Water Sample for Analysis

The well is allowed to recover after purging and a ground water sample is collected. A fresh bailer is used to collect enough water for the requirements of the laboratory for the analyses needed or required. The water samples are decanted from the bailer into the appropriate number and size containers. These containers are furnished pre-cleaned to exact EPA protocols, with and without preservatives added, by the analytical laboratory or a chemical supply company. The bottles are filled, with no headspace, and then capped with plastic caps with teflon liners.

The vials or bottles containing the ground water samples are labeled with site name, station, date, time, sampler, and analyses to be performed, and documented on a chain of custody form. They were placed in ziplock bags and stored in a chest cooled to 4°C with ice. The preserved samples are chain of custody delivered to the chosen laboratory.

Analytical Results

TPH is the abbreviations used for Total Petroleum Hydrocarbons used by the laboratories for water and soil analyses. The letter following TPH indicates a particular distinction or grouping for the results. The letters "g", "d", "k", or "o" indicate gasoline, diesel, kerosene, or oil, respectively, ie TPH-d for diesel range TPH.

MBTEX acronym or abbreviation used for Methyl Tertiary Butyl Ether (MTBE), Benzene, Toluene, Ethylbenzene and all of the Xylenes.

The less than symbol, <, used with a "parts per value" indicates the lower detection limit for a given analytical result and the level, if present, of that particular analyte is below or less than that lower detection limit.

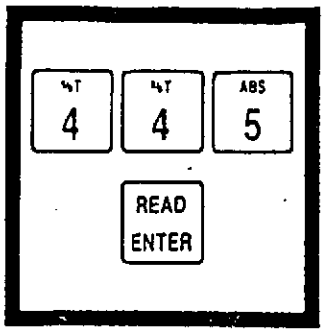
Other abbreviations commonly used are ppm, ppb, mg/Kg, ug/Kg, ml/l and ul/l are parts per million, parts per billion, milligrams per kilogram, micrograms per kilogram, milliliters per liter, microliters per liter, respectivily.

Chain of Custody Documentation

All water samples that are collected by WEGE and transported to a certified analytical laboratory are accompanied by chain-of-custody (COC) documentation. This documentation is used to record the movement and custody of a sample from collection in the field to final analysis and storage. Samples to be analyzed at the certified laboratory were logged on the COC sheet provided by the laboratory. The same information provided on the sample labels (site name, sample location, date, time, and analysis to be performed) are also noted on the COC form. Each person relinquishing custody of the sample set signs the COC form indicating the date and time of the transfer to the recipient. A copy of the COC follows the samples or their extracts throughout the laboratory to aid the analyst in identifying the samples and to assure analysis within holding times.

Copies of the COC documentation are included with the laboratory results in Appendix B of this report.

HRDO Method



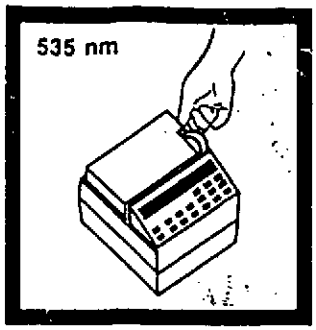
1. Enter the stored program number for dissolved oxygen.

Press: 4 4 5 READ/ENTER

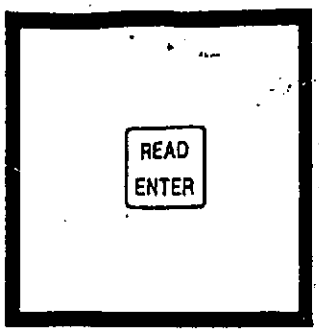
The display will show:
DIAL nm TO 535

Note: Or, use the up and down arrows to scroll the display to: 445 mg/l O_2 HRDO and press: READ/ENTER

Note: Samples must be analyzed on site and cannot be stored; see Sampling and Storage below.

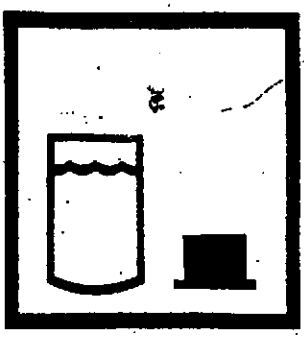


2. Rotate the wavelength dial until the small display shows:
535 nm

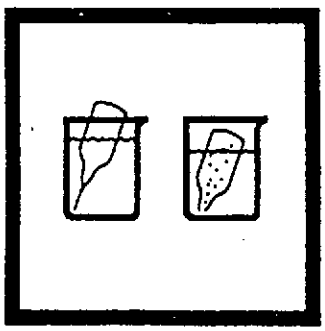


3. Press: READ/ENTER

The display will show:
mg/l O_2 HRDO

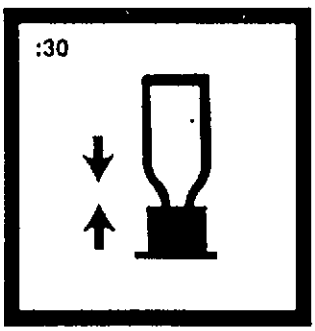


4. Fill a zeroing vial (the blank) with at least 10 mL of sample. Fill a blue ampul cap with sample.



5. Fill a High Range Dissolved Oxygen AccuVac Ampul with sample.

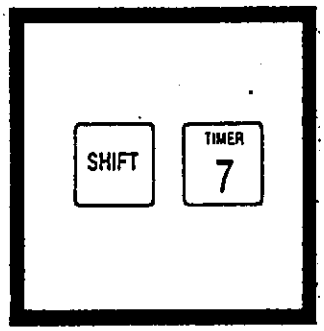
Note: Keep the tip immersed while the ampul fills completely.



6. Without inverting the ampul, immediately place the ampul cap that has been filled with sample securely over the tip of the ampul. Shake the ampul for approximately 30 seconds.

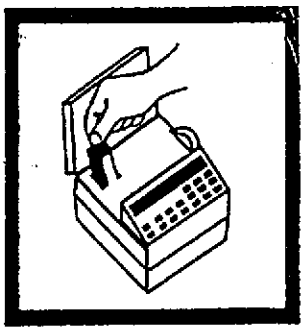
Note: A small amount of the undissolved HRDO Reagent does not affect results.

Note: The cap prevents contamination with atmospheric oxygen.



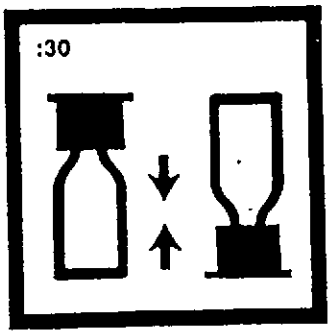
7. Press: SHIFT TIMER

A two-minute reaction period enables oxygen, which was degassed during aspiration, to redissolve and react.



8. Place the AccuVac Vial Adapter into the cell holder.

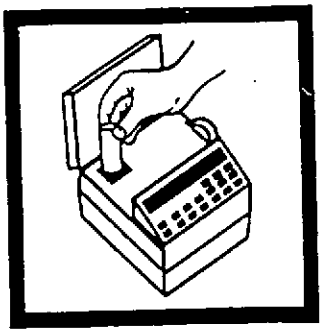
Note: Place the grip tab at the rear of the cell holder.



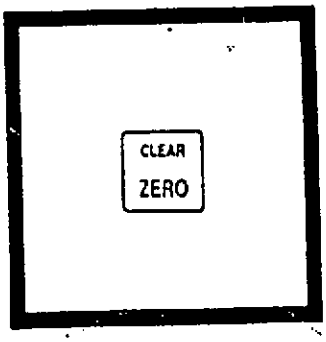
9. When the timer beeps, the display will show:

mg/l O_2 HRDO

Shake the ampul for 30 seconds.



10. Place the blank into the cell holder. Close the light shield.



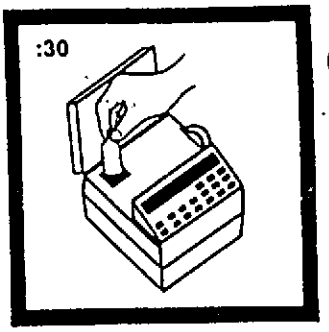
11. Press: ZERO

The display will show:

WAIT

then:

0.0 mg/l O_2 HRDO



12. Place the AccuVac ampul into the cell holder. Close the light shield. Wait approximately 30 seconds for the air bubbles to disperse from the light path.

Press: READ/ENTER

The display will show:

WAIT

then the result in mg/L dissolved oxygen will be displayed.

Note: In the constant-on mode, pressing READ/ENTER is not required. WAIT will not appear. When the display stabilizes, read the result.

SAMPLING AND STORAGE

The foremost consideration in sampling with the High Range Dissolved Oxygen AccuVac Ampul is to prevent the sample from becoming contaminated with atmospheric oxygen. This is accomplished by capping the ampul with an ampul cap in the interval between breaking open the ampul and reading the absorbance. If the ampul is securely capped, the ampul should be safe from contamination for several hours. The absorbance will decrease by approximately 3% during the first hour and will not change significantly afterwards.

Sampling and sample handling are important considerations in obtaining meaningful results. The dissolved oxygen content of the water being tested can be expected to change with depth, turbulence, temperature, sludge deposits, light, microbial action, mixing, travel time and other factors. A single dissolved oxygen test rarely reflects the accurate over-all condition of a body of water. Several samples taken at different times, locations and depths are recommended for most reliable results. Samples must be tested immediately upon collection although only a small error results if the absorbance reading is taken several hours later.

ACCURACY CHECK

The results of this procedure may be compared with the results of a titrimetric procedure or dissolved oxygen meter.

PRECISION

In a single laboratory, using a standard solution of 7.22 mg/L O_2 determined by the Winkler method and two representative lots of reagent with the DR/2000, a single operator obtained a standard deviation of ± 0.20 mg/L O_2.

INTERFERENCES

The following do not interfere at a level of 10 mg/L which is in excess of naturally occurring levels of Cr^{3+}, Mn^{2+}, Fe^{2+}, Ni^{2+}, Cu^{2+} and NO_2^-

APPENDIX B
LABORATORY
RESULTS

Northstate Environmental

Subcontracted Microbiology Assays

performed by

CytoCulture Environmental Biotechnology

Chain of Custody Form

Project Name:	Project No.	Northstate LOG IN #: 97-1272
Northstate Client Organization:		Northstate Project Manager: John Stetz
Address to Send Results: P.O. Box 5624 SSF, CA 94083		
Client Fax for Sending Data: 415-588-1950		Client Contact / Project Manager:
Client Tel for Follow-up: 415-266-1583		Client Sampler / Recorder:

Sample I.D.	Sampling		Matrix		Analysis								
Indicate target Hydrocarbon range Gasoline	Date	Time	Soil	Water (amber)	CFU Hydrocarbon Degraders	CFU Total Heterotrophic	pH	DO	NH_4	PO_4	NO_3	SO_4	Other Tests or Comments
MW-2	12/30/97	14:05		Water	X		X		X	X			
MW-1		11:02			X		X		X	X			
MW-5		12:42			X		X		X	X			
MW-7		11:50			X		X		X	X			
MW-8		10:00			X		X		X	X			

Chain of Custody Record	Signature of this form constitutes	a firm Purchase Order for services	requested above.
Relinquished by:	Date/Hr: 12/30/97 5:15PM	Received by:	Date/Hr:
Received for CytoCulture Lab by:	Date/Hr: 12/30/97 5:20 PM	CytoCulture Tel: 510-233-0102 Lab Services Fax: 510-233-3777	Please fax Chain of Custody form to CytoCulture prior to delivery.

INVOICED 12/30/97

CytoCulture
ENVIRONMENTAL
BIOTECHNOLOGY
CytoCulture International, Inc. 1986

January 7, 1998

Client: Northstate Environmental
Contact: John Stetz
Client Code: Lab Northst

Fax: (415)-588-1950 **Tel:** (415)266-4563
Project Log In# 97-1272

SAMPLES: Five water samples were received on 12/30/97. The samples were stored at 4°C until assayed the next morning.

Hydrocarbon-Degrading Bacteria Enumeration Assay

ANALYSIS REQUEST: Bacterial enumeration for total petroleum hydrocarbon-degraders (target hydrocarbon: gasoline, possibly waste oil).

CARBON SOURCE: Petroleum hydrocarbons were added as the sole carbon and energy sources for the growth of hydrocarbon-degrading aerobic bacteria on agar plates. Gasoline (Chevron Reg.) was added to the lids to provide petroleum hydrocarbon vapors. Diesel (Chevron #2) and motor oil were blended in a 50:50 ratio and dissolved into the agar to provide additional aliphatic hydrocarbons in the growth matrix.

PROTOCOL: Sterile agar plates (100 x 15 mm) were prepared with minimal salts medium at pH 6.8 with 1.5% noble agar, without any other carbon sources or nutrients added. A 200 ml aliquot of pasteurized gasoline was added to absorbent paper in the plate lids to provide the vapor source of light fraction hydrocarbons. Plates were inoculated with 1.0 ml of sample or a log dilution of each water sample. Triplicate plates were inoculated at sample dilutions of 10^0, 10^{-1}, and 10^{-2}. The hydrocarbon plates were poured on 12/31/97 and counted after 7 days on 1/7/98. The plate count data are reported as colony forming units (**cfu**) per milliliter (**ml**) for the water samples. Each bacteria population value represents a statistical average of the plate count data obtained with inoculations for two of the three log dilutions tested.

Hydrocarbon-Degrading Bacteria Enumeration Results

CLIENT SAMPLE NUMBER	SAMPLE DATE	HYDROCARBON DEGRADERS (cfu/ml or cfu/g)
MW-2	12/30/97	2.2×10^2
MW-1	12/30/97	6×10^1
MW-5	12/30/97	1.6×10^2
MW-7	12/30/97	6×10^1
MW-8	12/30/97	3×10^2

1×10^1 cfu/ml is the lowest reporting level for this assay.

NUTRIENT ASSAYS

ANALYSIS REQUEST: Nutrient assays for nitrogen as ammonia and phosphorus as ortho-phosphate.

PROTOCOL: Spectrophotometric assays were performed to determine the concentrations of ammonia nitrogen and ortho-phosphate using precalibrated reagents and a Gilford 240 spectrophotometer. Assays conform to California CLP and Standard Water & Wastewater methods.

Client Sample	Sample Date	N-Ammonia (mg/L or mg/kg)	Ortho-phosphate (mg/L or mg/kg)	N-Nitrate (mg/L or mg/kg)	Sulfate (mg/L or mg/kg)
MW-2	12/30/97	1.3	0.4	NT	NT
MW-1	12/30/97	1.3	0.1	NT	NT
MW-5	12/30/97	0.8	0.4	NT	NT
MW-7	12/30/97	0.2	0.2	NT	NT
MW-8	12/30/97	0.8	0.3	NT	NT

0.1 mg/L represents the lowest reporting level for these assays. NT = not tested

Dissolved Oxygen and pH

ANALYSIS REQUEST: Analysis for dissolved oxygen and pH for water and soil samples.

PROTOCOL: The pH levels of the water or extracted soil samples were measured with a Corning digital pH meter and reported as the mean of triplicate values. The dissolved oxygen levels of the water samples were measured with a YSI analog DO meter and reported as the mean of duplicate values. All assays conform to California CLP and Standard Water & Wastewater analytical specifications. The pH and DO were measured on 12/31/97.

Client Sample	Sample Date	DO (mg/L)	pH
MW-2	12/30/97	NT	6.55
MW-1	12/30/97	NT	6.50
MW-5	12/30/97	NT	6.63
MW-7	12/30/97	NT	6.61
MW-8	12/30/97	NT	6.56

Moderate to low levels of discernable colonies of hydrocarbon-degrading aerobic bacteria were enumerated in all 5 samples. In spite of obvious dissolved phase hydrocarbons (strong odor) in several samples, population densities were not greater than 300 cfu/ml suggesting other environmental factors were inhibiting the growth of the bacteria. Nutrient levels proved to be low, near or below the level of detection for the ammonia and o-phosphate levels. The pH levels were near optimal for typical soil bacteria monitored in contaminated ground water.

CytoCulture can provide, on a consulting basis, assistance with interpreting these data in the context of other field data and assist in the development of bioremediation strategies for this site. Please contact us if we can be of any further help.

Bacteria plate enumerations, nutrient assays, pH and DO measurements were performed by Dr. James McEldoon, Laboratory Services, and reported by Randall von Wedel.

James P. McEldoon, Ph.D.
Laboratory Services

Randall von Wedel, Ph.D.
Principal, Director of Research

c:\Cytolab\Lab Reports\Ish-North\ste\1-8

Sheet1

Absorbance vs. Concentration Template

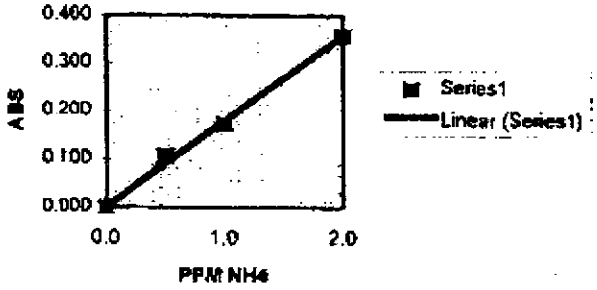
Project: Northstate **Date: 1/7/98**

Ammonia Nitrogen Assay

x	y		
ppm NH4	Abs 1	Abs 2	Abs Avg
0.0	0	0	0.000
0.5	0.108	0.105	0.1065
1.0	0.172	0.173	0.1725
2.0	0.358	0.356	0.357

slope	0.1752
int	0.0057
cor	0.995875

	Abs	PPM	%Calc/Std
STDs	0.1065	0.58	115.1
	0.1725	0.95	95.2
	0.324	1.82	90.8

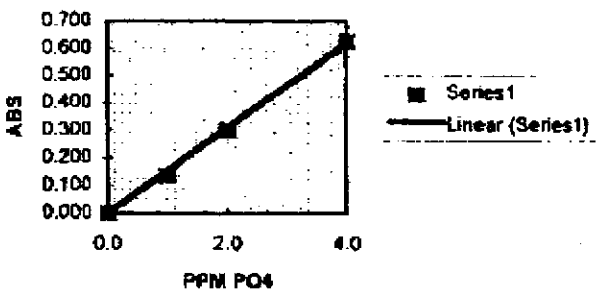


ortho-Phosphate Assay

x	y		
ppm PO4	Abs 1	Abs 2	Abs Avg
0.0	0	0	0.000
1.0	0.131	0.141	0.136
2.0	0.298	0.305	0.302
4.0	0.621	0.635	0.628

slope	0.158443
int	-0.0109
cor	0.998643

	PPM	%Calc/Std
STDs	0.136	0.93	92.7
	0.302	1.97	98.6
	0.628	4.03	100.8



sample	ml sample	DF sample	DF soil	Abs 1	Abs 2	Blk 1	Blk 2	Avg-Blk	PPM	NH4 PPM
MW-2	10	1	1	0.229	0.253		0.000	0.241	1.34	1.3
MW-1	10	1	1	0.225	0.255		0.000	0.240	1.34	1.3
MW-5	10	1	1	0.111	0.171		0.000	0.141	0.77	0.8
MW-7	10	1	1	0.027	0.047		0.000	0.037	0.18	0.2

MW-6	10	1	1	0.115	0.165	0.000	0.000	0.140	0.77	0.8
x	10	1	1	0.000	0.000	0.000	0.000	0.000	-0.03	0.0
x	10	1	1	0.000	0.000	0.000	0.000	0.000	-0.03	0.0

sample	m sample	DF sample	DF soil	Abs 1	Abs 2	Blk 1	Blk 2	Avg-Blk	PPM	PO4 PPM	
MW-2	10	1	1	0.05	0.052		0.000	0.051	0.39	0.4	
MW-1	10	1	1	0.001	0.001		0.000	0.001	0.08	0.1	
MW-5	10	1	1	0.047	0.049		0.000	0.048	0.37	0.4	
MW-7	10	1	1	0.013	0.017		0.000	0.015	0.16	0.2	
MW-8	10	1	1	0.04	0.049		0.000	0.045	0.35	0.3	
MW-	10	1	1	0	0		0.000	0.000	0.07	0.1	
MW-	10	1	1	0	0		0.000	0.000	0.07	0.1	
MW-	10	1	1	0	0		0.000	0.000	0.07	0.1	

North State Environmental
Chemical Waste Disposal · Trucking · Consulting

FAX

Date 1/9/98

Number of pages including cover sheet- 4

TO: George

Phone
Fax Phone 916-462-0273

FROM: John Stetz
North State Environmental
P.O. Box 5624
South San Francisco, CA 94083

Phone 415.266.4583
Fax Phone 415.588.1950

REMARKS: ☐ Urgent ☑ For your review ☐ Reply ASAP ☐ Please Comment

- MW-6, MW-10 from Tony's

North State Environmental
Chemical Waste Disposal · Trucking · Consulting

FAX

Date 1/16/98

Number of pages including cover sheet- 13

TO: GEORGE CONVERSE

Phone

Fax Phone 916-662-0273

FROM: John Stetz
North State Environmental
P.O. Box 5624
South San Francisco, CA 94083

Phone 415.266.4583
Fax Phone 415.588.1950

REMARKS: ☐ Urgent ☑ For your review ☐ Reply ASAP ☐ Please Comment

North State Environmental
Chemical Waste Disposal · Trucking · Consulting

C E R T I F I C A T E O F A N A L Y S I S

Lab Number: 97-1272
Client: Western Geo-Engineers
Project: Tony's

Date Reported: 01/09/98

Gasoline and BTEX by Methods 8015M and 8020

Analyte	Method	Result	Unit	Date Sampled	Date Analyzed
Sample: 97-1272-01 Client ID: MW-2				12/30/97	WATER
Gasoline	8015M	35000	ug/L		01/08/98
Benzene	8020	4900	ug/L		
Ethylbenzene	8020	1600	ug/L		
Toluene	8020	4900	ug/L		
Xylenes	8020	7000	ug/L		
Sample: 97-1272-02 Client ID: MW-1				12/30/97	WATER
Gasoline	8015M	27000	ug/L		01/08/98
Benzene	8020	2900	ug/L		
Ethylbenzene	8020	1400	ug/L		
Toluene	8020	2100	ug/L		
Xylenes	8020	5100	ug/L		
Sample: 97-1272-03 Client ID: MW-4				12/30/97	WATER
Gasoline	8015M	2300	ug/L		01/08/98
Benzene	8020	410	ug/L		
Ethylbenzene	8020	100	ug/L		
Toluene	8020	270	ug/L		
Xylenes	8020	1500	ug/L		

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North State Environmental
Chemical Waste Disposal · Trucking · Consulting

C E R T I F I C A T E O F A N A L Y S I S

Lab Number: 97-1272
Client: Western Geo-Engineers
Project: Tony's

Date Reported: 01/09/98

Gasoline and BTEX by Methods 8015M and 8020

Analyte	Method	Result	Unit	Date Sampled	Date Analyzed
Sample: 97-1272-04 Client ID: MW-5				12/30/97	WATER
Gasoline	8015M	790	ug/L		01/08/98
Benzene	8020	82	ug/L		
Ethylbenzene	8020	59	ug/L		
Toluene	8020	66	ug/L		
Xylenes	8020	160	ug/L		
Sample: 97-1272-05 Client ID: MW-7				12/30/97	WATER
Gasoline	8015M	1400	ug/L		01/08/98
Benzene	8020	130	ug/L		
Ethylbenzene	8020	75	ug/L		
Toluene	8020	98	ug/L		
Xylenes	8020	200	ug/L		
Sample: 97-1272-06 Client ID: MW-8				12/30/97	WATER
Gasoline	8015M	28000	ug/L		01/08/98
Benzene	8020	6000	ug/L		
Ethylbenzene	8020	2100	ug/L		
Toluene	8020	1600	ug/L		
Xylenes	8020	4700	ug/L		

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97-12

North State Environmental Analytical Laboratory

Phone: (415) 588-9652 Fax: (415) 588-1950

Chain of Custody / Request for Analysis

Lab Job No.: _____ Page ___ of ___

Client: [illegible]	Report to: [illegible]	Phone: 530 668 5320	Turnaround Time: Normal
Mailing Address:	Billing to: 1350 E. Seminary Woodland CA 95776	Fax:	
		PO# / Billing Reference:	Date: 12-30-97
			Sampler: C. Cervenka

Project / Site Address: Terry's

	Sample ID	Sample Type	Container No. / Type	Pres.	Sampling Date / Time	Analysis Requested: TPH/BTEX	Comments/Hazards
1-	MW6	water	2/VOAs	HCl	12/29/97 / 1700	/	
2-	MW10	/	/	/	/ 1622	/	

Relinquished by: [signature] Date: 12/31/97 Time: 10:25 Received by: [signature] NSE LAB

Relinquished by: Date: Time: Received by:

Relinquished by: Date: Time: Received by:

Lab Comments

North State Environmental
Chemical Waste Disposal · Trucking · Consulting

C E R T I F I C A T E O F A N A L Y S I S

Lab Number: 97-1281
Client: Western Geo-Engineers
Project: Tony's

Date Reported: 01/07/97

Gasoline and BTEX by Methods 8015M and 8020

Analyte	Method	Result	Unit	Date Sampled	Date Analyzed
Sample: 97-1281-01 Client ID: MW-6				12/30/97	WATER
Gasoline	8015M	36000	ug/L		01/05/98
Benzene	8020	6600	ug/L		
Ethylbenzene	8020	1500	ug/L		
Toluene	8020	7600	ug/L		
Xylenes	8020	7700	ug/L		
Sample: 97-1281-02 Client ID: MW-10				12/30/97	WATER
Gasoline	8015M	10000	ug/L		01/05/98
Benzene	8020	5300	ug/L		
Ethylbenzene	8020	1100	ug/L		
Toluene	8020	76	ug/L		
Xylenes	8020	780	ug/L		

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North State Environmental
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C E R T I F I C A T E O F A N A L Y S I S

Lab Number: 97-1272
Client: Western Geo-Engineers
Project: Tony's

Date Reported: 01/09/98

Gasoline and BTEX by Methods 8015M and 8020

Analyte	Method	Result	Unit	Date Sampled	Date Analyzed
Sample: 97-1272-07	Client ID: MW-11			12/30/97	WATER
Gasoline	8015M	710	ug/L		01/08/98
Benzene	8020	66	ug/L		
Ethylbenzene	8020	59	ug/L		
Toluene	8020	97	ug/L		
Xylenes	8020	190	ug/L		

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North State Environmental
Chemical Waste Disposal · Trucking · Consulting

CERTIFICATE OF ANALYSIS

Quality Control/Quality Assurance

Lab Number: 97-1272
Client: Western Geo-Engineers
Project: Tony's

Date Reported:01/09/98

Gasoline and BTEX by Methods 8015M and 8020

Analyte	Method	Reporting Limit	Unit	Blank	MS/MSD Recovery	RPD
Gasoline	8015M	50	ug/L	ND	88	2
Benzene	8020	0.5	ug/L	ND	99	6
Ethylbenzene	8020	0.5	ug/L	ND	112	5
Toluene	8020	0.5	ug/L	ND	108	5
Xylenes	8020	1.0	ug/L	ND	110	3

ELAP Certificate NO:1753
Reviewed and Approved

John A.Murphy,Laboratory Director

P. O. Box 5624 • South San Francisco, California 94083 • 650-588-2838 FAX 588-1950

North State Environmental
Chemical Waste Disposal · Trucking · Consulting

CERTIFICATE OF ANALYSIS

Quality Control/Quality Assurance

Lab Number: 97-1281
Client: Western Geo-Engineers
Project: Tony's

Date Reported:01/07/97

Gasoline and BTEX by Methods 8015M and 8020

Analyte	Method	Reporting Limit	Unit	Blank	MS/MSD Recovery	RPD
Gasoline	8015M	50	ug/L	ND	91	36
Benzene	8020	0.5	ug/L	ND	110	15
Ethylbenzene	8020	0.5	ug/L	ND	108	17
Toluene	8020	0.5	ug/L	ND	109	16
Xylenes	8020	1.0	ug/L	ND	107	12

ELAP Certificate NO:1753
Reviewed and Approved

John A.Murphy, Laboratory Director

P. O. Box 5624 • South San Francisco, California 94083 • 650-588-2838 FAX 588 1950

North State Environmental Analytical Laboratory

Phone: (415) 588-9652 Fax: (415) 588-1950

KPI- 7486

Chain of Custody / Request for Analysis

Lab Job No.: _____ Page ___ of ___

Client: NSE	Report to: John Stett	Phone: 415-206-4583	Turnaround Time: Normal
Mailing Address: P.O. Box 5624 SSF, CA 94083	Billing to:	Fax: 415-588-1950	
		PO# / Billing Reference: 97-1272	Date:
			Sampler:

Project / Site Address:

Analysis Requested

Sample ID	Sample Type	Container No. / Type	Pres.	Sampling Date / Time	Methane/CO2	KPI Sample #			Comments / Hazards
MW-2	water	3 VOAs	—	12/31/97 14:05	X	14167	✓	✓	
MW-1		3		11:02	X	14168	✓	✓	
MW-5		3		12:42	X	14169	✓	✓	
MW-7		3		1150	X	14170	✓	✓	
MW-8		2		10:00	X	14171	✓	✓	
END OF LIST									

Relinquished by: [signature]	Date: 12/31/97	Time: 9:05AM	Received by: Gabriele Stenzel	Lab Comments	
Relinquished by:	Date:	Time:	Received by:		
Relinquished by:	Date:	Time:	Received by:		

Jan-16-98 01:53P Jan-16-98 12:12 Ginger Brinlee (707) 527-7879 P.13 P.12

K PRIME, INC. **ANALYTICAL LABORATORY**

4197 Lakeside Drive, Suite170
Richmond, CA 94806
Phone: 510.222.4815
Fax: 510.222.4817

3621 Westwind Blvd.
Santa Rosa CA 95403
Phone: 707.527.7574
Fax: 707.527.7879

TRANSMITTAL

DATE: 01/16/98

TO: Mr. JOHN STETZ
NORTH STATE ENVIRONMENTAL
PO BOX 5624
SOUTH SAN FRANCISCO CA 94083

Acct: 100-9486
Project: 97-1272

Phone: 415.266.4583
FAX: 415.588.1950

FROM: Richard A. Kagel, Ph D. RAK 1/16/98
Laboratory Director

SUBJECT: YOUR PROJECT "97-1272" LABORATORY RESULTS

Enclosed please find K Prime's laboratory reports for the following samples

SAMPLE ID	SAMPLE TYPE	DATE	KPI LAB #
MW-2	WATER	12/30/97	14167
MW-1	WATER	12/30/97	14168
MW-5	WATER	12/30/97	14169
MW-7	WATER	12/30/97	14170
MW-8	WATER	12/30/97	14171

These samples were received in our laboratory on 12/31/97 and tested in our laboratory as requested on the chain of custody document.

Please call me if you have any questions or need further information. Thank you for this opportunity to be of service.

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-2
LAB NO: 14167
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 14:05

METHOD: METHANE IN WATER
REFERENCE: EPA 18 (GC/FID)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
METHANE	74-82-8	0.789	1,240

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: [signature]
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-1
LAB NO: 14168
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 11:02

METHOD: METHANE IN WATER
REFERENCE: EPA 18 (GC/FID)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
METHANE	74-82-8	0.789	3,200

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: RMC
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-5
LAB NO: 14169
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 12:42

METHOD: METHANE IN WATER
REFERENCE: EPA 18 (GC/FID)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
METHANE	74-82-8	0.789	11.3

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: [signature]
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-7
LAB NO: 14170
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 11:50

METHOD: METHANE IN WATER
REFERENCE: EPA 18 (GC/FID)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
METHANE	74-82-8	0.789	449

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: RAM
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-8
LAB NO: 14171
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 10:00

METHOD: METHANE IN WATER
REFERENCE: EPA 18 (GC/FID)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
METHANE	74-82-8	0.789	3,540

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: [signature]
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-1
LAB NO: 14168
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 11:02

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D1946(GC/TCD)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
CARBON DIOXIDE	124-38-9	165	99,100

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: [signature]
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-2
LAB NO: 14167
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 14:05

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D1946(GC/TCD)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
CARBON DIOXIDE	124-38-9	165	117,000

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: [signature]
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-5
LAB NO: 14169
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 12:42

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D1946(GC/TCD)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
CARBON DIOXIDE	124-38-9	165	62,700

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: RAK
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-7
LAB NO: 14170
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 11:50

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D1946(GC/TCD)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
CARBON DIOXIDE	124-38-9	165	64,200

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: [signature]
DATE: 1/13/98

K PRIME, INC.
LABORATORY REPORT

OUR PROJECT: 9486
YOUR PROJECT: 97-1272

SAMPLE ID: MW-8
LAB NO: 14171
SAMPLE TYPE: WATER
DATE SAMPLED: 12/30/97
TIME SAMPLED: 10:00

METHOD: CARBON DIOXIDE
REFERENCE: ASTM D1946(GC/TCD)

DATE ANALYZED: 1/6/98
UNITS: UG/L

COMPOUND NAME	CAS NO.	REPORTING LIMIT	SAMPLE CONC
CARBON DIOXIDE	124-38-9	165	153,000

NOTES:
ND - NOT DETECTED AT STATED REPORTING LIMIT
NA - NOT APPLICABLE OR AVAILABLE

PREPARED BY: [signature]
DATE: 1-9-98

APPROVED BY: [signature]
DATE: 1/13/98

APPENDIX C
RBCA
RISK BASED CORRECTIVE ACTION
TABLES

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Tony's Express Service Station Job Identification: Tonys
Site Location: 3609 East 14th Street Date Completed: 1/21/98
Completed By: Roy Butler

Software: GSI RBCA Spreadsheet
Version: 1.0.1

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined.

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF.Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing. rate (mg-yr/kg-d)	1.1E+02			9.4E+01	
IRa.in	Inhalation rate indoor (m^3/day)	15			20	
IRa.out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5.8E+03		2.0E+03	5.8E+03	5.8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2.1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)?	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS.v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	TRUE	TRUE	
GW.v	Volatilization from Groundwater	FALSE	TRUE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	TRUE	
GW.b	Vapors from Groundwater	FALSE	TRUE	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW.i	Groundwater Ingestion	TRUE	TRUE	
S.l	Leaching to Groundwater from all Soils	TRUE	TRUE	

Matrix of Receptor Distance and Location On- or Off-Site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)	2.1E+04	FALSE		TRUE
S	Inhalation receptor (cm)	2.4E+03	FALSE		TRUE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	1.0E-06	
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1.0E+00	
Opt	Calculation Option (1, 2, or 3)	2	
Tier	RBCA Tier	2	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	***1.5E+06***	1.0E+06
W	Length of affect. soil parallel to wind (cm)	***1.2E+03***	1.0E+03
W.gw	Length of affect. soil parallel to groundwater (cm	***1.2E+03***	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	***9.1E+01***	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***7.6E+02***
Ugw.tr	Groundwater seepage velocity (cm/yr)	***3.8E+03***
Ks	Saturated hydraulic conductivity(cm/s)	1.3E-03
grad	Groundwater gradient (cm/cm)	1.9E-02
Sw	Width of groundwater source zone (cm)	6.1E+03
Sd	Depth of groundwater source zone (cm)	7.6E+02
phi.eff	Effective porosity in water-bearing unit	2.0E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	TRUE
BC	Biodegradation Capacity (mg/L)	1.6E+01

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	***6.1E+00***		
hv	Vadose zone thickness (cm)	***2.7E+02***		
rho	Soil density (g/cm^3)	1.7		
foc	Fraction of organic carbon in vadose zone	0.01		
phi	Soil porosity in vadose zone	0.38		
Lgw	Depth to groundwater (cm)	***2.8E+02***		
Ls	Depth to top of affected subsurface soil (cm)	***9.1E+01***		
Lsubs	Thickness of affected subsurface soils (cm)	***8.2E+02***		
pH	Soil/groundwater pH	6.5		
		capillary	vadose	foundation
phi.w	Volumetric water content	0.342	0.12	0.12
phi.a	Volumetric air content	0.038	0.26	0.26

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	0.01	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)	6.4E+02	
ay	Transverse dispersivity (cm)	6.4E+01	
az	Vertical dispersivity (cm)	6.4E+00	
Vapor			
dcy	Transverse dispersion coefficient (cm)	2.8E+02	
dcz	Vertical dispersion coefficient (cm)	1.9E+02	

CAS Number	Constituent	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(l/kg)	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
71-43-2	Benzene	A	78.1	5	9.30E-02	A	1.10E-05	A	1.58	A	5.29E-03	2.20E-01	A	9.52E+01	4	1.75E+03	A			
100-41-4	Ethylbenzene	A	106.2	5	7.60E-02	A	8.50E-06	A	1.98	A	7.69E-03	3.20E-01	A	1.00E+01	4	1.52E+02	5			
108-88-3	Toluene	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	A	6.25E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29			
1330-20-7	Xylene (mixed isomers)	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	A	6.97E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5			

Site Name: Tony's Express Service Station Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

Software version: 1.0.1

CAS Number	Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Inhalation RfD_inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Inhalation SF_inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
71-43-2	Benzene	-		1.70E-03	R	2.90E-02	A	2.90E-02	A	A	TRUE
100-41-4	Ethylbenzene	1.00E-01	A	2.86E-01	A	-		-		D	FALSE
108-88-3	Toluene	2.00E-01	A,R	1.14E-01	A,R	-		-		D	FALSE
1330-20-7	Xylene (mixed isomers)	2.00E+00	A,R	2.00E+00	A	-		-		D	FALSE

Site Name: Tony's Express Service Stat Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

Software version: 1.0.1

RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level MCL (mg/L)	Maximum Contaminant Level reference	Permissible Exposure Limit PEL/TLV (mg/m3)	PEL/TLV ref	Relative Absorption Factors Oral	Relative Absorption Factors Dermal	Detection Limits Groundwater (mg/L)	Groundwater ref	Detection Limits Soil (mg/kg)	Soil ref	Half Life (First-Order Decay) (days) Saturated	Half Life (First-Order Decay) (days) Unsaturated	ref
71-43-2	Benzene	5.00E-03	52 FR 25690	3.20E+00	OSHA	1	0.5	0.002	C	0.005	S	720	720	H
100-41-4	Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.002	C	0.005	S	228	228	H
108-88-3	Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	1	0.5	0.002	C	0.005	S	28	28	H
1330-20-7	Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.005	C	0.005	S	360	360	H

Site Name: Tony's Express Service Stat Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

Software version: 1.0.1

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

(Complete the following table)

CONSTITUENT	Representative COC Concentration in Groundwater value (mg/L)	note	in Surface Soil value (mg/kg)	note	in Subsurface Soil value (mg/kg)	note
Benzene	6.0E+0		5.0E-2		1.1E+1	
Ethylbenzene	2.1E+0		5.0E-2		1.5E+1	
Toluene	7.6E+0		5.0E-2		3.6E+1	
Xylene (mixed isomers)	7.7E+0		5.0E-2		7.3E+1	

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

RBCA SITE ASSESSMENT | Input Screen 6.3

CONSTITUENT MOLE FRACTIONS

(Complete the following table)

CONSTITUENT	Mole Fraction of Constituent in Source Material
Benzene	
Ethylbenzene	
Toluene	
Xylene (mixed isomers)	

Site Name: Tony's Express Service Stat Completed By: Roy Butler
Site Location: 3609 East 14th Street Date Completed: 1/21/1998

RBCA SITE ASSESSMENT	Input Screen 9.4

GROUNDWATER DAF VALUES

(Enter DAF values in the grey area of the following table)

CONSTITUENT	Dilution Attenuation Factor (DAF) in Groundwater	
	Residential Receptor	Comm./Ind. Receptor
Benzene	6.0E+0	1.0E+0
Ethylbenzene	6.0E+0	1.0E+0
Toluene	6.0E+0	1.0E+0
Xylene (mixed isomers)	6.0E+0	1.0E+0

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

RBCA SITE ASSESSMENT | Input Screen 9.1

CONSTITUENT HALF-LIFE VALUES

(Complete the following table)

CONSTITUENT	Half-Life of Constituent (day)
Benzene	720
Ethylbenzene	228
Toluene	28
Xylene (mixed isomers)	360

Site Name: Tony's Express Service Stati Completed By: Roy Butler
Site Location: 3609 East 14th Street Date Completed: 1/21/1998

RBCA SITE ASSESSMENT

EXPOSURE LIMITS IN GROUNDWATER AND AIR

CONSTITUENT	Exposure Limits Applied to Receptors	
	Groundwater (MCL) (mg/L)	Air (Comm. only) (PEL/TLV) (mg/m^3)
Benzene		
Ethylbenzene		
Toluene		
Xylene (mixed isomers)		

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

Site Name: Tony's Express Service Station | Site Location: 3609 East 14th Street | Completed By: Roy Butler | Date Completed: 1/21/1998 | 1 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS: VAPOR AND DUST INHALATION

Constituents of Concern	Exposure Concentration 1) Source Medium: Surface Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor		3) Exposure Medium: Outdoor Air: POE Conc. (mg/m^3) (1) / (2)		4) Exposure Multiplier: (IRxEFxED)/(BWxAT) (m^3/kg-day)		5) Average Daily Intake Rate: (mg/kg-day) (3) X (4)	
Benzene	5.0E-2								
Ethylbenzene	5.0E-2								
Toluene	5.0E-2								
Xylene (mixed isomers)	5.0E-2								

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor (mg/cm^2); AT = Averaging time (days); BW = Body weight (kg); CF = Units conversion factor; ED = Exposure duration (yrs); EF = Exposure frequencey (days/yr); ET = Exposure time (hrs/day); IR = Inhalation rate (m^3/day); POE = Point of exposure; SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station | Site Location: 3609 East 14th Street | Completed By: Roy Butler | Date Completed: 1/21/1998 | 2 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

SUBSURFACE SOILS: VAPOR INHALATION — **Exposure Concentration**

Constituents of Concern	1) Source Medium: Subsurface Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-Site Commercial	2) NAF Value (m^3/kg) Receptor: Off-Site Residential	3) Exposure Medium: Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial	3) Exposure Medium: Outdoor Air: POE Conc. (mg/m^3) (1) / (2): Off-Site Residential	4) Exposure Multiplier: (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Commercial	4) Exposure Multiplier: (IRxEFxED)/(BWxAT) (m^3/kg-day): Off-Site Residential	5) Average Daily Intake Rate (mg/kg-day) (3) X (4): On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) X (4): Off-Site Residential
Benzene	1.1E+1	2.1E+4	3.1E+4	5.3E-4	3.6E-4	7.0E-2	1.2E-1	3.7E-5	4.2E-5
Ethylbenzene	1.5E+1	2.1E+4	3.1E+4	7.2E-4	4.9E-4	2.0E-1	2.7E-1	1.4E-4	1.3E-4
Toluene	3.6E+1	2.1E+4	3.1E+4	1.7E-3	1.2E-3	2.0E-1	2.7E-1	3.4E-4	3.2E-4
Xylene (mixed isomers)	7.3E+1	2.1E+4	3.1E+4	3.5E-3	2.4E-3	2.0E-1	2.7E-1	6.9E-4	6.5E-4

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposue area (cm^2/day)

Site Name: Tony's Express Service Station | Site Location: 3609 East 14th Street | Completed By: Roy Butler | Date Completed: 1/21/1998 | 3 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) — Receptor: On-Site Commercial		3) Exposure Medium — Outdoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial		4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Commercial		5) Average Daily Intake Rate (mg/kg-day) (3) X (4): On-Site Commercial		TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface, subsurface & groundwater routes.): On-Site Commercial	Off-Site Residential
Benzene	6.0E+0	5.3E+4		1.1E-4		7.0E-2		7.9E-6		4.5E-5	4.2E-5
Ethylbenzene	2.1E+0	5.2E+4		4.0E-5		2.0E-1		7.9E-6		1.5E-4	1.3E-4
Toluene	7.6E+0	5.4E+4		1.4E-4		2.0E-1		2.8E-5		3.7E-4	3.2E-4
Xylene (mixed isomers)	7.7E+0	5.8E+4		1.3E-4		2.0E-1		2.6E-5		7.1E-4	6.5E-4

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAYS ARE ACTIVE)**

		CARCINOGENIC RISK					TOXIC EFFECTS				
	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Commercial	(2) Total Carcinogenic Intake Rate (mg/kg/day) Off-Site Residential	(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site Commercial	(4) Individual COC Risk (2) x (3) Off-Site Residential	(5) Total Toxicant Intake Rate (mg/kg/day) On-Site Commercial	(5) Total Toxicant Intake Rate (mg/kg/day) Off-Site Residential	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Commercial	(7) Individual COC Hazard Quotient (5) / (6) Off-Site Residential
Constituents of Concern											
Benzene	A	4.5E-5	4.2E-5	2.9E-2	1.3E-6	1.2E-6	1.3E-4	9.9E-5	1.7E-3	7.4E-2	5.8E-2
Ethylbenzene	D						1.5E-4	1.3E-4	2.9E-1	5.2E-4	4.7E-4
Toluene	D						3.7E-4	3.2E-4	1.1E-1	3.2E-3	2.8E-3
Xylene (mixed isomers)	D						7.1E-4	6.5E-4	2.0E+0	3.6E-4	3.3E-4
Total Pathway Carcinogenic Risk =					1.3E-6	1.2E-6	***Total Pathway Hazard Index =***			7.8E-2	6.2E-2

Site Name: Tony's Express Service Station | Site Location: 3609 East 14th Street | Completed By: Roy Butler | Date Completed: 1/21/1998 | 4 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

[redacted] ■ (CHECKED IF PATHWAY IS ACTIVE)

SUBSURFACE SOILS: Exposure Concentration

VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	1) Source Medium: Subsurface Soil Conc. (mg/kg)	2) NAF Value (m^3/kg) Receptor: On-Site Commercial	3) Exposure Medium: Indoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) X (4): On-Site Commercial
Benzene	1.1E+1	3.9E+1	2.8E-1	7.0E-2	2.0E-2
Ethylbenzene	1.5E+1	6.2E+1	2.4E-1	2.0E-1	4.7E-2
Toluene	3.6E+1	9.3E+1	3.9E-1	2.0E-1	7.6E-2
Xylene (mixed isomers)	7.3E+1	1.7E+2	4.3E-1	2.0E-1	8.4E-2

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station | Site Location: 3609 East 14th Street | Completed By: Roy Butler | Date Completed: 1/21/1998 | 5 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER:
VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	Exposure Concentration 1) Source Medium: Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor: On-Site Commercial	3) Exposure Medium: Indoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) X (4): On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from subsurface & groundwater routes.): On-Site Commercial
Benzene	6.0E+0	1.6E+2	3.6E-2	7.0E-2	2.5E-3	2.2E-2
Ethylbenzene	2.1E+0	1.5E+2	1.4E-2	2.0E-1	2.7E-3	5.0E-2
Toluene	7.6E+0	1.6E+2	4.7E-2	2.0E-1	9.2E-3	8.5E-2
Xylene (mixed isomers)	7.7E+0	1.7E+2	4.5E-2	2.0E-1	8.8E-3	9.3E-2

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

TIER 2 PATHWAY RISK CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

Constituents of Concern	(1) EPA Carcinogenic Classification	CARCINOGENIC RISK: (2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site	Commercial	(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site	Commercial	TOXIC EFFECTS: (5) Total Toxicant Intake Rate (mg/kg/day) On-Site	Commercial	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site	Commercial
Benzene	A		2.2E-2	2.9E-2		6.5E-4		6.2E-2	1.7E-3		3.7E+1
Ethylbenzene	D							5.0E-2	2.9E-1		1.7E-1
Toluene	D							8.5E-2	1.1E-1		7.4E-1
Xylene (mixed isomers)	D							9.3E-2	2.0E+0		4.7E-2

Total Pathway Carcinogenic Risk = 0.0E+0 | 6.5E-4

Total Pathway Hazard Index = 0.0E+0 | 3.8E+1

Site Name: Tony's Express Servi Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998 *6 OF 9*

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SOIL EXPOSURE PATHWAYS ☐ **(CHECKED IF PATHWAY IS ACTIVE)**

SURFACE SOILS OR SEDIMENTS: **Exposure Concentration**

DERMAL CONTACT

Constituents of Concern	1) Source Medium	2) Exposure Multiplier (SAxAFxABSxCFxEFxED)/(BWxAT) (kg/kg-day)		3) Average Daily Intake Rate (mg/kg-day) (1) x (2)	
	Surface Soil Conc. (mg/kg)	On-Site Residential	On-Site Commercial	On-Site Residential	On-Site Commercial
Benzene	5.0E-2				
Ethylbenzene	5.0E-2				
Toluene	5.0E-2				
Xylene (mixed isomers)	5.0E-2				

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor (mg/cm^2); AT = Averaging time (days); BW = Body weight (kg); CF = Units conversion factor; ED = Exposure duration (yrs); EF = Exposure frequencey (days/; ET = Exposure time (hrs/day); IR = Intake rate (mg/day); POE = Point of exposure; SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

SOIL EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAY IS ACTIVE)

SURFACE SOILS OR SEDIMENTS:

INGESTION

Constituents of Concern	Exposure Concentration 1) Source Medium: Surface Soil Conc. (mg/kg)	2) Exposure Multiplier (IRxCFxEFxED)/(BWxAT) (kg/kg-day): On-Site Residential	2) Exposure Multiplier: On-Site Commercial	3) Average Daily Intake Rate (mg/kg-day) (1) x (2): On-Site Residential	3) Average Daily Intake Rate: On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from dermal & ingestion routes.): On-Site Residential	TOTAL PATHWAY INTAKE: On-Site Commercial
Benzene	5.0E-2						
Ethylbenzene	5.0E-2						
Toluene	5.0E-2						
Xylene (mixed isomers)	5.0E-2						

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor (mg/cm^2); AT = Averaging time (days); BW = Body weight (kg); CF = Units conversion factor; ED = Exposure duration (yrs); EF = Exposure frequency (days/yr); ET = Exposure time (hrs/day); IR = Intake rate (mg/day); POE = Point of exposure; SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

TIER 2 PATHWAY RISK CALCULATION

SOIL EXPOSURE PATHWAYS ☐ (CHECKED IF PATHWAYS ARE ACTIVE)

		CARCINOGENIC RISK					TOXIC EFFECTS				
	(1) EPA	(2) Total Carcinogenic Intake Rate (mg/kg/day)		(3) Oral Slope Factor	(4) Individual COC Risk (2) x (3)		(5) Total Toxicant Intake Rate (mg/kg/day)		(6) Oral Reference Dose	(7) Individual COC Hazard Quotient (5) / (6)	
Constituents of Concern	Carcinogenic Classification	On-Site Residential	On-Site Commercial	(mg/kg-day)^-1	On-Site Residential	On-Site Commercial	On-Site Residential	On-Site Commercial	(mg/kg-day)	On-Site Residential	On-Site Commercial
Benzene	A			2.9E-2							
Ethylbenzene	D								1.0E-1		
Toluene	D								2.0E-1		
Xylene (mixed isomers)	D								2.0E+0		
Total Pathway Carcinogenic Risk =					**0.0E+0**	**0.0E+0**	***Total Pathway Hazard Index =***			**0.0E+0**	**0.0E+0**

Site Name: Tony's Express Service Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

SOIL: LEACHING TO GROUNDWATER/ GROUNDWATER INGESTION

Constituents of Concern	Exposure Concentration 1) Source Medium: Soil Concentration (mg/kg)	2) NAF Value (L/kg) Receptor: On-Site Commercial	2) NAF Value (L/kg) Receptor: Off-Site Residential	3) Exposure Medium: Groundwater: POE Conc. (mg/L) (1)/(2) On-Site Commercial	3) Exposure Medium: Groundwater: POE Conc. (mg/L) (1)/(2) Off-Site Residential	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day) On-Site Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day) Off-Site Residential	5) Average Daily Intake Rate (mg/kg-day) (3) x (4) On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) x (4) Off-Site Residential
Benzene	1.1E+1	2.5E+0	1.5E+1	4.4E+0	7.4E-1	3.5E-3	1.2E-2	1.5E-2	8.7E-3
Ethylbenzene	1.5E+1	5.6E+0	3.3E+1	2.7E+0	4.5E-1	9.8E-3	2.7E-2	2.6E-2	1.2E-2
Toluene	3.6E+1	7.5E+0	4.5E+1	4.8E+0	8.0E-1	9.8E-3	2.7E-2	4.7E-2	2.2E-2
Xylene (mixed isomers)	7.3E+1	1.3E+1	7.7E+1	5.6E+0	9.4E-1	9.8E-3	2.7E-2	5.5E-2	2.6E-2

NOTE: ABS = Dermal absorption factor (dim); AF = Adherance factor (mg/cm^2); AT = Averaging time (days); BW = Body Weight (kg); CF = Units conversion factor; ED = Exposure duration (yrs); EF = Exposure frequencey (days/yr); ET = Exposure time (hrs/day); IR = Intake rate (L/day); POE = Point of exposure; SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ **(CHECKED IF PATHWAY IS ACTIVE)**

GROUNDWATER: INGESTION

Constituents of Concern	Exposure Concentration: 1) Source Medium Groundwater Conc. (mg/L)	2) NAF Value (dim) Receptor: On-Site Commercial	2) NAF Value (dim) Receptor: Off-Site Residential	3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2): On-Site Commercial	3) Exposure Medium Groundwater: POE Conc. (mg/L) (1)/(2): Off-Site Residential	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): On-Site Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): Off-Site Residential	5) Average Daily Intake Rate (mg/kg-day) (3) x (4): On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) x (4): Off-Site Residential	MAX. PATHWAY INTAKE (mg/kg-day) (Maximum intake of active pathways soil leaching & groundwater routes.): On-Site Commercial	MAX. PATHWAY INTAKE (mg/kg-day) (Maximum intake of active pathways soil leaching & groundwater routes.): Off-Site Residential
Benzene	6.0E+0	1.0E+0	6.0E+0	6.0E+0	1.0E+0	3.5E-3	1.2E-2	2.1E-2	1.2E-2	2.1E-2	1.2E-2
Ethylbenzene	2.1E+0	1.0E+0	6.0E+0	2.1E+0	3.5E-1	9.8E-3	2.7E-2	2.1E-2	9.7E-3	2.6E-2	1.2E-2
Toluene	7.6E+0	1.0E+0	6.0E+0	7.6E+0	1.3E+0	9.8E-3	2.7E-2	7.4E-2	3.5E-2	7.4E-2	3.5E-2
Xylene (mixed isomers)	7.7E+0	1.0E+0	6.0E+0	7.7E+0	1.3E+0	9.8E-3	2.7E-2	7.5E-2	3.5E-2	7.5E-2	3.5E-2

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Intake rate (L/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998 *4 OF 4*

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

		CARCINOGENIC RISK					TOXIC EFFECTS				
	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Commercial	(2) Total Carcinogenic Intake Rate (mg/kg/day) Off-Site Residential	(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site Commercial	(4) Individual COC Risk (2) x (3) Off-Site Residential	(5) Total Toxicant Intake Rate (mg/kg/day) On-Site Commercial	(5) Total Toxicant Intake Rate (mg/kg/day) Off-Site Residential	(6) Oral Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Commercial	(7) Individual COC Hazard Quotient (5) / (6) Off-Site Residential
Constituents of Concern											
Benzene	A	2.1E-2	1.2E-2	2.9E-2	6.1E-4	3.4E-4					
Ethylbenzene	D						2.6E-2	1.2E-2	1.0E-1	2.6E-1	1.2E-1
Toluene	D						7.4E-2	3.5E-2	2.0E-1	3.7E-1	1.7E-1
Xylene (mixed isomers)	D						7.5E-2	3.5E-2	2.0E+0	3.8E-2	1.8E-2
Total Pathway Carcinogenic Risk =					[illegible]	[illegible]	***Total Pathway Hazard Index =***			6.7E-1	3.2E-1

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 8.3**

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

TIER 2 BASELINE RISK SUMMARY TABLE

	BASELINE CARCINOGENIC RISK					BASELINE TOXIC EFFECTS				
	Individual COC Risk		Cumulative COC Risk		Risk Limit(s) Exceeded?	Hazard Quotient		Hazard Index		Toxicity Limit(s) Exceeded?
EXPOSURE PATHWAY	Maximum Value	Target Risk	Total Value	Target Risk		Maximum Value	Applicable Limit	Total Value	Applicable Limit	
OUTDOOR AIR EXPOSURE PATHWAYS										
Complete:	1.3E-6	1.0E-6	1.3E-6	N/A	■	7.4E-2	1.0E+0	7.8E-2	N/A	☐
INDOOR AIR EXPOSURE PATHWAYS										
Complete:	6.5E-4	1.0E-6	6.5E-4	N/A	■	3.7E+1	1.0E+0	3.8E+1	N/A	■
SOIL EXPOSURE PATHWAYS										
Complete:	NC	1.0E-6	NC	N/A	■	NC	1.0E+0	NC	N/A	■
GROUNDWATER EXPOSURE PATHWAYS										
Complete:	6.1E-4	1.0E-6	6.1E-4	N/A	■	3.7E-1	1.0E+0	6.7E-1	N/A	☐
CRITICAL EXPOSURE PATHWAY (Select Maximum Values From Complete Pathways)										
	6.5E-4	1.0E-6	6.5E-4	N/A	■	3.7E+1	1.0E+0	3.8E+1	N/A	■

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2
Groundwater DAF Option: Elec. Acceptor Super. (Two-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		X Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: 700 feet	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"■" If yes	Only if "yes" left
71-43-2	Benzene	6.0E+0	4.0E+0	9.9E-3	NA	NA	8.1E-2	NA	2.6E+1	9.9E-3	■	6.1E+02
100-41-4	Ethylbenzene	2.1E+0	8.7E+0	1.0E+1	NA	NA	>Sol	NA	>Sol	8.7E+0	☐	<1
108-88-3	Toluene	7.6E+0	2.0E+1	2.0E+1	NA	NA	9.4E+1	NA	>Sol	2.0E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	7.7E+0	1.5E+2	>Sol	NA	NA	>Sol	NA	>Sol	1.5E+2	☐	<1

>Sol indicates risk-based target concentration greater than constituent solubility

RBCA SITE ASSESSMENT | **Tier 2 Worksheet 9.2**

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

SUBSURFACE SOIL SSTL VALUES (> 3 FT BGS)

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2
Groundwater DAF Option: Elec. Acceptor Super. (Two-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways ("x" if Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X	Soil Leaching to Groundwater			X	Soil Volatilization to Indoor Air		X	Soil Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/kg)		Residential: 700 feet	Commercial: (on-site)	Regulatory(MCL): (on-site)		Residential: (on-site)	Commercial: (on-site)		Residential: 80 feet	Commercial: (on-site)	(mg/kg)	"■" If yes	Only if "yes" left
71-43-2	Benzene	1.1E+1		1.0E+1	2.5E-2	NA		NA	1.9E-2		9.0E+0	1.0E+1	1.9E-2	■	5.7E+02
100-41-4	Ethylbenzene	1.5E+1		4.8E+1	5.7E+1	NA		NA	9.1E+1		>Res	>Res	4.8E+1	☐	<1
108-88-3	Toluene	3.6E+1		1.5E+2	1.5E+2	NA		NA	5.4E+1		>Res	>Res	5.4E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	7.3E+1		>Res	>Res	NA		NA	>Res		>Res	>Res	>Res	☐	<1

>Res indicates risk-based target concentration greater than constituent residual saturation value

Software: GSI RBCA Spreadsheet Version: 1.0.1
Serial: G-443-CSX-444

RBCA TIER 1/TIER 2 EVALUATION

Output Table 1

Site Name: Tony's Express Service Station Job Identification: Tonys Software: GSI RBCA Spreadsheet
Site Location: 3609 East 14th Street Date Completed: 1/21/98 Version: 1.0.1
Completed By: Roy Butler

NOTE: values which differ from Tier 1 default values are shown in bold italics and underlined.

Exposure Parameter	Definition (Units)	Residential Adult	Residential (1-6yrs)	Residential (1-16 yrs)	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
ATc	Averaging time for carcinogens (yr)	70				
ATn	Averaging time for non-carcinogens (yr)	30	6	16	25	1
BW	Body Weight (kg)	70	15	35	70	
ED	Exposure Duration (yr)	30	6	16	25	1
t	Averaging time for vapor flux (yr)	30			25	1
EF	Exposure Frequency (days/yr)	350			250	180
EF.Derm	Exposure Frequency for dermal exposure	350			250	
IRgw	Ingestion Rate of Water (L/day)	2			1	
IRs	Ingestion Rate of Soil (mg/day)	100	200		50	100
IRadj	Adjusted soil ing. rate (mg-yr/kg-d)	1.1E+02			9.4E+01	
IRa.in	Inhalation rate indoor (m^3/day)	15			20	
IRa.out	Inhalation rate outdoor (m^3/day)	20			20	10
SA	Skin surface area (dermal) (cm^2)	5.8E+03		2.0E+03	5.8E+03	5.8E+03
SAadj	Adjusted dermal area (cm^2-yr/kg)	2.1E+03			1.7E+03	
M	Soil to Skin adherence factor	1				
AAFs	Age adjustment on soil ingestion	FALSE			FALSE	
AAFd	Age adjustment on skin surface area	FALSE			FALSE	
tox	Use EPA tox data for air (or PEL based)?	TRUE				
gwMCL?	Use MCL as exposure limit in groundwater?	FALSE				

Matrix of Exposed Persons to Complete Exposure Pathways		Residential	Commercial/Industrial Chronic	Commercial/Industrial Constrctn
Outdoor Air Pathways:				
SS.v	Volatiles and Particulates from Surface Soils	FALSE	FALSE	FALSE
S.v	Volatilization from Subsurface Soils	TRUE	TRUE	
GW.v	Volatilization from Groundwater	FALSE	TRUE	
Indoor Air Pathways:				
S.b	Vapors from Subsurface Soils	FALSE	TRUE	
GW.b	Vapors from Groundwater	FALSE	TRUE	
Soil Pathways:				
SS.d	Direct Ingestion and Dermal Contact	FALSE	FALSE	FALSE
Groundwater Pathways:				
GW.i	Groundwater Ingestion	TRUE	TRUE	
S.l	Leaching to Groundwater from all Soils	TRUE	TRUE	

Matrix of Receptor Distance and Location On- or Off-Site		Residential Distance	Residential On-Site	Commercial/Industrial Distance	Commercial/Industrial On-Site
GW	Groundwater receptor (cm)	2.1E+04	FALSE		TRUE
S	Inhalation receptor (cm)	2.4E+03	FALSE		TRUE

Matrix of Target Risks		Individual	Cumulative
TRab	Target Risk (class A&B carcinogens)	1.0E-06	
TRc	Target Risk (class C carcinogens)	1.0E-05	
THQ	Target Hazard Quotient	1.0E+00	
Opt	Calculation Option (1, 2, or 3)	2	
Tier	RBCA Tier	2	

Surface Parameters	Definition (Units)	Residential	Constrctn
A	Contaminated soil area (cm^2)	***1.5E+06***	1.0E+06
W	Length of affect. soil parallel to wind (cm)	***1.2E+03***	1.0E+03
W.gw	Length of affect. soil parallel to groundwater (cm	***1.2E+03***	
Uair	Ambient air velocity in mixing zone (cm/s)	2.3E+02	
delta	Air mixing zone height (cm)	2.0E+02	
Lss	Thickness of affected surface soils (cm)	***9.1E+01***	
Pe	Particulate areal emission rate (g/cm^2/s)	6.9E-14	

Groundwater	Definition (Units)	Value
delta.gw	Groundwater mixing zone depth (cm)	2.0E+02
I	Groundwater infiltration rate (cm/yr)	3.0E+01
Ugw	Groundwater Darcy velocity (cm/yr)	***7.6E+02***
Ugw.tr	Groundwater seepage velocity (cm/yr)	***3.8E+03***
Ks	Saturated hydraulic conductivity(cm/s)	1.3E-03
grad	Groundwater gradient (cm/cm)	1.9E-02
Sw	Width of groundwater source zone (cm)	6.1E+03
Sd	Depth of groundwater source zone (cm)	7.6E+02
phi.eff	Effective porosity in water-bearing unit	2.0E-01
foc.sat	Fraction organic carbon in water-bearing unit	1.0E-03
BIO?	Is bioattenuation considered?	TRUE
BC	Biodegradation Capacity (mg/L)	1.6E+01

Soil	Definition (Units)	Value		
hc	Capillary zone thickness (cm)	***5.1E+00***		
hv	Vadose zone thickness (cm)	***2.7E+02***		
rho	Soil density (g/cm^3)	1.7		
foc	Fraction of organic carbon in vadose zone	0.01		
phi	Soil porosity in vadose zone	0.38		
Lgw	Depth to groundwater (cm)	***2.8E+02***		
Ls	Depth to top of affected subsurface soil (cm)	***9.1E+01***		
Lsubs	Thickness of affected subsurface soils (cm)	***8.2E+02***		
pH	Soil/groundwater pH	6.5		
		capillary	vadose	foundation
phi.w	Volumetric water content	0.342	0.12	0.12
phi.a	Volumetric air content	0.038	0.26	0.26

Building	Definition (Units)	Residential	Commercial
Lb	Building volume/area ratio (cm)	2.0E+02	3.0E+02
ER	Building air exchange rate (s^-1)	1.4E-04	2.3E-04
Lcrk	Foundation crack thickness (cm)	1.5E+01	
eta	Foundation crack fraction	0.01	

Transport Parameters	Definition (Units)	Residential	Commercial
Groundwater			
ax	Longitudinal dispersivity (cm)	6.4E+02	
ay	Transverse dispersivity (cm)	6.4E+01	
az	Vertical dispersivity (cm)	6.4E+00	
Vapor			
dcy	Transverse dispersion coefficient (cm)	2.8E+02	
dcz	Vertical dispersion coefficient (cm)	1.9E+02	

RBCA CHEMICAL DATABASE

Physical Property Data

CAS Number	Constituent	type	Molecular Weight (g/mole) MW	ref	Diffusion Coefficients in air (cm2/s) Dair	ref	in water (cm2/s) Dwat	ref	log (Koc) or log(Kd) (@ 20 - 25 C) log(l/kg)	ref	Henry's Law Constant (@ 20 - 25 C) (atm-m3) mol	(unitless)	ref	Vapor Pressure (@ 20 - 25 C) (mm Hg)	ref	Solubility (@ 20 - 25 C) (mg/L)	ref	acid pKa	base pKb	ref
67-64-1	Acetone	O	58.08	4	1.24E-01	4	1.14E-05	4	-0.24	4	2.50E-05	1.04E-03	4	2.66E+02	4	1.00E+06	10			
71-43-2	Benzene	A	78.1	5	9.30E-02	A	1.10E-05	A	1.58	A	5.29E-03	2.20E-01	A	9.52E+01	4	1.75E+03	A			
67-66-3	Chloroform	C	119.4	4	1.04E-01	4	1.00E-05	4	1.93	4	3.39E-03	1.41E-01	4	2.08E+02	4	9.64E+03	4			
74-87-3	Chloromethane	C	51	5	1.28E-01	4	1.68E-04	7	7.02	11	8.82E-03	3.67E-01	29	3.80E+03	5	4.00E-03	5			
107-06-2	Dichloroethane, 1,2-	C	99	4	1.04E-01	4	9.90E-06	4	1.76	4	1.20E-03	4.99E-02	4	8.00E+01	4	8.69E+03	5			
100-41-4	Ethylbenzene	A	106.2	5	7.60E-02	A	8.50E-06	A	1.98	A	7.69E-03	3.20E-01	A	1.00E+01	4	1.52E+02	5			
91-20-3	Naphthalene	PAH	128.2	4	7.20E-02	A	9.40E-06	A	3.11	A	1.18E-03	4.90E-02	A	2.30E-01	4	3.29E+01	4			
108-88-3	Toluene	A	92.4	5	8.50E-02	A	9.40E-06	A	2.13	A	6.25E-03	2.60E-01	A	3.00E+01	4	5.15E+02	29			
1330-20-7	Xylene (mixed isomers)	A	106.2	5	7.20E-02	A	8.50E-06	A	2.38	A	6.97E-03	2.90E-01	A	7.00E+00	4	1.98E+02	5			

Site Name: Tony's Express Service Station Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

Software version: 1.0.1

RBCA CHEMICAL DATABASE

Toxicity Data

CAS Number	Constituent	Reference Dose (mg/kg/day) Oral RfD_oral	ref	Inhalation RfD_Inhal	ref	Slope Factors 1/(mg/kg/day) Oral SF_oral	ref	Inhalation SF_Inhal	ref	EPA Weight of Evidence	Is Constituent Carcinogenic ?
67-64-1	Acetone	1.00E-01	R	-		-		-		D	FALSE
71-43-2	Benzene	-		1.70E-03	R	2.90E-02	A	2.90E-02	A	A	TRUE
67-66-3	Chloroform	1.00E-02	R	-		6.10E-03	R	8.05E-02	R	B2	TRUE
74-87-3	Chloromethane	-		-		1.30E-02	R	6.30E-03	R	C	TRUE
107-06-2	Dichloroethane, 1,2-	-		2.86E-03	R	9.10E-02	R	9.10E-02	R	B2	TRUE
100-41-4	Ethylbenzene	1.00E-01	A	2.86E-01	A	-		-		D	FALSE
91-20-3	Naphthalene	4.00E-03	A	-		-		-		D	FALSE
108-88-3	Toluene	2.00E-01	A,R	1.14E-01	A,R	-		-		D	FALSE
1330-20-7	Xylene (mixed isomers)	2.00E+00	A,R	2.00E+00	A	-		-		D	FALSE

Site Name: Tony's Express Service Stat Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

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RBCA CHEMICAL DATABASE

Miscellaneous Chemical Data

CAS Number	Constituent	Maximum Contaminant Level MCL (mg/L)	reference	Permissible Exposure Limit PEL/TLV (mg/m3)	ref	Relative Absorption Factors Oral	Dermal	Detection Limits Groundwater (mg/L)	ref	Soil (mg/kg)	ref	Half Life (First-Order Decay) (days) Saturated	Unsaturated	ref
67-64-1	Acetone			1.78E+03	ACGIH	1	0.5	0.1	C	0.1	S	14	14	H
71-43-2	Benzene	5.00E-03	52 FR 25690	3.20E+00	OSHA	1	0.5	0.002	C	0.005	S	720	720	H
67-66-3	Chloroform	1.00E-01	56 FR 30266 (01 Jul 91	4.90E+01	ACGIH	1	0.5	0.0005	C	0.005	S	1800	1800	H
74-87-3	Chloromethane			1.03E+02	ACGIH	1	0.5	0.001	C	0.01	S			
107-06-2	Dichloroethane, 1,2-	5.00E-03	52 FR 25690 (08 Jul 87	4.00E+00	NIOSH	1	0.5	0.0005	C	0.005	S	360	360	H
100-41-4	Ethylbenzene	7.00E-01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.002	C	0.005	S	228	228	H
91-20-3	Naphthalene			5.00E+01	OSHA	1	0.05	0.01	C	0.01	S	258	258	H
108-88-3	Toluene	1.00E+00	56 FR 3526 (30 Jan 91)	1.47E+02	ACGIH	1	0.5	0.002	C	0.005	S	28	28	H
1330-20-7	Xylene (mixed isomers)	1.00E+01	56 FR 3526 (30 Jan 91)	4.34E+02	ACGIH	1	0.5	0.005	C	0.005	S	360	360	H

Site Name: Tony's Express Service Stat Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

Software version: 1.0.1

REPRESENTATIVE COC CONCENTRATIONS IN SOURCE MEDIA

(Complete the following table)

CONSTITUENT	Representative COC Concentration in Groundwater value (mg/L)	note	in Surface Soil value (mg/kg)	note	in Subsurface Soil value (mg/kg)	note
Acetone	1.1E+1	6(597)				
Benzene	6.0E+0		5.0E-2		1.1E+1	
Chloroform	7.5E-3					
Chloromethane	7.8E-2					
Dichloroethane, 1,2-	6.6E-3					
Ethylbenzene	2.1E+0		5.0E-2		1.5E+1	
Naphthalene	6.3E-1					
Toluene	7.6E+0		5.0E-2		3.6E+1	
Xylene (mixed isomers)	7.7E+0		5.0E-2		7.3E+1	

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

RBCA SITE ASSESSMENT	Input Screen 9.4

GROUNDWATER DAF VALUES

(Enter DAF values in the grey area of the following table)

CONSTITUENT	Dilution Attenuation Factor (DAF) in Groundwater	
	Residential Receptor	Comm./Ind. Receptor
Acetone	3.6E+0	1.0E+0
Benzene	3.6E+0	1.0E+0
Chloroform	3.6E+0	1.0E+0
Chloromethane	3.6E+0	1.0E+0
Dichloroethane, 1,2-	3.6E+0	1.0E+0
Ethylbenzene	3.6E+0	1.0E+0
Naphthalene	3.6E+0	1.0E+0
Toluene	3.6E+0	1.0E+0
Xylene (mixed isomers)	3.6E+0	1.0E+0

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

RBCA SITE ASSESSMENT | Input Screen 9.1

CONSTITUENT HALF-LIFE VALUES

(Complete the following table)

CONSTITUENT	Half-Life of Constituent (day)
Acetone	
Benzene	720
Chloroform	
Chloromethane	
Dichloroethane, 1,2-	
Ethylbenzene	228
Naphthalene	
Toluene	28
Xylene (mixed isomers)	360

Site Name: Tony's Express Service Stati Completed By: Roy Butler
Site Location: 3609 East 14th Street Date Completed: 1/21/1998

Site Name: Tony's Express Service Site Location: 3609 East 14th Street | Completed By: Roy Butler | Date Completed: 1/21/1998 | 9 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: INGESTION

Constituents of Concern	Exposure Concentration: 1) Source Medium — Groundwater Conc. (mg/L)	2) NAF Value (dim) — Receptor: On-Site Commercial	2) NAF Value (dim) — Receptor: Off-Site Residential	3) Exposure Medium — Groundwater: POE Conc. (mg/L) (1)/(2): On-Site Commercial	3) Exposure Medium — Groundwater: POE Conc. (mg/L) (1)/(2): Off-Site Residential	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): On-Site Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (L/kg-day): Off-Site Residential	5) Average Daily Intake Rate (mg/kg-day) (3) x (4): On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) x (4): Off-Site Residential	MAX. PATHWAY INTAKE (mg/kg-day) (Maximum intake of active pathways soil leaching & groundwater routes.): On-Site Commercial	MAX. PATHWAY INTAKE (mg/kg-day) (Maximum intake of active pathways soil leaching & groundwater routes.): Off-Site Residential
Acetone	1.1E+1	1.0E+0	3.6E+0	1.1E+1	3.1E+0	9.8E-3	2.7E-2	1.1E-1	8.4E-2	1.1E-1	8.4E-2
Benzene	6.0E+0	1.0E+0	3.6E+0	6.0E+0	1.7E+0	3.5E-3	1.2E-2	2.1E-2	2.0E-2	2.1E-2	2.0E-2
Chloroform	7.5E-3	1.0E+0	3.6E+0	7.5E-3	2.1E-3	3.5E-3	1.2E-2	2.6E-5	2.5E-5	2.6E-5	2.5E-5
Chloromethane	7.8E-2	1.0E+0	3.6E+0	7.8E-2	2.2E-2	3.5E-3	1.2E-2	2.7E-4	2.6E-4	2.7E-4	2.6E-4
Dichloroethane, 1,2-	6.6E-3	1.0E+0	3.6E+0	6.6E-3	1.8E-3	3.5E-3	1.2E-2	2.3E-5	2.2E-5	2.3E-5	2.2E-5
Ethylbenzene	2.1E+0	1.0E+0	3.6E+0	2.1E+0	5.8E-1	9.8E-3	2.7E-2	2.1E-2	1.6E-2	2.6E-2	2.1E-2
Naphthalene	6.3E-1	1.0E+0	3.6E+0	6.3E-1	1.8E-1	9.8E-3	2.7E-2	6.2E-3	4.8E-3	6.2E-3	4.8E-3
Toluene	7.6E+0	1.0E+0	3.6E+0	7.6E+0	2.1E+0	9.8E-3	2.7E-2	7.4E-2	5.8E-2	7.4E-2	5.8E-2
Xylene (mixed isomers)	7.7E+0	1.0E+0	3.6E+0	7.7E+0	2.1E+0	9.8E-3	2.7E-2	7.5E-2	5.9E-2	7.5E-2	5.9E-2

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Intake rate (L/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

TIER 2 PATHWAY RISK CALCULATION

GROUNDWATER EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

	CARCINOGENIC RISK						TOXIC EFFECTS				
	(1) EPA Carcinogenic Classification	(2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Commercial	(2) Total Carcinogenic Intake Rate (mg/kg/day) Off-Site Residential	(3) Oral Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site Commercial	(4) Individual COC Risk (2) x (3) Off-Site Residential	(5) Total Toxicant Intake Rate (mg/kg/day) On-Site Commercial	(5) Total Toxicant Intake Rate (mg/kg/day) Off-Site Residential	(6) Oral Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Commercial	(7) Individual COC Hazard Quotient (5) / (6) Off-Site Residential
Constituents of Concern											
Acetone	D						1.1E-1	8.4E-2	1.0E-1	1.1E+0	8.4E-1
Benzene	A	2.1E-2	2.0E-2	2.9E-2	6.1E-4	5.7E-4					
Chloroform	B2	2.6E-5	2.5E-5	6.1E-3	1.6E-7	1.5E-7	7.3E-5	5.7E-5	1.0E-2	7.3E-3	5.7E-3
Chloromethane	C	2.7E-4	2.6E-4	1.3E-2	3.5E-6	3.3E-6					
Dichloroethane, 1,2-	B2	2.3E-5	2.2E-5	9.1E-2	2.1E-6	2.0E-6					
Ethylbenzene	D						2.6E-2	2.1E-2	1.0E-1	2.6E-1	2.1E-1
Naphthalene	D						6.2E-3	4.8E-3	4.0E-3	1.5E+0	1.2E+0
Toluene	D						7.4E-2	5.8E-2	2.0E-1	3.7E-1	2.9E-1
Xylene (mixed isomers)	D						7.5E-2	5.9E-2	2.0E+0	3.8E-2	2.9E-2
Total Pathway Carcinogenic Risk =					6.1E-4	5.7E-4	***Total Pathway Hazard Index =***			3.3E+0	2.6E+0

Site Name: Tony's Express Service Station | Site Location: 3609 East 14th Street | Completed By: Roy Butler | Date Completed: 1/21/1998 | 3 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER: VAPOR INHALATION

Constituents of Concern	Exposure Concentration 1) Source Medium: Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) Receptor: On-Site Commercial		3) Exposure Medium: Outdoor Air: POE Conc. (mg/m^3) (1) / (2) On-Site Commercial		4) Exposure Multiplier (IRxEFxEDY/BWxAT) (m^3/kg-day) On-Site Commercial		5) Average Daily Intake Rate (mg/kg-day) (3) X (4) On-Site Commercial		TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from surface, subsurface & groundwater routes.) On-Site Commercial	Off-Site Residential
Acetone	1.1E+1	1.1E+6		1.0E-5		2.0E-1		2.0E-6		2.0E-6	0.0E+0
Benzene	6.0E+0	5.3E+4		1.1E-4		7.0E-2		7.9E-6		4.5E-5	4.2E-5
Chloroform	7.5E-3	6.7E+4		1.1E-7		7.0E-2		7.8E-9		7.8E-9	0.0E+0
Chloromethane	7.8E-2	8.6E+3		9.1E-6		7.0E-2		6.3E-7		6.3E-7	0.0E+0
Dichloroethane, 1,2-	6.6E-3	1.1E+5		5.9E-8		7.0E-2		4.1E-9		4.1E-9	0.0E+0
Ethylbenzene	2.1E+0	5.2E+4		4.0E-5		2.0E-1		7.9E-6		1.5E-4	1.3E-4
Naphthalene	6.3E-1	1.4E+5		4.7E-6		2.0E-1		9.1E-7		9.1E-7	0.0E+0
Toluene	7.6E+0	5.4E+4		1.4E-4		2.0E-1		2.8E-5		3.7E-4	3.2E-4
Xylene (mixed isomers)	7.7E+0	5.8E+4		1.3E-4		2.0E-1		2.6E-5		7.1E-4	6.5E-4

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station Site Location: 3609 East 14th Street Completed By: Roy Butler Date Completed: 1/21/1998

TIER 2 PATHWAY RISK CALCULATION

OUTDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAYS ARE ACTIVE)

Constituents of Concern	(1) EPA Carcinogenic Classification	CARCINOGENIC RISK: (2) Total Carcinogenic Intake Rate (mg/kg/day) On-Site Commercial	(2) Total Carcinogenic Intake Rate (mg/kg/day) Off-Site Residential	(3) Inhalation Slope Factor (mg/kg-day)^-1	(4) Individual COC Risk (2) x (3) On-Site Commercial	(4) Individual COC Risk (2) x (3) Off-Site Residential	TOXIC EFFECTS: (5) Total Toxicant Intake Rate (mg/kg/day) On-Site Commercial	(5) Total Toxicant Intake Rate (mg/kg/day) Off-Site Residential	(6) Inhalation Reference Dose (mg/kg-day)	(7) Individual COC Hazard Quotient (5) / (6) On-Site Commercial	(7) Individual COC Hazard Quotient (5) / (6) Off-Site Residential
Acetone	D										
Benzene	A	4.5E-5	4.2E-5	2.9E-2	1.3E-6	1.2E-6	1.3E-4	9.9E-5	1.7E-3	7.4E-2	5.8E-2
Chloroform	B2	7.8E-9	0.0E+0	8.1E-2	6.3E-10	0.0E+0					
Chloromethane	C	6.3E-7	0.0E+0	6.3E-3	4.0E-9	0.0E+0					
Dichloroethane, 1,2-	B2	4.1E-9	0.0E+0	9.1E-2	3.8E-10	0.0E+0	1.2E-8	0.0E+0	2.9E-3	4.0E-6	0.0E+0
Ethylbenzene	D						1.5E-4	1.3E-4	2.9E-1	5.2E-4	4.7E-4
Naphthalene	D										
Toluene	D						3.7E-4	3.2E-4	1.1E-1	3.2E-3	2.8E-3
Xylene (mixed isomers)	D						7.1E-4	6.5E-4	2.0E+0	3.6E-4	3.3E-4
Total Pathway Carcinogenic Risk =					1.3E-6	1.2E-6	***Total Pathway Hazard Index =***			7.8E-2	6.2E-2

Site Name: Tony's Express Service Station | Site Location: 3609 East 14th Street | Completed By: Roy Butler | Date Completed: 1/21/1998 | 5 OF 9

TIER 2 EXPOSURE CONCENTRATION AND INTAKE CALCULATION

INDOOR AIR EXPOSURE PATHWAYS ■ (CHECKED IF PATHWAY IS ACTIVE)

GROUNDWATER:
VAPOR INTRUSION TO BUILDINGS

Constituents of Concern	Exposure Concentration: 1) Source Medium — Groundwater Conc. (mg/L)	2) NAF Value (m^3/L) — Receptor: On-Site Commercial	3) Exposure Medium — Indoor Air: POE Conc. (mg/m^3) (1) / (2): On-Site Commercial	4) Exposure Multiplier (IRxEFxED)/(BWxAT) (m^3/kg-day): On-Site Commercial	5) Average Daily Intake Rate (mg/kg-day) (3) X (4): On-Site Commercial	TOTAL PATHWAY INTAKE (mg/kg-day) (Sum intake values from subsurface & groundwater routes.): On-Site Commercial
Acetone	1.1E+1	1.2E+4	9.0E-4	2.0E-1	1.8E-4	1.8E-4
Benzene	6.0E+0	1.6E+2	3.6E-2	7.0E-2	2.5E-3	2.2E-2
Chloroform	7.5E-3	2.2E+2	3.5E-5	7.0E-2	2.4E-6	2.4E-6
Chloromethane	7.8E-2	4.4E+1	1.8E-3	7.0E-2	1.2E-4	1.2E-4
Dichloroethane, 1,2-	6.6E-3	4.6E+2	1.4E-5	7.0E-2	9.9E-7	9.9E-7
Ethylbenzene	2.1E+0	1.5E+2	1.4E-2	2.0E-1	2.7E-3	5.0E-2
Naphthalene	6.3E-1	6.3E+2	1.0E-3	2.0E-1	2.0E-4	2.0E-4
Toluene	7.6E+0	1.6E+2	4.7E-2	2.0E-1	9.2E-3	8.5E-2
Xylene (mixed isomers)	7.7E+0	1.7E+2	4.5E-2	2.0E-1	8.8E-3	9.3E-2

NOTE:
ABS = Dermal absorption factor (dim)
AF = Adherance factor (mg/cm^2)
AT = Averaging time (days)
BW = Body weight (kg)
CF = Units conversion factor
ED = Exposure duration (yrs)
EF = Exposure frequencey (days/yr)
ET = Exposure time (hrs/day)
IR = Inhalation rate (m^3/day)
POE = Point of exposure
SA = Skin exposure area (cm^2/day)

Site Name: Tony's Express Service Station
Site Location: 3609 East 14th Street

Completed By: Roy Butler
Date Completed: 1/21/1998

GROUNDWATER SSTL VALUES

Target Risk (Class A & B) 1.0E-6
Target Risk (Class C) 1.0E-5
Target Hazard Quotient 1.0E+0

☐ MCL exposure limit?
☐ PEL exposure limit?

Calculation Option: 2
Groundwater DAF Option: Elec. Acceptor Super. (Two-directional vert. dispersion)

SSTL Results For Complete Exposure Pathways ("x" If Complete)

CONSTITUENTS OF CONCERN		Representative Concentration	X Groundwater Ingestion			X Groundwater Volatilization to Indoor Air		X Groundwater Volatilization to Outdoor Air		Applicable SSTL	SSTL Exceeded ?	Required CRF
CAS No.	Name	(mg/L)	Residential: 700 feet	Commercial: (on-site)	Regulatory(MCL): (on-site)	Residential: (on-site)	Commercial: (on-site)	Residential (on-site)	Commercial: (on-site)	(mg/L	"■" If yes	Only if "yes" left
67-64-1	Acetone	1.1E+1	1.2E+1	1.0E+1	NA	NA	NA	NA	NA	1.0E+1	■	1.0E+00
71-43-2	Benzene	6.0E+0	2.7E+0	9.9E-3	NA	NA	8.1E-2	NA	2.6E+1	9.9E-3	■	6.1E+02
67-66-3	Chloroform	7.5E-3	3.1E-2	4.7E-2	NA	NA	3.8E-2	NA	1.2E+1	3.1E-2	☐	<1
74-87-3	Chloromethane	7.8E-2	#VALUE!	#VALUE!	NA	NA	>Sol	NA	>Sol	#VALUE!	☐	<1
107-06-2	Dichloroethane, 1,2-	6.6E-3	4.8E-3	3.1E-3	NA	NA	7.3E-2	NA	1.8E+1	3.1E-3	■	2.0E+00
100-41-4	Ethylbenzene	2.1E+0	8.2E+0	1.0E+1	NA	NA	>Sol	NA	>Sol	8.2E+0	☐	<1
91-20-3	Naphthalene	6.3E-1	5.7E-1	4.1E-1	NA	NA	NA	NA	NA	4.1E-1	■	2.0E+00
108-88-3	Toluene	7.6E+0	1.8E+1	2.0E+1	NA	NA	9.4E+1	NA	>Sol	1.8E+1	☐	<1
1330-20-7	Xylene (mixed isomers)	7.7E+0	1.5E+2	>Sol	NA	NA	>Sol	NA	>Sol	1.5E+2	☐	<1

>Sol Indicates risk-based target concentration greater than constituent solubility

Software: GSI RBCA Spreadsheet
Version: 1.0.1

Serial: G-443-CSX-444

APPENDIX D
SLUG TEST TABLES
AND
GRAPHS

SLUG TEST, MW1	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.0833333			
RADIUS BORING	0.3333333			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.08			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	10			
DEPTH TO WATER	9.3			
LENGTH SCREEN BELOW WATER	20			
LENTH CASING BELOW WATER	20.7			
Le/rw	60			
C from graph	3.3			
ln(Re/rw)	3.1111484			
	SLUG TEST			
calculated k feet/day	0.3954346			
Calculated Ground Water Vel.	0.0375663			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	8.796	0		
INITAL DRAWDOWN	7.782	1.014	0	0.0139029
	8.3479	0.4481	2	-0.802739
	8.39	0.406	14	-0.901402
	8.432	0.364	24	-1.010601
	8.4746	0.3214	36	-1.135069
	8.517	0.279	54	-1.276543
	8.5591	0.2369	72	-1.440117
	8.6014	0.1946	104	-1.636809
	8.6436	0.1524	140	-1.881247
	8.6859	0.1101	204	-2.206366
	8.7281	0.0679	314	-2.689719

SLUG TEST, MW2	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.1666667			
RADIUS BORING	0.4166667			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.08			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	10			
DEPTH TO WATER	9.05			
LENGTH SCREEN BELOW WATER	20			
LENTH CASING BELOW WATER	20.95			
Le/rw	48			
C from graph	3			
ln(Re/rw)	2.9130431			
	SLUG TEST			
calculated k feet/day	0.4685005			
Calculated Ground Water Vel.	0.0445075			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	16.493	0		
INITAL DRAWDOWN	16.155	0.338	0	-1.084709
	16.197	0.296	8	-1.217396
	16.239	0.254	20	-1.370421
	16.281	0.212	34	-1.551169
	16.324	0.169	58	-1.777857
	16.366	0.127	106	-2.063568
	16.408	0.085	264	-2.465104

SLUG TEST, MW4	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.0833333			
RADIUS BORING	0.3333333			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.20			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	6			
DEPTH TO WATER	9.43			
LENGTH SCREEN BELOW WATER	16.57			
LENTH CASING BELOW WATER	16.57			
Le/rw	49.71			
C from graph	3.1			
ln(Re/rw)	2.9072737			
	SLUG TEST			
calculated k feet/day	2.0116523			
Calculated Ground Water Vel.	0.191107			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	3.743	0		
INITAL DRAWDOWN	3.1684	0.5746	0	-0.554081
	3.329	0.414	2	-0.881889
	3.4388	0.3042	4	-1.19007
	3.4811	0.2619	6	-1.339793
	3.5233	0.2197	10	-1.515492
	3.5656	0.1774	20	-1.729348
	3.6078	0.1352	44	-2.001
	3.6501	0.0929	98	-2.376232
	3.6323	0.1107	188	-2.200931

SLUG TEST, MW5	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.0833333			
RADIUS BORING	0.3333333			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.20			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	6			
DEPTH TO WATER	9.15			
LENGTH SCREEN BELOW WATER	16.85			
LENTH CASING BELOW WATER	16.85			
Le/rw	50.55			
C from graph	3.1			
ln(Re/rw)	2.9263235			
	SLUG TEST			
calculated k feet/day	2.0146411			
Calculated Ground Water Vel.	0.1913909			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	6.6158	0		
INITAL DRAWDOWN	6.1257	0.4901	0	-0.713146
	6.244	0.3718	4	-0.989399
	6.3032	0.3126	8	-1.162831
	6.3538	0.262	12	-1.339411
	6.3961	0.2197	18	-1.515492
	6.4383	0.1775	28	-1.728785
	6.4806	0.1352	50	-2.001
	6.522	0.0938	102	-2.36659
	6.5651	0.0507	240	-2.981829

SLUG TEST, MW6	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.0833333			
RADIUS BORING	0.3333333			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.20			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	6			
DEPTH TO WATER	9.3			
LENGTH SCREEN BELOW WATER	16.7			
LENTH CASING BELOW WATER	16.7			
Le/rw	50.1			
C from graph	3.1			
ln(Re/rw)	2.9161563			
	SLUG TEST			
calculated k feet/day	10.415752			
Calculated Ground Water Vel.	0.9894965			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	3.08	0		
INITAL DRAWDOWN	2.8305	0.2495	0	-1.388296
	2.8981	0.1819	2	-1.704298
	2.9403	0.1397	4	-1.968258
	2.9826	0.0974	8	-2.328929
	3.0248	0.0552	22	-2.896792
	3.067	0.013	62	-4.342806

SLUG TEST, MW7	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.0833333			
RADIUS BORING	0.3333333			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.20			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	6			
DEPTH TO WATER	8.56			
LENGTH SCREEN BELOW WATER	17.44			
LENTH CASING BELOW WATER	17.44			
Le/rw	52.32			
C from graph	3.2			
ln(Re/rw)	2.9487752			
	SLUG TEST			
calculated k feet/day	3.856836			
Calculated Ground Water Vel.	0.3663994			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	9.047	0		
INITAL DRAWDOWN	8.0437	1.0033	0	0.0032946
	8.4746	0.5724	2	-0.557917
	8.6352	0.4118	4	-0.887217
	8.7281	0.3189	6	-1.142878
	8.7873	0.2597	8	-1.348228
	8.8379	0.2091	12	-1.564943
	8.8802	0.1668	18	-1.79096
	8.9224	0.1246	30	-2.082647
	8.9647	0.0823	60	-2.497384
	9.0069	0.0401	133	-3.216379

SLUG TEST, MW8	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.0833333			
RADIUS BORING	0.3333333			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.20			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	6			
DEPTH TO WATER	8.95			
LENGTH SCREEN BELOW WATER	17.05			
LENTH CASING BELOW WATER	17.05			
Le/rw	51.15			
C from graph	3.2			
ln(Re/rw)	2.9229464			
	SLUG TEST			
calculated k feet/day	1.1646694			
Calculated Ground Water Vel.	0.1106436			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	11.584	0		
INITAL DRAWDOWN	10.967	0.617	0	-0.482886
	11.034	0.55	4	-0.597837
	11.085	0.499	10	-0.695149
	11.127	0.457	18	-0.783072
	11.17	0.414	42	-0.881889
	11.212	0.372	114	-0.988861

SLUG TEST, MW10	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.0833333			
RADIUS BORING	0.3333333			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.20			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	6			
DEPTH TO WATER	8.78			
LENGTH SCREEN BELOW WATER	17.22			
LENTH CASING BELOW WATER	17.22			
Le/rw	51.66			
C from graph	3.2			
ln(Re/rw)	2.9342741			
	SLUG TEST			
calculated k feet/day	9.6559604			
Calculated Ground Water Vel.	0.9173162			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	6.6327	0		
INITAL DRAWDOWN	6.1764	0.4563	0	-0.784605
	6.3032	0.3295	2	-1.110179
	6.4721	0.1606	4	-1.828838
	6.5313	0.1014	8	-2.288682
	6.582	0.0507	14	-2.981829
	6.6242	0.0085	66	-4.767689

SLUG TEST, MW11	FULLY PENETRATING WELL			
	WELL DATA			
RADIUS WELL	0.0833333			
RADIUS BORING	0.3333333			
Ne GRAVEL PACK	0.3			
CORRECTED rc	0.20			
PROBABLE Ne AQUIFER	0.2			
GRADIENT	0.019			
LENGTH SCREEN	20			
DEPTH TOP OF SCREEN	6			
DEPTH TO WATER	8.78			
LENGTH SCREEN BELOW WATER	17.22			
LENTH CASING BELOW WATER	17.22			
Le/rw	51.66			
C from graph	3.2			
ln(Re/rw)	2.9342741			
	SLUG TEST			
calculated k feet/day	2.5450925			
Calculated Ground Water Vel.	0.2417838			
	HEAD FEET	drawdown	time sec	ln dd
START READING FEET	8.99	0		
INITAL DRAWDOWN	8.5676	0.4224	0	-0.861803
	8.6959	0.2941	2	-1.223835
	8.7535	0.2365	4	-1.441807
	8.7957	0.1943	12	-1.638352
	8.8379	0.1521	26	-1.883217
	8.8802	0.1098	62	-2.209095
	8.9224	0.0676	114	-2.694147

APPENDIX E
FIELD SAMPLE DATA

WESTERN GEO-ENGINEERS
1386 EAST BEAMER
WOODLAND, CALIFORNIA 95695
(916) 668-5300, FAX (916) 662-0273

WELL SAMPLING DATA SHEET

SITE Tank 1	DATE 12/2/97	TIME 1145
WELL MW1	SAMPLED BY.	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER 2" 9.7'/20' = 20.7 x .06 = 1.24 x 9.78 / 7.61. 6"		
FLUID ELEVATION		
BAILER TYPE		
PUMP grafos Redi-flow		

WELL PURGING RECORD

TIME	VOLUME REMOVED	TEMP.	pH	COND.
10:55	8 gls	66.0	7.66	3.48
11:02	12 gls	69.8	7.06	3.52

FINAL VOLUME PURGED	12 gls
TIME SAMPLED	11:02
SAMPLE ID.	MW1
SAMPLE CONTAINERS	3 non-preserved 2 preserved VOA 1 L
ANALYSIS TO BE RUN	TPH G BTEX CO2/methane / Bio
LABORATORY	NSE
NOTES:	SI odor water clear
$O_2 = 0.5$	ORP -110
$NO_3 = 0.0$	
$SO_4 = 0.0$	
$Fe^{++} = 3.04$	

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1386 EAST BEAMER
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WELL SAMPLING DATA SHEET

SITE Tanks	DATE 12-30-97	TIME 13:35
WELL mw2	SAMPLED BY. C. Cruse	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER	4" ~~BTH~~(30') = 20.26' × .08(.76) = 39 gls = 17.5"	
FLUID ELEVATION	9.05	
BAILER TYPE		
PUMP		

WELL PURGING RECORD

TIME	VOLUME REMOVED	TEMP.	pH	COND.
13:47	10 gallon	70.0	pH malfunction	~~2.38~~ 2.38
13:52	20 gls	69.5		2.43
13:55	25 gls	70.0		2.51
13:58	28 gls	70.1	pH	2.50
14:00	30 gls	70.1	ok	2.49

FINAL VOLUME PURGED	40 gls
TIME SAMPLED	14:05
SAMPLE ID.	mw2
SAMPLE CONTAINERS	3 - ~~Amber~~ VOA 2 HCl VOA 1 L
ANALYSIS TO BE RUN	TPH-g BTEX CO2/Methane/Bio
LABORATORY	AVSE
NOTES:	water gray Bio odor
$O_2 = 0.0$	ORP = −81
$NO_3 = 0.0$	
$SO_4 = 0.0$	
$Fe^{++} \geq 3.30$	

2/01

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WELL SAMPLING DATA SHEET

SITE Tony's	DATE 12-30-97	TIME 14:40
WELL mw 4	SAMPLED BY.	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER		
FLUID ELEVATION 9.43/ 15.1 2" x.06 = 2 hrs		
BAILER TYPE		
PUMP		

WELL PURGING RECORD				
TIME	VOLUME REMOVED	TEMP.	pH	COND.
1445	3 gls	67.		2.68
1450	8 gls	68		2.30

FINAL VOLUME PURGED	8 gls
TIME SAMPLED	1450
SAMPLE ID.	mw 4
SAMPLE CONTAINERS	2- HCl VOAs
ANALYSIS TO BE RUN	TPH - BTEX
LABORATORY	NSE
NOTES:	water clear no odor
$O_2 = 0.0$	ORP = 72
$NO_3 = 4.5$	
$SO_4 = 42$	
$Fe^{++} = 0.39$	

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WELL SAMPLING DATA SHEET

SITE Tanks	DATE 12-30-97	TIME 12:15
WELL MW5	SAMPLED BY. C. Greene	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER	9.15 / 25 = 15.85 x .06 = 0.951 x 7.1 g/s	
FLUID ELEVATION		
BAILER TYPE		
PUMP		

WELL PURGING RECORD

TIME	VOLUME REMOVED	TEMP.	pH	COND.
12:37	7 g/s	70.03	7.78	3.30
12:42	9 g/s	71.2	7.30	3.65

FINAL VOLUME PURGED	9 g/s
TIME SAMPLED	12:42
SAMPLE ID.	MW5
SAMPLE CONTAINERS	3 VOAs 2 HCL VOAs 1 L
ANALYSIS TO BE RUN	TPHg - BTEX, CL2/methane / Fe
LABORATORY	MSE
NOTES:	water slightly turbid - no color
O_2 = 0.0	ORP = 46
NO_3 = 0.3	
SO_4 = 18	
Fe^{++} = 0.94	

3/01

WESTERN GEO-ENGINEERS
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WELL SAMPLING DATA SHEET

SITE Tosco	DATE 12-30-97	TIME 1640
WELL mw6	SAMPLED BY. Concord	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER 2" 9.3 / 25 = 15.7 = 7 gls		
FLUID ELEVATION		
BAILER TYPE		
PUMP		

WELL PURGING RECORD				
TIME	VOLUME REMOVED	TEMP.	pH	COND.
1700	5 gls	65.8		2.4
17:01	7 gls	67.5		2.45
17:03	9 gls	68.5		2.48
17:06	12 gls	68.5		2.48

FINAL VOLUME PURGED	12 gls
TIME SAMPLED	17:06
SAMPLE ID.	mw 6
SAMPLE CONTAINERS	2 - HCl VOA
ANALYSIS TO BE RUN	TPH - BTEX
LABORATORY	NSE
NOTES:	water clear slight odor
$O_2 = 0.0$	ORP = 14
$NO_3 = 0.0$	
$SO_4 = 5$	
$Fe^{+} = 0.30$	

WESTERN GEO-ENGINEERS
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WELL SAMPLING DATA SHEET

SITE Tanks	DATE 12-30-97	TIME 11:35
WELL mw 7	SAMPLED BY. G Cruz	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER 2" 8.65 / 19 = 10.35 x.05 (fact) = .7 = 5.25		
FLUID ELEVATION		
BAILER TYPE		
PUMP		

WELL PURGING RECORD

TIME	VOLUME REMOVED	TEMP.	pH	COND.
11:42	5 gls	65.5	7.7	2.82
11:45	7 gls	68.8	7.27	2.86

FINAL VOLUME PURGED	8 gls
TIME SAMPLED	11:50
SAMPLE ID.	mw 7
SAMPLE CONTAINERS	3 voa prsv. vials; 2 plastic vials 1 L
ANALYSIS TO BE RUN	TPH-g BTEX CH4/methane /Bio
LABORATORY	NSE
NOTES:	water gl turbid - Tr clear
O_2 = 1.2	ORP = -82.
NO_3 = 0.2	
SO_4 = 32	
Fe^{++} = 0.23	

WESTERN GEO-ENGINEERS
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WELL SAMPLING DATA SHEET

SITE Texaco	DATE 12/30/97	TIME
WELL SFMW-8	SAMPLED BY.	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER 8.95	/ 24.0 = x.06x3 = 3%	
FLUID ELEVATION		
BAILER TYPE		
PUMP		

WELL PURGING RECORD				
TIME	VOLUME REMOVED	TEMP.	pH	COND.
	6 gallons	67.7		314
	10 gallons	68.9	7.30	910

FINAL VOLUME PURGED	
TIME SAMPLED	10 Am
SAMPLE ID.	
SAMPLE CONTAINERS	
ANALYSIS TO BE RUN	TPH-BTEX Bio / Conductance
LABORATORY	
NOTES:	2" well, depth 24' feet.
$O_2 = 2.5$ Mr. ORP = 001	
$NO_3 > 0.1$	
$SO_4 = 0.0$	
$Fe^{2+} > 3.30$	

2/01

WESTERN GEO-ENGINEERS
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WELL SAMPLING DATA SHEET

SITE Tony's	DATE 12-30-97	TIME 16:10
WELL mw10	SAMPLED BY. Converse	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER 2" 8.78/23.5 = 14.72 x .06 + 7.48 = 6.6 g/s		
FLUID ELEVATION		
BAILER TYPE		
PUMP		

WELL PURGING RECORD

TIME	VOLUME REMOVED	TEMP.	pH	COND.
16:18	4 g/s	66.9		2.36
16:19	7 g/s	67.0		2.47
16:22	10 g/s	68		2.47

FINAL VOLUME PURGED	10 g/s
TIME SAMPLED	16:22
SAMPLE ID.	mw 10
SAMPLE CONTAINERS	2 - voa w/ HCl
ANALYSIS TO BE RUN	TPHg - BTEX
LABORATORY	MTE
NOTES:	water clear no odor
$O_2 = 0.0$	ORP = 4
$NO_3 = 0.13$	
$SO_4 = 0.0$	
$Fe = 2.21$	

WESTERN GEO-ENGINEERS
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WELL SAMPLING DATA SHEET

SITE Unocal	DATE 12-30-97	TIME 15:30
WELL mw-11	SAMPLED BY. Converse	
WELL ELEVATION		
PRODUCT THICKNESS		
DEPTH TO WATER		
FLUID ELEVATION 2"10.4/24.7z14.5x.06 = 6.5 gls 3vol		
BAILER TYPE		
PUMP		

WELL PURGING RECORD				
TIME	VOLUME REMOVED	TEMP.	pH	COND.
15:38	5 gls	67.9		2.60
15:39	7 gls	68.9		2.21
15:42	10 gls	69.0		2.17

FINAL VOLUME PURGED 6 gls	
TIME SAMPLED 15:42	
SAMPLE ID. mw11	
SAMPLE CONTAINERS 2- HCl VOA	
ANALYSIS TO BE RUN TPH-g -BTEX	
LABORATORY NSE	
NOTES: water clear no odor	
O_2 = 0.0	ORP = 66
NO_3 = 2.4	
SO_4 = 39	
Fe^{++} = 0.37	

2/01

APPENDIX F
RESULTS 8260 ANALYSIS

TABLE 1
WATER SAMPLES ANALYTICAL RESULTS
ANALYZED FOR VOLATILE ORGANICS (8260)
IN MILLIGRAM PER LITER (mg/L)

Date	Sample Number	Parameter	Detection Limit
5/21/97	STMW-1	Acetone	0.16
		Benzene	0.087
		Chloroform	0.0021
		2-hexanone	0.21
		Isopropylbenzene	0.034
		Methyl Chloride	0.0018
		Naphthalene	0.21
		p-isopropyltoluene	0.017
		sec-butylbenzene	0.03
		Toluene	0.027
		1,2,4-trimethylbenzene	1.4
		1,3,5-trimethylbenzene	0.31
		Xylenes	1.2
5/21/97	STMW-2	Acetone	6.1
		Benzene	3.3
		Chloroform	0.0038
		1,2-dichloroethane	0.0036
		2,2-dichloropropane	0.0061
		trans-1,3-dichloropropene	0.024
		Ethylbenzene	1.1
		2-hexanone	0.053
		Isopropylbenzene	0.012
		Methyl Chloride	0.0067
		N-butylbenzene	0.0056
		N-propylbenzene	0.014
		Naphthalene	0.034

TABLE 1 CONT'D
WATER SAMPLES ANALYTICAL RESULTS
ANALYZED FOR VOLATILE ORGANICS (8260)
IN MILLIGRAM PER LITER (mg/L)

Date	Sample Number	Parameter	Detection Limit
5/21/97	STMW-2	p-isopropyltoluene	0.0022
		sec-butylbenzene	0.2
		Toluene	4.2
		1,2,4-trimethylbenzene	1.1
		1,3,5-trimethylbenzene	0.28
		Xylenes	5.7
5/21/97	STMW-3	Acetone	10.0
		Benzene	9.2
		1,2-dichloroethane	0.0066
		trans-1,3-dichlorpropene	0.084
		Ethylbenzene	2.1
		2-hexanone	0.014
		Isopropylbenzene	0.038
		Methyl Chloride	0.078
		4-methyl-2-pentanone	0.0095
		N-butylbenzene	0.031
		N-propylbenzene	0.049
		Naphthalene	0.63
		p-isopropyltoluene	0.0068
		Tert-butylbenzene	0.23
		Toluene	14.0
		1,2,4-trimethylbenzene	0.86
		1,3,5-trimethylbenzene	0.55
		Xylenes	10.0
5/21/97	STMW-4	Benzene	0.37

TABLE 1 CONT'D
WATER SAMPLES ANALYTICAL RESULTS
ANALYZED FOR VOLATILE ORGANICS (8260)
IN MILLIGRAM PER LITER (mg/L)

Date	Sample Number	Parameter	Detection Limit
5/21/97	STMW-4	Toluene	0.028
		Xylenes	0.061
5/21/97	STMW-5	None Detected	
5/21/97	STMW-6	Acetone	11.0
		Benzene	3.6
		Chloroform	0.0075
		1,2-dichloroethane	0.0061
		Ethylbenzene	1.3
		2-hexanone	0.086
		Methyl Chloride	0.01
		Naphthalene	0.45
		p-isopropyltoluene	0.011
		sec-butylbenzene	0.3
		Toluene	5.8
		1,2,4-trimethylbenzene	1.6
		1,3,5-trimethylbenzene	0.42
		Xylenes	6.3
5/21/97	STMW-7	None Detected	
5/21/97	STMW-8	Acetone	7.3
		Benzene	2.3
		Chloroform	0.0064
		1,2-dichloroethane	0.0052
		2-hexanone	3.6
		Isopropylbenzene	0.012
		Methyl Chloride	0.0054

TABLE 1 CONT'D
WATER SAMPLES ANALYTICAL RESULTS
ANALYZED FOR VOLATILE ORGANICS (8260)
IN MILLIGRAM PER LITER (mg/L)

Date	Sample Number	Parameter	Detection Limit
5/21/97	STMW-8	Naphthalene	0.52
		p-isopropyltoluene	0.0095
		sec-butylbenzene	0.4
		Toluene	0.58
		1,2,4-trimethylbenzene	1.5
		1,3,5-trimethylbenzene	0.31
		Xylenes	2.8
5/21/97	STMW-10	Acetone	0.082
		Benzene	0.19
		Chloroform	0.0012
		Ethylbenzene	0.043
		Isopropylbenzene	0.0032
		Naphthalene	0.052
		Toluene	0.0037
		1,2,4-trimethylbenzene	0.04
		1,3,5-trimethylbenzene	0.011
		Xylenes	0.059
5/21/97	STMW-11	None Detected	

Argon Mobile Labs

3008 McKittrick Ct., Suite N • Ceres, CA 95307 • (209) 537-7836

SOIL TECH ENGINEERING, INC.
298 Brokaw Rd.
Santa Clara, CA 95050

Date Sampled: 07/13/93
Date Received: 07/14/93
Date Reported: 08/09/93

Project ID: 7-92-514-SA

Matrix: Soil

Organic Lead DOHS LUFT Analysis Report

Sample Number	Sample Description	Detection Limit	Results
		ppm	ppm
T307091	ST(1,2,3,4)	1.0	<1.0

QA/QC: 22% Matrix Spike Recovery (*)
21% Duplicate Spike Recovery (*)

ppm = mg/Kg
(*) = Matrix interference.

ARGON MOBILE LABS

Hiram Cueto
Lab Director

PROJ. NO.	NAME
1-92-514-5A	3609 E. 14 th. st. OAKLAND

SAMPLERS: (Signature)

NO.	DATE	TIME	SOIL	WATER	LOCATION	CONTAINER	TPH G/BTEX	Organic Lead (EX)	REMARKS
1	7/13/93	16[57]	✓		ST-1	1	✓	✓	T307091 COMP.
2	7/13/93	16[42]	✓		ST-2	1	✓	✓	COMP. ✱ Per Franky request on 8-02-93
3	7/13/93	16[42]	✓		ST-3	1	✓	✓	
4	7/13/93	16[20]	✓		ST-4	1	✓	✓	
5	7/13/93	16[52]	✓		ST-5	1	✓		
6	7/13/93	17[00]	✓		ST-6	1	✓		COMP. T307092
7	7/13/93	17[05]	✓		ST-7	1	✓		
8	7/13/93	17[10]	✓		ST-8	1	✓		
9	7/13/93	17[15]	✓		ST-9	1	✓		
10	7/13/93	17[21]	✓		ST-10	1	✓		COMP. T307093
11	7/13/93	17[29]	✓		ST-11	1	✓		
12	7/13/93	17[35]	✓		ST-12	1	✓		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	7/14/93 2:12	[signature]			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	

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